COLORADO WATER CONSERVATION BOARD
Finance Committee Agenda
1:25 pm – 4:30 pm
Thursday, September 17, 2015
Montrose, Colorado

10min **(Tab 1) Opening Comments**
Review Agenda
Fiscal Year 2014/15 Recap and 2015/16 Projections
Current Policy #13 - Funds Available for Non-Reimbursable Investments

45min **(Tab 2) Non-Reimbursable Project Investments**
CONSTRUCTION FUND
(1) Flood & Drought Response Fund – Refresh
(2) Litigation Fund Budget – Refresh
(3) Satellite Monitoring/Maintenance Program – Add Lysimeter
(4) Weather Modification Permitting Program
(5) Colorado Floodplain Map Modernization
(6) Water Forecasting Partnerships Project
(7) Colorado Mesonet
SEVERANCE TAX PERPETUAL BASE FUND
(8) Watershed Restoration Program
(9) Bear Creek Rehabilitation of Storage Study

15min **(Tab 3) Recommended Change to Target Growth Rate - Financial Policy #13**
Discussion of Funds History/Performance/Status
Target Growth Rate – Financial Policy 13 – Redlined Document
Funds Available for Non-Reimbursable Investments

5min **BREAK**

30min **(Tab 4) Project Funding Update and Discussion**
Rio Grande Cooperative Project
Chatfield Reallocation Project
Arkansas Valley Conduit Project

20min **(Tab 5) Possible Statute and Financial Policy Changes**
Treated Water Language
Using Severance Tax Perpetual Base Fund for Non-Reimbursable Investments

4:30 **Adjourn**

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street
Denver, CO 80203

P (303) 866-3441
F (303) 866-4474

John Hickenlooper, Governor

Mike King, DNR Executive Director

James Eklund, CWCB Director

TO: Colorado Water Conservation Board
Finance Committee Members

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

DATE: September 10, 2015

RE: 2015 Finance Committee

Please find enclosed the documents that will be utilized during the upcoming Finance Committee Meeting on Thursday, September 17, 2015, at the Holiday Inn Express & Suites Montrose. One of the primary purposes of the Finance Committee Meeting is to review CWCB's funds available for applications received for Non-reimbursable Project Investments (NRI) and make recommendations to the full Board.

The growth of the Construction Fund is guided by the Financial Policies of the CWCB. If projects are supported by the Committee they will be put on the November Board Meeting Agenda for approval. Upon approval by the full Board, the items will be included in the 2016 CWCB Projects Bill. The Project Manager or Section Chief will be present at the Committee Meeting to answer question regarding the NRI Projects.

In addition to the NRI projects review, the 2015 Finance Committee will discuss:
1) a recap of the 2014/15 Fiscal Year and projections into Fiscal Year 2016/17
2) recommended revisions to Financial Policy #13 – Target Fund Growth
4) an update of CWCB's participation in three large water projects
5) possible changes to the Statutes and Financial Policies related to funding

If you have any questions or have a topic you would like to have included in the agenda please call me at 303-866-3441, x3232.

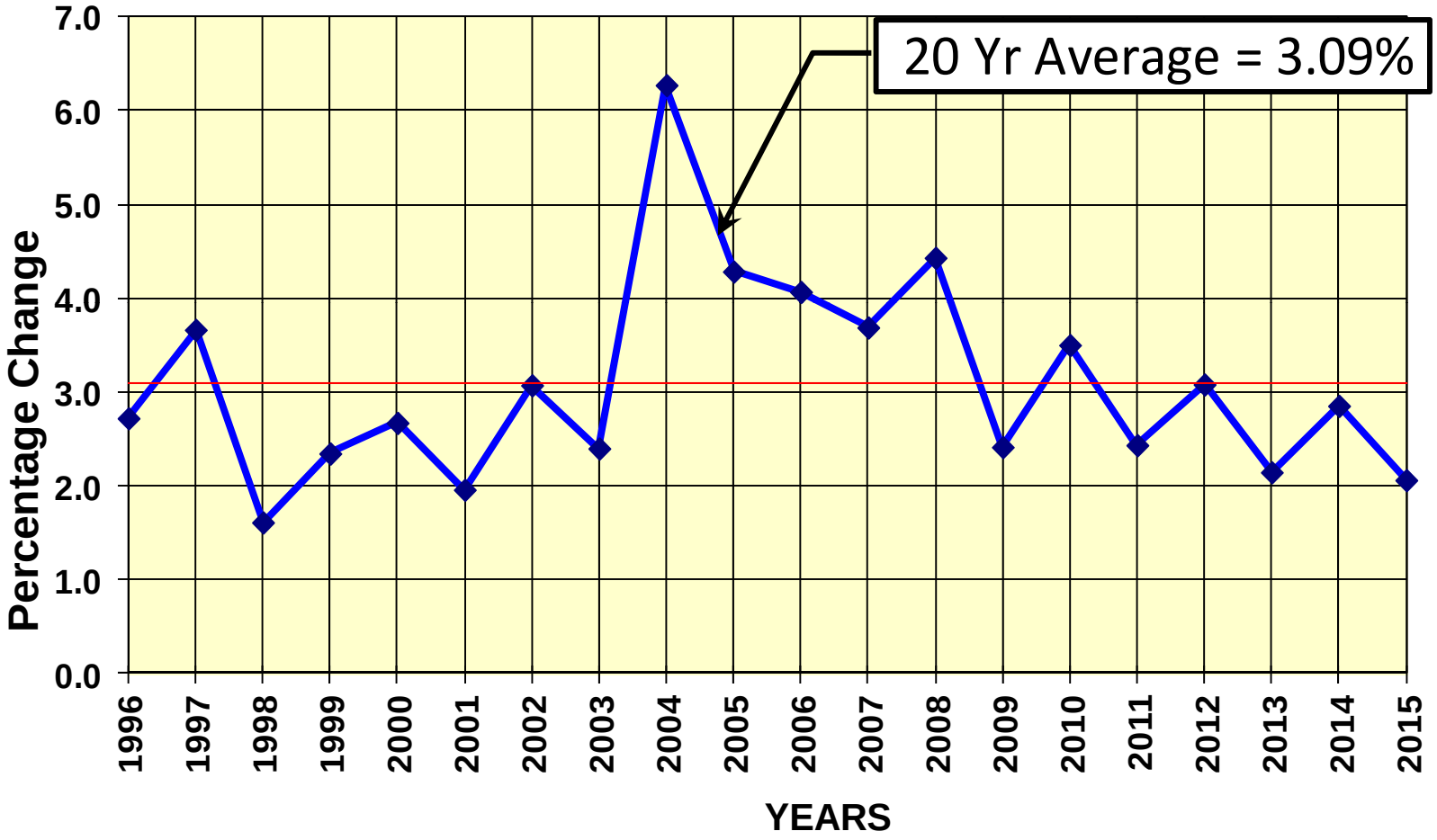
Colorado Water Conservation Board
September 2015, Finance Committee Mtg

Projections of Total Loan/Grant Funds Available Through FY16/17 for Budgeting Discussion

		Constructon Fund		Severance Tax PBF	
FY 14/15		($Millions)		($Millions)	
7/1/14		*ACTUALS*		*ACTUALS*	
	+	*$ 1.0*	*Unreserved 7/1/14*	+ *$ -*	*Unreserved 7/1/14*
	+	*$ 30.0*	*General Fund Surplus Received*		
	+	*$ 14.4*	*Federal Mineral Lease Received*	+ *$ 58.7*	*ST Received FY14/15*
	+	*$ 24.5*	*Loan Prin/Int/Treas/Reversals*	+ *$ 29.0*	*Loan Prin/Int/Treas/Reversals*
		$ 69.9		*$ 87.7*	
	-	*$ 6.5*	*Approved CF Loans*	- *$ 18.3*	*Approved ST Loan*
	-	*$ 13.0*	*14/15 Operations & 15/16 NRI/Programs*	- *$ 19.6*	*FY 15/16 Proj Bill Obligations*
		$ 19.5		*$ 37.9*	
		$ 50.4	*Estimated Unreserved Balance on 7/1/15*	*$ 49.8*	*Estimated Unreserved Balance on 7/1/15*
				$ 100.2	*Total Unreserved balance on 7/1/15*
FY 15/16					
		Constructon Fund		**Severance Tax PBF**	
7/1/15		($Millions)		($Millions)	
	+	$ 50.0	Unreserved 7/1/15	+ $ 50.0	Unreserved 7/1/15
	+	$ 13.5	Federal Mineral Lease	+ $ 30.0	ST Projections FY15/16
	+	$ 20.0	Loan Prin/Int/Treas/Reversals	+ $ 20.0	Loan Prin/Int/Treas/Reversals
		$ 83.5		$ 100.0	
	-	$ 60.0	Projected New CF Loans	- $ 60.0	Projected New ST Loan
				- $ 29.0	Chatfield transfer SB13-181
	-	$ 12.0	15/16 Operations & 16/17 NRI/Programs	- $ 5.0	FY 16/17 Proj Bill Obligations
		$ 72.0		$ 94.0	
		$ 11.5	Estimated Unreserved Balance on 7/1/16	$ 6.0	Estimated Unreserved Balance on 7/1/16
FY 16/17				$ 17.5	Total Unreserved balance on 7/1/16
7/1/16		**Constructon Fund**		**Severance Tax PBF**	
	+	$ 11.5	Unreserved 7/1/16	+ $ 6.0	Unreserved 7/1/16
	+	$ 16.0	Federal Mineral Lease	+ $ 45.0	ST Projections FY16/17
	+	$ 20.0	Loan Prin/Int/Treas/Reversals	+ $ 20.0	Loan Prin/Int/Treas/Reversals
		$ 47.5		$ 71.0	
	-	$ 20.0	Projected New CF Loans	- $ 60.0	Projected New ST Loan
	-	$ 14.0	16/17 Operations & 17/18 NRI/Programs	- $ 5.0	Total FY 16/17 Proj Bill Obligations
		$ 34.0		$ 65.0	
		$ 13.5	Estimated Unreserved Balance on 7/1/17	$ 6.0	Estimated Unreserved Balance on 7/1/17
				$ 19.5	Total Unreserved balance on 7/1/17

September 11, 2015
Kirk Russell, Chief
Finance Section

ENR Construction Cost Index
for 20 cities, 1996-2015



Per Policy 13: Target Growth Rate = 0.5% + CCI Index (3.09%) = 3.59%

POLICY NUMBER: 13

SUBJECT: **TARGET GROWTH RATE FOR THE COMBINED EQUITY OF THE CONSTRUCTION FUND AND SEVERANCE TAX TRUST FUND PERPETUAL BASE ACCOUNT**

EFFECTIVE DATE: October 1, 2000

POLICY: The Colorado Water Conservation Board (CWCB) will attempt to maintain an overall growth rate for the combined equity of the Construction Fund and Severance Tax Trust Fund Perpetual Base Account (STTFPBA) of no less than the long-term rate of inflation, as established by appropriate construction cost indices, plus 0.5%.

PURPOSE: To offset the impacts of cost inflation, to maintain the financial integrity of the CWCB Construction Fund and STTFPBA and to provide a process for estimating the financial resources available for non-reimbursable investments from the Construction Fund in any given year.

APPLICABILITY: This policy and procedure apply to the CWCB Construction Fund and STTFPBA.

PROCEDURE: The overall growth rate for the combined fund equity of the Construction Fund and STTFPBA will be presented as part of the Comprehensive Annual Financial Report by CWCB staff at the September Board meeting each year. Staff will present an annual estimate of funds available for grants relative to various rates of growth in combined fund equity including the target growth rate. At the same Board meeting each year, staff will present a summary of long-term construction cost indices with any recommendations for revisions to the target growth rate in combined fund equity.

Approved by the CWCB
September 25, 2000 Board Meeting
Agenda Item # 13d

Colorado Water Conservation Board
September 17, 2015, Finance Committee

Current Policy #13

Construction Fund Analysis for FY16/17 NonReimbursables

		Projected Gains	
Projected Equity Gained			
Interest Earnings - Treasury		$ 1,900,000	
Interest Earnings - Loans		$ 8,400,000	
Federal Mineral Lease Income		$ 13,500,000	
	Total	**$ 23,800,000**	
Construction Fund Target Growth @ **3.6%**	$405,000,000 x 3.6% =	**$ 14,580,000**	
Available for Operations and Non-Reimbursable Project Investments =			**$ 9,220,000**
Projected Equity Reduction to the Construction Fund			
CWCB Operations			$ 7,800,000

Statute Refresh

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		**$ 9,600,000**
Available for 2016 Projects Bill - Non-Reimbursable Project Investments =		**$ (380,000)**

Non-Reimbursable Investment Applications

For Consideration by Board with Exemption from Policy #13			**Benefit**	**Requested Amount**		**Staff Recommends**
(1)	CWCB - Kevin Houck	Flood & Drought Response Fund - Refreshed	Statewide	$ 500,000	Up To $500K	$ 500,000
(2)	CWCB - Ted Kowalski	Litigation Fund - Refresh to $2M	Statewide	$ 600,000	($200K in 2015)	$ 600,000
(3)	DWR - Matt Hardesty/Jeff Baessler	Satellite Monitoring System Maintenance + Lysimeter	Statewide	$ 380,000	($330K in 2015)	$ 380,000
(4)	CWCB - Joe Busto	Weather Modification Permitting	Statewide	$ 175,000	($175K in 2015)	$ 175,000
(5)	CWCB - Thuy Patton	Colorado Floodplain Map Modernization	Statewide	$ 500,000	(Up To $500K)	$ 500,000
(6)	CWCB - Joe Busto	Water Forecasting Partnerships Project	Statewide	$ 300,000	New	$ 300,000
(7)	CWCB - Taryn Finnessey	Colorado Mesonet Project	Statewide	$ 150,000	($150K in 2015)	$ 150,000
(8)	CWCB - Chris Sturm	Colorado Watershed Restoration Program	Statewide	$ 1,500,000	($1.5M in 2015)	$ 1,500,000
(9)	CWCB - Ted Kowalski	Bear Creek Reallocation of Storage Study	So. Platte	$ 2,500,000	New	$ 2,500,000
						$ 6,605,000
				Total Recommended Projects Bill Items =		**$ 6,605,000**

Footnotes:

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

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

To: Finance Committee Meeting

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

Date: September 17, 2015

Subject: Non-Reimbursable Investments

CWCB staff will be available to answer questions on all of these recommendations for approval below; however, in order to best utilize the Committee's time only five of the following NRI applications will be presented. They are identified in **Bold** font.

CONSTRUCTION FUND

(1) Flood & Drought Response Fund – Refresh
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SEVERANCE TAX PERPETUAL BASE FUND

(8) Watershed Restoration Program
(9) Bear Creek Rehabilitation of Storage Study

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

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To: Finance Committee
Colorado Water Conservation Board

From: Kevin Houck, P.E., Chief, Watershed Protection and Flood Mitigation Section
Taryn Finnessey, Climate Risk Management Specialist, Water Supply Planning Section

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Flood and Drought Response Fund – Fund Refresh

Introduction

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. In FY 2013 the scope of the fund was expanded to include drought response activities, which continue to be included. The original expansion of the scope did not include any increase in funds; however in fiscal year 2014 the fund was increased to $500,000 to reflect activities associated with Drought Response and to address the increasing threat of wildfires and post-wildfire activities. The Flood and Drought Response Fund (Fund) exists to give the CWCB an ability to quickly respond to events and have program funds in the areas of: 1) flood & drought documentation, 2) flood & drought forecasting and outlooks, 3) post-event floodplain mapping, 4) aerial photography, and 5) flood & drought mitigation.

The current request is to refresh the account up to $500,000 for FY 2016/17 for flood and drought response purposes, including post-wildfire activities. 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 year, as was the case in 2013. In those situations, the Fund could be stressed by needs from the two extreme conditions, and Staff will prioritize expenditures.

Staff Recommendation

The Committee recommends the Board request the General Assembly to authorize from the Construction Fund up to $500,000 to the Flood and Drought Response Fund to refresh the unencumbered balance up to $500,000 for technical activities related to flood and drought response.

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Colorado Flood & Drought Response Fund

Colorado Water Conservation Board

September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	$500,000 annually
NRI Funding Request:	$500,000
Funding Source:	*Construction Fund*
Project Type:	Program Funds
Type of Grantee:	State Government

LOCATION	
Benefits:	Statewide
Water Source:	N/A
Drainage Basin:	All Basins

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Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

2

To: Finance Committee
Colorado Water Conservation Board

From: Ted Kowalski, Chief, Interstate, Federal, and Water Information Section

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Litigation Fund Budget- Fund Refresh

Introduction
Section 37-60-121(2.5) provides that the Colorado Water Conservation Board is authorized "to expend, pursuant to continuous appropriation and subject to the requirements of paragraph (b) of this subsection (2.5), a total sum not to exceed the balance of the litigation fund, which is created, for the purpose of engaging in litigation…to defend and protect Colorado's allocations of water in interstate streams and rivers…" Paragraph (b) of section 121(2.5) provides: "pursuant to the spending authority set forth in paragraph (a) of this subsection (2.5), moneys may be expended from the litigation fund at the discretion of the board if (I) with respect to litigation, the Colorado Attorney General requests that the Board authorize the expenditure of moneys in a specified amount not to exceed the balance of the fund for the costs of litigation associated with one or more specifically identified lawsuits meeting the criteria set forth in paragraph (a) of this subsection (2.5)."

The current request is to refresh the account up to $2,000,000 for FY 2016/17. Increased activity on the interstate streams, especially the Rio Grande, the Republican, and the Colorado Rivers, has brought down the balance of the litigation fund since last year. With many ongoing processes and controversies ahead, the IFWI section and Office of the Attorney General requested in May 2015 that $600,000 in expenses in FY 2015/16 are needed therefore a request for $600,000 is needed to refresh the fund up to the $2 million. This will allow staff and the Attorneys General to prepare and participate in these ongoing important matters.

Staff Recommendation
The Committee recommends that the Board request the General Assembly to authorize $600,000 from the Construction Fund in order to restore the Litigation Fund balance to allow the Attorneys General Office to prepare and participate in ongoing legal matters on behalf of the Colorado Water conservation Board.

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Colorado Water Conservation Board
Department of Natural Resources

Litigation Fund

Colorado Water Conservation Board

September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	Approx. $600,000 annually
NRI Funding Request:	up to $2,000,000
Funding Source:	*Construction Fund*
Project Type:	Program Funds
Type of Grantee:	State Government

LOCATION	
Benefits:	Statewide
Water Source:	N/A
Drainage Basin:	All Basins

Section 37-60-121(2.5) provides that the Colorado Water Conservation Board is authorized "to expend, pursuant to continuous appropriation and subject to the requirements of paragraph (b) of this subsection (2.5), a total sum not to exceed the balance of the litigation fund, which is created, for the purpose of engaging in litigation…to defend and protect Colorado's allocations of water in interstate streams and rivers…" Paragraph (b) of section 121(2.5) provides: "pursuant to the spending authority set forth in paragraph (a) of this subsection (2.5), moneys may be expended from the litigation fund at the discretion of the board if (I) with respect to litigation, the Colorado Attorney General requests that the Board authorize the expenditure of moneys in a specified amount not to exceed the balance of the fund for the costs of litigation associated with one or more specifically identified lawsuits meeting the criteria set forth in paragraph (a) of this subsection (2.5)."

The current request is to refresh the account up to $2 million for FY 2016/17. Increased activity on the interstate streams, especially the Rio Grande, the Republican, and the Colorado Rivers, has brought down the balance of the litigation fund since last year. With many ongoing processes and controversies ahead, the IFWI section and Office of the Attorney General request that the fund be refreshed up to the cap of $2 million to allow staff and the Attorneys General to prepare and participate in these ongoing important matters.

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Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 721
Denver, CO 80203

TO: Colorado Water Conservation Board Members

FROM: Ted Kowalski
Meg Dickey-Griffith

DATE: May 21, 2015

SUBJECT: Agenda Item 22b, Interestate, Federal & Water Information Section Litigation Account, Requests for Authorization

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Background
Section 37-60-121(2.5) of the Colorado Revised Statutes provides that the Colorado Water Conservation Board is authorized "to expend, pursuant to continuous appropriation and subject to the requirements of paragraph (b) of this subsection (2.5), a total sum not to exceed the balance of the litigation fund, which is created for the purpose of engaging in litigation . . . to defend and protect Colorado's allocations of water in interstate streams and waters; and to ensure the maximum beneficial use of water for present and future generations by addressing important questions of federal law . . ." The CWCB has received a letter from Attorney General Suthers, attached, regarding the use of the litigation fund.

The Attorney General requests a total of $1,000,534 of new authorizations to adequately defend, in negotiations, litigation, and other processes the State's apportionments under the Compacts for FY16. The requested expenditures will be used for the interstate litigation activities associated with the Republican River litigation, the Rio Grande litigation, the Arkansas River litigation, and the Defense of the Colorado River work. Further information is included in the Attorney General's letter, attached.

The tasks outlined above are essential to allowing the Office of the Attorney General, State Engineer, and CWCB to prepare for and participate in ongoing and future negotiations and litigation with the goal to defend Colorado's rights, as provided by the compacts. This request also provides that the CWCB Director, in consultation with the State Engineer, and the staff of the Department of Law, "allocate these funds between the activities based on actual costs and litigation necessities."

Staff Recommendation
The Staff recommends that the Board:

1) Authorize expenditure of $55,034 for FY 16 for the Arkansas River Basin,
2) Authorize expenditures of $500,000 for FY 16 for Colorado River Basin,
3) Authorize expenditure of $85,000 for FY16 for litigation work related to the Republican River litigation.
4) Authorize $310,500 for FY 16 for litigation work related to the Rio Grande River and $50,000 related to the potential suit from WildEarth Guardians,
5) Direct the CWCB Director and Staff to expend these funds consistent with the request by the Office of the Attorney General, and;
6) Direct the CWCB Director, CWCB Staff, and Office of the Attorney General to comply with the annual reporting requirements as specifically provided for in Section 37-60-121(2.5).

Attachment.

CYNTHIA H. COFFMAN
Attorney General

DAVID C. BLAKE
Chief Deputy Attorney General

MELANIE J. SNYDER
Chief of Staff

FREDERICK R. YARGER
Solicitor General

STATE OF COLORADO
DEPARTMENT OF LAW

RALPH L. CARR
COLORADO JUDICIAL CENTER
1300 Broadway, 10th Floor
Denver, Colorado 80203
Phone (720) 508-6000

Office of the Attorney General

May 6, 2015

Request for Expenditure from Litigation Fund for FY16
for Federal and Interstate Water Unit Legal Expenses

Dear Board Members:

Section 37-60-121(2.5)(a)(III), C.R.S., authorizes the Colorado Water Conservation Board (CWCB) to expend money from its Litigation Fund, at the request of the Attorney General, for the costs to defend and protect Colorado's allocations of water in interstate streams and rivers. Pursuant to that authorization, I request you to approve the expenditure of specific funds from your Litigation Fund for Fiscal Year 16 (FY16) to continue our efforts to effectively protect Colorado's interests in the Arkansas, Colorado, Republican and Rio Grande River Basins. I believe these expenditures, as itemized below, are necessary to participate fully in all processes, including negotiation and litigation, where Colorado's interests in these interstate rivers could be affected.

Previous years' funding requests for work to defend and protect Colorado's interests in these river basins were based on our then-current "best estimates" of the work required in the upcoming year. Because such work is heavily dependent on court decisions and case and project management practices beyond the control of the attorneys, it is difficult to accurately project the timing of litigation related costs for the entire year. As a result, certain funds authorized for expenditure in a basin in a given year are not always fully expended by the close of that year. This is the case for the Arkansas, Colorado, Republican, and Rio Grande River Basins this year as it is anticipated that the funds you authorized for Fiscal Year 15 (FY15) will not be fully expended by June 30, 2016.

For accounting clarity we zero out the remaining FY15 authorizations and make new requests for each basin for the funds needed in FY16. Below is a discrete funding authorization request for each basin for FY16. Attached to this letter is a summary table of the basins which reflects the FY15 authorization, actual expenditures through March 31, 2015, *estimated* expenditures through June 30, 2015, and the funding request for FY16. As the table shows, the authorizations this letter seeks for FY16 do not exceed the unexpended funds authorized in FY15 for either the Arkansas or Republican River Basins. Moreover, the funding requests for the Rio Grande and Colorado River Basins are partially offset by the unexpended funds authorized for those basins in FY15.

Request for approval of expenditure for the Arkansas River Basin.
In 2014, the Board approved a request for expenditure of $90,000 from the Litigation Fund for Fiscal Year 15 to protect Colorado's surface water irrigation uses under the Arkansas River Compact. Specifically, the funds were directed to provide legal and technical assistance for Rule 10 Plans under the State Engineer's Compact Rules Governing Improvements to Surface Water Irrigation Systems in the Arkansas River Basin in Colorado. Although hydrology and legal disputes over operation of the Rule 10 plans delayed this work, it is now under contract and in the process of being implemented. I request the Board authorize the expenditure for this basin of $55,034.00 for FY 16 to complete this work.

Request for approval of expenditure for the Colorado River Basin.
The Colorado River remains the only river basin originating in Colorado that is not over appropriated in some parts of the basin. Colorado continues to be embroiled in basin planning investigations, processes under the National Environmental Policy Act and Endangered Species Act, 7-State and federal negotiations for coordinated reservoir operations, international discussions, and litigation to defend and protect its allocations of water in the Colorado River system. Such investigations, negotiations, processes and litigation have been and remain critical to allowing Colorado to achieve the optimum use of this resource for present and future generations and to minimize costly litigation. These ongoing activities require sound legal analysis and detailed technical knowledge to inform decision making.

In May 2014, the Board approved $300,000 for legal staff from the Department of Law ("DOL") and $200,000 for expert consulting work to coordinate ongoing efforts on the Environmental Impact Statement for 20 year reoperation of Glen Canyon Dam, and to inform ongoing legal positions regarding compact administration and interstate negotiations. Actual expenditures for DOL legal staff are estimated to be approximately $315,000 and operating costs and contract expenditures are estimated at to be closer to $115,000. For FY15, I estimate the need to expend $325,000 for DOL legal staff and $175,000 for operating costs, expert consulting/modeling work, and the State's portion of mediation costs in the Animas-La Plata proceedings. I request the Board authorize the expenditure for this basin of $510,000 for FY16.

Request for approval of expenditure for the Republican River Basin.
In May 2014, the Board approved requests for expenditure of $145,000 from the Litigation Fund to "continue to defend Colorado's use and allocation of water under the Republican River Compact." These funds paid for outside consultant fees, briefing costs, negotiation meetings, travel and other expenses related to preparing for and participating in U.S. Supreme Court arguments, compact meetings, and ongoing settlement negotiations with Kansas and Nebraska regarding future operation of, among other things, the Colorado Compliance Pipeline as well as administration of the South Fork consistent with the Compact.
For FY16, continued case work and work of expert consultants in negotiations with Nebraska and Kansas will be necessary. Moreover, funds for additional travel expenses over and above that contemplated for ongoing interstate discussions may

also be necessary in FY16 depending on whether the *Hutton Trust Foundation v. Wolfe, et. al, 15CW3018* proves to implicate the State's interests in management and administration of the Republican River Basin. To pay for these efforts, I request the Board authorize the expenditure for this basin of $85,000 for FY 16.

Request for approval of expenditure for the Rio Grande Basin.
In May 2014, the Board approved a request for expenditure of $140,000 for retaining expert consultants, funding a percentage of any Special Master fees, and providing for travel and operating expenses associated with Rio Grande litigation among Texas, New Mexico, Colorado and the United States. Although progress on this original action was delayed while the Court appointed a Special Master, work on the case is expected to increase now that oral arguments on pending motions have been scheduled and litigation preparation is starting to get in full swing. For the upcoming year, I anticipate the need for travel/operating costs to prepare briefs and attend arguments before the Special Master, provide a portion of the funding for the Special Master expenses, and participate in any settlement negotiations among the parties. Moreover, to be prepared, Colorado has entered into contracts with certain expert consultants and anticipates more in the upcoming year to retain expertise in groundwater, hydrogeology, Rio Grande administration, and agricultural engineering. I estimate these costs to total $310,500 for FY 16.

The Board also authorized expenditure of $50,000 to defend the State and its officials against potential suit from WildEarth Guardians. Despite filing a notice of intent, WEG did not file suit against the Executive Director of the Department of Natural Resources or the State Engineer for allegedly violating the Endangered Species Act in their administration of the Rio Grande Basin. Therefore, I do not anticipate the need to authorize expenditure of funds for this matter at this time.

The efforts highlighted above are essential to support my office, the CWCB, the Department of Natural Resources, and Colorado's Compact Commissioners in ongoing negotiations, investigations and litigation to protect Colorado's rights to and interests in interstate streams and rivers. I, therefore, request and recommend that CWCB authorize the above-identified expenditures for FY16.

I further recommend that the CWCB's authorizations allow the funds to be used in FY17 if not expended in FY16, and allow the Board Director, in consultation with the State Engineer and my staff, to allocate funds between these activities based on actual costs and litigation necessities.

Thank you for your consideration.

Sincerely,

Cynthia H. Coffman

CYNTHIA H. COFFMAN
Colorado Attorney General

Federal and Interstate Water Unit
Litigation Fund Expendtitures
Current and Projected (FY15 & FY16)

Project by Basin	Authorization FY14	Expenses Incurred Through 04/15	Estimated Expenses 04/15-06/15	Available Funds End FY15	Funding Needs FY165	Difference
Arkansas River						
Contracting	$15,000.00			$15,000.00		
Irr Imp Plan Work	$75,000.00	$13,466.00	$6,500.00	$55,034.00	$55,034.00	
Arkansas River Total	*$90,000.00*	*$13,466.00*	*$6,500.00*	*$70,034.00*	*$55,034.00*	*$15,000.00*
Colorado River						
Personnel	$300,000.00	$242,584.54	$68,050.00	-$10,634.54	$325,000.00	
Operating	$5,000.00	$3,179.43	$1,060.00	$760.57	$5,000.00	
Travel	$20,000.00	$10,907.34	$5,000.00	$4,092.66	$20,000.00	
Contracting	$175,000.00	$48,047.83	$59,500.00	$67,452.17	$160,000.00	
Colorado River Total	*$500,000.00*	*$304,719.14*	*$133,610.00*	*$61,670.86*	*$510,000.00*	*-$448,329.14*
Republican River						
Operating	$15,000.00	$526.78	$175.59	$14,297.63	$2,000.00	
Travel	$10,000.00	$3,881.50	$1,000.00	$5,118.50	$8,000.00	
Contracting	$120,000.00	$30,260.29	$24,739.71	$65,000.00	$75,000.00	
Republican River Total	*$145,000.00*	*$34,668.57*	*$25,915.30*	*$84,416.13*	*$85,000.00*	*-$583.87*
Rio Grande						
TX v. NM and CO						
Contracting	$70,000.00	$0.00	$10,000	$60,000.00	$265,500.00	
Operating	$8,000.00	$0.00	$0	$8,000.00	$5,000.00	
Travel	$12,000.00	$0.00	$0	$12,000.00	$10,000.00	
Special Master	$50,000.00	$0.00	$0	$50,000.00	$30,000.00	
WildEarth Guardians	$50,000.00	$0.00	$0	$50,000.00		
Rio Grande Total	*$190,000.00*	*$0.00*	*$10,000.00*	*$180,000.00*	*$310,500.00*	*-$130,500.00*
TOTALS				***$396,120.99***	***$960,534.00***	***$564,413.01***

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Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

3

To: Finance Committee
Colorado Water Conservation Board

From: Jeff Baessler, Deputy Section Chief, Stream and Lake Protection Section

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Satellite-linked Monitoring System and Stream Gage Refurbishment Program

Introduction
The Division of Water Resources (DWR) has requested an appropriation of $380,000 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
The Committee recommends the Board request the General Assembly to authorize $380,000 from the Construction Fund to the Department of Natural Resources for allocation to the Division of Water Resources (DWR) to replace out-dated Data Collection Platforms and associated satellite telemetry equipment in the existing satellite monitoring system, and to refurbish existing stream gages.

Discussion
The $380,000 request for FY 2016-2017 will support the continued, long-term operational viability of 520 satellite-linked water resources monitoring sites. These funds will be allocated as follows:

$275,000 for replacement of out-dated Data Collection Platforms (DCP) and associated satellite telemetry equipment and upgrading of satellite transmission components. The rate of replacement of DCPs is based on a life expectancy from normal wear, tear and software life cycle issues of 10 years. Replacement of out of date DCPs may also be required to accommodate technology upgrades and changes which are mandated by NOAA, the Federal Agency managing the GOES satellite resource.

$55,000 for refurbishing existing stream gages as needed to maintain operational reliability of stream flow data collection infrastructure and equipment. This is a recurring annual request to cover refurbishment and repair costs which arise due to deterioration of the physical stream gage infrastructure. In addition, these funds will be uses as necessary to purchase measurement equipment that can minimize or eliminate the need for future capital improvements such as personnel cableways.

The requested funding amount of $380,000 is increased from last year's request to provide annual maintenance support for the Lysimeter in the Arkansas River Basin. The attached memo from Matthew Hardesty dated July 24, 2015 provides more in depth information regarding this request.

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Department of Natural Resources

Satellite-linked Monitoring System and Stream Gage Refurbishment Program

Colorado Water Conservation Board

September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	$380,000
NRI Funding Request:	$380,000
Funding Source:	*Construction Fund*
Project Type:	DWR Streamgaging
Type of Grantee:	State Agency

LOCATION	
Benefits:	Statewide
Water Source:	Various
Drainage Basin:	All Basins

This project entails the continued, long-term operational viability of the State Satellite Linked Monitoring System and Stream Gage Refurbishment Program, which is administered by the Division of Water Resources (DWR). This program currently encompasses 520 satellite stream gaging stations which require continued replacement of outdated data collection platforms, upgrades to transmission components, and refurbishment of the associated infrastructure. In addition, many existing gaging stations need to be modified to provide critical stream flow data for both flood and low flow monitoring. Changes in technology, which will ultimately increase reliability and real time data transmission rates, will require the DWR to continue to upgrade the system in the future. The costs associated with the continued refurbishment and operational viability of the system is currently approximately $380,000 per year.

North Fork Gunnison River – New Radar Sensor Installation (Note these installations are more cost efficient as they require significantly less infrastructure than a typical stilling well and shelter)

Purgatoire River @ Fishers Crossing
DWR/CWCB Compact Gage

MEMORANDUM

To: James Eklund**,** Director, Colorado Water Conservation Board

From: Matthew Hardesty, Chief of Hydrography

Cc: Jeff Baessler, CWCB
Scott Cuthbertson, DWR

Date: July 24, 2015

RE: Division of Water Resources Satellite-linked Monitoring System and Stream Gage Refurbishment Funding Request for FY2016-17

Summary

The Colorado Division of Water Resources (DWR) requests a total of **$330,000** from the CWCB Construction Fund for FY2016-17. 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 $275,000 will be used to replace out-dated Data Collection Platforms (DCP) and associated satellite telemetry equipment and upgrading satellite transmission components. The rate of replacement of DCPs is based on a life expectancy from normal wear, tear and software life cycle issues of 10 years.
2. The remainder of $55,000 will maintain operational reliability of stream flow data collection infrastructure and equipment. This is a recurring annual request to cover refurbishment and repair costs which arise due to deterioration of the physical stream gage infrastructure. In addition to refurbishing existing stream gages as requested in the past, we also intend to use this money, if necessary, to purchase measurement equipment that can minimize or eliminate the need for future capital improvements such as personnel cableways.

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 electronic equipment in satellite-linked data collection stations;
- refurbish deteriorating gage station infrastructure and non-electronic station hardware;
- refurbish/replace cableways used for high flow measurements or implement alternate means of high flow measurement (for calibration of the upper end of stage-discharge relationships);
- rebuild gage sections damaged by high flows;
- flood harden, when possible, critical gages; and,
- continue, as necessary, the operation of vital gages operated by the United States Geological Survey (USGS) when that program can no longer provide the required support.

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.

FY2016-17 Funding Request

Satellite Telemetry Equipment. DWR requests $275,000 to replace out-dated DCPs and upgrade associated satellite telemetry equipment. This is the same amount as requested for FY2015-2016 represents the basic funding required to replace equipment as it wears out or becomes out-dated.

In order to maintain the system, 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 satellite 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). Using a mean of $4500 and life expectancy of 10 years, the total annual projected equipment cost to simply maintain operable equipment is approximately $216,000. The life of antennas, batteries, solar panels, wiring, and grounding equipment varies considerably. Based on the last several years, we project an average annual expense of this equipment is approximately $24,000. Travel (vehicle mileage, per diem, etc.) and overtime support to perform this work around the State is projected at $35,000. Total annual current cost is, therefore, approximately $275,000.

Existing Stream Gages. DWR requests $55,000 for refurbishing existing stream gages. The request in this category of funding is level and the same as the past several years. 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 accurate data.

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 every 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 addressing some of these needs.

As an alternative to cableway refurbishment, DWR has been increasing the number of Acoustic Current Doppler Profilers (ADCP) used to make discharge without the operator being required to enter the water. These electronic measurement devices are mounted to a small, plastic tri-maran boat that can be moved across the stream by means of a rope tether to make a discharge measurement with much more accuracy than the traditional weight and meter system utilized by cableways. The use of the ADCP lends itself to use of existing infrastructure, namely bridges, to provide measurement locations that span the stream. In

addition to minimizing or even eliminating the need for expensive cableway infrastructure, the flexibility that these devices afford in choosing a measurement location has the potential to significantly improve the quality of measurement data collected. Finally, use of existing infrastructure such as bridges minimizes the safety and liability risks associated with large cableway structures spanning rivers and streams. As a result, instead of spending money to refurbish a cableway, we will likely pursue the more effective solution of purchasing ADCP's that have the potential to offset the need for cableway infrastructure and replace ADCP's currently in use as they reach they're life expectancy.

FY2014-15 Accomplishments

The CWCB provided $330,000 in FY2014-15 for satellite telemetry equipment upgrade/replacement and stream gage refurbishment. An additional $9,068.34 in CWCB carryover funds was available from the previous fiscal year. As discussed in our FY2013-2014 Summary from last year, we also received $43,143 of Flood Recovery reimbursement from Risk Management resulting in a total FY2014-15 project budget of $382,211.34 As stated previously, since CWCB construction funds were utilized to complete necessary construction projects in the immediate aftermath of the 2013 Flood, we will continue to track receipt of Risk Management funds in this account and expect to reduce our annual projects request when those funds are available without the additional need for flood recovery construction. With the inclusion of the $43,143 Risk Management funds discussed above, an amount of $50,346.42 will be carried over to FY2015-2016. In total, DWR expended and committed a total of $331,864.92 or 86.8% of project funding.

Satellite Telemetry Upgrade Program. Of the $275,000 allocated, $287,816.30 was expended on the procurement and installation of new generation, high data rate, satellite-linked monitoring equipment and associated components. High data rate DCP upgrades have now been completed at all DWR gage stations. However, as discussed earlier, the normal wear, tear and software life cycle anticipates replacing all equipment every ten years, regardless of other system changes.

Streamgage Refurbishment. An allocation of $55,000 along with carryover funds from the previous fiscal year in the amount of $9,068.34 and Risk Management funds of $43,143 resulted in a total available budget of $107,211.34 for refurbishment of existing stream gages throughout the State. Refurbishment projects and miscellaneous expenditures totaling $44,048.57 (See Table 1) were completed at the stream gages listed in Table 1. It should be noted, however, that approximately $43,000 of this amount was scheduled for a reconstruction project (Big Thompson at the Mouth Near LaSalle) this spring that had to be postponed due to the onset of extended moisture this spring. We expect that construction to take place this summer.

Table 1 - FY2014-15 Gage Projects

Div. I	Project	Total
	2013 Flood Recovery (BIGLASCO re-construction)**	$1,598.98
	Big Dry Creek Near Fort Lupton gage relocation	$13,386.00
	Gage Maintenance (Bear Creek at Morrison)	$2,886.70
	Radar	$10.54
Div. II		
	Radar sensors at 7 locations	$1,263.02
	Arkansas River at Catlin Dam cableway improvements	$758.36
Div. III		
	Gage Maintenance (including North Channel Conejos radar installation)	$1,098.66
Div. IV		
	Radar Sensors	$293.95
	Uncompaghre River Near Olathe bank operated cableway	$5,637.53
Div. V		
	Orchard Mesa gage relocation	$177.19
	West Divide Creek Cantilever Gage Installation	$3,145.39
Div. VI		
	Michigan River at Walden new stilling well and shelter installation	$479.69
Div. VII		
	Gauge Maintenance	$362.22
	Basin Creek at Mouth gage installation	$57.66
	Long Hollow above Long Hollow Reservoir gage installation	$48.51
	Government Draw above Long Hollow Reservoir gage installation	$97.40
	Pine River below Vallecito - manned cableway equipment	$9,999.99
	La Plata River below Long Hollow Reservoir gage installation	$245.40
Miscellaneous		
	Radar Projects	$2,501.43
	Misc. gage maintenance	
	Projects Total	**$44,048.62**

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To: Finance Committee
Colorado Water Conservation Board

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

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Weather Modification Permitting Program - Water User Cost Share Assistance

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

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

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

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

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

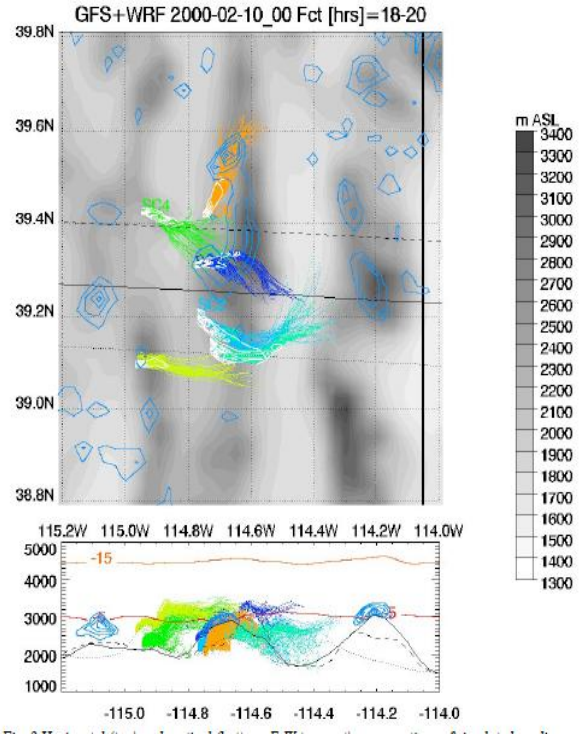
LOCATION	
Benefits:	Statewide
Water Source:	Various
Drainage Basin:	Colorado, Gunnison,& SW

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

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

Typically each year about $1M is spent on cloud seeding with $175,000 or 18% from the CWCB and $175,000 or 17% from the Lower Basin and New Mexico. The work of CWCB providing grant and technical assistance and equipment upgrades is a part of the augmentation goals of the Colorado River Seven Basin states and has been ongoing since 2007.

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



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

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To: Finance Committee
Colorado Water Conservation Board

From: Thuy Patton, Floodplain Mapping Coordinator,
Watershed Protection and Flood Mitigation Section

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Colorado Floodplain Map Modernization Program

Introduction & 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 $11.2 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 Recommendation

The Committee recommends the Board request the General Assembly to appropriate to the Department of Natural Resources for allocation to the Colorado Water Conservation Board, the sum of $500,000 or so much as may be necessary in order to restore the unencumbered balance up to $500,000 for the Board to continue to assist with the preparation of revised and improved floodplain studies and maps for communities throughout Colorado and to participate in federally sponsored floodplain map modernization activities.

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Colorado Floodplain Map Modernization Program

Colorado Water Conservation Board

September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	$1,900,000
NRI Funding Request:	$500,000
Funding Source:	*Construction Fund*
Project Type:	Matching Funds for Grants
Type of Grantee:	State Government

LOCATION	
Benefits:	Statewide
Water Source:	Various
Drainage Basin:	All Basins

Colorado has received approximately $11.2 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 floodplain 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	$1,472,030	Pitkin	$20,772	$466,388
Elbert	$141,548	$301,982	Prowers	$76,605	$691,024
Fremont	$23,294	$146,240	Pueblo	$71,768	$1,115,902
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	$140,137	$347,963
Clear Creek Wtsd	$114,060	$456,240	Cache La Poudre	$718,834	$150,000
Upper White Wtsd	$0	$353,756	El Paso Approximate Mapping	$0	$129,860

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To: Finance Committee
Colorado Water Conservation Board

From: Kevin Houck, Section Chief
Joe Busto, Scientist Researcher
Watershed Protection and Flood Mitigation Section

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Water Forecasting Partnerships Project

Introduction

The Rio Grande Forecasting Project winter 2014-15 was a historic project in the United States. The CWCB and local water users partnered with NASA Aerial Snow Observatory, NOAA-National Severe Storms Lab, the National Center for Atmospheric Research, and Riverside Technologies, inc. to support the project by comparing existing water forecast methods to emerging technologies for snowpack assessment and water modeling. We also had RTi develop the NWS West Gulf RFC hydrologic modeling to put it in the hands of the DWR. Initial results were that the WRF-Hydro model was robust, the mobile radar put precipitation where it belonged for modeling, and we had a snow on flight and await a snow free flight from NASA. NASA will provide value added as they do for the California DWR.

In the Rio Grande, water forecasting is an issue and the DWR found that four of the last ten years have had large volumetric forecast errors with impacts in the millions of dollars to the water users. NCAR has a new $1M contract with NWS-Office of Hydrologic Development to run WRF-Hydro for the nation. It is known that WRF-Hydro is superior modeling but more quality data, field projects, and optimization are needed to outperform existing methods. We will partner with forecasters on R&D to benefit compacts, apportionment, and beneficial use in Colorado.

Traditional snow data at a few discrete points will not serve us well now or in the future. Nor will reliance on historical data sets to estimate the water volume numbers today. We need to partner and force the future by developing more and better data and modeling for a better way of doing business. This project request builds on success in the Rio Grande with plans to work with the agencies to implement projects in other watersheds. Dick Wolfe has stated there is a general need for better forecasting statewide and Nathan Coombs of the Conejos Water District said, “Working with these experts and the new science has absolutely put more water at the head gates of our users.”

Staff Recommendation

The Committee recommends the Board request the General Assembly to authorize $300,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allcation to CWCB for the Water Forecasting Partnerships Project.

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Department of Natural Resources

Water Forecasting Partnerships Project

Colorado Water Conservation Board

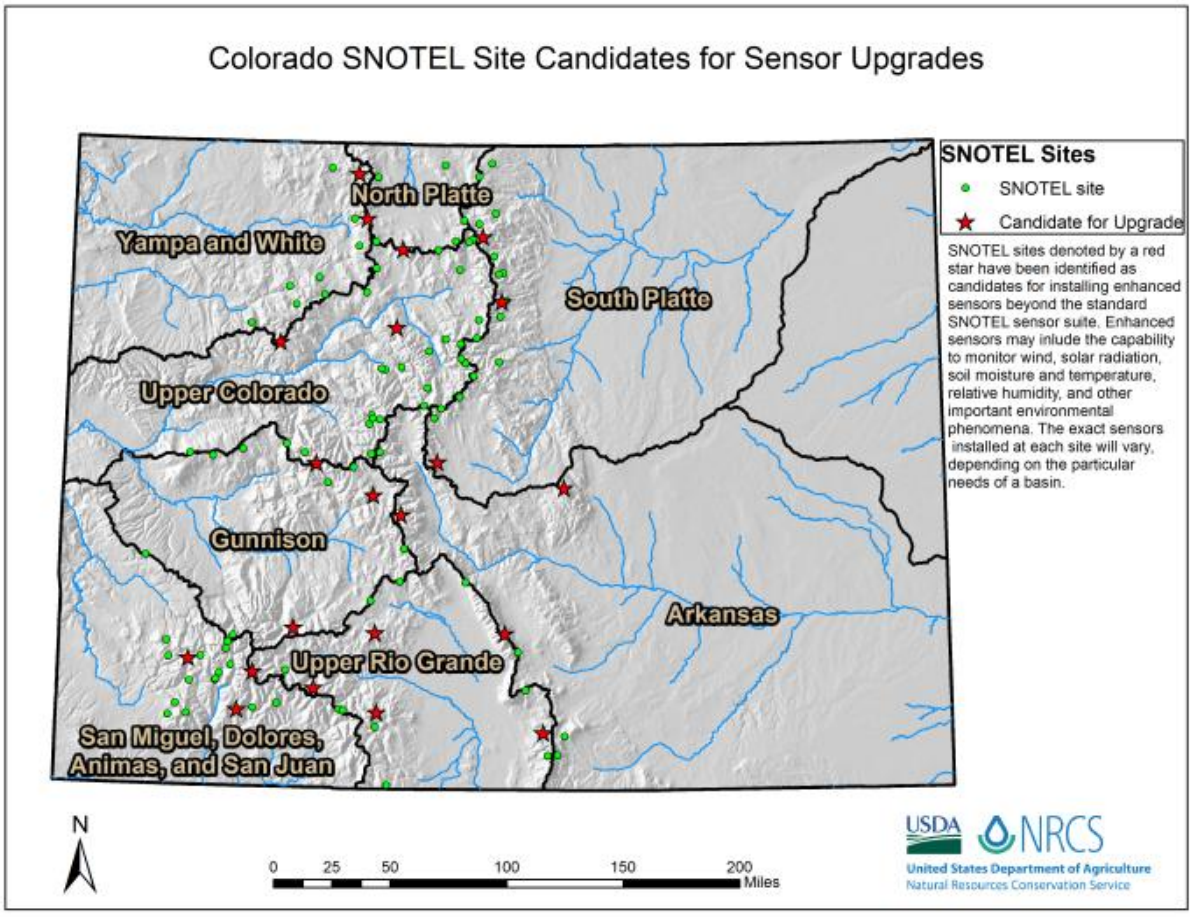
September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	$300,000 (matching sought)
NRI Funding Request:	$300,000
Funding Source:	*Construction Fund*
Project Type:	Data and Modeling Upgrades
Type of Grantee:	Funding for Partnerships

LOCATION	
Benefits:	Statewide
Water Source:	Various
Drainage Basin:	All Basins

The Rio Grande Forecasting Project was a historic end-to-end field demonstration project with new data and new modeling to compare with existing forecast methods. The final report is due at the end of this calendar year and we seek to build on the success. Volumetric water supply forecasts in the Rio Grande for four of the last ten years had between a 16%-50% discrepancy from forecasted to actual levels with impacts in the tens of millions of dollars to water users. The complexity of compacts, surface and ground water, and equitable apportionment now make it so there is less tolerance for these errors. Better characterization of snowpack, new ground and aerial remote sensing data, and better hydrologic modeling are needed. The State Engineer said there is a general need for better forecasting statewide. Better forecasts help the DWR and municipal, agriculture, environmental (including ESA issues), recreation, and other interests. Accurate forecasts are needed by well owners that rely on streamflow forecasts for replacement of water through the augmentation plans and support the 2011 Adopted Irrigation Rules in the Rio Grande. Nathan Coombs Manager of the Conejos Water District said, "Working with these experts using the new science has absolutely put more water at the head gates of our users."

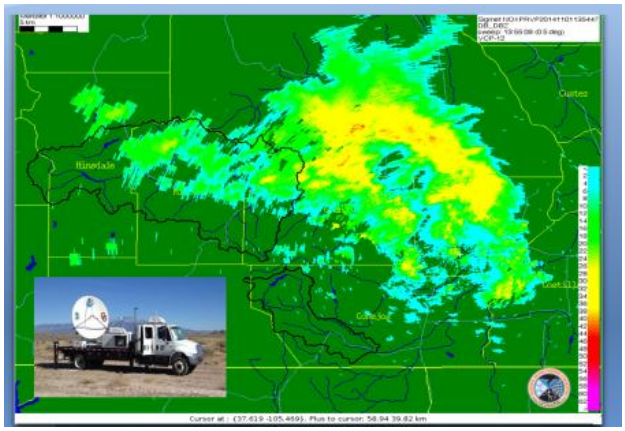
The red stars are proposed upgrades the NRCS will install and maintain if we help purchase the sensors. We direct federal priorities with funding and local, state, and federal partnerships.



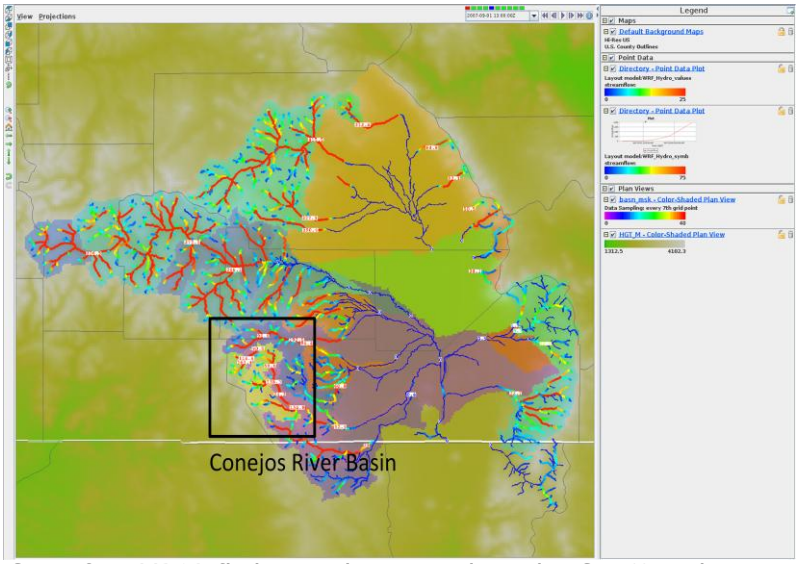
Additional Information Regarding Project

The CWCB partnered with the NRCS before. Twenty new SNOTELS were added for an 18% increase in data over ten years. Some of the funding will focus on upgrades to the existing SNOTEL network to collect wind, solar radiation, soil moisture, and relative humidity data. The physics of the snowpack are important and more than just snow depth and snow water are needed for the newer models.

The rest of the funding will be to partner using radars and planes and modeling and data collection work with NWS RFCs, NASA, NCAR, NOAA and others. It will leverage other funding. We need radars for weather data and NASA for snowpack mapping. Radars track the weather and NASA maps how much snow is there. One of the goals was to go somewhere without radar coverage and build a business case to fill in radar observational gaps in Colorado.



To the right are 1) a NASA graphic of the Uncompaghre Basin, 2) the NOAA radar during a snow event (Rio and Conejos basins in black), and below is 3) the WRF-Hydro detailed stream network in red. Rich data from the planes and radars helps the robust modeling framework of WRF-Hydro. This work is in step with the federal direction but provides an important field project that was "end to end". NCAR has a new $1M contract with NWS-OHD to run WRF-Hydro for the nation. The WRF-Hydro model needs to be "optimized" through new and better data and field investigations then turned over to the RFCs for forecasts. Much of this work is applicable statewide: SNOTEL lites can be deployed where there are forecasting issues and not enough data. This is happening next summer with CWCB ST and local funding in the upper Taylor Basin. Radar precipitation estimates can be refined and mixed with satellite precipitation estimates to feed modeling where we have OK mountain radar coverage in the South Platte and Arkansas. The rich new data is valuable for other programs as well. Snow free LIDAR flights are being conducted in San Miguel County, Otero County, and parts of Montrose using Governor's Office of Information Technology funding for all hazards and floodplain mapping projects.



COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Water Forecasting Partnerships Project

(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)

Mailing address: 1313 Sherman Street, Room 718, Denver, Co 80203

Taxpayer ID#: Email address:

(Please supply current W-9 with application)

Phone Numbers: Business: 303-866-3441,

Home:

Fax: 303-866-4474

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

Name: Joe Busto

Position/Title Scientist Researcher, Watershed and Flood Protection Program

3. Provide a brief description of your organization below:

The CWCB protects, develops, and conserves water. In the Watershed and Protection Section snow data has been a priority for ten years and advances in water supply forecasting methodologies have been the focus on a recent valuable project in the Rio Grande. New snow data in ungauged basins, remote sensing data through planes and mobile radars, and new modeling techniques were employed in the Rio Grande to benefit the whole state and western U.S. by advancing the pace at which forecasting methods are developing. This funding will be a continuation of those efforts.

Part B. - Description of the Project or Study

1. Name of the study or project: Snow Data and Water Forecasting Partnerships Project

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

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

This funding will be used to partner with agencies like NRCS, NOAA, NWS RFCs, NCAR, NASA, other agencies, and water users to develop the data and modeling techniques in known problem areas where forecasting and management of water in rivers and at dams is an issue. These projects are about wise use and administration of water by greater certainty.

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

With the NRCS we developed a list of SNOTEL upgrades with solar radiation and other sensors deployed in all watersheds. Working with other partners we will seek matching funding through federal agencies, research programs, etc. to conduct remote sensing data and field demonstration projects aimed at better volumetric water supply forecasting.

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)

There are already a few known areas of concern in the Upper Gunnison, Upper Rio Grande, Conejos Basin, Upper Arkansas. and South Platte Basins where complex relationships between snowmelt, river management and flows, and reservoir operations are complicated by lack of data and traditional modeling techniques. New more robust modeling is slated for the U.S. but it is well beyond the federal scope to "optimize" that modeling and add in the new and better data to make it specific for Colorado's watersheds. We can do so through new ground and aerial remote sensing data projects and field investigations that will optimize model performance in our watersheds.

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 grant is needed to help purchase equipment and help direct federal priorities to upgrade the existing SNOTEL network. Traditional thinking was a snowpack depth and water equivalent driving the modeling and forecasts. Current thinking is that snow, dust, land use changes, beetle kill, and sun (solar radiation), weather anomalies, and other factors area also drivers of snowmelt hydrology and more and different sensors and data are needed. The NRCS Snow Survey Program is a small data collection program in a Farm Agency. They need stronger water user partnerships. Of benefit to them is local and state partnerships and a better data network to move into the 21st century. Of benefit to water users is mountain data and sensor upgrades will be installed, operated, and maintained by the NRCS with no annual obligation.

Methodology development and the use of radar precipitation estimates and NASA's ASO are emerging technologies that create very large volumes of quality spatial data sets for modeling and volumetric forecasts. The use and development of those methods complement NRCS snow data used for forecasting. For example federal radar coverage in the Arkansas and South Platte may be good enough to do implement radar QPE for modeling without needing mobile radars. Each basin will be need stakeholder engagement and project development work to look at the ground and aerial data and modeling needs.

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.

Brian Domonkos, NRCS Snow Survey Supervisor
Mike Strobel, NRCS National Water and Climate Center
Ken Howard, NOAA National Severe Storms Lab
The NWS River Basin Forecast Centers
Dave Gochis, National Center for Atmospheric Research
Tom Painter, NASA ASO
Jeff Deems, National Snow and Ice Data Center

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 first year of the Rio Grande Forecasting project will have a final report by December 31, 2015. Funding has been found to conduct a second field campaign with NASA mapping snow, NOAA using a mobile radar to focus on spring precipitation when SNOTEL data is less reliable. Through WSRA and Flood Response NCAR will be working with the Conejos District to harden installed SNOTEL–lites and provide volumetric forecasts using WRF – Hydro. Severance Tax is secured and Gunnison funding is being sought to provide new snow data (SNOTEL-Lites) in the Upper Taylor River basin where forecasting and reservoir spill fill cycles are problematic. This funding will continue that work and branch out statewide.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised July 2014

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:	

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:

Print Applicant's Name:

Project Title:

Date:

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1313 Sherman Street, Room 718
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 866-4474
For questions call (303) 866-3441, ext. 3232.

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Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

7

To: Finance Committee
Colorado Water Conservation Board

From: Taryn Finnessey - Climate Change Risk Management Specialist

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Colorado Mesonet Project

Introduction

Weather and climate monitoring in Colorado currently exists as a patchwork of networks operated by multiple federal, state, local and private entities, rather than a single mesonet or spatially coherent network of weather stations reporting in near real-time via major data portals. Since each network was built for a specific purpose, there is no spatial coherency to where stations are located. Each network is valuable for specific applications. Collectively, the data are critical for long term climate monitoring, agriculture, fire weather, flood warning, water supply forecasting and drought monitoring.

The Colorado Climate Center currently runs the CoAgMet network consisting of 70+ stations statewide tracking agricultural weather conditions and crop water use. It is quickly becoming foundational for water administration in Colorado. The Center also oversees the regional climate reference network (USRCRN) consisting of 17 high-quality precipitation and temperature monitoring stations located in pristine environments. It was recently abandoned by NOAA and deeded to Colorado State University. These sites were intended to provide a baseline to monitor the climate over long periods of time in areas free of urbanization and land use changes. Neither of these networks receive baseline funding that would assure consistent performance, longevity and high quality data. Because the networks were developed independently, data outputs are not consistent or fully accessible for use by consumers.

CoAgMet and USRCRN represent valuable investments in hardware and infrastructure for monitoring climate for water resources planning and management. They have great potential to be the backbone of a Colorado Mesonet. Lack of adequate funding currently limits proper maintenance, operation, and expansion of these networks, as well as the development of an integrated data management system to bring the data output of the separate networks together. With a properly designed data management system, data would be more easily and electronically accessible for real time water resources monitoring and decision support, water supply and flood forecasting and warning, drought assessments and forecast, agricultural applications, fire weather as well as long term climate monitoring.

Staff Recommendation

The Committee recommends the Board request the General Assembly to authorize $150,000 from the Construction Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for the Colorado Mesonet Project.

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Department of Natural Resources

Colorado Mesonet Project

Colorado Water Conservation Board

September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	$182,500 annually
NRI Funding Request:	$150,000
Funding Source:	*Construction Fund*
Project Type:	Data Collection/Maint.
Type of Grantee:	State Government

LOCATION	
Benefits:	Statewide
Water Source:	Various
Drainage Basin:	All Basins

Weather and climate monitoring in Colorado currently exists as a patchwork of networks operated by multiple federal, state, local and private entities, rather than a single mesonet or spatially coherent network of weather stations reporting in near real-time via major data portals. Since each network was built for a specific purpose, there is no spatial coherency to where stations are located. Each network is valuable for specific applications. Collectively, the data are critical for long term climate monitoring, agriculture, fire weather, flood warning, water supply forecasting and drought monitoring.

The Colorado Climate Center currently runs the CoAgMet network consisting of 70+ stations statewide tracking agricultural weather conditions and crop water use. It is quickly becoming foundational for water administration in Colorado. The Center also oversees the regional climate reference network (USRCRN) consisting of 17 high-quality precipitation and temperature monitoring stations located in pristine environments. It was recently abandoned by NOAA and deeded to Colorado State University. These sites were intended to provide a baseline to monitor the climate over long periods of time in areas free of urbanization and land use changes. Neither of these networks receive baseline funding that would assure consistent performance, longevity and high quality data. Because the networks were developed independently, data outputs are not consistent or fully accessible for use by consumers.

CoAgMet and USRCRN represent valuable investments in hardware and infrastructure for monitoring climate for water resources planning and management. They have great potential to be the backbone of a Colorado Mesonet. Lack of adequate funding currently limits proper maintenance, operation, and expansion of these networks, as well as the development of an integrated data management system to bring the data output of the separate networks together. With a properly designed data management system, data would be more easily and electronically accessible for real time water resources monitoring and decision support, water supply and flood forecasting and warning, drought assessments and forecast, agricultural applications, fire weather as well as long term climate monitoring.

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Colorado Mesonet

(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): Department of Natural Resources

Mailing address: 1313 Sherman Street, Suite 400
Denver, CO 80203

Taxpayer ID#: Email address:

(Please supply current W-9 with application)

Phone Numbers: Business:

Home:

Fax:

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

Name: Taryn Finnessey

Position/Title Climate Change Risk Mgmt. Specialist

3. Provide a brief description of your organization below:

The Colorado Climate Center runs the CoAgMet network consisting of 70 stations statewide tracking agricultural weather; as well as a US regional climate reference network called USRCRN consiting of 17 high-quality precipitation and temperature monitoring stations located in pristine environments that was abandoned by NOAA. These sites were intended to monitor the climate over long periods of time in areas free of urbanization and with datasets free of station moves, changes in observation time and other factors that create inhomogenetity in climate datasets.

Part B. - Description of the Project or Study

1. Name of the study or project: Colorado Mesonet

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

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

Data Collection/ Maintenance

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)

The USRCRN network needs multiple station visits per year to add and remove fluids from rain gages. The CoAgMet network, in order to be run as a reliable mesonet and for calculations of consumptive use needs close attention paid to quality control and making sure all sensors are functioning properly as well as regular station visits. Lack of funding currently prohibits proper maintenance and operation of both of these networks.

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.

To fully fund these stations would require a minimum of $182,500 annually. It includes operation, maintenance, travel, communications, database and website management as well as hazardous waste disposal.

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.

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 July 2014

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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:

Project Title: Colorado Mesonet

Date: 08/06/2015

Return this application to:

Mr. Kirk Russell, P.E., Chief
Finance Section
COLORADO WATER CONSERVATION BOARD
1313 Sherman Street, Room 718
Denver, CO 80203

Submit applications by email to: kirk.russell@state.co.us or fax to (303) 866-4474
For questions call (303) 866-3441, ext. 3232.

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Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

8

To: Finance Committee
Colorado Water Conservation Board

From: Chris Strum, Stream Restoration Coordinator,
Watershed Protection and Flood Mitigation Section

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
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 36 projects with over $1,300,000 since its first grant cycle in January 2009. The projects have leveraged over $5.50 for every $1.00 contributed by CWRP.

In recent years Colorado has experienced catastrophic floods, mega-fires, and floods exeracerbated by fire scars that have de-stabilized many rivers. Staff is requesting that the Colorado Watershed Restoration Program continue to be funded to aid in post-flood and fire restoration. Staff also requests that the funds be used for non disaster related watershed and stream protection and restoration efforts throughout the state.

Staff Recommendation

The Committee recommends the Board request the General Assembly to authorize $1,500,000 from the Severance Tax Perpetual Base Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for the Colorado Watershed Restoration Program.

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Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Restoration Program

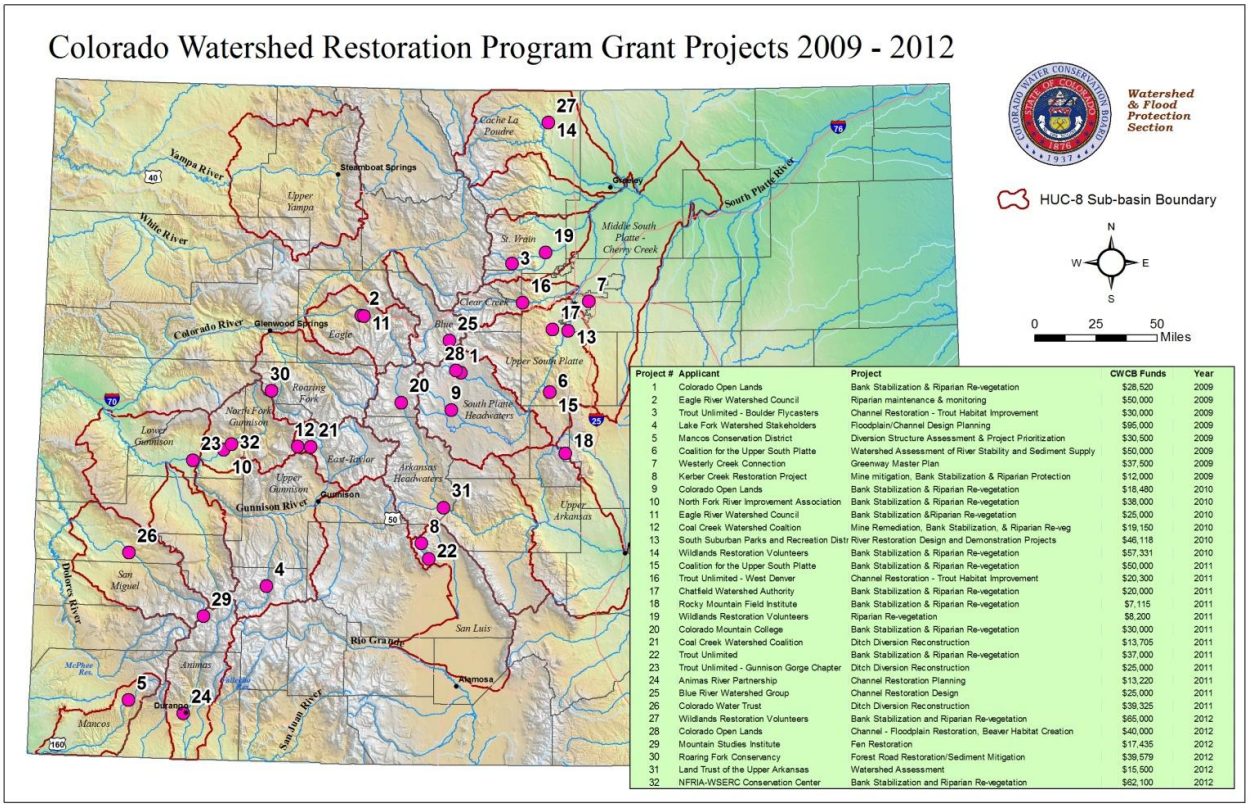
Colorado Water Conservation Board

September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	Up to 50% Cost Share
NRI Funding Request:	$1,500,000
Funding Source:	*Severance Tax Fund*
Project Type:	Watershed Restoration
Type of Grantee:	State Government

LOCATION	
Benefits:	Statewide
Water Source:	Various
Drainage Basin:	All Basins

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, stabilize post-fire watersheds, and increase benefits for water supply. Past projects successfully completed with aid from the Construction Fund include post-fire channel stabilization on Trail Creek in the Hayman burn area, channel stabilization and restoration on the North Fork Gunnison River in Paonia, and channel design planning on the Lake Fork of the Gunnison 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, flood protection, forest restoration (including post-fire), 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 36 projects since the first grant cycle in January 2009. Total project funding exceeds $1,300,000. The projects have leveraged $5.5 for every $1 contributed by the Program. Twenty-three of the thirty-two projects funded have been mapped with focus areas identified in the Non-Consumptive Needs Assessment. The Program is intended for statewide benefit. For an example of the geographic spread of the projects, the map below displays projects funded from 2009-2012.



Project #	Applicant	Project	CWCB Funds	Year
1	Colorado Open Lands	Bank Stabilization & Riparian Re-vegetation	$28,520	2009
2	Eagle River Watershed Council	Riparian maintenance & monitoring	$50,000	2009
3	Trout Unlimited - Boulder Flycasters	Channel Restoration - Trout Habitat Improvement	$30,000	2009
4	Lake Fork Watershed Stakeholders	Floodplain/Channel Design Planning	$95,000	2009
5	Mancos Conservation District	Diversion Structure Assessment & Project Prioritization	$30,500	2009
6	Coalition for the Upper South Platte	Watershed Assessment of River Stability and Sediment Supply	$50,000	2009
7	Westerly Creek Connection	Greenway Master Plan	$37,500	2009
8	Kerber Creek Restoration Project	Mine mitigation, Bank Stabilization & Riparian Protection	$12,000	2009
9	Colorado Open Lands	Bank Stabilization & Riparian Re-vegetation	$18,480	2010
10	North Fork River Improvement Association	Bank Stabilization & Riparian Re-vegetation	$38,000	2010
11	Eagle River Watershed Council	Bank Stabilization &Riparian Re-vegetation	$25,000	2010
12	Coal Creek Watershed Coalition	Mine Remediation, Bank Stabilization, & Riparian Re-veg	$19,150	2010
13	South Suburban Parks and Recreation Distr	River Restoration Design and Demonstration Projects	$46,118	2010
14	Wildlands Restoration Volunteers	Bank Stabilization & Riparian Re-vegetation	$57,331	2010
15	Coalition for the Upper South Platte	Bank Stabilization & Riparian Re-vegetation	$50,000	2011
16	Trout Unlimited - West Denver	Channel Restoration - Trout Habitat Improvement	$20,300	2011
17	Chatfield Watershed Authority	Bank Stabilization & Riparian Re-vegetation	$20,000	2011
18	Rocky Mountain Field Institute	Bank Stabilization & Riparian Re-vegetation	$7,115	2011
19	Wildlands Restoration Volunteers	Riparian Re-vegetation	$8,200	2011
20	Colorado Mountain College	Bank Stabilization & Riparian Re-vegetation	$30,000	2011
21	Coal Creek Watershed Coalition	Ditch Diversion Reconstruction	$13,705	2011
22	Trout Unlimited	Bank Stabilization & Riparian Re-vegetation	$37,000	2011
23	Trout Unlimited - Gunnison Gorge Chapter	Ditch Diversion Reconstruction	$25,000	2011
24	Animas River Partnership	Channel Restoration Planning	$13,220	2011
25	Blue River Watershed Group	Channel Restoration Design	$25,000	2011
26	Colorado Water Trust	Ditch Diversion Reconstruction	$39,325	2011
27	Wildlands Restoration Volunteers	Bank Stabilization and Riparian Re-vegetation	$65,000	2012
28	Colorado Open Lands	Channel - Floodplain Restoration, Beaver Habitat Creation	$40,000	2012
29	Mountain Studies Institute	Fen Restoration	$17,435	2012
30	Roaring Fork Conservancy	Forest Road Restoration/Sediment Mitigation	$39,579	2012
31	Land Trust of the Upper Arkansas	Watershed Assessment	$15,500	2012
32	NFRIA-WSERC Conservation Center	Bank Stabilization and Riparian Re-vegetation	$62,100	2012

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Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

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To: Finance Committee
Colorado Water Conservation Board

From: Ted Kowalski, Chief, Interstate, Federal, and Water Information Section

Date: September 17, 2015

Subject: Non-Reimbursable Investment Request
Bear Creek Reallocation of Storage Program

Introduction
The Interstate, Federal, and Water Information Section represents the state in negotiations, discussions, and litigation regarding interstate matters, but the Colorado River Compact, the Arkansas River Compact, "wild and scenic alternative processes," and matters associated with the Endangered Species Act and Recovery Programs demand most of the attention of this Section. This Section is also responsible for establishing and maintaining the State of Colorado's decision support systems.

Under the authority of the Energy and water Development Appropriations Act of 1998, the U.S. Army Corps of Engineers is authorized to investigate reallocation of storage space at existing reservoirs within the United States. This act requires a 50% cost share between the U.S. Army Corp of Engineers and a local sponsor. The CWCB as the "local sponsor" would be responsible for 50% of the implementation costs associate with such a study. Any reallocation would occur under the authority of the 1958 Water Supply Act.

The use of this existing storage space would provide a statewide benefit. While the water storage space would be used to meet future municipal and industrial needs within the South Platte River basin, this would reduce pressure on the need to develop supplies from the Colorado River basin. In addition, this would reduce pressure on the acquisition of agricultural lands to meet future water needs ("buy and dry").

Staff Recommendation
The Commttee recommends the Board request the General Assembly to authorize $2,500,000 from the Severance Tax Perpetual Base Fund to be appropriated to the Department of Natural Resources for allocation to the CWCB for the Bear Creek Reallocation of Storage Program.

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Department of Natural Resources

Bear Creek Reallocation of Storage Study

Colorado Water Conservation Board

September 2015 Finance Committee Meeting

PROJECT DETAILS	
Project Cost:	$5,000,000
NRI Funding Request:	$2,500,000
Funding Source:	Severance Tax PBF
Project Type:	Storage Study
Type of Grantee:	State Government

LOCATION	
Benefits:	Statewide
Water Source:	Various
Drainage Basin:	All Basins

Under the authority of the Energy and water Development Appropriations Act of 1998, the U.S. Army Corps of Engineers is authorized to investigate reallocation of storage space at existing reservoirs within the United States. This act requires a 50% cost share between the U.S. Army Corp of Engineers and a local sponsor. The CWCB as the "local sponsor" would be responsible for 50% of the implementation costs associate with such a study. Any reallocation would occur under the authority of the 1958 Water Supply Act.

The use of this existing storage space would provide a statewide benefit. While the water storage space would be used to meet future municipal and industrial needs within the South Platte River basin, this would reduce pressure on the need to develop supplies from the Colorado River basin. In addition, this would reduce pressure on the acquisition of agricultural lands to meet future water needs ("buy and dry").

COLORADO WATER CONSERVATION BOARD

CONSTRUCTION FUND
NON-REIMBURSABLE PROJECT INVESTMENT APPLICATION

Bear Creek Reservoir Reallocation of Storage Study

(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): Interstate, Federal, and Water information Section, Colorado Water Conservation Board

Mailing address: 1313 Sherman Street, Room 723
Denver, CO 80203

Taxpayer ID#:

Email address: ted.kowalski@state.co.us

Phone Numbers: Business: 303-866-3441 .3222

Home:

Fax:

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

Name: Ted Kowalski

Position/Title: Chief; Interstate, Federal, Water Information Section

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised November 2011

3. Provide a brief description of your organization below:

The Interstate, Federal, and Water Information Section represents the state in negotiations, discussions, and litigation regarding interstate matters, but the Colorado River Compact, the Arkansas River Compact, "wild and scenic alternative processes," and matters associated with the Endangered Species Act and Recovery Programs demand most of the attention of this Section. This Section is also responsible for establishing and maintaining the State of Colorado's decision support systems.

Part B. - Description of the Project or Study

1. Name of the study or project: Bear Creek Lake Storage Study

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

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

In conjunction with the Army Corps of Engineers, conduct a study rearding the reallocation of storage at Bear Creek Reservoir.

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

Lakewood, CO

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)

Under the authority of the Energy and water Development Appropriations Act of 1998, the U.S. Army Corps of Engineers is authorized to investigate reallocation of storage space at existing reservoirs within the United States. This act requires a 50% cost share between the U.S. Army Corp of Engineers and a local sponsor. The CWCB as the "local sponsor" would be responsible for 50% of the implementation costs associate with such a study. Any reallocation would occur under the authority of the 1958 Water Supply Act.

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 use of this existing storage space would provide a statewide benefit. While the water storage space would be used to meet future municipal and industrial needs within the South Platte River basin, this would reduce pressure on the need to develop supplies from the Colorado River basin. In addition, this would reduce pressure on the acquisition of agricultural lands to meet future water needs ("buy and dry").

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.

Not applicable.

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):

Reconnaissance Study Section 905(b)(WRDA 86) Analysis by the U.S. Army Corp of Engineers.

Non-Reimbursable Project Investment Application - CWCB Construction Fund

Form Revised November 2011

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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:	$2,000,000.00
Estimated Engineering Costs:	$3,000,000.00
Estimated Construction Costs:	
Estimated Total Costs:	$5,000,000

9. **How much funding are you requesting?** $2,500,000

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: Ted Kowalski

Project Title: Refresh of Litigation Fund

Date: 7/30/13

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.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
1616 CAPITOL AVENUE
OMAHA NE 68102-4901

REPLY TO
ATTENTION OF

District Commander

MAY 2 1 2015

Mr. Ted Kowalski
Chief, Interstate, Federal and Water Information Section
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Mr. Kowalski:

The U.S. Army Corps of Engineers, Omaha District (Corps) appreciates the Colorado, Department of Natural Resources interest in a study of potential reallocation of storage in the Bear Creek Project located in Lakewood, Colorado for permanent water supply uses. Subject to preparation and approval of a report and compliance with applicable Federal and state laws and regulations such storage may be available. Authority exists to study reallocation at Bear Creek Lake under The Energy and Water Development Appropriations Act of 1998. This Act authorized study of Chatfield, Cherry Creek, and Bear Creek for water supply reallocation.

As part of the process of considering a water supply reallocation, we are compelled to inform you of the current dam safety rating and risks, their potential dynamic nature, and potential financial obligations and impacts on water supply storage associated with potential future dam safety remediation. While the Corps recognizes the numerous public benefits of providing storage in its reservoirs for water supply purposes, we also recognize our responsibility to provide storage in a safe, secure, and reliable environment. The Corps continually evaluates its dams and determines if remediation may be necessary to meet and maintain current Corps safety standards. The Corps is totally committed to the safety of its dams. Our dams are classified through a risk assessment process into five Dam Safety Action Classes (DSAC) which represent varying levels of urgency of action and incremental flood risk (ratings range from 1 greatest risk to 5 lowest risk).

The Principal Dam Embankment at the dam Bear Creek Project, Lakewood, Colorado has been classified a DSAC 4 [Low Urgency]. As a result, we will conduct elevated monitoring and evaluation of the dam. In the event the DSAC assignment is elevated to a higher level of urgency, the Corps may implement interim or long term measures to remediate the conditions which led to the new DSAC assignment.

The Secondary (South) Dam Embankment at the Bear Creek Project has been classified DSAC 3 [Moderate Urgency]. We plan to continue investigating the nature of the risk and may implement interim or long term measures to remediate the conditions which led to the DSAC assignment.

Measures taken on the Principle Dam Embankment or Secondary Dam Embankment may impact the storage in the reservoir for water supply purposes, such that the amount of storage available for water supply could be reduced. The Corps' water storage agreements require non-Federal users to share the costs of remediation in proportion to the storage space that has been provided to each user.

The 905(b) Reconnaissance Report affirming Federal interest will be submitted to higher authority for approval in May 2015 (draft enclosed). A Letter of Intent (LOI) from the State of Colorado will be required in order to gain approval of the 905(b) Reconnaissance Report. A sample LOI is enclosed for your use, as needed.

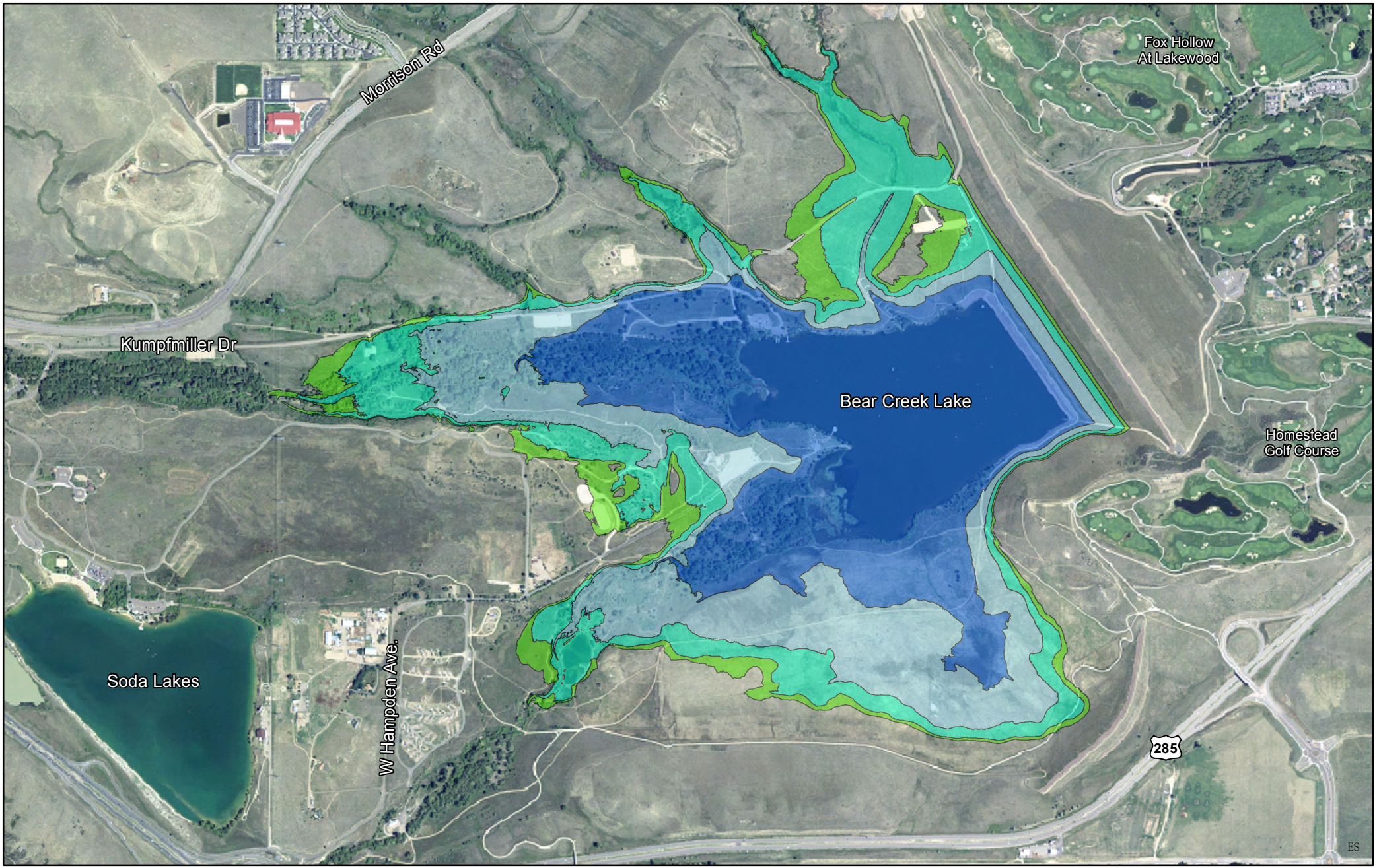
We look forward to continuing to work with you in your efforts to meet the State of Colorado's present and future water needs. If you have questions about any matters addressed in this letter, or wish to learn more about the Corps' commitment to dam safety, please contact Ms Gwyn Jarrett at (402) 253-9392 or Mr. Greg Johnson at (402) 995-2701.

Sincerely,

FOR Joel R. Cross
Colonel, Corps of Engineers
District Commander

Enclosures

Bear Creek Lake Level Changes for Different Amounts of Storage



N
W E
S

3,898 AF
10,000 AF
15,000 AF
20,000 AF

0 0.2 0.4 0.6 0.8 Miles

NAD 1983 Zone 13N
Storage Data Provided by DWR
Spatial Data Created by CWCB

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

FINAL
BEAR CREEK RESERVOIR, CO
RECONNAISSANCE STUDY
SECTION 905(b) (WRDA 86) ANALYSIS
May 7, 2015

RECONNAISSANCE STUDY
SECTION 905(b) (WRDA 86) ANALYSIS
Bear Creek Reservoir, CO

1 PROJECT AND STUDY AUTHORITY

The Bear Creek Dam and Reservoir in the South Platte River Basin in Colorado was authorized by the Flood Control Act of 1968 Public Law 90-483. The authorized purposes are flood control, recreation, and fish and wildlife enhancement. Municipal or industrial water supply is authorized by the Water Supply Act of 1958. Authorizing language for construction of the project reads:

"The project for the Bear Creek Dam and Reservoir, South Platte River, Colorado, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 87, Ninetieth Congress, at an estimated cost of $32,314,000."

The Energy and Water Development Appropriations Act of 1998 authorized study of Chatfield, Cherry Creek and Bear Creek for water supply reallocation. Legislative language reads:

"Chatfield, Cherry Creek, and Bear Creek Reservoirs, Colorado.—The Bill included an initial $100,000 for the Corps of Engineers to initiate a study of the potential for reallocation of storage at Chatfield, Cherry Creek, and Bear Creek Reservoirs from flood control to water supply."

In 1998, funding was provided to develop the Expedited Reconnaissance Study for Chatfield, Cherry Creek and Bear Creek, Colorado with the focus on Chatfield Reservoir. The Chatfield Reservoir Storage Reallocation Final Integrated Feasibility Report and Environmental Impact Statement (FR/EIS) was completed in September 26, 2013. The ASA(CW) approved the FR/EIS on May 29, 2014 and simultaneously issued a Record of Decision. A water storage agreement was executed between Colorado Department of Natural Resources (CDNR) and the U.S. Corps of Engineers (USACE or Corps) on October 9, 2014. Following the successful completion of the Chatfield study, interest has shifted to assessing the potential for reallocation at Bear Creek. Funds in the amount of $50,000 were appropriated in Fiscal Year 2014 to conduct the reconnaissance phase on Bear Creek.

2 STUDY PURPOSE

The purpose of this reconnaissance study is to determine if there is a federal interest by the Corps and a non-federal sponsor to pursue the investigation of water storage reallocation for Bear

Creek Dam and Reservoir Project through the completion of a Generation Investigation (GI) Study. A preliminary assessment of water supply and demand, engineering feasibility, and other technical issues regarding potential water storage reallocation at the Bear Creek Reservoir are presented in this report.

3 LOCATION OF STUDY, NON-FEDERAL SPONSOR AND CONGRESSIONAL DISTRICTS

3.1 Tri-Lakes Location

Bear Creek Reservoir, in conjunction with Chatfield and Cherry Creek Reservoirs (i.e., Tri-Lakes), were constructed by the Corps. The Tri-Lakes dams are systemically managed to protect the Denver Metro area from catastrophic floods that devastated the area periodically for more than 100 years. Construction of Cherry Creek Dam began in 1946 and was completed in 1950. Chatfield Dam was the second dam to be built; construction began in 1967 and was completed in 1975. Bear Creek Dam construction began in 1973 and was completed in 1977. Figure 1 shows the Tri-Lakes project locations within the greater Denver region.

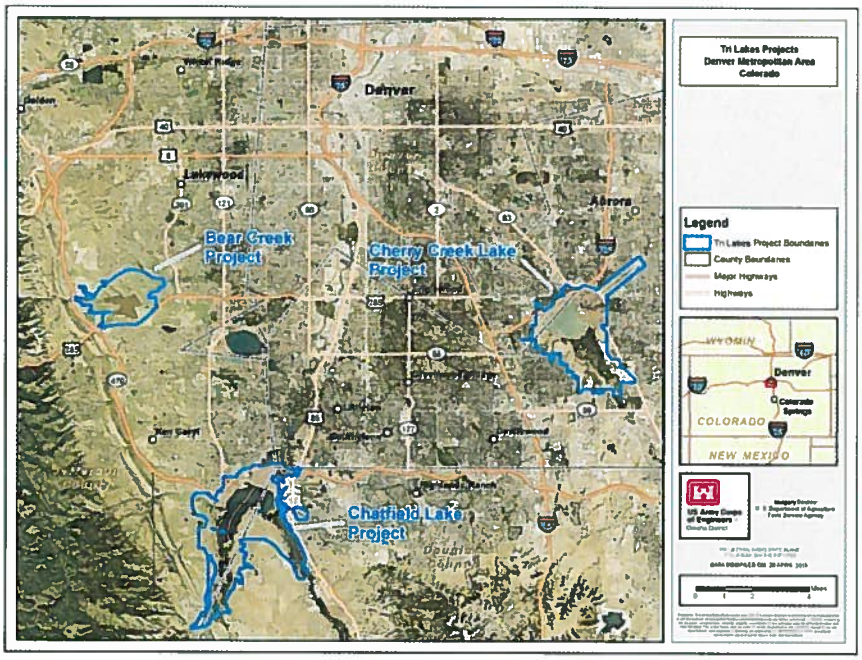


Figure 1: Tri-Lakes Project Locations within Greater Denver Region

3.2 Bear Creek Location

Bear Creek Dam and Reservoir is located in the Bear Creek Watershed and the South Platte River Basin. The Bear Creek Watershed is 236 square miles and extends from the Mount Evans Wilderness Area on the western end to the town of Morrison, Colorado on the eastern end. The

watershed includes all tributary water flows, including the two major tributaries (Bear Creek and Turkey Creek), that discharge into Bear Creek Reservoir. The South Platte River Basin has a drainage area of approximately 24,300 miles and is located in parts of Colorado, Wyoming and Nebraska.

The Bear Creek Dam and Reservoir Project is located on Bear Creek immediately below its confluence with Turkey Creek and downstream of Evergreen Lake and Dam, approximately 10 miles southwest of Denver, Colorado in Jefferson County. Figure 2 depicts the location of Bear Creek Lake Project in relation to Bear Creek, Turkey Creek, the South Platte River and Chatfield Lake Project.

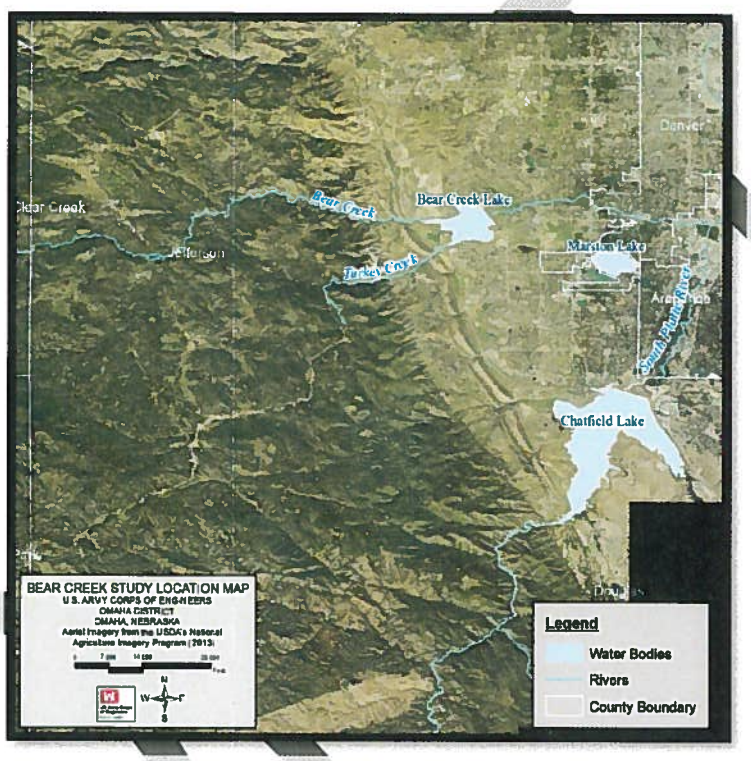


Figure 2: Bear Creek Study Location Map

3.3 Study Sponsor

The CDNR has expressed interest in a Bear Creek Reallocation Study based in part on findings from the "2010 Statewide Water Supply Initiative" developed by the Colorado Water Conservation Board, a division of CDNR. This report concludes the state's population is expected to double by the year 2050 with the majority of people living in the South Platte River and Arkansas River Basins, further increasing demand for water supply.

3.4 Congressional District Representation

The study area lies within the jurisdiction of Colorado's 7th Congressional District, represented by Ed Perlmutter. Colorado Senators are Michael Bennet and Cory Gardner.

4 PRIOR REPORTS AND EXISTING PROJECTS

4.1 House Document No. 669, 80th Congress, 2nd Session, 1948

This congressional document contained the Chief of Engineer's Report for the Bear Creek Project which provided an evaluation of the flood and related water problems of the South Platte River Basin based on levels of economic growth existing in 1945. The report included a plan for flood control on Bear Creek by means of a dam and reservoir, but the plan was not economically justified at that time (USACE, 1977). By the mid-1960s, development of housing and businesses along Bear Creek below the current dam site resulted in a favorable economic justification for construction of the Bear Creek Dam and Lake Project.

4.2 Design Memorandum (DM) No. PB-2, Preliminary Development and Site Selection, Bear Creek Dam and Lake, South Platte River, Colorado, October 1970

This DM submits the results of preliminary cost analyses and subsurface investigations in sufficient detail to indicate the most appropriate location for the dam axis and the major project structures. Included within this DM is documentation of the field review conference held in September 1970 regarding site selection for the Bear Creek Dam project that included members of the Omaha District, Missouri River Division and OCE offices of USACE.

4.3 Design Memorandum No. PB-6, General Design Memorandum, Bear Creek Dam and Lake, South Platte River, Colorado, March 1972

This DM submits a summary of the overall preliminary design of Bear Creek Dam and includes (1) the basic project plan, (2) major features of the project, and (3) a reliable cost estimate. This DM covers the analyses and coordination of all aspects of the project in order to (1) provide the basis for preparation of feature design memoranda, (2) determine all project purposes, (3) establish the scope of the project, based on current criteria and develop the most economical plan, in total cost, of the acceptable alternative plans studied, (4) establish operating requirements and determine that the project will meet such requirements, (5) coordinate the project plan with views of other governmental agencies and local interests, (6) provide the basis for a reliable, up-to-date estimate of project cost, (7) establish the current economic aspects of the project, and (8) facilitate the orderly scheduling and programming of funds for detailed design and construction of the project.

4.4 Design Memorandum No. PB-7, Embankment and Spillway, Bear Creek Dam and Lake, South Platte River, Colorado, July 1974

This DM presents the results of final studies, analyses, and laboratory testing pertaining specifically to the main and south embankments and the spillway. It covers the design of the main embankment, the supplemental earthfill dam (south embankment), and the spillway, and also presents a plan for handling drainage from Coyote Gulch.

4.5 Embankment Criteria and Performance Report, Bear Creek Dam and Lake, South Platte River, Colorado, June 1980

This report provides in one volume the significant information needed by engineers to (1) familiarize themselves with the project, (2) re-evaluate the embankment in the event unsatisfactory performance occurs, and (3) provide guidance for designing comparable future projects. The scope includes a summary record of significant design data, design assumptions, design computations, specification requirements, construction equipment, construction procedures, construction experience, field control test data, and an assessment of project performance.

4.6 Construction Foundation Report, Bear Creek Dam and Lake, South Platte River, Colorado, February 1983

This report documents the construction procedures and foundation conditions encountered during the design and construction of Bear Creek Dam. This information is useful for future work on the embankments, or for planning purposes on projects with similar design requirements.

4.7 Memorandum of Understanding (MOU), State of Colorado and the Corps, March 1988 regarding the regulation for Bear Creek Dam and Reservoir

This MOU allows for continuous gated release for water rights and/or water supply up to elevation 5559.0 feet. Releases below elevation 5559.0 feet are determined by the Colorado State Engineer's Office as needed to satisfy downstream water rights. Elevation 5559.0 feet is one foot into the flood storage zone and was selected to allow flexibility in targeting authorized pool levels. The Bear Creek Dam and Reservoir is to be regulated for flood control and multi-purpose usage by the state and Corps. In flood conditions, the Corps' Omaha District office retains authority to make all water release decisions.

4.8 Screening for Portfolio Risk Analysis (SPRA), Bear Creek Dam, 19 September 2009; [Revised February 2010 to reflect new information on the Probable Maximum Flood (PMF)]

A preliminary screening-level risk analysis was performed for Bear Creek Dam by an independent regional SPRA cadre in September 2009. The cadre conducted an evaluation and gave engineering ratings to potential failure modes for the major project features. All failure modes were evaluated for three hydrologic loading conditions (PMF, 300-year & 10-year) and two seismic loading conditions: Operating Basis Earthquake and Maximum Design Earthquake.

Life loss, economic damage, and loss of project benefit estimates were developed during the SPRA by the Omaha District.

The SPRA report is the official documentation of the initial Dam Safety Action Classification (DSAC) rating of 4 that was assigned to the main embankment of Bear Creek Dam by the Dam Safety Senior Oversight Group.

4.9 SPRA for Bear Creek Dam South Embankment, 3 November 2009

A preliminary screening-level risk analysis of the south embankment was performed for Bear Creek Dam by an independent regional SPRA cadre in November 2009. The SPRA report is the official documentation of the initial DSAC rating of 3 that was assigned to the south embankment structure by the Dam Safety Senior Oversight Group. This rating was primarily due to the high consequences resulting from potential failure of the embankment. Both the main and south embankments received an inadequate (I) engineering rating for the overtopping potential failure mode during an extreme event (for having less than the required freeboard).

4.10 Statewide Water Supply Initiative (SWSI), Colorado's Water Supply Future, 2010

The SWSI is a comprehensive study that was authorized by the Colorado Legislature in 2003. The CWCB is the lead agency for SWSI. Key analyses in this report are: water supply demands to 2050, non-consumptive needs in each basin, and water availability in the Colorado River Basin. Other elements are representative costs for water supply strategies and implementation associated with identified projects, water conservation agricultural transfers, and development of new water supplies.

4.11 A 2050 Vision for Colorado's Water Supply Future, 2010

Colorado's population is expected to nearly double within the next 40 years. Other pressures on Colorado's water supply include recurring drought conditions, the need to meet multiple water user needs (i.e., municipal, environmental, recreational) with limited water resources, and impacts to agriculture due to water shortages, urbanization, and transfers to new users. The CWCB has undertaken a visioning process to explore solutions to these future water supply challenges by engaging stakeholders across Colorado's multiple river basins. The *2050 Vision for Colorado's Water Supply Future* report recommends various portfolios depending on basin circumstances combining methods such as conservation, local water projects, new Colorado River development, and agricultural transfers.

4.12 Bear Creek Watershed Association (BCWA). 2011a. 2010 Annual Report for the Water Quality Control Commission

The BCWA is a local water quality management agency and watershed association for the Bear Creek Watershed, Colorado. The Association implements the *State of Colorado Bear Creek Reservoir Control Regulation* (Regulation #74). The control regulation assures watershed point

and nonpoint source water quality compliance consistent with adopted Colorado stream standards and classifications.

4.13 Bear Creek Dam Consequence Assessment Report, October 2011

The Consequence Assessment Report summarizes modeling efforts and consequence assessments conducted by the Modeling Mapping and Consequence Estimation (MMC) Production Center for Bear Creek Dam using a range of real world flood scenarios under normal and extreme hydrological conditions. The consequence report provides a basis for the loss of life estimates used in future semi-quantitative risk assessments.

4.14 Design Memorandum No. PB-10, Final Master Plan, Bear Creek Dam and Lake Project, South Platte River, Colorado, 2012

This master plan for the Bear Creek Dam and Lake Project updates the original 1980 Bear Creek Dam and Lake Master Plan and 1988 partial update. The Master Plan provides guidance for future development and maintenance of recreation opportunities, consistent with the project purposes of flood control, recreation, and fish and wildlife enhancement.

4.15 Chatfield Reservoir Storage Reallocation, Final Integrated Feasibility Report and Environmental Impact Statement, July 2013

The Chatfield Reservoir Storage Reallocation FR/EIS, approved May 29, 2014, evaluates the impacts of reallocation alternatives on the ecological, cultural, and aesthetic resources identified and investigated, and determined the financial feasibility and cost of water storage reallocation. The federally-owned Chatfield Reservoir provides an opportunity to reallocate 20,600 acre-feet of storage to help the state and water providers meet a growing demand for water in the Denver Metro area.

4.16 Engineering Regulation (ER) 1110-2-1156, "Safety of Dams – Policy and Procedures," 31 March 2014

This regulation prescribes the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities and a dam safety portfolio risk management process within USACE. The purpose and intent of this regulation is to ensure that responsible officials at all levels within USACE implement and maintain a strong dam safety program in compliance with "Federal Guidelines for Dam Safety." The program ensures that all dams and appurtenant structures are designed, constructed, and operated safely and effectively under all conditions, based on the following dam safety and dam safety program purposes, as adopted by the Interagency Committee on Dam Safety (ICODS). Chapter 24 of ER 1110-2-1156 establishes policy and provides guidance on the impacts of dam safety deficiencies for storage allocation, reallocation, and related studies.

5 PROBLEMS AND OPPORTUNITIES

The primary water resource problem to be addressed is the inadequate supply of water to meet increasing water supply demand in the Denver Metro area over the next 50 years due to the combined effects of population growth, depletion of nonrenewable groundwater sources, and agricultural water providers' need for augmentation water for alluvial wells. Potential reallocation of storage space at Bear Creek Reservoir is just one of many opportunities that may help secure Colorado's water future.

5.1 Problem Statements

5.1.1 Population growth has resulted in increased Municipal and Industrial (M&I) water demands.

In the past, the Colorado water picture has been difficult to bring into focus given the multitude of individual water users and providers, the voluminous information available, and the complexity of developing water supply solutions. As a means to address the collective water communities' desire to understand their water supply situation, the CWCB undertook, at the direction of the Colorado General Assembly, the SWSI in 2003-2004 and 2009 to identify water supply needs now and in the future and inventory current and future projects and processes that local and regional entities are planning to fulfill the water supply needs.

In 2010, the state of Colorado's population was approximately 5.0 million. The CWCB SWSI estimates in 2050 the state's population will roughly double to between 8.6 and 10.3 million people. The majority of these people will live in the South Platte and Arkansas River basins. Figure 3 depicts population concentration in the South Platte River Basin with the most concentrated population density located along the Front Range urban corridor where the mountains meet the plains.

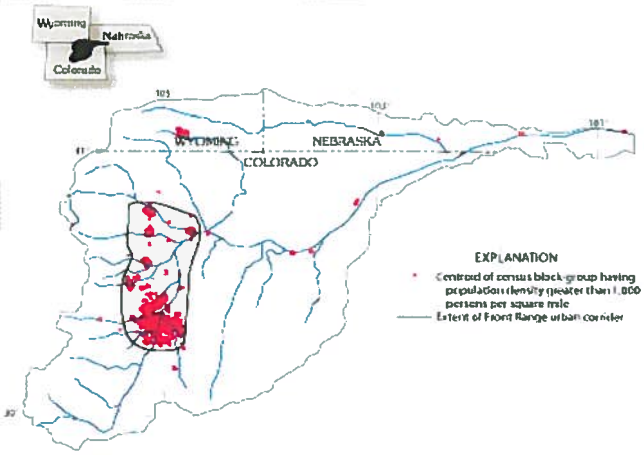


Figure 3: Population Concentration in the South Platte River Basin

Based upon the CWCB research, it is projected that 360,000 to 450,000 acre-feet of additional M&I water supply will be needed (known as the "gap") in the South Platte Basin including the

Denver Metro area. In addition to conservation and other measures, SWSI identified local plans for several "Identified Projects and Processes" (IPPs), in order to help meet the M&I needs and the needs of agricultural producers in northeast Colorado. Even with the IPPs and other measures, a significant water supply "gap" will still remain.

5.1.2 Water need has resulted in the reliance on non-renewable Denver Basin groundwater by some municipal and agricultural water providers.

Denver Basin groundwater for municipal water supplies has been determined to be an insufficient and unsustainable long-term source for water supply, a path of severely increasing costs and decreased water availability and reliability that will continue to worsen in the future (Black & Veatch et al., 2003). Additionally, ground water is not sustainable for agricultural water providers' need for augmentation water for alluvial wells. The water providers now using groundwater need to reduce dependency on this to preserve long-term availability of these sources during periods of drought. This water is legally reusable; however, the practical ability to reuse usually involves recapture (either downstream or upstream by exchange) and storage of effluent after discharge to a stream.

5.2 Opportunity Statements

5.2.1 There is an opportunity to potentially expand the use of an existing federal facility (Bear Creek Reservoir) to provide additional water supply storage.

To address the water shortages resulting from population growth, Colorado water providers have the options of either stretching existing supplies, developing new supplies, or, most likely, a combination of both. SWSI identifies several broad strategies for meeting the South Platte River Basin's future water needs including: development of additional storage, M&I reuse, agricultural water transfers, conjunctive use of surface and groundwater, and additional water conservation. Developing additional storage could include utilizing new storage projects or expanding the use of existing storage facilities, such as Bear Creek Reservoir. The major opportunity offered by the potential reallocation of storage space in Bear Creek Reservoir is that making storage space available in an existing structure may be lower cost and have less impact on the environment than constructing new storage facilities.

5.2.2 Ability to store augmentation water for future use exists.

The Bear Creek Reservoir storage reallocation project could potentially give agricultural water providers involved in the project the additional ability to store augmentation water for later release. Because Bear Creek flows into the South Platte River, some relief from the mandated well pumping curtailment situation may be provided.

5.2.3 Bear Creek Reservoir's on-channel location provides the opportunity to logistically and cost-effectively capture available flow.

The reservoir's location directly on Bear Creek and Turkey Creek, or "on-channel," allows the reservoir to immediately capture all available flows that can be legally stored. Bear Creek is a

tributary to the South Platte (see Figure 2). This is a significant advantage over off-channel reservoirs that are limited by the design capacity of diversion and delivery facilities. Additional storage in Bear Creek Reservoir could be operated in conjunction with existing off-channel storage facilities further downstream to allow certain water providers to maximize the capture of their junior water rights. The opportunity for recapture of reusable water for indirect reuse may also exist depending on water providers in the project.

5.2.4 Bear Creek Reservoir's location at a relatively high elevation within the basin provides opportunity to deliver water by gravity flow.

Bear Creek Reservoir's location and relatively high elevation within the watershed provides the opportunity to deliver water by gravity flow. The possibility exists for water providers who would potentially be involved in the project, to receive water deliveries directly from Bear Creek Reservoir releases. Because Bear Creek is a tributary to the South Platte, the need for constructing new conveyances (e.g., ditches, pump stations, and pipelines) is reduced.

5.2.5 Availability of storage potentially exists.

During the original site selection study for Bear Creek Dam, the crest elevation of the spillway was set to contain a predetermined surcharge storage above the flood pool. This increment of storage was recommended by the authorizing document to reduce the frequency of spillway operation and the magnitude of its discharges. During design, several spillway crest elevations were studied in combination with various spillway widths. It was concluded the optimum spillway (based on total earthwork costs for the project) was the current spillway configuration (crest at elevation 5667 and bottom width of 800 feet).

This resulted in a "perched" spillway with potential excess storage capacity in the reservoir between the flood control pool and the spillway crest. Flood control storage requirements for Bear Creek Dam were determined to be 26,290 acre-feet to control the Standard Project Flood. Because the spillway was constructed at elevation 5,667 feet Project Datum (PD), there was 55,290 acre-feet of storage at the crest of the spillway. Since 2,000 acre-feet of storage was required for sediment and 26,290 acre-feet of storage was required for flood control, the original design included approximately 27,000 acre-feet of storage capacity (surcharge) beyond requirements for the Standard Project Flood. The calculation is shown in Table 1.

Table 1: Potential Excess Storage Calculations

Reservoir Area	Acre-Feet
Spillway Crest Storage	55,290
Sediment Storage (minus)	-2,000
Flood Control Storage (minus)	-26,290
Potential Excess Storage Capacity	=27,000

It should be noted that the Standard Project Flood, which determines the flood control storage, is less severe than the Inflow Design Flood (IDF). Without structural modifications to the dam or

spillway, a significant portion or possibly all of the calculated excess storage in Table 1 is needed as surcharge storage to safely pass the IDF. Detailed analyses of the IDF and the availability of potential excess storage will be carried out during the feasibility study.

6 PLANNING GOALS AND OBJECTIVES

- Assess the potential to provide water supply from Bear Creek enabling water providers to meet the increasing demand of local users, mainly for municipal, industrial, and agricultural purposes.
- Maintain the primary flood control purpose in Bear Creek Reservoir. Avoid or minimize recreation and fish and wildlife impacts identified with a reallocation. Mitigate any recreation and environmental resources impacts which may result from a reallocation.

In addition to meeting the goals and objectives, the study will also assess impacts from water reallocation alternatives including: socio-economics, water rights, environmental laws and policies including the National Environmental Policy Act (NEPA), public concerns, downstream flow, and water quality.

7 PLANNING CONSTRAINTS AND CONSIDERATIONS

7.1 Constraints

7.1.1 Flood Risk Management Purpose

The Bear Creek, Cherry Creek and Chatfield Projects operate as a system providing critical flood protection to the Denver Metro area. Any reallocation at Bear Creek must not adversely impact the primary authorized purpose of flood risk management, operation of the reservoir, or operation of the Tri-Lakes system. If reallocation at Bear Creek is pursued, a Tri-Lakes system evacuation analysis would need to be performed to show how the reallocation at Bear Creek might impact the system. Figure 4 shows a similar analysis that was conducted for the Chatfield Reallocation.

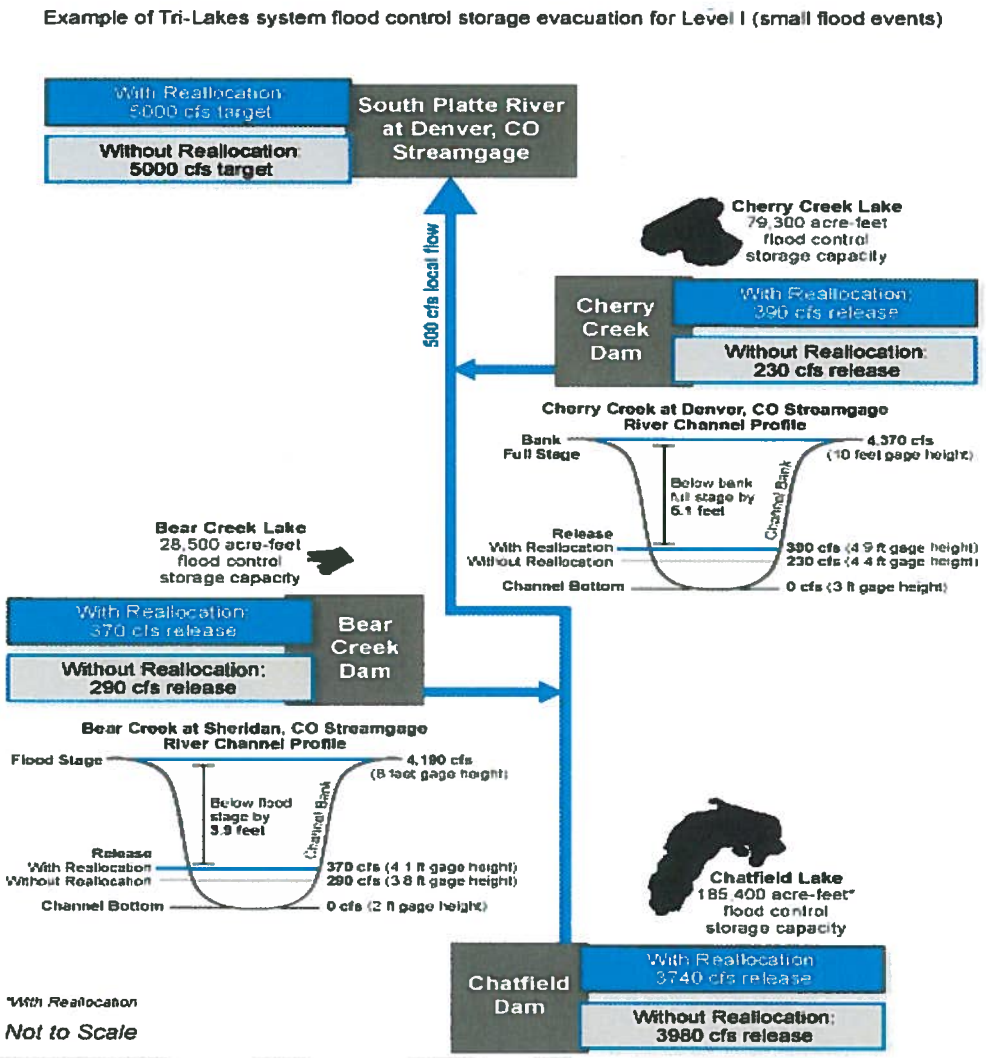


Figure 4: Tri-Lakes Flood Control Storage Evacuation for Small Flood Events (Level 1)
Prepared by the Omaha District Water Control and Water Quality Section for Chatfield Reallocation

Release decisions for the Tri-Lakes system are made by the Corps' Omaha District Office during flood events. Flood control storage evacuation for the system occurs when portions of two or more of the flood control storage zones of Cherry Creek, Chatfield and Bear Creek Reservoirs are occupied. An equal protective balance of remaining flood control storage should be maintained during the evacuation of these projects. This balance is based on establishing an equal risk in each project of filling the remaining flood control space from a similar subsequent flood.

The storage remaining should provide equal protection at each project against runoff from rainfall of standard project flood magnitude. System or coordinated regulation of the three projects in parallel will be necessary only after the cessation of flood inflows and during flood storage evacuation. All three of the projects release water contributing to the South Platte River at Denver, CO streamgage. The current Water Control Plan targets 5,000 cubic feet per second

(cfs), including incremental flow below the dams, at this stream gage. Table 2 shows the Bear Creek Reservoir flood control release rates based on pool elevation for individual operation.

Table 2: Bear Creek Reservoir Release Schedule

Elevation (ft)		Release Rate (cfs)
From	To	Streamflow up to
5558	5611.5	500
5611.5	5625	1000
5625	5635.5	1500
5635.5	5667	2000

Bear Creek flood control releases are controlled and regulated by two 3x6-foot slide service gates in the dome-type gated control structure buried under the embankment. The outlet works has discharge capacity of 2,160 cfs at elevation 5667.0 feet, which is the emergency spillway crest.

A gated outlet structure is located on the Harriman Canal in the south embankment. The invert elevation of the canal as it enters the south embankment is 5548.0 feet. In order to keep flood water stored in the reservoir from flowing into the Harriman Canal below the project, a gated control structure is located in this south embankment. This structure contains an 84x84-inch sluice gate. The conduit entering and leaving this structure is an 84 inch diameter reinforced concrete pipe and may require mitigation due to issues with long-term pressurization. This is explained in more detail in Section 8.3.1.6.

The historical record pool level of 5607.8 feet was set on September 21, 2013 after an estimated 5-6 inches, with a localized area of up to 8 inches, of rainfall occurred in the basin from September 9-16. The historical record daily inflow of 1,170 cfs also occurred during this event on September 17, 2013. Figure 5 depicts the reservoir elevation, inflow and release for this event.

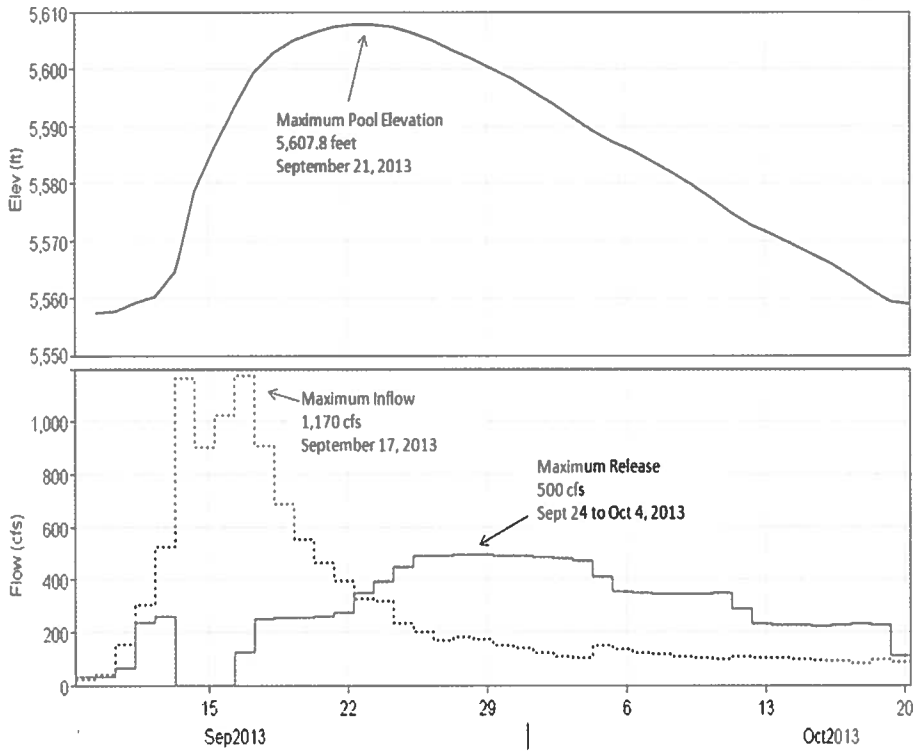


Figure 5: Bear Creek Reservoir Elevation, Inflow, and Release for the 2013 Rainfall Event

If this study proceeds to a feasibility study, an analysis of the impact of raising the top of the flood control pool on the IDF will be required. The original design of Bear Creek Dam had 5.0 feet of freeboard. A draft update of the IDF routings performed in 2012 using probable maximum precipitation data from Hydrometerological Report (HMR) 55A indicated that there is currently about 3.4 feet of freeboard. According to guidance in ER1110-8-2(FR), the minimum required freeboard at Bear Creek Dam is 3 feet since the reservoir level would be within three feet of maximum pool for less than 36 hours. The antecedent pool for the IDF routing was assumed to be the top of the flood control pool or elevation 5635.5 feet PD. If the top of the flood control pool is raised from elevation 5635.5 to 5659.6, this will have an impact on the maximum pool from the IDF routing. If the amount of freeboard is less than 3 feet, mitigation may be required to meet dam safety requirements. It is anticipated the IDF would be analyzed in greater detail during the feasibility study. A potential outcome would be a lower maximum pool occurring from the IDF routing which could allow for greater excess storage available for reallocation.

7.1.2 Impacts to Environmental Resources

Unavoidable impacts to environmental resources that are considered significant would need to be fully mitigated. This includes impacts to migratory bird habitat and wetlands. Costs of mitigation maintenance and monitoring costs, and any increase in Corps operation costs of a preferred alternative being implemented would be borne 100 percent by the non-federal sponsor in accordance with the 1958 Water Supply Act.

7.1.3 Environmental Compliance. The project must comply with the Clean Water Act and other applicable environmental laws and regulations. Other legal and policy constraints including compliance with county, state and federal permitting actions must be adhered to.

7.1.4 Dam Safety Compliance. The project must comply with all applicable USACE Dam Safety Policies and Guidance.

7.1.4.1 USACE Dam Safety Portfolio Risk Management, Dam Safety Action Classification and Storage Reallocation Study Policy.

Engineering Regulation (ER) 1110-2-1156, "Safety of Dams – Policy and Procedures" dated 31 March 2014, prescribes the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities and a dam safety portfolio risk management process within USACE. USACE's dam safety portfolio risk management process is a series of hierarchical activities that are used to assess, classify, and manage the risks associated with the USACE inventory of dams. These activities include SPRA, development of Interim Risk Reduction Measure Plans (IRRMP), Issue Evaluation Studies (IES) and Dam Safety Modification Studies (DSMS).

USACE's DSAC System provides consistent and systematic guidelines for appropriate actions to address the dam safety issues and deficiencies of USACE dams. USACE dams are classified through a risk assessment process into five DSAC ratings which represent varying levels of urgency of action and incremental flood risk (ranging from DSAC 1 dams having the highest urgency for action and typically the highest risk level to DSAC 5 dams considered to have very low risk and that meet all essential USACE guidelines). DSAC considers event probability, probability of failure, and the incremental inundation consequences, given the physical properties of the dam.

Chapter 24 of ER 1110-2-1156 establishes policy and provides guidance on the impacts of dam safety deficiencies for storage allocation, reallocation, and related studies. Para. 24.4.1.1 states "a reallocation that would require raising the conservation pool is not permitted while a project is classified DSAC 1, 2, or 3." Para. 24.4.2 states that for DSAC 4 dams "recommendations for reallocations that would require raising the conservation pool will be considered by Headquarters USACE (USACE Dam Safety Officer [DSO] and Headquarters' Planning and Policy Division) on a case-by-case basis. Reallocation reports that recommend pool raises must include a review of the Potential Failure Mode Analysis for the dam and an analysis of the effect of a higher pool elevation on the probability of failure and consequences associated with the changed pool elevation. Para. 24.7.1 states "reallocation Studies are not allowed at projects where a DSAC 1, 2, or 3 is currently assigned to the dam, levees, dikes, or appurtenant structures, except when approved by the USACE DSO." Preliminary planning and the requests for exception must be coordinated among the District, MSC and HQ DSOs, District, Major Subordinate Command

(MSC), and Headquarters Planning Division Chiefs, and the Water Management and Reallocation Studies Planning Center of Expertise.

Requests for exceptions must address the following considerations: (1) a clear and consistent logic outlining why the project should be granted an exception, including the purpose and need for the proposed study or action; (2) the sponsor must be well-informed, including in writing, of the financial risks and acknowledge the information in a letter; (3) identification of all stakeholders or stakeholder groups, upstream and downstream, that must be informed and invited to participate in the study; (4) the study schedule and availability of necessary funding to complete all analyses, including the requirements of this chapter and other relevant guidance, policy, law, and regulations.

Paragraph 24.7.6 states "in all cases, prior to initiation of a reallocation study, the non-Federal entity must be informed, in writing, by the District Commander of the project's DSAC and the current status of the dam and reservoir; that dam safety risks are dynamic and future performance could require elevated monitoring and evaluation, IRRM or other remediation; the restrictions and conditions imposed by this ER; that water supply storage may be reduced by IRRM or other remediation; and that, upon, execution of a water storage or surplus water agreement, the non-Federal entity will be required to share in the costs of IRRM and other remediation consistent with current policy. The non-Federal entity must submit a Letter of Intent that includes their understanding of the costs typically associated with reallocation, including potential costs of modifications for Dam Safety related reasons."

7.1.4.2 Risk Assessment History and DSAC for Bear Creek Dam.
SPRA evaluations for the main embankment and the south embankment of Bear Creek Dam were conducted in September and November 2009, respectively. In January 2010, the main embankment was assigned a DSAC rating of 4 (low urgency of action) and the south embankment was assigned a DSAC rating of 3 (moderate urgency of action). The south embankment was given a DSAC 3 rating primarily due to the high consequences resulting from potential failure of the embankment. In addition, both the main and south embankments received an inadequate (I) engineering rating for the overtopping potential failure mode during an extreme event (for having less than the required freeboard). By virtue of its current individual rating of the south embankment, the entire Bear Creek Dam Project is currently rated as DSAC 3 (moderate urgency of action). As per ER1110-2-1156, all significant and high hazard potential dams operated and maintained by USACE must undergo a Periodic Assessment (PA) on a routine and systematic schedule not to exceed ten fiscal years. Periodic assessments consist of a site visit, typically in conjunction with a periodic inspection, a potential failure modes analysis, and a risk assessment based on existing data and estimated potential consequences. The next re-evaluation of the risk associated with the Bear Creek Dam is scheduled for FY16 when a PA is scheduled. The DSAC rating of the dam will be re-evaluated during the PA process.

Due to the current DSAC 3 rating for the Bear Creek Dam Project, a reallocation study is not allowed unless an exception is approved by the USACE Dam Safety Officer. This exception is required prior to the initiation of the study. The current DSAC rating for Bear Creek Dam should be considered a significant constraint for the proposed feasibility study and storage reallocation at Bear Creek Dam.

7.1.5 Land Development Guidance

Design, materials, and elevations of recreation modification structures need to comply with the provisions of the Northwest Division (NWD) Regulation 1110-2-5, Land Development Guidance at Corps Reservoir Projects, as coordinated with Corps, Omaha District staff.

7.2 Planning Considerations

In addition to the specific planning constraints, some additional considerations were identified that will need to be evaluated during any feasibility study.

7.2.1 Water Quality Purpose

Water quality (WQ) concerns regarding storage reallocation at Bear Creek Reservoir are due to the potential increase in reservoir hypolimnetic volume. Increased hypolimnetic oxygen depletion, internal nutrient loading, and liberation of sediment bound metals could result from an expansion of the hypolimnion. Hypoxic conditions have been monitored in the past during periods of thermal stratification; however, the reservoir aeration system has helped to address the problem. An expanded reservoir aeration system could potentially mitigate the increased hypolimnetic oxygen demand if storage reallocation was desired. A secondary WQ concern is the potential increase in E. coli/fecal coliform bacteria due to increased use by waterfowl.

7.2.2 Conveyance Infrastructure

Water providers desiring to install any infrastructure associated with on- or off-channel water storage or water distribution systems on Corps project lands must apply to the Corps for a land availability determination. If Corps project lands are determined to be available for any proposed infrastructure, the water providers must acquire the appropriate real estate easements and pay any Corps charges in accordance with Corps real estate regulations. See Figure 6 depicting existing infrastructure within the area leased to the city of Lakewood, Colorado.

Figure 6: Bear Creek Infrastructure within Bear Creek Park, Lakewood, Colorado

8 INVENTORY AND FORECAST

8.1 Water Rights in Bear Creek

Preliminary information indicates the state of Colorado holds water rights in Bear Creek Reservoir. Approximately one half of these rights are absolute meaning the permit has been issued, and the water is being put to beneficial use for environmental, recreational or piscatorial purposes, the latter which specifically involves fish or fishing. Denver Water also holds water rights in Bear Creek. The state submitted an application October, 2014 to increase the amount of water it holds in Bear Creek and to make all of its water rights in Bear Creek absolute. The CWCB has identified seven potential water providers who may be interested in storage in Bear Creek.

8.2 Bear Creek Reservoir Water Yield and Storage-Comparison Analysis

8.2.1 Water Yield

Historical daily flows for the Bear Creek at Morrison stream gage for the period of 1920-2014 were analyzed and used to estimate the demand that could be met (yield) with various amounts of storage in Bear Creek Reservoir allocated to water supply. The daily flows were converted to monthly flows and a sequential routing was performed using an Excel spreadsheet. Inflows were compared to a constant monthly demand and excess flows were stored in the water supply storage pool up to the maximum reallocated capacity. In months where inflows were not sufficient to meet demand, water was withdrawn from storage. If the demand could not be met

by inflows and water in storage, the demand was varied by trial and error until the demand could be met throughout the period of record. The end of month storage was converted to surface area using the 2009 elevation capacity curve and average net evaporation rates for each month were applied to the surface area and subtracted from the storage amounts. This was a preliminary analysis and did not consider water rights in order to estimate the maximum yield potential of storage in Bear Creek Reservoir. Consideration of existing water rights would have to be accounted for to estimate the water supply yield per acre/foot of storage. Future studies should include adjusting historical streamflows to present conditions and consideration of water rights to estimate the true yield of storage in Bear Creek. The critical drawdown period is the time from when the storage is full until it is empty and begins to refill. The critical drought period for the South Platte River Basin was in the early 2000's for smaller storage amounts and in the 1950's for storage of 20,000 acre-feet. An informal analysis indicated that the yield without any storage would be 2,100 acre-feet per year. This amount was subtracted from the yield with storage when computing the storage to yield ratio. The storage to yield ratio represents the amount of storage in acre-feet needed to provide a yield of 1 acre-foot per year. Results are summarized in Table 3 and Figure 7.

Table 3: Bear Creek Storage Analysis

Storage (acre-feet)	Critical Drawdown Period	Critical Drawdown Period (months)	Yield (ac-ft/yr)	Storage to Yield Ratio
0	-	-	2,100	-
2,000	Jun 2002-Feb 2003	9	8,500	0.31
5,000	Dec 2001-Feb 2003	15	11,200	0.55
10,000	Oct 2001-Feb 2003	17	14,900	0.78
20,000	Sep 1953-Mar 1957	43	19,300	1.16

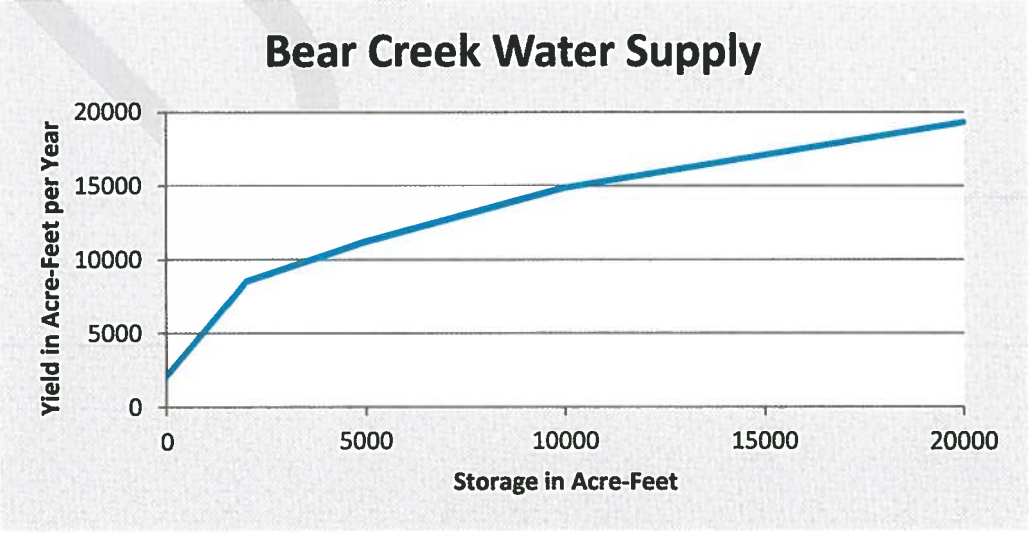


Figure 7: Bear Creek Water Supply Storage Yield Relationship

8.2.2 Storage-Zone Comparison

Results of a 2009 survey of Bear Creek Reservoir indicated that the multipurpose/sediment pool (elevation 5528-5558) had 1,824 acre-feet of storage; the flood control pool (elevation 5558-5635.5) had 30,338 acre-feet of storage (including the sediment pool); and the total storage below the spillway crest (elevation 5667) was 57,678 acre-feet. Therefore, the current potential excess storage between the top of the flood control pool and the spillway crest is 27,340 acre-feet, similar to the original design. Based on this calculation and recognizing that greater reallocated storage will influence the dam's ability to pass the IDF, reallocating 20,000 acre-feet of storage was assumed to be the upper value for consideration in this analysis. As presented in Table 4 and depicted in Figure 8, the water supply pool would exist between the multipurpose/sediment pool and the flood control pool. This level of storage would require a raise in the elevation of the top of the designated flood control pool from elevation 5635.5 to elevation 5659.6 (24.1 feet), which would remain about 7 feet below the spillway crest elevation.

Table 4: Bear Creek Storage Zone Capacities and Elevations

Pool	Original Design		Current Condition (2009 Survey)		With Additional 20,000 AF Storage for Water Supply (2009 Survey)	
	Elevation Project Datum	Cumulative Capacity (ac-ft)	Elevation (Project Datum)	Cumulative Capacity (ac-ft)	Elevation (Project Datum)	Cumulative Capacity (ac-ft)
Multipurpose Pool/Sediment	5558	2,000	5558	1,824	5558	1,824
Water Supply	NA	NA	NA	NA	5623	21,824
Flood Control	5635.5	28,290	5635.5	30,338	5659.6	50,338
Spillway Crest	5667	55,290	5667	57,678	5667	57,678
Maximum Pool	5684.5[1]	75,000	5685.6[2]	78,647	TBD[5]	TBD[5]
Top of Dam	5689.5	NA	5690.2[3]	84,000[4]	5690.2[3]	84,000[4]

(1) The original Inflow Design Flood (IDF) used HMR44 to develop the maximum pool elevation.

(2) The 2012 IDF used HRM55A to develop the maximum pool elevation.

(3) The current top of the dam elevation is based on a March 2010 surveyed profile along the dam centerline with a low point of 5690.2 feet.

(4) Capacity curve was extrapolated to obtain this value

(5) Maximum pool would be determined based on a study of the Inflow Design Flood.

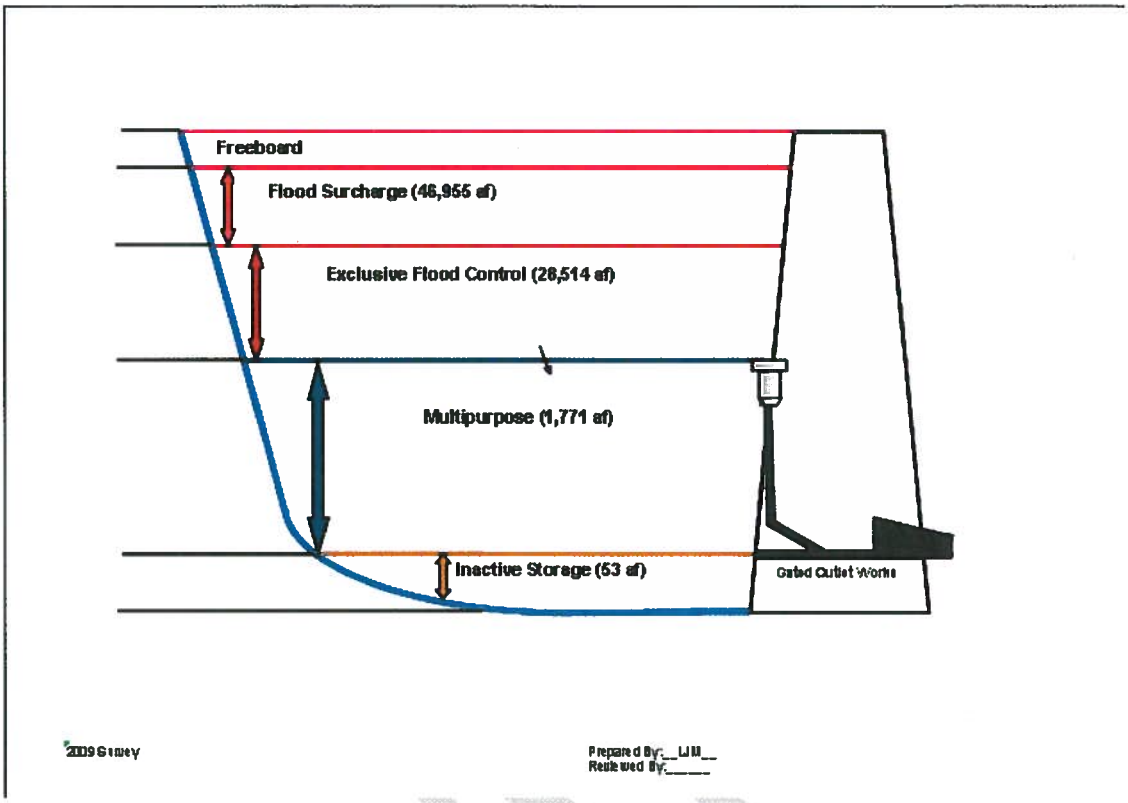


Figure 8: Cross Section of Bear Creek Reservoir

8.3 Dam Safety Considerations and Infrastructure

8.3.1 Original Dam Design/Potential Impacts if Multi-purpose Pool is Raised.

8.3.1.1 Embankment and Foundation Stability. Five cases were evaluated for the stability of the embankments and foundations of the main and south embankments during original design of the dam: (1) end of construction, (2) sudden drawdown, (3) partial pool, (4) steady seepage, and (5) earthquake. A re-evaluation of stability will be required as part of this study. The re-evaluation will consider the hydraulic loading conditions proposed in this study and will use the current state of the practice methodology. It is currently not anticipated that embankment and foundation stability will be a significant concern during this re-evaluation. Re-evaluation analysis of seismic loading conditions (and seismic stability) for the embankments will also be required.

8.3.1.2 Seepage Control Through the Dam Foundation. Seepage control through the foundations of the main and south embankments include an upstream impervious blanket and inspection/cutoff trenches to bedrock. These features were designed to control foundation underseepage considering the original hydraulic loading conditions for the dam. The adequacy of these existing features will need to be re-evaluated for the hydraulic loading conditions proposed in this study and using the current state of the practice methodology.

8.3.1.3 Seepage Control Through the Dam Embankment. Seepage control through the main and south embankments include central impervious cores, random fill shells upstream of the core and clay-shale fill shells downstream of the core. In addition, inclined and horizontal pervious drains exist downstream of the impervious core for both embankments. The adequacy of these existing features will need to be re-evaluated for the hydraulic loading conditions proposed in this study and using the current state of the practice methodology.

8.3.1.4 Riprap Slope Protection. Slope protection for the upstream face of the main embankment consists of riprap protection between elevations 5553.0 and 5572.0 and between elevation 5679.5 and the crest. A rock-raked zone, topsoiling and seeding exist between the two riprap sections. Slope protection for the upstream face of the south embankment consists of riprap protection between elevation 5679.5 and the crest. New riprap protection will be required for the main embankment (above elevation 5572) for any increase in the multipurpose pool. The need for additional slope protection for the south embankment will have to be further investigated as part of this study.

8.3.1.5 Operation and Maintenance (O&M) Access Road. Access to the upstream slope inspections during normal conditions will be affected by a normal pool raise. The service road on the upstream dam face is overtopped at its current elevation of 5572 feet PD. Installation of a new upstream road would be required for operational and surveillance reasons for normal pool levels above elevation 5572 PD.

8.3.1.6 Outlet Works (Intake Structure, Flood Conduit, Domed-Gate Structure). The outlet works are currently designed for normal pool levels and controlled releases through the dam up to elevation 5558 (the uncontrolled weir elevation of the intake structure). The intake structure, conduit and service gates were not designed for sustained pool levels above elevation 5558. Above this elevation water is released through the intake into the flood conduit either under gravity flow or pressurized flow depending on the service gate openings and the reservoir elevation. Increasing/raising the multi-purpose pool for long periods above elevation 5564.5 will impact access to the existing intake and the gate controls for the low level inlets. In addition, long-term pool levels above elevation 5558 will pressurize the portion of the conduit upstream of the domed gate structure. The existing intake structure will require modification or replacement as part of a proposed reallocation project. The potential long-term pressurization of the upstream conduit and whether or not there will be resulting joint or seepage issues will also have to be further investigated as part of this study.

8.3.2 Dam Performance and Dam Safety Surveillance (Inspections and Instrumentation)

8.3.2.1 Dam Performance. To date, there have been no significant operational or dam performance issues at the Bear Creek Dam project. The maximum pool of record (elevation 5607.8) at Bear Creek Dam occurred in September 2013. The flood event, which was 5-6 weeks in duration, occurred without any adverse or significant impacts to the project. There were

several areas on the dam that experienced relatively minor flood related damage/problems. These included a large amount of debris on the upstream slope, damage to the vegetation on upstream slope and abutments, damage to the upstream slope access road and damage to the low level intake valves.

The embankment and foundation as well as the appurtenant structures of Bear Creek Dam have not yet been tested above elevation 5607.8 (the current maximum pool of record). Below elevation 5607.8, the dam has only been tested for a limited period of time (the record pool was only above normal pool for approximately 5 weeks). Potential storage behind the dam for water supply with a normal pool up to elevation 5623 would likely occur for much longer than a few days or weeks. Increased surveillance of the dam (inspections and instrumentation) for a higher normal pool that is above elevation of 5558 for longer periods of time will need to be evaluated as part of this study.

8.3.2.2 Dam Surveillance (Inspections and Instrumentation). The dam safety surveillance program for Bear Creek Dam currently includes a routine inspection program consisting of monthly inspections, annual inspections, periodic inspections (PI), and periodic assessments (PA). The program also includes regular instrumentation data collection and evaluation.

If a reallocation is ultimately recommended, increases to the normal pool elevation will most likely require increases to the frequency and number of inspections conducted, the amount of instrumentation data collected and evaluation of the data. Continuing evaluation inspections of the embankments and appurtenant structures by the Tri-Lakes Project Office would need to be increased until the Corps' Engineering Division is confident the dam is performing as designed. Additional (or more frequent) Periodic (or 1st Filling) Inspections may need to be conducted depending on the amount of the normal pool raise. Existing instrumentation may need to be monitored more frequently. New instrumentation may need to be installed to monitor embankment and foundation movement and/or piezometric conditions.

8.4 Environmental Resources

8.4.1 Wetlands and Riparian Habitat

The most abundant wetland types in the potential inundation zone include forested and scrub-shrub wetlands dominated by narrowleaf cottonwood (*Populus angustifolia),* plains cottonwood (*Populus sargentii*), sandbar willow (*Salix exigua*) and peachleaf willow (*Salix amygdaloides*). This wetland type is currently found along the reservoir shoreline, alluvial fans at the mouths of both Bear and Turkey Creeks, and scattered throughout the floodplains of both creeks. The willow shrub and cottonwood forested wetland types intermix in varying proportions throughout both creek floodplains. Narrow bands of willow, narrowleaf cattail (*Typha angustifolia*), sedges, and rushes occur along two unnamed intermittent-flow drainages that enter the reservoir from the north. Corridor widths of this habitat type vary from 15 to 25 feet. Several small ponds within the Turkey Creek floodplain have shallow-water shoreline areas dominated by sedges and

rushes. Most of the wetland acreage is located in the Bear Creek floodplain, followed by the Turkey Creek floodplain, the Bear Creek Reservoir shoreline, and the two unnamed intermittent drainages. These wetlands provide varying degrees of wildlife habitat, sediment retention and stabilization, nutrient transformation, water quality, and production export.

The main areas of riparian habitat in the project area are associated with Bear and Turkey Creeks upstream of the existing reservoir. Plains cottonwood (*Populus deltoides occidentalis*), box elder (*Acer negundo*), and sandbar willow (*Salix exigua*) are the most abundant species within the Bear Creek, Turkey Creek, and Coyote Gulch riparian corridors (Harner & Associates, 1990). The riparian corridor understory is composed of chokeberry (*Prunus virginiana*), skunkbush sumac (*Rhus trilobata*), and snowberry (*Symphoricarpos albus*) (Harner & Associates, 1990).

8.4.2 Listed Species

No federally-listed endangered, threatened, or candidate species are known to exist in the potential project area (USACE, 2012) although there are listed species with a history of high profile review from the U.S. Fish and Wildlife Service (USFWS) in the region. Those species include the black footed ferret (*Mustela nigripes*, endangered) and preble's meadow jumping mouse (*Zapus hudsonius Preble*, threatened). In addition to these species, there are four federally-listed species on the Central Platte River in Nebraska subject to a 2006 Biological Opinion that are consistently a USFWS concern on any project with the potential to deplete flows to the Platte River. These additional species include the whooping crane (*Grus Americana),* the northern Great Plains population of the piping plover (*Charadrius melodus*), the interior least tern (*Sterna antillarum*), and the pallid sturgeon (*Scaphirhynchus albus*). Under a 2007 program established by the USFWS, project proponents can use a streamlined consultation process for Platte River species using the programmatic biological opinion of June 16, 2006.

8.4.3 Aquatic Habitat

The seasonality, frequency, rate, and degree of water level change could be either beneficial or detrimental to fish and the recreational fishery. Shallow shoreline habitats are important to aquatic species and increased storage could alter the structure, substrate, vegetation, and overall habitat of shoreline areas. Alternatives that cause inundation of trees and other vegetation near shorelines could be beneficial for spawning/reproductive success of some species, for example. Overall, stability of water levels would be better for fish spawning than rapidly changing levels. An abrupt fluctuation in water levels during spawning is anticipated to be the most problematic. The city of Lakewood installed a new complete aeration system in early fall of 2002 providing greater coverage throughout the lake and improved oxygen transfer potential (BCWA, 2003). In 2010, operational studies were conducted to evaluate the aeration system's efficacy in oxygen transfer during phased on-off cycling. Results of the testing indicate that the aeration system can increase the dissolved oxygen concentrations throughout the water column by about 2 mg/l within a two-week period (BCWA, 2011a), which provides needed oxygen to protect the existing fishery.

8.5 Recreation Assessment

The Bear Creek Reservoir project land is leased to the city of Lakewood for park and recreation purposes. The city is concerned about impacts to recreation facilities constructed at its expense. Unavoidable impacts to facilities would need to be fully mitigated.

The Bear Creek Lake Park is a very popular recreation area due to its proximity to the Denver Metropolitan area, as well as the popular Red Rocks Amphitheater (located within a 15-minute drive north west of the project). The Bear Creek Lake Park average annual visitation estimate from 2003 through 2011 is 424,150. Visitors come to the park for a variety of recreation activities including: hiking, picnicking, camping and other activities. During days of peak visitation (summer weekends), the campground and parking lots are typically full with many visitors walking or biking into the park. Recreation use of the reservoir is expected to continue at current or increasing levels with nearby Denver population growth. City of Lakewood park management staff considers recreational facilities at Bear Creek Lake Park to be complete for recreation amenities and operating at or near capacity. Figure 9 depicts the hatched area leased to the city of Lakewood for park and recreational purposes within the blue outlined project boundary.

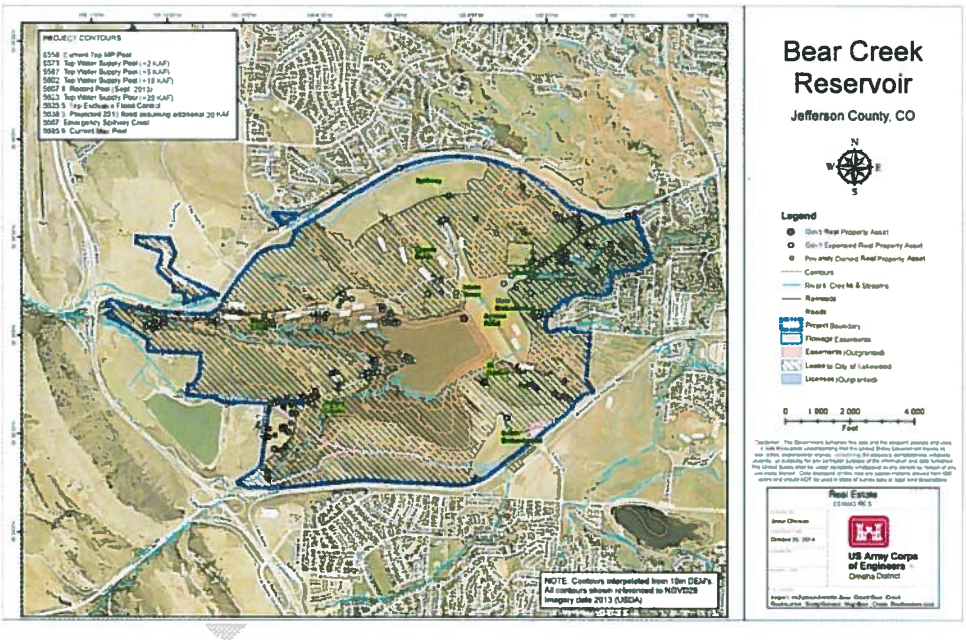


Figure 9: Area Leased to City of Lakewood for Park and Recreation Purposes

8.6 Preliminary Updated Cost of Storage Calculations

As described in the Corps' Water Supply Handbook, the updated cost of storage procedure begins with updating the original cost of reservoir construction to present day price levels and then assigning a percentage of the costs based on a 'use of facilities' cost allocation procedure. Costs are allocated to usable storage based upon the original reservoir storage capacity. As

shown in Table 5, total usable storage for Bear Creek Reservoir includes the exclusive flood control pool and the spillway crest; it does not include the permanent sediment pool.

Table 5: Bear Creek Usable Storage Calculations (acre-feet)

Zone	Acre- Feet*
Operating Pool	73,000
Multipurpose/Sediment	2,000
Total	75,000

*Original design storage capacity

For the reconnaissance study, 20,000 acre-feet or 27.4 percent of the usable storage pool is assumed to be available for reallocation, and thus is the basis of the updated cost of storage estimate. The 20,000 acre-feet value is a preliminary estimate of storage available for reallocation, and would likely change if this study proceeds to feasibility.

Construction costs are updated using the Corps of Engineers' Civil Works Construction Cost Index System (CWCCIS) as provided in EM 1110-2-1304 (revised 31 March 2014). The updated cost calculations are estimated based on the midpoint of construction as per the Water Supply Handbook (page 4-9). The mid-point of construction was identified as 1975, since construction began in 1973 and ended in 1977 (see Table 6). The state adjustment factor for Colorado is 0.98, as identified in EM 1110-2-1304, CWCCIS table A-3; this adjustment factor is also used in the calculation of the FY15 costs. The value of lands are updated based on the ratio of total FY15 updated costs to the total original costs (excluding lands) as directed by the Water Supply Handbook (page 4-10). This ratio is 4.16 and is based on ratio of $162,821,946 (cost in FY15 dollars excluding land) to $39,172,697 (cost in 1975 excluding land).

Table 6: Bear Creek Reservoir - Updated Cost of Construction 1975 - FY2015

Cost Category	1975 Cost	1975 CWCCIS	1st Quarter FY15 CWCCIS	FY15 Cost
Main Dam	$37,820,410	189.8	802.53	$156,717,457
Outlet Works	-	-	-	-
Reservoirs	$1,180,687	189.8	885.32	$5,397,155
Intake Structure	$171,600	189.8	798.32	$707,333
Fish & Wildlife	-	-	-	-
Levees & Floodwalls	-	-	-	-
Pumping Plant	-	-	-	-
Roads & Bridges	-	-	-	-
Buildings & Grounds	-	-	-	-
Perm Operating Equip	-	-	-	-
Relocations	-	-	-	-
Lands & Damages	$21,290,670	-	-	$88,495,012.78
Total	**$60,463,367**			**$251,316,958**

The proportion of storage considered for reallocation is 27.40 percent which equals $68,853,961 in FY15 dollars. This equals a cost per acre-foot of storage of $3,443.

The total annual cost of storage for the non-Federal sponsor would include both the annual payment for reallocation storage, plus the proportional annual operation and maintenance costs (O&M). Detailed O&M cost were not calculated since this is a reconnaissance level of analysis. Based on average annual O&M costs through 2009, however, it's estimated that O&M costs for water supply would be approximately $160,000 annually (this is the estimated proportion of total O&M allocated to water supply).

Annual payments are based on a 30-year payment schedule and the Water Supply Interest Rate from PL 85-500, which is the interest rate used for water supply storage space in projects completed or under construction prior to enactment of PL 99-662 (17 Nov 1986). The FY15 water supply interest rate is 3.5%. The annual cost for storage is estimated at $3,777,084, which equals $188.85/acre-foot of storage (included estimated O&M).

An evaluation of storage yield has not been completed for Bear Creek Reservoir as part of the reconnaissance study. A final estimate of cost/acre-foot of firm yield is unavailable at this time.

9 KEY UNCERTAINTIES

Currently, there are uncertainties related to impacts and effects of the topics listed below if a reallocation at Bear Creek would occur. As further analysis is completed and information is gathered, the following key uncertainties associated with a proposed study, will be addressed.

- Dam Safety – Bear Creek Dam currently has a DSAC rating of 3. As per ER-1110-2-1156, an exception approved by the USACE DSO would be required prior to initiation of a reallocation study. The current DSAC rating of the dam will be re-evaluated during the Periodic Assessment currently scheduled to be initiated in 2016 and completed in 2017.
- Inflow Design Flood – An analysis of the impact of raising the top of the flood control pool on the IDF would be required.
- Intake Structure – Ability to modify the structure cost effectively for higher water levels.
- Water Rights – Identification of providers' water rights involved in the project would be needed to assess impacts.
- Operations – Impacts to operations need to be identified at proposed pool elevations.
- Hydrology – Impacts and effects on non-tributary ground water, infrastructure, environment and facilities.
- Water Quality – The primary water quality concern is an increase in the hypolimnetic volume of Bear Creek Reservoir. The secondary concern is the potential increase in water eutrophication, phosphorous loads, metals, E. coli/fecal coliform bacteria, nutrients and algae.
- Aquatic Life and Fisheries – Extent of impacts resulting by creating/constructing new storage facilities, impacts and effects on existing reservoir aquatic life.
- Vegetation/Wetlands – Impacts to onsite wetlands, plants and trees.
- Wildlife – Effect on upland, terrestrial resident, migratory, riparian, wetland, water dependent, aquatic, semi-aquatic including any species of concern and sensitive communities.
- Recreation Impacts – Extent of impacts on facilities.
- Cultural Resources – Potential for and extent of impacts on cultural resources.

10 FORMULATING ALTERNATIVE PLANS

The process of building alternative plans will occur during plan formulation. Plan formulation begins with development of potential management measures that meet planning objectives and avoid planning constraints. Multiple measures will be identified to address the objectives of this project and combined into alternatives for evaluation. Initially, alternatives will be screened on broad concepts categorized as follows:

- Increased storage
- Importation of water
- Increased ground water use
- Increased water conservation

Details on potential alternative reallocations levels would be further developed during the feasibility phase.

10.1 Screening of Measures and Alternatives

Measures that pass screening will be combined into preliminary alternatives, based on initial data collection and professional judgment. These alternatives will again be screened using a wider range of planning criteria and more quantitative analysis based on measures identified below.

- Completeness of an alternative by itself vs. dependence on uncontrollable factors
- Effectiveness toward achieving the objectives partially or fully
- Efficiency, such as cost-benefit effectiveness, a low incremental cost
- Acceptablity/Feasibility, in technical, environmental, legal, and social terms
- Focus on the federal interest, significant federal resources

The results will be ranked in order of highest priority based on which objectives are met. Key uncertainties affecting selection of a tentatively selected plan will be identified and addressed.

11 RECOMMENDATION AND FINDINGS

It is recommended that a feasibility study be conducted, based on federal and sponsor interest in water supply reallocation. The initiation of the study would be subject to approval of an exception to proceed with conducting feasibility by the USACE DSO due to the current DSAC rating. Additional information on dam safety will be available following the PA scheduled to be initiated in 2016 and completed in 2017 and. Support for this recommendation is outlined in the report and include the following. CDNR has expressed support in pursuing a study. The 2010 State Water Supply Initiative Report projects the population of Colorado will double by 2050. The reallocation would help enable water providers to meet increasing water supply demand in the Denver Metro area over the next 50 years due to the combined effects of population growth, depletion of nonrenewable groundwater sources, and agricultural water providers' need for

augmentation water for alluvial wells. Potential exists for storage availablility in Bear Creek Reservoir. Finally, the state has reported that potential communities interested in obtaining water storage shares in Bear Creek have been identified. Following approval of this study, an exception requesting to proceed with a feasibility study examining the potential of reallocating existing storage for water supply in Bear Creek Reservoir will follow.

JOEL R. CROSS
Colonel, EN
Commanding

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

August 31, 2015

Colonel Joel R. Cross
District Engineer
Omaha District Corps of Engineers
1616 Capitol Avenue
Omaha, NE 68102-1618

RE: Reallocation at Bear Creek Reservoir, Lakewood, Colorado

Dear Colonel Cross:

The purpose of this letter is to indicate the Colorado Water Conservation Board's (CWCB) intent to sponsor a feasibility study with the Corps of Engineers to investigate the potential for reallocation of storage space, located at Bear Creek Reservoir. The feasibility study will investigate the reallocation at Bear Creek Lake under the authority of the Energy and Water Development Appropriations Act of 1998.

We understand that the feasibility study will investigate water reallocation opportunities. We are also aware of our obligations as a local sponsor under the General Investigations Program, including the cost-sharing requirement of 50 percent of the feasibility cost after the Feasibility Cost Sharing Agreement (FCSA) signing and 100 percent of the project implementation costs if a feasible plan is identified and a Water Reallocation Agreement is signed. For feasibility work to be accomplished, some of the sponsor's share may be in- kind services. This commitment is subject to the CWCB receiving appropriations from the Colorado General Assembly. We intend to pursue budgetary actions so that funds will be available to meet our cost sharing requirements at the time needed by the Corps of Engineers, however, this letter of intent is subject to gaining appropriations from the Colorado General Assembly.

The CWCB is interested in up to 20,000 acre feet for permanent reallocation in Bear Creek Reservoir. The State of Colorado is a public entity. Reallocation would occur under the authority of the 1958 Water Supply Act.

In reference to the Corps letter dated May 21, 2015, the State understands the issues related to dam safety considerations, at the principal dam embankment a DSAC 4 [Low Urgency and the secondary (south) dam embankment a DSAC 3 [Moderate Urgency]. We understand that the Corps will continue to investigate and may implement measures to remediate the dam safety conditions. If the State were to receive an allocation for water supply and near term or future remediation efforts were required, cost sharing would be in proportion to the storage space reallocated.

Sincerely,

James Eklund, Director

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street
Denver, CO 80203

P (303) 866-3441
F (303) 866-4474

John Hickenlooper, Governor

Mike King, DNR Executive Director

James Eklund, CWCB Director

TO: Finance Committee Members
Colorado Water Conservation Board

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

DATE: September 17, 2015

SUBJECT: Growth Rate Policy Change – Financial Policy #13

Introduction

Over the past five years the Finance Committee has been required to make an "Exemption" from the Financial Policy #13 in order to fund the important projects CWCB is involved in each year. The 2015/16 revenue projections from Federal Mineral Lease (FML) indicate that there is not enough money to fully fund even the statutorily required CWCB programs. This reality has caused staff to revisit Financial Policy #13 in order to free up much needed money for NonReimbursable Investment (NRI) funding and to more accurately represent its impact to the Construction Fund (Fund).

The current Policy requires the Board to consider only projects that allow the Fund to grow with construction inflation. The modified Policy, as recommended below and shown on the attached Red-lined version, will let the Fund grow as a revolving fund without supplemental money from FML. This will allow the Board access to approximately $3 million for Non-Reimbursable Investments out of the Construction Fund in the current year.

Staff Recommendation

The Finance Committee recommends to the Board a change to Financial Policy #13 regarding the Target Growth of the Construction Fund to look at the Construction Inflation Cost but not be bound to it in Policy. The Construction Fund will grow at the rate of return on its invested Projects.

Discussion

Over the past 10 years the CWCB has utilized the Construction Cost Index, which measures Construction Inflation and is published in the 'Engineering New Record' publication. Using a 20 year average to attenuate the extreme swings, inflation has been calculated around 3% for the past ten years. The intent of the Growth Policy as written was to preserve the buying power of the Construction Fund for future projects.

Since 2010, the Fund has required about $3 to $5 million of FML revenues to offset the difference between the Target Growth for inflation (3%) and what the Fund actual generates from interest rates charged on outstanding loans (2.5%).

The Policy as proposed will remove the requirement to grow to match inflation and instead allow the Fund to grow only from its own interest earnings. It is important to know that the Severance Tax Perpetual Base Fund (Sev Tax PBF) is not part of this calculation.

The attached redline includes recommended changes.

POLICY NUMBER: 13

SUBJECT: **TARGET GROWTH RATES FOR THE EQUITY OF THE CONSTRUCTION FUND AND SEVERANCE TAX PERPETUAL BASE FUND**

EFFECTIVE DATE: October 1, 2000

REVISED DATES: January 27, 2004
September 14, 2004
November __ 2015

POLICY: The Colorado Water Conservation Board (CWCB) will attempt to maintain an overall growth rate for the equity of the Construction Fund (CF) and Severance Tax Perpetual Base Fund (Sev. Tax Fund). CWCB shall grow the Construction Fund at the rate of return on the interest rates invested in water projects throughout the state. CWCB shall require the Sev. Tax Fund to also grow at the rate of return on loans plus 90% of the revenues from annual Severance Tax revenues.~~of no less than the long-term rate of inflation, as established by appropriate construction cost indices, plus 0.5%.~~ This will be the "target growth rate" for each fund.

PURPOSE: To offset the impacts of cost inflation, to maintain the financial integrity of the CWCB Construction Fund and Sev. Tax Fund and to provide a process for estimating the financial resources available for non-reimbursable investments from the Funds in any given year.

APPLICABILITY: This policy and procedure applies to the CWCB Construction Fund and Severance Tax Perpetual Base Fund.

PROCEDURE: The overall growth for the fund equity of the Construction Fund and Sev Tax Fund will be presented as part of the ~~Comprehensive~~ Annual Financial Report by CWCB staff at the Annual ~~September~~ Finance Committee Meeting and ~~Board~~subsequent Board meeting each year. Staff will present an annual estimate of funds available for non-reimbursable investments relative to the target growth rate. The estimate of funds available for non-reimbursable investments will be based on projections, fund performance and actual

distributions from Federal Mineral Lease and Severance Tax. ~~the current fund equity (as of the end of the most recent fiscal year), less the previous year's fund equity increased by the target growth rate. At the same Board meeting each year,~~

Staff will present a summary of long-term construction cost indices with any recommendations for revisions to the target growth rate of the equity of the fund.

Colorado Water Conservation Board
September 17, 2015, Finance Committee

Modified Policy #13

Construction Fund Analysis for FY16/17 NonReimbursables

Using a Modified Financial Policy #13

FY15/16 FML June Projection **$ 13,500,000**

Expenses Effecting Equity of the Construction Fund

CWCB Operations		$ 7,800,000

Funds to be Refreshed - Per Statute		
Wild and Scenic Fund	Up to $400K	$ 400,000
In-Stream Flow Acquisitions	Up to $1M	$ 1,000,000
Stream Gauge Fund	Up to $250K	$ 250,000
Colorado Water Education Foundation - Annual Support *	Up to $150K	$ 150,000

Refreshed Subtotal = $ 1,800,000

Total **$ 9,600,000**

(Tab) **Available for 2016 NRIs from Const Fund = $ 3,900,000**

Construction Fund Non-Reimbursable Investment Programs and Projects

Priority	**Program Funding Requests**		**Benefit**	**Requested Amount**		**Staff Recommends**
(1)	CWCB - Kevin Houck	Flood & Drought Response Fund	Statewide	$ 500,000	(Up to $500K)	$ 500,000
(2)	CWCB - Ted Kowalski	Litigation Fund (Budget for AG's)	Statewide	$ 600,000	(Up to $2M)	$ 600,000
(3)	DWR - M Hardesty/J Baessler	Satellite Monitoring System Maintenance Program	Statewide	$ 380,000	($330K in 2015)	$ 380,000
(4)	CWCB - Joe Busto	Weather Modification Permitting Program	Statewide	$ 175,000	($175K in 2015)	$ 175,000
(5)	CWCB - Thuy Patton	Colorado Floodplain Map Modernization Program	Statewide	$ 500,000	(Up To $500K)	$ 500,000
Project Funding Requests						
(6)	CWCB - Joe Busto	Water Forecasting Partnerships Project	Rio Grande	$ 300,000	New	$ 300,000
(7)	CWCB - Taryn Finnessey	Colorado Mesonet Project	Statewide	$ 150,000	($150K in 2015)	$ 150,000
						$ 2,605,000
Severence Tax PBF Projects Bill Projects						
(8)	CWCB - Chris Sturm	Colorado Watershed Restoration Program	Statewide	$ 1,500,000	($1.5M in 2015)	$ 1,500,000
(9)	CWCB - Ted Kowalski	Bear Creek Reallocation of Storage Study	So. Platte	$ 2,500,000	New	$ 2,500,000
						$ 4,000,000

Total Recommended 2016 Projects Bill - Non-Reimbursable Investments (1 thru 9) = $ 6,605,000

Footnotes:

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

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

To: Finance Committee Meeting

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

Date: September 17, 2015

Subject: Project Funding Update and Discussion

The CWCB staff will provide information regarding the following Projects for the Committee to be aware of some of the developments over the past few years.

1) Rio Grande Cooperative Project – Tim

2) Chatfeld Reallocation Project – Tom

3) Arkansas Valley Conduit Project - Kirk

Project Beneficiary	Storage Amount (AF)	% of Total Storage	Est. Total Mitigatin and Storage Cost (1)	Funding Source				Estimated Future Annual OM,R,R&R (4)
				CWCB Investment (2)	CWCB Loan	CWCB Loan Int./Term	Entity (3)	
Centennial Water & Sanitation District	6,922	33.60	$48,454,000.00	$0.00	$44,440,000.00	3.0%/30 yr	$4,845,400.00	$373,788
Colorado Water Conservation Board	6,278	30.48	$43,946,000.00	$43,946,000.00	$0.00	n/a	n/a	$339,012
Orphan Shared Acquired:								
a) City of Aurora - 3,561 AF (5)								
b) Town of Castle Rock - 1,300 AF (6)								
b) Castle Pines Metro District - 777 AF								
c) Town of Roxborough - 500 AF								
d) Perry Park - 100 AF								
e) Denver Botanic Gardens - 40 AF								
Central Water Conservancy District - 2,849 AF	4,274	20.75	$29,918,000.00	$2,000,000.00	$28,451,700.00	1.75%/30 yr.	$0.00	$230,796
a) Western Mutual Ditch Co. - 1,425 AF (7)								
Castle Pine North Metro District	1,006	4.88	$7,042,000.00	$0.00	$6,453,900.00	3.0%/30-yr.	$704,200.00	$54,324
Colorado Parks and Wildlife	1,000	4.85	$7,000,000.00	$7,000,000.00	$7,000,000.00	0%/30 yr.	$0.00	$54,000
Mount Carbon Metro District	779	3.78	$5,453,000.00	$0.00	$0.00	n/a	$5,453,000.00	$42,066
Town of Castle Rock	200	0.97	$1,400,000.00	$0.00	$0.00	n/a	$1,400,000.00	$10,800
Center of Colorado Water Conserv. Dist.	131	0.64	$917,000.00	$0.00	$606,000.00	2.5%/30-yr.	$311,000.00	$7,074
Castle Pines Metro District	10	0.05	$70,000.00	$0.00	$0.00	n/a	$70,000.00	$540
Totals	20,600	100	$144,200,000.00	$52,946,000.00	$86,951,600.00		$12,783,600.00	$1,112,400.00

Footnotes:

(1) Total Project cost is estimated at $134M, which includes storage $16M, recreational facility relocations $48M, environmental mitigation $60M, and the state, fish, wildlife rec. plan at $10M For planning and Project budgeting, the total cost for each project participant has been estimate at $7,000/AF, which provides for a total cost of $144.2M, which provides for a 7.6% contigency.

(2) CWCB has $62M currently authorized and appropriated by the General Assembly for the Project. The $62M was based on purchasing 6,900 AF of orphan shares, at an estimated cost of $9,000/AF, which also accounted for long term OM,R,R, & R expenses. The amount of orphan share for the Project continues to evolve, but currently CWCB has committed to acquire the orphan shares identified above, with CPW agreeing to purchase its 1,000 AF with a CWCB loan, and Central Water Conservancy District agreeing to purchase Western Mutuals project allocation of 1,425 AF. As part of Central agreeing to acquire Western Mutual's 1,425 AF, CWCB agreed to provide Central with a $2M grant to promote agricultural and to enhance stream flows in the upper reach. Therefore, CWCB's current financial Project exposure is approx. $53M, leaving $9M available to cover long term $OMR,R&R.

(3) The Entity amount where a CWCB loan is involved is based on 10% of the total mitigation and storage cost. CWCB's loan amount plus the entity contribution may add up to more then the total project cost, given that the initial loan approval by the CWCB Board may have been based on a higher cost per AF. However, disbursement of loan funds will be limited to 90% of the total cost.

(4) The Army Corps of Engineer's has estimated the long term (50-year) OMR,R&R on the Projec to be $56M (present worth), which equates to an anuual cost of $54/AF. This annual OMR,R,R&R value seems quite high, based on other working Associations, such as the Animas-La Plata Project, where a more realistic value might be around $30/AF.

(5) Central may be interested in acquiring Aurora's orphan shares, currently held by CWCB, per a long term storage purchase agreement, similar to what excuted with Town of Castle Rock.

(6) In July of 2015, the Town of Castle Rock executed a 15 year storage purchase agreement with CWCB to acquire 87 AF/YR. at a cost of $7K/AF . To-date the Town has acquired 87 AF.

(7) CWCB originally agreed to pickup Western Mutual orphan shares in 2014, but have since made arrangement with Central to have them purchase the orphan shares. CWCB's loan amount to Central reflects them covering Western Mutuals storage allocation of 1,425 AF

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
Denver, CO 80203

To: Finance Committee Meeting

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

Date: September 17, 2015

Subject: Possible Statute and Financial Policy Changes

The CWCB staff will present two statutory changes in order to generate consensus among Committee members in order to prepare 2016 Project Bill language for consideration by the Board in November 2016. The ideas and questions surrounding the issues are provided below.

1) Change the CWCB's statutory authority to not exclude treated water projects. See attached redline version of C.R.S 37-60-119
    a. This may require a change to Financial Policy #to control the types of projects CWCB will fund
    b. This may require coordination with other Colorado Department of Public Health (CDPHE) and/or EPA.

2) Changing the use of the Severance Tax Perpetual Base Fund to include Non-Reimbursable Project Investments (NRIs) C.R.S. 39-29-109. This would require a change to the Financial Policy #13 – Target Growth. Ideas have included:
    a. 5%, 10%, or 20% of Sev. Tax Perpetual Base Fund revenues be dedicated to NRI's annually for Multi-Use beneficiaries.
    b. Allow first $30, $35M, or $40M in revenues to go to the Fund and transfer the remainder over to the Construction Fund. This could possibly be in lieu of allowing NRI's to be funded out of the Fund
    c. Require a certain portion of the Fund to be dedicated to non-consumptive project components. (ie. ISF purchase, Watershed Restoration, Wild & Scenic Fund, recreational, etc.)

37-60-119. Construction of water and power facilities - contracts with and charges against users.

(1) (a) In order to promote the general welfare and safety of the citizens of this state and to protect the allocation of interstate waters to the state, the board may, subject to the provisions in section 37-60-122, construct, rehabilitate, enlarge, or improve, or loan moneys to enable the construction, rehabilitation, enlargement, or improvement of, such flood control, water supply, and hydroelectric energy facilities, excluding ~~domestic water treatment and distribution systems~~, together with related recreational facilities, in whole or in part, as will, in the opinion of the board, abate floods or conserve, effect more efficient use of, develop, or protect the water and hydroelectric energy resources and supplies of the state of Colorado.

(b) In carrying out this subsection (1), the board shall place special emphasis upon the adoption and incorporation of measures that will encourage the conservation and more efficient use of water, including the installation of water meters or such other measuring and control devices as the board deems appropriate in each particular case.

(2) The board may, subject to the provisions in section 37-60-122, enter into contracts for the use of, or to loan moneys to enable the construction, rehabilitation, enlargement, or improvement of, said flood control, water, power, and any related recreational facilities, excluding domestic water treatment and distribution systems, with any agency or political subdivision of this state or the federal government, individuals, corporations, or organizations composed of citizens of this state. Any such contracts may provide for such charges to the using entity as, in the opinion of the board, are necessary and reasonable to recover the board's capital investment, together with operational, maintenance, and interest charges over the term of years agreed upon by contract. Interest charges shall be recommended by the board at between zero and seven percent on the basis of the project sponsor's ability to pay and the significance of the project to the development and protection of the water supplies of the state. Interest charges shall be credited to and made a part of the Colorado water conservation board construction fund. Any other charges, as determined appropriate by the board, shall be continuously appropriated to the Colorado water conservation board for supplemental operational expenditures.

(3) (Deleted by amendment, L. 2002, p. 456, § 29, effective May 23, 2002.)

Source: L. 71: p. 1343, § 2. **C.R.S. 1963:** § 149-1-19. **L. 78:** Entire section R&RE, p. 465, § 1, effective May 4. **L. 79:** Entire section amended, p. 1361, § 1, effective July 1. **L. 81:** (2) amended, p. 1768, § 2, effective June 16. **L. 84:** Entire section amended, p. 958, § 9, effective May 21. **L. 86:** Entire section amended, p. 1085, § 6, effective April 24. **L. 92:** Entire section amended, p. 2283, § 3, effective May 27. **L. 96:** (3) amended, p. 1223, § 25, effective August 7. **L. 2002:** (2) and (3) amended, p. 456, § 29, effective May 23. **L. 2004:** (1)(b) and (2) amended, p. 888, § 21, effective May 21.

Editor's note: Section 21 of House Bill 04-1221 (chapter 253) amended subsection (1), resulting in paragraph designations being added to the subsection; however, during the legislative process, paragraph (a) of the subsection was removed from the bill by a house second reading floor amendment. For clarity of the legislative intent the entire subsection is set out with the amendments made in said bill.

Cross references: For the legislative declaration contained in the 1996 act amending subsection (3), see section 1 of chapter 237, Session Laws of Colorado 1996.

39-29-109. Severance tax trust fund - created - administration - distribution of moneys - repeal

(1) There is hereby created in the state treasury the severance tax trust fund, also referred to in this section as the "fund", which the department of natural resources shall administer. The fund is to be perpetual and held in trust as a replacement for depleted natural resources, for the development and conservation of the state's water resources pursuant to sections 37-60-106 (1) (j) and (1) (l), 37-60-119, and 37-60-122, C.R.S., for the use in funding programs that promote and encourage sound natural resource planning, management, and development related to minerals, energy, geology, and water and for the use in funding programs to reduce the burden of increasing home energy costs on low-income households.

(2) State severance tax receipts shall be credited to the severance tax trust fund as provided in section 39-29-108. Except as otherwise set forth in section 39-29-109.5, all income derived from the deposit and investment of the moneys in the fund shall be credited to the fund. At the end of any fiscal year, all unexpended and unencumbered moneys in the fund remain therein and shall not be credited or transferred to the general fund or any other fund. All moneys in the fund are subject to appropriation by the general assembly for the following purposes:(a) The severance tax perpetual base fund. (I) Repealed.

(I.5) There is hereby created in the state treasury the severance tax perpetual base fund, also referred to in this paragraph (a) as the "fund", which the Colorado water conservation board, also referred to in this paragraph (a) as the "board", shall administer. The state treasurer shall transfer moneys to the fund from the severance tax trust fund, as specified in this section. The moneys in the fund are continuously appropriated to the board for purposes authorized by this paragraph (a).

(II) One-half of the severance tax receipts credited to the fund for fiscal years commencing on or after July 1, 2009, shall be credited to the severance tax perpetual base fund and used for state water projects pursuant to sections 37-60-119 and 37-60-122, C.R.S.; except that the total amount of severance tax receipts credited to the severance tax perpetual base fund during the fiscal year shall not exceed fifty million dollars unless the cap established in subparagraph (III) of this paragraph (a) is exceeded. The authorization and contract for each project must require repayment of principal and interest to the fund, and moneys so repaid shall be credited to the severance tax perpetual base fund.

(III) For fiscal years commencing on or after July 1, 2009, the state treasurer shall transfer the moneys credited to the fund that are not credited to either the severance tax perpetual base fund or the severance tax operational fund to the small communities water and wastewater grant fund created in section 25-1.5-208 (4), C.R.S.; except that the maximum amount of moneys annually credited to the small communities water and wastewater grant fund shall not exceed ten million dollars.