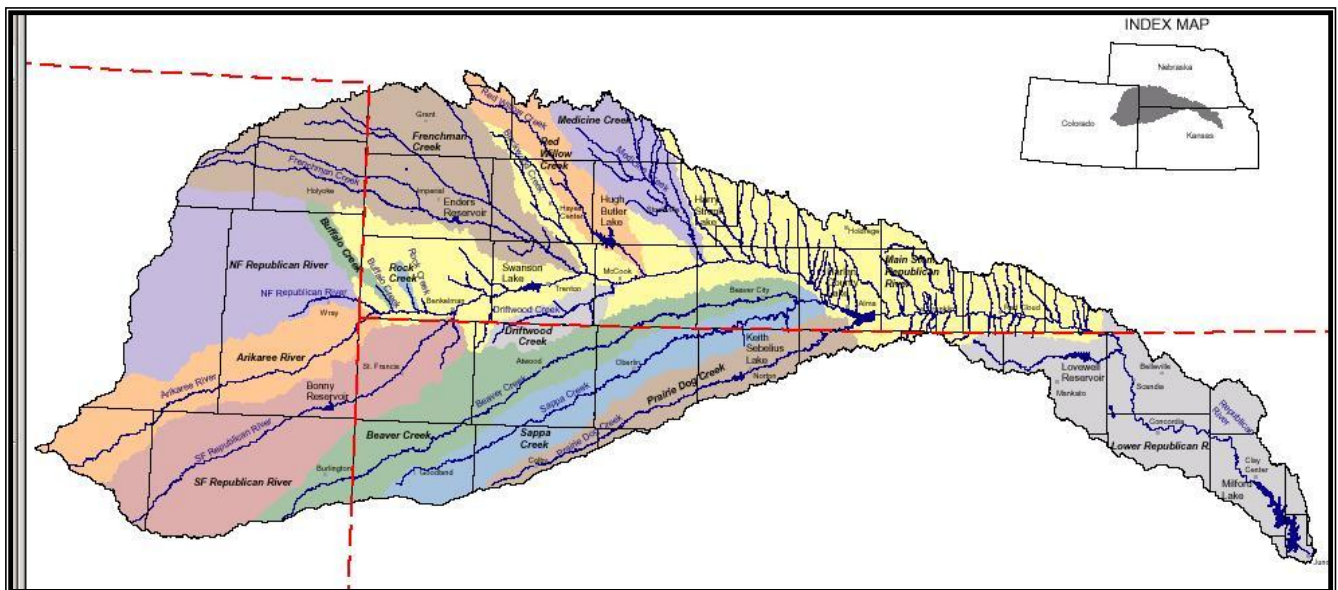


# REPUBLICAN RIVER COMPACT ADMINISTRATION

## 56<sup>th</sup> ANNUAL REPORT

FOR THE YEAR 2016



**BURLINGTON, COLORADO**

**AUGUST 22, 2017**

# 56<sup>th</sup> Annual Report for the Year 2016 | 2017 Annual meeting

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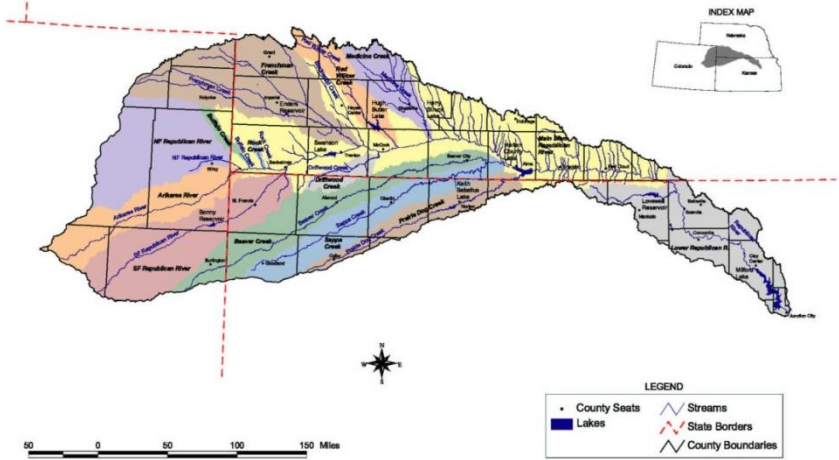
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# REPUBLICAN RIVER COMPACT ADMINISTRATION

Special Meeting  
May 25, 2017





SUMMARY AND MINUTES OF  
THE SPECIAL MEETING OF THE  
REPUBLICAN RIVER COMPACT  
ADMINISTRATION

May 25, 2017, 9:28 a.m. (CST)

LINCOLN NEBRASKA AND VIA  
CONFERENCE CALL

**Summary & Minutes**

A transcript of this meeting was prepared by Linda W. Rohman of General Reporting Service. (Exhibit A). The transcript was reviewed by each of the States and, upon final approval by the Compact Administration; this transcript will serve as the official minutes of this Special Meeting of the Compact Administration. Below is a summary of the meeting.

**Agenda Item 1: Introductions**

The Special Meeting of the Republican River Compact Administration (RRCA) was called to order by Colorado Chairperson Dick Wolfe at 9.28 a.m. CST on May 25, 2017. Chairperson Wolfe noted that both he and Commissioner Barfield were in attendance and that Commissioner Fassett was present via phone.

Chairperson Wolfe introduced those present at the Colorado listening location and asked the other two states to do the same. A fuller listing of those attendees is attached as Exhibit B. Some of the attendees included:

<u>Name</u>	<u>Representing</u>
Dick Wolfe	Colorado Commissioner and Chairperson
Gordon W. "Jeff" Fassett	Nebraska Commissioner
David Barfield	Kansas Commissioner
Ivan Franco	Colorado Engineering Committee Chairperson
Chris Beightel	Kansas Engineering Committee Member
Jesse Bradley	Nebraska Engineering Committee Member

**Agenda Item 2: Modifications & Adoption of the Agenda**

Chairperson Wolfe introduced adoption of the agenda with one modification. He proposed to add a section for public comments before adjournment. The agenda was adopted with the proposed addition. A copy of the final agenda is attached as Exhibit C.

**Agenda Item 3 (a): Discuss proposal regarding Amendments to the Accounting Procedures and Reporting Requirements.**

Commissioner Wolfe started by thanking his staff and all other instrumental folks involved in bringing the agenda items to a vote at this meeting. Commissioner Barfield also made comments recognizing the hard work of staff and the significance of the meeting. Commissioner Fassett also spoke on the magnitude of the meeting and thanked all staff members involved.

Commissioner Wolfe moved on to agenda item 3a, by providing a short introduction and then turned the discussion over to Commissioner Barfield for a more detailed description of the agenda item. Commissioner Barfield's introduction touched on the original accounting procedures that were adopted in 2003 as part of the final settlement stipulation. He noted that the accounting procedures have been changed a number of times over the years in various ways and the current resolution would now propose an extensive set of changes in an effort to implement the long-term agreements at hand. The changes to the accounting procedures have been extensively reviewed by the states and accountings prepared for years 2007 to 2015 in a manner consistent with the proposed changes. Commissioner Barfield then went on to read into the record the resolution entitled "Resolution Approving Accounting Changes, May 25, 2017" (Exhibit D).

Afterwards Commissioner Barfield moved to adopt the Resolution Approving Accounting Changes, dated May 25<sup>th</sup>, 2017, and a second by Commissioner Fassett, the motion passed unanimously.

**Agenda Item 3 (b): Discuss proposal regarding Rules and Regulations of the Republican River Compact Administration.**

Commissioner Wolfe introduced agenda item 3b, noting that this agenda item was a change to the rules and regulations from August 24<sup>th</sup>, 2016, now being revised to May 25<sup>th</sup>, 2017. There were a number of small changes made throughout the document and Commissioner Wolfe went through the document and noted each change (Exhibit E). The principle purpose of the amendment to the rules and regulation is to reference the amended Accounting Procedures and Reporting Requirements just adopted.

Afterwards Commissioner Barfield moved to adopt the Resolution Approving Accounting Changes, dated May 25<sup>th</sup>, 2017, and a second by Commissioner Fassett, the motion passed unanimously.

**Agenda Item 3 (c): Review motion to accept the Engineering Committee Report containing the 2005-2015 accounting inputs and accounting results.**

Commissioner Wolfe moved on to agenda item 3c, where he noted that the purpose of the agenda item was to approve an Engineering Committee report that includes accounting for several years. After this he turned the floor over to staff member and current Engineering Committee Chair Ivan Franco to step through a narrative describing the contents of the report being proposed.

Mr. Franco noted that the Engineering Committee was assigned to continue efforts to finalize all accounting for years since 2006 and resolve issues between the States preventing finalization. Also, the Engineering Committee was to conform the accounting procedures and reporting requirements to the various approved RRCA resolutions, including determining the appropriate model runs or runs to be performed by Principia Mathematica. These two assignments were completed by the Engineering Committee.

The Engineering Committee provided, with the report the committee's recommendations on the 2005 through 2015 accounting for the RRCA action following the adoption of accounting procedures and reporting requirements, rules and regulations, and the Resolution Approving Accounting Changes by the RRCA on May 25th, 2017. Mr. Franco noted that two attachments are included with this report detailing the 2005 and 2006 accounting recommendation and the 2007 through 2015 accounting recommendation of the Engineering Committee. Mr. Franco explained that there were three agreements attached to the Engineering Committee report which propose adoption of the 2005, 2006 and 2007 thru 2015 accounting.

Commissioner Wolfe asked if there were any questions regarding the Engineering Committee Report and the attachments (Exhibit F). Hearing none, Commissioner Barfield moved to adopt the spreadsheet for 2005 that is referenced in the report, adopt the 2006 spreadsheet that is referenced in the report, agree to adopt the 2007 to 2015 accounting inputs, accounting tables and attachment report, as well as the spreadsheet listed in the Engineering Committee Report for the years 2007 to 2015. Commissioner Fassett seconded the motion and the motion passed unanimously.

#### **Agenda Item 4: Public Comment**

Commissioner Wolfe moved onto the final agenda item and opened the floor to public comments. Hearing none, Commissioner Wolfe thanked the water users in the basin, the water districts and the Bureau of Reclamation for making this moment possible.

Commissioner Fassett suggested that the Engineering Committee be assigned to document the differences between the states that lead to Table 4a being left blank in the proposed accounting. He felt that with staffing changes and time this issue may become nebulous to future staff if not documented in some form. Commissioner Wolfe agreed with the proposal but suggested delaying the discussion until the upcoming August annual meeting.

**Agenda Item 4: Adjournment**

Commissioner Wolfe thanked everyone for their comments and made his own remarks about his final time serving as Colorado Commissioner and Chairman. After a round of applause from the audience, it was agreed that all business for the meeting had concluded and the meeting was adjourned.

The meeting adjourned (time not noted on transcript)

The May 25, 2017, Special Meeting report is hereby approved by unanimous vote of the RRCA on this 21st day of August, 2018.

As indicated by their signature and date below, the RRCA Commissioners agree that the report was approved by RRCA on the date indicated above.

Kevin D. Rein DATE SIGNED: 8-21-18  
Kevin Rein, Chairperson and Colorado Commissioner

Gordon W. Fassett DATE SIGNED: 8/21/18  
Gordon W. "Jeff" Fassett, Nebraska Commissioner

David W. Barfield DATE SIGNED: 8/21/2018  
David Barfield, Kansas Commissioner

**Exhibits**

- Exhibit A: Transcript of the May 25, 2017, Special Meeting
- Exhibit B: Attendance of the May 25, 2017, Special Meeting
- Exhibit C: Agenda of the May 25, 2017, Special Meeting
- Exhibit D: Resolution Approving Accounting Changes, May 25, 2017
- Exhibit E: Rules and Regulations of the Republican River Compact Administration, May 25 2017
- Exhibit F: Engineering Committee Report (with attachments) May 25, 2017

SPECIAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION

May 25, 2017  
9:28 a.m. Central Time  
Flatwater Group, Inc.  
8200 Cody Drive, Suite A  
Lincoln, Nebraska

MEMBERS PRESENT

FOR COLORADO: Commissioner Dick Wolfe, Chair  
Ivan Franco

FOR KANSAS: Commissioner David Barfield

FOR NEBRASKA: Commissioner Gordon W. "Jeff" Fassett (via  
conference call)

- - -

REPORTER'S CERTIFICATE:

State of Nebraska )  
 ) ss.  
County of Lancaster )

I, LINDA W. ROHMAN, reporter for GENERAL REPORTING SERVICE, certify that I reported the proceedings in this matter; that the transcript of testimony is a true, accurate, and complete extension of the recording made of these proceedings.

IN TESTIMONY WHEREOF, I have hereunto set my hand at Lincoln, Nebraska, this \_\_\_\_\_ day of June, 2017.

By: \_\_\_\_\_  
Reporter

- - -

1 PROCEEDINGS:

2 CHAIRPERSON WOLFE: Well, good morning everyone.  
3 This is Dick Wolfe, Chairman for the Republican River  
4 Compact Administration and Commissioner for Colorado. This  
5 is the special meeting of the Republican River Compact  
6 Administration, May 25<sup>th</sup>, 2017. We're here at the Flatwater  
7 Group in Lincoln. And just for the record, for the  
8 Commissioners, just in attendance, David Barfield for Kansas  
9 is here and Jeff Fassett with Nebraska -- Commissioner -- is  
10 on the phone. So, we do have a requisite number of  
11 commissioners here to take action.

12 And since we are recording this, if someone is  
13 going to speak, will you please state your name.

14 (Tone.)

15 Hello, who just joined us?

16 MR. STANTON: Shane from the Cambridge Field  
17 Office.

18 CHAIRPERSON WOLFE: All right. Thank you. We  
19 just started so, just getting into the agenda.

20 And there were sign-up sheets that went around.  
21 And for those who are on the phone, if your -- that we got  
22 your name, if there's any others then you individually, you  
23 could give us that information via sign-up sheet or  
24 verbally.

25 So, I think we're going to go ahead and get

1 started. First, are there any other specific introductions,  
2 Commissioner Barfield or Commissioner Fassett, that you  
3 wanted to do before we moved on into the agenda?

4 COMMISSIONER BARFIELD: I don't believe so.

5 COMMISSIONER FASSETT: Yeah. This is Jeff. Since  
6 I'm on the phone, I wouldn't mind if you went around and let  
7 me know who -- everybody who's there.

8 CHAIRPERSON WOLFE: Okay. We can certainly do  
9 that quickly. I'm going to let them introduce themselves  
10 and we'll go around the table.

11 (Tone.)

12 Who just joined us?

13 MR. THAYER: Chance.

14 CHAIRPERSON WOLFE: Hi, Chance. Thank you for  
15 joining. We're just going around the room here in the  
16 Flatwater Group's office for introductions quickly, and I'm  
17 going to turn to my left. Jennifer will start us off, and  
18 we'll just go around the room, so --

19 MS. SCHELLPEPER: All right. Thanks, Dick. This  
20 is Jennifer Schellpeper with the State Department of Natural  
21 Resources, Nebraska.

22 MR. LAVENE: Justin Lavene, Nebraska Attorney  
23 General's Office.

24 MR. WILMOTH: Tom Wilmoth, Blankenau Wilmoth.

25 COMMISSIONER BARFIELD: David Barfield,



1 Commissioner for Kansas.

2 MR. BRADLEY: Jesse Bradley with the Nebraska  
3 Department of Natural Resources.

4 MS. FLAUTE: Carol Flaute, Nebraska Department of  
5 Natural Resources.

6 MR. KRACMAN: David Kracman, the Flatwater Group.

7 MR. SCOTT: Craig Scott, Bureau of Reclamation.

8 MR. RILEY: Tom Riley with the Flatwater Group.

9 MR. LETOURNEAU: I'm Lane Letourneau with the  
10 Kansas Department of Agriculture.

11 MR. TITUS: Kenny Titus, Kansas Department of  
12 Agriculture.

13 MR. BEIGHTEL: Chris Beightel, Kansas Department  
14 of Agriculture.

15 MR. STEINBRECHER: Scott Steinbrecher, Colorado  
16 Attorney General's Office.

17 MR. BROWN: Don Brown, Colorado Department of  
18 Agriculture.

19 MR. FRANCO: Ivan Franco, Colorado Division of  
20 Water Resources.

21 MR. MERRIGAN: Bob Merrigan, Middle Republican  
22 NRD.

23 MR. RUSSELL: Jack Russell, Middle Republican NRD.

24 MR. SULLIVAN: Mike Sullivan, Colorado Division of  
25 Water Resources.

1 MS. BURGERT: Kari Burgert, Nebraska DNR.

2 MR. FANNING: Jasper Fanning, Upper Republican.

3 MR. CLEMENTS: Mike Clements, Lower Republican

4 NRD.

5 MR. DICKE: Scott Dicke, Lower Republican NRD.

6 MR. GROFF: Marc Groff, the Flatwater Group.

7 CHAIRPERSON WOLFE: And then, we just had someone

8 join by phone. Who was it that just joined in the last

9 minute or so?

10 MR. JENKINS: Nate Jenkins with Upper Republican

11 NRD.

12 CHAIRPERSON WOLFE: All right. Thank you, Nate.

13 (Tone.)

14 Who just joined us?

15 MS. TROMPKE: This is Marcia Trompke, Central

16 Nebraska Public Power and Irrigation District.

17 CHAIRPERSON WOLFE: Thank you for joining. We

18 just started; just did introductions here in the Flatwater

19 Group office.

20 MS. TROMPKE: Thank you.

21 CHAIRPERSON WOLFE: Thank you.

22 So, I think we're all good to go. Next on our

23 agenda is any modifications and adoption of the agenda; and

24 I think we were going to make one amendment to the agenda

25 before adjournment to allow for public comments, if there

1 are any. So, I would ask to have that added. And are there  
2 any other amendments or changes to the agenda from either of  
3 the Commissioners?

4 COMMISSIONER BARFIELD: No. I'd move we adopt the  
5 agenda with the addition of allowing an opportunity for  
6 public comments at the end.

7 CHAIRPERSON WOLFE: Okay. Motion's been made.  
8 Second?

9 COMMISSIONER FASSETT: This is Jeff. I'll second.

10 CHAIRPERSON WOLFE: All right. Thank you. All  
11 those in favor, say aye.

12 COMMISSIONER BARFIELD: Aye.

13 CHAIRPERSON WOLFE: Aye. Motion approved.

14 COMMISSIONER FASSETT: Aye.

15 CHAIRPERSON WOLFE: All right. Next on our  
16 agenda, we've got three specific action items that we're  
17 going to do today. And maybe, before we get started into  
18 this, we've got to plan how we're going to attack these  
19 three agenda items. But I wanted to, I guess, first, take  
20 this opportunity, before we get into these actions items,  
21 because I know we're going to have a fairly short agenda  
22 today and -- but I think it shouldn't get past us how much  
23 effort's really gone into getting to this point. And I  
24 particularly want to thank folks from my staff -- Mike  
25 Sullivan, and Ivan Franco, and Scott Steinbrecher, Willem

1 Schreüder, and Don Brown -- who have been instrumental, at  
2 least on behalf of Colorado, getting us to this point.  
3 You'll see all of the documents that are going to be  
4 presented today and -- for action items. Really brings to a  
5 culmination of a lot of effort and work that's gone on over,  
6 certainly, the last almost 10 years that I've been  
7 Commissioner. And so, I want to thank those individuals.

8 I also want to thank the staff from the other  
9 states, Kansas and Nebraska, and all of their legal counsel  
10 and engineering consultants as well who have played a big  
11 part in this as well. As you can see by the attendance here  
12 today, there's a lot of interest in what goes on in the  
13 Republican River Basin, and all of you have played a great  
14 part in helping us get there.

15 So, I certainly wanted to recognize those efforts.  
16 Because I think this is really another historic event and,  
17 certainly, in this -- within the past year, as you know, we  
18 took a action on two resolutions last August that helped get  
19 us to this point. And this is really the last step in  
20 bringing together all of that work and effort and what we're  
21 trying to do in terms of long-term agreements and getting  
22 good footing going forward with our accounting procedures  
23 and in reporting. So, thank you all for that.

24 And I really just want to, lastly, comment on what  
25 I think what's been really -- got us to this point. I

1 think, certainly, in the last couple of years that we've  
2 worked on getting to those resolutions, what we've done here  
3 is that the -- that all the stakeholders in this from all  
4 the states have really come at this with their interest in  
5 mind, and we kind of got off of bringing to the table our  
6 positions, and I think that really helped us find good  
7 resolution and innovative solutions to these challenges that  
8 we've had over the last several years. So, I hope that's a  
9 good framework in moving forward into the next  
10 commissioners. Certainly, the one that will follow me from  
11 this meeting, but certainly with the other states as well.

12 So, with that I'd certainly -- will turn it over  
13 to either one of the other Commissioners, if you have any  
14 other remarks you wanted to make before we start into those  
15 action items. I'd -- Commissioner Barfield, would you have  
16 anything you'd like to say as well?

17 COMMISSIONER BARFIELD: Sure. Yeah. Thank you,  
18 yes, I would like to really echo all of those comments.  
19 Certainly, I appreciate all of the hard work that has -- you  
20 know, the two years of work to sort of get us to the long-  
21 term resolution that so many of us participated in, and  
22 then, really, the work of the last year to get us to today  
23 when we can approve an accounting procedure that implements  
24 the long-term agreements and get 11 years' worth of  
25 accountings approved. So, I appreciate, as well, my staff

1 for all their hard work and support to look through this and  
2 make sure everything's good and work through the, you know,  
3 the details to get to these final accountings.

4 I'm going to beat Jeff to the punch and really  
5 appreciate the Nebraska DNR staff, Jesse Bradley and Kari  
6 and others, who've sort of developed the road map to get us  
7 here and really done a lot of the -- really led the work to  
8 get us here. Appreciate that effort and look forward to  
9 getting this done today.

10 CHAIRPERSON WOLFE: Thank you. Appreciate those  
11 comments.

12 Commissioner Fassett, would you like to say  
13 anything?

14 COMMISSIONER FASSETT: Sure, Mr. Chairman. Thank  
15 you.

16 Yeah, I concur with all of the sentiments that you  
17 and David have both expressed. And, certainly, the work led  
18 by Jesse, and Jennifer, Kari, and our team from Flatwater  
19 Group have just been outstanding in trying to get this  
20 behind us. I do think, maybe, historic is -- for those of  
21 you that have been through the trenches is maybe too  
22 overused. But I think, hopefully, what will happen today is  
23 really just another step to really look forward and to get  
24 the past in the past and to sort of reduce the amount of  
25 over-the-shoulder looking that, certainly as I've entered

1 the fray on behalf of Nebraska, I think we've built a new  
2 confidence. We're building in new flexibility. We're  
3 focusing more on how to best manage the limited resource  
4 that we all share in this particular river basin, and  
5 certainly stepping away from the long, controversial, and  
6 contentious past. So, I do think this really does build on  
7 that and sets a great framework for us to work with all of  
8 our water users.

9 So, I appreciate our staff and the staff from the  
10 other states, just as you two have expressed. So, thank  
11 you, Mr. Chairman.

12 CHAIRPERSON WOLFE: Thank you for -- to both of  
13 your for your comments. With that, we certainly set the  
14 framework context for the next action items, so thank you.

15 The first agenda item we have under Item 3 for  
16 action is consideration of the amendments to the accounting  
17 procedures and reporting requirements. And what we have to  
18 go along with that is a resolution that's been prepared for  
19 the Commissioners. And I'd like to turn it over to  
20 Commissioner Barfield who's going to address this particular  
21 agenda item.

22 So, Commissioner Barfield?

23 COMMISSIONER BARFIELD: Sure. Thank you, Chairman  
24 Wolfe. And, yes, we'll do this fairly quickly here.

25 We have a resolution. So, again, you know, we

1 have a set of accounting procedures that were adopted first  
2 in 2003 that implemented the final settlement stipulation.  
3 And we've amended those a number of times over the years in  
4 various ways; but we now have a -- an extensive set of  
5 changes or a significant set of changes to implement the  
6 long-term agreements in our accounting procedures. This has  
7 been thoroughly vetted through the states and we've all come  
8 here today to approve this and adopt it for future use.  
9 And, actually, we -- basically, the accounting procedures  
10 for 2007 to '15, that we'll adopt a little later, have been  
11 done consistent with those -- this revised procedure and the  
12 long-term agreement.

13 So, I'm going to go ahead and read the resolution.  
14 It's not that long, and our agenda today is not that long.  
15 Let me read it in the record here: "Resolution Approving  
16 Accounting Changes, May 25, 2017.

17 "Whereas, the States of Kansas, Nebraska, and  
18 Colorado entered into a Final Settlement Stipulation, dated  
19 December 15, 2002, to resolve pending litigation in the  
20 United States Supreme Court regarding the Republican River  
21 Compact in the case of *Kansas v. Nebraska and Colorado*, No.  
22 126 Original; and,

23 "Whereas, the FSS was approved by the United  
24 States Supreme Court on May 19, 2003; and,

25 "Whereas, the FSS requires the States to annually



1 approve accounting to determine each State's compliance with  
2 the Compact and FSS; and,

3 "Whereas, the States have resolved their  
4 disagreements that prevented them from approving certain  
5 annual accountings in the past; and,

6 "Whereas, the States have previously determined  
7 and continue to hold that the Compact may be administered in  
8 a manner that increases flexibility for all water users,  
9 while remaining consistent with the terms of the Compact and  
10 the FSS; and,

11 "Whereas, on August 24, 2016, the RRCA approved  
12 the Resolution Approving Long-Term Agreements Related to the  
13 Operation of Harlan County Lake for Compact Call Years,  
14 which requires changes to the RRCA accounting procedures for  
15 its proper implementation; and,

16 "Whereas, on August 24, 2016, the RRCA also  
17 approved the Resolution Approving Operation and Accounting  
18 for the Colorado Compact Compliance Pipeline and Colorado's  
19 Compliance Efforts in the South Fork Republican River Basin,  
20 in which the States agreed, among other things, to  
21 collaborate on how to resolve their disagreement regarding  
22 Colorado's allocation on Beaver Creek during water-short  
23 years in which accounting has not been finally approved by  
24 the RRCA.

25 "Now, therefore, it is resolved: (1) The RRCA

1 adopts -- approves and adopts the attached Revised  
2 Accounting Procedures, dated May 25, 2017;

3 "(2) The RRCA shall use the Revised Accounting  
4 Procedures when it approves accountings for 2007 and every  
5 year thereafter;

6 "(3) If a State provides Notice of Intent to  
7 Terminate the August 24, 2016, Resolution Approving Long-  
8 Term Agreements Related to the Operation of Harlan County  
9 Lake for Compact Call Years, then Nebraska shall not receive  
10 Nebraska Resolution Water Supply Credit after December 13th"  
11 -- "December 31," excuse me, "of the second full year  
12 following the RRCA's receipt of a Notice of Intent to  
13 Terminate per the Resolution;

14 "(4) If a State provides Notice of Intent to  
15 Terminate the August 24, 2016, Resolution Approving  
16 Operation and Accounting for the Colorado Compact Compliance  
17 Pipeline and Colorado's Compliance Effort in the South Fork  
18 Republican River Basin, then Colorado shall not receive  
19 Colorado Resolution Water Supply Credit after December 31 of  
20 the second full year following the RRCA's receipt of a  
21 Notice of Intent to Terminate per the Resolution."

22 So, that's the resolution before us. I guess, I  
23 would move adoption of the resolution.

24 CHAIRPERSON WOLFE: Thank you.

25 Is there a second?

1 COMMISSIONER FASSETT: This is Jeff. I'll second.

2 CHAIRPERSON WOLFE: All right. Motion's been made  
3 and seconded. Is there any further discussion on this  
4 resolution?

5 (No response.)

6 Hearing none, all those in favor, signify by  
7 saying aye.

8 Aye.

9 COMMISSIONER BARFIELD: Aye.

10 CHAIRPERSON WOLFE: Motion approved.

11 COMMISSIONER FASSETT: Aye.

12 (Laughter.)

13 CHAIRPERSON WOLFE: Thank you. Couldn't hear if  
14 it was being said at the same time or not. So, I think we  
15 got them all in there, so thank you.

16 All right. Agenda Item 3(b) is discussion and  
17 consideration of -- regarding the rules and regulations of  
18 the Republican River Compact Administration. Folks should  
19 have a clean copy and, also, a red-lined version of changes  
20 that were made to the rules and regulations from August  
21 24<sup>th</sup>, 2016, now being revised May 25<sup>th</sup>, 2017. So, I'd like  
22 to, maybe, just take a second to just highlight what changes  
23 were made in these rules and regulations to be commensurate  
24 with the -- principally for these accounting procedures and  
25 reporting requirements that we just adopted.

1                   So, the first change, other than change to the  
2 title for the date of the revision, on page two under  
3 paragraph six, there was a correction. The word "and" was  
4 stricken and the word "at" was inserted.

5                   The next change in those procedures is under  
6 paragraph 14 on page four. Again, the date, August 24<sup>th</sup>,  
7 2016, has been changed to May 25<sup>th</sup>, 2017.

8                   And then, lastly, on page five, the date of August  
9 24<sup>th</sup>, 2016, has been changed to today's date of May 25<sup>th</sup>,  
10 2017.

11                   And I think I've captured all the changes,  
12 unless --

13                   MS. SCHELLPEPER: There was one that was small --  
14 other one there.

15                   CHAIRPERSON WOLFE: Oh, did I miss -- hold on here  
16 just a second. Okay. There was one other small change,  
17 too, I missed. Under paragraph six where it had "her" has  
18 just been changed to "he." So, I think that --

19                   Thank you for catching that. I missed that one in  
20 the change.

21                   So, I think we have captured all the changes in  
22 there. So, is there any discussion regarding those changes?

23                   (No response.)

24                   Seeing none, I'd entertain a motion to approve  
25 changes -- amendments to the rules and regulations.

1                   COMMISSIONER BARFIELD: Mr. Chairman, I would move  
2 we adopt the rules and regulations with the revised May 25,  
3 2017, date that have -- put before us with those -- which  
4 makes the changes that you've noted.

5                   CHAIRPERSON WOLFE: All right. Is there a second?

6                   COMMISSIONER FASSETT: This is Jeff. I will  
7 second.

8                   CHAIRPERSON WOLFE: All right. It's been moved  
9 and seconded. Is there any further discussion?

10                   (No response.)

11                   Hearing none, all those in favor, signify by  
12 saying aye.

13                   CHAIRPERSON WOLFE: Aye.

14                   COMMISSIONER FASSETT: Aye.

15                   COMMISSIONER BARFIELD: Aye.

16                   CHAIRPERSON WOLFE: All right.

17                   COMMISSIONER BARFIELD: I was pausing to get Jeff  
18 to say aye first.

19                   (Laughter.)

20                   CHAIRPERSON WOLFE: Thank you. Motion approved.

21                   All right. Next on our agenda is Agenda Item  
22 3(c), and this is regarding the acceptance of the  
23 Engineering Committee Report containing the 2005 to 2015  
24 accounting inputs and accounting results and also includes  
25 some recommendations for the Commissioners. I'm going to

1 turn it over to the Engineering Committee Chairperson, Ivan  
2 Franco, to step us through that.

3 MR. FRANCO: Thank you, Commissioner Wolfe. As he  
4 said, it's my pleasure, as Engineering Chair for this year,  
5 to read into the record the Engineering Committee Report,  
6 dated May 25<sup>th</sup>, 2017, for the special meeting of the  
7 Republican River Compact Administration. "At the August  
8 24<sup>th</sup>, 2016, Annual Meeting, the Engineering Committee was  
9 given the assignments to (1) continue efforts to finalize  
10 all accounting for years since 2006 and resolve issues  
11 between the States preventing finalization, and (2) by  
12 December 31<sup>st</sup>, 2016, unify accounting procedures and  
13 reporting requirements approved by all RRCA resolutions,  
14 including determining the appropriate model run or runs to  
15 be performed by Principia Mathematica." Both of these  
16 assignments have been completed by the Engineering  
17 Committee.

18 "The Engineering Committee is providing, with the  
19 report, recommendations on the 2005 through 2015 accounting  
20 for the RRCA action following the adoption of accounting  
21 procedures and reporting requirements, rules and  
22 regulations, and the *Resolution Approving Accounting*  
23 *Changes* by the RRCA on May 25<sup>th</sup>, 2017. Two attachments are  
24 included with this report detailing the 2005 and 2006  
25 accounting recommendation and the 2007 through 2015

1 accounting recommendation of the Engineering Committee.

2 "Items for RRCA discussion and action. Based upon  
3 the Engineering Committee discussions and information  
4 presented in this report, the Engineering Committee  
5 recommends the RRCA discussion and potential action on the  
6 following items:

7 "(1) Agreement to adopt the spreadsheet titled,  
8 'RRCA Accounting for 2015 (sic) w NRF evap entire  
9 basin.xls,' as the official RRCA accounting spreadsheet for  
10 2005.

11 "(2) Agreement to adopt the spreadsheet titled,  
12 'Corrected RRCA Accounting for 2006\_KS\_Version, Special  
13 Master HCL Evap Adjustment.xls,' spreadsheet as the official  
14 RRCA accounting spreadsheet for 2006.

15 "(3) Agreement to adopt the 2007 through 2015  
16 accounting inputs, accounting tables, and attachments report  
17 and spreadsheet titled, 'RRCA\_AccountingFor2007to2015.xlsx,'  
18 as the official RRCA accounting for the years 2007 through  
19 2015."

20 That completes my reading of the Engineering  
21 Committee Report.

22 CHAIRPERSON WOLFE: Okay. Are there any questions  
23 for Mr. Franco in regards to the Engineering Committee  
24 Report?

25 COMMISSIONER BARFIELD: I have none.

1           CHAIRPERSON WOLFE: Hearing none, I'd entertain a  
2 motion to approve the Engineering Committee Report and the  
3 action items, recommendations for consideration by this  
4 Commission, in their report.

5           COMMISSIONER BARFIELD: Mr. Chairman, I would move  
6 that we adopt the Engineering Committee Report and,  
7 specifically, that we agree to adopt the spreadsheet for  
8 2005 that's referenced in the report; agree to adopt the  
9 spreadsheet for 2006 that's referenced in the report; and  
10 agree to adopt the 2007 to 2015 accounting inputs,  
11 accounting tables, and attachments report, as well as the  
12 spreadsheet listed in the Engineering Committee Report for  
13 the years 2007 to 2015.

14           CHAIRPERSON WOLFE: All right. Is there a second?

15           COMMISSIONER FASSETT: This is Jeff. I will  
16 second.

17           CHAIRPERSON WOLFE: All right, it's been moved and  
18 seconded. Any other discussion?

19           COMMISSIONER BARFIELD: No, I don't think, really,  
20 we need to add too much. Again, we've already lauded the  
21 work that's got us here, and I think the documents that, you  
22 know, describe what we're doing here. So, I -- that's all I  
23 have to say.

24           CHAIRPERSON WOLFE: Yeah, I'd like to echo, too,  
25 just the hard work that the Engineering Committee has done.



1 And, literally, up to the 11<sup>th</sup> hour, with us trying to  
2 finalize all the other parts to this that are important for  
3 this to all get integrated. So, thank you for all your many  
4 hours and grueling hours you've put in on this over this  
5 past year. It's much appreciated. We couldn't have done it  
6 without you.

7 COMMISSIONER BARFIELD: Yeah, I'm happy to support  
8 this. Sort of moving us to a new normal for the  
9 administration of this compact, so it's a good day here.

10 CHAIRPERSON WOLFE: Yeah. Good. Well, with that,  
11 all those in favor, signify by saying aye.

12 COMMISSIONER FASSETT: Aye.

13 COMMISSIONER BARFIELD: Aye.

14 CHAIRPERSON WOLFE: Aye. Motion approved.

15 All right, next on our agenda is public comments.  
16 If there's anyone here in the room or on the phone that had  
17 anything they'd like to add before we adjourn today, we'd be  
18 happy to entertain any comments.

19 Well, I think I want to just --

20 Oh, Tom. Mr. Riley, did you have some- -- please  
21 stand up.

22 MR. RILEY: No. Nothing to say here, folks.

23 CHAIRPERSON WOLFE: Please. You were getting  
24 ready to rise.

25 MR. RILEY: My leg was going to sleep.

1 (Laughter.)

2 COMMISSIONER BARFIELD: Let the record note.

3 CHAIRPERSON WOLFE: No, I'd just -- I'd certainly  
4 be remiss in all of our accolades to thank, foremost, the  
5 water users in the Basin in all the districts that are here  
6 and not in attendance who have helped bring this together.  
7 You've had to certainly work with us in a very collaborative  
8 way.

9 The Bureau of Reclamation as well. Craig Scott is  
10 here with us as well. And certainly, the Bureau plays an  
11 integral role in implementing our resolution, and the water  
12 users in accepting the vision and the guidance that this  
13 compact provides for water use in the Basin. So, thank all  
14 of you and hope that those who are in attendance today will  
15 thank your users and pass along that to them. We do greatly  
16 appreciate that.

17 I'd also just let --

18 COMMISSIONER FASSETT: Mr. Chairman.

19 CHAIRPERSON WOLFE: Go ahead, Commissioner.

20 COMMISSIONER FASSETT: Oh, I'm sorry. Were you  
21 done or not?

22 CHAIRPERSON WOLFE: I just had one closing thing,  
23 but I will allow you to speak first, please.

24 COMMISSIONER FASSETT: Well, I did want to bring  
25 up one issue before we closed. Obviously, the State of

1 Nebraska has been supportive of all this horrendous amount  
2 of work and to get us to where we are in approving all the  
3 actions we've just taken. The last week of activity, Mr.  
4 Chairman, though, related to, I think it's Table 4A, and the  
5 last changes we made associated with the '07 to '15  
6 accounting with the addition of a footnote just left a  
7 little bit open question in my mind. And I was just -- I  
8 was hopeful that -- and I'm sorry I'm not with you to sort  
9 of get into this a little further -- but I'd like to see us,  
10 perhaps, make an assignment to the Engineering Committee  
11 that would allow us to just really document the differences  
12 of the States of Kansas and Colorado on that -- that real  
13 sort of relatively minor point. But it was one that was,  
14 sort of, left open for another day.

15 And while it is, obviously, not a hugely  
16 significant issue, with the change, Mr. Chairman, with your  
17 very well-earned retirement and other changes among the  
18 States, I'd like to see us just sort of document in a --  
19 perhaps just a memo or some sort of thing that the Committee  
20 could develop for us to make sure we're really clear.  
21 Because it may be a number of years before that issue comes  
22 back. I'm with David Barfield on the -- on pushing forward  
23 with the new normal. But I think it's important for us to  
24 leave some good, clear tracks as to what the issue was and  
25 why there were these particular comments being made that

1 we've compromised and avoided in moving forward. But I  
2 still think some documentation would be worthwhile for the  
3 RRCA records.

4 CHAIRPERSON WOLFE: Thank you, Commissioner. I  
5 appreciate that comment. And I guess, hearing that, I'm  
6 not, certainly, opposed to that. I think anything we can do  
7 to document and memorialize, if you will, some of the intent  
8 and reasons for our actions, I think it's important. And I  
9 guess, based on that, I think, given the upcoming Annual  
10 Meeting that will be happening in August, I presume -- we're  
11 working on getting that set -- that this could be part of  
12 that discussion with a workshop and consideration by the  
13 Engineering Committee. I don't think we need to take an  
14 official action on it. I think we're in agreement, unless  
15 Commissioner Barfield does not agree with that approach,  
16 that I think we could have further discussion on that and  
17 whatever consideration in terms of how that would be  
18 memorialized maybe at that meeting and workshop. And I'm  
19 just throwing out, I think that might be -- given that's not  
20 too far away, maybe would be a good forum to do that in.

21 So, Commissioner Barfield, did you have any  
22 further thoughts on that?

23 COMMISSIONER BARFIELD: No, that's fine. We could  
24 have that discussion and figure out how to fulfill Mr.  
25 Fassett's request here. Commissioner Wolfe and I got to

1 live through an arbitration or two on this issue, and so  
2 there is a record as to sort of what the States' positions  
3 are. But, you know, a brief summary of that, certainly, if  
4 that's desirable, we'd certainly cooperate with that.

5 COMMISSIONER FASSETT: I appreciate that, as the  
6 sophomore member, now, of the group. So, I had the pleasure  
7 of not going through some of that history. I just think we  
8 ought to, you know, just speak as clearly as we can on a few  
9 of these minor issues. As those with the history begin to  
10 move on, I think it'll just be important. So, I appreciate  
11 that.

12 CHAIRPERSON WOLFE: Yeah, thank you for your  
13 comments and suggestions on that.

14 Anyone else on the line have any other comments  
15 before we move to adjourn?

16 I certainly just wanted to, lastly, say, given  
17 this is my last official action as Chairman for the Compact  
18 Administration, it certainly has been an honor to serve this  
19 Commission and almost -- over the past almost 10 years now.  
20 And I wanted to thank all of you that are here and on the  
21 phone for, certainly, enriching my life and my professional  
22 career being able to serve on this board. It's been a  
23 blessing to have so many people who have the same shared  
24 interest in protecting this most precious resource of ours,  
25 this water. So, thank you all, and I wish you much success

1 in the coming years and look forward to coming out and,  
2 maybe, being part of the public in future meetings, so -- in  
3 a positive way. So, thank you.

4 (Applause.)

5 I think that's all the action that we had before  
6 us today. So, with that, I'd certainly entertain a motion  
7 to adjourn.

8 COMMISSIONER BARFIELD: All right. I would move  
9 we adjourn.

10 CHAIRPERSON WOLFE: A second?

11 COMMISSIONER FASSETT: Second.

12 CHAIRPERSON WOLFE: All right. All those in  
13 favor, say aye.

14 Aye.

15 COMMISSIONER FASSETT: Aye.

16 COMMISSIONER BARFIELD: Aye.

17 CHAIRPERSON WOLFE: Motion approved. We are  
18 adjourned. Thank you all.

19 (Whereupon, on May 25, 2017, the special meeting  
20 was concluded.)

21

- - -

22

23

24

25

**SPECIAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION**

May 25, 2017

**Attendance by Location**

Name	Representing
<b>Lincoln, Nebraska</b>	
Dick Wolfe	Colorado Commissioner and Chairperson
Scott Steinbrecher	Colorado Attorney General's Office
Ivan Franco	Colorado Division of Water Resources
Mike Sullivan	Colorado Deputy State Engineer
Jesse Bradley	Nebraska Department of Natural Resources
Justin Lavene	Nebraska Attorney General's Office
Tom Riley	Flatwater Group
Lane Letourneau	Kansas Water Appropriation Program
Chris Beightel	Kansas Division of Water Resources
David Barfield	Kansas Commissioner
Robert Merrigan	Middle Republican NRD, Nebraska
Scott Dicke	Lower Republican NRD, Nebraska
Kenneth Titus	Kansas Water Office
Jack Russell	Middle Republican Natural Resource District
Mike Clements	Lower Republican Natural Resource District
David Kracman	Flatwater Group
Craig Scott	Bureau of Reclamation
Tom Riley	Flatwater Group
Carol Flaute	Nebraska DNR
Kari Burgert	Nebraska DNR
Marc Groff	Flatwater Group

**Remote Location by Phone**

Jeff F. Fassett	Nebraska Commissioner
Tracy Streeter	Kansas Water Office
Deb Daniel	Republican River Water Conservation District
Chance Thayer	Flatwater Group
Tracy Streeter	Kansas Water Office
Linda W. Rohman	Court Reporter
Shirley Fraser	
Don Felker	
Shane Stanton	
Nate Jenkins	
Marcia Trompke	

**SPECIAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION**  
May 25, 2017, 9:00 AM Central Time

The Flatwater Group, Inc.  
8200 Cody Dr. Suite A  
Lincoln, NE 68512  
And via Conference Call  
(Phone Number: 1-888-820-1398; Passcode: 1363142#)

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**SPECIAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION**  
May 25, 2017, 9:00 AM Central Time

The Flatwater Group, Inc.  
8200 Cody Dr. Suite A  
Lincoln, NE 68512  
And via Conference Call  
(Phone Number: 1-888-820-1398; Passcode: 1363142#)

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Chance Thayer		
Shane Stanton		
Nate Jenkins		
Marcia <del>Thompson</del> Trompke		

calling  
in ↓

AGENDA FOR  
**SPECIAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION**  
May 25, 2017, 9:00 AM Central Time

The Flatwater Group, Inc.  
8200 Cody Dr. Suite A  
Lincoln, NE 68512  
And via Conference Call  
(Phone Number: 1-888-820-1398; Passcode: 1363142#)

1. Introductions
2. Modification and Adoption of the Agenda
3. Action Item
  - a. Discuss proposal regarding Amendments to the Accounting Procedures and Reporting Requirements.
  - b. Discuss proposal regarding Rules and Regulations of the Republican River Compact Administration.
  - c. Review motion to accept the Engineering Committee Report containing the 2005-2015 accounting inputs and accounting results
4. Public Comments
5. Adjournment

## RESOLUTION APPROVING ACCOUNTING CHANGES

May 25, 2017

**Whereas**, the States of Kansas, Nebraska, and Colorado (States) entered into a Final Settlement Stipulation (FSS), dated December 15, 2002, to resolve pending litigation in the United States Supreme Court regarding the Republican River Compact (Compact) in the case of *Kansas v. Nebraska and Colorado*, No. 126 Original; and

**Whereas**, the FSS was approved by the United States Supreme Court on May 19, 2003; and

**Whereas**, the FSS requires the States to annually approve accounting to determine each State's compliance with the Compact and FSS; and

**Whereas**, the States have resolved their disagreements that prevented them from approving certain annual accountings in the past; and

**Whereas**, the States have previously determined and continue to hold that the Compact may be administered in a manner that increases flexibility for all water users, while remaining consistent with the terms of the Compact and the FSS; and

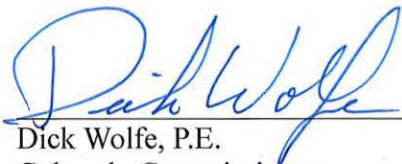
**Whereas**, on August 24, 2016, the RRCA approved the Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years, which requires changes to the RRCA Accounting Procedures for its proper implementation; and

**Whereas**, on August 24, 2016, the RRCA also approved the Resolution Approving Operation and Accounting for the Colorado Compact Compliance Pipeline and Colorado's Compliance Efforts in the South Fork Republican River Basin, in which the States agreed, among other things, to collaborate on how to resolve their disagreement regarding Colorado's allocation on Beaver Creek during water-short years in which accounting has not been finally approved by the RRCA.

### **NOW THEREFORE BE IT RESOLVED:**

1. The RRCA approves and adopts the attached Revised Accounting Procedures Dated: May 25, 2017;
2. The RRCA shall use the Revised Accounting Procedures when it approves accounting for 2007 and every year thereafter.
3. If a state provides Notice of Intent to Terminate the August 24, 2016, Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years then Nebraska shall not receive Nebraska Resolution Water Supply Credit after December 31 of the second full year following the RRCA's receipt of a Notice of Intent to Terminate, per the Resolution.
4. If a state provides Notice of Intent to Terminate the August 24, 2016, Resolution Approving Operation and Accounting for the Colorado Compact Compliance Pipeline and Colorado's Compliance Efforts in the South Fork Republican River basin, then Colorado shall

not receive Colorado Resolution Water Supply Credit after December 31 of the second full year following the RRCA's receipt of a Notice of Intent to Terminate, per the Resolution.




Dick Wolfe, P.E.  
Colorado Commissioner  
Chairman, RRCA

May 25, 2017  
Date



David Barfield, P.E.  
Kansas Commissioner

May 25, 2017  
Date



Gordon W. Fassett, P.E.  
Nebraska Commissioner

MAY 25, 2017  
Date

Republican River Compact  
Administration

ACCOUNTING PROCEDURES AND  
REPORTING REQUIREMENTS

Revised May 25, 2017

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## I. Introduction

This document describes the definitions, procedures, basic formulas, specific formulas, and data requirements and reporting formats to be used by the RRCA to compute the Virgin Water Supply, Computed Water Supply, Allocations, Imported Water Supply Credit, Resolution Water Supply Credits, and Computed Beneficial Consumptive Use. These computations shall be used to determine supply, allocations, use and compliance with the Compact according to the Stipulation and the attached RRCA Resolutions. These definitions, procedures, basic and specific formulas, data requirements and attachments may be changed by consent of the RRCA consistent with Subsection I.F of the Stipulation. This document will be referred to as the RRCA Accounting Procedures. Attached to these RRCA Accounting Procedures as Figure 1 is the map attached to the Compact that shows the Basin, its streams and the Basin boundaries.

## II. Definitions

The following words and phrases as used in these RRCA Accounting Procedures are defined as follows:

**2016 Colorado CCP/SF Resolution:** “Resolution Approving Operation and Accounting for the Colorado Compact Compliance Pipeline and Colorado’s Compliance Efforts in the South Fork Republican River Basin”, adopted by the RRCA on August 24, 2016;

**2016 CCY HCL Operations Resolution:** “Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years”, adopted by the RRCA on August 24, 2016;

**Additional Water Administration Year:** a year when the projected or actual irrigation water supply is less than 130,000 Acre-feet of storage available for use from Harlan County Lake as determined by the Bureau of Reclamation using the methodology described in the Harlan County Lake Operation Consensus Plan attached as Appendix K to the Stipulation;

**Allocation(s):** the water supply allocated to each State from the Computed Water Supply;

**Annual:** yearly from January 1 through December 31;

**Augmentation Pumping Volume:** The measured outflow from an augmentation project;

**Basin:** the Republican River Basin as defined in Article II of the Compact;

**Beaver Creek Reduction:** the Water Short Year reduction to Colorado’s statewide allocation. The procedure to determine the Beaver Creek Reduction is set forth in III.E;

**Beneficial Consumptive Use:** that use by which the Water Supply of the Basin is consumed through the activities of man, and shall include water consumed by evaporation from any reservoir, canal, ditch, or irrigated area;

**Change in Federal Reservoir Storage:** the difference between the amount of water in storage in the reservoir on December 31 of each year and the amount of water in storage on December 31 of the previous year. The current area capacity table supplied by the appropriate federal operating agency shall be used to determine the contents of the reservoir on each date;

**Colorado Resolution Water Supply Credit (CORWS Credit):** The credit provided for Colorado's Compact compliance activities through augmentation pumping in conformance with the 2016 Colorado CCP/SF Resolution;

**Compact:** the Republican River Compact, Act of February 22, 1943, 1943 Kan. Sess. Laws 612, codified at Kan. Stat. Ann. § 82a-518 (1997); Act of February 24, 1943, 1943 Neb. Laws 377, codified at 2A Neb. Rev. Stat. App. § 1-106 (1995), Act of March 15, 1943, 1943 Colo. Sess. Laws 362, codified at Colo. Rev. Stat. §§ 37-67-101 and 37-67-102 (2001); Republican River Compact, Act of May 26, 1943, ch. 104, 57 Stat. 86;

**Compact Compliance Volume (CCV):** a volume of water, as defined under the 2016 CCY HCL Operations Resolution;

**Computed Beneficial Consumptive Use:** for purposes of Compact accounting, the stream flow depletion resulting from the following activities of man:

- Irrigation of lands in excess of two acres;
- Any non-irrigation diversion of more than 50 Acre-feet per year;
- Multiple diversions of 50 Acre-feet or less that are connected or otherwise combined to serve a single project will be considered as a single diversion for accounting purposes if they total more than 50 Acre-feet;
- Net evaporation from Federal Reservoirs;
- Net evaporation from Non-federal Reservoirs within the surface boundaries of the Basin;
- Any other activities that may be included by amendment of these formulas by the RRCA;

**Computed Water Supply:** the Virgin Water Supply less the Change in Federal Reservoir Storage in any Designated Drainage Basin, plus the Computed Water Supply Adjustment (for the Main Stem only), and less the Flood Flows;

**Computed Water Supply Adjustment:** an adjustment made to the Computed Water Supply of the Main Stem reflecting water contributed to the Kansas Account that is not beneficially consumed in the year it is provided, consistent with the terms of the 2016 CCY HCL Operations Resolution;

**Designated Drainage Basins:** the drainage basins of the specific tributaries and the Main Stem of the Republican River as described in Article III of the Compact. Attached hereto as Figure 3 is a map of the Sub-basins and Main Stem;

**Dewatering Well:** a Well constructed solely for the purpose of lowering the groundwater elevation;

**Federal Reservoirs:**

Bonny Reservoir  
Swanson Lake  
Enders Reservoir  
Hugh Butler Lake  
Harry Strunk Lake  
Keith Sebelius Lake  
Harlan County Lake  
Lovewell Reservoir

**Flood Flows:** the amount of water deducted from the Virgin Water Supply as part of the computation of the Computed Water Supply due to a flood event as determined by the methodology described in Subsection III.B.1.;

**Gaged Flow:** the measured flow at the designated stream gage;

**Guide Rock:** a point at the Superior-Courtland Diversion Dam on the Republican River near Guide Rock, Nebraska; the Superior-Courtland Diversion Dam gage plus any flows through the sluice gates of the dam, specifically excluding any diversions to the Superior and Courtland Canals, shall be the measure of flows at Guide Rock;

**Historic Consumptive Use:** that amount of water that has been consumed under appropriate and reasonably efficient practices to accomplish without waste the purposes for which the appropriation or other legally permitted use was lawfully made;

**Imported Water Supply:** the water supply imported by a State from outside the Basin resulting from the activities of man;

**Imported Water Supply Credit:** the accretions to stream flow due to water imports from outside of the Basin as computed by the RRCA Groundwater Model. The Imported Water Supply Credit of a State shall not be included in the Virgin Water Supply and shall be counted as a credit/offset against the Computed Beneficial Consumptive Use of water allocated to that State, except as provided in Subsection V.B.2. of the Stipulation and Subsections III.I. – J. of these RRCA Accounting Procedures;

**Kansas Account:** an account that shall store all Project Water made available for exclusive use by Kansas Bostwick Irrigation District (KBID), and water supplies previously available to KBID under Warren Act Contract(s) existing as of the date of the 2016 Colorado CCP/SF Resolution and the 2016 CCY HCL Operations Resolution;

**Kansas Supplemental Account:** an account that shall store water supplies not in the Kansas Account and which shall be for use outside of KBID within the state of Kansas in conformance with the 2016 Colorado CCP/SF Resolution and the 2016 CCY HCL Operations Resolution;

**Main Stem:** the Designated Drainage Basin identified in Article III of the Compact as the North Fork of the Republican River in Nebraska and the main stem of the Republican River between the junction of the North Fork and the Arikaree River and the lowest crossing of the river at the Nebraska-Kansas state line and the small tributaries thereof, and also including the drainage basin Blackwood Creek;

**Main Stem Allocation:** the portion of the Computed Water Supply derived from the Main Stem and the Unallocated Supply derived from the Sub-basins as shared by Kansas and Nebraska;

**Meeting(s):** a meeting of the RRCA, including any regularly scheduled annual meeting or any special meeting;

**Modeling Committee:** the modeling committee established in Subsection IV.C. of the Stipulation;

**Moratorium:** the prohibition and limitations on construction of new Wells in the geographic area described in Section III. of the Stipulation;

**Nebraska Resolution Water Supply Credit (NERWS Credit):** The credit provided for Nebraska's Compact compliance activities through augmentation pumping and other water management activities in conformance with the 2016 CCY HCL Operations Resolution;

**Non-federal Reservoirs:** reservoirs other than Federal Reservoirs that have a storage capacity of 15 Acre-feet or greater at the principal spillway elevation;

**Northwest Kansas:** those portions of the Sub-basins within Kansas;

**Remaining Compact Compliance Volume (RCCV):** is a volume of water, as defined under the 2016 CCY HCL Operations Resolution;

**Replacement Well:** a Well that replaces an existing Well that a) will not be used after construction of the new Well and b) will be abandoned within one year after such construction or is used in a manner that is excepted from the Moratorium pursuant to Subsections III.B.1.c.-f. of the Stipulation;

**RRCA:** Republican River Compact Administration, the administrative body composed of the State officials identified in Article IX of the Compact;

**RRCA Accounting Procedures:** this document and all attachments hereto;

**RRCA Groundwater Model:** the groundwater model developed under the provisions of Subsection IV.C. of the Stipulation and as subsequently adopted and revised through action of the RRCA;

**State:** any of the States of Colorado, Kansas, and Nebraska;

**States:** the States of Colorado, Kansas and Nebraska;

**Stipulation:** the Final Settlement Stipulation to be filed in *Kansas v. Nebraska and Colorado*, No. 126, Original, including all Appendices attached thereto;

**Sub-basin:** the Designated Drainage Basins, except for the Main Stem, identified in Article III of the Compact. For purposes of Compact accounting the following Sub-basins will be defined as described below:

North Fork of the Republican River in Colorado drainage basin is that drainage area above USGS gaging station number 06823000, North Fork Republican River at the Colorado-Nebraska State Line,

Arikaree River drainage basin is that drainage area above USGS gaging station number 06821500, Arikaree River at Haigler, Nebraska,

Buffalo Creek drainage basin is that drainage area above USGS gaging station number 06823500, Buffalo Creek near Haigler, Nebraska,

Rock Creek drainage basin is that drainage area above USGS gaging station number 06824000, Rock Creek at Parks, Nebraska,

South Fork of the Republican River drainage basin is that drainage area above USGS gaging station number 06827500, South Fork Republican River near Benkelman, Nebraska,

Frenchman Creek (River) drainage basin in Nebraska is that drainage area above USGS gaging station number 06835500, Frenchman Creek in Culbertson, Nebraska,

Driftwood Creek drainage basin is that drainage area above USGS gaging station number 06836500, Driftwood Creek near McCook, Nebraska,

Red Willow Creek drainage basin is that drainage area above USGS gaging station number 06838000, Red Willow Creek near Red Willow, Nebraska,

Medicine Creek drainage basin is that drainage area above the Medicine Creek below Harry Strunk Lake, State of Nebraska gaging station number 06842500; and the drainage area between the gage and the confluence with the Main Stem,

Sappa Creek drainage basin is that drainage area above USGS gaging station number 06847500, Sappa Creek near Stamford, Nebraska and the drainage area between the gage and the confluence with the Main Stem; and excluding the Beaver Creek drainage basin area downstream from the State of Nebraska gaging station number 06847000 Beaver Creek near Beaver City, Nebraska to the confluence with Sappa Creek,

Beaver Creek drainage basin is that drainage area above State of Nebraska gaging station number 06847000, Beaver Creek near Beaver City, Nebraska, and the drainage area between the gage and the confluence with Sappa Creek,

Prairie Dog Creek drainage basin is that drainage area above USGS gaging station number 06848500, Prairie Dog Creek near Woodruff, Kansas, and the drainage area between the gage and the confluence with the Main Stem;

Attached hereto as Figure 2 is a line diagram depicting the streams, Federal Reservoirs and gaging stations;

**Test hole:** a hole designed solely for the purpose of obtaining information on hydrologic and/or geologic conditions;

**Trenton Dam:** a dam located at 40 degrees, 10 minutes, 10 seconds latitude and 101 degrees, 3 minutes, 35 seconds longitude, approximately two and one-half miles west of the town of Trenton, Nebraska;

**Unallocated Supply:** the “water supplies of upstream basins otherwise unallocated” as set forth in Article IV of the Compact;

**Upstream of Guide Rock, Nebraska:** those areas within the Basin lying west of a line proceeding north from the Nebraska-Kansas state line and following the western edge of Webster County, Township 1, Range 9, Sections 34, 27, 22, 15, 10 and 3 through Webster County, Township 2, Range 9, Sections 34, 27 and 22; then proceeding west along the southern edge of Webster County, Township 2, Range 9, Sections 16, 17 and 18; then proceeding north following the western edge of Webster County, Township 2, Range 9, Sections 18, 7 and 6, through Webster County, Township 3, Range 9, Sections 31, 30, 19, 18, 7 and 6 to its intersection with the northern boundary of Webster County. Upstream of Guide Rock, Nebraska shall not include that area in Kansas east of the 99° meridian and south of the Kansas-Nebraska state line;

**Virgin Water Supply:** the Water Supply within the Basin undepleted by the activities of man;

**Water Short Year Administration:** administration in a year when the projected or actual irrigation water supply is less than 119,000 acre feet of storage available for use from Harlan County Lake as determined by the Bureau of Reclamation using the methodology described in the Harlan County Lake Operation Consensus Plan attached as Appendix K to the Stipulation.

**Water Supply of the Basin or Water Supply within the Basin:** the stream flows within the Basin, excluding Imported Water Supply;

**Well:** any structure, device or excavation for the purpose or with the effect of obtaining groundwater for beneficial use from an aquifer, including wells, water wells, or groundwater wells as further defined and used in each State’s laws, rules, and regulations.

**III. Basic Formulas**

The basic formulas for calculating Virgin Water Supply, Computed Water Supply, Imported Water Supply, Allocations and Computed Beneficial Consumptive Use are set forth below. The results of these calculations shall be shown in a table format as shown in Table 1.

Basic Formulas for Calculating Virgin Water Supply, Computed Water Supply, Allocations and Computed Beneficial Consumptive Use	
Sub-basin VWS	= Gage + All CBCU + ΔS – IWS – APV*
Main Stem VWS	= Hardy Gage – Σ Sub-basin gages + All CBCU in the Main Stem + ΔS – IWS
CWS	= VWS - Δ S – FF + CWSA <sup>1</sup>
Allocation for each State in each Sub-basin And Main Stem	= CWS x %
State's Allocation	= Σ Allocations for Each State
State's CBCU	= Σ State's CBCUs in each Sub-basin and Main Stem

<sup>1</sup> The Computed Water Supply Adjustment (CWSA) is only applied to the Main Stem, with respect to Harlan County Lake operations, as described in Subsection IV.B and Attachment 8.

**Abbreviations:**

APV = Augmentation Pumping Volume

CBCU = Computed Beneficial Consumptive

Use FF = Flood Flows

Gage = Gaged Flow

IWS = Imported Water Supply Credit

CWS = Computed Water Supply

CWSA = Computed Water Supply Adjustment

VWS = Virgin Water Supply

% = the ratio used to allocate the Computed Water Supply between the States. This ratio is based on the allocations in the Compact

 $\Delta S$  = Change in Federal Reservoir Storage

Note: \* The Augmentation Pumping Volume is not included as part of the Computed Water Supply for the sub-basins or the Main Stem.

**A. Calculation of Annual Virgin Water Supply****1. Sub-basin calculation:**

The annual Virgin Water Supply for each Sub-basin will be calculated by adding: a) the annual stream flow in that Sub-basin at the Sub-basin stream gage designated in Section II., b) the annual Computed Beneficial Consumptive Use above that gaging station, and c) the Change in Federal Reservoir Storage in that Sub-basin; and from that total subtract any Imported Water Supply Credit and Augmentation Pumping Volume. The Computed Beneficial Consumptive Use will be calculated as described in Subsection III. D. Adjustments for flows diverted around stream gages and for Computed Beneficial Consumptive Uses in the Sub-basin between the Sub-basin stream gage and the confluence of the Sub-basin tributary and the Main Stem shall be made as described in Subsections III. D. 1 and 2 and IV. B.

**2. Main Stem Calculation:**

The annual Virgin Water Supply for the Main Stem will be calculated by adding: a) the flow at the Hardy gage minus the flows from the Sub-basin gages listed in Section II, b) the annual Computed Beneficial Consumptive Use in the Main Stem, and c) the Change in Federal Reservoir Storage from Swanson Lake and Harlan County Lake; and from that total subtract any Imported Water Supply Credit for the Main Stem. Adjustments for flows diverted around Sub-basin stream gages and for Computed Beneficial Consumptive Uses in a Sub-basin between the Sub-basin stream gage and the confluence of the Sub-basin tributary and the Mains Stem shall be made as described in Subsections III. D. 1 and 2 and IV.B.,



**3. Imported Water Supply Credit Calculation:**

The amount of Imported Water Supply Credit shall be determined by the RRCA Groundwater Model. The Imported Water Supply Credit of a State shall not be included in the Virgin Water Supply and shall be counted as a credit/offset against the Computed Beneficial Consumptive Use of water allocated to that State. Currently, the Imported Water Supply Credits shall be determined using two runs of the RRCA Groundwater Model:

- a. The “base” run shall be the run with all groundwater pumping, groundwater pumping recharge, and surface water recharge within the model study boundary for the current accounting year turned “on.”
- b. The “no NE import” run shall be the run with the same model inputs as the base run with the exception that surface water recharge associated with Nebraska’s Imported Water Supply shall be turned “off.” This will be the same “no NE import” run used to determine groundwater Computed Beneficial Consumptive Uses.

The Imported Water Supply Credit shall be the difference in stream flows between these two model runs. Differences in stream flows shall be determined at the same locations as identified in Subsection III.D.1. for the “no pumping” runs. Should another State import water into the Basin in the future, the RRCA will develop a similar procedure to determine Imported Water Supply Credits.

**4. Augmentation Pumping Volume**

The Augmentation Pumping Volume (APV) of a State shall not be included in the Virgin Water Supply of the applicable sub-basin.

**B. Calculation of Computed Water Supply**

On any Designated Drainage Basin without a Federal Reservoir, the Computed Water Supply will be equal to the Virgin Water Supply of that Designated Drainage Basin minus Flood Flows.

On any Designated Drainage Basin with a Federal Reservoir, the Computed Water Supply will be equal to the Virgin Water Supply minus the Change in Federal Reservoir Storage in that Designated Drainage Basin and minus Flood Flows. In the Main Stem only, the Computed Water Supply Adjustment will also be added to determine the Computed Water Supply for the Main Stem, as shown in Subsection IV.B and discussed below in sub-section 2 and as illustrated in Attachment 8.

### **1. Flood Flows**

If in any calendar year there are five consecutive months in which the total actual stream flow<sup>2</sup> at the Hardy gage is greater than 325,000 Acre-feet, or any two consecutive months in which the total actual stream flow is greater than 200,000 Acre-feet, the annual flow in excess of 400,000 Acre-feet at the Hardy gage will be considered to be Flood Flows that will be subtracted from the Virgin Water Supply to calculate the Computed Water Supply, and Allocations. The Flood Flow in excess of 400,000 Acre-feet at the Hardy gage will be subtracted from the Virgin Water Supply of the Main Stem to compute the Computed Water Supply unless the Annual Gaged Flows from a Sub-basin, minus the Augmentation Pumping Volume for that Sub-basin, were in excess of the flows shown for that Sub-basin in Attachment 1. These excess Sub-basin flows shall be considered to be Sub-basin Flood Flows.

If there are Sub-basin Flood Flows, the total of all Sub-basin Flood Flows shall be compared to the amount of Flood Flows at the Hardy gage. If the sum of the Sub-basin Flood Flows are in excess of the Flood Flow at the Hardy gage, the flows to be deducted from each Sub-basin shall be the product of the Flood Flows for each Sub-basin times the ratio of the Flood Flows at the Hardy gage divided by the sum of the Flood Flows of the Sub-basin gages. If the sum of the Sub-basin Flood Flows is less than the Flood Flow at the Hardy gage, the entire amount of each Sub-basin Flood Flow shall be deducted from the Virgin Water Supply to compute the Computed Water Supply of that Sub-basin for that year. The remainder of the Flood Flows will be subtracted from the flows of the Main Stem.

### **2. Computed Water Supply Adjustment**

The Computed Water Supply Adjustment shall be applied to the Main Stem calculations for years when Nebraska's Compact compliance activities are stored in Harlan County Lake for future Kansas use subject to the terms of the 2016 CCY HCL Operations Resolution. The methods used to calculate the Computed Water Supply Adjustment and RCCV are contained in Attachment 8 and will be applied for compliance activities initiated after October 1, 2015.

## **C. Calculation of Annual Allocations**

Article IV of the Compact allocates 54,100 Acre-feet for Beneficial Consumptive Use in Colorado, 190,300 Acre-feet for Beneficial Consumptive Use in Kansas and 234,500 Acre-feet for Beneficial Consumptive Use in Nebraska. The Compact provides that the Compact totals are to be derived from the sources and in the amounts specified in Table 2.

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<sup>2</sup> These actual stream flows reflect Gaged Flows after depletions by Beneficial Consumptive Use and change in reservoir storage above the gage.

The Allocations derived from each Sub-basin to each State shall be the Computed Water Supply multiplied by the percentages set forth in Table 2. In addition, Kansas shall receive 51.1% of the Main Stem Allocation and the Unallocated Supply and Nebraska shall receive 48.9% of the Main Stem Allocation and the Unallocated Supply.

#### **D. Calculation of Annual Computed Beneficial Consumptive Use**

##### **1. Groundwater**

Computed Beneficial Consumptive Use of groundwater shall be determined by use of the RRCA Groundwater Model. The Computed Beneficial Consumptive Use of groundwater for each State shall be determined as the difference in streamflows using two runs of the model:

The “no NE import” run shall be the run with all groundwater pumping, groundwater pumping recharge, and surface water recharge within the model study boundary for the current accounting year “on”, with the exception that surface water recharge associated with Nebraska’s Imported Water Supply shall be turned “off.”

The “no State pumping” run shall be the run with the same model inputs as the “no NE import” run with the exception that all groundwater pumping and pumping recharge of that State shall be turned “off.”

An output of the model is baseflows at selected stream cells. Changes in the baseflows predicted by the model between the “no NE import” run and the “no-State- pumping” model run is assumed to be the depletions to streamflows, i.e., groundwater computed beneficial consumptive use, due to State groundwater pumping at that location. The values for each Sub-basin will include all depletions and accretions upstream of the confluence with the Main Stem. The values for the Main Stem will include all depletions and accretions in stream reaches not otherwise accounted for in a Sub-basin. The values for the Main Stem will be computed separately for the reach above Guide Rock, and the reach below Guide Rock.

##### **2. Surface Water**

The Computed Beneficial Consumptive Use of surface water for irrigation and non- irrigation uses shall be computed by taking the diversions from the river and subtracting the return flows to the river resulting from those diversions, as described in Subsections IV.A.2.a.-d. The Computed Beneficial Consumptive Use of surface water from Federal Reservoir and Non-Federal Reservoir evaporation shall be the net reservoir evaporation from the reservoirs, as described in Subsections IV.A.2.e.-f.

For Sub-basins where the gage designated in Section II. is near the confluence with the Main Stem, each State's Sub-basin Computed Beneficial Consumptive Use of surface water shall be the State's Computed Beneficial Consumptive Use of surface water above the Sub-basin gage. For Medicine Creek, Sappa Creek, Beaver Creek and Prairie Dog Creek, where the gage is not near the confluence with the Main Stem, each State's Computed Beneficial Consumptive Use of surface water shall be the sum of the State's Computed Beneficial Consumptive Use of surface water above the gage, and its Computed Beneficial Consumptive Use of surface water between the gage and the confluence with the Main Stem.

### **E. Calculation to Determine Compact Compliance Using Five-Year Running Averages**

Each year, using the procedures described herein, the RRCA will calculate the Annual Allocations by Designated Drainage Basin and total for each State, the Computed Beneficial Consumptive Use by Designated Drainage Basin and total for each State, CORWS and NERWS (RWS Credits), and the Imported Water Supply Credit that a State may use for the preceding year. These results for the current Compact accounting year as well as the results of the previous four accounting years and the five-year average of these results will be displayed in the format shown in Table 3.

The amount of CORWS Credit shall be determined based on the Compact compliance activities through augmentation pumping in conformance with the 2016 Colorado CCP/SF Resolution. CORWS Credit shall be determined based on the measured outflow from the Colorado Compact Compliance Pipeline. The CORWS Credit shall be counted as a credit/offset against the Computed Beneficial Consumptive Use of water by Colorado.

Colorado's compliance will be measured based on the average of the accounting results from the current accounting year's annual balance and the previous four accounting year's annual balances. If none of those five years is a Water Short Year (as defined in Section III.J.), then Colorado's compliance will be calculated using Table 3A.

If any one of the previous four accounting years or the current accounting year is a Water Short Year (as defined in Section III.J.a and b), then Colorado's compliance will be calculated using Table 5A. For each accounting year that is designated as a Water Short Year pursuant to Section III.J, Colorado's statewide allocation will be reduced by the Beaver Creek Reduction which is the average of the unused Colorado Beaver Creek Sub-basin allocation for the five most-recent Water Short Year designations prior to that accounting year as shown in Table 5F example. The Beaver Creek Reduction will be reported in Table 5F. If the accounting year was not designated as a Water Short Year then the Beaver Creek Reduction will not be applied in that year.

The amount of NERWS Credit shall be determined based on the Compact compliance activities through augmentation pumping and other water management activities in conformance with the 2016 CCY HCL Operations Resolution. NERWS Credit for the year shall be equal to the greater of the Compact Compliance Volume and the contribution from Nebraska's water management activities consistent with the 2016 CCY HCL Operations Resolution. NERWS Credit shall be counted as a credit/offset against the Computed Beneficial Consumptive Use of water by Nebraska. NERWS Credit for Nebraska augmentation activities initiated prior to October 1, 2015, will be equal to the measured outflow from the augmentation projects.

#### **F. Calculations To Determine Colorado's and Kansas's Compliance with the Sub-basin Non-Impairment Requirement**

The data needed to determine Colorado's and Kansas's compliance with the Sub-basin non-impairment requirement in Subsection IV.B.2. of the Stipulation are shown in Tables 4.A. and B.

#### **G. Calculations To Determine Projected Water Supply**

##### **1. Procedures to Determine Water Short Years**

The Bureau of Reclamation will provide each of the States with a monthly or, if requested by any one of the States, a more frequent update of the projected or actual irrigation supply from Harlan County Lake for that irrigation season using the methodology described in the Harlan County Lake Operation Consensus Plan, attached as Appendix K to the Stipulation. The steps for the calculation are as follows:

Step 1. At the beginning of the calculation month (1) the total projected inflow for the calculation month and each succeeding month through the end of May shall be added to the previous end of month Harlan County Lake content and (2) the total projected 1993 level evaporation loss for the calculation month and each succeeding month through the end of May shall then be subtracted. The total projected inflow shall be the 1993 level average monthly inflow or the running average monthly inflow for the previous five years, whichever is less.

Step 2. Determine the maximum irrigation water available by subtracting the sediment pool storage (currently 164,111 Acre-feet) and adding the summer sediment pool evaporation (20,000 Acre-feet) to the result from Step 1.

Step 3. For October through January calculations, take the result from Step 2 and using the Shared Shortage Adjustment Table in Attachment 2 hereto, determine the preliminary irrigation water available for release. The calculation using the end of

December content (January calculation month) indicates the minimum amount of irrigation water available for release at the end of May. For February through June calculations, subtract the maximum irrigation water available for the January calculation month from the maximum irrigation water available for the calculation month. If the result is negative, the irrigation water available for release (January calculation month) stays the same. If the result is positive the preliminary irrigation water available for release (January calculation month) is increased by the positive amount.

Step 4. Compare the result from Step 3 to 119,000 Acre-feet. If the result from Step 3 is less than 119,000 Acre-feet Water Short Year Administration is in effect.

Step 5. The final annual Water-Short Year Administration calculation determines the total estimated irrigation supply at the end of June (calculated in July). Use the result from Step 3 for the end of May irrigation release estimate, add the June computed inflow to Harlan County Lake and subtract the June computed gross evaporation loss from Harlan County Lake.

## **2. Procedures to Determine 130,000 Acre Feet Projected Water Supply**

To determine the preliminary irrigation supply for the October through June calculation months, follow the procedure described in steps 1 through 4 of the “Procedures to determine Water Short Years” Subsection III. G. 1. The result from step 4 provides the forecasted water supply, which is compared to 130,000 Acre-feet. For the July through September calculation months, use the previous end of calculation month preliminary irrigation supply, add the previous month’s Harlan County Lake computed inflow and subtract the previous month’s computed gross evaporation loss from Harlan County Lake to determine the current preliminary irrigation supply. The result is compared to 130,000 Acre-feet.

## **H. Calculation of Computed Water Supply, Allocations and Computed Beneficial Consumptive Use Above and Below Guide Rock During Water-Short Administration Years.**

For Water-Short-Administration Years, in addition to the normal calculations, the Computed Water Supply, Allocations, Computed Beneficial Consumptive Use, NERWS Credit, and Imported Water Supply Credits shall also be calculated above Guide Rock as shown in Table 5C. These calculations shall be done in the same manner as in non-Water-Short Administration years except that water supplies originating below Guide Rock shall not be included in the calculations of water supplies originating above Guide Rock. The calculations of Computed Beneficial Consumptive Uses shall be also done in the same manner as in non-Water-Short Administration years except that Computed Beneficial Consumptive Uses from diversions below Guide Rock shall not be included.

The depletions from the water diverted by the Superior and Courtland Canals at the Superior- Courtland Diversion Dam shall be included in the calculations of Computed Beneficial Consumptive Use above Guide Rock. Imported Water Supply Credits above Guide Rock, as described in Sub-section III.I., may be used as offsets against the Computed Beneficial Consumptive Use above Guide Rock by the State providing the Imported Water Supply Credits.

The Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage shall be determined by taking the difference in stream flow at Hardy and Guide Rock, adding Computed Beneficial Consumptive Uses in the reach (this does not include the Computed Beneficial Consumptive Use from the Superior and Courtland Canal diversions), and subtracting return flows from the Superior and Courtland Canals in the reach. The Computed Water Supply above Guide Rock shall be determined by subtracting the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from the total Computed Water Supply. Nebraska's Allocation above Guide Rock shall be determined by subtracting 48.9% of the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from Nebraska's total Allocation. Nebraska's Computed Beneficial Consumptive Uses above Guide Rock shall be determined by subtracting Nebraska's Computed Beneficial Consumptive Uses below Guide Rock from Nebraska's total Computed Beneficial Consumptive Use.

#### **I. Calculation of Imported Water Supply Credits During Water-Short Year Administration Years.**

Imported Water Supply Credit during Water-Short Year Administration years shall be calculated consistent with Subsection V.B.2.b. of the Stipulation.

The following methodology shall be used to determine the extent to which Imported Water Supply Credit, as calculated by the RRCA Groundwater Model, can be credited to the State importing the water during Water-Short Year Administration years.

##### **1. Monthly Imported Water Supply Credits**

The RRCA Groundwater Model will be used to determine monthly Imported Water Supply Credits by State in each Sub-basin and for the Main Stem. The values for each Sub-basin will include all depletions and accretions upstream of the confluence with the Main Stem. The values for the Main Stem will include all depletions and accretions in stream reaches not otherwise accounted for in a Sub-basin. The values for the Main Stem will be computed separately for the reach 1) above Harlan County Dam, 2) between Harlan County Dam and Guide Rock, and 3) between Guide Rock and the Hardy gage. The Imported Water Supply Credit shall be the difference in stream flow for two runs of the model: a) the "base" run and b) the "no State import" run.

During Water-Short Year Administration years, Nebraska's credits in the Sub-basins shall be determined as described in Section III. A. 3.

## **2. Imported Water Supply Credits Above Harlan County Dam**

Nebraska's Imported Water Supply Credits above Harlan County Dam shall be the sum of all the credits in the Sub-basins and the Main Stem above Harlan County Dam.

## **3. Imported Water Supply Credits Between Harlan County Dam and Guide Rock During the Irrigation Season**

- a. During Water-Short Year Administration years, monthly credits in the reach between Harlan County Dam and Guide Rock shall be determined as the differences in the stream flows between the two runs at Guide Rock.
- b. The irrigation season shall be defined as starting on the first day of release of water from Harlan County Lake for irrigation use and ending on the last day of release of water from Harlan County Lake for irrigation use.
- c. Credit as an offset for a State's Computed Beneficial Consumptive Use above Guide Rock will be given to all the Imported Water Supply accruing in the reach between Harlan County Dam and Guide Rock during the irrigation season. If the period of the irrigation season does not coincide with the period of modeled flows, the amount of the Imported Water Supply credited during the irrigation season for that month shall be the total monthly modeled Imported Water Supply Credit times the number of days in the month occurring during the irrigation season divided by the total number of days in the month.

## **4. Imported Water Supply Credits Between Harlan County Dam and Guide Rock During the Non-Irrigation Season**

- a. Imported Water Supply Credit shall be given between Harlan County Dam and Guide Rock during the period that flows are diverted to fill Lovewell Reservoir to the extent that imported water was needed to meet Lovewell Reservoir target elevations.
- b. Fall and spring fill periods shall be established during which credit shall be given for the Imported Water Supply Credit accruing in the reach. The



fall period shall extend from the end of the irrigation season to December 1. The spring period shall extend from March 1 to May 31. The Lovewell target elevations for these fill periods are the projected end of November reservoir level and the projected end of May reservoir level for most probable inflow conditions as indicated in Table 4 in the current Annual Operating Plan prepared by the Bureau of Reclamation.

c. The amount of water needed to fill Lovewell Reservoir for each period shall be calculated as the storage content of the reservoir at its target elevation at the end of the fill period minus the reservoir content at the start of the fill period plus the amount of net evaporation during this period minus White Rock Creek inflows for the same period.

d. If the fill period as defined above does not coincide with the period of modeled flows, the amount of the Imported Water Supply Credit during the fill period for that month shall be the total monthly modeled Imported Water Supply Credit times the number of days in the month occurring during the fill season divided by the total number of days in the month.

e. The amount of non-imported water available to fill Lovewell Reservoir to the target elevation shall be the amount of water available at Guide Rock during the fill period minus the amount of the Imported Water Supply Credit accruing in the reach during the same period.

f. The amount of the Imported Water Supply Credit that shall be credited against a State's Consumptive Use shall be the amount of water imported by that State that is available in the reach during the fill period or the amount of water needed to reach Lovewell Reservoir target elevations minus the amount of non-imported water available during the fill period, whichever is less.

#### **5. Other Credits**

Kansas and Nebraska will explore crediting Imported Water Supply that is otherwise useable by Kansas.

#### **J. Calculations of Compact Compliance in Water-Short Year Administration Years**

During Water-Short Year Administration, using the procedures described in Subsections III.A-D, the RRCA will calculate the Annual Allocations for each State, the Computed Beneficial Consumptive Use by each State, and Imported Water Supply Credit and RWS Credits that a State may use to offset Computed Beneficial Consumptive Use in that year. The resulting annual and average values will be calculated as displayed in Tables 5 A-C and E.

The compliance tests outlined in Tables 5B – 5E shall not apply when on or before June 30:

- a. the sum of all waters available for irrigation from Harlan County Lake, including irrigation releases prior to June 30 of each year, the RCCV (as calculated in Attachment 8), and the volume in the Kansas Supplemental Account, is greater than or equal to 119,000 acre-feet; or
- b. the sum of the Kansas Account, Kansas Supplemental Account, and irrigation releases made from both accounts prior to June 30 of each year is greater than or equal to 68,000 acre-feet.

For the State of Colorado, if the current accounting year or any one of the previous four years is designated as a Water Short Year based on the criteria in Section III.J.a or b above, then Colorado's compliance will be calculated using Table 5A. The methods used to implement the Table 5A calculations will be in conformance with Section III.E.

If Nebraska is implementing an Alternative Water-Short-Year Administration Plan, data to determine Compact compliance will be shown in Table 5D. Nebraska's compliance with the Compact will be determined in the same manner as Nebraska's Above Guide Rock compliance except that compliance will be based on a three-year running average of the current year and previous two year calculations. In addition, Table 5 D. will display the sum of the previous two-year difference in Allocations above Guide Rock and Computed Beneficial Consumptive Uses above Guide Rock minus any Imported Water Credits and compare the result with the Alternative Water-Short-Year Administration Plan's expected decrease in Computed Beneficial Consumptive Use above Guide Rock. Nebraska will be within compliance with the Compact as long as the three-year running average difference in Column 8 is positive and the sum of the previous year and current year deficits above Guide Rock are not greater than the expected decrease in Computed Beneficial Consumptive Use under the plan.

#### IV. Specific Formulas

##### **A. Computed Beneficial Consumptive Use**

###### **1. Computed Beneficial Consumptive Use of Groundwater:**

The Computed Beneficial Consumptive Use caused by groundwater diversion shall be determined by the RRCA Groundwater Model as described in Subsection III.D.1.

###### **2. Computed Beneficial Consumptive Use of Surface Water:**

The Computed Beneficial Consumptive Use of surface water shall be calculated as follows:

a) Non-Federal Canals

Computed Beneficial Consumptive Use from diversions by non- federal canals shall be 60 percent of the diversion; the return flow shall be 40 percent of the diversion

b) Individual Surface Water Pumps

Computed Beneficial Consumptive Use from small individual surface water pumps shall be 75 percent of the diversion; return flows will be 25 percent of the diversion unless a state provides data on the amount of different system types in a Sub-basin, in which case the following percentages will be used for each system type:

Gravity Flow	30%
Center Pivot	17%
LEPA	10%

c) Federal Canals

Computed Beneficial Consumptive Use of diversions by Federal canals will be calculated as shown in Attachment 7. For each Bureau of Reclamation Canal the field deliveries shall be subtracted from the diversion from the river to determine the canal losses. The field delivery shall be multiplied by one minus an average system efficiency for the district to determine the loss of water from the field. Eighty-two percent of the sum of the field loss plus the canal loss shall be considered to be the return flow from the canal diversion for diversions occurring during the irrigation season (May-September). For recharge diversions occurring during the non-irrigation season (October-April), 92 percent of the sum of the field loss plus the canal loss shall be considered to be the return flow from the canal diversion. The assumed field efficiencies and the amount of the field and canal loss that reaches the stream may be reviewed by the RRCA and adjusted as appropriate to insure their accuracy.

d) Non-irrigation Uses

Any non-irrigation uses diverting or pumping more than 50 acre-feet per year will be required to measure diversions. Non-irrigation uses diverting more than 50 Acre-feet per year will be assessed a Computed Beneficial Consumptive Use of 50% of what is pumped or diverted, unless the entity presents evidence to the RRCA demonstrating a different percentage should be used.

- e) Evaporation from Federal Reservoirs  
 Net Evaporation from Federal Reservoirs will be calculated as follows:

(1) Harlan County Lake, Evaporation Calculation

April 1 through October 31:

Evaporation from Harlan County Lake is calculated by the Corps of Engineers on a daily basis from April 1 through October 31. Daily readings are taken from a Class A evaporation pan maintained near the project office. Any precipitation recorded at the project office is added to the pan reading to obtain the actual evaporation amount. The pan value is multiplied by a pan coefficient that varies by month. These values are:

March	.56
April	.52
May	.53
June	.60
July	.68
August	.78
September	.91
October	1.01

The pan coefficients were determined by studies the Corps of Engineers conducted a number of years ago. The result is the evaporation in inches. It is divided by 12 and multiplied by the daily lake surface area in acres to obtain the evaporation in Acre-feet. The lake surface area is determined by the 8:00 a.m. elevation reading applied to the lake's area-capacity data. The area-capacity data is updated periodically through a sediment survey. The last survey was completed in December 2000.

November 1 through March 31

During the winter season, a monthly total evaporation in inches has been determined. The amount varies with the percent of ice cover. The values used are:

HARLAN COUNTY LAKE

Estimated Evaporation in Inches  
 Winter Season -- Monthly Total

PERCENTAGE OF ICE COVER

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
JAN	0.88	0.87	0.85	0.84	0.83	0.82	0.81	0.80	0.78	0.77	0.76
FEB	0.90	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79
MAR	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19
OCT	4.87			NO IC							
NOV	2.81			NO IC							
DEC	1.31	1.29	1.27	1.25	1.24	1.22	1.20	1.18	1.17	1.16	1.14

The monthly total is divided by the number of days in the month to obtain a daily evaporation value in inches. It is divided by 12 and multiplied by the daily lake surface area in acres to obtain the evaporation in Acre-feet. The lake surface area is determined by the 8:00 a.m. elevation reading applied to the lake's area-capacity data. The area-capacity data is updated periodically through a sediment survey. The last survey was completed in December 2000.

To obtain the net evaporation, the monthly precipitation on the lake is subtracted from the monthly gross evaporation. The monthly precipitation is calculated by multiplying the sum of the month's daily precipitation in inches by the average of the end of the month lake surface area for the previous month and the end of the month lake surface area for the current month in acres and dividing the result by 12 to obtain the precipitation for the month in acre feet.

Kansas supplemental accounts established within Harlan County Lake, as defined in the 2016 CCY HCL Operations Resolution, will be charged annual net evaporation in an amount proportional to the relative contents of the supplemental account compared to the total irrigation supply.

The remaining annual net evaporation (Acre-feet) will be charged to Kansas and Nebraska in proportion to the annual diversions made by the Kansas Bostwick Irrigation District and the Nebraska Bostwick Irrigation District during the time period each year when irrigation releases are being made from Harlan County Lake. For any year in which no irrigation releases were made from Harlan County Lake, the annual net evaporation charged to Kansas and Nebraska will be based on the average of the above calculation for the most recent three years in which irrigation releases from Harlan

County Lake were made. In the event Nebraska chooses to substitute supply for the Superior Canal from Nebraska's allocation below Guide Rock in Water-Short Year Administration years, the amount of the substitute supply will be included in the calculation of the split as if it had been diverted to the Superior Canal at Guide Rock.

- (2) Evaporation Computations for Bureau of Reclamation Reservoirs  
The Bureau of Reclamation computes the amount of evaporation loss on a monthly basis at Reclamation reservoirs. The following procedure is utilized in calculating the loss in Acre-feet.

An evaporation pan reading is taken each day at the dam site. This measurement is the amount of water lost from the pan over a 24-hour period in inches. The evaporation pan reading is adjusted for any precipitation recorded during the 24-hour period. Instructions for determining the daily pan evaporation are found in the "National Weather Service Observing Handbook No. 2 – Substation Observations." All dams located in the Kansas River Basin with the exception of Bonny Dam are National Weather Service Cooperative Observers. The daily evaporation pan readings are totaled at the end of each month and converted to a "free water surface" (FWS) evaporation, also referred to as "lake" evaporation. The FWS evaporation is determined by multiplying the observed pan evaporation by a coefficient of .70 at each of the reservoirs. This coefficient can be affected by several factors including water and air temperatures. The National Oceanic and Atmospheric Administration (NOAA) has published technical reports describing the determination of pan coefficients. The coefficient used is taken from the "NOAA Technical Report NWS 33, Map of coefficients to convert class A pan evaporation to free water surface evaporation". This coefficient is used for the months of April through October when evaporation pan readings are recorded at the dams. The monthly FWS evaporation is then multiplied by the average surface area of the reservoir during the month in acres. Dividing this value by twelve will result in the amount of water lost to evaporation in Acre-feet during the month.

During the winter months when the evaporation pan readings are not taken, monthly evaporation tables based on the percent of ice cover are used. The tables used were developed by the Corps of Engineers and were based on historical average evaporation rates. A separate table was developed for each of the reservoirs. The

monthly evaporation rates are multiplied by the .70 coefficient for pan to free water surface adjustment, divided by twelve to convert inches to feet and multiplied by the average reservoir surface area during the month in acres to obtain the total monthly evaporation loss in Acre- feet.

To obtain the net evaporation, the monthly precipitation on the lake is subtracted from the monthly gross evaporation. The monthly precipitation is calculated by multiplying the sum of the month's daily precipitation in inches by the average of the end of the month lake surface area for the previous month and the end of the month lake surface area for the current month in acres and dividing the result by 12 to obtain the precipitation for the month in acre feet.

f) Non-Federal Reservoir Evaporation:

For Non-Federal Reservoirs with a storage capacity less than 200 Acre-feet, the presumptive average annual surface area is 25% of the area at the principal spillway elevation. Net evaporation for each such Non-Federal Reservoir will be calculated by multiplying the presumptive average annual surface area by the net evaporation from the nearest climate and evaporation station to the Non-Federal Reservoir. A State may provide actual data in lieu of the presumptive criteria.

Net evaporation from Non-Federal Reservoirs with 200 Acre-feet of storage or greater will be calculated by multiplying the average annual surface area (obtained from the area-capacity survey) and the net evaporation from the nearest evaporation and climate station to the reservoir. If the average annual surface area is not available, the Non-Federal Reservoirs with 200 Acre-feet of storage or greater will be presumed to be full at the principal spillway elevation.

**B. Specific Formulas for Each Sub-basin and the Main Stem**

All calculations shall be based on the calendar year and shall be rounded to the nearest 10 Acre-feet using the conventional rounding formula of rounding up for all numbers equal to five or higher and otherwise rounding down.

Abbreviations:

- APV = Augmentation Pumping Volume
- CBCU = Computed Beneficial Consumptive
- Use CWS = Computed Water Supply

CWSA	= Computed Water Supply Adjustment
D	= Non-Federal Canal Diversions for Irrigation
Ev	= Evaporation from Federal Reservoirs
EvNFR	= Evaporation from Non-Federal Reservoirs
FF	= Flood Flow
GW	= Groundwater Computed Beneficial Consumptive Use (includes irrigation and non-irrigation uses)
IWS	= Imported Water Supply Credit from Nebraska
M&I	= Non-Irrigation Surface Water Diversions (Municipal and Industrial)
P	= Small Individual Surface Water Pump Diversions for Irrigation
RF	= Return Flow
VWS	= Virgin Water Supply
c	= Colorado
k	= Kansas
n	= Nebraska
ΔS	= Change in Federal Reservoir Storage
%	= Average system efficiency for individual pumps in the Sub-basin
% BRF	= Percent of Diversion from Bureau Canals that returns to the stream
###	= Value expected to be zero

### 1. North Fork of Republican River in Colorado<sup>3</sup>

$$\text{CBCU Colorado} = 0.6 \times \text{Haigler Canal Diversion Colorado} + 0.6 \times D_c + \% \times P_c + 0.5 \times M\&I_c + EvNFR_c + GW_c$$

$$\text{CBCU Kansas} = GW_k$$

$$\text{CBCU Nebraska} = 0.6 \times \text{Haigler Canal Diversion Nebraska} + GW_n$$

Note: The diversion for Haigler Canal is split between Colorado and Nebraska based on the percentage of land irrigated in each state

$$\text{VWS} = \text{North Fork of the Republican River at the State Line, Stn. No. 06823000} + \text{CBCU}_c + \text{CBCU}_k + \text{CBCU}_n + \text{Nebraska Haigler Canal RF} - \text{IWS} - \text{APV}$$

Note: The Nebraska Haigler Canal RF returns to the Main Stem.

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<sup>3</sup> The RRCA will investigate whether return flows from the Haigler Canal diversion in Colorado may return to the Arikaree River, not the North Fork of the Republican River, as indicated in the formulas. If there are return flows from the Haigler Canal to the Arikaree River, these formulas will be changed to recognize those returns.



$$\text{CWS} = \text{VWS} - \text{FF}$$

$$\text{Allocation Colorado} = 0.224 \times \text{CWS}$$

$$\text{Allocation Nebraska} = 0.246 \times \text{CWS}$$

$$\text{Unallocated} = 0.53 \times \text{CWS}$$

## 2. Arikaree River<sup>3</sup>

$$\text{CBCU Colorado} = 0.6 \times \text{Dc} + \% \times \text{Pc} + 0.5 \times \text{M\&Ic} + \text{EvNFRc} + \text{GWc}$$

$$\text{CBCU Kansas} = 0.6 \times \text{Dk} + \% \times \text{Pk} + 0.5 \times \text{M\&Ik} + \text{EvNFRk} + \text{GWk}$$

$$\text{CBCU Nebraska} = 0.6 \times \text{Dn} + \% \times \text{Pn} + 0.5 \times \text{M\&In} + \text{EvNFRn} + \text{GWn}$$

$$\text{VWS} = \text{Arikaree Gage at Haigler Stn. No. 06821500} + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} - \text{IWS}$$

$$\text{CWS} = \text{VWS} - \text{FF}$$

$$\text{Allocation Colorado} = 0.785 \times \text{CWS}$$

$$\text{Allocation Kansas} = 0.051 \times \text{CWS}$$

$$\text{Allocation Nebraska} = 0.168 \times \text{CWS}$$

$$\text{Unallocated} = -0.004 \times \text{CWS}$$

## 3. Buffalo Creek

$$\text{CBCU Colorado} = 0.6 \times \text{Dc} + \% \times \text{Pc} + 0.5 \times \text{M\&In} + \text{EvNFRc} + \text{GWc}$$

$$\text{CBCU Kansas} = \text{GWk}$$

$$\text{CBCU Nebraska} = 0.6 \times \text{Dn} + \% \times \text{Pn} + 0.5 \times \text{M\&In} + \text{EvNFRn} + \text{GWn}$$

$$\text{VWS} = \text{Buffalo Creek near Haigler Gage Stn. No. 06823500} + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} - \text{IWS}$$

$$\text{CWS} = \text{VWS} - \text{FF}$$

$$\text{Allocation Nebraska} = 0.330 \times \text{CWS}$$

$$\text{Unallocated} = 0.670 \times \text{CWS}$$

#### 4. Rock Creek

$$\text{CBCU Colorado} = \text{GWc}$$

$$\text{CBCU Kansas} = \text{GWk}$$

$$\text{CBCU Nebraska} = 0.6 \times \text{Dn} + \% \times \text{Pn} + 0.5 \times \text{M\&In} + \text{EvNFRn} + \text{GWn}$$

$$\text{VWS} = \text{Rock Creek at Parks Gage Stn. No. 06824000} + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} - \text{IWS} - \text{APV}$$

$$\text{CWS} = \text{VWS} - \text{FF}$$

$$\text{Allocation Nebraska} = 0.400 \times \text{CWS}$$

$$\text{Unallocated} = 0.600 \times \text{CWS}$$

#### 5. South Fork Republican River

$$\text{CBCU Colorado} = 0.6 \times \text{Hale Ditch Diversion} + 0.6 \times \text{Dc} + \% \times \text{Pc} + 0.5 \times \text{M\&Ic} + \text{EvNFRc} + \text{Bonny Reservoir Ev} + \text{GWc}$$

$$\text{CBCU Kansas} = 0.6 \times \text{Dk} + \% \times \text{Pk} + 0.5 \times \text{M\&Ik} + \text{EvNFRk} + \text{GWk}$$

$$\text{CBCU Nebraska} = 0.6 \times \text{Dn} + \% \times \text{Pn} + 0.5 \times \text{M\&In} + \text{EvNFRn} + \text{GWn}$$

$$\text{VWS} = \text{South Fork Republican River near Benkelman Gage Stn. No. 06827500} + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} + \Delta \text{S Bonny Reservoir} - \text{IWS}$$

$$\text{CWS} = \text{VWS} - \Delta \text{S Bonny Reservoir} - \text{FF}$$

$$\text{Allocation Colorado} = 0.444 \times \text{CWS}$$

$$\text{Allocation Kansas} = 0.402 \times \text{CWS}$$

$$\text{Allocation Nebraska} = 0.014 \times \text{CWS}$$

Unallocated = 0.140 x CWS

**6. Frenchman Creek in Nebraska**

CBCU Colorado = GWc

CBCU Kansas = GWk

CBCU Nebraska = Culbertson Canal Diversions (IRR Season) x (1-%BRF)  
+ Culbertson Canal Diversions (Non-IRR Season) x (1-92%) + Culbertson Extension (IRR Season) x (1-%BRF)  
+ Culbertson Extension (Non-IRR Season) x (1-92%)  
+ 0.6 x Champion Canal Diversion + 0.6 x Riverside Canal Diversion + 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn  
+ Enders Reservoir Ev + GWn

VWS = Frenchman Creek in Culbertson, Nebraska Gage Stn. No. 06835500 + CBCUc + CBCUk + CBCUn  
+ 0.17 x Culbertson Diversion RF + Culbertson Extension RF  
+ 0.78 x Riverside Diversion RF + ΔS Enders Reservoir – IWS

Note: 17% of the Culbertson Diversion RF and 100% of the Culbertson Extension RF return to the Main Stem

CWS = VWS - ΔS Enders Reservoir – FF

Allocation Nebraska = 0.536 x CWS

Unallocated = 0.464 x CWS

**7. Driftwood Creek**

CBCU Colorado = GWc

CBCU Kansas = 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + GWk

CBCU Nebraska = 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn

VWS = Driftwood Creek near McCook Gage Stn. No. 06836500  
+ CBCUc + CBCUk + CBCUn  
– 0.24 x Meeker Driftwood Canal RF - IWS

Note: 24 % of the Meeker Driftwood Canal RF returns to Driftwood Creek

$$\begin{aligned} \text{CWS} &= \text{VWS} - \text{FF} \\ \text{Allocation Kansas} &= 0.069 \times \text{CWS} \\ \text{Allocation Nebraska} &= 0.164 \times \text{CWS} \\ \text{Unallocated} &= 0.767 \times \text{CWS} \end{aligned}$$

**8. Red Willow Creek in Nebraska**

$$\begin{aligned} \text{CBCU Colorado} &= \text{GWc} \\ \text{CBCU Kansas} &= \text{GWk} \\ \text{CBCU Nebraska} &= 0.1 \times \text{Red Willow Canal CBCU} + 0.6 \times \text{Dn} + \% \times \text{Pn} \\ &\quad + 0.5 \times \text{M\&In} + \text{EvNFRn} + 0.1 \times \text{Hugh Butler Lake Ev} \\ &\quad + \text{GWn} \end{aligned}$$

Note:  
 Red Willow Canal CBCU = Red Willow Canal Diversion (IRR Season) x (1- % BRF) + Red Willow Canal Diversion (Non-IRR Season) x (1-92%)

90% of the Red Willow Canal CBCU and 90% of Hugh Butler Lake Ev charged to Nebraska’s CBCU in the Main Stem

$$\text{VWS} = \text{Red Willow Creek near Red Willow Gage Stn. No. 06838000} + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} + 0.9 \times \text{Red Willow Canal CBCU} + 0.9 \times \text{Hugh Butler Lake Ev} + 0.9 \times \text{Red Willow Canal RF} + \Delta \text{S Hugh Butler Lake} - \text{IWS}$$

Note: 90% of the Red Willow Canal RF returns to the Main Stem

$$\begin{aligned} \text{CWS} &= \text{VWS} - \Delta \text{S Hugh Butler Lake} - \text{FF} \\ \text{Allocation Nebraska} &= 0.192 \times \text{CWS} \end{aligned}$$

Unallocated = 0.808 x CWS

**9. Medicine Creek**

CBCU Colorado = GWc

CBCU Kansas = GWk

CBCU Nebraska = 0.6 x Dn above and below gage + % x Pn above and below gage + 0.5 x M&In above and below gage + EvNFRn above and below gage + GWn

Notes: Harry Strunk Lake Ev charged to Nebraska’s CBCU in the Main Stem.

CU from Harry Strunk releases in the Cambridge Canal is charged to the Main stem (no adjustment to the VWS formula is needed as this water shows up in the Medicine Creek gage).

VWS = Medicine Creek below Harry Strunk Lake Gage Stn. No. 06842500 + CBCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x Pn below gage – 0.5 \* M&In below gage - EvNFRn below gage + Harry Strunk Lake Ev + ΔS Harry Strunk Lake – IWS – APV

Note: The CBCU surface water terms for Nebraska which occur below the gage are added in the VWS for the Main Stem

CWS = VWS - ΔS Harry Strunk Lake - FF

Allocation Nebraska = 0.091 x CWS

Unallocated = 0.909 x CWS

**10. Beaver Creek**

CBCU Colorado = 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + GWc

CBCU Kansas = 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + GWk

CBCU Nebraska =  $0.6 \times Dn$  above and below gage +  $\% \times Pn$  above and below gage +  $0.5 \times M\&In$  above and below gage +  $EvNFRn$  above and below gage +  $GWn$

VWS = Beaver Creek near Beaver City gage Stn. No. 06847000 +  $BCUc$  +  $CBCUk$  +  $CBCUn$  –  $0.6 \times Dn$  below gage -  $\% \times Pn$  below gage –  $0.5 * M\&In$  below gage -  $EvNFRn$  below gage – IWS

Note: The CBCU surface water terms for Nebraska which occur below the gage are added in the VWS for the Main Stem

CWS =  $VWS - FF$

Allocation Colorado =  $0.200 \times CWS$

Allocation Kansas =  $0.388 \times CWS$

Allocation Nebraska =  $0.406 \times CWS$

Unallocated =  $0.006 \times CWS$

**11. Sappa Creek**

CBCU Colorado =  $GWc$

CBCU Kansas =  $0.6 \times Dk$  +  $\% \times Pk$  +  $0.5 \times M\&Ik$  +  $EvNFRk$  +  $GWk$

CBCU Nebraska =  $0.6 \times Dn$  above and below gage +  $\% \times Pn$  above and below gage +  $0.5 \times M\&In$  above and below gage +  $EvNFRn$  above and below gage +  $GWn$

VWS = Sappa Creek near Stamford gage Stn. No. 06847500 – Beaver Creek near Beaver City gage Stn. No. 06847000 +  $BCUc$  +  $CBCUk$  +  $CBCUn$  –  $0.6 \times Dn$  below gage -  $\% \times Pn$  below gage –  $0.5 * M\&In$  below gage -  $EvNFRn$  below gage - IWS

Note: The CBCU surface water terms for Nebraska which occur below the gage are added in the VWS for the Main Stem.

CWS =  $VWS - FF$

$$\text{Allocation Kansas} = 0.411 \times \text{CWS}$$

$$\text{Allocation Nebraska} = 0.411 \times \text{CWS}$$

$$\text{Unallocated} = 0.178 \times \text{CWS}$$

## 12. Prairie Dog Creek

$$\text{CBCU Colorado} = \text{GWc}$$

$$\begin{aligned} \text{CBCU Kansas} &= \text{Almena Canal Diversion} \times (1 - \% \text{BRF}) + 0.6 \times \text{Dk} + \% \times \text{Pk} \\ &+ 0.5 \times \text{M\&Ik} + \text{EvNFRk} + \text{Keith Sebelius Lake Ev} + \text{GWk} \end{aligned}$$

$$\begin{aligned} \text{CBCU Nebraska} &= 0.6 \times \text{Dn below gage} + \% \times \text{Pn below gage} + 0.5 \times \\ &\text{M\&In below gage} + \text{EvNFRn} + \text{GWn below gage} \end{aligned}$$

$$\begin{aligned} \text{VWS} &= \text{Prairie Dog Creek near Woodruff, Kansas USGS Stn. No.} \\ &06848500 + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} - 0.6 \times \text{Dn below} \\ &\text{gage} - \% \times \text{Pn below gage} - 0.5 \times \text{M\&In below gage} - \\ &\text{EvNFRn below gage} + \Delta \text{S Keith Sebelius Lake} - \text{IWS} \end{aligned}$$

Note: The CBCU surface water terms for Nebraska which occur below the gage are added in the VWS for the Main Stem

$$\text{CWS} = \text{VWS} - \Delta \text{S Keith Sebelius Lake} - \text{FF}$$

$$\text{Allocation Kansas} = 0.457 \times \text{CSW}$$

$$\text{Allocation Nebraska} = 0.076 \times \text{CWS}$$

$$\text{Unallocated} = 0.467 \times \text{CWS}$$

## 13. The North Fork of the Republican River in Nebraska and the Main Stem of the Republican River between the junction of the North Fork and the Arikaree River and the Republican River near Hardy

$$\text{CBCU Colorado} = \text{GWc}$$

$$\begin{aligned} \text{CBCU Kansas} &= \\ &(\text{Deliveries from the Courtland Canal to Kansas above} \end{aligned}$$

Lovewell) x (1-%BRF)  
 + Amount of transportation loss of Courtland Canal deliveries to Lovewell that does not return to the river, charged to Kansas  
 + (Diversions of Republican River water from Lovewell Reservoir by the Courtland Canal below Lovewell) x (1-%BRF)  
 + 0.6 x Dk  
 + % x Pk  
 + 0.5 x M&Ik  
 + EvNFRk  
 + Harlan County Lake Ev charged to Kansas  
 + Lovewell Reservoir Ev charged to the Republican River  
 + GWk

CBCU Nebraska

=  
 Deliveries from Courtland Canal to Nebraska lands x (1-%BRF)  
 + Superior Canal (IRR Season) x (1- %BRF) + Superior Canal (Non-IRR Season) x (1 - 92%)  
 + Franklin Pump Canal (IRR Season) x (1- %BRF) + Franklin Pump Canal (Non-IRR Season) x (1 - 92 %)  
 + Franklin Canal (IRR Season) x (1- %BRF) + Franklin Canal (Non-IRR Season) x (1 - 92%)  
 + Naponee Canal (IRR Season) x (1- %BRF) + Naponee Canal (Non-IRR Season) x (1 - 92%)  
 + Cambridge Canal (IRR Season) x (1- %BRF) + Cambridge Canal (Non-IRR Season) x (1 - 92%)  
 + Bartley Canal (IRR Season) x (1- %BRF) + Bartley Canal (Non-IRR Season) x (1 - 92%)  
 + Meeker-Driftwood Canal (IRR Season) x (1- %BRF) + Meeker-Driftwood Canal (Non-IRR Season) x (1- 92%)  
 + 0.9 x Red Willow Canal CBCU  
 + 0.6 x Dn  
 + % x Pn  
 + 0.5 x M&In  
 + EvNFRn  
 + 0.9 x Hugh Butler Lake Ev  
 + Harry Strunk Lake Ev  
 + Swanson Lake Ev  
 + Harlan County Lake Ev charged to Nebraska  
 + GWn

Notes:



The allocation of transportation losses in the Courtland Canal above Lovewell between Kansas and Nebraska shall be done by the Bureau of Reclamation and reported in their “Courtland Canal Above Lovewell” spreadsheet. Deliveries and losses associated with deliveries to both Nebraska and Kansas above Lovewell shall be reflected in the Bureau’s Monthly Water District reports. Losses associated with delivering water to Lovewell shall be separately computed.

Amount of transportation loss of the Courtland Canal deliveries to Lovewell that does not return to the river, charged to Kansas shall be 18% of the Bureau’s estimate of losses associated with these deliveries.

Red Willow Canal CBCU = Red Willow Canal Diversion x (IRR Season) x (1 - % BRF) + Red Willow Canal Diversion (Non-IRR Season) x (1 - 92%)

10% of the Red Willow Canal CBCU is charged to Nebraska’s CBCU in Red Willow Creek sub-basin

10% of Hugh Butler Lake Ev is charged to Nebraska’s CBCU in the Red Willow Creek sub-basin

None of the Harry Strunk Lake EV is charged to Nebraska’s CBCU in the Medicine Creek sub-basin

VWS

=

- Republican River near Hardy Gage Stn. No. 06853500
- North Fork of the Republican River at the State Line, Stn. No. 06823000
- Arikaree Gage at Haigler Stn. No. 06821500
- Buffalo Creek near Haigler Gage Stn. No. 06823500
- Rock Creek at Parks Gage Stn. No. 06824000
- South Fork Republican River near Benkelman Gage Stn. No. 06827500
- Frenchman Creek in Culbertson Stn. No. 06835500
- Driftwood Creek near McCook Gage Stn. No. 06836500
- Red Willow Creek near Red Willow Gage Stn. No. 06838000
- Medicine Creek below Harry Strunk Lake Gage Stn. No. 06842500
- Sappa Creek near Stamford Gage Stn. No. 06847500
- Prairie Dog Creek near Woodruff, Kansas Stn. No.

068485000

+ CBCUc

+ CBCUn

+ 0.6 x Dk

+ % x Pk

+ 0.5 x M&amp;Ik

+ EvNFRk

+ Harlan County Lake Ev charged to Kansas

+ Amount of transportation loss of the Courtland Canal  
above the Stateline that does not return to the river, charged  
to Kansas+ **GWk**

- 0.9 x Red Willow Canal CBCU

- 0.9 x Hugh Butler Ev

- Harry Strunk Ev

+ 0.6 x Dn below Medicine Creek gage

+ % x Pn below Medicine Creek gage

+ 0.5 \* M&amp;In below Medicine Creek gage

+ EvNFRn below Medicine Creek gage

+ 0.6 x Dn below Beaver Creek gage

+ % x Pn below Beaver Creek gage

+ 0.5 \* M&amp;In below Beaver Creek gage

+ EvNFRn below Beaver Creek gage

+ 0.6 x Dn below Sappa Creek gage

+ % x Pn below Sappa Creek gage

+ 0.5 \* M&amp;In below Sappa Creek gage

+ EvNFRn below Sappa Creek gage

+ 0.6 x Dn below Prairie Dog Creek gage

+ % x Pn below Prairie Dog Creek gage

+ 0.5 \* M&amp;In below Prairie Dog Creek gage

+ EvNFRn below Prairie Dog Creek gage

+ Change in Storage Harlan County Lake

+ Change in Storage Swanson Lake

- Nebraska Haigler Canal RF

- 0.78 x Riverside Canal RF

- 0.17 x Culbertson Canal RF
- Culbertson Canal Extension RF to Main Stem
- + 0.24 x Meeker Driftwood Canal RF which returns to Driftwood Creek
- 0.9 x Red Willow Canal RF
  
- + Courtland Canal at Kansas-Nebraska State Line Gage Stn No. 06852500
- Courtland Canal RF in Kansas above Lovewell Reservoir
  
- IWS

Notes:

None of the Nebraska Haigler Canal RF returns to the North Fork of the Republican River

83% of the Culbertson Diversion RF and none of the Culbertson Extension RF return to Frenchman Creek

24 % of the Meeker Driftwood Canal RF returns to Driftwood Creek.

10% of the Red Willow Canal RF returns to Red Willow Creek

Courtland Canal RF in Kansas above Lovewell Reservoir = 0.015 x (Courtland Canal at Kansas-Nebraska State Line Gage Stn No. 06852500)

CWS = VWS - Change in Storage Harlan County Lake - Change in Storage Swanson Lake – FF + CWSA

Allocation Kansas = 0.511 x CWS

Allocation Nebraska = 0.489 x CWS

**V. Annual Data/ Information Requirements, Reporting, and Verification**

The following information for the previous calendar year shall be provided to the members of the RRCA Engineering Committee by April 15<sup>th</sup> of each year, unless otherwise specified.

All information shall be provided in electronic format, if available.

Each State agrees to provide all information from their respective State that is needed for the RRCA Groundwater Model and RRCA Accounting Procedures and Reporting Requirements, including but not limited to the following:

### **A. Annual Reporting**

#### **1. Surface water diversions and irrigated acreage:**

Each State will tabulate the canal, ditch, and other surface water diversions that are required by RRCA annual compact accounting and the RRCA Groundwater Model on a monthly format (or a procedure to distribute annual data to a monthly basis) and will forward the surface water diversions to the other States. This will include available diversion, wasteway, and farm delivery data for canals diverting from the Platte River that contribute to Imported Water Supply into the Basin. Each State will provide the water right number, type of use, system type, location, diversion amount, and acres irrigated.

#### **2. Groundwater pumping and irrigated acreage:**

Each State will tabulate and provide all groundwater well pumping estimates that are required for the RRCA Groundwater Model to the other States.

**Colorado** – will provide an estimate of pumping based on a county format that is based upon system type, Crop Irrigation Requirement (CIR), irrigated acreage, crop distribution, and irrigation efficiencies. Colorado will require installation of a totalizing flow meter, installation of an hours meter with a measurement of the pumping rate, or determination of a power conversion coefficient for 10% of the active wells in the Basin by December 31, 2005. Colorado will also provide an annual tabulation for each groundwater well that measures groundwater pumping by a totalizing flow meter, hours meter or power conversion coefficient that includes: the groundwater well permit number, location, reported hours, use, and irrigated acreage.

**Kansas** - will provide an annual tabulation by each groundwater well that includes: water right number, groundwater pumping determined by a meter on each well (or group of wells in a manifold system) or by reported hours of use and rate; location; system type (gravity, sprinkler, LEPA, drip, etc.); and irrigated acreage. Crop distribution will be provided on a county basis.

**Nebraska** – will provide an annual tabulation through the representative Natural Resource District (NRD) in Nebraska that includes: the well registration number or other ID number; groundwater pumping determined

by a meter on each well (or group of wells in a manifold system) or by reported hours of use and rate; wells will be identified by; location; system type (gravity, sprinkler, LEPA, drip, etc.); and irrigated acreage. Crop distribution will be provided on a county basis.

### 3. Climate information:

Each State will tabulate and provide precipitation, temperature, relative humidity or dew point, and solar radiation for the following climate stations:

State	Identification	Name
Colorado	C050109	Akron 4 E
Colorado	C051121	Burlington
Colorado	C054413	Julesburg
Colorado	C059243	Wray
Kansas	C140439	Atwood 2 SW
Kansas	C141699	Colby 1SW
Kansas	C143153	Goodland
Kansas	C143837	Hoxie
Kansas	C145856	Norton 9 SSE
Kansas	C145906	Oberlin1 E
Kansas	C147093	Saint Francis
Kansas	C148495	Wakeeny
Nebraska	C250640	Beaver City
Nebraska	C250810	Bertrand
Nebraska	C252065	Culbertson
Nebraska	C252690	Elwood 8 S
Nebraska	C253365	Gothenburg
Nebraska	C253735	Hebron
Nebraska	C253910	Holdredge
Nebraska	C254110	Imperial
Nebraska	C255090	Madrid
Nebraska	C255310	McCook
Nebraska	C255565	Minden
Nebraska	C256480	Palisade
Nebraska	C256585	Paxton
Nebraska	C257070	Red Cloud
Nebraska	C258255	Stratton
Nebraska	C258320	Superior
Nebraska	C258735	Upland
Nebraska	C259020	Wauneta 3 NW

### 4. Crop Irrigation Requirements:

Each State will tabulate and provide estimates of crop irrigation requirement

information on a county format. Each State will provide the percentage of the crop irrigation requirement met by pumping; the percentage of groundwater irrigated lands served by sprinkler or flood irrigation systems, the crop irrigation requirement; crop distribution; crop coefficients; gain in soil moisture from winter and spring precipitation, net crop irrigation requirement; and/or other information necessary to compute a soil/water balance.

**5. Streamflow Records from State-Maintained Gaging Records:**

Streamflow gaging records from the following State maintained gages will be provided:

Station No	Name
00126700	Republican River near Trenton
06831500	Frenchman Creek near Imperial
06832500	Frenchman Creek near Enders
06835000	Stinking Water Creek near Palisade
06837300	Red Willow Creek above Hugh Butler Lake
06837500	Red Willow Creek near McCook
06841000	Medicine Creek above Harry Strunk Lake
06842500	Medicine Creek below Harry Strunk Lake
06844000	Muddy Creek at Arapahoe
06844210	Turkey Creek at Edison
06847000	Beaver Creek near Beaver City
	Republican River at Riverton
06851500	Thompson Creek at Riverton
06852000	Elm Creek at Amboy
	Republican River at the Superior-Courtland Diversion Dam

**6. Platte River Reservoirs:**

The State of Nebraska will provide the end-of-month contents, inflow data, outflow data, area-capacity data, and monthly net evaporation, if available, from Johnson Lake; Elwood Reservoir; Sutherland Reservoir; Maloney Reservoir; and Jeffrey Lake.

**7. Water Administration Notification:**

The State of Nebraska will provide the following information that describes the protection of reservoir releases from Harlan County Lake and for the administration of water rights junior in priority to February 26, 1948:

Date of notification to Nebraska water right owners to curtail their diversions, the amount of curtailment, and length of time for curtailment.

The number of notices sent.

The number of diversions curtailed and amount of curtailment in the Harlan County Lake to Guide Rock reach of the Republican River.

**8. Moratorium:**

Each State will provide a description of all new Wells constructed in the Basin Upstream of Guide Rock including the owner, location (legal description), depth and diameter or dimension of the constructed water well, casing and screen information, static water level, yield of the water well in gallons per minute or gallons per hour, and intended use of the water well.

Designation whether the Well is a:

- a. Test hole;
- b. Dewatering Well with an intended use of one year or less;
- c. Well designed and constructed to pump fifty gallons per minute or less;
- d. Replacement Water Well, including a description of the Well that is replaced providing the information described above for new Wells and a description of the historic use of the Well that is replaced;
- e. Well necessary to alleviate an emergency situation involving provision of water for human consumption, including a brief description of the nature of the emergency situation and the amount of water intended to be pumped by and the length of time of operation of the new Well;
- f. Transfer Well, including a description of the Well that is transferred providing the information described above for new Wells and a description of the Historic Consumptive Use of the Well that is transferred;
- g. Well for municipal and/or industrial expansion of use;

Wells in the Basin in Northwest Kansas or Colorado. Kansas and Colorado will provide the information described above for new Wells along with copies of any other information that is required to be filed with either State of local agencies under the laws, statutes, rules and regulations in existence as of April 30, 2002, and; Any changes in State law in the previous year relating to existing Moratorium.

**9. Non-Federal Reservoirs:**

Each State will conduct an inventory of Non Federal Reservoirs by December 31, 2004, for inclusion in the annual Compact Accounting. The inventory shall include the following information: the location, capacity (in Acre-feet) and area (in acres) at the principal spillway elevation of each Non-Federal Reservoir. The States will annually provide any updates to the initial inventory of Non-Federal Reservoirs, including enlargements that are constructed in the previous year.

Owners/operators of Non-Federal Reservoirs with 200 Acre-feet of storage capacity or greater at the principal spillway elevation will be required to provide an area- capacity survey from State-approved plans or prepared by a licensed professional engineer or land surveyor.

**10. Augmentation Projects:**

Each State will provide a description of the wells, measuring devices, conveyance structure(s), and other infrastructure to describe the physical characteristics, water diversions, and consumptive use associated with each project. The States will provide daily pumping data for each augmentation project on an annual basis.

**B. RRCA Groundwater Model Data Input Files**

1. Monthly groundwater pumping, surface water recharge, groundwater recharge, and precipitation recharge provided by county and indexed to the one square mile cell size.
2. Potential Evapotranspiration rate is set as a uniform rate for all phreatophyte vegetative classes – the amount is X at Y climate stations and is interpolated spatially using kriging.

**C. Inputs to RRCA Accounting****1. Surface Water Information**

- a. Streamflow gaging station records: obtained as preliminary USGS or Nebraska streamflow records, with adjustments to reflect a calendar year, at the following locations:

Arikaree River at Haigler, Nebraska  
North Fork Republican River at Colorado-Nebraska state line



Buffalo Creek near Haigler, Nebraska  
 Rock Creek at Parks, Nebraska  
 South Fork Republican River near Benkelman, Nebraska  
 Frenchman Creek at Culbertson, Nebraska  
 Red Willow Creek near Red Willow, Nebraska  
 Medicine Creek below Harry Strunk Lake, Nebraska\*  
 Beaver Creek near Beaver City, Nebraska\*  
 Sappa Creek near Stamford, Nebraska  
 Prairie Dog Creek near Woodruff, Kansas  
 Courtland Canal at Nebraska-Kansas state line  
 Republican River near Hardy, Nebraska  
 Republican River at Superior-Courtland Diversion Dam near  
 Guide Rock,  
 Nebraska (new)\*

- b. Federal reservoir information: obtained from the United States Bureau of Reclamation:

Daily free water surface evaporation, storage, precipitation, reservoir release information, and updated area-capacity tables.

Federal Reservoirs:

Bonny Reservoir  
 Swanson Lake  
 Harry Strunk Lake  
 Hugh Butler Lake  
 Enders Reservoir  
 Keith Sebelius Lake  
 Harlan County  
 Lake Lovewell  
 Reservoir

- c. Non-federal reservoirs obtained by each state: an updated inventory of reservoirs that includes the location, surface area (acres), and capacity (in Acre-feet), of each non-federal reservoir with storage capacity of fifteen (15) Acre-feet or greater at the principal spillway elevation. Supporting data to substantiate the average surface water areas that are different than the presumptive average annual surface area may be tendered by the offering State.

- d. Diversions and related data from USBR

Irrigation diversions by canal, ditch, and pumping station that irrigate more than two (2) acres  
 Diversions for non-irrigation uses greater than 50 Acre-feet  
 Farm Deliveries  
 Wasteway measurements  
 Irrigated acres

- e. Diversions and related data – from each respective State

Irrigation diversions by canal, ditch, and pumping station that irrigate more than two (2) acres  
 Diversions for non-irrigation uses greater than 50 Acre-feet  
 Wasteway measurements, if available

**2. Groundwater Information**

(From the RRCA Groundwater model as output files as needed for the accounting procedures)

- a. Imported water - mound credits in amount and time that occur in defined streamflow points/reaches of measurement or compliance – ex: gaging stations near confluence or state lines
- b. Groundwater depletions to streamflow (above points of measurement or compliance – ex: gaging stations near confluence or state lines)

**3. Summary**

The aforementioned data will be aggregated by Sub-basin as needed for RRCA accounting.

**D. Verification**

**1. Documentation to be Available for Inspection Upon Request**

- a. Well permits/ registrations database
- b. Copies of well permits/ registrations issued in calendar year
- c. Copies of surface water right permits or decrees
- d. Change in water right/ transfer historic use analyses
- e. Canal, ditch, or other surface water diversion records
- f. Canal, ditch, or other surface water measurements
- g. Reservoir storage and release records
- h. Irrigated acreage
- i. Augmentation well pumping and delivery records

## **2. Site Inspection**

- a. Accompanied – reasonable and mutually acceptable schedule among representative state and/or federal officials.
- b. Unaccompanied – inspection parties shall comply with all laws and regulations of the State in which the site inspection occurs.

Table 1: Annual Virgin and Computed Water Supply, Allocations and Computed Beneficial Consumptive Uses by State, Main Stem and Sub-basin

Designated Drainage Basin	Col. 1: Virgin Water Supply	Col. 2: Computed Water Supply	Col. 3: Allocations				Col. 4: Computed Beneficial Consumptive Use		
			Colorado	Nebraska	Kansas	Unallocated	Colorado	Nebraska	Kansas
North Fork in Colorado									
Arikaree									
Buffalo									
Rock									
South Fork of Republican River									
Frenchman									
Driftwood									
Red Willow									
Medicine									
Beaver									
Sappa									
Prairie Dog									
North Fork of Republican River in Nebraska and Main Stem									
Total All Basins									
North Fork Of Republican River in Nebraska and Mainstem Including Unallocated Water									
Total									

Table 2: Original Compact Virgin Water Supply and Allocations

Designated Drainage Basin	Virgin Water Supply	Colorado Allocation	% of Total Drainage Basin Supply	Kansas Allocation	% of Total Drainage Basin Supply	Nebraska Allocation	% of Total Drainage Basin Supply	Unallocated	% of Total Drainage Basin Supply
North Fork - CO	44,700	10,000	22.4			11,000	24.6	23,700	53.0
Arikaree River	19,610	15,400	78.5	1,000	5.1	3,300	16.8	-90	-0.4
Buffalo Creek	7,890					2,600	33.0	5,290	67.0
Rock Creek	11,000					4,400	40.0	6,600	60.0
South Fork	57,200	25,400	44.4	23,000	40.2	800	1.4	8,000	14.0
Frenchman Creek	98,500					52,800	53.6	45,700	46.4
Driftwood Creek	7,300			500	6.9	1,200	16.4	5,600	76.7
Red Willow Creek	21,900					4,200	19.2	17,700	80.8
Medicine Creek	50,800					4,600	9.1	46,200	90.9
Beaver Creek	16,500	3,300	20.0	6,400	38.8	6,700	40.6	100	0.6
Sappa Creek	21,400			8,800	41.1	8,800	41.1	3,800	17.8
Prairie Dog Creek	27,600			12,600	45.7	2,100	7.6	12,900	46.7
Sub-total Tributaries	384,400							175,500	
Main Stem + Blackwood Creek	94,500								
Main Stem + Unallocated	270,000			138,000	51.1	132,000	48.9		
Total	478,900	54,100		190,300		234,500			

Table 3A: Table to Be Used to Calculate Colorado's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance for Averaging Periods with No Water Short Year Designations Pursuant to Section III.J.

Colorado				
	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and CORWS Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit Col 1 – (Col 2- Col 3)
Year t= -4				
Year t= -3				
Year t= -2				
Year t= -1				
Current Year t= 0				
Average				

Table 3B. Table to Be Used to Calculate Kansas's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance

Kansas				
	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Col 1 – (Col 2- Col 3)
Year T= -4				
Year T= -3				
Year T= -2				
Year T= -1				
Current Year T= 0				
Average				

Table 3C. Table to Be Used to Calculate Nebraska's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance

Nebraska				
	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and NERWS Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and NERWS Credit Col 1 – (Col 2- Col 3)
Year T= -4				
Year T= -3				
Year T= -2				
Year T= -1				
Current Year T= 0				
Average				

Table 4A: Colorado Compliance with the Sub-basin Non-impairment Requirement

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (5-year running average)	Unallocated Supply (5-year running average)	Credits from Imported Water Supply and CORWS Credit (5-year running average)	Total Supply Available (5-year running average)	Colorado Computed Beneficial Consumptive Use (5-year running average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (5-year running average)
North Fork Republican River Colorado						
Arikaree River			N/A			
South Fork Republican River			N/A			
Beaver Creek			N/A			

Note: In Table 4A, the CORWS Credit in Col 3 can only be applied to the North Fork Republican River Colorado. Table 4A is left unpopulated pursuant to the 2016 Colorado CCP/SF Resolution, paragraph E.

Table 4B: Kansas Compliance with the Sub-basin Non-impairment Requirement

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (5-year running average)	Unallocated Supply (5-year running average)	Unused Allocation from Colorado (5-year running average)	Credits from Imported Water Supply (5-year running average)	Total Supply Available = Col 1+ Col 2+ Col 3 + Col 4 (5-year running average)	Kansas Computed Beneficial Consumptive Use (5-year running average)	Difference Between Available Supply and Computed Beneficial Consumptive Use = Col 5 – Col 6 (5-year running average)
Arikaree River							
South Fork Republican River							
Driftwood Creek							
Beaver Creek							
Sappa Creek							
Prairie Dog Creek							



Table 5A: Table to Be Used to Calculate Colorado's Compact Compliance for Averaging Periods with Water Short Year Designations Pursuant to Section III.J.

Colorado							
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Year	Is the year Water Short Pursuant to III.J?*( Yes or No)	Statewide Allocation	Beaver Creek Reduction Pursuant to Table 5F	Allocation – Beaver Creek Reduction (Col. 2 – Col. 3)	Computed Beneficial Consumptive (excluding the Beaver Creek Sub-basin)	Imported Water Supply Credit – IWS Beaver Creek $\pm$ <u>CORWS Credit</u>	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit <u>and</u> <u>CORWS Credit</u> (Col. 4 – Col. 5 + Col. 6)
Year T= -4							
Year T= -3							
Year T= -2							
Year T= -1							
Current Year T= 0							
Average							

\* If the Column 1 entry is “No”, then the Beaver Creek Reduction in Column 3 will be zero for that year.

Table 5B: Kansas Compliance During Water-Short Year Administration

Kansas							
Year	Allocation				Computed Beneficial Consumptive Use	Imported Water Supply Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
Column	1	2	3	4	5	6	7
	Sum Sub-basins	Kansas's Share of the Unallocated Supply	Kansas' Share of Unused Colorado Allocation	Total Col 1 + Col 2 + Col 3			Col 4 – (Col 5 – Col 6)
Previous Year							
Current Year							
Average							

Note: In Table 5B, Column 3 values are the sum of Kansas' Share of Unused Colorado Allocations for the sub-basins listed in Table 4B. Kansas' share of the Unused Colorado Allocation is 51.1%.

Table 5C: Nebraska Compliance During Water-Short Year Administration

	Nebraska								
Year	Allocation				Computed Beneficial Consumptive Use			Imported Water Supply Credit and NERWS Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Above Guide Rock and NERWS Credit
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	Nebraska's Share of Unused Colorado Allocation	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 + Col 4 – (Col 7 – Col 8)
Previous Year									
Current Year									
Average									

Note: In Table 5C, Column 4 values are the sum of Nebraska's Share of Unused Colorado Allocations for the sub-basins listed in Table 4B and the North Fork Sub-basin. Nebraska's share of the Unused Colorado Allocation is 48.9%.

Table 5D: Nebraska Compliance Under an Alternative Water-Short Year Administration Plan

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water Supply Credit and NERWS Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Above Guide Rock and NERWS Credit
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	Nebraska's Share of Unused Colorado Allocation	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 + Col 4 – (Col 7 - Col 8)
Year = -2									
Year = -1									
Current Year									
Three-Year Average									
	Sum of Previous Two-year Difference								
	Expected Decrease in CBCU Under Plan								

Note: In Table 5D, Column 4 values are the sum of Nebraska's Share of Unused Colorado Allocations for the sub-basins listed in Table 4B and the North Fork Sub-basin. Nebraska's share of the Unused Colorado Allocation is 48.9%.

Table 5E: Nebraska Tributary Compliance During Water-Short Year Administration

Year	Sum of Nebraska Sub-basin Allocations	Sum of Nebraska's Share of Sub-basin Unallocated Supplies	Total Available Water Supply for Nebraska	Computed Beneficial Consumptive Use	Imported Water Supply Credit and NERWS Credit generated in a Sub-basin	Difference between Allocation And the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and NERWS Credit
	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
			Col 1 + Col 2			Col 3 -(Col 4-Col 5)
Previous Year						
Current Year						
Average						

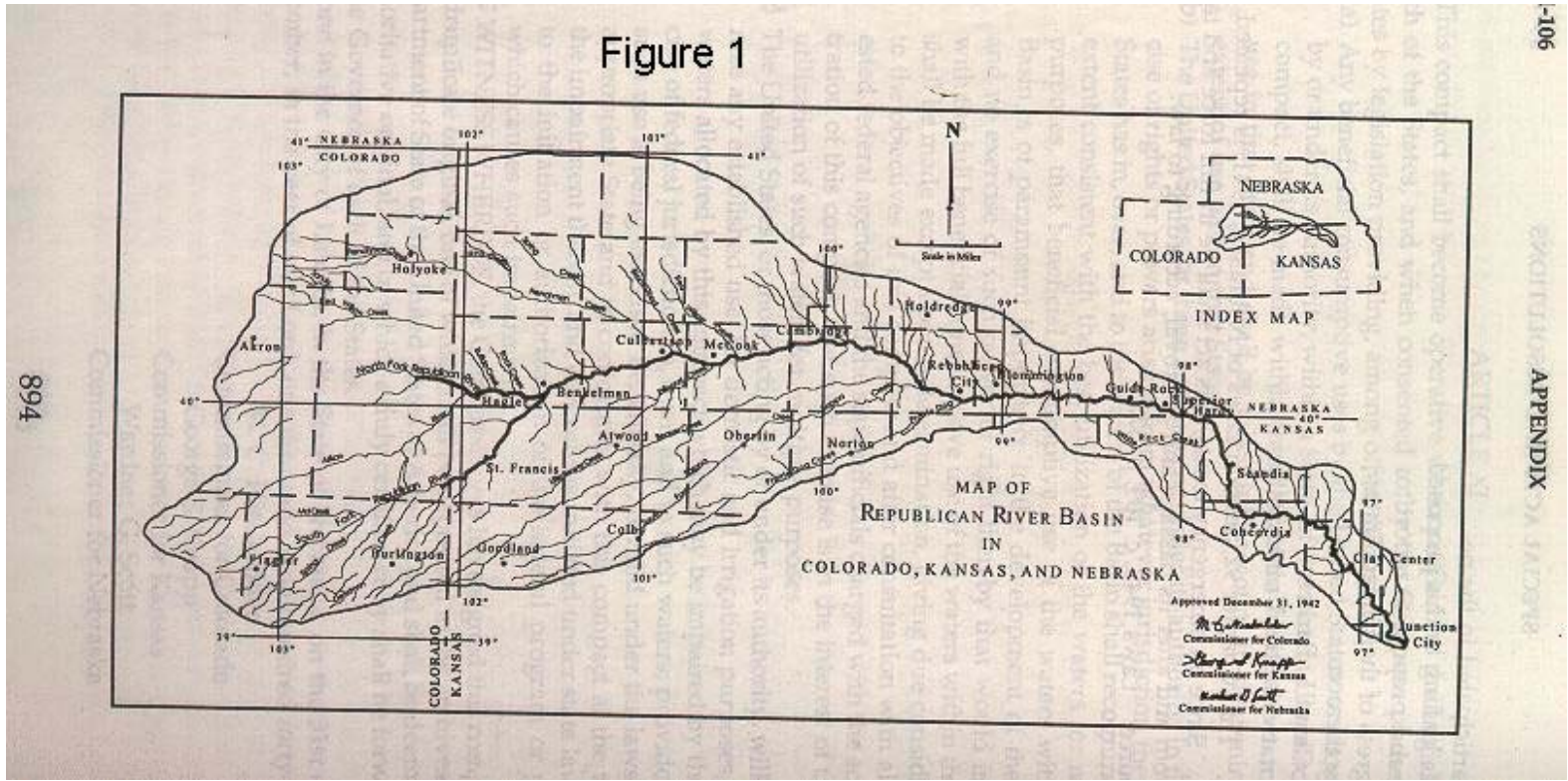
Table 5F: Colorado's Beaver Creek Reduction During Water-Short Years

Colorado		
Water Short Year (WSY) Pursuant to III.J	Beaver Creek Allocation	Current Accounting Year Reduction = Average of last 5 WSY Beaver Creek Allocations
	Col. 1	Col. 2
Fifth Most Recent WSY		
Fourth Most Recent WSY		
Third Most Recent WSY		
Second Most Recent WSY		
Most Recent* WSY		
		Average of Col. 1

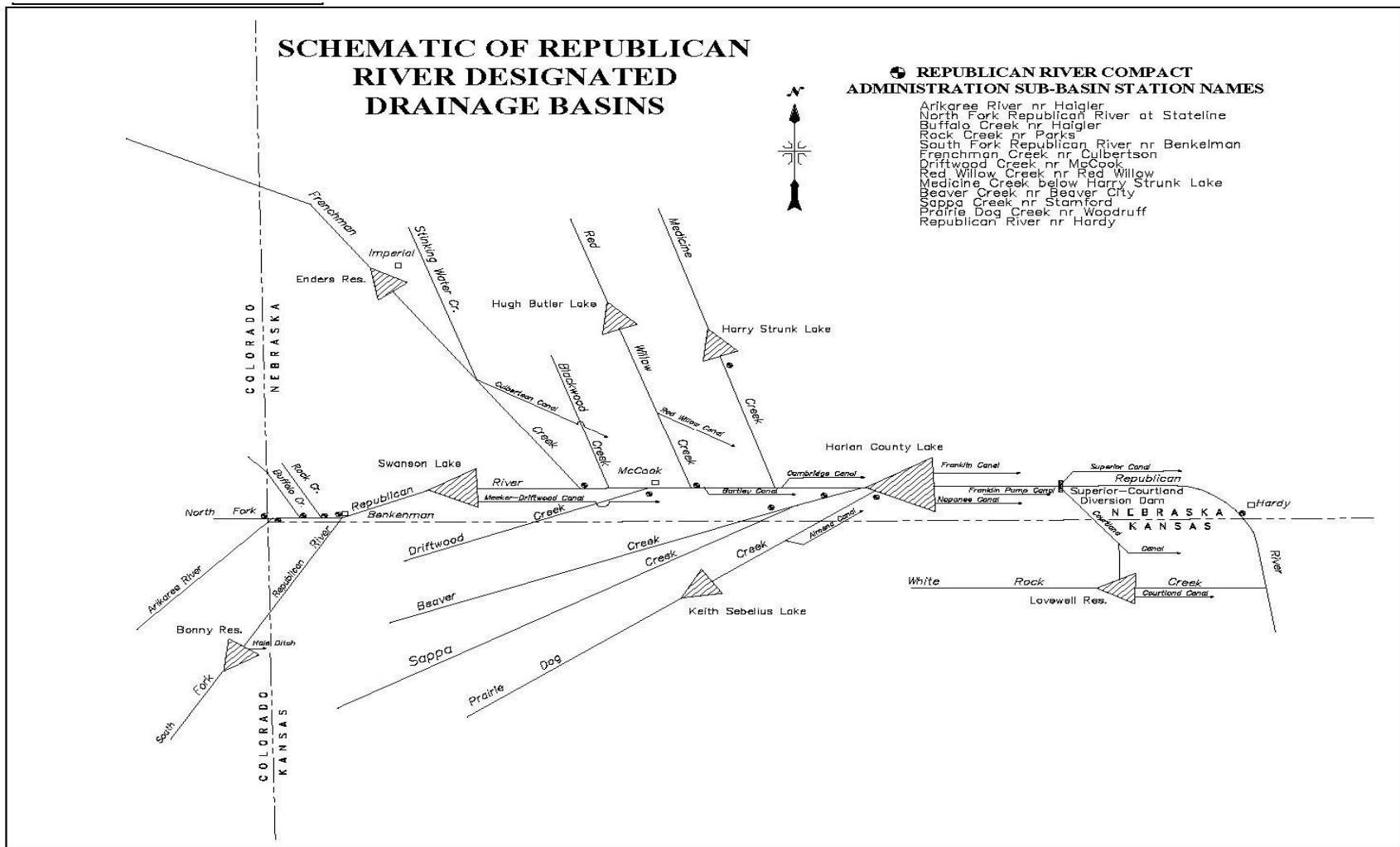
\*Most Recent WSY prior to the current accounting year.

Example calculation for Table 5F

Colorado		
Water Short Year Pursuant to III.J	Beaver Creek Allocation	Reduction = Average of last 5 WSY Beaver Creek Allocations
	Col. 1	Col. 2
2002	770	
2003	260	
2004	360	
2005	910	
2006	1420	
2007	2320	744
2013	1130	1054
2014	1250	1228
2015	2130	1406
2016	2520	1650



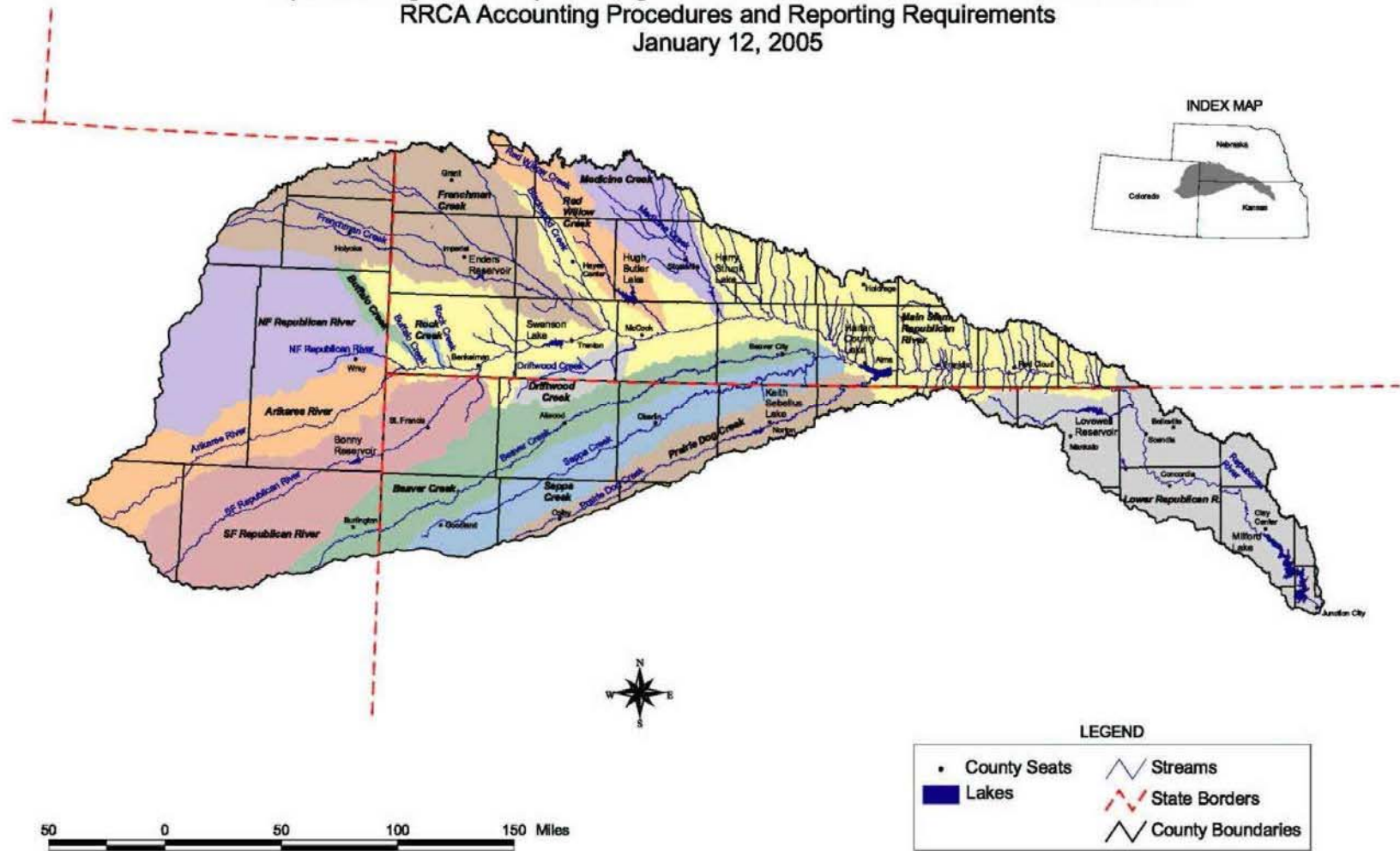
Basin Map Attached to Compact that Shows the Streams and the Basin Boundaries



Line Diagram of Designated Drainage Basins Showing Federal Reservoirs and Sub-basin Gaging Stations



Update of Figure 3 - Map Showing Sub-basins, Streams, and the Basin Boundaries  
RRCA Accounting Procedures and Reporting Requirements  
January 12, 2005



Map Showing Sub-basins, Streams, and the Basin Boundaries

Attachment 1: Sub-basin Flood Flow Thresholds

Sub-basin	Sub-basin Flood Flow Threshold Acre-feet per Year <sup>4</sup>
Arikaree River	16,400
North Fork of Republican River	33,900
Buffalo Creek	4,800
Rock Creek	9,800
South Fork of Republican River	30,400
Frenchman Creek	51,900
Driftwood Creek	9,400
Red Willow Creek	15,100
Medicine Creek	55,100
Beaver Creek	13,900
Sappa Creek	26,900
Prairie Dog	15,700

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<sup>4</sup> Flows considered to be Flood Flows are flows in excess of the 94% flow based on a flood frequency analysis for the years 1971-2000. The Gaged Flows are measured after depletions by Beneficial Consumptive Use and change in reservoir storage.

Attachment 2: Description of the Consensus Plan for Harlan County Lake

The Consensus Plan for operating Harlan County Lake was conceived after extended discussions and negotiations between Reclamation and the Corps. The agreement shaped at these meetings provides for sharing the decreasing water supply into Harlan County Lake. The agreement provides a consistent procedure for: updating the reservoir elevation/storage relationship, sharing the reduced inflow and summer evaporation, and providing a January forecast of irrigation water available for the following summer.

During the interagency discussions the two agencies found agreement in the following areas:

- The operating plan would be based on current sediment accumulation in the irrigation pool and other zones of the project.
- Evaporation from the lake affects all the various lake uses in proportion to the amount of water in storage for each use.
- During drought conditions, some water for irrigation could be withdrawn from the sediment pool.
- Water shortage would be shared between the different beneficial uses of the project, including fish, wildlife, recreation and irrigation.

To incorporate these areas of agreement into an operation plan for Harlan County Lake, a mutually acceptable procedure addressing each of these items was negotiated and accepted by both agencies.

1. Sediment Accumulation.

The most recent sedimentation survey for Harlan County project was conducted in 1988, 37 years after lake began operation. Surveys were also performed in 1962 and 1972; however, conclusions reached after the 1988 survey indicate that the previous calculations are unreliable. The 1988 survey indicates that, since closure of the dam in 1951, the accumulated sediment is distributed in each of the designated pools as follows:

Flood Pool	2,387 Acre-feet
Irrigation Pool	4,853 Acre-feet
Sedimentation Pool	33,527 Acre-feet

To insure that the irrigation pool retained 150,000 Acre-feet of storage, the bottom of the irrigation pool was lowered to 1,932.4 feet, msl, after the 1988 survey.

To estimate sediment accumulation in the lake since 1988, we assumed similar conditions have occurred at the project during the past 11 years. Assuming a consistent rate of deposition since 1988, the irrigation pool has trapped an additional 1,430 Acre-feet.

A similar calculation of the flood control pool indicates that the flood control pool has captured an additional 704 Acre-feet for a total of 3,090 Acre-feet since construction.

The lake elevations separating the different pools must be adjusted to maintain a 150,000-acre-foot irrigation pool and a 500,000-acre-foot flood control pool. Adjusting these elevations results in the following new elevations for the respective pools (using the 1988 capacity tables).

Top of Irrigation Pool	1,945.70 feet, msl
Top of Sediment Pool	1,931.75 feet, msl

Due to the variability of sediment deposition, we have determined that the elevation capacity relationship should be updated to reflect current conditions. We will complete a new sedimentation survey of Harlan County Lake this summer, and new area capacity tables should be available by early next year. The new tables may alter the pool elevations achieved in the Consensus Plan for Harlan County Lake.

## 2. Summer Evaporation.

Evaporation from a lake is affected by many factors including vapor pressure, wind, solar radiation, and salinity of the water. Total water loss from the lake through evaporation is also affected by the size of the lake. When the lake is lower, the surface area is smaller and less water loss occurs. Evaporation at Harlan County Lake has been estimated since the lake's construction using a Weather Service Class A pan which is 4 feet in diameter and 10 inches deep. We and Reclamation have jointly reviewed this information and assumed future conditions to determine an equitable method of distributing the evaporation loss from the project between irrigation and the other purposes.

During those years when the irrigation purpose expected a summer water yield of 119,000 Acre-feet or more, it was determined that an adequate water supply existed and no sharing of evaporation was necessary. Therefore, evaporation evaluation focused on the lower pool elevations when water was scarce. Times of water shortage would also generally be times of higher evaporation rates from the lake.

Reclamation and we agreed that evaporation from the lake during the summer (June through September) would be distributed between the irrigation and sediment pools based on their relative percentage of the total storage at the time of evaporation. If the sediment pool held 75 percent of the total storage, it would be charged 75 percent of the evaporation. If the sediment pool held 50 percent of the total storage, it would be charged 50 percent of the evaporation. At the bottom of the irrigation pool (1,931.75 feet, msl) all of the evaporation would be charged to the sediment pool.

Due to downstream water rights for summer inflow, neither the irrigation nor the

sediment pool is credited with summer inflow to the lake. The summer inflows would be assumed passed through the lake to satisfy the water right holders. Therefore, Reclamation and we did not distribute the summer inflow between the project purposes.

As a result of numerous lake operation model computer runs by Reclamation, it became apparent that total evaporation from the project during the summer averaged about 25,000 Acre-feet during times of lower lake elevations. These same models showed that about 20 percent of the evaporation should be charged to the irrigation pool, based on percentage in storage during the summer months. About 20 percent of the total lake storage is in the irrigation pool when the lake is at elevation 1,935.0 feet, msl. As a result of the joint study, Reclamation and we agreed that the irrigation pool would be credited with 20,000 Acre-feet of water during times of drought to share the summer evaporation loss.

Reclamation and we further agreed that the sediment pool would be assumed full each year. In essence, if the actual pool elevation were below 1,931.75 feet, msl, in January, the irrigation pool would contain a negative storage for the purpose of calculating available water for irrigation, regardless of the prior year's summer evaporation from sediment storage.

### 3. Irrigation withdrawal from sediment storage.

During drought conditions, occasional withdrawal of water from the sediment pool for irrigation is necessary. Such action is contemplated in the Field Working Agreement and the Harlan County Lake Regulation Manual: "Until such time as sediment fully occupies the allocated reserve capacity, it will be used for irrigation and various conservation purposes, including public health, recreation, and fish and wildlife preservation."

To implement this concept into an operation plan for Harlan County Lake, Reclamation and we agreed to estimate the net spring inflow to Harlan County Lake. The estimated inflow would be used by the Reclamation to provide a firm projection of water available for irrigation during the next season.

Since the construction of Harlan County Lake, inflows to the lake have been depleted by upstream irrigation wells and farming practices. Reclamation has recently completed an in-depth study of these depleted flows as a part of their contract renewal process. The study concluded that if the current conditions had existed in the basin since 1931, the average spring inflow to the project would have been 57,600 Acre-feet of water. The study further concluded that the evaporation would have been 8,800 Acre-feet of water during the same period. Reclamation and we agreed to use these values to calculate the net inflow to the project under the current conditions.

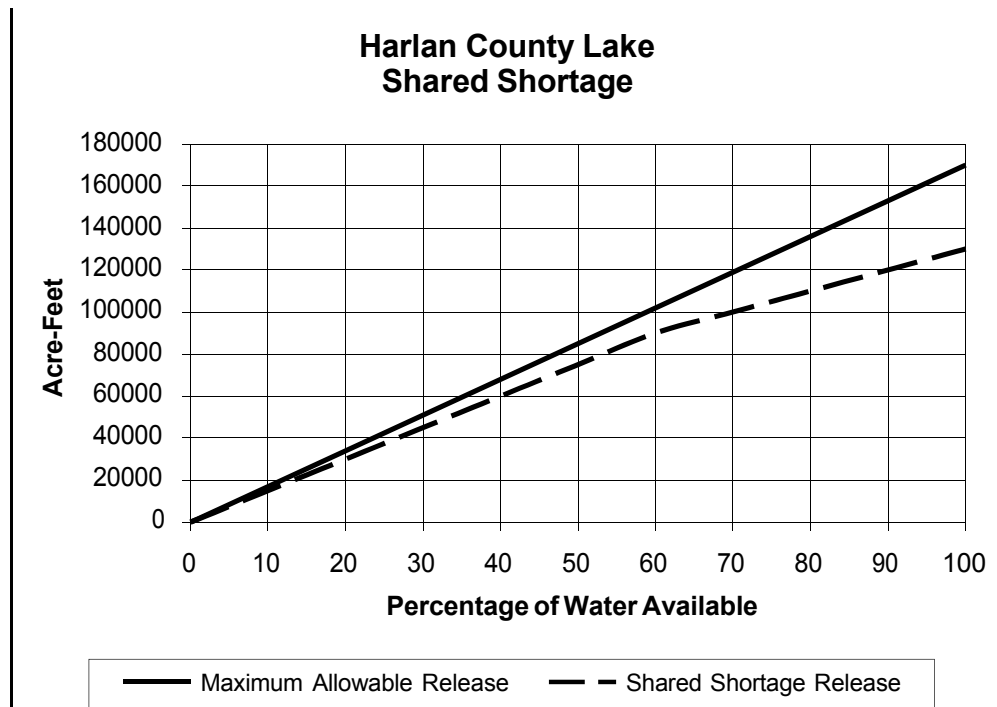
In addition, both agencies also recognized that the inflow to the project could continue to decrease with further upstream well development and water conservation farming. Due to these concerns, Reclamation and we determined that the previous 5-year inflow values would be

averaged each year and compared to 57,600 Acre-feet. The inflow estimate for Harlan County Lake would be the smaller of these two values.

The estimated inflow amount would be used in January of each year to forecast the amount of water stored in the lake at the beginning of the irrigation season. Based on this forecast, the irrigation districts would be provided a firm estimate of the amount of water available for the next season. The actual storage in the lake on May 31 would be reviewed each year. When the actual water in storage is less than the January forecast, Reclamation may draw water from sediment storage to make up the difference.

4. Water Shortage Sharing.

A final component of the agreement involves a procedure for sharing the water available during times of shortage. Under the shared shortage procedure, the irrigation purpose of the project would remove less water than otherwise allowed and alleviate some of the adverse effects to the other purposes. The procedure would also extend the water supply during times of drought by “banking” some water for the next irrigation season. The following graph illustrates the shared shortage releases.



5. Calculation of Irrigation Water Available

Each January, the Reclamation would provide the Bostwick irrigation districts a firm estimate of the quantity of water available for the following season. The firm estimate of water available for irrigation would be calculated by using the following equation and shared shortage

adjustment:

$\text{Storage} + \text{Summer Sediment Pool Evaporation} + \text{Inflow} - \text{Spring Evaporation} = \text{Maximum Irrigation Water Available}$
--

The variables in the equation are defined as:

- Maximum Irrigation Water Available. Maximum irrigation supply from Harlan County Lake for that irrigation season.
- Storage. Actual storage in the irrigation pool at the end of December. The sediment pool is assumed full. If the pool elevation is below the top of the sediment pool, a negative irrigation storage value would be used.
- Inflow. The inflow would be the smaller of the past 5-year average inflow to the project from January through May, or 57,600 Acre-feet.
- Spring Evaporation. Evaporation from the project would be 8,800 Acre-feet which is the average January through May evaporation.
- Summer Sediment Pool Evaporation. Summer evaporation from the sediment pool during June through September would be 20,000 Acre-feet. This is an estimate based on lower pool elevations, which characterize the times when it would be critical to the computations.

#### 6. Shared Shortage Adjustment

To ensure that an equitable distribution of the available water occurs during short-term drought conditions, and provide for a “banking” procedure to increase the water stored for subsequent years, a shared shortage plan would be implemented. The maximum water available for irrigation according to the above equation would be reduced according to the following table. Linear interpolation of values will occur between table values.

Shared Shortage Adjustment Table

Irrigation Water Available (Acre-feet)	Irrigation Water Released (Acre-feet)
0	0
17,000	15,000
34,000	30,000
51,000	45,000
68,000	60,000
85,000	75,000
102,000	90,000
119,000	100,000
136,000	110,000
153,000	120,000
170,000	130,000

## 7. Annual Shutoff Elevation for Harlan County Lake

The annual shutoff elevation for Harlan County Lake would be estimated each January and finally established each June.

The annual shutoff elevation for irrigation releases will be estimated by Reclamation each January in the following manner:

1. Estimate the May 31 Irrigation Water Storage (IWS) (Maximum 150,000 Acre-feet) by taking the December 31 irrigation pool storage plus the January-May inflow estimate (57,600 Acre-feet or the average inflow for the last 5-year period, whichever is less) minus the January-May evaporation estimate (8,800 Acre-feet).
2. Calculate the estimated Irrigation Water Available, including all summer evaporation, by adding the Estimated Irrigation Water Storage (from item 1) to the estimated sediment pool summer evaporation (20,000 AF).
3. Use the above Shared Shortage Adjustment Table to determine the acceptable Irrigation Water Release from the Irrigation Water Available.
4. Subtract the Irrigation Water Release (from item 3) from the Estimated IWS (from item 1). The elevation of the lake corresponding to the resulting irrigation storage is the Estimated Shutoff Elevation. The shutoff elevation will not be below the bottom of the irrigation pool if over 119,000 AF of water is supplied to the districts, nor below 1,927.0 feet, msl. If the shutoff elevation is below the irrigation pool, the maximum irrigation release is 119,000 AF.

The annual shutoff elevation for irrigation releases would be finalized each June in accordance with the following procedure:

1. Compare the estimated May 31 IWS with the actual May 31 IWS.
2. If the actual end of May IWS is less than the estimated May IWS, lower the shutoff elevation to account for the reduced storage.
3. If the actual end of May IWS is equal to or greater than the estimated end of May IWS, the estimated shutoff elevation is the annual shutoff elevation.
4. The shutoff elevation will never be below elevation 1,927.0 feet, msl, and will not be below the bottom of the irrigation pool if more than 119,000 Acre-feet of water is supplied to the districts.



Attachment 3: Inflows to Harlan County Lake 1993 Level of Development

BASELINE RUN - 1993 LEVEL INFLOW TO HARLAN COUNTY RESERVOIR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1931	10.2	10.8	13.4	5.0	18.8	15.8	4.3	1.8	1.8	0.0	0.1	0.1	82.1
1932	6.8	16.6	18.5	4.6	3.8	47.6	3.8	2.8	4.8	0.0	0.0	0.4	109.7
1933	0.4	0.0	3.9	30.2	31.0	5.4	1.8	0.0	10.4	0.0	2.6	5.5	91.2
1934	2.1	0.0	3.2	1.8	0.7	7.3	0.8	0.0	1.3	0.0	2.2	0.0	19.4
1935	0.3	0.1	0.7	4.2	0.8	389.3	6.1	19.1	26.1	2.4	5.2	0.9	455.2
1936	0.3	0.0	11.9	0.0	35.9	4.7	0.4	0.0	1.8	0.0	1.6	3.8	60.4
1937	4.8	12.9	6.0	2.5	0.0	12.6	6.3	6.9	2.4	0.0	0.0	12.4	66.8
1938	9.9	7.8	8.7	10.4	18.7	8.6	7.3	7.8	4.9	0.2	0.0	4.7	89.0
1939	2.7	7.5	9.6	12.2	6.6	13.3	5.0	4.1	0.0	0.0	0.0	0.0	61.0
1940	0.0	0.0	12.2	5.2	4.6	23.7	2.8	3.2	0.0	3.6	0.0	1.4	56.7
1941	0.0	10.6	10.6	7.7	17.2	67.1	28.9	19.7	14.9	8.3	6.7	7.1	198.8
1942	3.3	10.6	0.5	34.1	30.8	83.9	11.7	10.9	36.5	3.1	8.7	0.3	234.4
1943	1.2	11.2	14.6	31.4	4.7	28.3	4.8	0.3	0.9	0.0	0.0	11.8	109.2
1944	0.1	4.3	9.0	43.1	31.9	63.9	26.6	15.4	0.5	0.3	3.0	4.5	202.6
1945	4.3	7.8	5.7	9.5	4.1	53.5	5.0	0.9	1.5	5.0	6.0	6.3	109.6
1946	5.9	11.2	9.3	4.9	7.0	3.1	1.6	11.4	28.1	129.9	25.0	12.1	249.5
1947	1.1	3.2	10.4	8.2	11.9	195.4	22.3	5.9	2.9	0.2	0.3	0.3	262.1
1948	6.2	9.8	24.1	5.4	0.2	39.8	13.5	6.8	4.2	0.0	0.1	0.1	110.2
1949	2.0	1.5	25.2	16.3	49.0	57.4	9.2	5.5	2.1	3.0	2.8	0.3	174.3
1950	0.3	5.7	10.8	10.9	28.9	10.1	12.7	9.3	7.8	7.2	3.8	3.1	110.6
1951	3.8	3.4	7.1	5.3	42.0	39.9	42.1	10.1	36.0	15.5	14.8	8.9	228.9
1952	16.4	21.4	26.3	23.8	34.6	4.0	9.3	3.1	1.5	11.7	4.3	0.1	156.5
1953	1.8	4.6	5.3	3.3	15.1	9.5	1.8	0.2	0.0	0.0	2.8	0.1	44.5
1954	1.0	6.8	1.9	3.2	7.1	2.4	0.0	1.2	0.0	0.0	0.0	0.0	23.6
1955	0.0	4.0	6.3	4.8	2.9	6.4	2.7	0.0	1.4	0.0	0.0	0.0	28.5
1956	1.6	3.4	2.9	2.4	1.3	1.5	0.0	0.6	0.0	0.0	0.0	0.0	13.7
1957	0.0	4.1	6.2	12.8	3.5	62.4	21.3	1.2	2.0	3.4	4.5	4.7	126.1
1958	0.8	3.0	14.2	14.0	18.7	1.3	3.4	2.2	0.0	0.4	0.0	0.6	58.6
1959	1.9	15.4	16.4	8.5	13.6	4.2	1.4	1.2	0.0	4.3	1.0	4.5	72.4
1960	1.4	12.3	71.4	23.9	21.7	53.7	14.1	3.2	0.0	0.0	0.2	2.8	204.7
1961	2.3	6.4	7.7	7.4	26.5	24.0	7.2	4.9	0.0	2.3	4.8	1.7	95.2

## Attachment 3: Inflows to Harlan County Lake 1993 Level of Development

## BASELINE RUN - 1993 LEVEL INFLOW TO HARLAN COUNTY RESERVOIR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1962	4.5	9.1	16.2	9.9	14.4	42.6	41.6	21.1	2.3	8.7	8.3	5.7	184.4
1963	3.4	18.2	18.2	15.0	12.7	14.7	3.4	6.1	8.7	0.8	5.3	1.8	108.3
1964	5.4	7.6	8.3	8.4	9.9	11.9	7.2	6.5	2.4	1.9	1.4	2.3	73.2
1965	6.0	8.1	11.1	12.8	32.8	40.0	22.9	6.5	37.2	53.7	19.5	11.0	261.6
1966	8.9	21.4	15.7	11.4	12.0	34.7	12.4	2.5	3.5	5.4	6.8	5.7	140.4
1967	7.2	11.5	11.5	12.9	9.1	75.3	43.7	15.3	4.4	7.3	6.9	5.4	210.5
1968	3.9	10.2	8.5	11.6	10.8	12.5	3.1	2.7	1.6	2.0	4.3	3.4	74.6
1969	4.2	10.8	24.5	15.1	18.9	17.5	17.0	12.6	16.6	9.2	11.8	9.9	168.1
1970	3.5	8.7	8.5	10.5	11.1	7.7	4.6	3.2	0.5	3.3	4.7	4.5	70.8
1971	4.1	10.3	12.4	12.8	18.3	7.2	8.4	6.2	1.9	4.2	7.3	7.1	100.2
1972	5.5	8.1	9.2	8.3	14.8	8.5	6.5	4.4	0.1	2.9	7.6	4.1	80.0
1973	11.4	14.2	19.0	16.2	17.4	20.9	9.1	1.9	8.4	19.6	11.9	13.2	163.2
1974	13.2	13.4	12.0	14.3	15.4	17.2	5.5	0.0	0.0	0.0	4.9	5.5	101.4
1975	7.2	8.2	13.6	14.8	12.0	48.1	11.6	7.4	0.1	3.0	6.2	7.3	139.5
1976	7.0	10.2	10.1	16.0	12.1	3.5	2.2	1.8	0.9	1.0	3.2	3.1	71.1
1977	4.4	9.6	12.9	21.2	31.5	12.1	5.9	1.9	10.6	4.1	5.5	5.3	125.0
1978	5.0	6.5	20.6	12.9	11.8	3.8	0.0	1.0	0.0	0.0	0.3	1.6	63.5
1979	1.3	7.6	21.5	18.8	15.9	5.4	10.4	10.6	1.6	0.9	3.6	6.2	103.8
1980	5.7	9.3	11.6	15.2	10.4	2.1	2.5	0.0	0.0	0.0	2.5	2.2	61.5
1981	5.5	6.0	11.6	14.9	22.5	6.4	11.5	16.3	4.3	2.5	6.7	6.2	114.4
1982	5.3	12.5	17.9	14.3	26.8	27.1	8.9	2.7	0.0	6.5	6.3	15.5	143.8
1983	6.5	9.7	27.2	16.4	41.4	74.2	10.7	7.6	3.8	3.1	6.7	5.2	212.5
1984	6.8	14.6	17.2	32.9	40.6	15.5	8.1	4.5	0.0	5.5	4.8	6.2	156.7
1985	6.9	14.1	13.6	11.9	27.4	9.9	10.0	2.0	6.0	8.5	5.6	5.8	121.7
1986	9.1	9.4	12.2	11.7	34.3	13.0	13.5	4.6	3.3	5.9	5.4	7.1	129.5
1987	5.9	9.2	19.7	24.1	24.3	11.7	19.0	5.7	2.3	2.7	8.2	7.0	139.8
1988	6.2	13.7	11.6	15.2	15.2	7.0	17.9	10.4	0.6	2.0	5.9	5.4	111.1
1989	5.4	5.9	10.5	9.1	11.4	11.8	14.0	6.2	0.2	3.1	3.1	3.5	84.2
1990	6.6	7.7	13.2	9.7	15.5	1.4	4.3	10.7	0.6	3.2	2.0	2.7	77.6
1991	2.4	8.0	9.0	10.6	15.2	3.9	1.9	0.5	0.0	0.0	2.7	4.8	59.0
1992	8.0	8.8	12.7	8.5	4.5	6.1	6.5	9.4	2.4	6.9	6.7	5.2	85.7
1993	5.2	14.4	71.6	22.7	21.0	17.0	68.0	37.5	23.3	16.8	30.1	17.7	345.3
Avg	4.5	8.8	14.1	13.0	17.2	30.6	11.0	6.2	5.4	6.3	5.0	4.7	126.8

Attachment 4: Evaporation Loss Harlan County Lake 1993 Level of Development

BASELINE - 1993 LEVEL FLOWS - HARLAN COUNTY EVAPORATION													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1931	0.7	0.9	1.6	2.9	4.2	7.4	6.9	5.2	2.7	2.1	1.2	0.4	36.2
1932	0.6	0.8	1.5	2.7	4.1	5.0	6.8	5.0	2.7	2.1	1.2	0.4	32.9
1933	0.6	0.8	1.4	2.5	3.8	7.8	6.1	4.2	2.7	2.1	1.2	0.4	33.6
1934	0.6	0.8	1.4	2.4	4.5	6.5	8.0	6.2	2.7	2.0	1.2	0.4	36.7
1935	0.6	0.8	1.3	2.3	2.2	3.6	9.7	6.2	3.1	2.5	1.4	0.5	34.2
1936	0.7	0.9	1.6	2.9	5.5	6.8	8.7	6.5	2.7	2.1	1.2	0.4	40.0
1937	0.6	0.8	1.4	2.5	3.6	4.0	6.2	6.5	2.7	2.1	1.2	0.4	32.0
1938	0.6	0.9	1.5	2.7	3.4	4.9	6.5	5.7	2.7	2.1	1.2	0.4	32.6
1939	0.6	0.8	1.4	2.6	4.3	4.9	6.8	4.6	2.7	2.1	1.2	0.4	32.4
1940	0.6	0.8	1.4	2.4	3.5	5.0	6.5	4.6	2.7	2.1	1.2	0.4	31.2
1941	0.6	0.8	1.4	2.5	3.9	4.2	6.7	5.3	2.8	2.1	1.3	0.5	32.1
1942	0.6	0.9	1.5	2.8	4.0	5.2	8.3	5.1	3.2	2.5	1.5	0.5	36.1
1943	0.7	1.0	1.8	3.2	4.3	5.7	7.9	6.3	2.7	2.1	1.2	0.4	37.3
1944	0.6	0.8	1.4	2.7	4.2	5.3	7.0	5.8	3.5	2.6	1.5	0.5	35.9
1945	0.7	1.0	1.8	3.1	3.8	3.0	6.7	5.7	2.9	2.2	1.3	0.5	32.7
1946	0.6	0.9	1.6	2.8	3.5	5.1	5.6	4.4	2.9	2.7	1.8	0.6	32.5
1947	1.0	1.5	2.9	3.2	3.4	-1.2	5.8	5.3	3.7	1.7	0.5	0.1	27.9
1948	0.8	0.7	1.5	3.6	3.1	2.4	4.2	4.7	3.0	2.7	0.8	0.3	27.8
1949	0.1	0.9	0.7	1.8	1.1	0.7	6.5	4.1	3.1	1.7	1.5	0.4	22.6
1950	0.7	0.1	0.8	2.8	2.0	5.6	0.8	2.8	4.5	2.3	1.6	0.6	24.6
1951	0.5	0.2	2.1	0.7	-0.1	1.9	3.5	4.1	0.4	3.1	2.2	0.9	19.5
1952	1.1	1.2	1.9	2.5	5.2	6.2	1.5	3.4	3.6	2.9	1.1	-0.1	30.5
1953	0.5	1.0	1.5	2.9	4.7	4.5	4.6	6.6	5.3	3.3	0.1	0.0	35.0
1954	0.7	0.6	2.2	3.6	0.3	4.9	6.7	1.6	3.6	1.6	1.5	0.6	27.9
1955	0.5	1.0	2.1	4.6	3.4	-0.5	7.3	6.9	2.7	2.6	1.4	0.4	32.4
1956	0.6	1.1	1.9	2.8	3.9	4.5	5.0	3.7	4.7	3.7	1.3	0.5	33.7
1957	0.7	1.0	1.3	0.5	-0.6	-1.1	6.1	3.7	2.3	1.7	1.2	0.4	17.2
1958	0.7	0.1	1.0	0.6	2.3	4.4	1.0	1.9	3.3	3.3	1.0	0.6	20.2
1959	0.4	1.0	1.1	2.1	1.0	3.5	5.0	4.8	2.3	0.7	1.5	0.6	24.0
1960	0.1	0.7	2.0	2.7	0.9	0.1	4.9	3.6	3.9	2.0	1.3	0.4	22.6
1961	0.9	1.0	1.4	2.7	-1.1	0.6	5.1	2.9	1.2	2.4	0.7	0.1	17.9

Attachment 4: Evaporation Loss Harlan County Lake 1993 Level of Development

Attachment 4: Evaporation Loss Harlan County Lake 1993 Level of Development

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1962	0.6	0.6	0.9	3.7	3.4	1.5	0.3	1.6	2.0	2.0	1.7	0.3	18.6
1963	0.7	1.4	1.3	4.5	4.6	6.3	6.1	3.1	-0.8	2.7	1.5	0.4	31.8
1964	0.8	0.8	1.7	3.2	5.6	1.2	6.9	3.0	3.0	3.3	1.2	0.6	31.3
1965	0.4	0.7	1.2	2.8	1.5	-0.5	2.0	2.8	-3.9	1.7	2.1	0.4	11.2
1966	0.9	0.8	2.9	2.7	7.5	2.8	5.8	3.7	2.7	2.8	1.5	0.4	34.5
1967	0.7	1.2	2.5	3.0	2.0	-2.9	1.6	4.5	3.5	2.0	1.6	0.4	20.1
1968	0.9	1.2	2.8	2.6	3.2	4.9	4.7	1.8	2.3	0.7	1.2	0.2	26.5
1969	0.4	0.6	2.4	3.3	0.1	3.8	-0.7	2.9	2.2	-1.0	1.5	0.4	15.9
1970	0.7	1.4	2.3	2.8	4.7	4.4	6.5	5.9	0.9	1.0	1.5	0.7	32.8
1971	0.7	0.2	2.0	2.9	0.7	5.1	3.4	4.5	1.4	1.5	0.2	0.5	23.1
1972	0.8	1.3	2.0	1.7	1.1	0.0	3.3	1.8	2.1	1.7	-0.4	0.1	15.5
1973	0.5	1.1	-0.7	2.5	3.4	6.7	-1.7	4.2	-3.0	0.2	0.2	0.2	13.6
1974	0.7	1.5	2.6	1.5	3.7	2.5	9.1	2.6	3.4	1.4	1.1	0.3	30.4
1975	0.7	0.7	2.0	2.1	0.8	1.1	4.3	2.7	3.0	3.4	0.7	0.6	22.1
1976	0.8	1.2	1.7	0.7	1.5	5.0	5.9	5.7	-0.2	1.4	1.4	0.7	25.8
1977	0.7	1.3	0.2	1.1	0.0	4.6	4.0	0.6	2.0	1.6	1.0	0.4	17.5
1978	0.5	0.7	1.2	3.4	3.9	6.2	7.1	4.5	4.5	3.0	1.1	0.5	36.6
1979	0.5	0.6	1.1	3.9	4.4	4.6	3.5	5.1	4.1	2.8	1.4	0.7	32.7
1980	0.5	0.6	1.2	3.4	3.7	4.7	6.8	6.0	3.9	2.7	1.3	0.6	35.4
1981	0.5	0.6	1.2	3.8	3.2	4.8	4.2	3.7	2.9	1.7	1.3	0.7	28.6
1982	0.5	0.7	1.2	3.9	3.8	3.9	5.1	3.8	2.9	2.2	1.4	0.8	30.2
1983	0.5	0.7	1.4	2.9	4.2	5.3	8.6	7.2	4.6	1.8	1.5	0.6	39.3
1984	0.6	0.8	1.4	2.9	4.2	5.8	7.2	5.7	4.7	1.4	1.4	0.7	36.8
1985	0.5	0.7	1.3	2.3	4.0	4.5	5.6	3.5	3.8	1.5	1.5	0.7	29.9
1986	0.6	0.7	1.3	2.8	4.4	5.8	6.7	4.0	2.7	1.3	1.4	0.7	32.4
1987	0.5	0.8	1.3	3.1	4.2	6.2	6.9	3.5	3.1	2.2	1.4	0.7	33.9
1988	0.5	0.7	1.3	3.5	4.9	6.6	4.6	4.8	3.5	2.2	1.4	0.7	34.7
1989	0.5	0.7	1.2	4.2	4.5	4.4	4.8	3.6	3.0	2.5	1.4	0.7	31.5
1990	0.5	0.7	1.2	3.0	3.5	5.6	6.4	4.0	5.0	3.4	1.4	0.6	35.3
1991	0.5	0.7	1.2	2.8	3.3	5.5	6.0	5.0	5.1	3.2	1.3	0.6	35.2
1992	0.6	0.7	1.2	1.8	3.2	2.2	4.1	3.5	4.2	2.9	1.9	1.0	27.3
1993	0.6	0.5	1.0	2.2	3.1	4.6	4.2	4.9	4.5	4.4	3.1	1.2	34.3
Avg	0.6	0.8	1.5	2.7	3.2	3.9	5.3	4.3	2.8	2.2	1.3	0.5	29.1

Attachment 5: Projected Water Supply Spread Sheet Calculations

<b>Trigger Calculations Based on Harlan County Lake Irrigation Supply</b>	Units-1000 Acre-feet		Irrigation Trigger		119.0		Assume that during irrigation release season HCL Inflow = Evaporation Loss						
			Total Irrigation Supply		130.0								
			Bottom Irrigation		164.1								
			Evaporation Adjust		20.0								
	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Total</b>
1993 Level AVE inflow	6.3	5	4.7	4.5	8.8	14.1	13.0	17.2	30.6	11.0	6.2	5.4	126.8
1993 Level AVE evap (1931-93)	2.2	1.3	0.5	0.6	0.8	1.5	2.7	3.2	3.9	5.3	4.3	2.8	29.1
Avg. Inflow Last 5 Years	10.8	13.0	12.3	12.9	16.6	22.4	19.4	18.1	14.8	16.5	11.0	4.7	172.6

<b>Year 2001-2002 Oct - Jun Trigger and Irrigation Supply Calculation</b>									
Calculation Month	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>
Previous EOM Content	236.5	235.9	238.6	242.9	248.1	255.1	263.8	269.6	276.2
Inflow to May 31	73.6	67.3	62.3	57.6	53.1	44.3	30.2	17.2	0.0
Last 5 Yrs Avg Inflow to May 31	125.6	114.8	101.7	89.5	76.6	59.9	37.5	18.1	0.0
Evap to May 31	12.8	10.6	9.3	8.8	8.2	7.4	5.9	3.2	0.0
Est. Cont May 31	297.3	292.6	291.6	291.7	293.0	292.0	288.1	283.6	276.2
Est. Elevation May 31	1944.44	1944.08	1944.00	1944.01	1944.11	1944.03	1943.72	1943.37	1942.77
Max. Irrigation Available	153.2	148.5	147.5	147.6	148.9	147.9	144.0	139.5	132.1
Irrigation Release Est.	120.1	117.4	116.8	116.8	118.1	117.1	116.8	116.8	116.8
Trigger - Yes/No	NO	YES	YES	YES	YES	YES	YES	YES	YES
130 kAF Irrigation Supply - Yes/No	NO	NO	NO	NO	NO	NO	NO	NO	NO

Attachment 5: Projected Water Supply Spread Sheet Calculations

<b>Year 2002</b>				
<b>Jul - Sep</b>				
<b>Final Trigger and</b>				
<b>Total Irrigation Supply</b>				
<b>Calculation</b>				
Calculation Month		<b>Jul</b>	<b>Aug</b>	<b>Sep</b>
Previous EOM Irrigation Release Est.		116.8	116.0	109.7
Previous Month Inflow		5.5	0.5	1.3
Previous Month Evap		6.3	6.8	6.6
Irrigation Release Estimate		116.0	109.7	104.4
Final Trigger - Yes/No		YES		
130 kAF Irrigation Supply - Yes/No		NO	NO	NO

Attachment 6: Computing Water Supplies and Consumptive Use Above Guide Rock

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Total Main Stem VWS	Hardy gage	Superior-Courtland Diversion Dam Gage	Courtland Canal Diversions	Superior Canal Diversions	Courtland Canal Returns	Superior Canal Returns	Total Bostwick Returns Below Guide Rock	NE CBCU Below Guide Rock	KS CBCU Below Guide Rock	Total CBCU Below Guide Rock	Gain Guide Rock to Hardy	VWS Guide Rock to Hardy	Main Stem Virgin Water Supply Above Guide Rock	Nebraska Main Stem Allocation Above Hardy	Kansas Main Stem Allocation Above Hardy	Nebraska Guide Rock to Hardy Allocation	Kansas Guide Rock to Hardy Allocation
							Col F+ Col G			Col I + Col J	+ Col B - Col C+ Col K - Col H	+ Col L + Col K	Col A - Col M	.489 x Col N	.511 x Col N	.489 x Col M	.511 x Col M

Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of deliveries to the field	Col 4 – Col 5	1 – Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11 / Col 2
∑ Irrigation Season											
∑ Non-Irrigation Season											
Example	100	5	95	60	35	30%	18	53	82%	48.46	48.5%
	100	5	95	0	95	30%	0	95	92%	87.4	87.4%
Culbertson						30%			82%		
						30%			92%		
Culbertson Extension						30%			82%		
						30%			92%		
Meeker - Driftwood						30%			82%		
						30%			92%		
Red Willow						30%			82%		
						30%			92%		
Bartley						30%			82%		
						30%			92%		
Cambridge						30%			82%		
						30%			92%		
Naponee						35%			82%		
						35%			92%		
Franklin						35%			82%		
						35%			92%		
Franklin Pump						35%			82%		
						35%			92%		
Almena						30%			82%		
Superior						31%			82%		
						31%			92%		
Nebraska Courtland						23%			82%		
Courtland Canal Above Lovewell (KS)						23%			82%		
Courtland Canal Below Lovewell						23%			82%		

\*The average field efficiencies for each district and percent loss that returns to the stream may be reviewed and, if necessary, changed by the RRCA to improve the accuracy of the estimates.

Attachment 8: Calculation of the Computed Water Supply Adjustment and Remaining Compact Compliance Volume for

Implementation of 2016 RRCA Resolution

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
	Start of Year RCCV	RCCV Adjustment	CCV	CCV Inflow Into HCL	RCCV Inflow Into HCL	Total CCV and RCCV Inflow Into HCL	Total CCV and RCCV Available for Release	CCV Released from HCL as Flow	CCV Released from HCL as Evaporation	CCV Retained in HCL (at End of Year)	CWSA	End of Year RCCV <sup>5</sup>
	=Col. 12 of previous year	<sup>6</sup>	<sup>7</sup>			= Col. 4 + Col. 5	=Col. 6 + Col. 10 of previous year			= Col. 7 – (Col. 8 + Col. 9)	=Col. 10 – Col. 10 of previous year	= Col. 1 – Col. 2 + Col. 3 – Col. 6
Year 1												
Year 2												
Year 3												
Year 4												
Year 5												

This attachment provides definitions and example calculations for determining the Computed Water Supply Adjustment (CWSA), Remaining Compact Compliance Volume (RCCV), and other calculations necessary for implementation of the RRCA Resolution signed August 24, 2016, titled “Resolution Approving Long-Term Agreement Related to the Operation of Harlan County Lake for Compact Call Years.” An electronic copy of the spreadsheet containing the live formulas in this Attachment is included with the May 25, 2017, Accounting Procedures adopted by the RRCA and will be used as Attachment 8.

<sup>5</sup> The formula for calculation of RCCV is based on calendar year operations and will vary when operations occur in a different calendar year than NERWS Credit is applied.

<sup>6</sup> See Provision 10 of the RRCA Resolution signed August 24, 2016, titled “Resolution Approving Long-Term Agreement Related to the Operation of Harlan County Lake for Compact Call Years” for the terms of assigning RCCV Adjustment. The RCCV Adjustment for each year is equal to 20% of the unadjusted portion of the RCCV, if it is a non-Compact Call Year, plus any remaining volumetric reductions from the previous four years.

<sup>7</sup> In years when the contributions from Nebraska’s water management activities, consistent with the 2016 CCY HCL Operations Resolution, are greater than CCV and the NERWS is equal to the greater contribution volume, CCV in Column 3 should also be set equal to the contribution.



**Definitions**

The definitions below identify additional terms from the Accounting Procedures and Resolution that are utilized in the calculations.

**CCV Inflow Into HCL** is the Compact Compliance Volume made available in HCL for Kansas exclusive use pursuant to the 2016 CCY HCL Operations Resolution;

**CCV Released from HCL** is the volume of CCV Inflow Into HCL and RCCV Inflow Into HCL that is released from HCL in a calendar year;

**CCV Retained in HCL** is the volume of CCV Inflow Into HCL and RCCV Inflow Into HCL that is not released from HCL in a calendar year;

**RCCV Inflow Into HCL** is the Remaining Compact Compliance Volume made available in HCL for Kansas exclusive use pursuant to 2016 CCY HCL Operations Resolution;

**CWSA and RCCV Example Calculations**

Five examples representing various conditions have been developed to illustrate calculations of the CWSA and RCCV. These examples are applicable to calculations based on calendar year operations and will vary when CCV and RCCV Inflow Into HCL occurs in a different calendar year than NERWS Credit is applied. The five examples are presented below:

- Example 1: **All CCV Inflow Into HCL is Passed Through HCL**
- Example 2: **A Portion of CCV Inflow Into HCL is Retained in HCL**
- Example 3: **A Portion of CCV Inflow Into HCL is Retained in HCL and Released in a Subsequent Calendar Year**
- Example 4: **RCCV Inflow Into HCL and CCV Inflow Into HCL**
- Example 5: **HCL Reservoir Accounting for CWSA**
- **RCCV Example Calculation**

Evaporation losses have been ignored in these examples for simplicity. In reality, any water stored in HCL, including water from CCV or RCCV sources, is subject to evaporation, per the current RRCA Accounting Procedures.

**Example 1: All CCV Inflow Into HCL is Passed Through HCL**

In this example, all CCV inflow into HCL is released in the same year (Year = 1) that the APV occurred.

**Assumptions**

- RCCV = 0
- CCV = 20,000 Acre-feet
- APV = 20,000 Acre-feet
- CCV Inflow Into HCL = 20,000 Acre-feet
- RCCV Inflow Into HCL = 0
- CCV Released from HCL = 20,000 Acre-feet
- CCV Retained in HCL = 0
- NERWS Credit = 20,000 Acre-feet

**Computed Water Supply Adjustment (CWSA)**

The Computed Water Supply Adjustment (CWSA) can simply be calculated by subtracting the CCV Released from HCL from the CCV Inflow into HCL:

$$\begin{aligned} \text{CWSA} &= \text{CCV Inflow Into HCL} + \text{RCCV Inflow Into HCL} - \text{CCV Released from HCL} \\ &= 20,000 + 0 - 20,000 = 0 \end{aligned}$$

Since all CCV inflow into HCL is passed through the reservoir within the same year, there is no CWSA adjustment necessary in Year 1 or in any subsequent year's accounting.

**Example 2: A Portion of CCV Inflow Into HCL is Retained in HCL**

This example includes some of the same initial conditions as in Example 1, except that a portion of the CCV Inflow Into HCL is retained into a subsequent year. Additional accounting adjustments are required as a result and are illustrated below:

**Assumptions**

- RCCV = 0
- CCV = 20,000 Acre-feet
- APV = 20,000 Acre-feet
- CCV Inflow Into HCL = 20,000 Acre-feet
- RCCV Inflow Into HCL = 0
- CCV Released from HCL = 15,000 Acre-feet
- CCV Retained in HCL = 5,000 Acre-feet
- NERWS Credit = 20,000 Acre-feet

**Computed Water Supply Adjustments (CWSA)**

Because a portion of the CCV Inflow Into HCL is retained in HCL, a positive CWSA results:

$$\begin{aligned} \text{CWSA} &= \text{CCV Inflow Into HCL} + \text{RCCV Inflow Into HCL} - \text{CCV Released from HCL} \\ &= 20,000 + 0 - 15,000 = 5,000 \text{ Acre-feet} \end{aligned}$$

The accounting adjustment to the Main Stem CWS in this example would be made through applying a CWSA of 5,000 acre-feet through the calculations in Subsection IV.B of the RRCA Accounting Procedures.

**Example 3: A Portion of CCV Inflow Into HCL is Retained in HCL and Released in a Subsequent Calendar Year**

This example is identical to the situation in Example 2 above, with the exception that we will also consider what accounting adjustments are needed in the subsequent year (Year 2) once CCV Retained in HCL is released from the reservoir.

**Assumptions**

- RCCV = 0
- CCV = 20,000 Acre-feet
- APV = 20,000 Acre-feet
- CCV Inflow Into HCL = 20,000 Acre-feet
- RCCV Inflow Into HCL = 0
- CCV Released from HCL = 25,000 Acre-feet
- CCV Retained in HCL = 0
- NERWS Credit = 20,000 Acre-feet

**Computed Water Supply Adjustment (CWSA)**

Because the CCV Released from HCL includes CCV water stored over from a previous year, the CCV Released from HCL is greater than the CCV and RCCV Inflow Into HCL, resulting in a negative CWSA:  
CWSA = 20,000 + 0 – 25,000 = -5,000 Acre-feet

The accounting adjustment to the Main Stem CWS in this example would be made through applying a CWSA of -5,000 acre-feet through the calculations in Subsection IV.B of the RRCA Accounting Procedures.

**Example 4: RCCV Inflow Into HCL and CCV Inflow Into HCL**

This example includes the additional consideration of Remaining Compact Compliance Volume (RCCV). The CCV in this example will also be greater than that used in the previous examples:

**Year 1****Assumptions**

- RCCV = 0
- CCV = 55,000 Acre-feet
- APV = 20,000 Acre-feet
- CCV Inflow Into HCL = 20,000 Acre-feet
- RCCV Inflow Into HCL = 0
- CCV Released from HCL = 15,000 Acre-feet
- CCV Retained in HCL = 5,000 Acre-feet
- NERWS Credit = 55,000 Acre-feet

In this example the Year 1 NERWS Credit is larger than the CCV Inflow Into HCL because Kansas has determined that a portion of the Compact Compliance Volume will be carried over as RCCV in Year 2.

**Computed Water Supply Adjustment (CWSA)**

$$\text{CWSA} = 20,000 + 0 - 15,000 = 5,000 \text{ Acre-feet}$$

**Remaining Compact Compliance Volume (RCCV) for Following Year**

$$\begin{aligned} \text{Year 2 RCCV} &= \text{Start of Year 1 RCCV} - \text{RCCV Adjustment} + \text{CCV} - (\text{CCV Inflow Into HCL} + \\ &\text{RCCV Inflow Into HCL}) \\ &= 0 - 0 + 55,000 - (20,000 + 0) = 35,000 \text{ Acre-feet} \end{aligned}$$

The accounting adjustment to the Year 1 Main Stem CWS in this example would be made through applying a CWSA of 5,000 acre-feet through the calculations in Subsection IV.B of the RRCA Accounting Procedures.

## Year 2

### Assumptions

- RCCV = 35,000
- CCV = 10,000 Acre-feet
- APV = 45,000 Acre-feet
- CCV Inflow Into HCL = 10,000 Acre-feet
- RCCV Inflow Into HCL = 35,000 Acre-feet
- CCV Released from HCL = 50,000 Acre-feet
- CCV Retained in HCL = 0
- NERWS Credit = 10,000 Acre-feet<sup>8</sup>

### Computed Water Supply Adjustment (CWSA)

As the CCV Released from HCL is greater than CCV and RCCV Inflow into HCL, a negative CWSA results.

$$\text{CWSA} = 10,000 + 35,000 - 50,000 = -5,000 \text{ Acre-feet}$$

The accounting adjustment to the Year 2 Main Stem CWS in this example would be made through applying a CWSA of -5,000 acre-feet through the calculations in Subsection IV.B of the RRCA Accounting Procedures.

### **Example 5: HCL Reservoir Accounting for CWSA**

Because some of the accounting adjustments required under the examples described above involve multi-year operations, and because the current HCL water supply accounting methodologies under the Consensus Plan and the NBID-KBID MOA do not include consideration of several of the accounting components required under the new RRCA Resolutions, a reservoir accounting system may be needed for tracking certain portions of HCL content (CCV Retained in HCL). This example shows how this tracking might operate for HCL content, using a simple tabular format.

## Year 1

### Assumptions

- RCCV = 0
- CCV = 55,000 Acre-feet
- APV = 20,000 Acre-feet
- CCV Inflow Into HCL = 20,000 Acre-feet
- RCCV Inflow Into HCL = 0
- CCV Released from HCL = 15,000 Acre-feet
- CCV Retained in HCL = 5,000 Acre-feet
- NERWS Credit = 55,000 Acre-feet

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<sup>8</sup> With respect to the NERWS Credit in Year 2, the value is only 10,000 Acre-feet, despite the fact that 45,000 Acre-feet of the CCV and RCCV water from Years 1 and 2 were made available in HCL during Year 2. This is because the credit is applied in the years in which it is needed for compliance purposes, and not necessarily in the same year as when releases are made from HCL or augmentation water is pumped.

As with Example 4, this example represents a situation in which Kansas determines that not all of the CCV is required in Year 1, leading to RCCV that carries over into Year 2. In addition, Kansas determines that not all of the CCV delivered to HCL would need to be released in Year 1, resulting in a CWSA of 5,000 Acre-feet.

**Year 2**

**Assumptions**

- RCCV = 35,000 Acre-feet
- CCV = 10,000 Acre-feet
- APV = 11,000 Acre-feet
- CCV Inflow Into HCL = 10,000 Acre-feet
- RCCV Inflow Into HCL = 1,000 Acre-feet
- CCV Released from HCL = 16,000 Acre-feet
- CCV Retained in HCL = 0
- NERWS Credit = 10,000 Acre-feet

**Remaining Compact Compliance Volume (RCCV) for Following Year**

$$\begin{aligned} \text{Start of Year 3 RCCV} &= \text{Start of Year 2 RCCV} - \text{RCCV Adjustment} + \text{CCV} - (\text{CCV Inflow} \\ &\text{Into HCL} + \text{RCCV Inflow Into HCL}) \\ &= 35,000 - 0 + 10,000 - (10,000 + 1,000) = 34,000 \text{ Acre-feet} \end{aligned}$$

**Table 1. Example of HCL Accounting for CWSA**

**Table 1: Example HCL Accounting for CWSA**

	<b>CCV Inflow Into HCL</b>	<b>RCCV Inflow Into HCL</b>	<b>Total CCV and RCCV Inflow Into HCL</b>	<b>Total CCV and RCCV Available for Release</b>	<b>CCV Released from HCL</b>	<b>CCV Retained in HCL (at End of Year)</b>	<b>CWSA</b>
<b>Year 0</b>	0 af	0 af	0 af	0 af	0 af	0 af	0 af
<b>Year 1</b>	20,000 af	0 af	20,000 af	20,000 af	15,000 af	5,000 af	5,000 af
<b>Year 2</b>	10,000 af	1,000 af	11,000 af	16,000 af	16,000 af	0 af	-5,000 af

Table 1 above illustrates that once the RCCV or CCV water reaches HCL as inflow, there is no need to differentiate between the two sources, since both will be treated the same in terms of accounting adjustments, including when those supplies are released from the reservoir. It is sufficient, as a result, to include both water sources as one common pool for accounting purposes once they reach HCL. That is why both the last two terms in the table above (“CCV Released from HCL” and “CCV Retained in HCL”) only include the abbreviation “CCV”, even though they may include water from both CCV and RCCV inflows.

The examples contained in this attachment did not account for reservoir evaporation as a means to simplify the calculations. In reality, evaporation may impact the quantity of CCV water remaining within HCL. This evaporation will be assessed to the CCV Retained in HCL pool in proportion to the volume contained in this portion of the pool relative to the entire contents of the irrigation pool, consistent with methods employed by the Bureau of Reclamation to assess evaporation on water supplies within the reservoir.

**CWSA and RCCV Tracking Example Calculations**

This section contains an example of the calculations used to determine the CWSA, CCV, and RCCV and track how the RCCV changes year to year and between Compact Call Years and non-Compact Call Years.

Table 2. Example of Relationship between CCV and RCCV and annual tracking of CWSA

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Start of Year RCCV	RCCV Adjustment	CCV	CCV Inflow Into HCL	RCCV Inflow Into HCL	Total CCV and RCCV Inflow Into HCL	Total CCV and RCCV Available for Release	CCV Released from HCL as Flow	CCV Released from HCL as Evaporation	CCV Retained in HCL (at End of Year)	CWSA	End of Year RCCV
	=Col. 12 of previous year					= Col. 4 + Col. 5	=Col. 6 + Col. 10 of previous year			= Col. 7 – (Col. 8 + Col. 9)	=Col. 10 – Col. 10 of previous year	= Col. 1 – Col. 2 + Col. 3 – Col. 6
<b>Year 0</b>	0	0	0	0	0	0	0	0	0	0	0	0
<b>Year 1*</b>	0	0	23,000	20,000	0	20,000	20,000	15,000	0	5,000	5,000	3,000
<b>Year 2*</b>	3,000	0	10,000	10,000	1,000	11,000	16,000	15,000	1,000	0	-5,000	2,000
<b>Year 3*</b>	2,000	0	15,000	15,000	0	15,000	15,000	15,000	0	0	0	2,000
<b>Year 4</b>	2,000	400	0	0	0	0	0	0	0	0	0	1,600
<b>Year 5</b>	1,600	400	0	0	0	0	0	0	0	0	0	1,200
<b>Year 6</b>	1,200	400	0	0	0	0	0	0	0	0	0	800
<b>Year 7*</b>	800	400	15,000	10,000	0	10,000	10,000	10,000	0	0	0	5,400
<b>Year 8</b>	5,400	1,400	0	0	0	0	0	0	0	0	0	4,000
<b>Year 9</b>	4,000	1,000	0	0	0	0	0	0	0	0	0	3,000

\*Indicates Compact Call Year

**RESOLUTION APPROVING LONG-TERM AGREEMENTS  
RELATED TO THE OPERATION OF HARLAN COUNTY LAKE  
FOR COMPACT CALL YEARS**

August 24, 2016

**Whereas**, the States of Kansas, Nebraska, and Colorado (States) entered into a Final Settlement Stipulation (FSS), dated December 15, 2002, to resolve pending litigation in the United States Supreme Court regarding the Republican River Compact (Compact) in the case of *Kansas v. Nebraska and Colorado*, No. 126 Original; and

**Whereas**, the FSS was approved by the United States Supreme Court on May 19, 2003; and

**Whereas**, the States have previously determined and continue to hold that the Compact may be administered in a manner that increases flexibility for all water users, while remaining consistent with the terms of the Compact and the FSS; and

**Whereas**, the RRCA has previously enacted multiple resolutions to modify the operations of Harlan County Lake (HCL) and the RRCA Accounting Procedures for the years 2014, 2015, and 2016 to maximize the beneficial consumptive use of the waters of the Republican River Basin, and desires to establish a long-term agreement to implement similar modifications to Harlan County Lake operations and the RRCA Accounting Procedures to ensure the continued maximum beneficial consumptive use of the waters within the Basin; and

**Whereas**, the RRCA holds that *Project Water* means all water made up of flows of the Republican River basin, which may include flows resulting from water management actions, water rights administration and imported surface or groundwater supplies; and stored in Harlan County Lake for the benefit of water users in Kansas and/or Nebraska, pursuant to water right permits approved by the State of Nebraska.

**Whereas**, the intent of this Resolution is to build on the success of the prior Resolutions by establishing a process that applies during all Compact Call Years without the need for annual renewals.

**NOW THEREFORE BE IT RESOLVED:**

1. For this Resolution, the following definitions shall apply:
  - A. *Compact Call Year* means the calendar year that is designated by the State of Nebraska pursuant to its Republican River Basin Integrated Management Plans for Compact compliance activities, which may include augmentation, water rights administration, and other actions to effect Compact compliance.
  - B. *Compact Call Forecast Volume* means the amount of water that is identified through application of the forecasting methodology established in Nebraska's Republican River Basin Integrated Management Plans.
  - C. *Compact Compliance Volume* means the amount of water Nebraska would need to contribute to the natural flows of the Republican River Basin, for Kansas' exclusive use through augmentation activities, alone or in combination with other water management activities by the State of Nebraska, for purposes of ensuring Nebraska's Compact compliance.

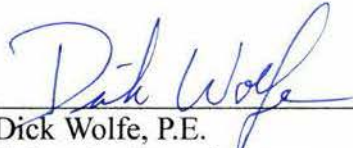
- D. *Kansas Account* means an account that shall store all Project Water made available for the exclusive use by the Kansas Bostwick Irrigation District (KBID), and water supplies previously available to KBID under Warren Act Contract(s) existing as of the date of this Resolution.
- E. *Kansas Supplemental Account* means an account that shall store water supplies not in the Kansas Account and which shall be for use outside of KBID within the state of Kansas.
- F. *Remaining Compact Compliance Volume* means the portion of a previous year's Compact Compliance Volume retained for Kansas' use in a subsequent Compact Call Year subject to the conditions of Provisions 5 and 10.
2. Nebraska may supplement the natural flows of the Republican River Basin through augmentation discharges, alone or in combination with other water management activities beginning October 1 of the year preceding the year which is designated as a Compact Call Year and until such time as necessary to provide the Remaining Compact Compliance Volume, subject to the terms of Provision 5 and 10.
  3. Prior to October 1 of each Compact Call Year, Kansas and Nebraska shall meet to discuss the preliminary Compact Call Forecast Volume and the projected water supply available for irrigation within HCL for the upcoming year, and establish the portion of the Remaining Compact Compliance Volume that will be utilized to meet the conditions of Provisions 5 and 6.
  4. Nebraska shall establish, pursuant to the Integrated Management Plans, the Compact Call Forecast Volume no later than December 31 of each year.
  5. Nebraska shall make good faith efforts to ensure that, no later than June 1 of each Compact Call Year, the Kansas Account contains not less than the amount of water established by October 1 of the previous year as described in Provision 3 subject to Nebraska's operational capacity.
  6. Upon Kansas's request any portion of Remaining Compact Compliance Volume shall be administered to the Kansas Account or the Kansas Supplemental Account subject to Nebraska's operational capacity and Provision 3.
  7. Water in the Kansas Supplemental Account shall not be considered part of the Kansas Account for the purposes of Provision 5. Evaporation from water stored in the Kansas Supplemental Account shall be exclusively charged to Kansas.
  8. During Compact Call Years, Nebraska shall evaluate actual hydrologic conditions on a regular basis to estimate the Compact Compliance Volume. Beginning May 10 of each Compact Call Year, Nebraska shall provide the results of this estimate to Kansas and Colorado and to the United States not later than the tenth day of each month. Nebraska shall provide the other States the final Compact Compliance Volume no later than December 31 of each Compact Call Year.
  9. The accounting offset, equal to the final Compact Compliance Volume, for Nebraska's compliance operations shall be recorded in the "Imported Water Supply Credit" column of Nebraska's Table 3c and Table 5e and "Imported Water Supply Credit Above Guide Rock" column of Nebraska's Table 5c. The computed water supply will be reduced by the amount of augmentation water contributed to the natural flows of each respective



subbasin for the years in which the augmentation water contributions occur. Additionally, in the event that water contributed to the Kansas Account is not beneficially consumed within the year that it is provided, the Computed Water Supply will be adjusted as necessary to ensure that Nebraska receives full credit for the Compact Compliance Volume in that Compact Call Year. Subsequent release of water from the Kansas Account that was not beneficially consumed in a Compact Call Year, but for which Nebraska received full credit in a prior year, shall not increase the Computed Water Supply or allocation, and for purposes of Compact accounting shall be the last Project Water released from the Kansas Account.

10. Should the balance of the Remaining Compact Compliance Volume be greater than zero on January 1 of any year not designated as a Compact Call Year then the balance shall immediately be reduced by twenty-percent, and an equal volumetric reduction shall be applied to the balance of the Remaining Compact Compliance Volume on January 1 of each of the four subsequent years.
11. The compliance tests outlined in Tables 5A – 5E shall not apply when, on or before June 30:
  - A. the sum of all waters available for irrigation from Harlan County Lake, the Remaining Compact Compliance Volume, and the volume in the Kansas Supplemental Account, is greater than or equal to 119,000 acre-feet; or
  - B. the sum of the Kansas Account and Kansas Supplemental Account is greater than or equal to 68,000 acre-feet.
12. The RRCA agrees that if a state is developing or considering a management strategy, including supplementing the basin's natural water supply that may impact the availability, usability or timing of the water supply of another state, that state will share the concepts of the management strategy with the other States.
13. The RRCA is committed to the establishment of water storage accounts for Kansas and Nebraska in HCL. The RRCA agrees to cooperate on working with the United States and the Nebraska Bostwick Irrigation District and the Kansas Bostwick Irrigation District (Districts) to establish these accounts.
14. The RRCA Commissioners hereby agree that compliance with this Resolution constitutes compliance with the Final Settlement Stipulation and Republican River Compact
15. Re-examination and Termination.
  - A. The States agree to re-examine the terms of this Resolution to ensure they are being implemented as intended and with the desired effect not later than April 1, 2020.
  - B. The terms of this Resolution shall remain in full force and effect until terminated by election of one or more States, which termination may be effectuated on the following conditions:
    - i. The terminating State must provide a written Notice of Intent to Terminate to the RRCA not later than October 1 of the year in which a State desires to issue a Notice;
    - ii. The terms of this Resolution shall remain in full force and effect through December 31 of the second full year following the RRCA's receipt of a Notice of Intent to Terminate.

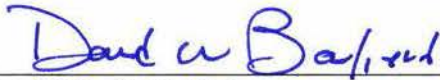
iii. The States agree to work in good faith to resolve any disputes arising from the interpretation of this resolution.



Dick Wolfe, P.E.  
Colorado Commissioner  
Chairman, RRCA

8/24/16

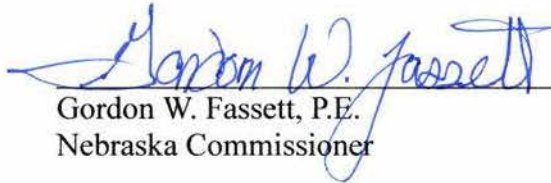
Date



David Barfield, P.E.  
Kansas Commissioner

8/24/16

Date



Gordon W. Fassett, P.E.  
Nebraska Commissioner

8/24/16

Date

**RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION  
APPROVING OPERATION AND ACCOUNTING FOR THE COLORADO COMPACT  
COMPLIANCE PIPELINE AND COLORADO'S COMPLIANCE EFFORTS IN THE SOUTH  
FORK REPUBLICAN RIVER BASIN**

**RECITALS**

**Whereas**, the States of Kansas, Nebraska, and Colorado (each, a "State", and collectively, the "States") entered into a Final Settlement Stipulation ("FSS") as of December 15, 2002, to resolve pending litigation in the United States Supreme Court regarding the Republican River Compact ("Compact") in the case of *Kansas v. Nebraska and Colorado*, No. 126 Original;

**Whereas**, the FSS was approved by the United States Supreme Court on May 19, 2003;

**Whereas**, the State of Colorado's Computed Beneficial Consumptive Use of the waters of the Republican River Basin exceeded Colorado's Compact Allocation using the five-year running average to determine Compact compliance from 2003 through 2012, as provided in Subsection IV.D of the FSS;

**Whereas**, the Republican River Water Conservation District is a water conservation district created by Colorado statute to assist the State of Colorado to comply with the Compact;

**Whereas**, the Republican River Water Conservation District, acting by and through its Water Activity Enterprise ("RRWCD WAE"), has acquired fifteen wells ("Compact Compliance Wells") in the Republican River Basin in Colorado and has constructed collector pipelines, a storage tank, a main transmission pipeline, and an outlet structure capable of delivering groundwater to the North Fork of the Republican River for the sole purpose of offsetting stream depletions in order to comply with the State of Colorado's Compact Allocations;

**Whereas**, the RRWCD WAE has purchased groundwater rights in the Republican River Basin within Colorado and proposes to pump the historical consumptive use of some or all of these groundwater rights from the Compact Compliance Wells into the pipeline it has constructed and deliver that water into the North Fork of the Republican River near the Colorado/Nebraska state line to offset stream depletions in order to comply with Colorado's Compact Allocations (the "Colorado Compact Compliance Pipeline" or the "Pipeline");

**Whereas**, the States agreed to operate the Pipeline during 2014, 2015, and 2016 on certain terms. This Resolution does not affect accounting for those years;

**Whereas**, the States have now agreed to a long-term plan to operate the Pipeline on different terms, which are described below;

**Whereas**, Colorado, Kansas, and Nebraska wish to comply with their obligations under the Republican River Compact and believe the action described herein will assist the States in their continued efforts to meet those obligations while maximizing the beneficial use of the basin's water for their constituents;

**Whereas,** Kansas' water users in the South Fork sub-basin depend on stream flows for their livelihoods, and remain concerned about diminishing flows at the Colorado-Kansas state line;

**Whereas,** in addition to numerous other efforts to reduce consumption, Colorado has already removed from irrigation in the South Fork Republican River basin 23,838 acres;

**Whereas,** Colorado and Kansas share a belief that, by removing additional acres in the South Fork Republican River basin or otherwise reducing consumption as set forth herein, Colorado's consumption of water in the South Fork Republican River averaged over five years will be less than or equal to its sub-basin allocation plus half of the unallocated waters of the South Fork Republican River.

**Now, therefore,** it is hereby resolved that the RRCA approves operation and the related accounting procedures for the Colorado Compact Compliance Pipeline subject to the terms and conditions set forth herein, including in the Recitals set forth above, which are fully incorporated as part of the agreement between the States.

#### **A. Colorado Compact Compliance Pipeline.**

The operation of the Colorado Compact Compliance Pipeline is described below. The related changes to the RRCA Accounting Procedures and Reporting Requirements ("revised RRCA Accounting Procedures") are attached hereto as Exhibit I. The Compact accounting will follow the terms and conditions described in this resolution and its exhibits. Beginning January 1, 2017, operation of the Pipeline and the related changes to the accounting procedures for the Pipeline is subject to the following terms and conditions:

1. The average annual historical consumptive use of the groundwater rights that will be diverted at the Compact Compliance Wells shall be the amounts determined by the Colorado Ground Water Commission pursuant to its rules and regulations, as shown on Exhibit 2.
2. Diversions from any individual Compact Compliance Well shall not exceed 2,500 acre-feet during any calendar year.
3. Diversions during any calendar year under the groundwater rights listed on Exhibit 2 and any additional groundwater rights approved for diversion through the Compact Compliance Wells shall not exceed the total average annual historical consumptive use of the rights, except that banking of groundwater shall be permitted in accordance with the rules and regulations of the Colorado Ground Water Commission, subject to the terms and conditions of this resolution.
4. Diversions from the Compact Compliance Wells shall be measured by totalizing flow meters in compliance with the Colorado State Engineer's rules and regulations for the measurement of groundwater diversions in the Republican River basin, and the measured groundwater pumping from such wells shall be included in the "base" run of the RRCA Groundwater Model in accordance with paragraph III.D.1 of the revised RRCA Accounting Procedures. Net depletions from the Colorado Compact Compliance Wells shall be computed by the RRCA Groundwater Model and included in Colorado's

Computed Beneficial Consumptive Use of groundwater pursuant to paragraph III.D.1 of the revised RRCA Accounting Procedures (See Exhibit I).

5. Deliveries from the Colorado Compact Compliance Pipeline to the North Fork of the Republican River shall be measured by a Parshall flume or other measuring device located at the outlet structure. Authorized representatives of Kansas and Nebraska shall have the right to inspect the Parshall flume and other measurement devices for the Pipeline at any reasonable time upon notice to the RRWCD WAE.
6. The measured deliveries from the Colorado Compact Compliance Pipeline, to the extent they are in compliance with this resolution, shall offset stream depletions to the North Fork of the Republican River sub-basin on an acre-foot for acre-foot basis in accordance with the revised RRCA Accounting Procedures.
7. Unlike previous temporary approvals, under the plan described herein, the measured deliveries from the Colorado Compact Compliance Pipeline will not be added to the RRCA Groundwater Model. Instead, the Accounting would be performed as shown in the attached Exhibit I. The measured outflow from the CCP will be called the Colorado North Fork Augmentation Water Supply (CCPAWS). The CCPAWS will be subtracted from the gaged flow at the North Fork Republican River at Colorado-Nebraska state line (USGS Gage 06823000) for purposes of calculating the Virgin Water Supply of the North Fork of Republican River in Colorado sub-basin.
8. The CCPAWS will then be added as a credit to Column 3 (Credits for Imported Water Supply) in Table 3A, 4A, and Table 5A to provide Colorado with a credit against Colorado's CBCU. The column headers in Tables 3A, 4A, and 5A will be modified to reflect that the Augmentation Water Supply is accounted for analogous to Imported Water Supply.
9. Colorado shall determine the Projected Augmentation Water Supply Delivery ("Projected Delivery") to estimate the volume of augmentation water that will be delivered from the Pipeline as provided below, and the RRWCD WAE shall make deliveries from the Pipeline as provided below:
  - A. Colorado will initially estimate the Projected Delivery required for each year based on the largest stream depletions to the North Fork of the Republican River sub-basin during the previous five years without Pipeline deliveries. The RRWCD WAE will begin deliveries from the Colorado Compact Compliance Pipeline each year based on the Projected Delivery and shall make a minimum delivery of 4,000 acre-feet per year as provided below.
  - B. Accounting for deliveries will start January 1.
  - C. The RRWCD WAE will begin deliveries from the Pipeline on or after January 1 and will make the minimum annual delivery of 4,000 acre-feet during the months of January, February, and March, unless such deliveries cannot be made due to operational conditions beyond the control of the RRWCD WAE. If the minimum annual delivery of 4,000 acre-feet cannot be made during the months of January, February and March due to such operational conditions, Colorado will consult with Nebraska and Kansas to schedule such deliveries later in the year.
  - D. Colorado will calculate and provide notice to the Kansas and Nebraska RRCA Members, by April 10, of the Projected Delivery as provided in paragraph 8.A of this resolution. Unless Colorado determines by April 10 that it will not be able to deliver additional required augmentation water in October through December,

Colorado shall stop deliveries at the end of March. If Colorado anticipates that deliveries in the months of November and December will not be sufficient to replace stream depletions to the North Fork of the Republican River for Compact compliance, Colorado will maximize deliveries first in January, then sequentially in the months of February, March, and April. Deliveries will be made in May only if there is reason to believe that additional deliveries in the months of October through December will not be sufficient to replace stream depletions to the North Fork of the Republican River for Compact compliance.

- E. Because the final accounting for determining Compact compliance is not done until after the compact year is completed and because Colorado's allocations and computed beneficial consumptive use are dependent upon such factors as runoff, the amount of pumping, precipitation and crop evapotranspiration, Colorado cannot know the precise amount of augmentation water that will be needed at the beginning of a calendar year. After the initial minimum delivery of 4,000 acre-feet, Colorado will collect preliminary data for Compact accounting for that year and, no later than September 10 of that year, will update the Projected Delivery required for the remainder of the year, less the initial minimum delivery of the 4,000 acre-feet that has already been delivered; but not to exceed the average annual historical consumptive use of the groundwater rights as shown on Exhibit 2.
  - F. After updating the Projected Delivery, as described above, if additional deliveries in excess of the initial delivery of 4,000 acre-feet are necessary to offset projected stream depletions to the North Fork of the Republican River, Colorado and the RRWCD WAE will maximize such additional deliveries first in the month of December, then November and October of that same year. If the total necessary additional deliveries cannot be made within those three months, Colorado will attempt to schedule those deliveries in April and May of the same year, or at such time so as to avoid, to the extent practicable, deliveries during the subject accounting year's irrigation season.
  - G. Colorado's shortage and Projected Delivery will be calculated in accordance with the FSS.
10. Augmentation credit for deliveries from the Pipeline to the North Fork of the Republican River shall be limited to offsetting stream depletions to the North Fork of the Republican River Colorado sub-basin for the purpose of determining Colorado's compliance with the sub-basin non-impairment requirement (Table 4A) and for calculating Colorado's five-year running average allocation and computed beneficial use for determining Compact compliance (Tables 3A and 5A).
  11. The approval of operation of the Pipeline and the related accounting procedures for the Pipeline shall not govern the approval of any future proposed augmentation plan and related accounting procedures submitted by the State of Colorado or any other State under Subsection III.B.1.k of the FSS.
  12. Colorado agrees to collect data related to pumping of Pipeline wells and delivery of water through the outfall structure of the Pipeline on at least a daily basis and provide such data to Kansas and Nebraska on a monthly basis; and by January 30 of each calendar year, will provide all spreadsheets and calculations related to the initial "Projected Delivery" of

augmentation water. Colorado will provide to Kansas and Nebraska all updates to that projection within one week of the completion of any update.

**B. Bonny Reservoir**

1. The States agree to collaborate between now and December 31, 2017 to develop options to maximize the use of Bonny Reservoir. Any proposed change to the accounting or modeling of Bonny Reservoir will require approval by the RRCA under the terms of the Final Settlement Stipulation.
2. Colorado agrees to work in good faith with the Bureau of Reclamation, Colorado Parks and Wildlife, and Republican River Water Conservation District to maintain the flow of water through Bonny Reservoir during the term of this Resolution.

**C. Irrigation in South Fork Republican River basin**

1. Utilizing the Conservation Reserve Enhancement Program or other voluntary programs, Colorado agrees to retire up to an additional 25,000 acres from irrigation in the South Fork Republican River basin. Of that amount, Colorado will retire at least 10,000 acres by 2022 and will retire the remaining 15,000 acres by December 31, 2027.
2. In the event Colorado cannot or will not retire 25,000 acres by December 31, 2027, it may submit to the other States for their approval a plan to reduce consumption within Colorado by other means.

**D. Water Short Year Accounting**

The States agree to collaborate between now and December 31, 2017 on how to resolve the Beaver Creek issue for all water-short years in which accounting has not been finally approved by the RRCA.

**E. Use of the Unallocated Supply of the South Fork**

The States agree that this Resolution does not affect any State's right to use the Unallocated Supply of the South Fork Republican River or any other sub-basin. Nor should this Resolution be used as evidence of any State's legal position regarding use of the Unallocated Supply and each State hereby reserves all legal arguments concerning their rights to the Unallocated Supply or pertaining to its use.

**F. Disputes under this Agreement**

The States agree to work in good faith to resolve any disputes over implementation or interpretation of this Agreement, prior to submitting those disputes to arbitration under the terms of the FSS.

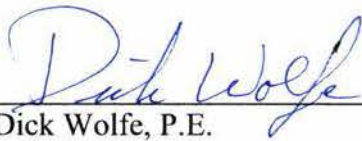
**G. Term of Agreement**

1. The terms of this Resolution remain in full force and effect until terminated by election of one or more States, which termination occurs on the following conditions:

- a. The terminating State must provide a written Notice of Intent to Terminate to the RRCA not later than October 1st of the year in which a State desires to issue a Notice;
  - b. The terms of the agreement remain in full force and effect through December 31st of the second full year following the RRCA's receipt of a Notice of Intent to Terminate.
2. The States agree in 2024 to review the terms of this Resolution and progress made under its terms.

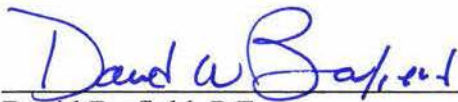
**H. Compliance Measure**

The RRCA Commissioners hereby agree that compliance with this Resolution constitutes compliance with the Final Settlement Stipulation and Republican River Compact.



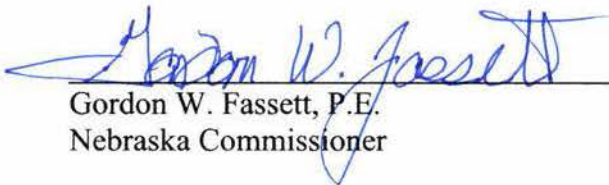
Dick Wolfe, P.E.  
Colorado Commissioner  
Chairman, RRCA

8/24/16  
Date



David Barfield, P.E.  
Kansas Commissioner

8/24/16  
Date



Gordon W. Fassett, P.E.  
Nebraska Commissioner

8/24/16  
Date



**RESOLUTION APPROVING ACCOUNTING CHANGES**

May 25, 2017

**Whereas**, the States of Kansas, Nebraska, and Colorado (States) entered into a Final Settlement Stipulation (FSS), dated December 15, 2002, to resolve pending litigation in the United States Supreme Court regarding the Republican River Compact (Compact) in the case of *Kansas v. Nebraska and Colorado*, No. 126 Original; and

**Whereas**, the FSS was approved by the United States Supreme Court on May 19, 2003; and

**Whereas**, the FSS requires the States to annually approve accounting to determine each State's compliance with the Compact and FSS; and

**Whereas**, the States have resolved their disagreements that prevented them from approving certain annual accountings in the past; and

**Whereas**, the States have previously determined and continue to hold that the Compact may be administered in a manner that increases flexibility for all water users, while remaining consistent with the terms of the Compact and the FSS; and

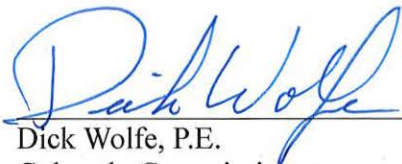
**Whereas**, on August 24, 2016, the RRCA approved the Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years, which requires changes to the RRCA Accounting Procedures for its proper implementation; and

**Whereas**, on August 24, 2016, the RRCA also approved the Resolution Approving Operation and Accounting for the Colorado Compact Compliance Pipeline and Colorado's Compliance Efforts in the South Fork Republican River Basin, in which the States agreed, among other things, to collaborate on how to resolve their disagreement regarding Colorado's allocation on Beaver Creek during water-short years in which accounting has not been finally approved by the RRCA.

**NOW THEREFORE BE IT RESOLVED:**

1. The RRCA approves and adopts the attached Revised Accounting Procedures Dated: May 25, 2017;
2. The RRCA shall use the Revised Accounting Procedures when it approves accounting for 2007 and every year thereafter.
3. If a state provides Notice of Intent to Terminate the August 24, 2016, Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years then Nebraska shall not receive Nebraska Resolution Water Supply Credit after December 31 of the second full year following the RRCA's receipt of a Notice of Intent to Terminate, per the Resolution.
4. If a state provides Notice of Intent to Terminate the August 24, 2016, Resolution Approving Operation and Accounting for the Colorado Compact Compliance Pipeline and Colorado's Compliance Efforts in the South Fork Republican River basin, then Colorado shall

not receive Colorado Resolution Water Supply Credit after December 31 of the second full year following the RRCA's receipt of a Notice of Intent to Terminate, per the Resolution.




Dick Wolfe, P.E.  
Colorado Commissioner  
Chairman, RRCA

May 25, 2017  
Date



David Barfield, P.E.  
Kansas Commissioner

May 25, 2017  
Date



Gordon W. Fassett, P.E.  
Nebraska Commissioner

MAY 25, 2017  
Date

## **Rules and Regulations**

### **Republican River Compact Administration**

**Revised May 25, 2017**

1. Pursuant to Article IX of the Republican River Compact (“Compact”), the States of Colorado, Nebraska and Kansas have the duty to administer the Compact through the officials in such States who are now or may hereafter be charged with the duty of administering the public water supplies in each of such States. Such officials shall be the members of an administrative body hereby designated as the Republican River Compact Administration (“RRCA”). The purpose of the RRCA shall be to administer the Compact. Such administration shall include but not be limited to the responsibilities as are assigned to it in the Final Settlement Stipulation dated December 15, 2002, approved by the States of Colorado, Nebraska and Kansas and filed in the case of *Kansas v. Nebraska and Colorado*, No. 126, Original, in the Supreme Court of the United States (“Final Settlement Stipulation”).
2. As of the effective date of these Rules and Regulations, the officials who are charged with the duty of administering the public water supplies in each of the three States, and who therefore constitute the Members<sup>1</sup> are the individuals who hold the following offices: the State Engineer of the Division of Water Resources of the Colorado Department of Natural Resources; the Director of Natural Resources for the State of Nebraska; and, the Chief Engineer of the Division of Water Resources of the Kansas Department of Agriculture.
3. Each RRCA Member’s term shall run concurrent with his or her term of office as the official charged with administering the public water supplies in his or her State.
4. Each State official shall be recognized as a Member of the RRCA upon furnishing to the other Members satisfactory evidence that he or she is the official in his or her State charged with the duty of administering the public water supplies in such State.

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<sup>1</sup> Reference in the RRCA records to “Commissioner(s)” refers to the Members as described in these Rules and Regulations.

5. Any Member of the RRCA may appoint an alternate person to serve in his or her place. In the event any Member is unable to perform his or her official duties, the appointing authority of the State represented by that Member may appoint the Member's alternate to serve in his or her place. Any such alternate shall be recognized as that State's representative to the RRCA upon presentation to the Members from the other States of a written appointment letter signed by the absent Member, or, as applicable, by the appointing authority of the State involved. An appointment of an alternate shall be valid only for the period of the appointment.
6. The Chair of the RRCA shall be a Member of the RRCA. Each Chair shall serve a term encompassing two annual meetings. The Chair's term shall begin upon the conclusion of the last meeting chaired by the previous Chair and shall expire at the conclusion of the second annual meeting at which he or she serves as Chair. Unless otherwise agreed by all Members, the rotation of the Chair shall be by State in the following order beginning at the conclusion of the annual meeting in 2003: Colorado; Kansas; and Nebraska.
7. The Chair, or his or her alternate, shall preside at all meetings of the RRCA. The Chair may initiate or second motions and vote on all matters coming before the RRCA. The Chair shall issue notice of all meetings to all members as to the time, place, and agenda of the meeting at least 15 days in advance of any regular meeting, unless otherwise agreed by the Members, and as soon as possible prior to any special meeting. Any issue to be raised for dispute resolution at a regular meeting pursuant to paragraph 15 of these Rules and Regulations shall be distributed to the members at least 30 days in advance of the regular meeting. The agenda shall include all items for which a Member makes a timely request for inclusion on the agenda. The Chair or other person designated by the RRCA shall also keep a record of the proceedings, including official meeting minutes, of all meetings and of all transactions of the RRCA during his or her term of office. The record of proceedings shall include: minutes; Annual Report; reports required by the Final Settlement Stipulation; committee and subcommittee reports; the data, computations and results required in the Accounting Procedures; and such other matters as deemed appropriate

by the RRCA. Meeting minutes will not be official until approved by the RRCA. Unless otherwise agreed to by all Members of the RRCA, the Chair shall be responsible for the preparation of an electronic recording of each meeting, unless any Member requests in advance a transcript of each meeting. The Chair will be responsible for providing a copy of the record of proceedings for that year. The RRCA, through the Chair, will maintain an official repository of records of the proceedings.

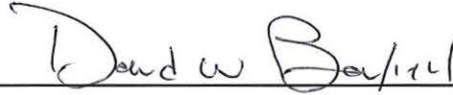
8. The RRCA hereby creates a standing Engineering Committee that shall be composed of one representative from each State appointed by the RRCA Member from that State. The RRCA may create other standing, ad hoc or special committees composed of members of the RRCA and/or other persons appointed by the Members. The RRCA may assign to such committees any tasks that it determines to be appropriate.
9. The RRCA shall hold a regular annual meeting prior to September 1st each year. However, the Chair may waive an annual meeting, or hold the meeting at a later date, upon unanimous written consent of the Members. The annual meeting shall be held at a location in the Chair's State at a time and place acceptable to the other members.
10. The RRCA shall hold a special meeting, other than a meeting to address a "fast track issue" as provided for in the Section VII of the Final Settlement Stipulation, upon written request of any Member and with the concurrence of the other two Members. The Chair of the RRCA shall poll all of the Members prior to setting the meeting date, time, and place of a specially scheduled meeting. All Members shall make a good faith effort to arrange a mutually agreeable date, time, and place for all meetings.
11. A quorum for a RRCA meeting shall be present only when all of the Members or their duly appointed alternates are in attendance. The RRCA may act only by unanimous vote of all members or duly appointed alternates. Each State shall have one vote. The Chair shall document each action of the RRCA by formal written resolution or such action shall be recorded in the

approved minutes. The RRCA shall honor a request by any Member or duly appointed alternate that action on any matter be by formal resolution.

12. The RRCA shall prepare and approve an annual report that includes the official actions taken by the RRCA at the annual meeting and at any special meetings, a summary of the compact accounting for the previous year and such other matters as the RRCA may deem appropriate. The Chair shall furnish copies of the report to the President of the United States, the Governors of the States of Colorado, Nebraska and Kansas, the officials of appropriate State and federal agencies and to any other person, as the RRCA determines appropriate.
13. The RRCA may make amendments, revisions, deletions, or additions to these Rules and Regulations at any meeting of the RRCA. Unless otherwise agreed to by the RRCA, written notice and a copy of any proposed change must be sent to all Members by the Member proposing the change at least 15 days in advance of any meeting at which the RRCA shall consider such changes. Any Member may offer modifications of any such proposed changes at any time prior to the RRCA acting on those proposed changes.
14. Compact accounting and data exchanges among the States shall be done annually in accordance with the Final Settlement Stipulation, including the RRCA Accounting Procedures and Reporting Requirements, dated May 25, 2017, and the Republican River Compact Administration Groundwater Model, Version 12s2 (V12s2), dated August 6, 2010. Unless otherwise agreed to by the RRCA Members, the annual accounting shall be completed by the Engineering Committee and submitted to the RRCA no later than June 1st of the year following for which the accounting is being done. The RRCA may modify the RRCA Accounting Procedures and the RRCA Groundwater model only by contemporaneously amending these Rules and Regulations to show the date, title or version, as appropriate, of the RRCA Accounting Procedures and/or the RRCA Groundwater model that the RRCA shall use. At the time of any modification, the RRCA shall specify the time and method for implementation of each modification.

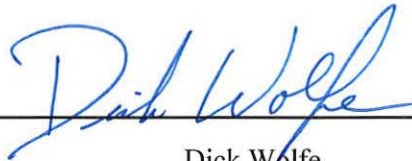
15. Any dispute arising among the States shall be resolved in accordance with the procedures set forth in Article VII of the Final Settlement Stipulation.

Adopted by the Republican River Compact Administration this 25<sup>th</sup> day of May, 2017.



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David W. Barfield  
Commissioner for Kansas



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Dick Wolfe  
Commissioner for Colorado



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Gordon W. Fassett  
Commissioner for Nebraska

**Engineering Committee Report**  
**Republican River Compact Administration**

Special Meeting  
May 25, 2017

At the August 24, 2016, Annual Meeting, the Engineering Committee (EC) was given the assignments to 1.) continue efforts to finalize all accounting for years since 2006 and resolve issues between the states preventing finalization and 2.) by December 31, 2016, unify accounting procedures and reporting requirements approved by all RRCA resolutions including determining the appropriate model run or runs to be performed by Principia Mathematica.

The EC is providing with this report recommendations on the 2005 through 2015 Accounting for RRCA action following adoption of Accounting Procedures and Reporting Requirements, Rules and Regulations, and the *Resolution Approving Accounting Changes* by the RRCA on May 25, 2017. Two attachments are included with this report detailing the 2005 and 2006 accounting recommendation and the 2007 through 2015 accounting recommendation of the EC.

**ITEMS FOR RRCA DISCUSSION & ACTION**

Based upon the EC discussions and information presented in this report, the EC recommends RRCA discussion and potential action on the following items:

1. Agreement to adopt the spreadsheet titled “RRCA Accounting for 2005 w NRF evap entire basin.xls” as the official RRCA Accounting spreadsheet for 2005.
2. Agreement to adopt the spreadsheet titled “Corrected RRCA Accounting For 2006\_KS\_Version, Special Master HCL Evap Adjustment.xls” spreadsheet as the official RRCA Accounting spreadsheet for 2006.
3. Agreement to adopt the 2007 through 2015 Accounting Inputs, Accounting Tables, and Attachments report and spreadsheet titled “RRCA\_AccountingFor2007to2015.xlsx” as the official RRCA Accounting for the years 2007 through 2015.



**SUBMITTED BY**



Ivan Franco  
Chair, Engineering Committee Member for Colorado

5-25-2017

Date



Jennifer J. Schellpeper  
Engineering Committee Member for Nebraska

5-25-2017

Date



Chris Beightel  
Engineering Committee Member for Kansas

5-25-17

Date

# **ATTACHMENT 1**

## **Republican River Compact Accounting for Years 2005 and 2006**

Republican River Compact Accounting for Years 2005 and 2006  
May 25, 2017

## **Background**

RRCA Accounting for 2005 and 2006 was discussed in the Report of the Special Master, dated November 15, 2013, which established that Nebraska consumed “a total of 70,869 acre-feet of water in excess of its Compact allocation in 2005 and 2006” (Report of the Special Master, Page 2, first sentence). Of this total overuse, the Special Master determined that 42,860 acre-feet occurred during 2005, and 28,009 acre-feet occurred during 2006 (Report of the Special Master, Page 88).

The spreadsheets used to establish these balances – with one important modification directed by the Special Master for 2006 – appear to have originated from tables prepared by the State of Kansas, as entered through Exhibit KS22. This document was a pdf version of RRCA Accounting spreadsheets for the years 2003, 2004, 2005, and 2006. The first pages of the 2005 and 2006 sections of KS22 (Pages 73 and 117 of that pdf, respectively) include information contained in the “Documentation” tab for each spreadsheet, which indicates that the spreadsheets used to produce the 2005 and 2006 sections of the pdf had the following file names, respectively:

- RRCA Accounting for 2005 w NRF evap entire basin.xls
- Corrected RRCA Accounting For 2006\_KS\_Version.xls

Kansas has recently<sup>1</sup> provided RRCA Accounting spreadsheets for 2005 and 2006 with the same names as the Excel documents indicated directly above, and in comparing the spreadsheets with KS 22, they appear to include identical information with a few minor exceptions for the 2006 spreadsheet. The particular issues concerning the 2005 and 2006 accounting spreadsheets are explained below.

### **2005 RRCA Accounting Spreadsheet**

The spreadsheet provided by Kansas titled “RRCA Accounting for 2005 w NRF evap entire basin.xls” appears to be the same spreadsheet used for 2005 accounting within the KS22 exhibit. In addition, the Table 5C balance for Nebraska of -42,860 acre-feet agrees with the value determined by the Special Master. As a result, it is recommended that the RRCA adopt this spreadsheet as the official RRCA Accounting spreadsheet for 2005.

### **2006 RRCA Accounting Spreadsheet**

The spreadsheet provided by Kansas titled “Corrected RRCA Accounting For 2006\_KS\_Version.xls” appears to be the same spreadsheet used for 2006 accounting within the KS22 exhibit, with a few minor exceptions which concern correcting an error in a calculation that does not appear to be used outside of two cells in the spreadsheet. The “Documentation” tab in the spreadsheet includes a “Last update” entry dated 9/24/2009, by Sam Perkins, which was not in the KS22 exhibit:

*Corrected sheet Sappa cell b61 to be "=b29+b38+b52"; erroneous reference was "=T2!d5" –spp*

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<sup>1</sup> April 25, 2017, email sent by David Barfield (Kansas Division of Water Resources).

Republican River Compact Accounting for Years 2005 and 2006  
May 25, 2017

Per the language in this entry, the “Sappa” tab, in Cell B61, includes the corrected equation for “Total GW CBCU”, which results in a value of -882 acre-feet, instead of the 0 acre-feet value in that cell within KS22. As a result, the “Total Basin CBCU” entry in Cell B62 of the spreadsheet has a value of -359 acre-feet, instead of the 523 acre-feet value in KS22 for that cell.

As indicated in the 9/24/2009 entry within the spreadsheet, it does appear that the equation for Cell B61 did contain an erroneous reference, and the change made to the spreadsheet cell also appears to correctly sum the Colorado, Kansas, and Nebraska Groundwater CBCU values to determine the Total GW CBCU in the Sappa Creek Sub-basin. In addition, the two cells that differ between the “Corrected RRCA Accounting For 2006\_KS\_Version.xls” spreadsheet and KS22 (Cells B61 and B62 in the “Sappa” tab) do not appear to be used in any other equation within the entire spreadsheet<sup>2</sup>. As a result, this spreadsheet would appear to match the entries in KS22, with the minor correction described above which appears to have no bearing beyond correcting the values within 2 spreadsheet cells that are not used in any other calculations.

The “Corrected RRCA Accounting For 2006\_KS\_Version.xls” should not, however, be used to represent the official 2006 accounting because of the Special Master’s decision that “Kansas’ estimate of Nebraska’s overuse in 2006 should therefore be reduced by 8,091 acre-feet” (Report of the Special Master, Page 79, last sentence). This correction concerns the assignment of Harlan County Lake (HCL) evaporation between Kansas and Nebraska. In the Kansas spreadsheet (both the Excel file and KS22), the HCL evaporation is split 52.28% to Kansas, and 47.72% to Nebraska. The Special Master determined that “The entirety of the 16,182 acre-feet of evaporation from Harlan County Lake ... should be charged to Kansas” (Report of the Special Master, Page 79, last paragraph).

In explaining his decisions, the Special Master assumed that Kansas had used a 50-50 split in assigning evaporation between the two states in its calculations (Report of the Special Master, Pages 79-80, Footnote 23), which is slightly different than the 52.28% and 47.72% values actually used by Kansas. As a result, instead of changing the HCL evaporation percentage values in the spreadsheet, we suggest that the 8,091 acre-feet reduction in Nebraska’s overuse, prescribed by the Special Master, be entered directly as an adjustment to Nebraska’s overall balance in Cell I5 of the “T5 C,D” tab and Cell E24 of the “T3 A,B,C” tab, to adjust the Table 5C and Table 3C balances for Nebraska, respectively. Making this adjustment results in Nebraska’s Table 5C balance for 2006 improving from -36,101 acre-feet to -28,010 acre-feet (within rounding error of the 28,009 acre-feet overuse number mentioned by the Special Master), and Nebraska’s Table 3C balance for 2006 improving from -36,876 acre-feet to -28,785 acre-feet.

Starting with the “Corrected RRCA Accounting For 2006\_KS\_Version.xls” spreadsheet provided by Kansas, these two cells were changed as described above, and an entry was made in the “Documentation” tab noting these two changes. The resulting Excel spreadsheet was named “Corrected RRCA Accounting For 2006\_KS\_Version, Special Master HCL Evap Adjustment.xls”. It is recommended that the RRCA adopt this “Corrected RRCA Accounting For 2006\_KS\_Version, Special Master HCL Evap Adjustment.xls” spreadsheet as the official RRCA Accounting spreadsheet for 2006.

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<sup>2</sup> This was determined using the “Trace Dependents” tool within Microsoft Excel 2016.

# **ATTACHMENT 2**

## **Republican River Compact Accounting for Years 2007 through 2015**

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## Summary and Recommendation of the Engineering Committee

By the *Resolution Approving Accounting Changes* and the RRCA Rules and Regulations, both dated May 25, 2017, the RRCA agreed to process all accounting including and after 2007 with the May 25, 2017, revised Accounting Procedures and Reporting Requirements (Accounting Procedures). The following sections of this report summarize the 2007 through 2015 Accounting Inputs, Accounting Tables, and Attachments. The 2007 through 2015 Accounting Inputs, Accounting Tables, and Attachments and all intermediate calculations can be found in the spreadsheet titled “RRCA\_AccountingFor2007to2015.xlsx”. It is recommended that the RRCA adopt this report and spreadsheet titled “RRCA\_AccountingFor2007to2015.xlsx” as the official Accounting for the years 2007 through 2015.

The 2007 through 2015 Accounting Inputs, Accounting Tables, and Attachments provided within this document were processed under the RRCA Accounting Procedures and Reporting Requirements revised May 25, 2017, following the implementation of the *Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years* and *Resolution Approving Operation and Accounting for Colorado Compact Compliance Pipeline and Colorado’s Compliance Efforts in the South Fork Republican River Basin*, both dated August 24, 2016.

RRCA approved accounting values for the years 2002 through 2006 were necessary for the averaging periods associated with the 2007 through 2015 accounting tables. Accounting for 2002 through 2006 were maintained as approved. This resulted in several deviations of the approved accounting values from the May 25, 2017, Accounting Procedures of note:

- The Beaver Creek Reduction for Table 5A, Column 3 was populated with the single accounting year allocation from Beaver Creek for the years 2003 to 2006.
- Nebraska’s Share of the Unused Colorado Allocation in Column 4 of Tables 5C and 5D were set to zero for 2005 and 2006.

Table 4A is left unpopulated pursuant to the August 24, 2016 “RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING OPERATION AND ACCOUNTING FOR THE COLORADO COMPACT COMPLIANCE PIPELINE AND COLORADO’S COMPLIANCE EFFORTS IN THE SOUTH FORK REPUBLICAN RIVER BASIN”, paragraph E.

Preliminary accountings and the states’ water management activities for the years 2007-2015 were subject to the Accounting Procedures in accordance with the Republican River Compact and Final Settlement Stipulation and Resolutions adopted through this period. Generally, the previous versions of the Accounting Procedures and Resolutions varied from the May 25, 2017, Accounting Procedures in the following ways:

- 1) Surface Water Computed Beneficial Consumptive Use calculations did not incorporate spill to waste-way data for Federal Canals prior to 2015.
- 2) Various groundwater model changes
  - a) Changes in accounting points within the model (Guide Rock and North Fork)
  - b) Representation of CCP augmentation pumping deliveries within the stream network
  - c) Bonny Reservoir representations of stage and stream network configurations
  - d) Implementation of the United States Supreme Court “5-Run” method

## Republican River Compact Accounting for Accounting Years 2007 through 2015

May 25, 2017

- 3) Credit for augmentation pumping activities and related Virgin Water Supply adjustments
- 4) Adjustments related to the distribution of Harlan County Lake evaporation charges

While this list is not intended to be all inclusive, it should serve to remind future users of the 2007-2015 accounting results that the final results established through use of the May 25, 2017, Accounting Procedures would likely differ from preliminary accounting results that may have been developed in the past.



# **ACCOUNTING INPUTS**

Groundwater Data										
Calendar Year		2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork Subbasin	GW CBCU Colorado	14,790	15,004	15,783	15,479	15,689	15,309	15,649	16,283	16,424
	GW CBCU Kansas	0	0	0	0	0	0	0	0	0
	GW CBCU Nebraska	899	928	952	975	1,003	1,021	1,059	1,096	1,123
Arikaree Subbasin	GW CBCU Colorado	1,143	1,536	4,011	1,446	1,830	1,558	458	1,141	2,829
	GW CBCU Kansas	99	92	155	98	156	92	197	225	178
	GW CBCU Nebraska	112	124	153	73	93	78	126	128	108
Buffalo Subbasin	GW CBCU Colorado	336	354	371	387	402	416	428	446	471
	GW CBCU Kansas	0	0	0	0	0	0	0	0	0
	GW CBCU Nebraska	3,313	3,295	3,294	3,308	3,318	3,332	3,349	3,391	3,440
Rock Subbasin	GW CBCU Colorado	70	75	80	85	90	97	103	108	113
	GW CBCU Kansas	0	0	0	0	0	0	0	0	0
	GW CBCU Nebraska	3,971	4,114	4,286	4,404	4,491	4,475	4,452	4,587	4,797
South Fork Subbasin	GW CBCU Colorado	12,511	14,707	14,976	11,938	13,092	9,321	12,321	13,868	13,865
	GW CBCU Kansas	5,527	5,812	7,791	2,918	6,045	2,355	5,043	8,452	5,404
	GW CBCU Nebraska	1,055	1,021	1,302	625	941	810	473	1,027	918
Frenchman Subbasin	GW CBCU Colorado	55	370	2,917	3,030	2,554	1,485	1,125	951	1,779
	GW CBCU Kansas	0	0	0	0	0	0	0	0	0
	GW CBCU Nebraska	79,743	80,473	82,168	80,379	80,087	75,161	81,511	81,705	81,403
Driftwood Subbasin	GW CBCU Colorado	0	0	0	0	0	0	0	0	0
	GW CBCU Kansas	0	0	0	0	0	0	0	0	0
	GW CBCU Nebraska	1,351	1,287	1,204	1,130	1,072	1,054	1,049	1,021	980
Red Willow Subbasin	GW CBCU Colorado	0	0	0	0	0	0	0	0	0
	GW CBCU Kansas	0	0	0	0	0	0	0	0	0
	GW CBCU Nebraska	9,326	9,361	9,777	8,726	8,333	6,687	7,418	8,423	8,239
Medicine Creek Subbasin	GW CBCU Colorado	0	0	0	0	0	0	0	0	0
	GW CBCU Kansas	0	0	0	0	0	0	0	0	0
	GW CBCU Nebraska	20,035	19,304	19,033	18,838	18,494	17,623	19,920	20,693	20,020
Beaver Subbasin	GW CBCU Colorado	0	0	0	0	0	0	0	0	0
	GW CBCU Kansas	5,199	7,431	7,858	7,237	6,699	4,844	2,985	3,468	5,763
	GW CBCU Nebraska	4,862	6,522	6,325	5,473	4,963	3,517	1,999	2,054	3,911
Sappa Subbasin	GW CBCU Colorado	0	0	0	0	0	0	0	0	0
	GW CBCU Kansas	(131)	2,751	4,416	3,673	3,035	884	(699)	(1,047)	164
	GW CBCU Nebraska	1,676	3,429	4,387	3,476	2,945	1,916	985	909	1,410
Prairie Dog Subbasin	GW CBCU Colorado	0	0	0	0	0	0	0	0	0
	GW CBCU Kansas	5,800	12,883	10,508	7,222	8,020	3,020	1,127	984	3,943
	GW CBCU Nebraska	0	84	36	29	24	0	0	0	0
Mainstem Subbasin	GW CBCU Colorado	(2,062)	(2,487)	(1,549)	(2,698)	(2,305)	(6,712)	(1,919)	(1,162)	(2,649)
	GW CBCU Kansas Above Guide Rock	(506)	827	721	326	215	(1,351)	(785)	(2,158)	(1,130)
	GW CBCU Kansas Below Guide Rock	69	42	54	54	36	74	91	31	28
	GW CBCU Nebraska Above Guide Rock	78,385	80,085	86,992	73,877	72,775	39,272	43,298	58,468	69,040
	GW CBCU Nebraska Below Guide Rock	2,936	2,290	2,245	2,493	2,212	2,306	2,312	1,911	2,337

Import Water Data										
Calendar Year		2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Arikaree Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Buffalo Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Rock Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
South Fork Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Frenchman Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Driftwood Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Red Willow Subbasin	Imported Water Nebraska	43	45	57	58	56	39	35	29	41
Medicine Creek Subbasin	Imported Water Nebraska	10,554	10,483	10,540	10,693	10,463	8,818	9,992	10,731	10,442
Beaver Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Sappa Subbasin	Imported Water Nebraska	0	0	82	62	41	15	0	0	0
Prairie Dog Subbasin	Imported Water Nebraska	0	0	0	0	0	0	0	0	0
Mainstem Subbasin	Imported Water Nebraska Above Guide Rock	11,336	15,522	12,075	13,953	12,903	5,905	2,447	2,232	7,000
	Imported Water Nebraska Below Guide Rock	0	0	(11)	0	(11)	(12)	(11)	(11)	(10)
Total		21,933	26,050	22,743	24,766	23,452	14,765	12,463	12,981	17,473

SW Pumping Data		2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Calendar Year</b>										
North Fork Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Colorado	2,376	570	394	474	530	886	553	412	707
	SW Diversions - Irrigation - Small Pumps - Colorado	73	21	0	0	0	0	0	0	85
	SW Diversions - M&I - Colorado	0	0	0	0	0	0	0	0	0
Arikaree Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Colorado	0	0	0	81	55	105	75	35	37
	SW Diversions - Irrigation - Small Pumps - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0
Buffalo Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	271	361	248	354	446	542	416	481	644
	SW Diversions - Irrigation - Small Pumps - Nebraska	0	0	0	0	0	0	0	0	2
Rock Subbasin	SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0	0	0	0	0	0	0	0	0
South Fork Subbasin	SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Colorado	401	87	0	14	16	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0	0	0	0	0	0	0	0	0
Frenchman Subbasin	SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	3	1	5	0	0	18	0	19	0
Driftwood Subbasin	SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0	0	0	0	0	0	0	0	0
Red Willow Subbasin	SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0	0	6	0	1	18	35	41	33
Medicine Creek Subbasin	SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	25	91	34	43	94	609	65	35	25
	SW Diversions - M&I - Nebraska - Above Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
Beaver Subbasin	SW Diversions - Irrigation - Small Pumps - Nebraska - Below Gage	25	40	37	18	4	14	24	38	65
	SW Diversions - M&I - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Colorado	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0	0	3	2	2	11	8	6	0
	SW Diversions - M&I - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	3	0	0	1	0	0	0	0	0
	SW Diversions - M&I - Nebraska - Above Gage	0	0	0	0	0	0	0	0	0
Sappa Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Kansas	6	0	0	0	0	0	0	0	0
Prairie Dog Subbasin	SW Diversions - M&I - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	189	0	115	221	58	552	0	135	0
	SW Diversions - M&I - Nebraska - Above Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - M&I - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Kansas	165	300	560	360	328	419	489	296	329
Mainstem Subbasin	SW Diversions - M&I - Kansas	362	203	354	327	158	203	365	352	356
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Below Gage	43	63	149	9	52	166	15	29	53
	SW Diversions - M&I - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Non-Federal Canals - Kansas	0	0	0	0	0	0	0	0	0
	SW Diversions - Irrigation - Small Pumps - Kansas	518	449	688	872	539	949	776	646	739
	SW Diversions - M&I - Kansas	0	0	0	0	0	0	0	0	0
SW Diversions - Irrigation - Non-Federal Canals - Nebraska	835	682	1,683	2,146	2,387	1,524	1,600	1,492	1,791	
SW Diversions - Irrigation - Small Pumps - Nebraska	1,033	1,053	1,304	1,196	1,574	4,268	1,418	790	1,201	
SW Diversions - M&I - Nebraska	0	0	0	0	0	0	0	0	0	
SW Diversions - Irrigation - Non-Federal Canals - Nebraska Below Guide Rock	0	0	0	0	0	0	0	0	0	
SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	358	244	456	350	496	1,271	850	476	786	
SW Diversions - M&I - Nebraska - Below Guide Rock	0	0	0	0	0	0	0	0	0	

Non-Federal SW Consumptive Use		2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Calendar Year</b>										
% Non-Federal Canal Diversion Consumed		60%	60%	60%	60%	60%	60%	60%	60%	60%
% Small Surface Water Pumps Consumed		75%	75%	75%	75%	75%	75%	75%	75%	75%
% Municipal And Industrial SW Consumed		50%	50%	50%	50%	50%	50%	50%	50%	50%

<b>Non-Federal Reservoir Evaporation Data</b>											
<b>Calendar Year</b>		<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	
North Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	38	37	28	41	36	51	45	38	37	
Arikaree Subbasin	Non-Federal Reservoir Evaporation - Colorado	0	0	0	0	0	0	0	0	0	
	Non-Federal Reservoir Evaporation - Kansas	18	14	7	11	14	24	17	11	14	
	Non-Federal Reservoir Evaporation - Nebraska	0	0	0	0	0	0	0	0	0	
Buffalo Subbasin	Non-Federal Reservoir Evaporation - Colorado	0	0	0	0	0	0	0	0	0	
	Non-Federal Reservoir Evaporation - Nebraska	18	15	10	21	24	15	3	2	6	
Rock Subbasin	Non-Federal Reservoir Evaporation - Nebraska	55	46	20	57	64	125	102	97	86	
South Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	0	0	0	117	154	107	52	40	38	
	Non-Federal Reservoir Evaporation - Kansas	143	121	65	98	119	213	147	100	124	
	Non-Federal Reservoir Evaporation - Nebraska	0	0	0	0	0	0	0	0	0	
Frenchman Subbasin	Non-Federal Reservoir Evaporation - Nebraska	152	126	32	217	238	243	66	50	51	
Driftwood Subbasin	Non-Federal Reservoir Evaporation - Kansas	13	11	6	11	11	17	13	10	10	
	Non-Federal Reservoir Evaporation - Nebraska	5	3	2	10	10	17	8	0	0	
Red Willow Subbasin	Non-Federal Reservoir Evaporation - Nebraska	75	40	48	118	118	159	269	209	171	
Medicine Creek Subbasin	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	251	155	104	321	314	313	315	241	195	
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	6	5	3	8	8	0	0	0	1	
Beaver Subbasin	Non-Federal Reservoir Evaporation - Colorado	0	0	0	0	0	0	0	0	0	
	Non-Federal Reservoir Evaporation - Kansas	254	260	141	251	253	409	313	223	244	
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	59	47	38	65	64	51	110	92	64	
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	0	0	0	0	0	0	0	0	0	
Sappa Subbasin	Non-Federal Reservoir Evaporation - Kansas	351	279	152	269	272	439	336	240	262	
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	32	28	32	60	63	77	51	46	28	
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	3	2	6	4	5	13	15	5	3	
Prairie Dog Subbasin	Non-Federal Reservoir Evaporation - Kansas	260	114	90	217	137	442	294	293	226	
	Non-Federal Reservoir Evaporation - Nebraska	44	39	25	17	23	58	27	21	11	
Mainstem Subbasin	Non-Federal Reservoir Evaporation - Kansas	84	84	64	85	80	150	145	111	63	
	Non-Federal Reservoir Evaporation - Nebraska - Above Guide Rock Gage - Whole Basin Value:	1,524	1,287	1,269	1,867	2,127	2,149	1,477	1,159	688	
	Non-Federal Reservoir Evaporation - Nebraska - Below Guide Rock Gage - Whole Basin Value:	163	147	209	180	244	299	50	67	14	

<b>Stream Gage Data</b>											
<b>Calendar Year</b>		<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	
North Fork Subbasin	North Fork Republican River At Colorado-Nebraska State Line	20,333	21,638	24,405	20,418	19,722	14,376	18,433	26,707	27,895	
Arikaree Subbasin	Arikaree River At Haigler	1,308	1,567	779	2,358	1,074	494	91	0	142	
Buffalo Subbasin	Buffalo Creek Near Haigler	2,007	2,190	2,353	2,374	1,972	1,045	1,268	1,463	1,623	
Rock Subbasin	Rock Creek At Parks	4,764	4,852	4,916	5,253	4,345	4,173	19,724	23,088	5,644	
South Fork Subbasin	South Fork Republican River Near Benkelman	674	1,397	8,407	12,756	9,916	6,441	0	0	4,819	
Frenchman Subbasin	Frenchman Creek At Culbertson	44,910	33,174	27,522	33,840	31,148	16,825	22,287	31,021	19,213	
Driftwood Subbasin	Driftwood Creek Near McCook	4,312	2,528	1,874	3,436	2,389	4,658	1,159	1,232	2,454	
Red Willow Subbasin	Red Willow Creek Near Red Willow	6,453	12,411	26,873	24,790	18,297	8,682	6,408	7,643	3,460	
Medicine Creek Subbasin	Medicine Creek Below Harry Strunk	50,356	65,150	36,450	44,469	37,420	37,444	26,198	40,561	56,850	
Beaver Subbasin	Beaver Creek Near Beaver City	1,227	1,118	1,154	1,438	899	461	224	412	652	
Sappa Subbasin	Sappa Creek Near Stamford	4,450	7,732	10,673	21,762	15,587	7,656	1,316	1,687	3,679	
Prairie Dog Subbasin	Prairie Dog Creek Near Woodruff	5,457	7,571	6,871	25,698	15,864	5,066	2,596	1,363	1,445	
Mainstem Subbasin	Republican River At Guide Rock	61,470	229,144	105,400	284,800	214,462	116,248	24,835	35,041	29,772	
	Republican River Near Hardy	100,257	272,571	130,578	340,610	274,226	139,460	44,745	50,362	104,931	

<b>Hardy Gage Data</b>		USGS Gage 06853500 Republican River Near Hardy, NE									
<b>Calendar Year</b>		<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	
Mainstem Subbasin	January	1,206	7,390	20,067	17,117	8,077	17,407	1,926	1,704	1,390	
	February	5,752	7,769	22,151	9,435	19,450	16,861	1,829	4,733	2,093	
	March	1,997	7,706	20,809	53,964	27,183	40,124	1,993	4,560	2,027	
	April	2,606	10,459	11,304	44,519	30,902	32,868	4,479	1,638	2,364	
	May	19,210	44,315	14,160	43,531	62,832	12,327	8,376	2,138	34,054	
	June	16,247	49,926	7,801	80,717	35,472	6,329	3,215	5,818	36,781	
	July	4,798	18,817	8,346	38,967	18,192	5,155	2,648	5,726	7,906	
	August	8,491	13,938	5,457	16,788	21,525	2,900	9,386	6,893	7,712	
	September	2,745	10,413	3,535	9,350	13,101	1,182	3,588	4,491	2,180	
	October	22,860	41,635	2,053	8,757	9,291	1,289	2,523	4,717	1,690	
	November	6,891	39,525	9,614	8,664	11,802	1,525	3,771	4,167	1,944	
	December	7,454	20,678	5,282	8,799	16,395	1,492	1,012	3,779	4,790	
	ANNUAL	100,257	272,571	130,579	340,608	274,222	139,459	44,746	50,364	104,931	

Reservoir Data		2007	2008	2009	2010	2011	2012	2013	2014	2015
Calendar Year										
South Fork Subbasin	Bonny Reservoir Evaporation	2,428	1,766	1,020	1,921	1,965	67	0	0	0
	Bonny Reservoir Change In Storage	(1,743)	1,161	836	449	(11,360)	(100)	0	0	0
Frenchman Subbasin	Enders Reservoir Evaporation	1,589	1,217	428	1,135	1,342	2,796	1,761	1,332	1,194
	Enders Reservoir Change In Storage	5,800	(1,500)	262	1,081	757	(2,378)	(1,802)	(4,170)	1,028
Red Willow Subbasin	Hugh Butler Lake Evaporation	2,369	1,205	1,458	1,069	1,089	2,101	1,580	1,275	1,379
	Hugh Butler Lake Change In Storage	11,900	1,500	(20,143)	(323)	(34)	98	863	1,180	4,738
Medicine Creek Subbasin	Harry Strunk Lake Evaporation	1,549	1,591	1,096	3,139	2,809	4,550	2,688	2,044	1,910
	Harry Strunk Lake Change In Storage	10,400	(1,000)	430	306	(836)	(13,161)	443	17,602	(4,211)
Prairie Dog Subbasin	Keith Sebelius Lake Evaporation	2,213	1,224	1,004	2,765	1,772	5,416	2,991	2,423	1,963
	Keith Sebelius Lake Change In Storage	1,600	6,600	1,086	3,214	2,600	(6,738)	(3,960)	(2,826)	(254)
Mainstem Subbasin	Swanson Lake Evaporation	6,444	5,527	2,599	6,676	6,850	9,924	6,078	3,625	5,035
	Swanson Lake Change In Storage	8,900	6,800	3,314	6,771	115	(24,403)	(8,920)	(1,189)	15,903
	Harlan County Evaporation Subject to Nebraska/Kansas Split	14,701	12,239	14,439	10,475	14,831	31,127	25,919	18,541	6,901
	Harlan County Evaporation Charged to Kansas	0	0	0	0	0	0	0	0	3,214
	Harlan County Change In Storage	139,100	63,900	958	(1,858)	4,700	(131,875)	(66,603)	24,320	18,574
	Lovewell Reservoir Ev charged to the Republican River	130	10	130	330	(160)	760	800	1,380	(280)

Canal Data		2007	2008	2009	2010	2011	2012	2013	2014	2015
Calendar Year										
North Fork Subbasin	Haigler Canal Diversions - Colorado	2,512	465	0	0	0	0	0	0	0
	Haigler Canal Diversions - Nebraska	4,522	4,995	4,193	5,041	4,826	6,129	3,839	3,110	3,668
	Haigler Canal Diversions	7,034	5,460	4,193	5,041	4,826	6,129	3,839	3,110	3,668
South Fork Subbasin	Hale Ditch Diversions	43	0	169	1,322	23	0	0	184	616
Frenchman Subbasin	Champion Canal Diversions	0	0	0	0	0	0	0	0	0
	Riverside Canal Diversions	0	0	2,336	2,471	2,419	0	0	0	0
	Culbertson Canal Diversions	0	0	9,624	9,609	9,889	5,470	0	0	9,121
	Culbertson Canal Extension Diversions	0	0	0	0	0	0	0	0	0
	Culbertson Canal % Return Flow	100%	100%	80%	79%	78%	77%	100%	100%	81%
	Culbertson Canal Extension % Return Flow	100%	100%	100%	100%	100%	100%	100%	100%	100%
Driftwood Subbasin	Meeker-Driftwood Canal Diversions	0	0	23,274	19,469	21,538	32,955	9,210	8,035	15,350
	Meeker-Driftwood Canal % Return Flow	100%	100%	82%	62%	62%	68%	67%	73%	63.0%
Red Willow Subbasin	Red Willow Canal Diversions	0	4,089	5,166	0	0	0	0	0	0
	Red Willow Canal % Return Flow	100%	67%	82%	100%	100%	100%	100%	100%	100%
Prairie Dog Subbasin	Almena Canal Diversions	1,099	2,217	1,551	3,330	2,277	3,172	2,274	1,385	0
	Almena Canal % Return Flow	61%	61%	71%	67%	65%	50%	49%	57%	100.0%
Mainstem Subbasin	Bartley Canal Diversion	0	0	10,711	8,589	9,718	8,137	0	0	8,590
	Bartley Canal % Return Flow	100%	100%	85%	65%	71%	58%	100%	100%	81%
	Cambridge Canal Diversion	0	19,387	23,961	24,280	28,850	27,618	12,575	12,242	29,156
	Cambridge Canal % Return Flow	100%	57%	72%	62%	62%	53%	56%	65%	67.5%
	Naponee Canal Diversion	0	316	1,059	690	1,182	1,985	755	0	812
	Naponee Canal % Return Flow	100%	57%	72%	71%	52%	52%	66%	100%	67%
	Franklin Canal Diversion	0	16,085	23,246	13,879	18,853	30,870	15,796	0	15,240
	Franklin Canal % Return Flow	100%	73%	68%	70%	68%	58%	60%	100%	62%
	Franklin Pump Canal Diversions	0	576	909	751	729	1,648	1,206	0	1,027
	Franklin Pump Canal % Return Flow	100%	69%	71%	72%	60%	58%	52%	100%	60%
	Superior Canal Diversions	0	5,666	6,336	6,489	7,070	9,744	6,161	0	6,571
	Superior Canal % Return Flow	100%	73%	61%	61%	68%	59%	60%	100%	67%
	Courtland Canal Diversions At Headgate	65,851	32,224	51,647	47,290	35,907	74,730	70,402	59,654	57,452
	Diversions to Nebraska Courtland	0	311	718	202	428	884	558	0	483
	Nebraska Courtland % Return Flow	100%	35%	28%	32%	50%	28%	26%	100%	25%
	Courtland Canal, Loss in NE assigned to upper Courtland KS	2,087	3,671	2,852	3,794	2,014	4,545	1,998	1,099	2,382
	Courtland Canal, Loss in NE assigned to delivery to Lovewell	7,628	2,945	5,385	4,558	2,215	5,664	2,825	4,346	3,627
	Courtland Canal At Kansas-Nebraska State Line	56,136	25,297	42,692	38,736	31,250	63,637	65,021	54,209	50,960
	Courtland Canal Diversions to the Upper Courtland District	14,748	17,433	18,833	20,190	17,889	26,777	20,093	15,525	20,438
	Courtland Canal Above Lovewell % Return Flow	61%	67%	63%	56%	60%	53%	53%	54%	58.6%
	Courtland Canal, Loss assigned to deliveries of water to Lovewell, Stateline to Lovewell	8,788	3,878	9,103	4,310	5,059	4,052	8,494	3,333	2,371
	Courtland Canal Deliveries To Lovewell Reservoir	34,688	7,658	17,608	18,030	10,316	37,353	38,432	36,450	30,533
	Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	35,960	11,280	12,560	20,410	12,710	26,840	37,250	32,108	31,544
	Courtland Canal Below Lovewell % Return Flow	54%	56%	55%	45%	53%	47%	48%	48%	48.8%
	<b>To allocate Harlan County evaporation:</b>									
	Kansas Bostwick Diversions During Irrigation Season (actual, or 3-year average)	30,156	29,253	35,504	44,732	26,097	59,938	32,966	40,605	32,381
	Nebraska Bostwick Diversions During Irrigation Season (actual or 3-year average)	0	22,915	32,248	21,973	26,884	44,974	24,430	0	23,298

# **TABLE 1**

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2007 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	43,570	43,570	9,760	0	10,720	23,090	17,820	0	3,610
Arikaree	2,680	2,680	2,100	140	450	(10)	1,140	120	110
Buffalo	5,840	5,840	0	0	1,930	3,910	340	0	3,490
Rock	8,860	8,860	0	0	3,540	5,320	70	0	4,030
South Fork	20,870	22,610	10,040	9,090	320	3,160	15,210	5,670	1,060
Frenchman	132,260	126,460	0	0	67,780	58,680	60	0	81,490
Driftwood	5,680	5,680	0	390	930	4,360	0	10	1,360
Red Willow	30,080	18,180	0	0	3,490	14,690	0	0	9,640
Medicine	72,060	61,660	0	0	5,610	56,050	0	0	20,330
Beaver	11,600	11,600	2,320	4,500	4,710	70	0	5,450	4,920
Sappa	5,290	5,290	0	2,170	2,170	950	0	220	1,850
Prairie Dog	16,070	14,470	0	6,610	1,100	6,760	0	9,010	80
Main Stem	250,640	102,640	0	52,450	50,190	0	(2,060)	40,150	94,410
Total All Basins	605,500	429,540	24,220	75,350	152,940	177,030	32,580	60,630	226,380
Main Stem Including Unallocated		279,670	0	142,910	136,760				
Total	605,500	429,540	24,220	165,810	239,510	0	32,580	60,630	226,380

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2008 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	43,250	43,250	9,690	0	10,640	22,920	15,680	0	3,930
Arikaree	3,340	3,340	2,620	170	560	(10)	1,540	110	120
Buffalo	6,070	6,070	0	0	2,000	4,070	350	0	3,530
Rock	9,090	9,090	0	0	3,640	5,450	80	0	4,160
South Fork	26,040	24,880	11,050	10,000	350	3,480	16,530	5,930	1,020
Frenchman	113,860	115,360	0	0	61,830	53,530	370	0	81,820
Driftwood	3,830	3,830	0	260	630	2,940	0	10	1,290
Red Willow	28,290	26,790	0	0	5,140	21,650	0	0	9,660
Medicine	74,780	75,780	0	0	6,900	68,880	0	0	19,560
Beaver	15,380	15,380	3,080	5,970	6,240	90	0	7,690	6,570
Sappa	13,100	13,100	0	5,380	5,380	2,340	0	3,030	3,460
Prairie Dog	29,660	23,060	0	10,540	1,750	10,770	0	15,410	170
Main Stem	305,520	234,820	0	119,990	114,830	0	(2,490)	20,060	114,440
Total All Basins	672,210	594,750	26,440	152,310	219,890	196,110	32,060	52,240	249,730
Main Stem Including Unallocated		430,930	0	220,200	210,730				
Total	672,210	594,750	26,440	252,520	315,790	0	32,060	52,240	249,730

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2009 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	45,600	45,600	10,210	0	11,220	24,170	16,050	0	3,470
Arikaree	5,100	5,100	4,000	260	860	(20)	4,010	160	150
Buffalo	6,170	6,170	0	0	2,040	4,130	370	0	3,450
Rock	9,310	9,310	0	0	3,720	5,590	80	0	4,310
South Fork	34,500	33,660	14,950	13,530	470	4,710	16,100	7,860	1,300
Frenchman	118,670	118,410	0	0	63,470	54,940	2,920	0	85,920
Driftwood	(1,480)	(1,480)	0	(100)	(240)	(1,140)	0	10	1,210
Red Willow	22,700	42,840	0	0	8,230	34,610	0	0	10,070
Medicine	46,600	46,170	0	0	4,200	41,970	0	0	19,190
Beaver	15,510	15,510	3,100	6,020	6,300	90	0	8,000	6,360
Sappa	18,510	18,510	0	7,610	7,610	3,290	0	4,570	4,510
Prairie Dog	20,630	19,540	0	8,930	1,490	9,120	0	12,640	170
Main Stem	145,410	141,140	0	72,120	69,020	0	(1,550)	24,290	128,890
Total All Basins	487,230	500,480	32,260	108,370	178,390	181,460	37,980	57,530	269,000
Main Stem Including Unallocated		322,600	0	164,850	157,750				
Total	487,230	500,480	32,260	201,100	267,120	0	37,980	57,530	269,000

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2010 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	42,230	42,230	9,460	0	10,390	22,380	15,800	0	4,000
Arikaree	4,030	4,030	3,160	210	680	(20)	1,490	110	70
Buffalo	6,300	6,300	0	0	2,080	4,220	390	0	3,540
Rock	9,800	9,800	0	0	3,920	5,880	90	0	4,460
South Fork	31,640	31,190	13,850	12,540	440	4,360	14,780	3,020	630
Frenchman	125,210	124,130	0	0	66,530	57,600	3,030	0	85,190
Driftwood	1,680	1,680	0	120	280	1,280	0	10	1,140
Red Willow	34,320	34,640	0	0	6,650	27,990	0	0	8,950
Medicine	56,410	56,100	0	0	5,110	50,990	0	0	19,210
Beaver	14,470	14,470	2,890	5,610	5,870	100	0	7,490	5,540
Sappa	27,910	27,910	0	11,470	11,470	4,970	0	3,940	3,710
Prairie Dog	40,670	37,460	0	17,120	2,850	17,490	0	11,730	50
Main Stem	295,960	291,050	0	148,730	142,320	0	(2,700)	30,120	121,670
Total All Basins	690,630	680,990	29,360	195,800	258,590	197,240	32,880	56,420	258,160
Main Stem Including Unallocated		488,290	0	249,520	238,770				
Total	690,630	680,990	29,360	296,590	355,040	0	32,880	56,420	258,160



**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2011 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	41,590	41,590	9,320	0	10,230	22,040	16,040	0	3,900
Arikaree	3,190	3,190	2,500	160	540	(10)	1,860	170	90
Buffalo	5,980	5,980	0	0	1,970	4,010	400	0	3,610
Rock	9,000	9,000	0	0	3,600	5,400	90	0	4,560
South Fork	20,890	32,250	14,320	12,960	450	4,520	15,230	6,160	940
Frenchman	121,800	121,040	0	0	64,880	56,160	2,550	0	85,280
Driftwood	290	290	0	20	50	220	0	10	1,080
Red Willow	27,750	27,780	0	0	5,330	22,450	0	0	8,560
Medicine	47,810	48,650	0	0	4,430	44,220	0	0	18,890
Beaver	12,880	12,880	2,580	5,000	5,230	70	0	6,950	5,030
Sappa	21,010	21,010	0	8,640	8,640	3,730	0	3,310	3,060
Prairie Dog	29,550	26,950	0	12,320	2,050	12,580	0	11,060	90
Main Stem	270,580	265,770	0	135,810	129,960	0	(2,310)	22,330	129,430
Total All Basins	612,320	616,380	28,720	174,910	237,360	175,390	33,860	49,990	264,520
Main Stem Including Unallocated		441,160	0	225,430	215,730				
Total	612,320	616,380	28,720	264,530	323,130	0	33,860	49,990	264,520

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2012 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	37,420	37,420	8,380	0	9,210	19,830	15,890	0	4,700
Arikaree	2,310	2,310	1,810	120	390	(10)	1,620	120	80
Buffalo	5,140	5,140	0	0	1,700	3,440	420	0	3,670
Rock	8,870	8,870	0	0	3,550	5,320	100	0	4,600
South Fork	19,210	19,310	8,570	7,760	270	2,710	9,490	2,570	810
Frenchman	96,140	98,520	0	0	52,810	45,710	1,490	0	79,490
Driftwood	330	330	0	20	50	260	0	20	1,070
Red Willow	17,700	17,600	0	0	3,380	14,220	0	0	7,070
Medicine	38,400	51,560	0	0	4,690	46,870	0	0	18,400
Beaver	9,290	9,290	1,860	3,600	3,770	60	0	5,260	3,570
Sappa	10,910	10,910	0	4,480	4,480	1,950	0	1,320	2,420
Prairie Dog	9,210	15,950	0	7,290	1,210	7,450	0	10,880	180
Main Stem	65,660	221,940	0	113,410	108,530	0	(6,710)	46,640	124,050
Total All Basins	320,590	499,150	20,620	136,680	194,040	147,810	22,300	66,810	250,110
Main Stem Including Unallocated		369,750	0	188,940	180,810				
Total	320,590	499,150	20,620	212,210	266,320	0	22,300	66,810	250,110

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2013 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	39,360	39,360	8,820	0	9,680	20,860	16,030	0	3,360
Arikaree	930	930	730	50	160	(10)	500	210	130
Buffalo	5,300	5,300	0	0	1,750	3,550	430	0	3,600
Rock	8,610	8,610	0	0	3,440	5,170	100	0	4,550
South Fork	18,030	18,030	8,010	7,250	250	2,520	12,370	5,190	470
Frenchman	104,960	106,760	0	0	57,220	49,540	1,130	0	83,340
Driftwood	740	740	0	50	120	570	0	10	1,060
Red Willow	16,530	15,670	0	0	3,010	12,660	0	0	7,870
Medicine	39,620	39,180	0	0	3,570	35,610	0	0	20,300
Beaver	5,630	5,630	1,130	2,180	2,290	30	0	3,300	2,110
Sappa	1,770	1,770	0	730	730	310	0	(360)	1,050
Prairie Dog	4,760	8,720	0	3,990	660	4,070	0	6,120	40
Main Stem	30,090	105,610	0	53,970	51,640	0	(1,920)	46,450	88,970
Total All Basins	276,330	356,310	18,690	68,220	134,520	134,880	28,640	60,920	216,850
Main Stem Including Unallocated		240,490	0	122,890	117,600				
Total	276,330	356,310	18,690	137,140	200,480	0	28,640	60,920	216,850

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2014 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	40,030	40,030	8,970	0	9,850	21,210	16,570	0	2,960
Arikaree	1,530	1,530	1,200	80	260	(10)	1,160	240	130
Buffalo	5,590	5,590	0	0	1,840	3,750	450	0	3,680
Rock	8,480	8,480	0	0	3,390	5,090	110	0	4,680
South Fork	23,600	23,600	10,480	9,490	330	3,300	14,020	8,550	1,030
Frenchman	110,900	115,070	0	0	61,680	53,390	950	0	83,100
Driftwood	860	860	0	60	140	660	0	10	1,020
Red Willow	18,730	17,550	0	0	3,370	14,180	0	0	8,790
Medicine	27,680	10,080	0	0	920	9,160	0	0	20,990
Beaver	6,260	6,260	1,250	2,430	2,540	40	0	3,700	2,150
Sappa	1,520	1,520	0	620	620	280	0	(810)	1,060
Prairie Dog	3,220	6,050	0	2,760	460	2,830	0	4,690	40
Main Stem	80,140	57,010	0	29,130	27,880	0	(1,160)	43,680	76,380
Total All Basins	328,540	293,630	21,900	44,570	113,280	113,880	32,100	60,060	206,010
Main Stem Including Unallocated		170,890	0	87,320	83,570				
Total	328,540	293,630	21,900	102,760	168,970	0	32,100	60,060	206,010

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2015 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	38,870	38,870	8,710	0	9,560	20,600	16,950	0	3,320
Arikaree	3,290	3,290	2,580	170	550	(10)	2,850	190	110
Buffalo	5,920	5,920	0	0	1,950	3,970	470	0	3,830
Rock	9,540	9,540	0	0	3,820	5,720	110	0	4,880
South Fork	25,540	25,540	11,340	10,270	360	3,570	14,270	5,530	920
Frenchman	107,630	106,600	0	0	57,140	49,460	1,780	0	84,350
Driftwood	1,120	1,120	0	80	180	860	0	10	980
Red Willow	17,970	13,230	0	0	2,540	10,690	0	0	8,570
Medicine	38,410	42,620	0	0	3,880	38,740	0	0	20,280
Beaver	10,640	10,640	2,130	4,130	4,320	60	0	6,010	3,980
Sappa	4,890	4,890	0	2,010	2,010	870	0	430	1,440
Prairie Dog	7,750	8,000	0	3,660	610	3,730	0	6,560	50
Main Stem	167,920	141,780	0	72,450	69,330	0	(2,650)	32,160	110,820
Total All Basins	439,490	412,040	24,760	92,770	156,250	138,260	33,780	50,890	243,530
Main Stem Including Unallocated		280,040	0	143,100	136,940				
Total	439,490	412,040	24,760	163,420	223,860	0	33,780	50,890	243,530

## **TABLE 2**

**Table 2: Original Compact Virgin Water Supply and Allocations**

Basin	Virgin Water Supply	Colorado Allocation	% of Basin Supply	Kansas Allocation	% of Basin Supply	Nebraska Allocation	% of Basin Supply	Unallocated	% of Basin Supply
North Fork	44,700	10,000	22.4%			11,000	24.6%	23,700	53.0%
Arikaree	19,610	15,400	78.5%	1,000	5.1%	3,300	16.8%	(90)	-0.4%
Buffalo	7,890					2,600	33.0%	5,290	67.0%
Rock	11,000					4,400	40.0%	6,600	60.0%
South Fork	57,200	25,400	44.4%	23,000	40.2%	800	1.4%	8,000	14.0%
Frenchman	98,500					52,800	53.6%	45,700	46.4%
Driftwood	7,300			500	6.9%	1,200	16.4%	5,600	76.7%
Red Willow	21,900					4,200	19.2%	17,700	80.8%
Medicine	50,800					4,600	9.1%	46,200	90.9%
Beaver	16,500	3,300	20.0%	6,400	38.8%	6,700	40.6%	100	0.6%
Sappa	21,400			8,800	41.1%	8,800	41.1%	3,800	17.8%
Prairie Dog	27,600			12,600	45.7%	2,100	7.6%	12,900	46.7%
Tributaries Sub-Total	384,000							175,500	
Main Stem	94,500								
Main Stem + Unallocated	270,000			138,000	51.1%	132,000	48.9%		
Total	478,900	54,100		190,300		234,500			

# **TABLE 3A**

**Table 3A: Table to Be Used to Calculate Colorado's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance for Averaging Periods with No Water Short Year Designations Pursuant to Section III.J.**

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and CORWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit Col 1 – (Col 2- Col 3)
2003	21,420	33,470	N/A	(12,050)
2004	21,540	33,670	N/A	(12,130)
2005	25,040	35,460	N/A	(10,420)
2006	21,090	30,760	N/A	(9,670)
2007	24,220	32,580	0	(8,360)
2008	26,440	32,060	0	(5,620)
2009	32,260	37,980	0	(5,720)
2010	29,360	32,880	0	(3,520)
2011	28,720	33,860	0	(5,140)
2012	20,620	22,300	0	(1,680)
2013	18,690	28,640	0	(9,950)
2014	21,900	32,100	7,448	(2,752)
2015	24,760	33,780	10,760	1,740
Avg 2003-2007	22,660	33,190	N/A	(10,530)
Avg 2004-2008	23,670	32,910	N/A	(9,240)
Avg 2005-2009	25,810	33,770	N/A	(7,960)
Avg 2006-2010	26,670	33,250	N/A	(6,580)
Avg 2007-2011	28,200	33,870	0	(5,670)
Avg 2008-2012	27,480	31,820	0	(4,340)
Avg 2009-2013	25,930	31,130	0	(5,200)
Avg 2010-2014	23,860	29,960	1,490	(4,610)
Avg 2011-2015	22,940	30,140	3,640	(3,560)

## **TABLE 3B**



**Table 3B: Table to Be Used to Calculate Kansas's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance**

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Col 1 – (Col 2- Col 3)
2003	167,780	48,910	N/A	118,870
2004	137,450	38,120	N/A	99,330
2005	136,820	44,310	N/A	92,510
2006	124,520	47,910	N/A	76,610
2007	165,810	60,630	N/A	105,180
2008	252,520	52,240	N/A	200,280
2009	201,100	57,530	N/A	143,570
2010	296,590	56,420	N/A	240,170
2011	264,530	49,990	N/A	214,540
2012	212,210	66,810	N/A	145,400
2013	137,140	60,920	N/A	76,220
2014	102,760	60,060	N/A	42,700
2015	163,420	50,890	N/A	112,530
Avg 2003-2007	146,480	47,980	N/A	98,500
Avg 2004-2008	163,420	48,640	N/A	114,780
Avg 2005-2009	176,150	52,520	N/A	123,630
Avg 2006-2010	208,110	54,950	N/A	153,160
Avg 2007-2011	236,110	55,360	N/A	180,750
Avg 2008-2012	245,390	56,600	N/A	188,790
Avg 2009-2013	222,310	58,330	N/A	163,980
Avg 2010-2014	202,650	58,840	N/A	143,810
Avg 2011-2015	176,010	57,730	N/A	118,280

## **TABLE 3C**

**Table 3C: Table to Be Used to Calculate Nebraska's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance**

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and NERWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and NERWS Credit Col 1 – (Col 2- Col 3)
2003	227,580	262,780	9,780	(25,420)
2004	205,630	252,650	10,380	(36,640)
2005	199,450	253,740	11,965	(42,325)
2006	187,060	236,150	12,214	(28,785)
2007	239,510	226,380	21,933	35,063
2008	315,790	249,730	26,050	92,110
2009	267,120	269,000	22,743	20,863
2010	355,040	258,160	24,766	121,646
2011	323,130	264,520	23,452	82,062
2012	266,320	250,110	14,765	30,975
2013	200,480	216,850	28,229	11,859
2014	168,970	206,010	75,136	38,096
2015	223,860	243,530	36,171	16,501
Avg 2003-2007	211,850	246,340	13,250	(19,620)
Avg 2004-2008	229,490	243,730	16,510	3,880
Avg 2005-2009	241,790	247,000	18,980	15,390
Avg 2006-2010	272,900	247,880	21,540	48,180
Avg 2007-2011	300,120	253,560	23,790	70,350
Avg 2008-2012	305,480	258,300	22,360	69,530
Avg 2009-2013	282,420	251,730	22,790	53,480
Avg 2010-2014	262,790	239,130	33,270	56,930
Avg 2011-2015	236,550	236,200	35,550	35,900

# **TABLE 4A**

**Table 4A: Colorado Compliance with the Sub-basin Non-impairment Requirement**

**Table 4A is left unpopulated pursuant to the August 24, 2016 "RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING OPERATION AND ACCOUNTING FOR THE COLORADO COMPACT COMPLIANCE PIPELINE AND COLORADO'S COMPLIANCE EFFORTS IN THE SOUTH FORK REPUBLICAN RIVER BASIN", paragraph E.**

**2007**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin	Unallocated Supply	Credits from	Total Available	Colorado	Difference Between
North Fork						
Arikaree						
South Fork						
Beaver						

**2008**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

**2009**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

**2010**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

**2011**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

**Table 4A: Colorado Compliance with the Sub-basin Non-impairment Requirement**

**Table 4A is left unpopulated pursuant to the August 24, 2016 "RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING OPERATION AND ACCOUNTING FOR THE COLORADO COMPACT COMPLIANCE PIPELINE AND COLORADO'S COMPLIANCE EFFORTS IN THE SOUTH FORK REPUBLICAN RIVER BASIN", paragraph E.**

**2012**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

**2013**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

**2014**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

**2015**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

## **TABLE 4B**

**Table 4B: Kansas's Sub-Basin Non-impairment Compliance 2007**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	104	(10)	840	N/A	934	134	800
South Fork	9,530	3,316	0	N/A	12,846	5,874	6,972
Driftwood	240	2,674	0	N/A	2,914	8	2,906
Beaver	2,048	32	1,054	N/A	3,134	2,206	928
Sappa	418	184	0	N/A	602	(512)	1,114
Prairie Dog	4,258	4,358	0	N/A	8,616	7,262	1,354

**2008**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	118	(10)	804	N/A	912	136	776
South Fork	9,622	3,348	0	N/A	12,970	5,984	6,986
Driftwood	258	2,880	0	N/A	3,138	10	3,128
Beaver	3,142	48	1,618	N/A	4,808	3,686	1,122
Sappa	1,478	646	0	N/A	2,124	146	1,978
Prairie Dog	5,664	5,792	0	N/A	11,456	9,024	2,432

**2009**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	156	(12)	674	N/A	818	136	682
South Fork	10,392	3,616	0	N/A	14,008	6,340	7,668
Driftwood	200	2,236	0	N/A	2,436	10	2,426
Beaver	4,204	64	2,166	N/A	6,434	5,214	1,220
Sappa	2,952	1,282	0	N/A	4,234	1,042	3,192
Prairie Dog	7,016	7,172	0	N/A	14,188	10,632	3,556

**2010**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Kansas' Share of Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	174	(14)	798	N/A	958	126	832
South Fork	10,684	3,718	0	N/A	14,402	5,440	8,962
Driftwood	178	1,970	0	N/A	2,148	10	2,138
Beaver	4,972	78	2,562	N/A	7,612	6,380	1,232
Sappa	5,272	2,286	0	N/A	7,558	2,066	5,492
Prairie Dog	9,378	9,584	0	N/A	18,962	11,342	7,620

**2011**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	188	(14)	870	N/A	1,044	134	910
South Fork	11,624	4,046	0	N/A	15,670	5,728	9,942
Driftwood	138	1,532	0	N/A	1,670	10	1,660
Beaver	5,420	84	2,794	N/A	8,298	7,116	1,182
Sappa	7,054	3,056	0	N/A	10,110	3,014	7,096
Prairie Dog	11,104	11,344	0	N/A	22,448	11,970	10,478



**Table 4B: Kansas's Sub-Basin Non-impairment Compliance****2012**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	184	(14)	716	N/A	886	134	752
South Fork	11,358	3,956	0	N/A	15,314	5,108	10,206
Driftwood	64	712	0	N/A	776	12	764
Beaver	5,240	82	2,702	N/A	8,024	7,078	946
Sappa	7,516	3,256	0	N/A	10,772	3,234	7,538
Prairie Dog	11,240	11,482	0	N/A	22,722	12,344	10,378

**2013**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	160	(14)	546	N/A	692	154	538
South Fork	10,808	3,764	0	N/A	14,572	4,960	9,612
Driftwood	22	238	0	N/A	260	12	248
Beaver	4,482	70	2,312	N/A	6,864	6,200	664
Sappa	6,586	2,850	0	N/A	9,436	2,556	6,880
Prairie Dog	9,930	10,142	0	N/A	20,072	10,486	9,586

**2014**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	124	(12)	554	N/A	666	170	496
South Fork	10,000	3,482	0	N/A	13,482	5,098	8,384
Driftwood	54	598	0	N/A	652	12	640
Beaver	3,764	60	1,942	N/A	5,766	5,340	426
Sappa	5,188	2,248	0	N/A	7,436	1,480	5,956
Prairie Dog	8,696	8,884	0	N/A	17,580	8,896	8,684

**2015**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	116	(10)	220	N/A	326	186	140
South Fork	9,546	3,324	0	N/A	12,870	5,600	7,270
Driftwood	46	514	0	N/A	560	12	548
Beaver	3,468	52	1,790	N/A	5,310	5,044	266
Sappa	3,296	1,428	0	N/A	4,724	778	3,946
Prairie Dog	6,004	6,132	0	N/A	12,136	7,862	4,274

**TABLE 5A  
and  
TABLE 5F**

**Table 5A: Colorado's Compliance During Water-Short Year Administration**

Year	Col. 1 Is the year Water Short Pursuant to III.J? (Yes or No)	Col. 2 Statewide Allocation	Col. 3 Beaver Creek Reduction Pursuant to Table 5F	Col. 4 Allocation - Beaver Creek Reduction (Col. 2 - Col.3)	Col. 5 Computed Beneficial Consumptive (excluding the Beaver Creek Sub-basin)	Col. 6 Imported Water Supply Credit - IWS Beaver Creek + CORWS Credit	Col. 7 Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit (Col. 4 - Col. 5 + Col. 6)
2003	Yes	21,420	260	21,160	33,470	0	(12,310)
2004	Yes	21,540	360	21,180	33,670	0	(12,490)
2005	Yes	25,040	910	24,130	35,460	0	(11,330)
2006	Yes	21,090	1,420	19,670	30,760	0	(11,090)
2007	Yes	24,220	744	23,476	32,580	0	(9,104)
2008	No	26,440	0	26,440	32,060	0	(5,620)
2009	No	32,260	0	32,260	37,980	0	(5,720)
2010	No	29,360	0	29,360	32,880	0	(3,520)
2011	No	28,720	0	28,720	33,860	0	(5,140)
2012	No	20,620	0	20,620	22,300	0	(1,680)
2013	Yes	18,690	1,054	17,636	28,640	0	(11,004)
2014	Yes	21,900	1,228	20,672	32,100	7,448	(3,980)
2015	Yes	24,760	1,406	23,354	33,780	10,760	334
Avg 2003-2007	Yes	22,660	740	21,920	33,190	0	(11,260)
Avg 2004-2008	Yes	23,670	690	22,980	32,910	0	(9,930)
Avg 2005-2009	Yes	25,810	610	25,200	33,770	0	(8,570)
Avg 2006-2010	Yes	26,670	430	26,240	33,250	0	(7,010)
Avg 2007-2011	Yes	28,200	150	28,050	33,870	0	(5,820)
Avg 2008-2012	No	27,480	0	27,480	31,820	0	(4,340)
Avg 2009-2013	Yes	25,930	210	25,720	31,130	0	(5,410)
Avg 2010-2014	Yes	23,860	460	23,400	29,960	1,490	(5,060)
Avg 2011-2015	Yes	22,940	740	22,200	30,140	3,640	(4,290)

**Table 5F: Colorado's Beaver Creek Reduction During Water-Short Years**

Water Short Year (WSY) Pursuant to III.J	Beaver Creek Allocation	Reduction = Average of last five WSY Beaver Creek Allocations
	Col. 1	Col. 2
2002	770	N/A
2003	260	N/A
2004	360	N/A
2005	910	N/A
2006	1,420	N/A
2007	2,320	744
2013	1,130	1,054
2014	1,250	1,228
2015		1,406

## **TABLE 5B**

**Table 5B: Kansas's Compliance During Water-Short Year Administration  
Kansas**

Year	Allocation				Computed Beneficial Consumptive Use	Imported Water Supply Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
Column	1	2	3	4	5	6	7
	Sum Sub-basins	Kansas' Share of Unallocated Supply	Kansas' Share of the Unused Colorado Allocation	Total Col 1 + Col 2 + Col 3			Col 4 - (Col 5 - Col 6)
2006	14,750	4,589	869	20,207	14,630	N/A	5,577
2007	22,900	7,813	1,676	32,389	20,480	N/A	11,909
2008	32,320	10,021	2,126	44,466	32,180	N/A	12,286
2009	36,250	8,202	1,584	46,036	33,240	N/A	12,796
2010	47,070	14,400	2,330	63,800	26,300	N/A	37,500
2011	39,100	10,787	1,645	51,533	27,660	N/A	23,873
2012	23,270	6,347	1,048	30,664	20,170	N/A	10,494
2013	14,250	3,827	695	18,772	14,470	N/A	4,302
2014	15,440	3,628	659	19,727	16,380	N/A	3,347
2015	20,320	4,640	1,088	26,048	18,730	N/A	7,318
Avg 2006-2007	18,825	6,201	1,272	26,298	17,555	N/A	8,743
Avg 2007-2008	27,610	8,917	1,901	38,428	26,330	N/A	12,098
Avg 2008-2009	34,285	9,111	1,855	45,251	32,710	N/A	12,541
Avg 2009-2010	41,660	11,301	1,957	54,918	29,770	N/A	25,148
Avg 2010-2011	43,085	12,594	1,988	57,666	26,980	N/A	30,686
Avg 2011-2012	31,185	8,567	1,346	41,098	23,915	N/A	17,183
Avg 2012-2013	18,760	5,087	871	24,718	17,320	N/A	7,398
Avg 2013-2014	14,845	3,728	677	19,250	15,425	N/A	3,825
Avg 2014-2015	17,880	4,134	874	22,888	17,555	N/A	5,333

## **TABLE 5C**

**Table 5C: Nebraska's Compliance During Water-Short Year Administration**

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water Supply Credit and NERWS Credit	Difference Between Allocation and Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Above Guide Rock and NERWS Credit
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Share of Unused Colorado Allocation	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2006	187,060	2,290	184,770	0	236,150	3,064	233,086	12,214	(28,010)
2007	239,510	16,530	222,980	1,604	226,380	3,368	223,013	21,939	23,510
2008	315,790	17,792	297,998	2,034	249,730	2,620	247,110	26,056	78,978
2009	267,120	8,373	258,747	1,516	269,000	2,796	266,204	22,765	16,824
2010	355,040	23,471	331,569	2,230	258,160	2,936	255,225	24,768	103,342
2011	323,130	26,466	296,664	1,575	264,520	2,828	261,692	23,475	60,022
2012	266,320	5,988	260,332	1,002	250,110	3,558	246,552	14,786	29,569
2013	200,480	7,264	193,216	665	216,850	3,000	213,851	28,252	8,282
2014	168,970	6,305	162,665	631	206,010	2,335	203,675	75,161	34,782
2015	223,860	33,485	190,375	1,042	243,530	2,941	240,590	36,195	(12,977)
Avg 2006-2007	213,290	9,410	203,880	800	231,270	3,220	228,050	17,080	(2,250)
Avg 2007-2008	277,650	17,160	260,490	1,820	238,060	2,990	235,060	24,000	51,240
Avg 2008-2009	291,460	13,080	278,370	1,780	259,370	2,710	256,660	24,410	47,900
Avg 2009-2010	311,080	15,920	295,160	1,870	263,580	2,870	260,710	23,770	60,080
Avg 2010-2011	339,090	24,970	314,120	1,900	261,340	2,880	258,460	24,120	81,680
Avg 2011-2012	294,730	16,230	278,500	1,290	257,320	3,190	254,120	19,130	44,800
Avg 2012-2013	233,400	6,630	226,770	830	233,480	3,280	230,200	21,520	18,930
Avg 2013-2014	184,730	6,780	177,940	650	211,430	2,670	208,760	51,710	21,530
Avg 2014-2015	196,420	19,890	176,520	840	224,770	2,640	222,130	55,680	10,900

## **TABLE 5D**



**Table 5D: Nebraska's Compliance Under a Alternative Water-Short Year Administration Plan**

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water	Difference Between Allocation
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Share of Unused Colorado Allocation	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2005	199,450	4,586	194,864	0	253,740	4,052	249,689	11,965	(42,860)
2006	187,060	2,290	184,770	0	236,150	3,064	233,086	12,214	(28,010)
2007	239,510	16,530	222,980	1,604	226,380	3,368	223,013	21,939	23,510
2008	315,790	17,792	297,998	2,034	249,730	2,620	247,110	26,056	78,978
2009	267,120	8,373	258,747	1,516	269,000	2,796	266,204	22,765	16,824
2010	355,040	23,471	331,569	2,230	258,160	2,936	255,225	24,768	103,342
2011	323,130	26,466	296,664	1,575	264,520	2,828	261,692	23,475	60,022
2012	266,320	5,988	260,332	1,002	250,110	3,558	246,552	14,786	29,569
2013	200,480	7,264	193,216	665	216,850	3,000	213,851	28,252	8,282
2014	168,970	6,305	162,665	631	206,010	2,335	203,675	75,161	34,782
2015	223,860	33,485	190,375	1,042	243,530	2,941	240,590	36,195	(12,977)
Avg 2005-2007	208,670	7,800	200,870	530	238,760	3,490	235,260	15,370	(15,790)
Avg 2006-2008	247,450	12,200	235,250	1,210	237,420	3,020	234,400	20,070	24,830
Avg 2007-2009	274,140	14,230	259,910	1,720	248,370	2,930	245,440	23,590	39,770
Avg 2008-2010	312,650	16,550	296,100	1,930	258,960	2,780	256,180	24,530	66,380
Avg 2010-2011	315,100	19,440	295,660	1,770	263,890	2,850	261,040	23,670	60,060
Avg 2010-2012	314,830	18,640	296,190	1,600	257,600	3,110	254,490	21,010	64,310
Avg 2011-2013	263,310	13,240	250,070	1,080	243,830	3,130	240,700	22,170	32,620
Avg 2012-2014	211,920	6,520	205,400	770	224,320	2,960	221,360	39,400	24,210
Avg 2013-2015	197,770	15,680	182,090	780	222,130	2,760	219,370	46,540	10,030

## **TABLE 5E**

**Table 5E: Nebraska's Tributary Compliance During Water-Short Year Administration**

Year	Allocation			Computed Beneficial Consumptive Use	Imported Water Supply Credit and AWS	Allocation - (CBCU - IWS-AWS)
	Sub-Basin Total	Share of Unallocated Supply	Total			
2006	82,030	67,022	149,052	126,760	9,450	31,742
2007	102,750	86,568	189,318	131,970	10,625	67,973
2008	105,060	95,898	200,958	135,290	10,557	76,225
2009	109,370	88,734	198,104	140,110	10,709	68,703
2010	116,270	96,450	212,720	136,490	10,844	87,074
2011	107,400	85,766	193,166	135,090	10,593	68,669
2012	85,510	72,279	157,789	126,060	8,903	40,632
2013	82,880	65,956	148,836	127,880	25,828	46,784
2014	85,400	55,687	141,087	129,630	72,955	84,412
2015	86,920	67,609	154,529	132,710	29,223	51,042
Avg 2006-2007	92,390	76,795	169,185	129,365	10,038	49,857
Avg 2007-2008	103,905	91,233	195,138	133,630	10,591	72,099
Avg 2008-2009	107,215	92,316	199,531	137,700	10,633	72,464
Avg 2009-2010	112,820	92,592	205,412	138,300	10,777	77,889
Avg 2010-2011	111,835	91,108	202,943	135,790	10,719	77,872
Avg 2011-2012	96,455	79,022	175,477	130,575	9,748	54,650
Avg 2012-2013	84,195	69,118	153,313	126,970	17,366	43,708
Avg 2013-2014	84,140	60,822	144,962	128,755	49,392	65,598
Avg 2014-2015	86,160	61,648	147,808	131,170	51,089	67,727

# **ATTACHMENT 1**

## Attachment 1: Sub-basin Flood Flow Thresholds

Sub-basin	Sub-basin Flood Flow Threshold Acre-feet per Year <sup>3</sup>
Arikaree River	16,400
North Fork of Republican River	33,900
Buffalo Creek	9,800
Rock Creek	9,800
South Fork of Republican River	30,400
Frenchman Creek	51,900
Driftwood Creek	9,400
Red Willow Creek	15,100
Medicine Creek	55,100
Beaver Creek	13,900
Sappa Creek	26,900
Prairie Dog	15,700

<sup>3</sup> Flows considered to be Flood Flows are flows in excess of the 94% flow based on a flood frequency analysis for the years 1971-2000. The Gaged Flows are measured after depletions by Beneficial Consumptive Use and change in reservoir storage.

# **ATTACHMENT 6**

Attachment 6: Computing Water Supplies and Consumptive Use Above Guide Rock

Year	Total Mainstem CWS	Hardy Gage	Superior Courtland Diversion Dam	Courtland Canal Diversions	Superior Canal Diversion	Courtland Canal Returns	Superior Canal Returns	Total Bostwick Returns Below Guide Rock	NE CBCU Below Guide Rock	KS CBCU Below Ruide Rock	Total CBCU Below Guide Rock	Gain Guide Rock to Hardy	VWS Guide Rock to Hardy	Mainstem VWS Above Guide Rock	NE MS Allocation Above Guide Rock	KS MS Allocation Above Guide Rock	Nebraska Guide Rock to Hardy Allocation	Kansas Guide Rock to Hardy Allocation
2006	77,740	14,089	2,711	50,631	0	10,547	0	10,547	3,064	787	3,851	831	4,682	73,058	35,725	37,333	2,290	2,393
2007	102,640	100,257	61,470	65,851	0	8,808	0	8,808	3,368	458	3,825	29,979	33,804	68,836	33,661	35,175	16,530	17,274
2008	234,820	272,571	229,144	32,224	5,666	5,893	4,148	10,041	2,620	379	2,999	33,386	36,384	198,436	97,035	101,401	17,792	18,592
2009	141,140	130,578	105,400	51,647	6,336	7,562	3,859	11,421	2,796	570	3,366	13,757	17,123	124,017	60,645	63,373	8,373	8,750
2010	291,050	340,610	284,800	47,290	6,489	7,483	3,972	11,455	2,936	708	3,644	44,355	47,998	243,052	118,852	124,200	23,471	24,527
2011	265,770	274,226	214,462	35,907	7,070	4,112	4,798	8,910	2,828	440	3,268	50,854	54,122	211,648	103,496	108,152	26,466	27,657
2012	221,940	139,460	116,248	74,730	9,744	9,526	5,785	15,311	3,558	786	4,344	7,901	12,245	209,695	102,541	107,154	5,988	6,257
2013	105,610	44,745	24,835	70,402	6,161	5,048	3,679	8,727	3,000	673	3,673	11,183	14,855	90,755	44,379	46,376	7,264	7,591
2014	57,010	50,362	35,041	59,654	0	5,278	0	5,278	2,335	515	2,850	10,043	12,893	44,117	21,573	22,544	6,305	6,588
2015	141,780	104,931	29,772	57,452	6,571	5,792	4,414	10,206	2,941	582	3,523	64,953	68,476	73,304	35,846	37,459	33,485	34,991

COURTLAND CANAL										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Return Flow From Courtland Canal To Republican River Above Lovewell From Kansas	577	842	379	640	581	469	955	975	813	764
Return Flow From Courtland Canal To Republican River Above Hardy From Nebraska	9,970	7,966	5,514	6,922	6,902	3,643	8,572	4,073	4,465	5,027
Courtland Canal Diversions At Headgate	50631	65,851	32,224	51,647	47,290	35,907	74,730	70,402	59,654	57,452
Courtland Canal At Kansas-Nebraska State Line	38473	56,136	25,297	42,692	38,736	31,250	63,637	65,021	54,209	50,960
NE Courtland Canal CBCU (includes transportation loss)	0	0	203	514	137	214	640	414	0	361
Superior Canal CBCU	0	0	1,518	2,477	2,517	2,272	3,959	2,482	0	2,157

NEBRASKA										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	697	358	244	456	350	496	1,271	850	476	786
SW Diversions - M&I - Nebraska - Below Guide Rock	0	0	0	0	0	0	0	0	0	0
SW Non-Federal Reservoir Evaporation - Below Guide Rock	122	163	147	209	180	244	299	50	67	14
SW Return - Irrigation	174.25	90	61	114	88	124	318	213	119	197
SW Return - M&I	0	0	0	0	0	0	0	0	0	0
GW CBCU Nebraska Below Guide Rock	2419	2,936	2,290	2,245	2,493	2,212	2,306	2,312	1,911	2,337

KANSAS										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
SW CBCU - Irrigation - Small Pumps	582	389	337	516	654	404	712	582	484	554
SW CBCU - M&I	0	0	0	0	0	0	0	0	0	0
GW CBCU Kansas Below Guide Rock	205	69	42	54	54	36	74	91	31	28

# **ATTACHMENT 7**



Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals

2007	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion	
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2	
2 Irrigation Season												
2 Non-Irrigation Season												
Culbertson	0	0	0	0	0	30%	0	0	82%	0	100.0%	
Culbertson Extension	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Meeker - Driftwood	0	0	0	0	0	30%	0	0	82%	0	100.0%	
Red Willow	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Bartley	0	0	0	0	0	30%	0	0	82%	0	100.0%	
Cambridge	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Naponee	0	0	0	0	0	35%	0	0	82%	0	100.0%	
Franklin	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Franklin Pump	0	0	0	0	0	35%	0	0	82%	0	100.0%	
Almena	1,099	8	1,091	403	688	30%	121	809	82%	671	61.1%	
Superior	0	0	0	0	0	31%	0	0	82%	0	100.0%	
Nebraska Courtland	0	0	0	0	0	23%	0	0	82%	0	100.0%	
Courtland Canal Above Lovewell (KS)	14,748	1,185	13,563	5,789	7,774	23%	1,331	9,105	82%	8,651	58.7%	
Courtland Canal Below Lovewell	35,101	4,091	31,010	17,164	13,846	23%	3,948	17,794	82%	18,682	53.2%	

2008	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion	
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2	
2 Irrigation Season												
2 Non-Irrigation Season												
Culbertson	0	0	0	0	0	30%	0	0	82%	0	100.0%	
Culbertson Extension	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Meeker - Driftwood	0	0	0	0	0	30%	0	0	82%	0	100.0%	
Red Willow	4,089	430	3,659	1,215	2,444	30%	365	2,809	82%	2,733	66.8%	
Bartley	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Cambridge	19,387	1,058	18,329	8,759	9,570	30%	2,628	12,198	82%	11,060	57.0%	
Naponee	316	35	281	159	122	35%	56	178	82%	181	57.2%	
Franklin	16,085	2,302	13,783	3,349	10,434	35%	1,172	11,606	82%	11,819	73.5%	
Franklin Pump	576	26	550	152	398	35%	53	451	82%	396	68.7%	
Almena	2,217	76	2,141	827	1,314	30%	248	1,562	82%	1,357	61.2%	
Superior	5,666	566	5,100	1,060	4,040	31%	329	4,369	82%	4,148	73.2%	
Nebraska Courtland	311	0	311	233	78	23%	54	132	82%	108	34.7%	
Courtland Canal Above Lovewell (KS)	17,433	1,637	15,796	4,609	11,187	23%	1,060	12,247	82%	11,680	67.0%	
Courtland Canal Below Lovewell	30,016	4,273	25,743	13,391	12,352	23%	3,080	15,432	82%	16,927	56.4%	

**Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals**  
**2009**

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
<b>2 Irrigation Season</b>											
<b>2 Non-Irrigation Season</b>											
Culbertson	9,624	841	8,783	537	8,246	30%	161	8,407	82%	7,735	80.4%
Culbertson Extension	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	23,274	17,671	5,603	5,603	0	30%	1,681	1,681	82%	19,049	81.8%
Red Willow	5,166	3,910	1,256	1,256	0	30%	377	377	82%	4,219	81.7%
Bartley	10,711	8,623	2,088	2,088	0	30%	626	626	82%	9,137	85.3%
Cambridge	23,961	15,115	8,846	8,846	0	30%	2,654	2,654	82%	17,291	72.2%
Naponee	1,059	158	901	246	655	35%	86	741	82%	766	72.3%
Franklin	23,246	3,332	19,914	7,227	12,687	35%	2,529	15,216	82%	15,809	68.0%
Franklin Pump	909	168	741	250	491	35%	88	579	82%	642	70.7%
Almena	6,336	507	5,829	2,523	3,306	31%	782	4,088	82%	3,859	60.9%
Superior	0	0	0	0	0	30%	0	0	92%	0	100.0%
Nebraska Courtland	718	0	718	609	109	23%	140	249	82%	204	28.4%
Courtland Canal Above Lovewell (KS)	18,833	1,836	16,997	6,118	10,879	23%	1,407	12,286	82%	11,911	63.2%
Courtland Canal Below Lovewell	35,631	4,611	31,020	16,813	14,207	23%	3,867	18,074	82%	19,432	54.5%

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
<b>2 Irrigation Season</b>											
<b>2 Non-Irrigation Season</b>											
Culbertson	9,609	1,095	8,514	771	7,743	30%	231	7,974	82%	7,634	79.4%
Culbertson Extension	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	19,469	0	19,469	6,705	12,764	30%	2,012	14,776	82%	12,116	62.2%
Red Willow	0	0	0	0	0	30%	0	0	92%	0	100.0%
Bartley	8,589	0	8,589	2,475	6,114	30%	743	6,857	82%	5,622	65.5%
Cambridge	24,280	0	24,280	8,487	15,793	30%	2,546	18,339	82%	15,038	61.9%
Naponee	690	88	602	171	431	35%	60	491	82%	490	71.1%
Franklin	13,879	1,673	12,206	3,775	8,431	35%	1,321	9,752	82%	9,670	69.7%
Franklin Pump	751	73	678	172	506	35%	60	566	82%	537	71.5%
Almena	3,330	80	3,250	877	2,373	30%	263	2,636	82%	2,242	67.3%
Superior	6,489	1,211	5,278	2,769	2,509	31%	858	3,367	82%	3,972	61.2%
Nebraska Courtland	202	0	202	159	43	23%	37	80	82%	65	32.3%
Courtland Canal Above Lovewell (KS)	20,190	1,994	18,196	8,868	9,328	23%	2,040	11,368	82%	11,315	56.0%
Courtland Canal Below Lovewell	38,043	5,429	32,614	23,695	8,919	23%	5,450	14,369	82%	17,211	45.2%

Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals  
2011

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
I Irrigation Season											
II Non-Irrigation Season											
Culbertson	9,889	1,381	8,508	1,096	7,412	30%	329	7,741	82%	7,728	78.2%
Culbertson Extension	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	21,538	1,164	20,374	7,998	12,376	30%	2,399	14,775	82%	13,280	61.7%
Red Willow	0	0	0	0	0	30%	0	0	82%	0	100.0%
Bartley	9,718	2,832	6,886	2,778	4,108	30%	833	4,941	82%	6,884	70.8%
Cambridge	28,850	2,975	25,875	10,801	15,074	30%	3,240	18,314	82%	17,993	62.4%
Naponee	1,182	138	1,044	705	339	35%	247	586	82%	618	52.3%
Franklin	18,853	2,409	16,444	5,701	10,743	35%	1,995	12,738	82%	12,854	68.2%
Franklin Pump	729	28	701	316	385	35%	111	496	82%	434	59.6%
Almena	2,277	114	2,163	722	1,441	30%	217	1,658	82%	1,473	64.7%
Superior	7,070	1,265	5,805	2,169	3,636	31%	672	4,308	82%	4,798	67.9%
Nebraska Courtland	428	0	428	217	211	23%	50	261	82%	214	50.0%
Courtland Canal Above Lovewell (KS)	17,889	1,956	15,933	6,811	9,122	23%	1,567	10,689	82%	10,721	59.9%
Courtland Canal Below Lovewell	36,183	5,022	31,161	18,044	13,117	23%	4,150	17,267	82%	19,181	53.0%

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
I Irrigation Season											
II Non-Irrigation Season											
Culbertson	5,470	22	5,448	515	4,933	30%	155	5,088	82%	4,194	76.7%
Culbertson Extension	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	32,955	9,577	23,378	10,784	12,594	30%	3,235	15,829	82%	22,557	68.4%
Red Willow	0	0	0	0	0	30%	0	0	82%	0	100.0%
Bartley	8,137	997	7,140	3,691	3,449	30%	1,107	4,556	82%	4,733	58.2%
Cambridge	27,618	1,402	26,216	14,568	11,648	30%	4,370	16,018	82%	14,537	52.6%
Naponee	1,985	96	1,889	1,132	757	35%	396	1,153	82%	1,042	52.5%
Franklin	30,870	2,369	28,501	14,904	13,597	35%	5,216	18,813	82%	17,796	57.6%
Franklin Pump	1,648	75	1,573	779	794	35%	273	1,067	82%	950	57.6%
Almena	3,172	96	3,076	1,806	1,270	30%	542	1,812	82%	1,582	49.9%
Superior	9,744	930	8,814	4,194	4,620	31%	1,300	5,920	82%	5,785	59.4%
Nebraska Courtland	884	0	884	761	123	23%	175	298	82%	244	27.6%
Courtland Canal Above Lovewell (KS)	26,777	2,284	24,493	12,987	11,506	23%	2,987	14,493	82%	14,168	52.9%
Courtland Canal Below Lovewell	50,078	5,881	44,197	29,240	14,957	23%	6,725	21,682	82%	23,660	47.2%

**Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals**  
**2013**

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
I Irrigation Season											
II Non-Irrigation Season											
Culbertson	0	0	0	0	0	30%	0	0	82%	0	100.0%
Culbertson Extension	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	9,210	0	9,210	2,384	6,826	30%	715	7,541	82%	6,184	67.1%
Red Willow	0	0	0	0	0	30%	0	0	82%	0	100.0%
Bartley	0	0	0	0	0	30%	0	0	92%	0	100.0%
Cambridge	12,575	0	12,575	5,638	6,937	30%	1,691	8,628	82%	7,075	56.3%
Naponee	755	54	701	238	463	35%	83	546	82%	502	66.5%
Franklin	15,796	1,463	14,333	7,050	7,283	35%	2,468	9,751	82%	9,458	59.9%
Franklin Pump	1,206	5	1,201	673	528	35%	236	764	82%	631	52.3%
Almena	2,274	0	2,274	1,306	968	30%	392	1,360	82%	1,115	49.0%
Superior	6,161	438	5,723	2,566	3,157	31%	795	3,952	82%	3,679	59.7%
Nebraska Courtland	558	0	558	497	61	23%	114	175	82%	144	25.8%
Courtland Canal Above Lovewell (KS)	20,093	2,109	17,984	9,840	8,144	23%	2,263	10,407	82%	10,643	53.0%
Courtland Canal Below Lovewell	40,139	4,415	35,724	22,659	13,065	23%	5,212	18,277	82%	19,402	48.3%

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
I Irrigation Season											
II Non-Irrigation Season											
Culbertson	0	0	0	0	0	30%	0	0	82%	0	100.0%
Culbertson Extension	0	0	0	0	0	30%	0	0	82%	0	100.0%
Meeker - Driftwood	8,035	209	7,826	1,372	6,454	30%	412	6,866	82%	5,839	72.7%
Red Willow	0	0	0	0	0	30%	0	0	92%	0	100.0%
Bartley	0	0	0	0	0	30%	0	0	92%	0	100.0%
Cambridge	12,242	1,543	10,699	4,094	6,605	30%	1,228	7,833	82%	7,966	65.1%
Naponee	0	0	0	0	0	35%	0	0	82%	0	100.0%
Franklin	0	0	0	0	0	35%	0	0	82%	0	100.0%
Franklin Pump	0	0	0	0	0	35%	0	0	82%	0	100.0%
Almena	1,385	0	1,385	595	790	30%	179	969	82%	794	57.3%
Superior	0	0	0	0	0	31%	0	0	82%	0	100.0%
Nebraska Courtland	0	0	0	0	0	23%	0	0	82%	0	100.0%
Courtland Canal Above Lovewell (KS)	15,525	1,657	13,868	7,459	6,409	23%	1,716	8,125	82%	8,319	53.6%
Courtland Canal Below Lovewell	32,108	4,010	28,098	18,440	9,658	23%	4,241	13,899	82%	15,407	48.0%

Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals  
2015

Canal	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion	
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2	
Irrigation Season												
Non-Irrigation Season												
Culbertson	9,121	1,056	8,065	438	7,627	30%	131	7,758	82%	7,418	81.3%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Culbertson Extension	0	0	0	0	0	30%	0	0	82%	0	100.0%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Meekeer - Driftwood	15,350	532	14,818	5,248	9,570	30%	1,574	11,144	82%	9,670	63.0%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Red Willow	0	0	0	0	0	30%	0	0	82%	0	100.0%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Bartley	8,590	1,100	7,490	461	7,029	30%	138	7,167	82%	6,977	81.2%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Cambridge	29,156	4,372	24,784	8,719	16,065	30%	2,616	18,681	82%	19,690	67.5%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Naponee	812	53	759	253	506	35%	89	595	82%	541	66.6%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Franklin	15,240	1,030	14,210	5,976	8,234	35%	2,092	10,326	82%	9,497	62.3%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Franklin Pump	1,027	59	968	436	532	35%	153	685	82%	620	60.4%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Almena	0	0	0	0	0	30%	0	0	82%	0	100.0%	
Superior	6,571	449	6,122	1,864	4,258	31%	578	4,836	82%	4,414	67.2%	
	0	0	0	0	0	30%	0	0	92%	0	100.0%	
Nebraska Courtland	483	0	483	434	49	23%	100	149	82%	122	25.3%	
Courtland Canal Above Lovewell (KS)	20,436	1,685	18,751	8,066	10,685	23%	1,855	12,540	82%	11,968	58.6%	
Courtland Canal Below Lovewell	31,544	3,558	27,986	17,599	10,387	23%	4,048	14,435	82%	15,395	48.8%	

**ATTACHMENT 8**  
**and**  
**Augmentation Pumping Volume**  
**and Resolution Water Supply**  
**Credits**

**Augmentation Pumping Volume, Colorado Resolution Water Supply Credit, and Nebraska Resolution Water Supply Credit**

**Colorado**

Input	2007	2008	2009	2010	2011	2012	2013	2014	2015
Augmentation Pumping Volume	0	0	0	0	0	0	0	7,448	10,760
Colorado Resolution Water Supply (CORWS) Credit	0	0	0	0	0	0	0	7,448	10,760

**Nebraska**

Input	2007	2008	2009	2010	2011	2012	2013	2014	2015
Augmentation Pumping Volume (APV) Rock Creek	0	0	0	0	0	0	15,766	19,397	1,098
Augmentation Pumping Volume	0	0	0	0	0	0	0	42,758	25,932
Computed Water Supply	0	0	0	0	0	0	0	0	8,332
Nebraska Resolution Water Supply (NERWS) Credit	0	0	0	0	0	0	15,766	62,155	18,698

**Attachment 8: Calculation of Computed Water Supply Adjustment and Remaining Compact Compliance Volume for Implementation of 2016 RRCA Resolution**

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Start of Year RCCV	RCCV Adjustment <sup>b</sup>	CCV <sup>c</sup>	CCV Inflow Into HCL	RCCV Inflow Into HCL	Total CCV and RCCV Inflow Into HCL	Total CCV and RCCV Available for Release	CCV released from HCL as Flow	CCV Released from HCL as Evaporation	CCV Retained in HCL (at End of Year	CWSA	End of Year RCCV <sup>a</sup>
	= Col. 12 of previous year					=Col. 4 + Col. 5	= Col. 6 + Col. 10 of previous year			= Col. 7 - (Col. 8 + Col. 9)	= Col. 10 - Col. 10 of previous year	= Col. 1 - Col. 2 + Col. 3 - Col. 6
2015 <sup>d</sup>	0	0	0	8,332	0	8,332	8,332	0	0	8,332	8,332	0

<sup>[a]</sup> The formula for calculation of RCCV is based on calendar year operations and will vary when operations occur in a different calendar year than NERWS Credit is applied.

<sup>[b]</sup> See Provision 10 of the RRCA Resolution signed August 24, 2016, titled "Resolution Approving Long-Term Agreement Related to the Operation of Harlan County Lake for Compact Call Years" for the terms of assigning RCCV Adjustment. The RCCV Adjustment for each year is equal to 20% of the unadjusted portion of the RCCV, if it is a non-Compact Call Year, plus any remaining volumetric reductions from the previous four years.

<sup>[c]</sup> In years when the contributions from Nebraska's water management activities, consistent with the 2016 CCY HCL Operations Resolution, are greater than CCV and the NERWS is equal to the greater contribution volume, CCV in Column 3 should also be set equal to the contribution.

<sup>[d]</sup> CWSA and RCCV are applied for compliance activities initiated after October 1, 2015. CCV Inflow into HCL (Column 4) for 2015 is the volume of NCORPE augmentation water delivered in the Fall 2015 in excess of 17,600 acre-feet for 2016 NERWS Credit. The 2015 contribution to RCCV is set equal to 0 in Column 12.

# **Flood Flow Calculations**



Flood Flow Calculations Based on Accounting Procedures III.B.1 and Attachment 1.

Hardy Gage 5-month Consecutive Period Flows (acre-feet)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Jan-May	30,771	77,639	88,491	168,566	148,444	119,587	18,603	14,773	41,928
Feb-Jun	45,812	120,175	76,225	232,166	175,839	108,509	19,892	18,887	77,319
Mar-Jul	44,858	131,223	62,420	261,698	174,581	96,803	20,711	19,880	83,132
Apr-Aug	51,352	137,455	47,068	224,522	168,923	59,579	28,104	22,213	88,817
May-Sep	51,491	137,409	39,299	189,353	151,122	27,893	27,213	25,066	88,633
Jun-Oct	55,141	134,729	27,192	154,579	97,581	16,855	21,360	27,645	56,269
Jul-Nov	45,785	124,328	29,005	82,526	73,911	12,051	21,916	25,994	21,432
Aug-Dec	48,441	126,189	25,941	52,358	72,114	8,388	20,280	24,047	18,316

5-month Consecutive Period Test									
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Jan-May	0	0	0	0	0	0	0	0	0
Feb-Jun	0	0	0	0	0	0	0	0	0
Mar-Jul	0	0	0	0	0	0	0	0	0
Apr-Aug	0	0	0	0	0	0	0	0	0
May-Sep	0	0	0	0	0	0	0	0	0
Jun-Oct	0	0	0	0	0	0	0	0	0
Jul-Nov	0	0	0	0	0	0	0	0	0
Aug-Dec	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0

Hardy Gage 2-month Consecutive Period Flows (acre-feet)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Jan-Feb	6,958	15,159	42,218	26,552	27,527	34,268	3,755	6,437	3,483
Feb-Mar	7,749	15,475	42,960	63,399	46,633	56,985	3,822	9,293	4,120
Mar-Apr	4,603	18,165	32,113	98,483	58,085	72,992	6,472	6,198	4,391
Apr-May	21,816	54,774	25,464	88,050	93,734	45,195	12,855	3,776	36,418
May-Jun	35,457	94,241	21,961	124,248	98,304	18,656	11,591	7,956	70,835
Jun-Jul	21,045	68,743	16,147	119,684	53,664	11,484	5,863	11,544	44,687
Jul-Aug	13,289	32,755	13,803	55,755	39,717	8,055	12,034	12,619	15,618
Aug-Sep	11,236	24,351	8,992	26,138	34,626	4,082	12,974	11,384	9,892
Sep-Oct	25,605	52,048	5,588	18,107	22,392	2,471	6,111	9,208	3,870
Oct-Nov	29,751	81,160	11,667	17,421	21,093	2,814	6,294	8,884	3,634
Nov-Dec	14,345	60,203	14,896	17,463	28,197	3,017	4,783	7,946	6,734

2-month Consecutive Period Test									
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Jan-Feb	0	0	0	0	0	0	0	0	0
Feb-Mar	0	0	0	0	0	0	0	0	0
Mar-Apr	0	0	0	0	0	0	0	0	0
Apr-May	0	0	0	0	0	0	0	0	0
May-Jun	0	0	0	0	0	0	0	0	0
Jun-Jul	0	0	0	0	0	0	0	0	0
Jul-Aug	0	0	0	0	0	0	0	0	0
Aug-Sep	0	0	0	0	0	0	0	0	0
Sep-Oct	0	0	0	0	0	0	0	0	0
Oct-Nov	0	0	0	0	0	0	0	0	0
Nov-Dec	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0

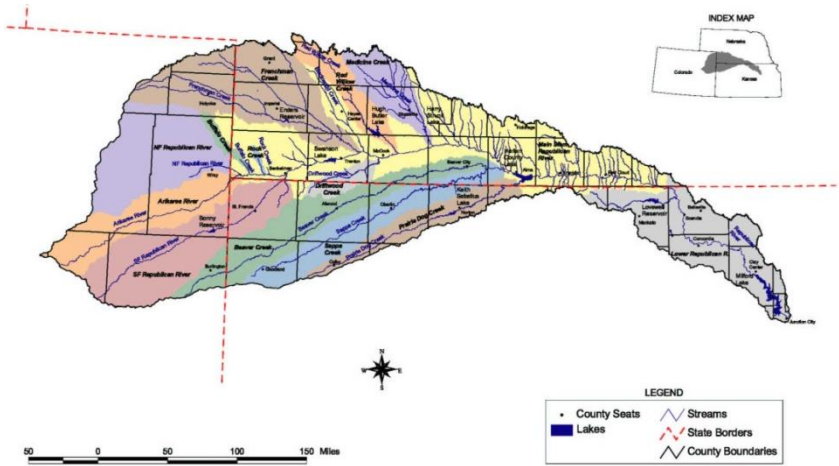
Sub-basin Flows Above Attachment 1 Flood Flow Thresholds									
	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork	0	0	0	0	0	0	0	0	0
Arikaree	0	0	0	0	0	0	0	0	0
Buffalo	0	0	0	0	0	0	0	0	0
Rock	0	0	0	0	0	0	0	0	0
South Fork	0	0	0	0	0	0	0	0	0
Frenchman	0	0	0	0	0	0	0	0	0
Driftwood	0	0	0	0	0	0	0	0	0
Red Willow	0	0	11,773	9,690	3,197	0	0	0	0
Medicine Creek	0	10,050	0	0	0	0	0	0	0
Beaver	0	0	0	0	0	0	0	0	0
Sappa	0	0	0	0	0	0	0	0	0
Prairie Dog	0	0	0	9,998	164	0	0	0	0
Sub-basin Sum	0	10,050	11,773	19,688	3,361	0	0	0	0

Combined Test									
	2007	2008	2009	2010	2011	2012	2013	2014	2015
FINAL TO	0	0	0	0	0	0	0	0	0

Final Sub-basin Flood Flows									
	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork	0	0	0	0	0	0	0	0	0
Arikaree Fl	0	0	0	0	0	0	0	0	0
Buffalo Flo	0	0	0	0	0	0	0	0	0
Rock Flood	0	0	0	0	0	0	0	0	0
Southfork f	0	0	0	0	0	0	0	0	0
Frenchmar	0	0	0	0	0	0	0	0	0
Driftwood f	0	0	0	0	0	0	0	0	0
Red Willow	0	0	0	0	0	0	0	0	0
Medicine C	0	0	0	0	0	0	0	0	0
Beaver Flo	0	0	0	0	0	0	0	0	0
Sappa Flo	0	0	0	0	0	0	0	0	0
Prairie Dog	0	0	0	0	0	0	0	0	0
Mainstem f	0	0	0	0	0	0	0	0	0

# REPUBLICAN RIVER COMPACT ADMINISTRATION

Annual Meeting  
August 22, 2017



SUMMARY AND MINUTES OF  
THE 2017 ANNUAL MEETING OF  
THE REPUBLICAN RIVER  
COMPACT ADMINISTRATION

AUGUST 22, 2017

HELD AT THE  
BURLINGTON COMMUNITY  
CENTER  
BURLINGTON, COLORADO

**Summary & Minutes**

A transcript of this meeting was prepared by Jessica R. Benson of Steven's-Koenig Reporting (Exhibit A). The transcript was reviewed by each of the States, and upon final approval by the Compact Administration the transcript will serve as the official minutes of this Annual Meeting of the Compact Administration. Below is a summary of the meeting.

**Agenda Item 1: Introductions**

The Annual Meeting of the Republican River Compact Administration (RRCA) was called to order by Colorado Commissioner and Chairman Kevin Rein at 10:30 a.m., August 22, 2017. Commissioner Rein asked for introductions around the room. A complete list of attendees is attached as Exhibit B. Some of the attendees included:

<u>Name</u>	<u>Representing</u>
Jeff Fassett	Nebraska Commissioner
Justin Lavene	Nebraska Attorney General's Office
Kevin Rein	Colorado Commissioner and Chairman
Ivan Franco	Colorado Engineering Committee Member and Chairman
Scott Steinbrecher	Colorado Attorney General's Office
David Barfield	Kansas Commissioner
Chris Beightel	Kansas Engineering Committee Member

**Agenda Item 2: Adoption of the Agenda**

Chairman Rein introduced the proposed agenda and asked if there were any changes to the draft agenda. Hearing none, the commissioners adopted the agenda as proposed. A copy of the final agenda is attached as Exhibit C.

### **Agenda Item 3: Status of Report and Transcripts for 2016 Annual Meeting and Prior Special Meetings**

Commissioner Rein reported that the 2017 Annual Report was not ready for action at the current meeting. Given that no action would be taken on this agenda item Commissioner Rein moved on to reports of the Commissioners.

### **Agenda Item 4: Report of Chairman and Commissioners' Reports**

- a. Kansas: Commissioner Barfield reported on Kansas Republican River basin issues followed by relevant recent Kansas legislation. :
  - i. Commissioner Barfield recognized the attendance of Pete Gile of the Kansas Bostwick Irrigation District, noting the funds appropriated from the Kansas v. Nebraska and Colorado to improve efficiency in the District, with several miles of laterals were converted to buried pipe with more to come. Commissioner Barfield noted that the Lower Republican River basin would also be benefiting from the funds and there are ongoing stakeholder meetings to determine how to apply the funds, including off-stream storage sites and creation of a special access district.
  - ii. On January 4, 2017 a meeting was held in St. Francis with South Fork constituents to explain the state of the current resolutions and implications for residences.
  - iii. Commissioner Barfield noted that the 2012 legislature created a mechanism to create local enhanced management areas, or LEMA's, to address the problem of groundwater decline. Through this tool, an area within the Northwest Kansas Ground Water Management District No. 4 was designated the Sheridan 6 LEMA. This area chose to reduce water use by 20 percent with certain flexibilities to best manage water use. More recently GMD No. 4 began looking at a District wide program to reduce groundwater level declines.
  - iv. In terms of legislation during the year, Commissioner Barfield mentioned Senate Bill 46 requires water users who feel they are injured by junior's actions must first go through the Chief Engineer's process before going to through district court. In addition, SB 46 amended provisions related to water conservation areas providing the Chief Engineer with additional flexibility to make the best use of a reduced water supply.
  - v. Commissioner Barfield noted that House Bill 2312 clarified proceeding for the administrative hearing conducted by the Chief Engineer related to over-pumping.
- b. Nebraska:
  - i. Commissioner Fassett stated that Nebraska continues to be in compliance with the compact and that continues to be a high priority for the state. He noted that the Kansas water allocation in Harlan County Lake was triggered this year and the tool worked as intended.

- ii. Commissioner Fassett touched on the efforts of the Natural Resources Districts and noted their instrumental role in achieving compliance each year.
  - iii. Commissioner Fassett discussed the fact that about 20,000 acre-feet of water was made available for downstream use through all of the state's efforts. Commissioner Fassett noted that the bulk of that water came from the two augmentation projects. He discussed the efforts of his office and the Natural Resources Districts to get ahead of the accounting curve and produce favorable results for all parties.
  - iv. In previous meetings there was mention of the 2014 Water Sustainability Fund. This is an annual competitive process that funds water projects. During this cycle there is approximately 15 million dollars available. There are 24 applications and 7 of those are within the Republican Basin, which is positive news for the basin. He viewed this as a likely investment in the basin and a move away from the days of litigation. He reminded the group that a basin planning process was implemented by legislation and there are several dozen participants who are meeting on a quarterly basis to help resolve difficult issues within the basin and best utilize the water supply.
  - v. Unfortunately, in-state litigation continues. This litigation was initiated during the dry difficult years, but fortunately there is no new litigation to speak of. Out of a series of five cases, two have already been resolved in the states favor. One case has been withdrawn and two cases remain. In the coming months, litigation will continue before the Nebraska Supreme Court with results that will hopefully provide further guidance for the remaining cases.
  - vi. The Frenchman Cambridge Irrigation District received a grant from the Water Sustainability Fund over a year ago now, and has used the money to institute a whole series of control activities that will tighten up the management of supply.
  - vii. One of the new applications this year is from the Nebraska Bostwick District, hoping to obtain funds for a Platte Republican Diversion Project. The application outlines a project that would seek to make use of some surplus water during times of plenty on the Platte River and transfer that water into the Republican Basin upstream of Harlan County as another augmentation approach to help maintain compliance with the compact.
  - viii. Commissioner Fassett wrapped up his comments by highlighting the benefits of the states working together, along with the Bureau, to manage the waters of the basin maximize the benefits for all parties.
- c. Colorado:
- i. Commissioner Rein reported that his predecessor, Dick Wolfe, had retired on June 30<sup>th</sup> and that there would be a resolution honoring Mr. Wolfe entered into the record later in the meeting. He had been informed on the issues by Mr. Wolfe prior to his retirement and would do his best to get up to speed quickly.
  - ii. Commissioner Rein notified the group of the increase, this past year, in the CREP rental rates and thanked the other two states for their aid in that process. He noted that this year Colorado applied to amend the CREP contract

with the USDA to make the process more efficient and would appreciate the other states support in completing the amendment.

- iii. The Republican River Rules that are being worked on currently have been put on hold temporarily while we look at passing new legislation that would clarify how and where disputes would be handled. If all goes well, we'll have the guidance that we need to move forward with finalizing the rules.

#### **Agenda Item 5: Federal Reports**

- a. Bureau of Reclamation: Craig Scott distributed the Bureau's summary report of operations in the Republican River Basin for 2016 (Exhibit D) and mentioned that the report also included a brief synopsis of operations through the first seven months of 2017. Mr. Scott did not walk the audience through the report, but rather asked if the commissioners had any questions.
- b. U.S. Army Corps of Engineers: A representative from the Corps was not present at the meeting. However, a report was made available to the commissioners and copies were available at the meeting. This report is attached as Exhibit E.
- c. U.S. Geological Survey: John Miller distributed a report of annual mean discharge for each of the 13 gages the USGS operates for the Compact, as well as two Nebraska operates (Exhibit F). Mr. Miller noted that the Arikaree River gage did see consistent flows and there has been significant vegetative growth. With these increased flows, beavers have come into the reach and the Bureau is working with landowners to get that problem resolved. Given this issue the Bureau is considering installing a weir to improve the quality of the record.

Also, the Bureau installed a radar gauge on the North Fork of the Republican this past year and the results have been very good so the Bureau is looking to expand the use of this technology. Mr. Miller touched on some highlights of the handout and noted the declines in flows that seem to continue throughout the basin.

#### **Agenda Item #6: Engineering Committee Report**

- a. Assignments from 2016 Annual Meeting: Ivan Franco shared the Engineering Committee (Committee) Report (Exhibit G). The Committee met four times in 2016, with six assignments being completed: (1) holding quarterly meetings, and (2) exchanging information listed in Section 5 of the Accounting Procedures and Reporting Requirements, and (3) continue work and provide future updates on improving accounting tools developed by the engineering committee, and (4) continue to explore options for sharing evaporation charges for Harlan County Lake when accounts exist separate from the project water supplies of the Bostwick Irrigation District and explore potential means to adjust the compact accounting of Harlan County Lake for the mutual benefit of the states, and (5) work to resolve the

- issues preventing agreement on final accounting for 2006 through 2015, and (6) work to finalize the 2016 accounting. Ongoing assignments include: (1) continued efforts to resolve concerns in the methods of estimating ground and surface water recharge and return flows, (2) discuss developing an application and approval process for future augmentation plans, (3) assign responsibility for collecting specific fields of data collected for the annual data exchange, and 4) create a document memorializing when RRCA accounting procedures have changed over the past years and incorporate it into the accounting procedures and, 5) work on producing a RRCA public website.
- b. Committee recommendations to RRCA: The committee recommends discussion by the RRCA on the exchange of data and documentation and the modeling runs completed by Principia Mathematica for 2016, discussion on the proposed 2016 accounting, direction from the commissioners on RRCA draft website, and the recommended engineering committee assignments for the following year. Specifically, the engineering committee recommends approval of the 2016 accounting as attachment 5 to the committee report. The spreadsheet is titled RRCA \_accounting\_2016\_final.xlsx.
- d. Recommended assignments for Engineering Committee: The Committee's recommendations regarding assignments for the coming year are outlined in the report.
1. Meet quarterly to review the tasks assigned to the committee.
  2. Exchange by April 15, 2018, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2018, the states will exchange any updates to these data.
  3. Work to finalize 2017 accounting.
  4. When possible, continue efforts to resolve concerns related to varying methods of estimating ground and surface water irrigation recharge and return flows within the Republican River Basin and related issues.
  5. Continue work to assign responsibility for collecting specific fields of data collected for the annual data exchange by determining who has the best available data and assigning them the responsibility of populating those fields in order to avoid confusion between multiple datasets.
  6. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
  7. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.

8. Continue efforts to develop and publish an administrative website that would be an informational page for the public.
9. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
10. Work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet.

Discussions during the committee workshop earlier in the day resulted in the conclusion that the internal accounting tool developed by the engineering committee would remain an internal resource, which may be distributed on a case-by-case basis if necessary. This tool included accounting from 1995 onwards as inputs and tables.

The commissioners delegated the engineering committee to move forward with the RRCA public website and to approve and add content by consensus. This will be incorporated as an assignment to the engineering committee for the coming year. The commissioners also assigned the engineering committee to summarize and document the status of Table 4(a) in the RRCA accounting procedures and recommend how said document should be memorialized. The recommended assignments are included in the report and with the addition of this assignment and that will bring the total number of assignments to 12.

#### **Agenda Item #7: Old Business**

- a. Approve Annual Report for 2015: The 2015 annual report has been prepared by the responsible party and copies of the final report have been distributed to each state. The engineering committee recommends approval of the 2015 annual report as presented to each state. Commissioner Barfield moved to adopt the final report as proposed. The motion was seconded by Commissioner Fassett and the motion passed unanimously.

#### **Agenda Item #8: New Business and Assignments to Compact Committees**

- a. Action on Engineering Committee Report and assignments: Commissioner Fassett moved to approve the Engineering Committee report and associated assignments for the upcoming year. Commissioner Barfield seconded, and the motion passed unanimously.
- b. Action on 2016 Accounting: Commissioner Barfield moved to approve the 2016 accounting noted in the engineering committee report, and the spreadsheet noted in this meeting. Commissioner Fassett seconded, and the motion passed unanimously.



- c. Action on Resolution Honoring Dick Wolfe: Commissioner Rein, after a short introduction, read the resolution into the record and Commissioner Fassett moved to adopt the resolution. Commissioner Barfield seconded and the motion passed unanimously. A copy of the resolution is attached as Exhibit H.

#### **Agenda Item #9: Remarks from the Public**

Tim Pautler is with the Plains Groundwater Management District. He thanked the commissioners for being in Burlington and encouraged them to work with Colorado to help pass the CREP changes in Washington D.C. He noted that the Plains Groundwater Management District is starting to have discussions with water users on how to reduce groundwater level declines in the District. Staff from Kansas has assisted in these discussions by explaining how the LEMA areas in Kansas work.

#### **Agenda Item #10: Future Meeting Arrangements**


Colorado's Chairmanship term has ended with this meeting and the chairmanship will move to Kansas. Commissioner Barfield stated that the 2018 meeting would likely occur the week of August 20<sup>th</sup> with future details to come. The actual dates will be agreed upon at a later date.

#### **Agenda Item #11: Adjournment**

The meeting was adjourned at 11:45 a.m. on August 22, 2017.

The August 22, 2017 Annual Meeting report is hereby approved by unanimous vote of the RRCA on this 21st day of August, 2018.

As indicated by their signature and date below, the RRCA Commissioners agree that the report was approved by RRCA on the date indicated above.

  
\_\_\_\_\_  
Kevin Rein, Chair and Colorado Commissioner

DATE SIGNED: 8-21-18

  
\_\_\_\_\_  
Jeff Fassett, Nebraska Commissioner

DATE SIGNED: 8/21/18

  
\_\_\_\_\_  
David Barfield, Kansas Commissioner

DATE SIGNED: \_\_\_\_\_

**Exhibits**

- Exhibit A: Transcript of the 2017 Annual Meeting
- Exhibit B: Attendance of the 2017 Annual Meeting with Sign-In Sheets
- Exhibit C: Agenda for the 2017 Annual Meeting
- Exhibit D: Bureau of Reclamation Report, *Nebraska-Kansas Area Report to the Republican River Compact Administration*, August 22, 2017
- Exhibit E: U.S. Army Corps of Engineers Presentation, *Harlan County Dam Tainter Gate & Irrigation Repairs*, August 22, 2017
- Exhibit F: U.S. Geological Survey Report, *Republican River Basin streamflow-gaging stations with records published by USGS for water year 2016*, August 22, 2017
- Exhibit G: Engineering Committee Report for the 2017 Annual Meeting
- Exhibit H: Resolution Honoring Dick Wolfe, August 22, 2017

*Republican River Compact Administration*

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*2017 Annual Meeting*

*August 22, 2017*

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2017 ANNUAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION

Burlington Community & Education Center Conference Hall  
340 South 14th Street  
Burlington, Colorado 80807

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Tuesday, August 22, 2017  
10:30 a.m.

The above-entitled meeting was taken at the Burlington Community & Education Center Conference Hall, 340 South 14th Street, Burlington, Colorado, before Jessica R. Benson, Certified Shorthand Reporter in and for the State of Texas and Notary Public within Colorado.

1 ATTENDANTS:

2 For Colorado:

Kevin Rein, Commissioner and Chair

3 Ivan Franco, Colorado Water Resources Engineer

4 Scott Steinbrecher, Colorado Attorney General's  
Office

Mike Sullivan, Colorado Deputy State Engineer

5

For Nebraska:

6 Gordon W. "Jeff" Fassett, Commissioner

Justin Lavene, Nebraska Attorney General's Office

7 Jesse Bradley, Nebraska Department of Natural  
Resources

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For Kansas:

9 David Barfield, Commissioner

Chris Beightel, Kansas Division of Water Resources

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1 P R O C E E D I N G S

2 MR. REIN: Good morning, everyone; and  
3 welcome to the meeting. Thank you for attending and  
4 welcome everyone to Colorado. We appreciate you coming  
5 here today. Hope y'all had a good trip here, and you  
6 were able to work your way through the eclipse traffic  
7 and safely navigate that as you got here.

8 I'm going to introduce myself. My name is  
9 Kevin Rein. I'm the newly appointed state engineer at  
10 the Colorado Division of Water Resources and the incoming  
11 commissioner for Colorado as well. So I thank you-all  
12 for allowing me to chair this meeting today, and I've  
13 been learning a lot about the compact and this meeting.  
14 So I'm going to lead us through this meeting. I'm going  
15 to respectfully ask you-all for just a little latitude as  
16 I do this today, and we'll get through it together with  
17 your help. So thank you for that.

18 And I'm -- I'm trying to figure out this  
19 microphone. Is that just about right? Too overpowering?  
20 That's just okay. Thank you very much, BreAnn.

21 So let's move ahead, just a few logistics.  
22 I think y'all understand by now where the bathrooms are,  
23 out -- out back and to the left. We've got doughnuts and  
24 coffee and tea and water available for you-all.

25 We do make transcripts of this meeting.

1 You see that we have a reporter up here and to make the  
2 job of the reporter easier, if you're going to speak  
3 during the public comments section, please be sure to  
4 clearly state your name and it may help if you give the  
5 reporter a business card when you do that but just be  
6 sure and help her out with that so that we get good,  
7 accurate comments from you and a good, accurate report of  
8 your name.

9 And so we will have a microphone up at the  
10 podium at that time. So you'll want to be sure to speak  
11 into the microphone when you do that as well. And, also,  
12 should there be a PowerPoint -- I don't know that there's  
13 anything really lined up for that today -- but should  
14 there be a PowerPoint, please coordinate that prior to --  
15 prior to starting that.

16 So I want to do some introductions today.  
17 We'll do that. I'll do that for myself and Colorado  
18 staff and then ask the other commissioners to do that and  
19 their state staff and then we'd like to just go around  
20 the room for everyone that was not otherwise identified  
21 and allow you to introduce yourself.

22 So, again, I'm Kevin Rein, as I said. And  
23 up here with me, we have Mike Sullivan, deputy state  
24 engineer that you're all familiar with, and Scott  
25 Steinbrecher from the Attorney General's Office. And to

1 my left is Ivan Franco, our engineering committee  
2 representative who's done a lot of work in preparation  
3 for this. Also, out in the audience, I just want to call  
4 out that we have Corey DeAngelis, assistant division  
5 engineer from Division 1, the Greeley office, sitting up  
6 front; and back there we have more of our field staff.  
7 We have Dave Keeler, Chris Kucera, Devin Ridnour, BreAnn  
8 Ferguson, and Matt Hardesty.

9 And I think I caught all of our Colorado  
10 Division of Water Resources staff in here; but if not, be  
11 sure and take the mic as it goes around the audience.

12 And with that, David, would you like to  
13 introduce yourself and your staff?

14 MR. BARFIELD: Certainly. Can you hear  
15 me? I'll get close to the mic.

16 And thank you, Chairman Rein. I  
17 appreciate -- I appreciate you hosting. Congratulations  
18 on your appointment as state engineer. We look forward  
19 to working with you as we continue to move forward on  
20 these important issues.

21 So with me is Chris Beightel, program  
22 manager with our water management services program and  
23 engineering committee representative.

24 You know, we have -- we've had an extended  
25 group of people that have been involved in the Republican



1 River issues in recent years. Secretary of Agriculture  
2 McClaskey was not able to attend today, but she's  
3 obviously been a very active part of all of those  
4 discussions and sent her apologies.

5 Susan Metzger, Deputy Secretary of  
6 Agriculture is here along with Kenny Titus, chief legal  
7 counsel with the department. Also with the Department of  
8 Agriculture, Lane Letourneau, program manager for our  
9 water rights program; Chelsea Erickson with our Stockton  
10 field office and Ginger Pugh. And then from the Kansas  
11 water office, we have Director Tracy Streeter and  
12 Assistant Director Earl Lewis. So those are our state  
13 reps here.

14 MR. REIN: Thank you, Commissioner  
15 Barfield.

16 Commissioner Fassett.

17 MR. FASSETT: Thank you. Jeff Fassett for  
18 the state of Nebraska. I'm the director of the  
19 Department of Natural Resources.

20 And, again, thank you, Kevin, for hosting  
21 us for this meeting and, again, congratulations. We look  
22 forward to working with the state of Colorado. You're  
23 the new representative.

24 With me here at the table, I have Justin  
25 Lavene. He's the senior assistant Attorney General's

1 Office that's been involved with Republican matters for a  
2 very long time; and Jesse Bradley who is the assistant  
3 director of my Department of Natural Resources.

4 We have other members of our team --  
5 consulting team and other folks that are very involved,  
6 and you're going to catch all of them when we send the  
7 microphone around. So I don't want to start down the  
8 list and miss somebody. So I'll stop with the two that  
9 are with me here at the table. So thank you.

10 MR. REIN: Thank you, Commissioner.

11 And with that, I think I'll just take this  
12 microphone -- that one? Thank you.

13 And if you could just -- we'll move around  
14 everyone and be sure and introduce yourselves. Thank  
15 you.

16 AUDIENCE INTRODUCTIONS:

17 My name is Kevin Holle. I just farm in  
18 Northwestern Kansas.

19 Good morning. My name is Deb Daniel. I'm  
20 the general manager for the Republican River Water  
21 Conservation District here in Colorado.

22 My name is Scott Dicke. I'm with the  
23 Lower Republican Natural Resources District.

24 My name is Craig Scott. I'm with the  
25 Bureau of Reclamation in McCook, Nebraska.

1 Hello. Aaron Thompson with the Bureau of  
2 Reclamation out of McCook. I represent Reclamation  
3 Nebraska, Kansas, and a small part of Colorado.

4 My name is Tracy Smith. I'm a manager at  
5 Bostwick Irrigation District in Nebraska.

6 Ross Montgomery, operations manager at  
7 Bostwick Irrigation District in Nebraska.

8 My name is Jared "Pete" Gile. I'm the  
9 superintendent of Kansas Bostwick Irrigation District in  
10 Courtland, Kansas.

11 Lori Marintzer, I'm with the USGS out of  
12 Kansas.

13 Peter Ampe, general counsel for the  
14 Republican River Water Conservation District.

15 Tom Riley with the Flatwater Group  
16 supporting the state of Nebraska.

17 I'm Marc Groff also with the Flatwater  
18 Group.

19 Mike Clements with Lower Republican NRD.

20 Todd Siel, Lower Republican NRD.

21 I'm Rod Mason. I'm the manager of the  
22 Arikaree Groundwater District, and I'm also on the  
23 Republican River board.

24 I'm Brandi Baquera. I'm the district  
25 manager for the Plains Groundwater Management District.

1 My name is Tim Pautler from Stratton. I'm  
2 on the Plains Groundwater Management District and also on  
3 the Republican River Water Conservation District.

4 Alex Boyce from Middle Republican NRD.

5 John Miller with the U.S. Geological  
6 Survey out of North Platte, Nebraska.

7 I'm Shannon Kenyon. I'm the assistant  
8 manager at the Groundwater Management District in Colby.

9 Dan Stephens from St. Francis, Kansas,  
10 farmer.

11 Don Brown, farmer and rancher from Yuma,  
12 Colorado Ag Commissioners.

13 And I'm Don Blankenau, outside legal  
14 counsel, state of Nebraska.

15 MR. REIN: Okay. Thank you-all very much.

16 Just a couple of other items, if you do  
17 not have an agenda, hopefully you saw them when you came  
18 in; but there are agendas at the table in the back by the  
19 door at that entrance. So be sure and grab an agenda if  
20 you don't have one; and, also, there's a sign-in sheet  
21 there. So please be sure that you signed in.

22 Having said that -- and if you do have an  
23 agenda, the next thing I'd like to do is just approve  
24 this morning's agenda; and I'll ask the commissioners, do  
25 we have any modifications to the agenda as you have it

1 now?

2 MR. BARFIELD: No, I believe not. So I  
3 would move we adopt the proposed agenda that was provided  
4 this morning to those that are here.

5 MR. FASSETT: I'll second.

6 MR. REIN: We have a motion to adopt the  
7 agenda and a second. Is there any other discussion on  
8 that?

9 If not, all in favor say aye.

10 MR. FASSETT: Aye.

11 MR. BARFIELD: Aye.

12 MR. REIN: Opposed?

13 Okay. This agenda is adopted from this  
14 morning.

15 The next item, then, on the agenda is to  
16 check in on the status of report and transcripts for the  
17 2016 annual meeting and prior special meetings; and I  
18 don't know whether I need to go to Ivan Franco, our  
19 engineering committee representative, but I understand  
20 that the report and transcripts are just not ready at  
21 this point; is that right?

22 MR. FRANCO: Right.

23 MR. REIN: Okay. So at this point the  
24 status is that they -- they're just not yet prepared for  
25 review.

1           And with that, we'll move on to reports  
2 from the commissioners. Again, I'll look to Commissioner  
3 Barfield for your report.

4           MR. BARFIELD: All right. Thank you.  
5 Very good.

6           I'll just report on some of the things  
7 that are going on within the basin and then some other  
8 items such as legislation and such that -- of a statewide  
9 nature that may be of interest to the commission.

10           In terms of in the basin, it's been a --  
11 been a decent year water supply-wise which has been  
12 welcome. It's been dry at times; but, overall, it's been  
13 a good year. Kansas Bostwick Irrigation District, Pete  
14 Gile is here. It's been a very active year for them, not  
15 just in terms of their normal operations but in terms of  
16 activity to improve their efficiency of use of Republican  
17 basin water, leveraging funds that we received in the  
18 settlement of Kansas v. Nebraska, Colorado combined with  
19 grants provided with the Bureau of Reclamation as well as  
20 their own hard work and labor.

21           They're accelerating their ongoing program  
22 of improving efficiencies within the district lands  
23 significantly. That includes converting the 33.0 lateral  
24 to -- lateral canal to buried pipe eliminating 3.9 miles  
25 of open canal, and then that was done before this season.

1 It's been successfully used this irrigation season. As  
2 soon as the irrigation season is over, they're going to  
3 be converting the 33.0 lateral canal to buried pipe as  
4 well -- I'm sorry -- the 32.1 canal. They've also been  
5 able to purchase a new trencher to facilitate work on  
6 larger pipelines.

7 We've also been looking at areas to  
8 improve operations in the lower basin once the Republican  
9 River comes back into Kansas. We've reserved part of the  
10 damage fund money for their use to improve management of  
11 the river in that portion of our state. This includes a  
12 number of studies to look at potential off-stream storage  
13 sites. We're also exploring the creation of a special  
14 access district that could potentially, via Warren Act  
15 contracts, use some of the water supply that is available  
16 in some years to offset MDS administration and such  
17 things during times of shortage. So we're having an  
18 active round of discussions with stakeholders to explore  
19 those issues.

20 This year we had another meeting with our  
21 South Fork constituents in St. Francis. That was held on  
22 January 4. Former state engineer Dick Wolfe participated  
23 with this. It was an opportunity to sort of explain to  
24 them the resolutions that we have developed and what it  
25 meant to them and then also talk about our ongoing

1 commitment to continue to explore issues related to  
2 Bonny, and particularly if there was ever an event -- a  
3 very large flow event that might let us look at some sort  
4 of operation there. It was a very well received and  
5 successful meeting.

6 Also, within the Republican basin -- and I  
7 reported in recent years that the legislature of 2012  
8 created a mechanism to create something called local  
9 enhanced management areas, or LEMAs, to look at  
10 especially problems of groundwater declines and how to  
11 address them to -- to resolve potential conflicts, to  
12 extend the life of the aquifer.

13 And our Northwest Kansas GMD No. 4 --  
14 Shannon is here from that district -- has been very  
15 active in using that tool. There was a group of water  
16 users in Sheridan County, about 100 water right users  
17 that wanted to extend the life of their aquifer and  
18 committed through that tool to reduce use 20 percent and  
19 through the LEMA were provided some flexibilities in  
20 terms of how to best use that reduced source of water.  
21 That LEMA -- the Sheridan 6 LEMA was created through two  
22 hearings in 2012 and operated for a five-year period from  
23 2013 to this year. They went through a process of  
24 evaluating the LEMA and decided they wanted to continue,  
25 and I held a hearing this spring related to continuing



1 that LEMA and working on the orders related to that as we  
2 speak.

3 More recently, the GMD No. 4 has decided  
4 to ask for a district-wide LEMA that would apply to the  
5 entire district and basically looks at rates of decline  
6 by township within the GMD and appropriate controls  
7 depending on the level of declines that are being  
8 experienced. And tomorrow in Colby there will be the  
9 first of two hearings related to the consideration of  
10 creating that local enhanced management area. Again, the  
11 principal purpose is, again, to extend the life of that  
12 aquifer. Much of it's within the Republican basin in  
13 Kansas.

14 So those are sort of what's going on in  
15 the basin. I might, as I said, note a couple of things  
16 that are going on statewide. Legislatively this year it  
17 was not a very big issue but -- very big year for water  
18 issues. It was principally dealing with items related to  
19 taxation and budget, but there were a couple of bills  
20 that I would note.

21 There's Senate Bill 46 that had two  
22 provisions related to water. One is related to what we  
23 call impairment investigations. In times of shortage  
24 when there's insufficient supply for all water users, we  
25 administer junior water rights for senior. In surface

1 water situations, that's very straightforward. Our law  
2 applies to groundwater and surface water in the same  
3 priority system. In groundwater, the impairment  
4 investigations have been very complicated and sometimes  
5 difficult.

6 Our law provides two avenues for people  
7 who believe they're being impaired to be -- to obtain  
8 relief. One is through requesting the chief engineer to  
9 investigate and, as appropriate, take action. The second  
10 mechanism allows the person who believes they're being  
11 harmed to go to district court directly and through some  
12 district court actions that many water users thought were  
13 not appropriate. Essentially this legislation requires  
14 anyone who believes they're being injured by a junior  
15 water right to essentially go through the chief  
16 engineer's process before going through district court,  
17 in short.

18 The second component of Senate Bill 46 was  
19 amending provisions related to water conservation areas.  
20 This is another tool that I've reported in previous  
21 sessions about. Unlike LEMAs, the water conservation  
22 area is -- was created -- the mechanism was created in  
23 2015. It allows water users to essentially negotiate  
24 consent agreement with the chief engineer to facilitate  
25 water conservation and, again, typically to provide

1 flexibilities to reduce -- to make best use of the  
2 reduced water supply.

3           This is a tool that is -- we have a number  
4 of these areas that have been created and a lot of  
5 ongoing discussion of the tool. We have something called  
6 water technology farms that -- that we are cost sharing  
7 on irrigation improvements and technology improvements,  
8 and typically we cost share on technology improvements  
9 where -- in the water conservation area where essentially  
10 they're going to take the water savings from technology  
11 and instead of growing more corn or whatever, to actually  
12 save water. So this sort of combination has been working  
13 very effectively. So the legislation -- essentially this  
14 legislative session amended the conservation areas to  
15 allow us to -- sort of more abilities to order additional  
16 types of flexibilities and extended the areas to which  
17 water conservation areas could be applied for.

18           And, finally, there was a House Bill 2312  
19 that clarified proceedings for administration --  
20 administrative hearings conducted by the chief engineer.  
21 We've had a pretty active year in terms of promulgating  
22 additional regulations, especially related to civil  
23 penalties for pumping more water than authorized and not  
24 reporting water use. We have a very active program in  
25 those regards, and people are very supportive of these

1 programs. They want to make sure if they have to comply  
2 with their terms and conditions of their permits, that  
3 their neighbors are as well.

4 Okay. Just a couple -- actually I think  
5 with that, I'll conclude my report. So thank you very  
6 much.

7 MR. REIN: Thank you, Commissioner.  
8 Commissioner Fassett, would you like to go  
9 next, please?

10 MR. FASSETT: Sure. Thank you.

11 I guess I'll start by just saying, like  
12 David mentioned, it's been a pretty good year. It's  
13 obviously noteworthy we're in full compliance with the  
14 compact, and that is always an important thing.

15 I think -- what was noteworthy, I think,  
16 this year was the resolution that we all worked on for  
17 several years and approved just a year ago dealing with  
18 the new trigger level in the Kansas count, and the Kansas  
19 water allocation in Harlan County was triggered this  
20 year. So that level of relief was achieved. The water  
21 supply was established, and that sort of switches some of  
22 the accounting for the next year or so. So, again, it  
23 was -- maybe we didn't anticipate implementing those  
24 things so quickly but it worked and I think we're all  
25 adjusting to some of the new attributes of that

1 resolution.

2 Most of our activity -- most of our  
3 compliance activities, of course, are really focused on  
4 our natural resource districts; and they have done the  
5 heavy lifting for working with the state for a number of  
6 years now. And, once again, our compliance is really  
7 reliant upon the water management activities of the  
8 projects and things of that nature that our natural  
9 resource districts have been implementing for a number of  
10 years.

11 The yield that was achieved this year  
12 through all those activities was around 20,000-acre foot  
13 of water. That came as a result of the number of  
14 retirements, some reservoir purchases, some interim  
15 leasing arrangements, and, of course, significantly with  
16 water that comes from both the N-Corpe and the Rock Creek  
17 Augmentation projects that have been heavily used the  
18 last few years. While the pumping of those projects'  
19 augmentation was very high for a few years, for 2017 at  
20 least those numbers were finally down. So the balancing  
21 and the hydrologic cycling, if you will, under this  
22 compact is in effect; and it's interesting to watch how  
23 the accounting does shift back and forth between the dry  
24 and wet periods and how we try to get ahead of the curve  
25 and do -- try to bring much more predictability and

1 forecasting into the accounting activities that the state  
2 of Nebraska has to undertake.

3 So we routinely and really on a very  
4 regular basis work very closely with the districts --  
5 natural resource districts in our state to make sure  
6 we're ahead of the curve and can really shift away and  
7 into better water management for everybody. So we're  
8 looking forward to the accounting. I think we'll --  
9 hopefully we'll cycle out of two year to five year, and  
10 the five-year numbers are pretty good. But, again, we're  
11 always looking ahead, seeing what adjustments have to be  
12 made, and the difficulty that this particular compact  
13 brings us sometimes in trying to forecast ahead to make  
14 good management decisions on a timely manner.

15 We've commented before about the new water  
16 development fund that got created in Nebraska back in  
17 2014. It's called the Water Sustainability Fund. That  
18 fund has been through two cycles and is now in a third  
19 cycle of funding. It's an annual process. The  
20 legislature set this up a couple of years ago but the  
21 state of Nebraska has been suffering the consequences of  
22 some tight budget years and that fund was affected a  
23 little bit but survived for the good part. There's good  
24 support for investing in water development even in tight  
25 budget times. So that process is quite competitive.

1           Again, this year we just closed out our  
2 cycle of funding applications. We received about 24 of  
3 those for over \$20 million. The fund only has about  
4 15 million available this coming cycle. So it will be a  
5 competitive process as to which projects get funded.

6           I think for the purposes of our discussion  
7 here, what was really a positive surprise for us is that  
8 of the 24, 7 of those new applications were from entities  
9 within the Republican River Basin for almost half the  
10 money. So we're really beginning to shift, in my view,  
11 sort of away from the long days of controversy into  
12 really seeing a shift towards investment in the basin by  
13 both the surface water districts as well as the natural  
14 resource districts continuing to aggressively implement  
15 conservation, potential buyouts, and other projects that  
16 we think will benefit the whole basin for the long term.  
17 So we've been real pleased to see that shift away from  
18 controversy, away from litigation towards -- towards  
19 really investing in much more improved water management,  
20 and that will hopefully continue.

21           We've had ongoing -- and I think I've  
22 reported to the administration our basic planning process  
23 that also got started by a legislative directive. That  
24 is continuing. It's -- we just added a year to the  
25 process. It will probably take four years before we get

1 through this new basin planning process. It's been  
2 pretty effective, though. We've got 60 to 70 people  
3 showing up on a quarterly basis with lots of work going  
4 on in between. A number of the goals -- and this large  
5 group is operating under -- under a consensus approach to  
6 basin planning; and as challenging as I thought that  
7 personally was going to be, it's been a real pleasure to  
8 watch even some very difficult issues get tossed out and  
9 worked on by the stakeholders, by the water users  
10 themselves.

11 This isn't a process driven by the state  
12 or the natural resource districts. It's really turned  
13 over to the water users. So we're pleased to see that  
14 process going on. Even as late as our last meeting,  
15 which was just a couple of weeks ago, we're still getting  
16 some new ideas. In fact, Aaron and Craig here for the  
17 Bureau of Reclamation themselves, they're one of the  
18 stakeholders, the Bureau is. So they themselves brought  
19 forth some new ideas about potential water banking, water  
20 marketing that, again, are going to be controversial.

21 There's a lot of debate about those  
22 projects, but the group is beginning to really talk about  
23 some of those issues and how those can get rolled into  
24 any future management activities that we might take in  
25 the basin but continue to help us to stay in compliance



1 and to make best use of the water supply as we have it  
2 available.

3 I think in the past I've reported on some  
4 of the in-state litigation in this basin. Unfortunately  
5 it continues. But I'm pleased to report that there's no  
6 new litigation in the last couple of years, but we're  
7 still winding through things that got started during the  
8 very difficult years as we were transitioning to some of  
9 the other projects and coming out of the dry years and  
10 very aggressive regulatory actions that we were forced to  
11 take to maintain compliance.

12 Out of a series of about five cases, two  
13 of those have already been resolved generally in the  
14 state's favor certainly. One case has been withdrawn.  
15 We were successful in working very closely with the  
16 Nebraska Bostwick district and had a litigation actually  
17 taken away and opened the doors for some more positive  
18 activities there. And then there's two cases remaining.  
19 I think Mr. Lavene will be busy in the Nebraska Supreme  
20 Court here next week arguing those cases in the next  
21 month or two. So there's a couple of more matters that  
22 still are wrestling with the state law and related issues  
23 in this basin that have not yet kind of been run to  
24 ground, and we'll just await any further guidance from  
25 the court. But so far that -- again, that's been

1 positive and, as I've said, we're really pushing and  
2 seeing a transition away from constantly running to court  
3 and actually working on some other projects.

4 Speaking of those investments, Frenchman  
5 Cambridge Irrigation District received a grant from this  
6 water sustainability fund over a year ago; and they very  
7 quickly instituted a whole series of control activities,  
8 engaged some measuring devices and controls through an  
9 automated system that they have quickly moved to have  
10 installed and are operating and really learning a lot  
11 this year, the first year of activity. We're hopeful  
12 that, again, will allow them to continue to sort of  
13 tighten up the operational and management of the supplies  
14 that they have for their district.

15 Again, one of the applications this year  
16 was a new project from the Nebraska Bostwick project,  
17 again, looking for direct-funding support for new  
18 activities there.

19 I've reported in the past -- and I know,  
20 David, you've always been interested in the proposed new  
21 basin transfer project. We call this the Platte  
22 Republican Diversion Project. The sponsors of that  
23 project -- again, a couple of the natural resource  
24 districts have applied for funding to help fund that  
25 project. We're still awaiting the application -- water

1 right permit application. That will be required for that  
2 project to move forward; and, again, the concept is to  
3 potentially make use of some surplus waters during times  
4 of plenty on the Platte and to move that water into the  
5 Republican basin upstream of Harlan County as yet another  
6 sort of augmentation approach to help us maintain water  
7 management in compliance with the compact. So that  
8 project is still out there. Like I said, they haven't  
9 seen the water right application yet; but that will be  
10 coming in, I suspect, sometime soon.

11 And then we -- again, our districts are  
12 continuing to stay pretty aggressive in investing in  
13 water management activities, the soil moisture probes,  
14 metering, really pretty strict enforcement on the  
15 groundwater irrigators across this basin. So they take  
16 the heat, but they're taking the actions that are really  
17 very supportive of the state's efforts for us to really  
18 manage this basin.

19 And, again, I think I just want to point  
20 out for my fellow states here that we really are seeing a  
21 positive shift; and I appreciated Dave's comments about  
22 the activities within KBID. David, I think -- as you  
23 know, we're going to continue to look for the districts  
24 and the Bureau and the states to work together to really  
25 begin to emphasize the conjunctive use, conjunctive water

1 management side of what's going on in this basin. We  
2 think there's some real benefits that we all can benefit  
3 from by just really monitoring and managing the supplies  
4 that we do have perhaps more carefully for beneficial  
5 uses for all of us in the future.

6 So, Mr. Chairman, that will be my report  
7 for today. Thank you.

8 MR. REIN: Thank you, Commissioner.

9 For Colorado's report, mine will be a  
10 little bit more brief today than perhaps you're used to  
11 as I'm in my getting-my-feet-wet period. So hopefully  
12 this is helpful to you, and then feel free to ask  
13 questions.

14 As you all know -- I'm reporting something  
15 you all know. Former Commissioner from Colorado, Dick  
16 Wolfe, retired June 30th. So that's exactly why I'm  
17 sitting here today, as you know. I think you all were  
18 very much familiar with Dick's leadership and his ability  
19 to work with people. We're going to have a resolution  
20 read into the record regarding Dick later on in the  
21 meeting.

22 But with Dick leaving and his reporting to  
23 me the things that have been going on, it's good for me  
24 to know that the states resolved some longstanding  
25 issues. That -- that was in August of last year, and

1 then last May we managed to get the compact accounting  
2 updated through 2015. And, again, that's just one  
3 more -- one more way in which I enjoyed the leadership of  
4 Dick and then also the work that you-all have put in as I  
5 come into this position. I look forward to continuing  
6 the work with Nebraska and Kansas on these issues and  
7 keep addressing these issues as we move forward.

8 A couple of more specific items: One, I  
9 wanted to mention that last year Colorado -- we reported  
10 on the successful CREP rental rate increase and just our  
11 appreciation of the other states in that process. So  
12 thank you for that.

13 This year, in response to our August  
14 agreement, we've proposed to amend the CREP contract with  
15 the USDA to make that process a little more efficient and  
16 right now with the change in the federal administration,  
17 things are a bit slow with that change but we would  
18 really appreciate the other states' support and quickly  
19 completing that amendment. So that's a note.

20 The other thing I'll bring up is that last  
21 year I know Colorado reported that we were working on the  
22 compact rules for our in-state administration, and those  
23 were in progress. Some really good work was being done.  
24 We are at a situation now where we had to pause on that.  
25 We're looking at a statute to fix an understanding or

1 give some clarity as to how disputes would be handled and  
2 where -- more importantly, where disputes would be  
3 handled. So that means that we, as I said, hit the pause  
4 button on that.

5 We're working on some legislation. We're  
6 looking at having that introduced into our upcoming  
7 session. If that process works out well, then we'll have  
8 that guidance or that clarity that we need going forward  
9 with the rule making and then be able to complete the  
10 rules process after this statutory fix is made. So we're  
11 looking forward to getting that clarity and moving ahead  
12 with that.

13 With that, as I said, that will be my  
14 brief report for you-all. Thanks.

15 Okay. Moving ahead on the agenda, next,  
16 we'd like to do the federal reports; and the first one,  
17 if I could ask the Bureau of Reclamation, it looks like  
18 not Aaron but Craig will be -- Craig Scott from the  
19 Bureau of Reclamation McCook office. Thank you, Craig.

20 MR. SCOTT: Good morning, Commissioners.  
21 I as well have a very brief report as well. Again, my  
22 name is Craig Scott. I'm representing Nebraska, Kansas  
23 area office with the Bureau of Reclamation. And our  
24 report is contained in a handout that I provided to each  
25 of the commissioners on your tables, and I've also

1 provided extra copies at the back of the room on the  
2 table.

3           Within that report, we've summarized our  
4 2016 reservoir operations as well as our water supplies  
5 and deliveries for 2016; and then you will find -- also  
6 find a brief synopsis of our operations through the first  
7 seven months of 2017 ending there on July 31st.

8           So with that, unless there's questions,  
9 that would conclude the report that we have for you.

10           MR. REIN: Do we have any questions for  
11 Mr. Scott? Thank you.

12           Next on the agenda is the Corps of  
13 Engineers, and we do not have a representative from the  
14 Corps of Engineers here today. There is a report that  
15 we've received. I believe that report is focused on the  
16 Harlan County Dam and gate repair on it, just for the  
17 record; but other than knowing that we've received that  
18 report -- and there are some copies of that report at the  
19 back. And beyond that, we'll just leave the agenda item  
20 at that.

21           Then next up will be USGS. This is John  
22 Miller from the Kansas office.

23           MR. MILLER: Good morning, Commissioners.  
24 I'd like to thank you for the opportunity to present the  
25 data that the U.S. Geological Survey has collected in

1 Nebraska. My report also is going to be brief.

2 I'd like to refer to the handout.

3 Hopefully everybody has gotten one. I placed a handout  
4 on each of the desks. I believe the handout is really  
5 clear, and it kind of defines the trends in data that was  
6 collected in this last -- last water year.

7 Some things I would like to point out, the  
8 Arikaree River gauge did see consistent flows these last  
9 months. Due to the low flows that have been in that or  
10 no flows at that site, there's been significant  
11 vegetative growth. I sent an email out concerning this  
12 gauge. The USGS, we're always looking for a better way  
13 to collect better discharge record; and this was one of  
14 the most significant problems I've seen.

15 With the vegetation and then the  
16 consistent flows brought the -- brought beavers into the  
17 reach and I worked with the landowner and we were able to  
18 remove some of them but the record through this year,  
19 it's going to be flagged as estimated just because of the  
20 unknown stage discharge relationship but not to belabor  
21 that issue but we definitely are pursuing the idea to  
22 have a weir installed that definitely would -- would  
23 improve the quality -- quality of that record.

24 Moving -- moving to the next site, I had  
25 mentioned last year that we had installed a radar gauge



1 at the North Fork of the Republican; and I'd like to  
2 report that that radar gauge has improved the quality of  
3 that record. That technology is really amazing. So  
4 we're definitely installing those as we can throughout  
5 the Republican basin.

6 Just a couple of notes, kind of the  
7 highlights of -- and, again, this is represented well on  
8 that handout. The Rock Creek gauge and the Republican at  
9 Benkelman gauge -- I believe it's not a compact gauge,  
10 but it's within the basin -- both recorded the lowest  
11 annual mean discharge for the period of record. And the  
12 Frenchman Creek at Palisade gauge recorded a second to  
13 the all-time low annual mean for the 2016 water year.  
14 Not great numbers to hear, but that is what we observed.

15 I guess overall, to kind of summarize what  
16 we're seeing, you know, the trend of the reduction in  
17 annual mean flows does continue through much of the  
18 basin. However, there has been some leveling and some  
19 isolated tribs and then some main stem reaches that those  
20 annual means seem to -- seem to be stabilizing out and not  
21 continuing to drop for various reasons.

22 But, again, I'd like to point everybody to  
23 the handout. If there's any questions concerning that,  
24 I'll entertain those now or afterwards is fine, too.

25 MR. REIN: Any questions from the

1 commissioners?

2 Okay. Thank you, John.

3 MR. MILLER: Thank you.

4 MR. REIN: Moving ahead on the agenda,  
5 committee reports, I'd like to move over to the  
6 engineering committee and turn that over to Ivan.

7 Ivan, thank you.

8 MR. FRANCO: Thank you, Commissioner Rein.

9 As the commissioner said, my name is Ivan  
10 Franco. I'm the current engineering committee chair for  
11 Colorado; and as that, it's my pleasure to address the  
12 engineering committee report for 2017. Each state should  
13 have what is a final copy of that engineering committee  
14 report.

15 For purposes of Agenda Item 6(a)(i),  
16 Assignments from the 2016 Annual Meeting, I'll simply  
17 read into the record the executive summary of said  
18 engineering committee report.

19 The engineering committee met four times  
20 since last August's Republican River Compact  
21 Administration annual meeting. Over the past year, the  
22 engineering committee completed these assignments: One,  
23 hold quarterly minutes. The minutes for those quarterly  
24 meetings are included as Attachments 1 through 4 in the  
25 engineering committee report.

1 Two, exchange information listed under  
2 Section V of the RRCA Accounting Procedures and Reporting  
3 Requirements, including all required data and  
4 documentation.

5 Three, continue work and provide future  
6 updates on improving accounting tools developed by the  
7 engineering committee.

8 Four, continue to explore options for  
9 sharing evaporation charges for Harlan County Lake when  
10 accounts exist separate from the project water supplies  
11 of the Bostwick Irrigation District and explore potential  
12 means to adjust the compact accounting of Harlan County  
13 Lake for the mutual benefit of the states.

14 Five, work to resolve the issues  
15 preventing agreement on final accounting for 2006 through  
16 2015.

17 And, six, work to finalize the 2016  
18 accounting.

19 Ongoing assignments include, one, continue  
20 efforts to resolve concerns related to varying methods of  
21 estimating ground and surface water recharge and return  
22 flows and related issues.

23 Two, discuss developing an application and  
24 approval process for future augmentation plans.

25 Three, assign responsibility for

1 collecting specific fields of data collected for the  
2 annual data exchange.

3 Four, create a document memorializing when  
4 RRCA accounting procedures have changed over the past  
5 years and incorporate it into the accounting procedures.

6 Five, work on producing a RRCA public  
7 website.

8 The engineering committee recommends  
9 discussion by the RRCA on the exchange of data and  
10 documentation and the modeling runs completed by  
11 Principia Mathematica for 2016, discussion on the  
12 proposed 2016 accounting, direction from the  
13 commissioners on RRCA draft website, and the recommended  
14 engineering committee assignments for the following  
15 years.

16 Now, I'll just note that the discussion on  
17 those last items took place this morning at the  
18 engineering committee workshop. So I'll just go through  
19 and highlight a couple of the pertinent engineering  
20 committee recommendations for the compact administration  
21 for 2016.

22 Specifically, the engineering committee  
23 recommends approval of the 2016 accounting as  
24 Attachment 5 to the engineering committee report. It was  
25 a spreadsheet which is titled

1 RRCA\_accounting\_2006\_final.xlsx. Again, this is  
2 Attachment No. 5 to the engineering committee report.

3 Further discussions that took place this  
4 morning at the engineering committee workshop covered an  
5 internal accounting tool that was developed by the  
6 engineering committee. The discussion produced the  
7 recommendation that the accounting tool developed by  
8 internal -- essentially having data from 1995 on as  
9 inputs and tables. Said tool will remain an internal  
10 resource which can be distributed to interested parties  
11 upon request, but that will remain internal. So that  
12 differs slightly from what was included in the  
13 engineering committee report.

14 Secondly, the engineering committee made  
15 some recommendations regarding a potential web -- RRCA  
16 website committee. The result of that was that the  
17 commissioners delegated the engineering committee to  
18 move -- let me take a step back there.

19 The commissioners assigned the engineering  
20 committee to summarize and document -- sorry. I got  
21 confused here on my notes. I apologize. Let me start  
22 again.

23 The commissioners delegated the  
24 engineering committee to move forward with the RRCA  
25 public website and to approve -- and to approve and add

1 content by consensus. So that was the result of that  
2 discussion, and it's -- it's going to be incorporated as  
3 an assignment to the engineering committee for the coming  
4 year.

5 As for further discussion that took place,  
6 this added an additional engineering committee  
7 assignment; and I'll just go ahead and read that into the  
8 record.

9 The commissioners assigned the engineering  
10 committee to summarize and document the status of  
11 Table 4(a) in the RRCA accounting procedures and  
12 recommend how said document should be memorialized.

13 So with that, I'll just note that this --  
14 the recommended assignments for the engineering committee  
15 are included in the report that was distributed; and with  
16 the additions that I noted, that will make up a total of  
17 12 assignments for the coming year.

18 I believe that will conclude my report for  
19 the engineering committee's activities over the past  
20 year. Does anyone have any questions or additions that  
21 are needed?

22 MR. BARFIELD: Just one clarification, I  
23 think when you were reading off the accounting  
24 spreadsheet name -- and I may have heard you wrong, but I  
25 thought you said 2006. It should have been 2016,

1 correct?

2 MR. FRANCO: My apologies.

3 MR. BARFIELD: Right. Right. Okay.

4 Other than that, thank you for the report.

5 MR. REIN: Thank you, Commissioner. Thank  
6 you, Ivan. Ivan, just checking, was there an item in  
7 there that needed action from the commissioners today?

8 MR. FRANCO: What we'll take action on is  
9 just approving the engineering committee report as  
10 proposed.

11 MR. REIN: Thank you very much.

12 Moving on to old business, we do have an  
13 item -- again, I'm going to look to you, Ivan. 2015  
14 annual report, is that something you can explain further?

15 MR. FRANCO: Sure. It would be my  
16 pleasure to discuss that.

17 So the 2015 annual report has been  
18 prepared by the responsible party and copies of that  
19 report -- final copies have been distributed to each of  
20 the states. The engineering committee presents this as  
21 old business that's ready to be acted upon by the  
22 commission today. The engineer committee recommends  
23 approval of the 2015 annual report as presented today.  
24 We have copies available for everyone.

25 MR. REIN: Thank you, Ivan.

1           And for this one, I do not see a later  
2 agenda item. So, Commissioners, is it appropriate now to  
3 ask for a motion to accept that accounting -- or that  
4 report?

5           MR. BARFIELD: Yes, I think that's  
6 appropriate. And I would move adoption of the 2015  
7 annual report that has been distributed to the states.

8           MR. REIN: And I'll second that.  
9 Is there any other discussion on that?  
10 Okay. All in favor of that motion?

11          MR. FASSETT: Aye.

12          MR. REIN: Aye.

13          MR. BARFIELD: Aye.

14          MR. REIN: Opposed?

15          The motion carries. It's been adopted.

16          So moving on to new business, then we  
17 do -- I guess we do have that spot in the agenda that I  
18 jumped ahead to just a few minutes ago. Based on that  
19 engineering committee report, we do have actions that --  
20 that are there for the commissioners to act on.

21          And, again, forgive me. Do we need to go  
22 back and identify those as discrete items, or can we look  
23 back at the report that Ivan gave us and make a broad  
24 motion to accept that?

25          MR. FASSETT: Yeah. Mr. Chairman, I think



1 that is the correct procedure. So I'll move that we  
2 adopt the engineering report and embedded in that are the  
3 recommended assignments to the committee from the  
4 commission.

5 MR. BARFIELD: I would second.

6 And, again, just to clarify, Ivan, you --  
7 so there's -- there's 11 items that are listed as  
8 assignments in the report. We're amending No. 8 to  
9 essentially authorize the engineering committee to  
10 develop the website by consensus and then adding of  
11 No. 12 related to the documentation of the Table 4(a),  
12 right?

13 MR. FRANCO: (Nods head.)

14 MR. REIN: Okay. So I have a motion and  
15 second and further clarified by Commissioner Barfield.

16 Any more discussion on that, Commissioner?  
17 Then all in favor of that motion?

18 MR. BARFIELD: Aye.

19 MR. FASSETT: Aye.

20 MR. REIN: No opposed?

21 That motion carries.

22 Similarly I'll ask for an action -- I'll  
23 ask for a motion on the 2016 accounting.

24 MR. BARFIELD: Certainly. So I would -- I  
25 would move that we approve the 2016 accounting that is

1 noted in the engineering committee report, summarized in  
2 the engineering committee report, and including the  
3 spreadsheet that Ivan noted.

4 MR. FASSETT: Second.

5 MR. REIN: Motion and seconded. Is there  
6 any further discussion on that?

7 If not, all in favor?

8 MR. FASSETT: Aye.

9 MR. BARFIELD: Aye.

10 MR. REIN: No opposed?

11 That motion carries.

12 At this point in the agenda I'd like to  
13 just cue up for us the resolution honoring Dick Wolfe and  
14 his service so that we can take action on that. We do  
15 have a resolution. I would like to read it into the  
16 record. And -- and just a reminder, of course, Dick was  
17 invited for this. He had a conflict and could not make  
18 it, and we certainly respect that. I feel in some ways,  
19 from talking to him, he's been just as busy since he  
20 retired as he was before. If you know Dick, that's not  
21 hard to imagine. But I will read this resolution into  
22 the record and for our --

23 MR. FASSETT: Is he fishing or is --

24 MR. REIN: I think Dick Wolfe is doing a  
25 lot of manual labor. The old farm boy is not going to

1 sit home and watch TV, I got a feeling.

2 Okay. This is a resolution of the  
3 Republican River Compact Administration honoring Dick  
4 Wolfe. Whereas, Dick Wolfe, from Broomfield, Colorado,  
5 has resigned his position as Colorado state engineer and  
6 director of the Colorado Division of Water Resources and,  
7 thus, Colorado commissioner for the Republican River  
8 Compact Administration after having served faithfully in  
9 that position for 10 years.

10 And, whereas, as the Colorado commissioner  
11 to the Republican River Compact Administration and the  
12 director of the Colorado Division of Water Resources,  
13 Dick has diligently represented the compact interests of  
14 the state of Colorado and the residents of the Republican  
15 River basin in Colorado.

16 And, whereas, while diligently  
17 representing the state of Colorado and its constituents,  
18 Dick exhibited professionalism, integrity, and provided  
19 leadership and guidance in addressing the complex issues  
20 of water administration and compact compliance,  
21 continually reaching out to the states of Kansas and  
22 Nebraska to reach fair and reasonable solutions to the  
23 many issues associated with administering the Republican  
24 River compact.

25 And, whereas, Dick's expertise in water

1 matters, diligence, positive attitude, and willingness to  
2 explore alternative resolution to problems has been an  
3 asset to the Republican River Compact Administration and  
4 the state of Colorado.

5 Now, therefore, be it hereby resolved that  
6 the Republican River Compact Administration does hereby  
7 express its sincerest gratitude and appreciation to Dick  
8 Wolfe for his dedicated service to the Republican River  
9 Compact Administration in his position of Colorado  
10 commissioner, and extends its best wishes to Dick Wolfe  
11 in all his future endeavors.

12 Be it further resolved that the Republican  
13 River Compact Administration honors Dick Wolfe's service  
14 by including this resolution and appropriate dedicatory  
15 remarks in the Republican River Compact Administration  
16 annual report for compact year 2016 and hereby instructs  
17 the Colorado commissioner to send copies of this  
18 resolution to the Wolfe family and the governor of the  
19 state of Colorado.

20 Entered, this 22nd day of August 2017 at  
21 the annual meeting of the Republican River Compact  
22 Administration held in Burlington, Colorado with the  
23 commissioners as signatories to this resolution.

24 I -- I'll put that before the  
25 commissioners for any comment and for a motion to adopt

1 that resolution.

2 MR. FASSETT: Mr. Chairman, very well  
3 said; and I'll move adoption of the resolution as you  
4 recited.

5 MR. BARFIELD: And, yes, I would heartily  
6 second the motion. Dick has been a pleasure to work  
7 with, and we've made a lot of progress in his stead. So,  
8 yes. Thank you for bringing the motion.

9 MR. REIN: All right. Thank you.

10 We have a motion and second. Any further  
11 discussion? I assume not. So all in favor say aye.

12 MR. FASSETT: Aye.

13 MR. BARFIELD: Aye.

14 MR. REIN: There's no opposed. The  
15 resolution is adopted. Thank you for that.

16 Next on the agenda, we're going to move to  
17 public comment; and I might suggest, as you use that  
18 microphone, you may want to hold it in your hand up to  
19 your mouth because it does not pick up quite as well as  
20 when it's in the stand.

21 MR. PAUTLER: My name is Tim Pautler. I  
22 farm over in Stratton, Colorado. I represent the RRWCD  
23 here this morning as well as the Plains Groundwater  
24 Management District.

25 I want to thank all three states for doing

1 what they do for us in compact -- in regard to the  
2 compact. Welcome you here. It's not always this green  
3 in Eastern Colorado; and if this meeting is what it takes  
4 to keep it that way, we will be more than happy to host  
5 your next meeting.

6 My comments this morning are related  
7 briefly in regard to what Commissioner Rein from Colorado  
8 said concerning the Republican River CREP. We're having  
9 some issues back in D.C.; and we're just asking for your  
10 support, Nebraska and Kansas, in that regard.

11 We went back there in February of this  
12 year and made the pitch for our issues, and it's just  
13 been a hard grind getting to a point where we have an  
14 amendment that's agreed upon. And so we're asking for  
15 your support because it goes without saying -- in our  
16 state, anyway -- this CREP amendment is huge as far as  
17 meeting our obligation to the three-state agreement that  
18 was signed into effect a year ago. So whatever you can  
19 do would be greatly appreciated.

20 One other comment that I would -- I think  
21 would be appropriate to make, representing the Plains  
22 Groundwater Management District, a year -- or last  
23 December we hosted a meeting of Kansas folks to start  
24 investigating what a LEMA concept -- not necessarily  
25 everything exactly like it is in the state of Kansas, but

1 we've been working with our producers and having some  
2 very informal informational meetings to try to -- how do  
3 I want to say it?

4 At my farm northeast of Stratton, at one  
5 time in the 1960s, I probably had 60, 70 feet of water in  
6 the domestic well. In 2012, I was down to 17 feet. So  
7 my -- my concern is certainly documented in that comment.  
8 We need to figure out how to become more efficient with  
9 what we've got left; and I'm just wanting to make the  
10 statement that the groundwater management district here  
11 in the plains in Eastern Colorado in Kit Carson County,  
12 we're starting that effort. And I can appreciate all the  
13 amount of time and effort all three states have done in  
14 this regard because this is a huge task to undertake; and  
15 to see where Kansas has started, what it took to get  
16 where you're at, we're just going through that process.

17 So we really appreciate the folks coming  
18 over here from Kansas and helping us kind of walk through  
19 a format that we might model after and we're looking  
20 forward to the process continuing along with our state's  
21 help and we'll see where it goes. But thank you very  
22 much for your time.

23 MR. BARFIELD: Excuse me. Could you bring  
24 the mic?

25 Actually I appreciate, Tim, your remarks;

1 and I actually wanted to add -- respond to a certain  
2 degree. You know, the three states have been very active  
3 in working out these last three years a lot of these  
4 disputes; and even though the -- you know, a lot of these  
5 disputes are behind us, we're not done working together;  
6 and we're actually going to be meeting just after this  
7 meeting to continue to talk about how to work together to  
8 build on what we've done.

9 And so we'll -- we are very interested in  
10 seeing what we can do to be supportive of the CREP tool.  
11 It's a tool that all the three states have used and,  
12 also, to find other ways to work together better.

13 So appreciate your remarks. And I need to  
14 introduce you to Susan Metzger who is here, maybe after  
15 the meeting. She and Tracy Streeter, both, are pretty  
16 active with our legislative issues. So we would like to  
17 work together and have those discussions. So thanks.

18 Other public comments?

19 MR. REIN: Thank you, Commissioner; and,  
20 thank you, Tim.

21 Is there anyone else that would like to  
22 make a public comment this morning?

23 If not, then I think what the  
24 commissioners have before us is a housekeeping item,  
25 future meeting arrangements.



1 MR. BARFIELD: Yeah. And I think now --  
2 this is Colorado's second year. So the rotation will go  
3 to Kansas next year. So we're expecting to have the  
4 annual meeting the week of October 20. We don't have  
5 a --

6 MR. BEIGHTEL: August.

7 MR. BARFIELD: August 20. Thank you.  
8 In Manhattan, Kansas. So we'll work  
9 together to get the date pinned down as we move forward,  
10 but that's the plan.

11 MR. REIN: Thank you, Commissioner.

12 Is there anything else, then, for the  
13 commissioners on the agenda for this morning?

14 If not, I'll entertain a motion to adjourn  
15 the meeting.

16 MR. BARFIELD: I would move we adjourn.

17 MR. REIN: I'll second that.

18 MR. FASSETT: Aye.

19 MR. REIN: With no further discussion, all  
20 in favor?

21 MR. BARFIELD: Aye.

22 MR. REIN: This meeting stands adjourned.  
23 Thank you.

24 (The meeting concluded at 11:45 a.m.)

25

CERTIFICATE OF DEPOSITION OFFICER

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STATE OF COLORADO )  
CITY AND COUNTY OF DENVER )

I, Jessica R. Benson, do hereby certify that I am a Certified Shorthand Reporter within and for the State of Texas and Notary Public within and for the State of Colorado.

I further certify that this meeting was taken in shorthand by me at the time and place herein set forth and was thereafter reduced to typewritten form and that the foregoing constitutes a true and correct transcript.

My commission expires: February 22, 2020.

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Jessica R. Benson  
Certified Shorthand Reporter - TX  
Notary Public, State of Colorado

**Republican River Compact Administration**

**2017 Annual Meeting  
August 22, 2017**

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## Republican River Compact Administration

2017 Annual Meeting  
August 22, 2017

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<p>44:4 <b>Streeter</b> 6:11 45:15 <b>strict</b> 24:14 <b>studies</b> 12:12 <b>successful</b> 13:5 22:15 26:10 <b>successfully</b> 12:1 <b>suffering</b> 19:21 <b>suggest</b> 42:17 <b>Sullivan</b> 4:23 <b>summarize</b> 30:15 34:20 35:10 <b>summarized</b> 28:3 39:1 <b>summary</b> 31:17 <b>superintendent</b> 8:9 <b>supplies</b> 23:13 25:3 28:4 32:10 <b>supply</b> 12:15 14:24 16:2 17:21 22:1 <b>supply-wise</b> 11:11 <b>support</b> 19:24 23:17 26:18 43:10,15 <b>supporting</b> 8:16 <b>supportive</b> 16:25 24:17 45:10 <b>Supreme</b> 22:19 <b>surface</b> 14:25 15:2 20:13 32:21 <b>surplus</b> 24:3 <b>surprise</b> 20:7 <b>Survey</b> 9:6 28:25 <b>survived</b> 19:23 <b>Susan</b> 6:5 45:14 <b>suspect</b> 24:10 <b>sustainability</b> 19:17 23:6 <b>switches</b> 17:21 <b>synopsis</b> 28:6 <b>system</b> 15:3 23:9</p>	<hr/> <p><b>T</b></p> <hr/> <p><b>table</b> 6:24 7:9 9:18 28:2 35:11 38:11 <b>tables</b> 27:25 34:9 <b>takes</b> 43:3 <b>taking</b> 24:16 <b>talk</b> 12:25 21:22 45:7 <b>talking</b> 39:19 <b>task</b> 44:14 <b>taxation</b> 14:19 <b>tea</b> 3:24 <b>team</b> 7:4,5 <b>technology</b> 16:6,7, 8,10 30:3 <b>term</b> 20:16 <b>terms</b> 11:10,15 13:20 16:21 17:2 <b>thing</b> 9:23 17:14 26:20 <b>things</b> 11:6 12:17 14:15 17:24 18:8 22:7 25:23 26:17 29:7 <b>Thompson</b> 8:1 <b>thought</b> 15:12 21:6 35:25 <b>three-state</b> 43:17 <b>tight</b> 19:22,24 <b>tighten</b> 23:13 <b>Tim</b> 9:1 42:21 44:25 45:20 <b>time</b> 4:10 7:2 44:5, 13,22 <b>timely</b> 19:14 <b>times</b> 11:12 12:17 14:23 19:25 24:3 31:19 <b>titled</b> 33:25 <b>Titus</b> 6:6 <b>today</b> 3:5,12,16 4:13,</p>	<p>16 6:2 25:7,10,17 28:14 36:7,22,23 <b>Todd</b> 8:20 <b>Tom</b> 8:15 <b>tomorrow</b> 14:8 <b>tool</b> 13:15,18 15:20 16:3,5 34:5,7,9 45:10,11 <b>tools</b> 32:6 <b>tossed</b> 21:8 <b>total</b> 35:16 <b>township</b> 14:6 <b>Tracy</b> 6:11 8:4 45:15 <b>traffic</b> 3:6 <b>transcripts</b> 3:25 10:16,20 <b>transfer</b> 23:21 <b>transition</b> 23:2 <b>transitioning</b> 22:8 <b>trencher</b> 12:5 <b>trend</b> 30:16 <b>trends</b> 29:5 <b>tribs</b> 30:19 <b>trigger</b> 17:18 <b>triggered</b> 17:19 <b>trip</b> 3:5 <b>turn</b> 31:6 <b>turned</b> 21:12 <b>TV</b> 40:1 <b>types</b> 16:16 <b>typically</b> 15:25 16:8</p> <hr/> <p style="text-align: center;"><b>U</b></p> <hr/> <p><b>U.S.</b> 9:5 28:25 <b>understand</b> 3:22 10:19 <b>understanding</b> 26:25 <b>undertake</b> 19:2</p>	<p>44:14 <b>unknown</b> 29:20 <b>Unlike</b> 15:21 <b>upcoming</b> 27:6 <b>updated</b> 26:2 <b>updates</b> 32:6 <b>upstream</b> 24:5 <b>USDA</b> 26:15 <b>users</b> 13:16 14:24 15:12,23 21:9,13 <b>USGS</b> 8:11 28:21 29:12</p> <hr/> <p style="text-align: center;"><b>V</b></p> <hr/> <p><b>varying</b> 32:20 <b>vegetation</b> 29:15 <b>vegetative</b> 29:11 <b>view</b> 20:10</p> <hr/> <p style="text-align: center;"><b>W</b></p> <hr/> <p><b>walk</b> 44:18 <b>wanted</b> 13:17,24 26:9 45:1 <b>wanting</b> 44:9 <b>Warren</b> 12:14 <b>watch</b> 18:22 21:8 40:1 <b>water</b> 3:10,24 5:10, 22 6:9,11 7:20 8:14 9:3 11:11,17 12:15 13:15,16,20 14:17, 22,24,25 15:1,2,12, 15,19,21,23,25 16:2, 6,9,10,12,17,23,24 17:19,20 18:7,13,16 19:7,15,17,24 20:13, 19 21:9,13,19 22:1 23:6,25 24:4,6,9,13, 25 28:4 29:6 30:13 32:10,21 40:6,12,20, 25 44:5 <b>waters</b> 24:3</p>	<p><b>ways</b> 39:18 45:12 <b>web</b> 34:15 <b>website</b> 33:7,13 34:16,25 38:10 <b>week</b> 22:20 46:4 <b>weeks</b> 21:15 <b>weir</b> 29:22 <b>wet</b> 18:24 <b>willingness</b> 41:1 <b>winding</b> 22:7 <b>wishes</b> 41:10 <b>withdrawn</b> 22:14 <b>Wolfe</b> 12:22 25:16 39:13,24 40:4 41:8, 10,18 <b>Wolfe's</b> 41:13 <b>work</b> 3:6 5:2 11:20 12:5 19:4 21:3 24:24 25:19 26:4,6,23 32:5, 14,17 33:6 42:6 45:7, 12,17 46:8 <b>worked</b> 17:16,24 21:9 29:17 <b>working</b> 5:19 6:22 14:1 16:12 18:5 22:15 23:3 26:21 27:5 44:1 45:3,5 <b>works</b> 27:7 <b>workshop</b> 33:18 34:4 <b>wrestling</b> 22:22 <b>wrong</b> 35:24</p> <hr/> <p style="text-align: center;"><b>Y</b></p> <hr/> <p><b>y'all</b> 3:5,22 <b>year</b> 11:11,13,14 12:20 13:23 14:16,17 16:21 17:12,16,17, 20,22 18:11 19:9 20:1,24 23:6,11,15 25:25 26:9,13,21 29:6,18,25 30:13 31:21 35:4,17,20 41:16 43:12,18,22</p>
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46:2,3

**years** 6:1 12:16 13:7  
17:17 18:6,10,18,19  
19:20,22 20:25 22:6,  
8,9 33:5,15 40:9 45:3

**yield** 18:11

**you-all** 3:11,15,24  
9:15 26:4 27:14

**Yuma** 9:11

**ANNUAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION**

August 22, 2017

**Burlington, Colorado**

Name	Representing
Kevin Rein	Colorado Commissioner and Chairperson
Scott Steinbrecher	Colorado Attorney General's Office
Ivan Franco	Colorado Division of Water Resources
Mike Sullivan	Colorado Deputy State Engineer
Jesse Bradley	Nebraska Department of Natural Resources
Justin Lavene	Nebraska Attorney General's Office
Tom Riley	Flatwater Group
Lane Letourneau	Kansas Division of Water Resources
Chris Beightel	Kansas Division of Water Resources
David Barfield	Kansas Commissioner
Alek Boyce	Middle Republican NRD, Nebraska
Scott Dicke	Lower Republican NRD, Nebraska
Kenneth Titus	Kansas Department of Agriculture Legal Counsel
Mike Clements	Lower Republican NRD, Nebraska
Craig Scott	Bureau of Reclamation
Marc Groff	Flatwater Group
Gordon W. "Jeff" Fassett	Nebraska Commissioner
Tracy Streeter	Kansas Water Office
Deb Daniel	Republican River Water Conservation District
Devin Ridnour	Colorado Division of Water Resources
Peter Ampe	Hill and Robbins
Kevin Holle	Kansas Farmer
Aaron Thompson	U.S. Bureau of Reclamation
Tracy Smith	Nebraska Bostwick Irrigation District
Ross Montgomery	Nebraska Bostwick Irrigation District
Jared "Pete" Gile	Kansas Bostwick Irrigation District

**ANNUAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION**

August 22, 2017

**Burlington, Colorado**

Name	Representing
Lori Marintzer	U.S. Geological Survey
Rod Mason	Arikaree Groundwater District
Brandi Baquera	Plains Groundwater Management District
Tim Pautler	Plains Groundwater Management District
John Miller	U.S. Geological Survey
Shannon Kenyon	Groundwater Management District in Colby
Dan Stephens	Area Farmer
Don Brown	Colorado Commissioner of Agriculture
Don Blankenau	Outside Legal Counsel for Nebraska
Chelsea Erickson	Kansas Division of Water Resources
Chris Kucera	Colorado Division of Water Resources
Matt Hardesty	Colorado Division of Water Resources
Corey DeAngelis	Colorado Division of Water Resources
Breann Ferguson	Colorado Division of Water Resources
Ginger Pugh	Kansas Division of Water Resources
Dave Keeler	Colorado Division of Water Resources
Susan Metzger	Kansas Water Office
Earl Lewis	Kansas Water Office
Jessica R. Benson	Court Reporter
Todd Siel	Lower Republican NRD, Nebraska

**Republican River Compact Administration – Annual Meeting Attendance Sheet**  
**August 22, 2017**

Location Burlington, CO

Name – Please print legibly	Affiliation/Group
Chris Beightel	KDA-DWR
Devin Ridhour	Co DWR
David Barfield	KDA-DWR
Peter Anaya	H&R/RRUCD
Alex Boyce	MENR
Kevin Rein	CDWR
Juan Franco	CDWR
Mike Sullivan	CDWR
LANE LETOURNEAU	KDA-DWR
Susan Metzger	KDA
Earl Lewis	KWD
Tracy Smith	Bostwick Irr. Dist. in NE
Ross Montgomery	Bostwick Irr. Dist. NE
Jeff Fassett	NE DWR
David Barfield	KDA DWR
Ginger Pugh	KDA-DWR
Paul Mason	Anibarao GWMND
Brandi Bequerra	Plains GWMND
Lori Marintzer	USGS KS
Jared "Pete" Gile	KS Bostwick I. D.

Republican River Compact Administration – Annual Meeting Attendance Sheet

August 22, 2017

Location Burlington, CO

Name – Please print legibly	Affiliation/Group
Chelsea Erickson	KDA- DWR Stockton Field Office
Scott Steinbrecher	Colorado Dept of Law
Dave Keeler	Colorado DWR
Aaron Thompson	Reclamation
Craig Scott	USBR
SCOTT DILKE	LRNRD
Shannon Kenyon	GMD4
Mike Clements	LRNRD
Todd Siel	LRNRD
Chris Kucera	CO DWR
Matt Hardesty	Rep DWR
Corey DeAngelis	CO DWR
Dan Stephens	St. Francis KS
Kevin Hall	Atwood KS
Abe Samiel	RRWCD-
Kenneth Litus	KDA-DWR
TIM PAUTLER	RRWCD
BreAnn Ferguson	CO DWR
Ginger Pugh	KDA-DWR
Jesse Brathy	Ne DWR
Tracy Streeter	KS Water Office





AGENDA FOR  
**2017 ANNUAL MEETING OF THE  
REPUBLICAN RIVER COMPACT ADMINISTRATION**

August 22, 2017, 10:30 a.m. Mountain Time

Burlington Community Center

Conference Hall

340 S 14<sup>th</sup> St.

Burlington, CO 80807

1. Introductions
2. Adoption of the Agenda
3. Status of Report and Transcripts for 2016 Annual Meeting and prior Special Meetings
4. Report of Chairman and Commissioners' Reports
  - a. Kansas
  - b. Colorado
  - c. Nebraska
5. Federal Reports
  - a. Bureau of Reclamation
  - b. U.S. Army Corps of Engineers
  - c. U.S. Geological Survey
6. Committee Reports
  - a. Engineering Committee
    - i. Assignments from 2016 Annual Meeting
    - ii. Committee recommendations to RRCA
    - iii. Recommended assignments for Engineering Committee
7. Old Business
  - a. 2015 RRCA Annual Report
8. New Business and Assignments to Compact Committees
  - a. Action on Engineering Committee Report and assignments
  - b. Action on 2016 Accounting
  - c. Action on Resolution Honoring Dick Wolfe
9. Remarks from the Public
10. Future Meeting Arrangements
11. Adjournment

# RECLAMATION

*Managing Water in the West*

## **Nebraska-Kansas Area Office**

### **Report**

### **To The**

### **Republican River**

### **Compact Administration**

**Burlington, CO**



**U.S. Department of the Interior  
Bureau of Reclamation  
Great Plains Region  
Nebraska-Kansas Area Office**

**August 22, 2017**

1. The RRCA Board of Directors shall have the authority to...

2. The RRCA Board of Directors shall have the authority to...

3. The RRCA Board of Directors shall have the authority to...

4. The RRCA Board of Directors shall have the authority to...

5. The RRCA Board of Directors shall have the authority to...

6. The RRCA Board of Directors shall have the authority to...

7. The RRCA Board of Directors shall have the authority to...

8. The RRCA Board of Directors shall have the authority to...

Bureau of Reclamation  
 Nebraska-Kansas Area Office

Republican River Compact Administration  
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## REPUBLICAN RIVER COMPACT MEETING

August 22, 2017  
 Burlington, Colorado

### 2016 Operations

As shown on the attached Table 1, precipitation in the Republican River Basin varied from 122 percent of normal at Harlan County Dam to 90 percent of normal at Norton Dam. Total precipitation at Reclamation project dams ranged from 18.81 inches at Red Willow Dam to 33.30 inches at Lovewell Dam.

Inflows varied from 51 percent of the most probable forecast at Bonny Reservoir and Hugh Butler Lake to 154 percent of the most probable forecast at Harry Strunk Lake. Inflows into Bonny Reservoir totaled 4,398 AF while inflows at Harlan County Lake totaled 126,679 AF.

Average farm delivery values for total irrigable acres were as follows:

<u>District</u>	<u>Farm Delivery</u>
Frenchman Valley	0.6 inches
H&RW	0.0 inches
Frenchman-Cambridge	4.8 inches
Almena	0.0 inches
Bostwick in NE	5.7 inches
Kansas-Bostwick	6.6 inches

### 2016 Operation Notes

**Bonny Reservoir** – Remained empty at elevation 3638.00 feet, 34.0 feet below the top of conservation. The annual computed inflow totaled 4,398 AF. Reservoir inflows were bypassed the entire year as ordered by the State of Colorado. A total of 691 AF was bypassed into Hale Ditch from April 1<sup>st</sup> through September 14<sup>th</sup>.

**Enders Reservoir** – Started the year at elevation 3084.28 feet, 28.0 feet below the top of conservation. This was the second lowest level ever recorded on the first of January since initial filling. The reservoir level increased gradually during the spring to a peak elevation of 3086.30 feet on June 15, 2016. Evaporation decreased the reservoir level from June through mid-November reaching elevation 3084.06 feet on November 15<sup>th</sup>. The 2016 computed inflow totaled 4,683 AF. No water was released from Enders Reservoir for irrigation. This was the fifteenth consecutive year that H&RW Irrigation District did not divert water. It was also the thirteenth consecutive year that storage releases were not made for Frenchman Valley Irrigation District. The end of the year reservoir level was 27.9 feet (3084.41 feet) below the top of conservation.

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**Swanson Lake** – Started the year at elevation 2734.84 feet, 17.2 feet below the top of conservation. The annual computed inflow totaled 31,055 AF (includes water pumped from Colorado’s Compact Compliance Pipeline). The lake gradually increased throughout the winter and spring. The peak elevation on June 3<sup>rd</sup> was 2741.72 feet (10.3 feet below the top of conservation). The reservoir level decreased throughout the irrigation season and reached an elevation of 2734.86 feet on November 14<sup>th</sup>. The district diverted 17,458 AF into Meeker-Driftwood Canal from June 20<sup>th</sup> through September 2<sup>nd</sup>. At the end of the year, the reservoir level was 16.4 feet below the top of conservation at 2735.63 feet.

**Hugh Butler Lake** – Started the year at elevation 2562.97 feet, 18.8 feet below the top of conservation. The 2016 computed inflow was 6,493 AF. Late winter and spring inflows gradually increased the lake level but summer evaporation slowed reservoir gains and the lake level peaked at 2566.78 feet on June 7<sup>th</sup>. No irrigation releases were made from Hugh Butler Lake in 2016. The reservoir elevation at the end of year was 2564.94 feet, 16.9 feet below the top of conservation.

**Harry Strunk Lake** – Started the year at elevation 2365.60 feet, 0.5 foot below the top of conservation. The annual computed inflow totaled 59,716 AF (includes water pumped from the Nebraska Cooperative Republican Platte Enhancement Project N-CORPE). The reservoir level was maintained near this level through the late winter and early spring months with inflows passed through the outlet works. Additional releases were started from the river outlet works on June 17<sup>th</sup> to meet increasing irrigation demands. Irrigation releases continued through September 5<sup>th</sup> reducing the reservoir level to 2355.92 feet. The district diverted 30,337 AF into Cambridge Canal. Late fall and early winter inflows (including water pumped from N-CORPE) increased the level of Harry Strunk Lake to elevation 2363.00 feet at the end of the year (3.1 feet below the top of conservation).

**Keith Sebelius Lake** – Started the year at elevation 2287.74 feet, 16.6 feet below the top of conservation. The total 2016 computed inflow was 8,285 AF. The reservoir level slowly increased to elevation 2289.68 feet on May 31<sup>st</sup>. No irrigation releases were made from Keith Sebelius Lake in 2016. The reservoir level gradually decreased during the summer and fall reaching elevation 2287.88 feet on August 26<sup>th</sup>. Runoff from a large precipitation event in September over Labor Day weekend increased the reservoir level 2.4 feet in two days with inflows peaking at approximately 1,750 cfs on September 4, 2016. Keith Sebelius Lake ended the year at elevation 2291.25 feet (13.0 feet below the top of conservation).

**Harlan County Lake** – Started the year at elevation 1932.86, 12.9 feet below the top of conservation pool. The 2016 computed inflow totaled 126,679 AF (includes augmentation water that passed through Harry Strunk Lake). The lake level peaked at elevation 1940.71 feet on June 10<sup>th</sup>. Irrigation releases began on June 10<sup>th</sup> and continued through September 9<sup>th</sup> decreasing the pool level to elevation 1935.44 feet. Bostwick in Nebraska Irrigation District diverted 27,500 AF in 2016. Irrigation releases from Harlan County Lake totaled 63,972 AF in 2016. The reservoir elevation was 1935.58 feet (10.2 feet below the top of conservation) on December 31<sup>st</sup>. A ten year summary of Harlan County Lake operations is shown on Table 3.

Kansas Bostwick Irrigation District entered into an Excess Capacity Contract (Warren Act

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Nebraska-Kansas Area Office

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Authority) with Reclamation for the use of compact compliance water stored in Harlan County Lake in 2014. An amendment to this contract in December 2014 provided for 14,100 AF of water to be carried over into 2015. No water was released under this contract during the 2015 irrigation season. Losses due to evaporation resulted in 10,900 AF remaining in this pool to be carried over into 2016. Prior to the 2016 irrigation season, the NDNR ordered an additional 28,000 AF of inflow resulting from augmentation pumping be stored for exclusive use by KBID. This additional water was included in the compact compliance pool for KBID use. A total of 466 AF was released under the Excess Capacity Contract during the 2016 irrigation season. An amendment to the contract between the KBID and Reclamation in December of 2016 provided for 15,000 AF of water to be carried over into 2017.

**Lovewell Reservoir** – Started the year at elevation 1582.13 feet, 0.5 foot below the top of conservation. The annual computed inflow total for 2016 was 46,529 AF. Republican River diversions were made via the Courtland Canal into Lovewell Reservoir during April. Lovewell Dam recorded 6.53 inches of precipitation during April and 8.39 inches during May. The reservoir pool reached a target level of 2.0 feet above top of conservation at the end of April. A river release was started on May 9<sup>th</sup> to maintain the pool level until irrigation releases began. The reservoir level peaked at elevation 1585.30 feet (2.7 feet above the top of conservation) on May 29<sup>th</sup>, and was at the target elevation when irrigation releases began on June 6<sup>th</sup>. Approximately 6,270 AF was released to the river.

Releases to the canal began on May 2<sup>nd</sup> and continued through September 9<sup>th</sup>. The reservoir elevation at the end of the irrigation season was 1581.39 feet. Republican River flow was not diverted via Courtland Canal into Lovewell Reservoir after the irrigation season. The Kansas Bostwick Irrigation District diverted a total of 48,633 AF in 2016, including 28,871 AF from Lovewell Reservoir. The reservoir level at the end of the year was 1582.51 feet (0.1 foot below top of conservation).

### **Current Operations (As of 7/31/17)**

**Bonny Reservoir** – The reservoir is currently empty. Inflows continue to be bypassed through the reservoir as ordered by the State of Colorado. Approximately 1,057 AF has been released into Hale Ditch in 2017. Bonny Dam has recorded 19.96 inches of precipitation during the first seven months of the year (169% of average).

**Enders Reservoir** - The reservoir level is currently 30.0 feet below full and 3.0 feet below last year at this time. Enders Dam recorded 10.22 inches of precipitation during the first seven months of the year (77% of normal). Due to the water supply shortage, H&RW Irrigation District is not irrigating for the sixteenth year in a row. This is also the fourteenth consecutive year that Frenchman Valley Irrigation District has not received storage water for irrigation. On January 18, 2017 the Frenchman Valley and H&RW Irrigation Districts entered into an agreement with the Middle Republican Natural Resources District to release 2,000 AF of storage water from Enders Reservoir for compact compliance. This release began on April 5<sup>th</sup> and was completed by April 12<sup>th</sup>.

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**Swanson Lake** – The lake level is currently 13.6 feet from full and is 0.1 foot above last year at this time. Precipitation for the year is at 110% of normal (14.89 inches). Irrigation releases began on June 22<sup>nd</sup>.

**Hugh Butler Lake** – The lake level is currently 16.3 feet below full and is 0.2 foot below last year at this time. The precipitation total so far this year is 10.50 inches (81% of normal). Irrigation releases began on July 24<sup>th</sup>.

**Harry Strunk Lake** – The lake level is currently 9.2 feet below the top of conservation. Precipitation at the dam during the first seven months of the year was 10.35 inches (73% of normal). Irrigation releases began on June 5<sup>th</sup>. The lake level is currently 5.6 feet below last year at this time.

**Keith Sebelius Lake** – Currently 12.4 feet below full. Lake level is 3.5 feet above last year at this time. Irrigation releases began July 10<sup>th</sup>. Precipitation at the dam during the first seven months of the year was 18.61 inches (117% of normal).

**Harlan County Lake** – The current water surface level is approximately 5.8 feet below full. The lake level is 2.5 feet above last year at this time. Harlan County Dam has recorded 19.83 inches of precipitation so far this year (131% of normal). Irrigation releases began on June 12<sup>th</sup>. The available irrigation supply from Harlan County Lake on June 30, 2017 was 111,600 AF.

**Lovewell Reservoir** – The reservoir level is currently 2.6 feet below the top of conservation and approximately 1.4 feet below last year's elevation at this time. Lovewell Dam recorded 13.84 inches of precipitation during the first seven months of the year (79% of average). Canal releases began on May 1<sup>st</sup>.

A summary of data for the first seven months of 2017 is shown on Table 2.

### Other Items

**Excess Capacity Contract** – Harlan County Lake – An Excess Capacity Contract (Contract) was executed with Kansas Bostwick Irrigation District (KBID) to temporarily store inflows into Harlan County Lake under the State of Nebraska's Compact Call water right administration. This Contract allowed water to be temporarily stored for KBID's use during the 2014 irrigation season. The contract was extended and amended into 2015, 2016, and 2017 to allow for carryover of the temporary storage.

**WaterSMART Basin Study Program** - The States of Colorado, Nebraska, and Kansas and the U.S. Department of the Interior, Bureau of Reclamation completed the Republican River Basin Study in early 2016. The Republican River Basin Study area covers the entire Republican River Basin in eastern Colorado, southern Nebraska, and northern Kansas down to the Clay Center gauging station in Kansas. The Basin Study represented an extensive collaborative effort among the states of Colorado, Kansas, and Nebraska to identify adaptation



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strategies that address current and future water management challenges in the basin.

The Basin Study found that climate change may have a pronounced impact on future supplies and demands across the basin. The modeling tools developed under the study were used to evaluate alternatives to improve the supply reliability at the Frenchman-Cambridge Irrigation District in Nebraska, as well as the Bostwick Irrigation Districts in Nebraska and Kansas.

Nebraska focused on augmenting the supply of Swanson Lake and creating new surface water storage on Thompson Creek, a tributary of the Republican River. Kansas evaluated alternatives that increase the storage volume at Lovewell Reservoir.

The newly developed ground and surface water modeling tools will help inform future water management decisions that help build resiliency against future climate change, while also maintaining compliance with the Republican River Compact.

The Republican River Basin Study is a part of Reclamation's WaterSMART Program. The report is available online at [www.usbr.gov/watersmart/bsp](http://www.usbr.gov/watersmart/bsp).

**TABLE 1**  
**NEBRASKA-KANSAS PROJECTS**  
**Summary of Precipitation, Reservoir Storage and Inflows**  
**CALENDAR YEAR 2016**

Reservoir	Total Precip. Inches	Percent Of Average %	Storage 12-31-15 AF	Storage 12-31-16 AF	Gain or Loss AF	Maximum Content AF	Storage Date	Minimum Content AF	Storage Date	Total Inflow AF	Percent Of Most Probable %
Box Butte	16.68	98	17,339	14,789	-2,550	25,737	MAY 18	11,599	SEP 15	16,590	108
Merritt	30.10	147	61,100	61,913	813	68,191	MAY 4	42,181	SEP 3	205,133	110
Calamus	30.03	124	102,456	101,203	-1,253	122,331	MAY 1	68,603	SEP 20	253,166	93
Davis Creek	24.51	99	9,849	14,300	4,451	31,581	JUL 7	9,102	APR 13	58,536	130
Bonny	19.41	113	0	0	0	0	N/A	0	N/A	4,398	51
Enders	21.29	112	10,178	10,264	86	11,602	JUN 15	10,027	SEP 27	4,683	62
Swanson	21.65	108	43,591	45,972	2,381	66,449	JUN 3	43,644	JAN 1	31,055	114
Hugh Butler	18.81	96	12,879	14,669	1,790	16,457	JUN 7	12,884	JAN 1	6,493	51
Harry Strunk	23.14	112	33,773	29,393	-4,380	38,820	JUN 1	19,880	SEP 5	59,716	154
Keith Sebelius	22.04	90	9,422	13,039	3,617	13,109	SEP 21	9,422	JAN 1	8,285	115
Harlan County	27.82	122	167,416	194,203	26,787	250,967	JUN 10	167,230	JAN 1	126,679	112
Lovewell	33.30	121	34,279	35,398	1,119	44,282	MAY 29	29,806	AUG 8	46,529	78
Kirwin	30.59	130	35,389	77,029	41,640	77,029	DEC 31	29,815	AUG 26	68,124	274
Webster	30.59	129	17,305	67,864	50,559	67,864	DEC 31	17,305	JAN 1	58,446	356
Waconda	27.46	108	213,417	216,908	3,491	256,082	SEP 7	200,897	APR 16	191,173	154
Cedar Bluff	27.66	132	55,681	54,285	-1,396	59,749	JUL 12	54,083	DEC 23	11,201	75

**TABLE 2**  
**NEBRASKA-KANSAS AREA OFFICE**  
**Summary of Precipitation, Reservoir Storage and Inflows**

**JANUARY - JULY 2017**

Reservoir	Precip. Inches	Percent Of Average %	Storage 7/31/2016 AF	Storage 7/31/2017 AF	Gain or Loss AF	Inflow AF	Percent Of Most Probable %
Bonny	19.96	169	0	0	0	3,881	69
Enders	10.22	77	10,861	8,854	(2,007)	3,237	77
Swanson	14.89	110	54,645	54,944	299	27,273	127
Hugh Butler	10.50	81	15,384	15,240	(144)	4,011	51
Harry Strunk	10.35	73	28,661	21,113	(7,548)	28,129	107
Keith Sebelius	18.61	117	10,040	13,797	3,757	5,320	102
Harlan County	19.83	131	214,164	241,369	27,205	95,643	123
Lovewell	13.84	79	32,246	28,462	(3,784)	32,582	120

Inflow at Swanson Lake and Harry Strunk Lake includes water from augmentation (pumping) projects.

**TABLE 3  
HARLAN COUNTY LAKE**

Year	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	Precipitation		End of Year Content (AF)	Projected Irrig. Water Supply On June 30th (AF)
					Harlan County Dam* (% of Average)	Rep. Basin Dams (% of Average)		
2007	198,528	21,237	38,197	26.92	118%	114%	255,393	111,700
2008	224,841	114,938	45,985	30.31	133%	131%	319,311	175,900
2009	136,747	94,079	41,721	24.50	108%	128%	320,258	156,000
2010	239,054	194,055	46,893	31.66	139%	119%	318,364	147,800
2011	174,830	120,989	49,241	30.69	135%	115%	322,964	157,700
2012	78,581	160,221	50,199	18.14	80%	64%	191,125	132,900
2013	48,794	75,355	40,042	17.46	77%	83%	124,522	81,400
2014	92,209	35,502	32,387	18.53	81%	105%	148,842	59,000
2015	106,728	54,502	33,652	28.85	127%	115%	167,416	79,600
2016	126,679	63,972	35,920	27.82	122%	109%	194,203	103,500

NOTE: On June 30, 2017 Projected Irrig. Water Supply was 111,600 AF.

\* Average Annual Precipitation at Harlan County Dam is 22.76 inches

# ***Harlan County Dam Tainter Gate & Irrigation Repairs***

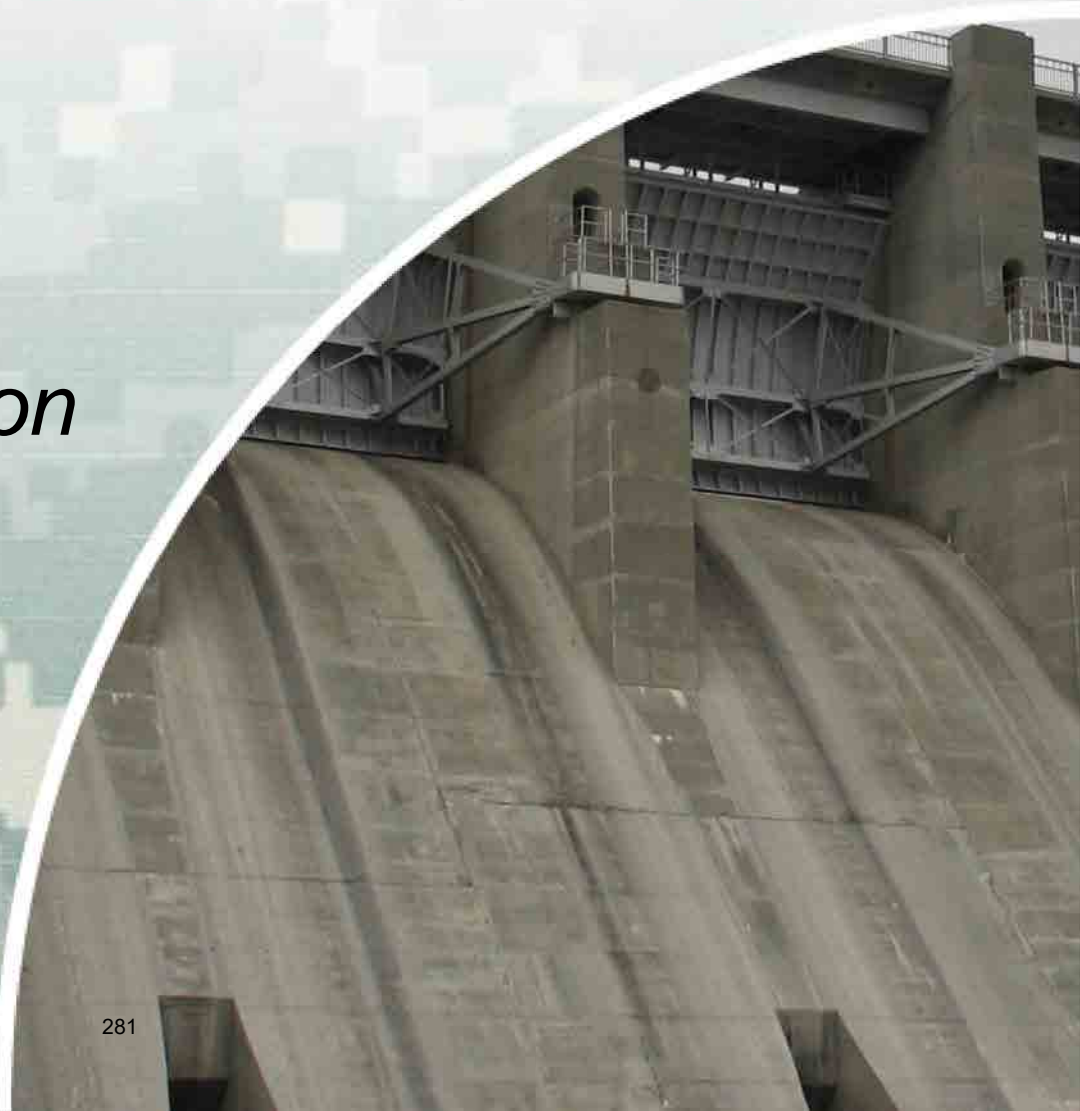
*John Grothaus,  
Chief, Plan Formulation  
Kansas City District*

*August 22, 2017*



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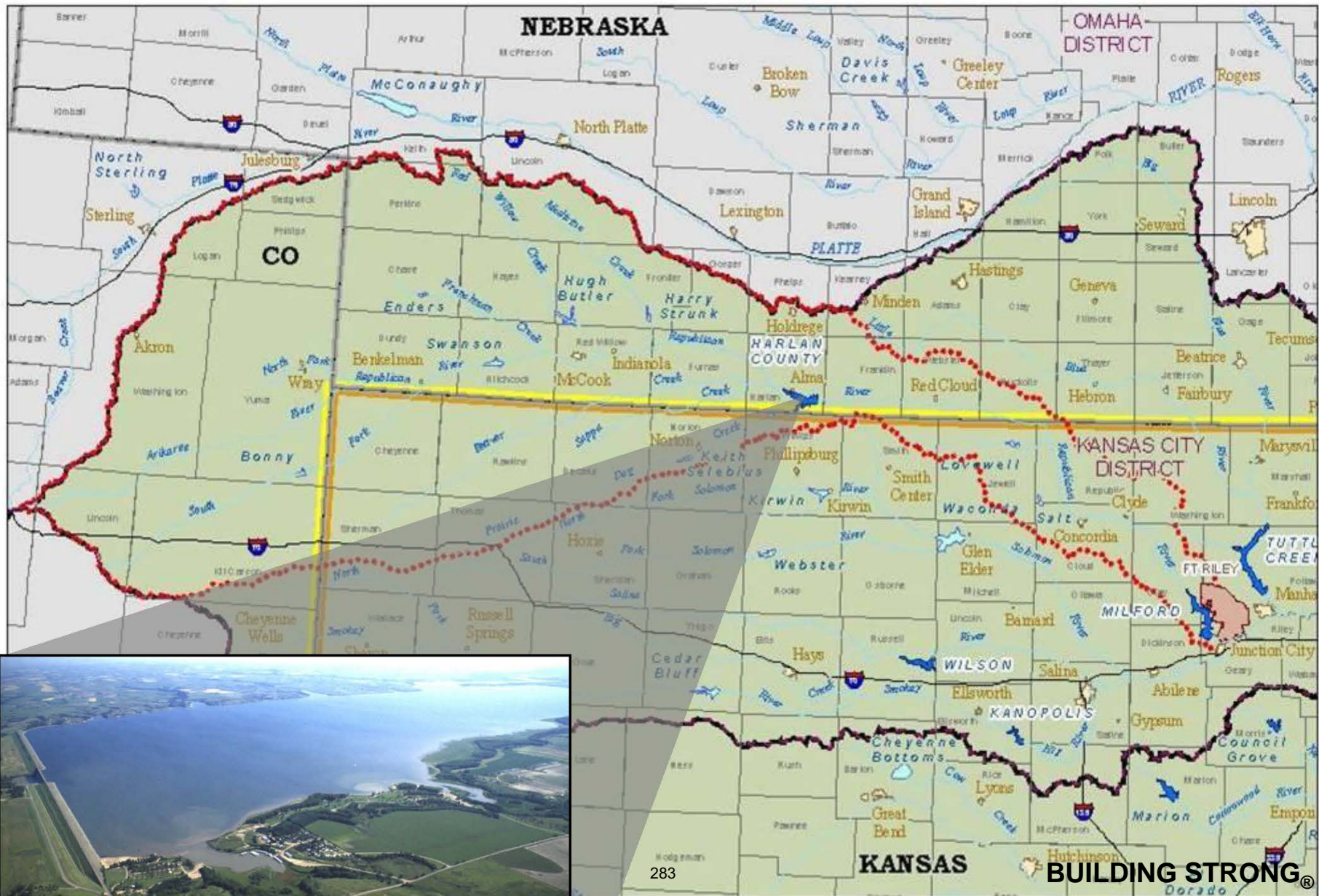
# ***Presentation Outline***

- Overview of Dam
- Dam Repairs
- Construction Status





# Harlan County Dam



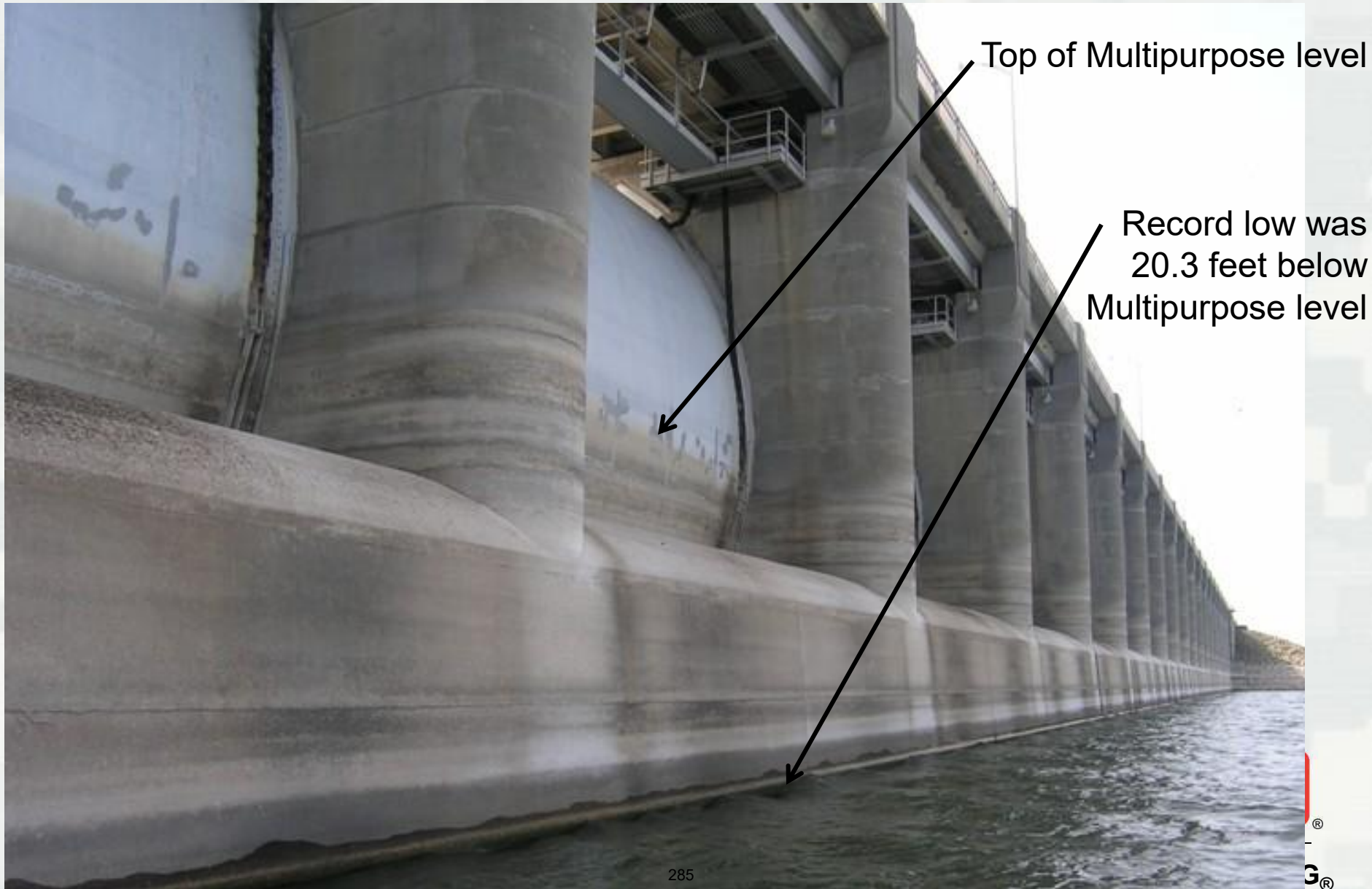


# *Harlan County Dam*





# Harlan County Dam



# Harlan County Dam

## 9 - Sluiceways

- Low/normal release
- 18 gates
- Each gate 5' x 8'
- 1 low flow bypass



## 2 - Irrigation conduits

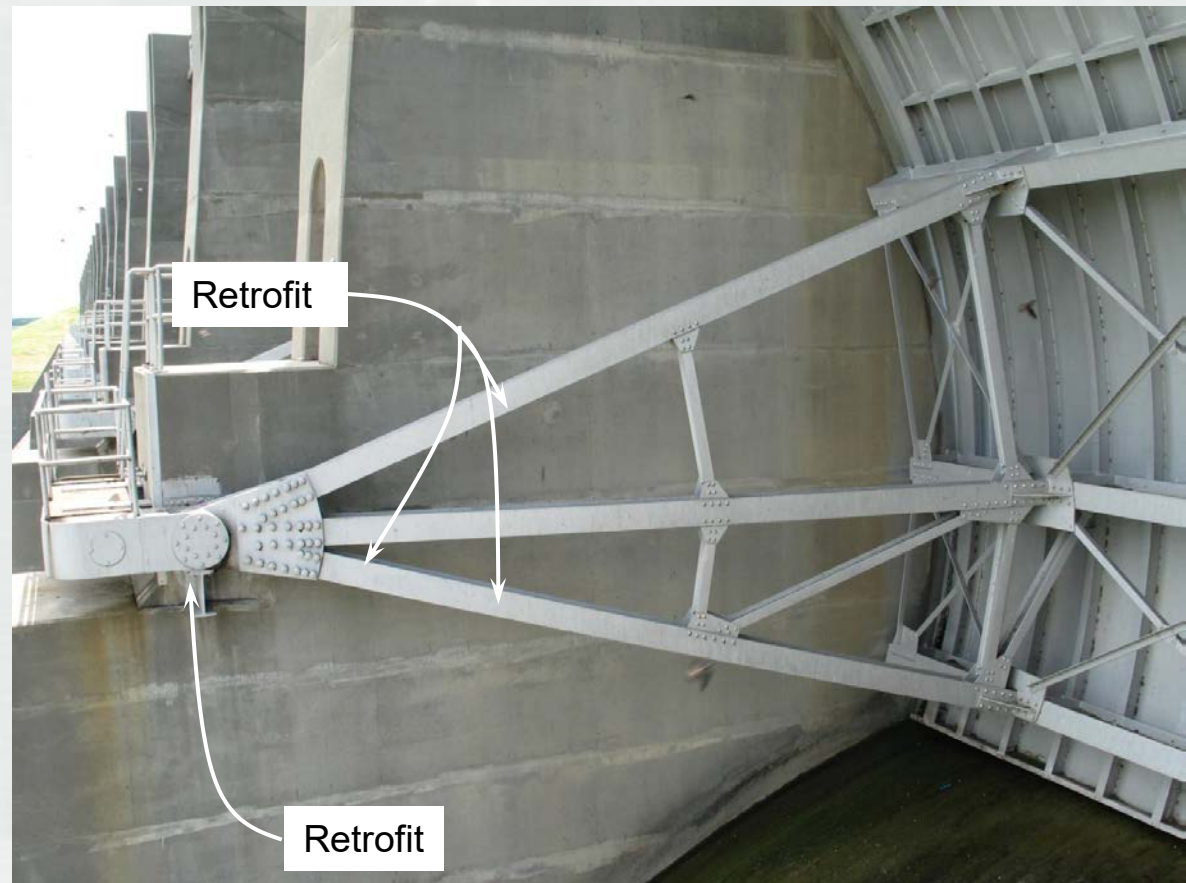
## 18 - Tainter gates

- Flood control release
- Each 40' x 30'



# Harlan County Dam Repairs

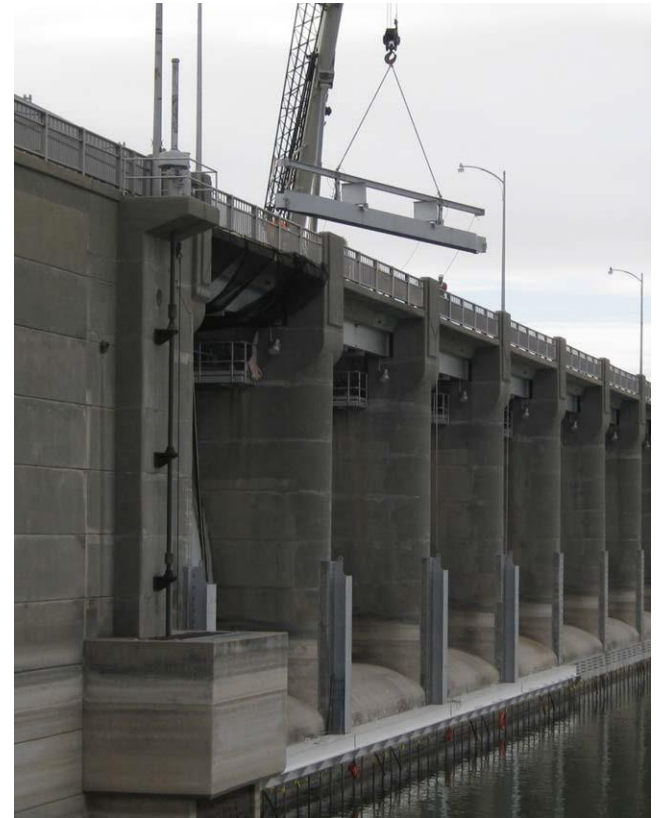
- ▶ Tainter Gate Stoplogs
- ▶ Tainter Gates
- ▶ Sluice Gates
- ▶ Irrigation Facilities





# TAINTER GATE STOP LOGS

- Contract Award: 20 Sept 2013
- Award Amount: \$4,058,367
- Contractor: BCI Construction
- Base Award: 2 sets of stoplogs
- Option for 3<sup>rd</sup> set of stoplogs
- Completed: July 2014



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# TAINTER GATE STOPLOGS



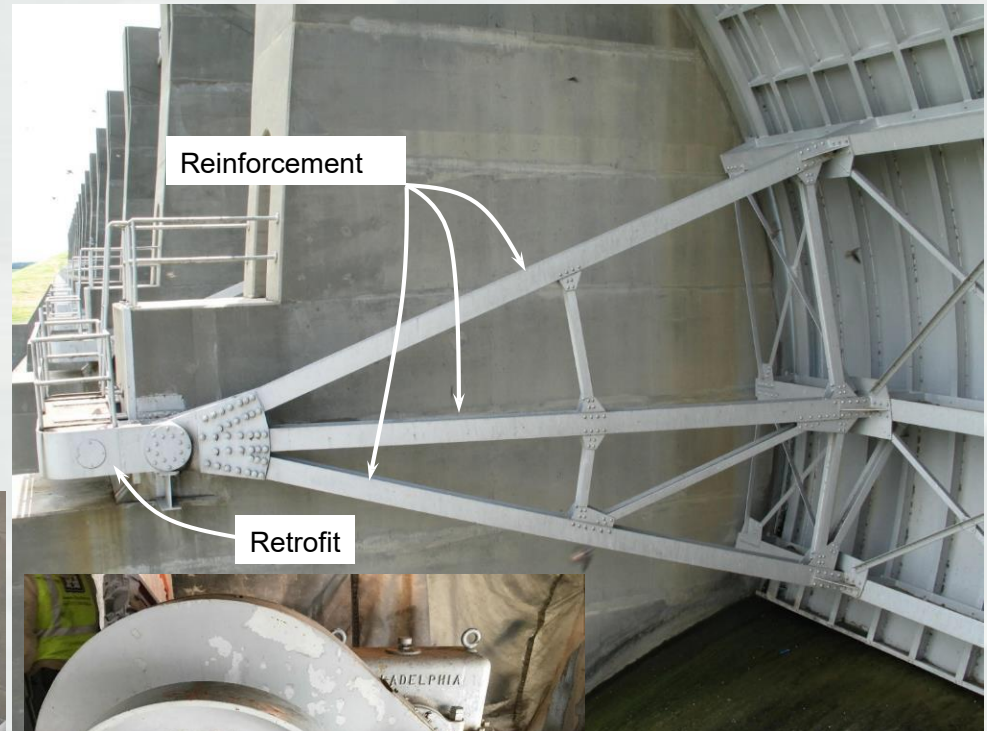
# TAINER GATE STOPLOGS





# TAINTER GATE REPAIRS

- Contract Award: 12 Sept 2014
- Award Amount: \$12,262,500
- Current Amount: \$27,661,218
- Contractor: OCCI
- New Bearings
- Structural Reinforcement
- New Electrical Controls
- New Brakes
- New Chains
- Painting
- Only 3 Gates @ a time.



# Construction Status



June 2017 – Painting Tainter Gate 15. Media Blasting Painting Now Completed on Gates 1-17. Structural Repairs Complete All Gates 1-18





# ***Construction Status***

Project is 87% Complete

Original & Current Required Completion is April 2018

Structural Repairs Complete on All 18 Tainter Gates

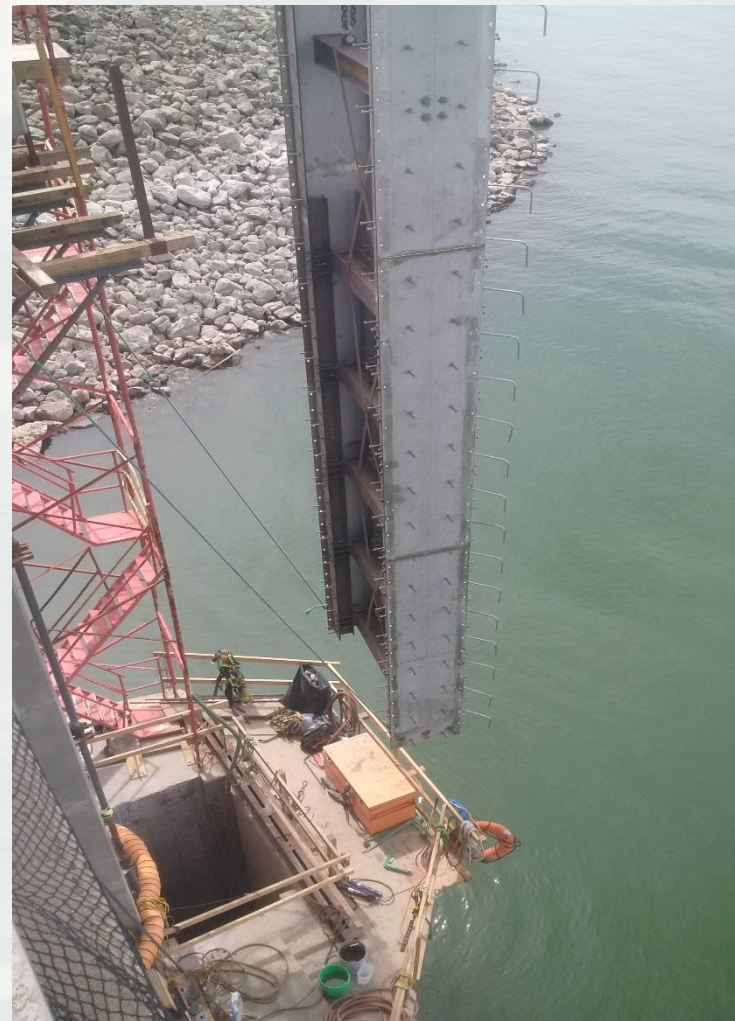
Media Blasting & Painting is Complete Bays 1-17

Repairs & Painting of Sluiceways 1-8 Complete, Sluice 9 work is Ongoing

New Electrical & Control work is Completed on Tainter Gates 1-9

Irrigation Conduit Repair/Replacement Contract is Complete





Winter 2016/2017 – 700 LF of Naponee Irrigation Conduit Was Replaced & New Lined Slots for Irrigation Stoplogs and Trash Racks Were Constructed



# ***Remaining Work***

# **Questions?**





**Republican River Basin streamflow-gaging stations with records published by USGS for water year (WY) 2016**

[DCP, data-collection platform; NDNR, Nebraska Department of Natural Resources; USACE, U.S. Army Corps of Engineers; USBR, U.S. Bureau of Reclamation; USGS, U.S. Geological Survey]

Station number	Station name	Mean discharge (ft <sup>3</sup> /s)		WY 2016 as	WY 2016 as	WYs used	Remarks
		WY 2016	Long-term	percentage of long-term mean	rank/years (1 highest)	for long-term mean	

**USGS Compact stations supported by the Groundwater Streamflow Information Program (GWSIP)**

06821500	Arikaree River at Haigler, Nebr	0.5	15.9	3.0%	80/84	1933 - 2016	
06823000	North Fork Republican River at Colo-Nebr State Line	39.0	41.2	94.7%	48/81	1935 - 2016	
06823500	Buffalo Creek near Haigler, Nebr	2.3	5.9	39.8%	71/76	1941 - 2016	
06824000	Rock Creek at Parks, Nebr	5.8	12.2	47.1%	76/76	1941 - 2016	
06824500	Republican River at Benkelman, Nebr	42.4	81.3	52.2%	49/49	1948 - 1994, 2015-2016	
06827500	South Fork Republican River near Benkelman, Nebr	5.4	33.5	16.0%	69/79	1938 - 2016	
06835500	Frenchman Creek at Culbertson, Nebr	26.6	63.5	41.9%	63/66	1951 - 2016	Since Enders Reservoir
06836500	Driftwood Creek near McCook, Nebr	4.2	8.1	52.4%	53/70	1947 - 2016	
06838000	Red Willow Creek near Red Willow, Nebr	5.5	13.2	41.9%	51/55	1962 - 2016	Since Hugh Butler Lake
06847000	Beaver Creek near Beaver City, Nebr	1.1	14.9	7.4%	58/79	1938 - 2016	
06847500	Sappa Creek near Stamford, Nebr (USACE funds DCP)	7.7	37.0	20.9%	49/70	1947 - 2016	
06852500	Courtland Canal at Nebr-Kans State Line (USBR DCP)	61.0	75.4	80.9%	45/62	1955 - 2016	
06853020	Republican River at Guide Rock, Nebr	57.1	253.0	22.6%	56/66	1951 - 2016	Based on record from this and upstream station 06853000

**USGS stations supported by USGS and/or other Federal or State agencies**

06828500	Republican River at Stratton, Nebr	42.2	91.6	46.1%	53/66	1951 - 2016	Funded by USACE and GWSIP
06837000	Republican River at McCook, Nebr	40.5	119.8	33.8%	56/62	1955 - 2016	Funded by USBR, NDNR, and GWSIP
06844500	Republican River near Orleans, Nebr	146.4	222.6	65.8%	45/69	1948 - 2016	Funded by USACE and GWSIP

**NDNR stations with USGS/USACE support for DCP, Web display, review, and publishing**

06834000	Frenchman Creek at Palisade, Nebr	18.0	58.4	30.8%	65/66	1951 - 2016	
06843500	Republican River at Cambridge, Nebr	136.6	205.4	66.5%	48/67	1950 - 2016	Since Harry Strunk Lake

Online Annual Water Data Reports available at or through:

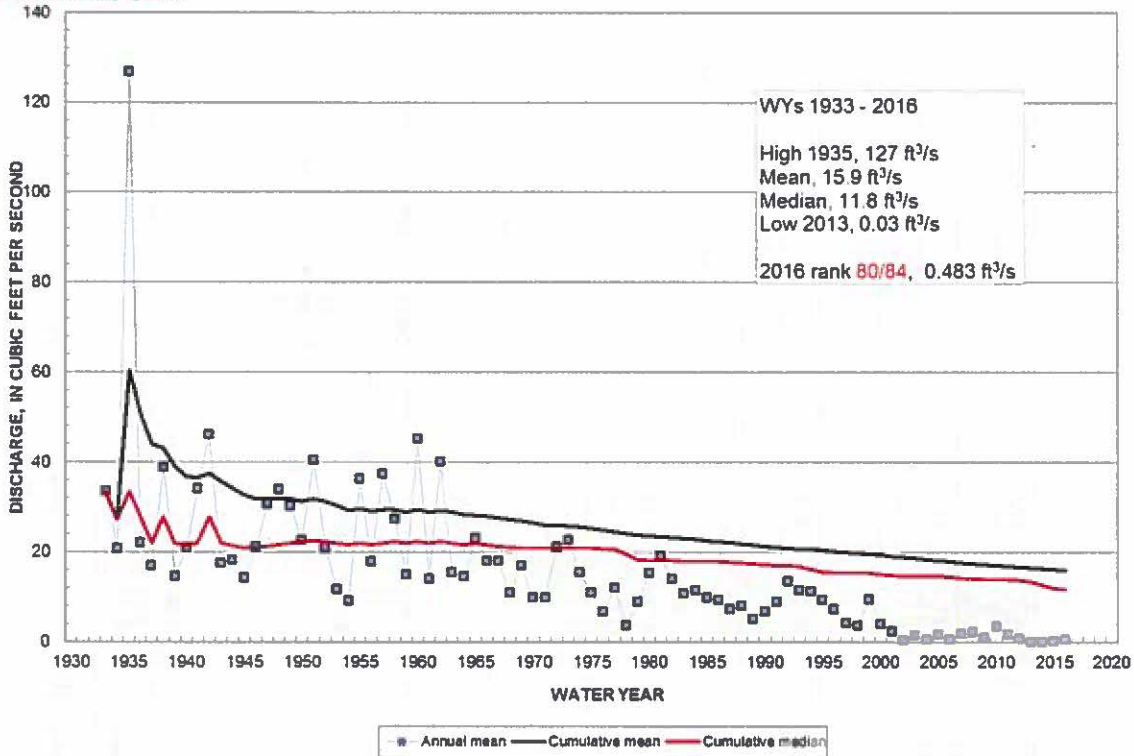
<http://wdr.water.usgs.gov>  
<https://www.usgs.gov/centers/ne-water>

**USGS North Platte Field Office**  
 John Miller (jdmiller@usgs.gov)  
 308-532-5323

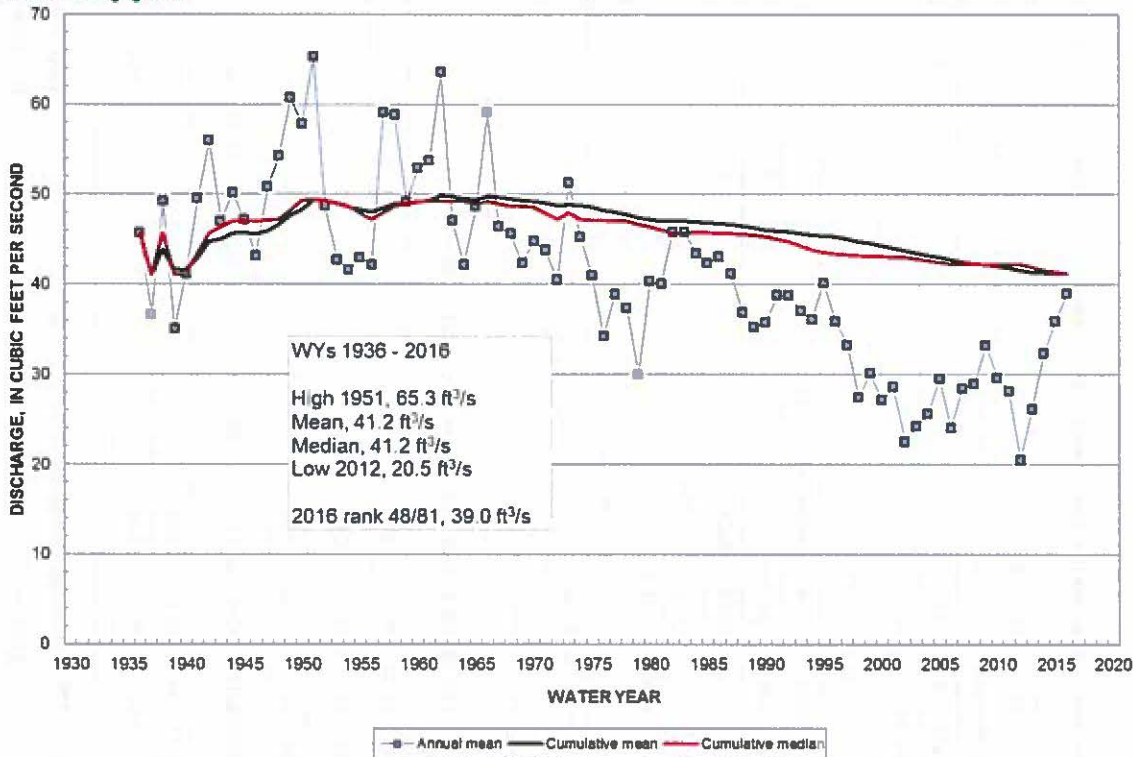
**USGS Lincoln Field Office**  
 Tim Boyle (tboyle@usgs.gov)  
 402-328-4125



06821500 Arikaree River at Haigler, NE

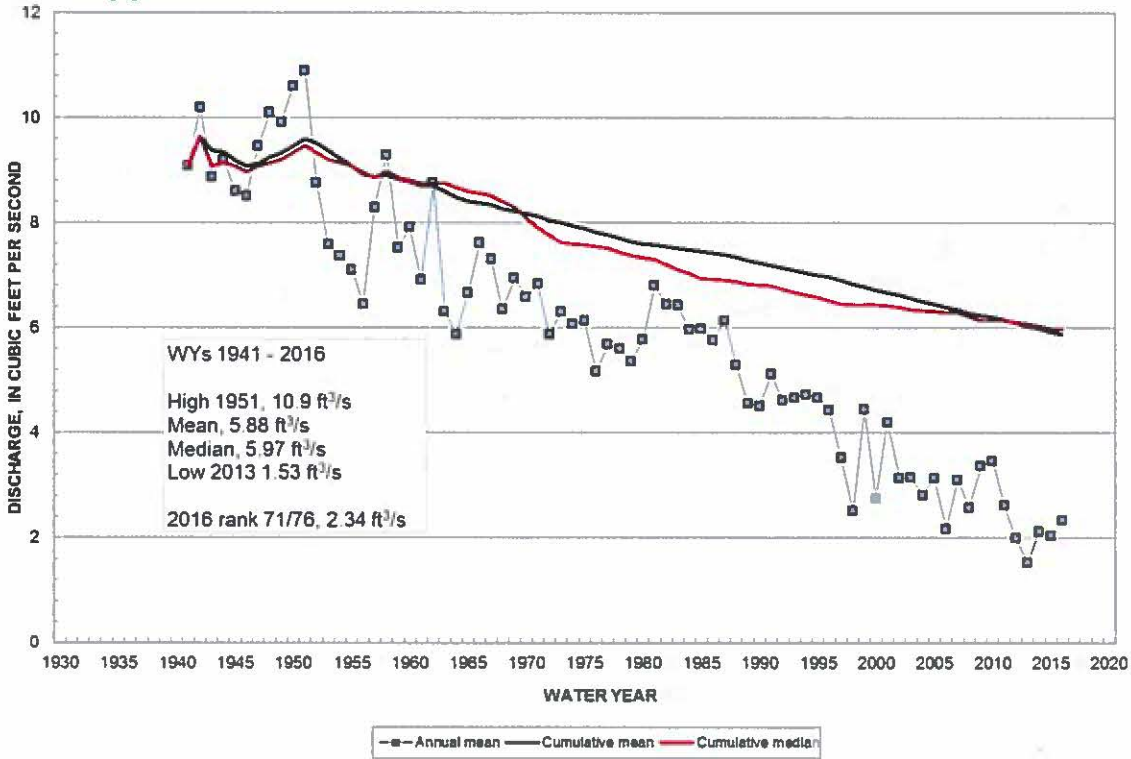


06823000 N Fk Republican River at CO-NE State Line

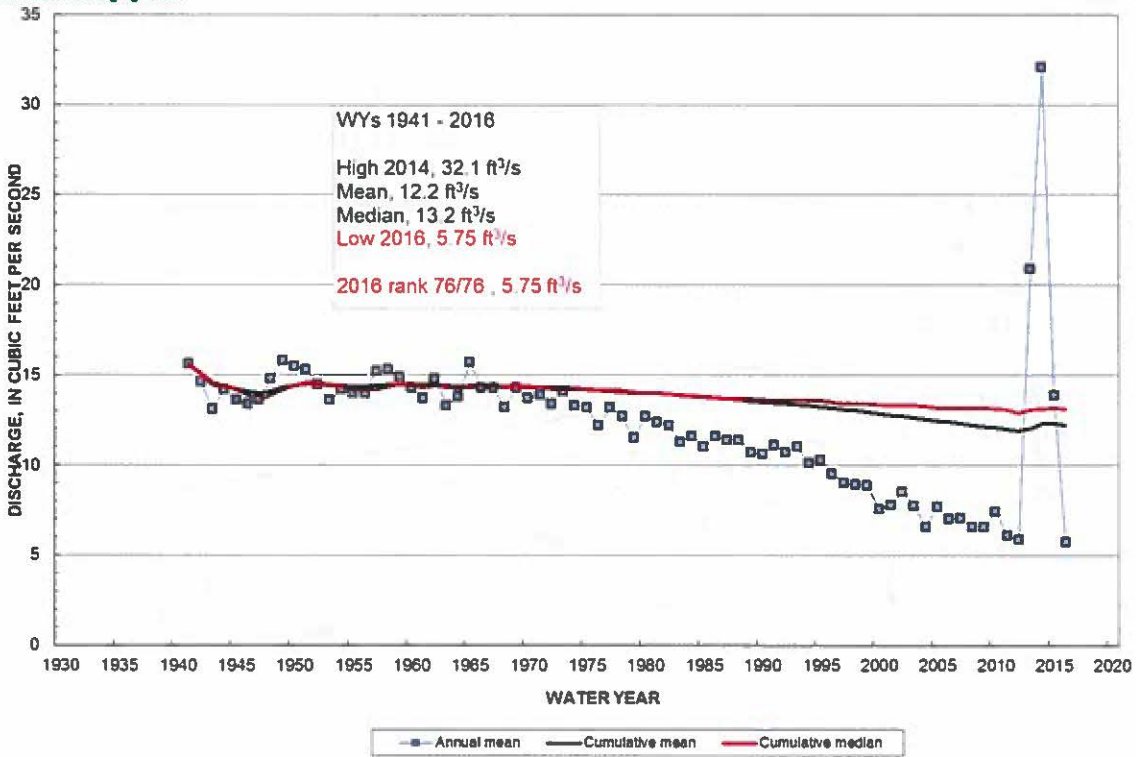




06823500 Buffalo Creek near Haigler, NE



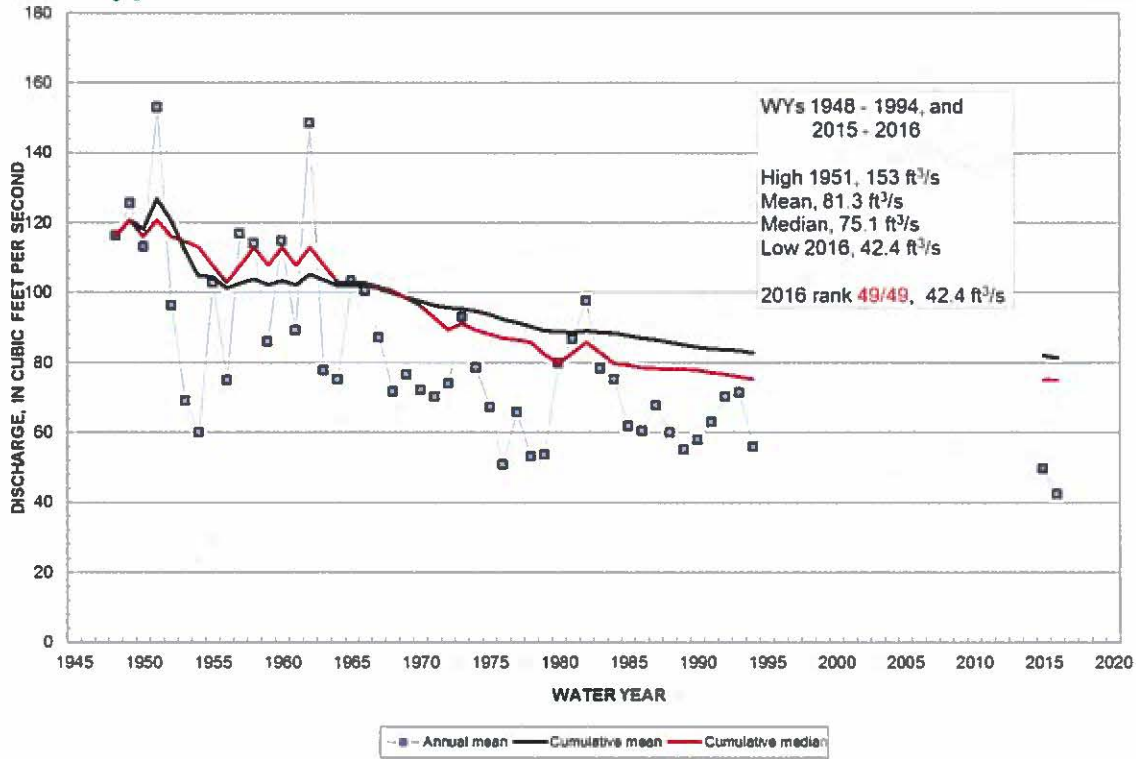
06824000 Rock Creek at Parks, NE



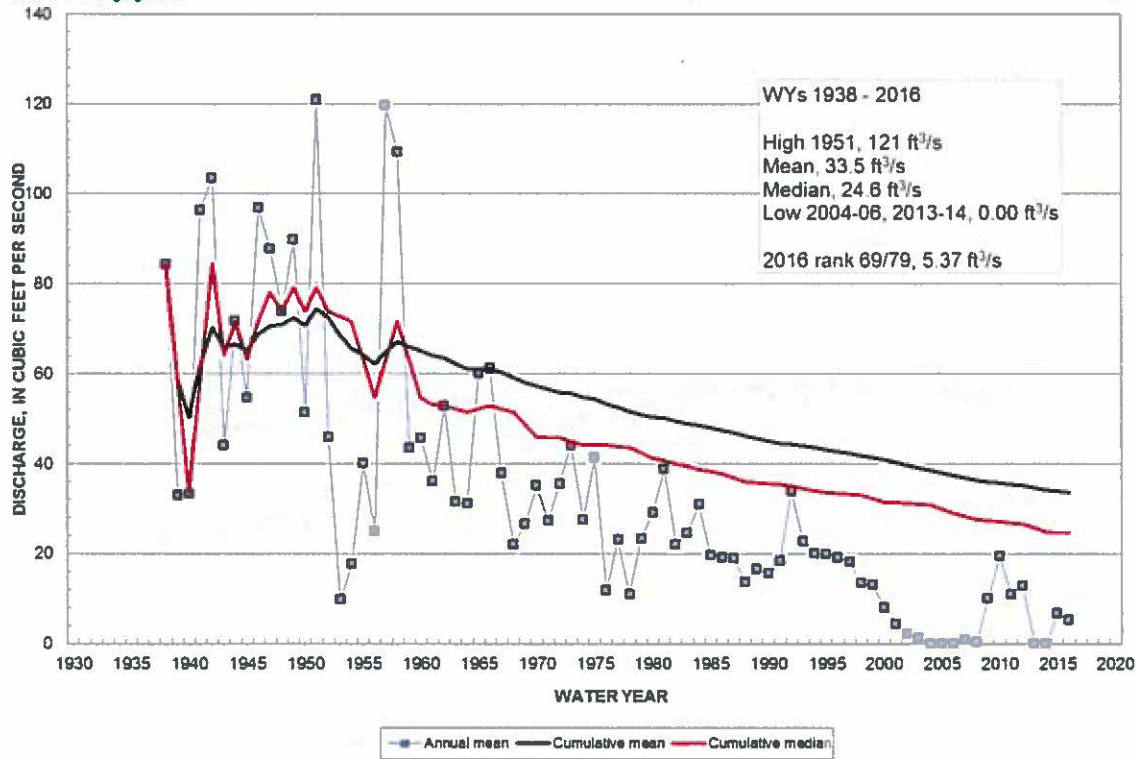




06824500 Republican River at Benkelman, NE

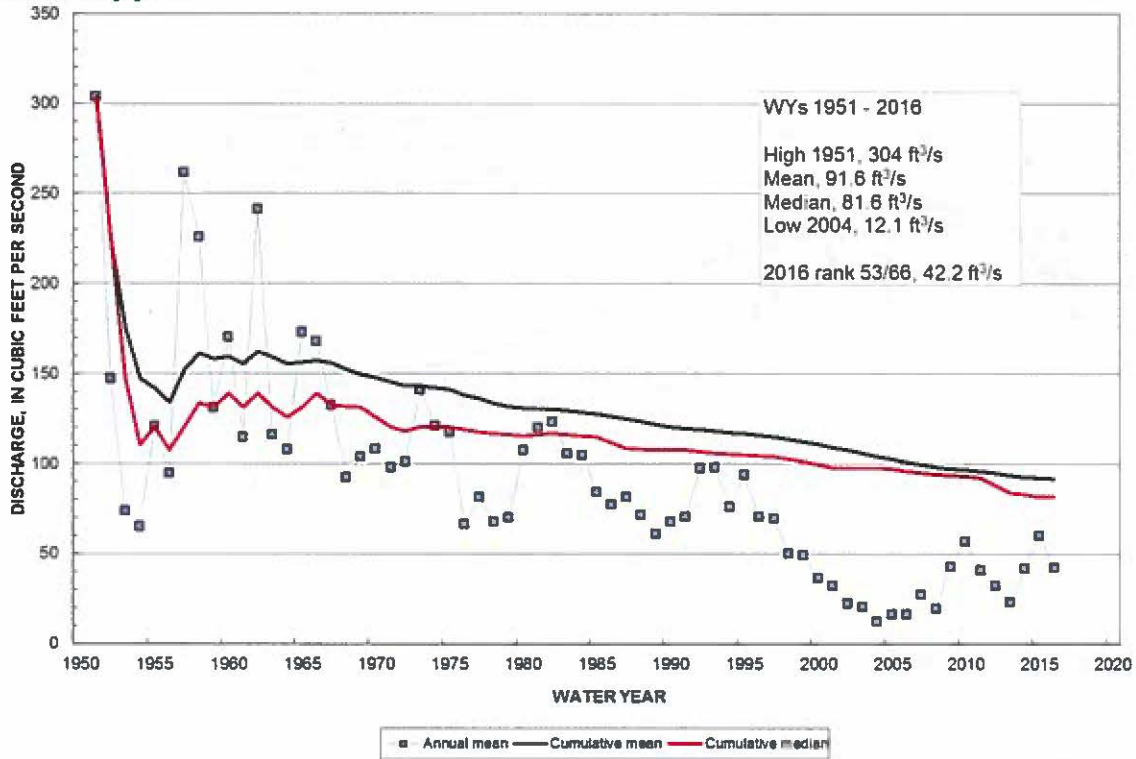


06827500 S Fk Republican River near Benkelman, NE

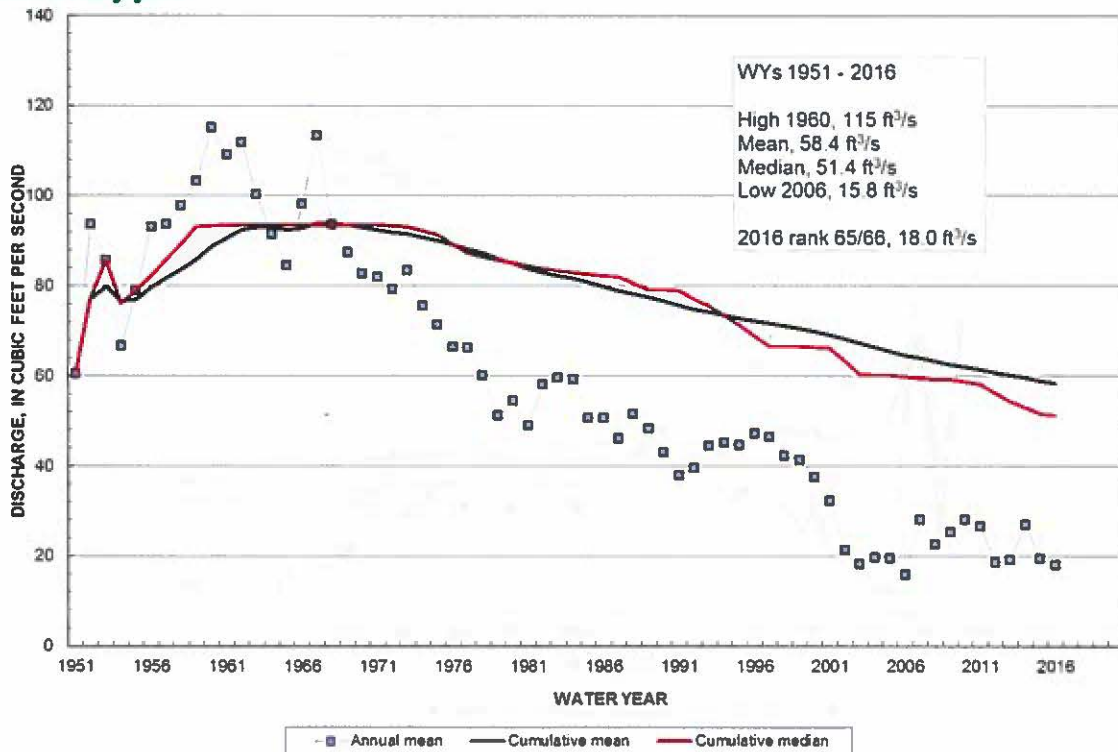




06828500 Republican River at Stratton, NE



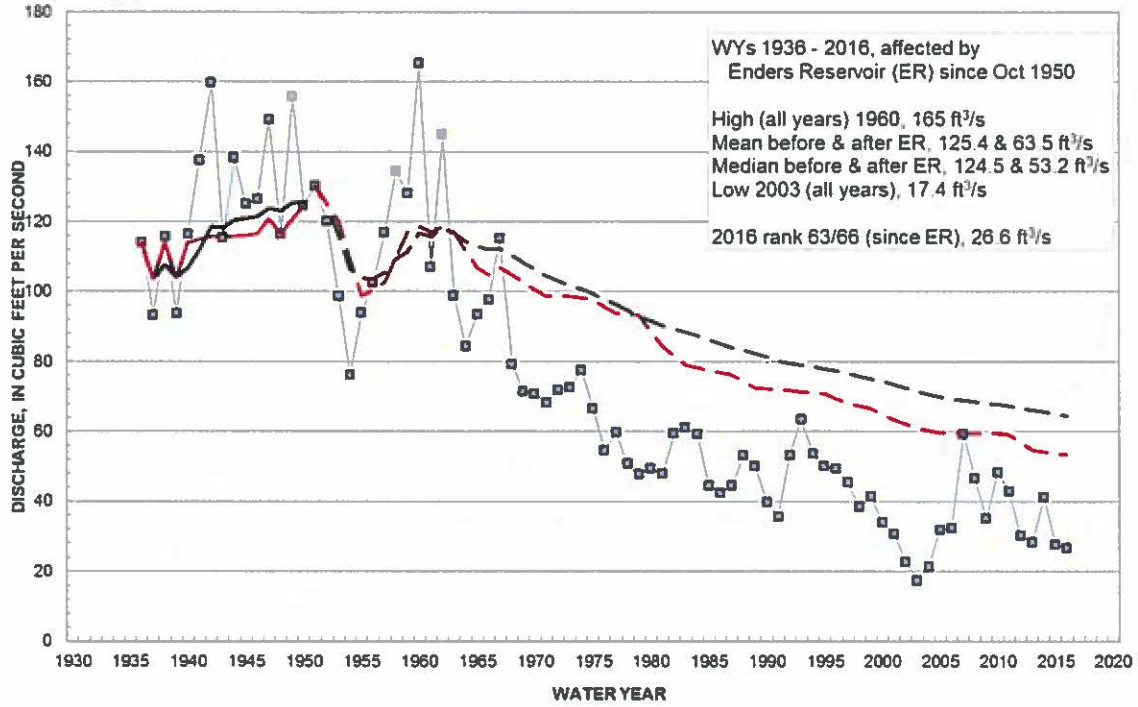
06834000 Frenchman Creek at Palisade, NE



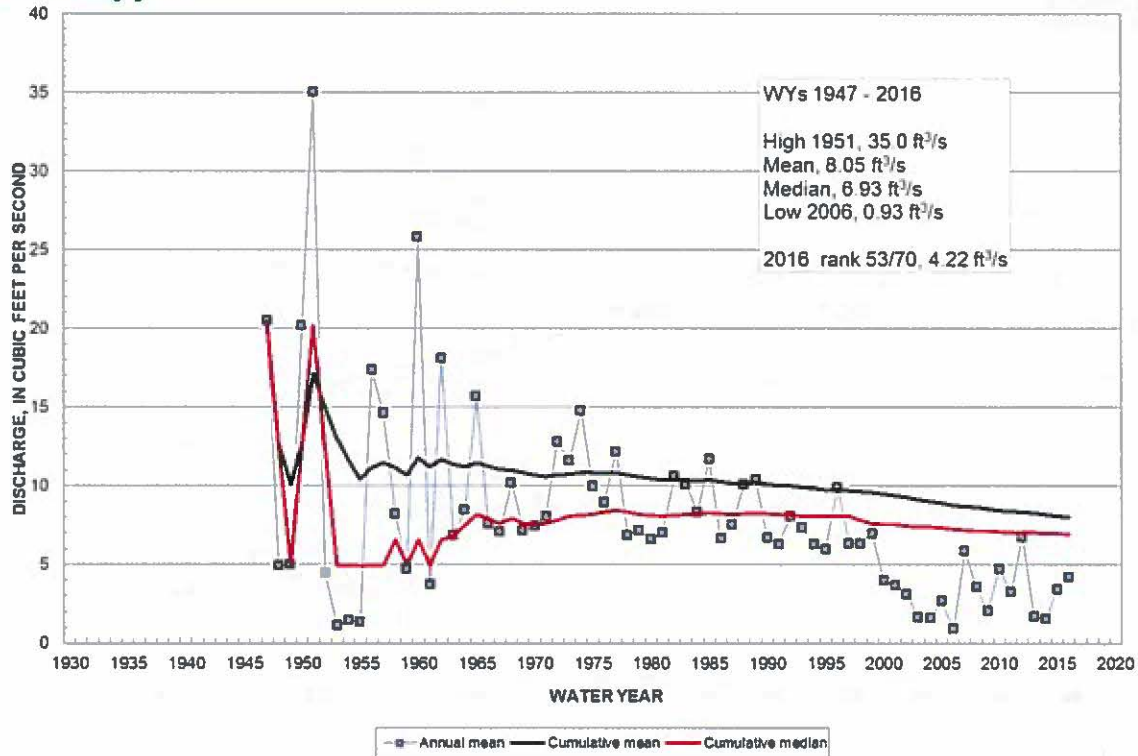


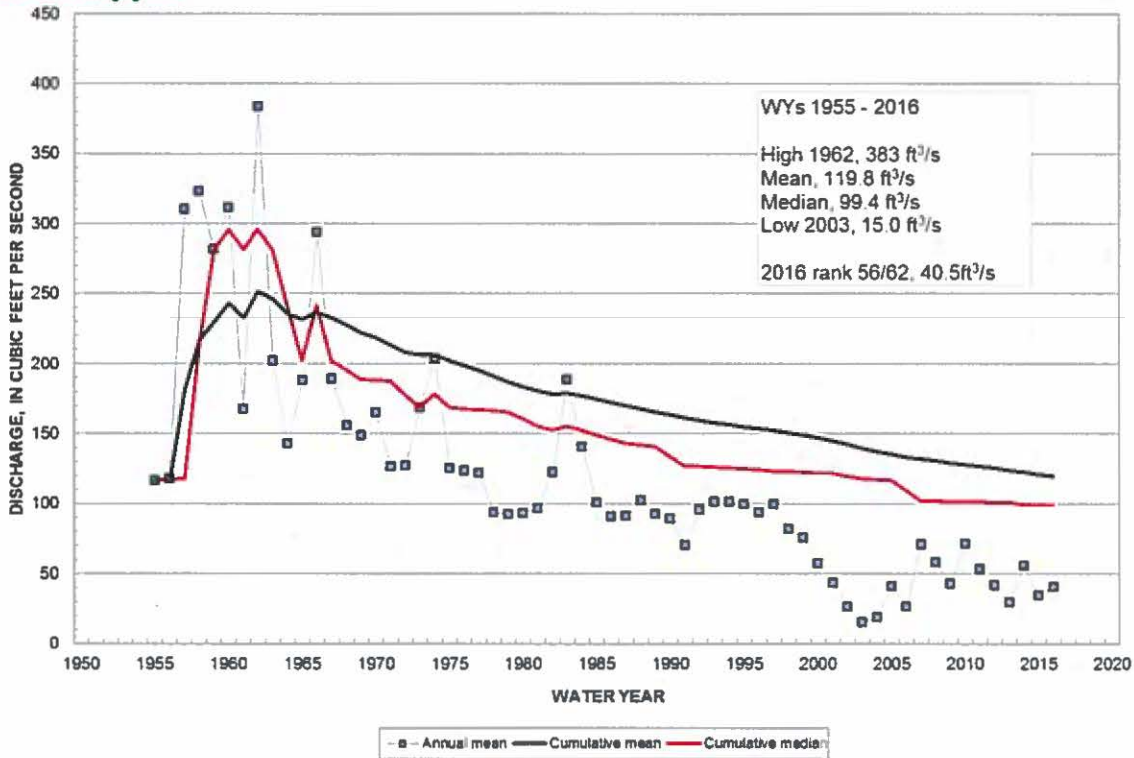


06835500 Frenchman Creek at Culbertson, NE

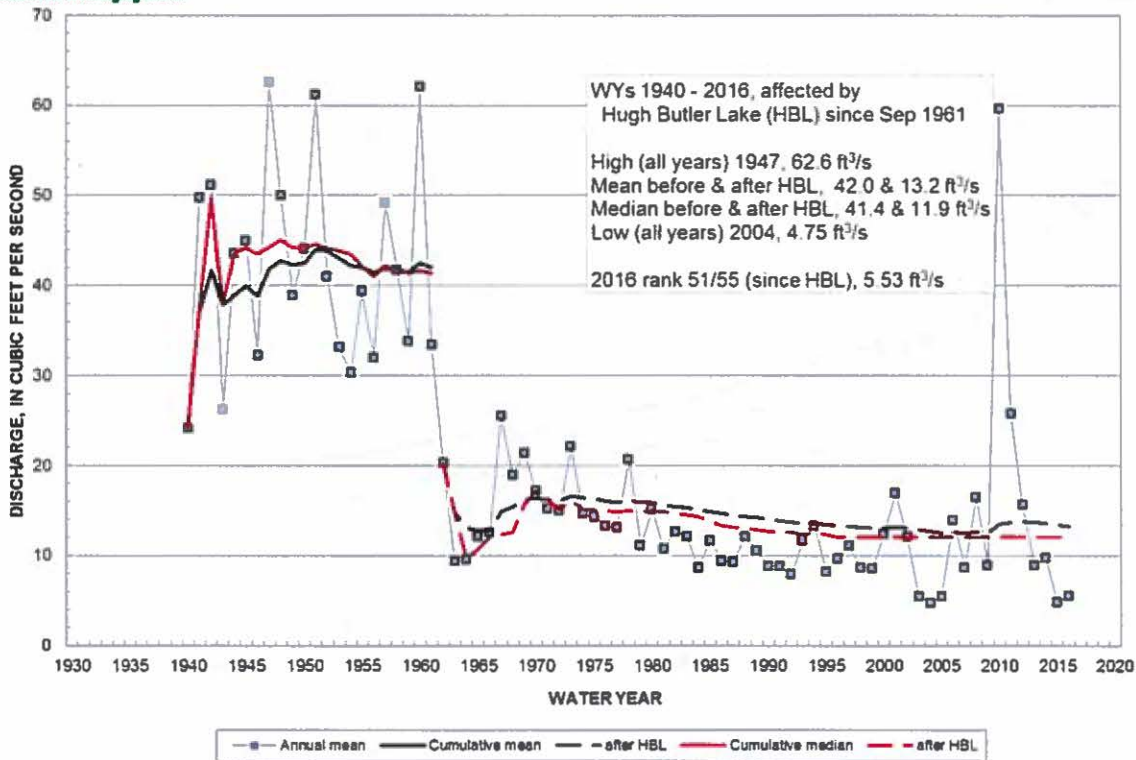


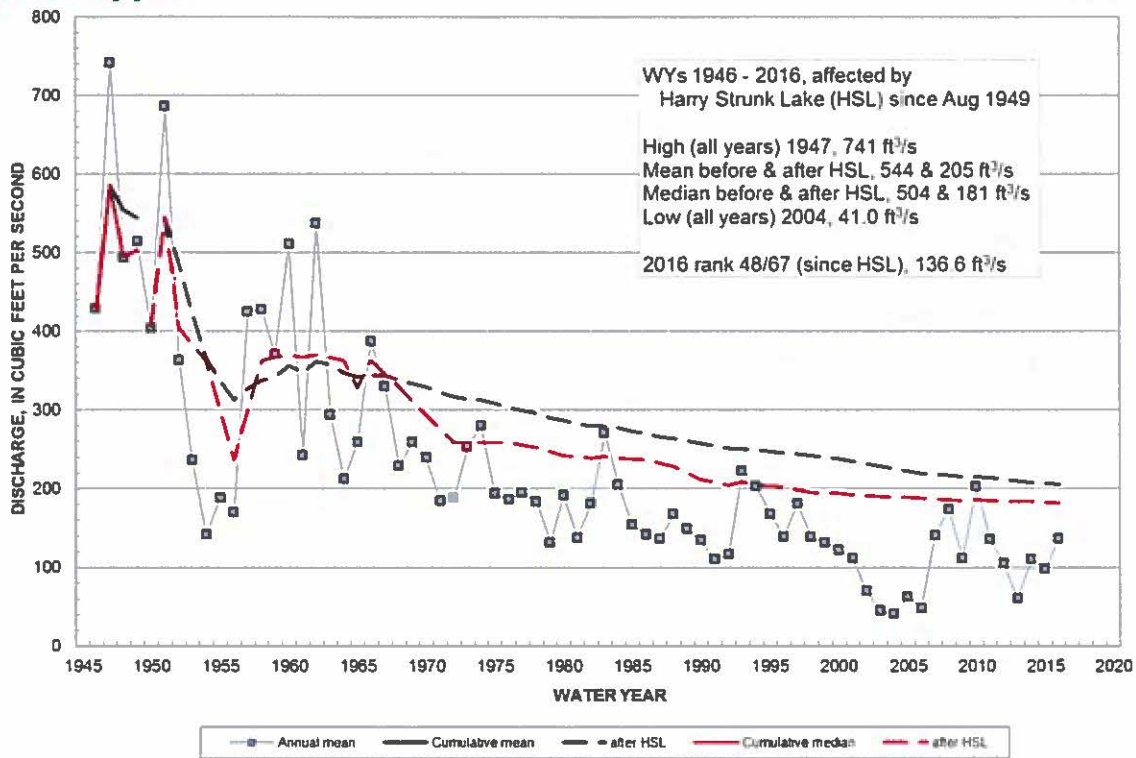
06836500 Driftwood Creek near McCook, NE



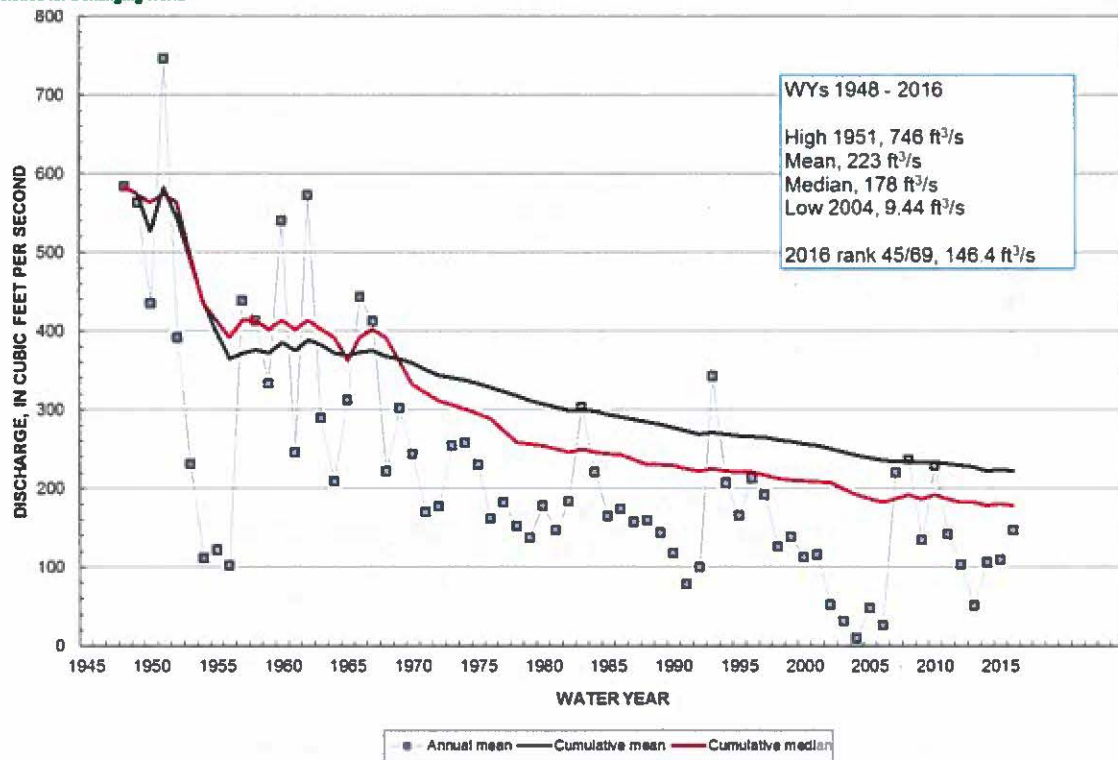


06838000 Red Willow Creek near Red Willow, NE



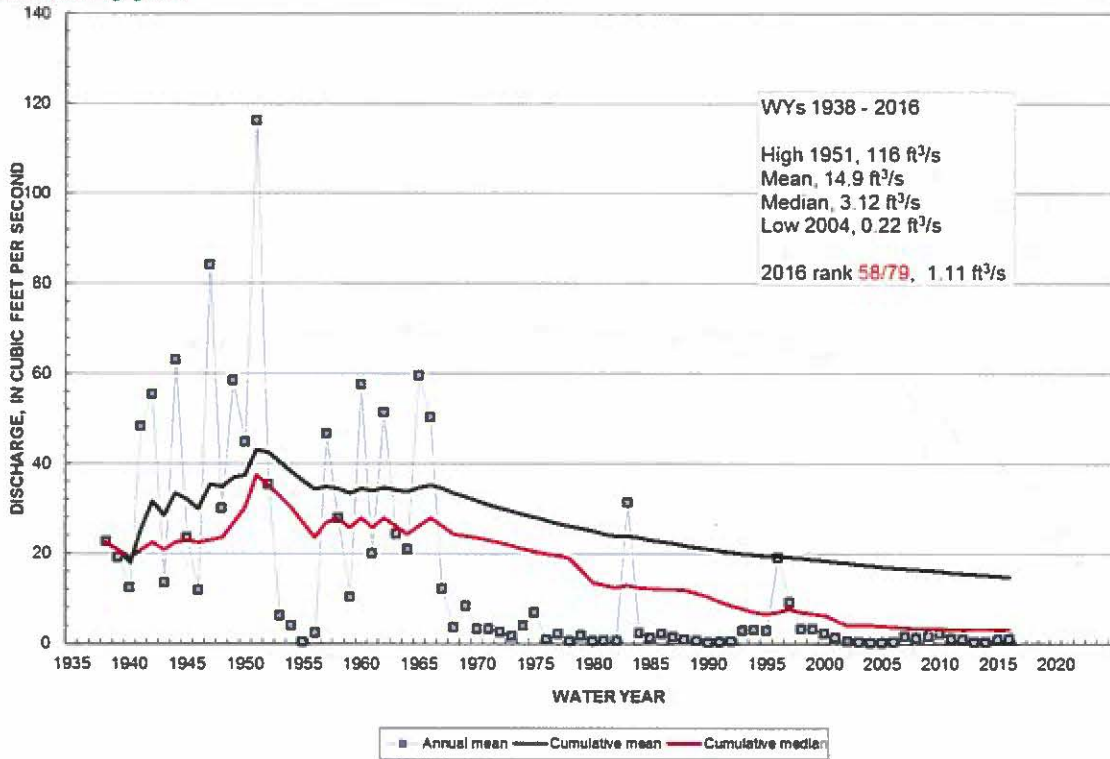


06844500 Republican River near Orleans, NE

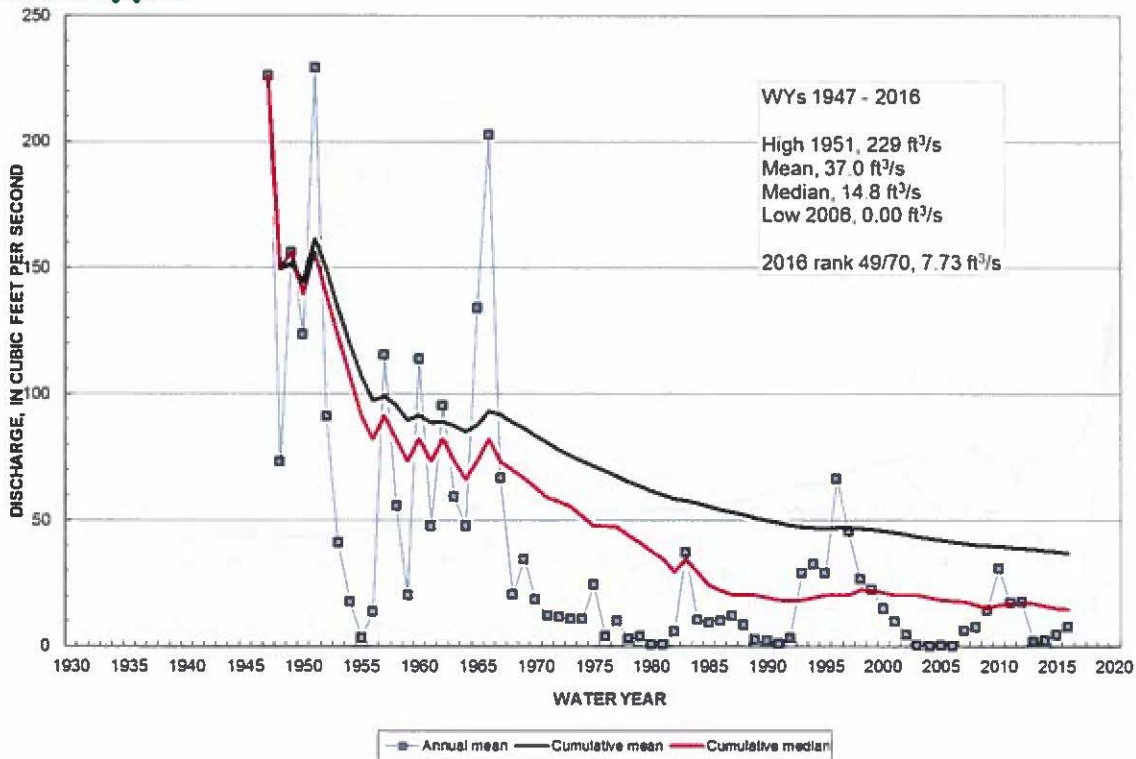




06847000 Beaver Creek near Beaver City, NE



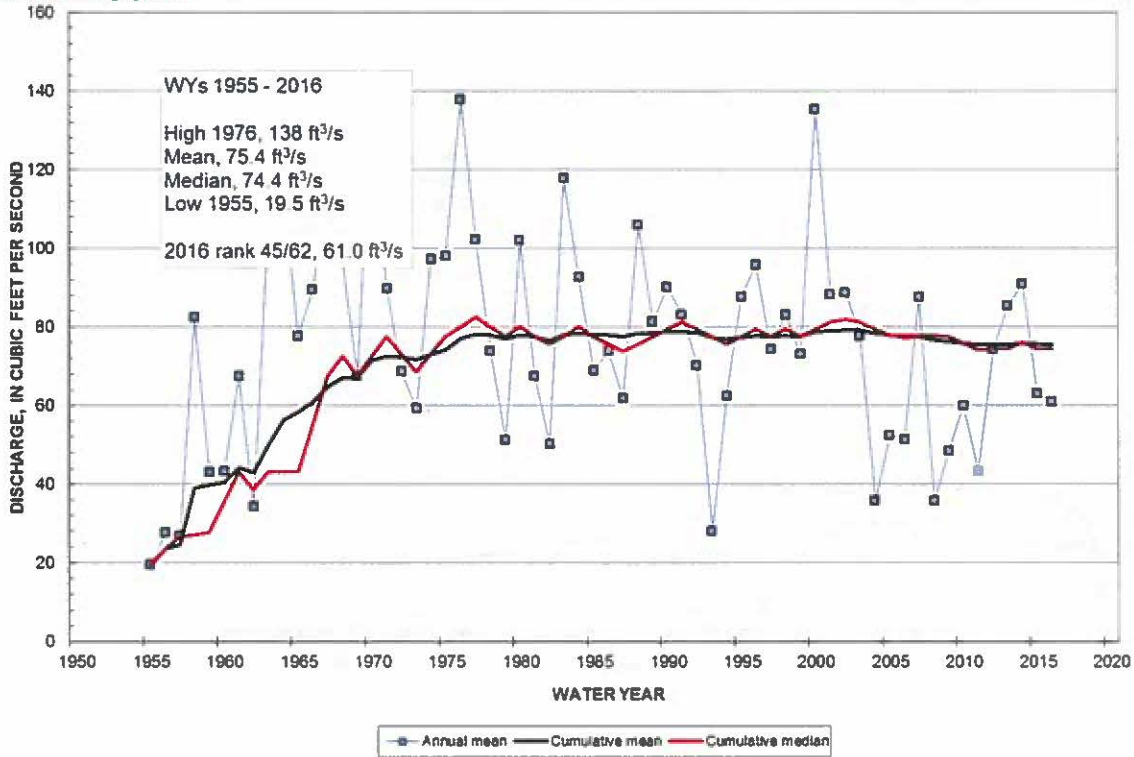
06847500 Sappa Creek near Stamford, NE



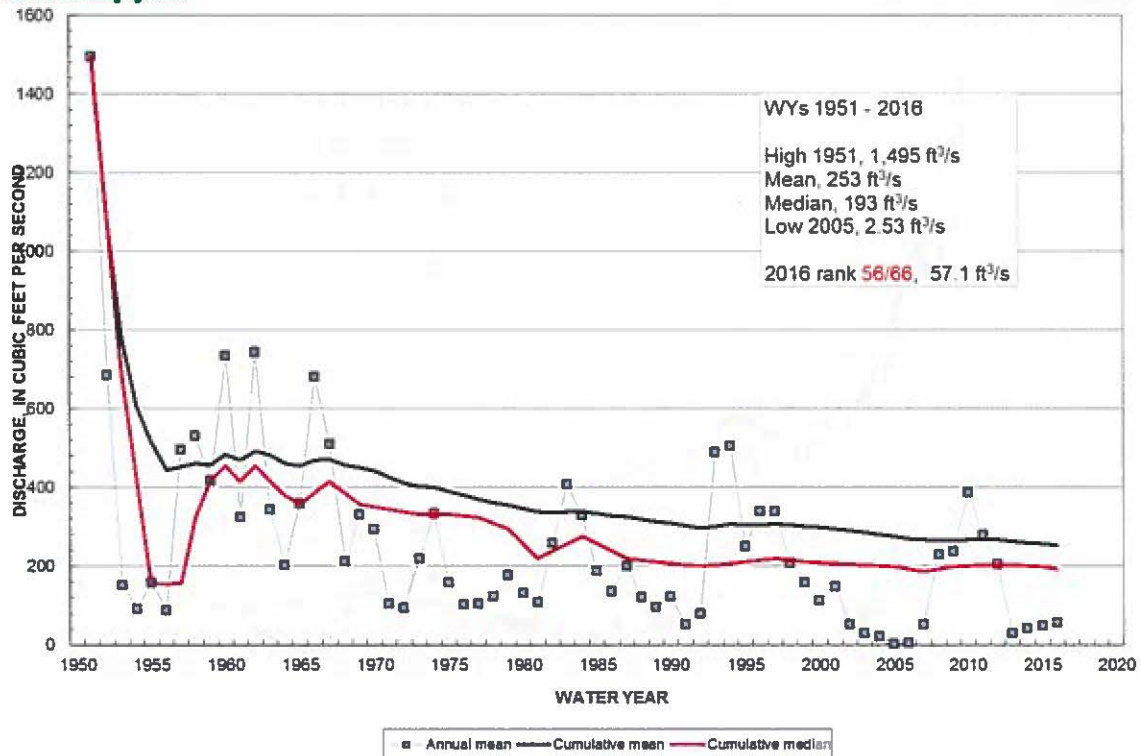




06852500 Courtland Canal at NE-KS State Line



06853020 Republican River at Guide Rock, NE



## **Engineering Committee Report**

### **Republican River Compact Administration**

August 22, 2017

#### **EXECUTIVE SUMMARY**

The Engineering Committee (EC) met four times since last August's Republican River Compact Administration (RRCA) Annual Meeting. Over the past year, the EC completed these assignments: 1) hold quarterly meetings; 2) exchange information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, including all required data and documentation; 3) continue work and provide future updates on improving accounting tools developed by the Engineering Committee; 4) continue to explore options for sharing evaporation charges for Harlan County Lake when accounts exist separate from the project water supplies of Bostwick Irrigation District and explore potential means to adjust the compact accounting of Harlan County Lake for the mutual benefit of the States; 5) work to resolve issues preventing agreement on final accounting for 2006-2015; and 6) work to finalize 2016 accounting.

Ongoing assignments include 1) continue efforts to resolve concerns related to varying methods of estimating ground and surface water recharge and return flows and related issues; 2) discuss developing an application and approval process for future augmentation plans; 3) assign responsibility for collecting specific fields of data collected for the annual data exchange; 4) create a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures; and 5) work on producing a RRCA public website.

The EC recommends discussion by the RRCA on the exchange of data and documentation and the modeling runs completed by Principia Mathematica for 2016, discussion on the proposed 2016 accounting, direction from the commissioners on the RRCA draft website, and the recommended EC assignments for the following year.

Details of the various EC tasks are described further in the remainder of this report, including as attachments, the EC meeting notes.

#### **COMMITTEE ASSIGNMENTS AND WORK ACTIVITIES RELATED TO THESE ASSIGNMENTS**

1. Meet quarterly to review the tasks assigned to the committee.
  - a. Assignment completed.
  - b. The EC held four meetings since the August 2015 RRCA Annual Meeting. Notes from the four EC meetings are attached: November 21, 2016 (Attachment 1), February 3, 2017 (Attachment 2), May 11, 2017 (Attachment 3), and July 18, 2017 (Attachment 4).

*RRCA Engineering Committee Report for 2017*

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- c. The EC also met informally on May 23, 2017 to prepare for the upcoming May 25, 2017 special meeting.
  2. Exchange by April 15, 2017, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2017, the states will exchange any updates to these data.
    - a. Assignment completed.
    - b. Kansas, Nebraska, and Colorado posted preliminary data by April 15, 2017. The status and details of the preliminary data exchange was discussed at the November 21 and February 3, 2016, EC meetings (Attachments 3 and 4). Nebraska posted final data on April 13, April 20, April 25, and July 18, 2017, and Kansas posted final data on April 11, June 28, and July 18, 2017. The Colorado procedure for 2016 uses the metered pumping for those wells covered by the Metering Rules with acreage data from 2010. Wells without meter records in parts of two counties use average application rates from Kit Carson County along with the acreage associated with each well. Due to data availability issues, Colorado's crop irrigation requirement-based estimate of pumping was distributed August 10, 2017.
    - c. In advance of the July 2017 meeting, Willem Schreüder of Principia Mathematica executed the most recent model run for 2016 using full-year temperature and precipitation data, river data, and augmentation pumping information. He also executed a preliminary model run for 2017 using temperature data, long-term average precipitation data, 2016 evaporation data, river data, and pipeline information. This information has been posted to the RRCA website.
    - d. The Committee continued to discuss updating documentation of the modeling processes. Principia Mathematica will continue to update the modeling process documentation. The write-up for the update will have two versions of the processing programs: 2001 to 2006 and 2007 skipping intermediate steps and describing the current procedure for running the model (5 run).
  3. When possible, continue efforts to resolve concerns related to varying methods of estimating ground and surface water irrigation recharge and return flows within the Republican River Basin and related issues.
    - a. Assignment ongoing.
    - b. Kansas is working on a scope and needs document for this task regarding changes in irrigation efficiency through time.
  4. When possible, continue efforts to finalize accounting for 2006-2015.
    - a. Assignment complete.
    - b. The RRCA approved final accounting for years 2006-2015 at the May 25, 2017 Special Meeting.

*RRCA Engineering Committee Report for 2017*

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5. Work to resolve issues preventing agreement on final accounting for 2006-2015, as identified in the 2016 EC Report. These issues include:
  - a. Kansas's request for beginning and ending meter data from other states.
    - i. Assignment complete.
    - ii. Kansas has reviewed Colorado's annual meter data for 2015, 2014, 2013, and 2012 and its application in the RRCA Model and has found these to be acceptable.
  - b. Reaching consensus about how to model Bonny Reservoir.
    - i. Assignment complete.
    - ii. The 3-states have reached an agreement that dictates how Bonny Reservoir will be represented in the RRCA Groundwater Model for the foreseeable future.
6. When possible, discuss developing an application and approval process for future augmentation plans.
  - a. Assignment not completed.
  - b. Due to ongoing consideration of this topic at Three-States meetings throughout the year, the EC deferred discussion of this assignment.
7. Continue to explore options for sharing evaporation charges for Harlan County Lake when accounts exist separate from the project water supplies of Bostwick Irrigation District and explore potential means to adjust the compact accounting of Harlan County Lake for the mutual benefit of the States.
  - a. Assignment complete.
  - b. The RRCA approved a resolution approving long-term operation of Harlan County Lake for compact call years and adopted revised accounting procedures for evaporation charges for Harlan County Lake when accounts exist separate from the project water supplies of Bostwick Irrigation District.
8. Assign responsibility for collecting specific fields of data collected for the annual data exchange by determining who has the best available data and assigning them the responsibility of populating those fields in order to avoid confusion between multiple datasets.
  - a. Assignment ongoing.
  - b. The EC is utilizing the SWInputs spreadsheet to collaborate and agree upon which source/state has the responsibility of populating data fields.
9. Create a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
  - a. Assignment ongoing.
  - b. Kansas is spearheading this document and the work has yielded a draft document that was presented to the RRCA during at the 2016 annual meeting. The draft document is broken out into Accounting Procedure changes, Model



*RRCA Engineering Committee Report for 2017*

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Update and Resolution Action, and how the document is kept current. Kansas is in the process of producing a final draft for review by the EC.

10. Create a RRCA oriented public website
  - a. Assignment ongoing.
  - b. Since the 2016 annual meeting, more content has been added to the site and the site has changed platforms from Go Daddy to WordPress. The EC requests direction from the commissioners on when and how to make this website public and how and when to change its content.

**OTHER COMMITTEE ACTIVITIES**

1. Updates on the status of the development and review of RRCA annual reports for 2015, and 2016 were given by the states at each quarterly EC meeting.
2. The EC held an informal call on May 23, 2017 to discuss preparations for the upcoming May 25, 2017 RRCA special meeting.
3. The EC discussed Nebraska's 2017 water administration and management actions being taken by Nebraska for Compact compliance.

**ITEMS FOR RRCA DISCUSSION & ACTION**

Based upon the EC discussions and information presented in this report, the EC recommends RRCA discussion and potential action on the following items:

1. Agreement that the Data Exchange & Modeling Results for 2016 were performed. The EC has examined the data exchanged and the results from Principia Mathematica and agrees that the 2016 modeling runs are complete.
2. Discussion and potential action on the proposed 2016 accounting presented in Attachment 5 and spreadsheet titled "RRCA\_Accounting\_2016\_Final.xlsx". The EC recommends the proposed 2016 accounting for approval by the RRCA.
3. Discussion and direction on the specific modeling and data tasks to be assigned to Principia Mathematica for 2017.
4. Discussion and direction on the use of the web-based RRCA accounting compilation developed by Willem Schreuder. This tool presents all accounting inputs and compliance tables from 1995 on, and will be updated each year as accountings are approved. There are small numeric differences in some tables in some years between the web-based tool and the official, approved accountings. Should the web-based tool be available to the public or should only the official approved accountings, which are not compiled over the years, be the only data available? Though the web-based version is very useful and convenient, the EC is concerned that the discrepancies could cause confusion to the public.
5. During 2015-2016 the engineering committee worked to develop an RRCA website geared toward public information – history of the compact and the administration, links to compact-related data and reports, state information, etc. At the 2016 annual meeting, the administration directed the EC to continue its work on the website. Since the 2016

### *RRCA Engineering Committee Report for 2017*

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annual meeting, more content has been added to the site and the site has changed platforms from Go Daddy to WordPress. The EC requests direction from the commissioners on the content that the RRCA wants published to the website, when to make the website public, and how and when to update its content. The EC recommends the commissioners create a website committee that will report to the EC committee. The website committee would consist of one representative from each state. The website committee's assignment would be to develop a draft plan to the EC by December 31, 2017. The EC would review and revise the plan and submit it to the commissioners by April 2018. The draft plan would include details on what information and data would be published to the public website vs what would be on the internal only website and the plan would describe protocols for updating and changing the content of the website.

6. Discussion of the recommended EC assignments and other potential assignments for the next year and agreement on a final set of assignments. The EC presents the list of eleven items in this report as recommended assignments to report on at the 2017 annual meeting of the RRCA.

### **RECOMMENDED ASSIGNMENTS FOR THE COMING YEAR**

The Engineering Committee recommends that the Republican River Compact Administration assign the following tasks:

1. Meet quarterly to review the tasks assigned to the committee.
2. Exchange by April 15, 2018, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2018, the states will exchange any updates to these data.
3. Finalize the 2017 accounting and recommend for approval by the RRCA.
4. When possible, continue efforts to resolve concerns related to varying methods of estimating ground and surface water irrigation recharge and return flows within the Republican River Basin and related issues.
5. Continue work to assign responsibility for collecting specific fields of data collected for the annual data exchange by determining who has the best available data and assigning them the responsibility of populating those fields to avoid confusion between multiple datasets.
6. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
7. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
8. Continue efforts to develop and publish an administrative website that would be an informational page for the public.

RRCA Engineering Committee Report for 2017

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9. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
10. Work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet.
11. Prepare the RRCA meeting reports for the following dates for approval by the RRCA at the 2018 annual meeting: August 24, 2016 annual meeting (CO); May 25, 2017 special meeting (CO), and 2017 annual meeting (CO).

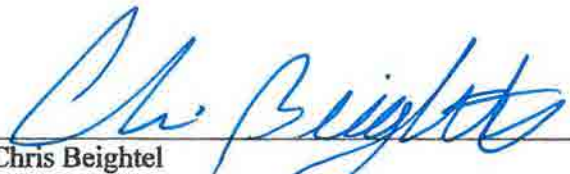
The Engineering Committee Report and the exchanged data will be posted on the web at [www.republicanrivercompact.org](http://www.republicanrivercompact.org).

**SIGNED BY**

Ivan Franco  
Chair, Engineering Committee Member for Colorado



Jennifer J. Schellpeper  
Engineering Committee Member for Nebraska



Chris Beightel  
Engineering Committee Member for Kansas

# Attachment 1 to the 2017 Engineering Committee Report

Final Meeting Notes for  
**QUARTERLY MEETING of the  
ENGINEERING COMMITTEE of the  
REPUBLICAN RIVER COMPACT ADMINISTRATION**  
November 21st, 2016, 12:30 PM Mountain, 1:30 PM Central

Attendees:

Ivan Franco	Colorado	Zablon Adane	Nebraska
Willem Schreuder	Principia Mathematica	David Kracman	The Flatwater Group
Jennifer Schellpeper	Nebraska	Jesse Bradley	The Flatwater Group
Mahesh Pun	Nebraska	Chris Beightel	Kansas
Kari Burgert	Nebraska	Chelsea Erickson	Kansas
Carol Flaute	Nebraska	Hongsheng Cao	Kansas

1. Introductions
2. Review/Modify Agenda
  - a. No changes to the agenda
3. Publication of RRCA Annual Reports
  - a. 2014 Report (Nebraska)
    - i. The cover letter for the report is being drafted and will be distributed when complete. Nebraska suggested that each state distribute the report to their respective governor's once complete. Nebraska would send a final copy to the office of the U.S. President. The other states agreed.
  - b. 2015 Reports (Nebraska)
    - i. October 2014 – Review complete by all states
    - ii. November 2014 – Drafted for second iteration of review
    - iii. March 2015 – The minutes are prepared and ready for first draft review
    - iv. August 2015 Annual – The minutes are prepared and ready for first draft review
  - c. 2016 Reports (Colorado)
    - i. Franco reported that he has not yet begun drafting the 2016 meeting minutes. It is anticipated that some progress might be made by the next Engineering Committee meeting.
4. Modeling and Data Tasks for Principia Mathematica
  - a. Documentation
    - i. Schreuder informed the group that due to recent activities undertaken by the RRCA there is a need for modification to his previously completed work. Schreuder intends to work on amending his past work before making any new progress on this assignment.
      1. Beightel raised a question about the status of the Principia Mathematica contract. Specifically, the question was whether the three-states needed to renew the contract with Principia, and if so by what process. The

group felt as though this matter could be resolved without having RRCA action taken but tasked Colorado with investigating the status of the contract(s) further.

5. Data Exchange
  - a. 2016 Accounting
    - i. Nebraska has continued to distribute the monthly accounting updates to each state. No further discussion on 2016 accounting.
  - b. 2017 Accounting
    - i. No substantive discussion on 2017 accounting.
6. Finalization of 2016 and previous years accounting
  - a. List of issues preventing finalization of accounting
    - i. Modeling Bonny Reservoir
      1. Kansas and Colorado discussions
        - a. This issue has been resolved in the 3-States Meetings. Beightel reminded the group that the provisions of the FSS will to be used when modeling Bonny Reservoir. Schreuder agreed with Beightel and added a little more information noting that moving forward Bonny Reservoir would be modeled as full as the FSS spells out.
    - ii. Beginning and Ending Meter Data
      1. Review of Colorado Data (Kansas)
        - a. Beightel asked Colorado if the 2015 CIR predictions had been completed and loaded on the RRCA website. Franco confirmed that this analysis likely hadn't been loaded onto the website and that he would follow up with Jim Slattery on the status. Beightel believed that this issue might be close to being put to bed if the 2015 CIR analysis could be provided.
    - iii. Discuss annual data exchange and who has the best available data.
      1. Procedure for populating current year Surface Water inputs
      2. Schreuder discussed his desire to include new fields in the SW Inputs spreadsheet to account for Nebraska augmentation projects.
  - b. Continue work and provide future update on improving accounting tools developed by the Engineering Committee.
    - i. 1995-2015 accounting spreadsheet from Schreuder
      1. Schreuder will incorporate any new changes to the SW Inputs spreadsheet and load an updated version on the website for review.
      2. Nebraska will start draft report of 2007-2015 accounting for Engineering Committee submission to RRCA at annual meeting.
7. By December 31, 2016, unify accounting procedures and reporting requirements approved by all RRCA resolutions including determining the appropriate model run or runs to be performed by Principia Mathematica.
  - a. Bradley walked through a draft version of the Accounting Procedures and Reporting Requirements (Revised August 24, 2016). Bradley noted that the sections in red are new

and the base document is the version Colorado distributed which incorporated the proposed CCP accounting changes. Bradley also noted that changes appearing in green have already been approved. An example of applying the proposed accounting procedures changes was also provided as Attachment 8.

8. Harlan County Lake–Evaporation Charges and Compact Accounting Adjustments
  - a. Continue to explore options for sharing evaporation charges for Harlan County Lake when accounts exist separate from the project water supplies of Bostwick Division and explore potential means to adjust the compact accounting of Harlan County Lake for the mutual benefit of the States.
  - b. Examples for calculating the incremental increase in reservoir areas
  - c. Ongoing discussions at Three-States Meetings
    - i. Beightel made a quick comment regarding Kansas exclusive accounts. How this account works will have to be figured out at a later time. There was no further discussion on the matter.
9. Estimating Ground and Surface Water Irrigation Recharge and Return Flows
  - a. Draft scope and needs document regarding changes in irrigation efficiency (Kansas)
    - i. Kansas continues to work on this document but does not have anything ready for distribution at this time.
10. Creating a New RRCA-oriented Website
  - a. Draft administrative website (Kansas)
    - i. Erickson informed the group that the old draft has been heavily modified and it is now going to be completely done away with. Further review of this draft is not required. Kansas will now be using Word Press, for various reasons, to build the website and a new draft version is in the works and will be distributed to the group when ready. Schreuder noted that Word Press will integrate well with his website.
11. Draft a document memorializing when and how RRCA Accounting Procedures have changed
  - a. Erickson is still working on this document. When a draft is complete it will be distributed to the group.
12. Future Augmentation Plans
  - a. Ongoing discussions at Three-States Meetings
    - i. Each state will keep one another apprised of future augmentation plans.
13. Summary of Meeting Actions/Assignments
  - Franco will investigate the renewal of Principia Mathematica contract.
  - Franco will investigate the status of Colorado’s 2015 CIR projections and report back.
  - Schreuder will prepare updated SWInput sheet and post on the website.
  - Beightel will work on getting comments back on the updated Accounting Procedures.
  - Nebraska will start draft report of 2007-2015 accounting for Engineering Committee submission to RRCA at annual meeting.



14. Future Meeting Schedule

February 1<sup>st</sup>, 2017 at 12:30 MST

15. Adjournment

Meeting concluded at 1pm MST

# Attachment 2 to the 2017 Engineering Committee Report

FINAL MEETING NOTES for the  
**QUARTERLY MEETING of the  
 ENGINEERING COMMITTEE of the  
 REPUBLICAN RIVER COMPACT ADMINISTRATION**  
 February 3<sup>rd</sup>, 2017, 12:30 PM Mountain, 1:30 PM Central

Attendees:

Ivan Franco	Colorado	Jesse Bradley	Flatwater Group
Willem Schreuder	Principia Mathematica	Chris Beightel	Kansas
Jennifer Schellpeper	Nebraska	Chelsea Erickson	Kansas
Kari Burgert	Nebraska	Hongsheng Cao	Kansas
Zablon Adane	Nebraska	Sam Perkins	Kansas
Carol Flaute	Nebraska		

1. Introductions
2. Review/Modify Agenda
3. Publication of RRCA Annual Reports
  - a. 2014 Report (Nebraska)
    - i. This report has been distributed to each state and is considered complete.
  - b. 2015 Reports (Nebraska)
    - i. October 2014 – Review is complete, and the final copy has been distributed to each state.
    - ii. November 2014 – Second draft is forthcoming.
    - iii. March 2015 - First draft has been sent to Kansas for edits then coming to Colorado.
    - iv. August 2015 Annual – First draft sent to Kansas for edits then coming to Colorado.
  - c. 2016 Reports (Colorado)
    - i. Franco is working on the November 24<sup>th</sup> Special Meeting minutes, and those are forthcoming.
4. Modeling and Data Tasks for Principia Mathematica
  - a. Documentation
    - i. Schreuder hasn't had a chance to get any work done on this matter. Schreuder noted that he has a contract with Nebraska covering several years sitting on his desk waiting for finalization. Beightel anticipates Kansas will be renewing its contract soon.
5. RRCA Data Exchange
  - a. 2016 Accounting – Nebraska is working on getting set for April 15<sup>th</sup> data exchange. Schreuder said that precipitation and reservoir data is updated through 2016. Schreuder will also put together preliminary 2017 run as soon as he can. Bradley asked if the 2016 run would include all updated precipitation and reservoir data. Schreuder noted it would



be a good idea if someone contacted the USGS regarding their data finalization for the year.

- b. 2017 Accounting – A preliminary accounting update would be provided to Kansas and Colorado by May 10<sup>th</sup> pursuant to the August 24, 2016 resolution.

6. Finalization of 2016 and previous years' accounting

a. List of issues preventing finalization of accounting

i. Modeling Bonny Reservoir

1. Kansas and Colorado discussions

- a. Schreuder was asked if he is using version 12S2 for the run? It was noted that conductance values in the Bonny stream cells seem to be set to zero which may not be appropriate. Schreuder stated that he thought version 12S3 is the newest version that includes CCP and reorganizes the stream package. Schreuder said that he will provide definitions and descriptions of 12S2 and 12S3 model updates. He also suggested requesting that the RRCA formally adopt 12S3.

ii. Beginning and Ending Meter Data

1. Review of Colorado Data (Kansas) – Kansas hasn't had a chance to look at Colorado's most recent CIR data. Kansas has looked at data from previous years and wants to compare Colorado's 2015 meter data with its CIR data.

iii. Discussion of annual data exchange and who has the best available data

1. Procedure for populating current year Surface Water inputs

- a. The group seemed comfortable with the data in the SWInputs sheet. Schreuder has some minor changes to implement Harlan County Lake agreements.

b. Continue work and provide future update on improving accounting tools developed by the Engineering Committee

i. 1995-2015 accounting spreadsheet from Schreuder

ii. Draft report of 2007-2015 accounting for submission to RRCA (Nebraska)

1. Schreuder will be reviewing the spreadsheet provided by Nebraska that was used to generate the draft report. Schreuder noted that he will use the spreadsheet to check Main Stem accounting issues which he believes are still lingering. Schreuder wants to work on this via email exchanges.
2. Colorado water short year calculations may need to be changed after discussion at the upcoming 3-States meeting.
3. It was discussed that augmentation water supply inputs need to be explicitly presented in the accounting report. Kansas will be reviewing how augmentation is handled in the calculations.
4. Beightel asked where the draft accounting comes from that Schreuder posted on his website. Schreuder informed the group that a program (*mkacct*) applies the Accounting equations and uses the SWInputs sheet

- pulled from a .dbf file. Schreuder noted that the program output can be used as a check of the spreadsheet provided by Nebraska.
5. The committee reaffirmed that the accounting inputs for approved years through 2006 would remain as they were approved, and if needed for programming purposes, Schreuder would note any discrepancies between approved data and updated/corrected values since approval.
  6. Beightel noted that the Harlan County Lake Warren Act water evaporation was not included in the draft accounting report but should be added.
7. By December 31, 2016, unify accounting procedures and reporting requirements approved by all RRCA resolutions including determining the appropriate model run or runs to be performed by Principia Mathematica.
    - a. This is now the latest draft trying to deal with and incorporate all of the Kansas edits. This new version started with the previously approved changes by resolution at the 2016 Annual Meeting and includes redline of the proposed HCL/CCP resolutions changes. Kansas also wants to add daily augmentation data to the annual reporting requirement for Nebraska similar to Colorado's approach.
  8. Harlan County Lake–Evaporation Charges and Compact Accounting Adjustments
    - a. Continue to explore options for sharing evaporation charges for Harlan County Lake when accounts exist separate from the project water supplies of Bostwick Division and explore potential means to adjust the compact accounting of Harlan County Lake for the mutual benefit of the States
    - b. Examples for calculating the incremental increase in reservoir areas
    - c. Ongoing discussions at Three-States Meetings
      - i. Kansas noted that they would eventually like Kansas exclusive data in the accounting. Otherwise, no further discussion on the matter.
  9. Estimating Ground and Surface Water Irrigation Recharge and Return Flows
    - a. Draft scope and needs document regarding changes in irrigation efficiency (Kansas)
      - i. Kansas continues to work on this document but does not have anything ready for distribution now.
  10. Creating a New RRCA-oriented Website
    - a. Draft administrative website (Kansas)
      - i. Chelsea informed the group that the website is being worked on but is still too rough to distribute a first draft. Schreuder thinks when its further along he can push it into the restricted area of the website, and the group can view it there.
  11. Draft a document memorializing when and how RRCA Accounting Procedures have changed
    - a. This document continues to be drafted. Chelsea is parsing data out of the actual annual reports to serve as references.

12. Future Augmentation Plans

a. Ongoing discussions at Three-States Meetings

- i. Each state will keep one another apprised of future augmentation plans. No updates now.

13. Summary of Meeting Actions/Assignments

- a. Franco will contact the USGS to touch base on annual data completion.  
b. Schreuder will frame up a document of Version 12S3 for discussion.  
c. All states would exchange updates to 2007-2015 accounting for the draft report.  
d. All states would discuss the latest draft accounting procedures, and Nebraska would follow-up on the proposed changes in the document.

14. Future Meeting Schedule

April 27<sup>th</sup>, 2017, at 12:30 MST

15. Adjournment

Meeting concluded at 1:37 pm MST

# Attachment 3 to the 2017 Engineering Committee Report

Final Meeting Notes for the  
**QUARTERLY MEETING of the  
ENGINEERING COMMITTEE of the  
REPUBLICAN RIVER COMPACT ADMINISTRATION**  
May 11, 2017, 9:30 AM Mountain

Attendees:

Ivan Franco	Colorado	Jesse Bradley	Nebraska
Willem Schreuder	Principia Mathematica	Chris Beightel	Kansas
Jennifer Schellpeper	Nebraska	Chelsea Erickson	Kansas
Kari Burgert	Nebraska		
Zablon Adane	Nebraska		

1. Introductions
2. Review/Modify Agenda
  - a. No changes to the agenda however it was agreed that the focus of the meeting would be only unapproved accounting issues to facilitate actions planned for the May 25, 2017, Special Meeting.
3. Publication of RRCA Annual Reports
  - a. 2015 Reports (Nebraska) – Discussion postponed until next EC Meeting
    - i. November 2014
    - ii. March 2015
    - iii. August 2015 Annual
  - b. 2016 Reports (Colorado) – Discussion postponed until next EC Meeting
4. Modeling and Data Tasks for Principia Mathematica
  - a. Documentation
    - i. Discussion postponed until next EC Meeting
5. RRCA Data Exchange - Discussion postponed until next EC Meeting
  - a. 2016 Accounting
  - b. 2017 Accounting
6. Finalization of 2016 and previous years accounting
  - a. List of issues preventing finalization of accounting
    - i. Modeling Bonny Reservoir
      1. Kansas and Colorado discussions
    - ii. Beginning and Ending Meter Data
      1. Review of Colorado Data (Kansas)
    - iii. Discussion of annual data exchange and who has the best available data.
      1. Procedure for populating current year Surface Water inputs

- a. Schreuder noted that USGS streamflow data for 2016 was downloaded and went smoothly. Franco offered to send a thank you to the USGS.
- b. Continue work and provide future update on improving accounting tools developed by the Engineering Committee.
  - i. 1995-2015 accounting spreadsheet from Schreuder
  - ii. Draft report of 2007-2015 accounting for submission to RRCA (Nebraska)
    1. This task is now considered complete.
    2. The group agreed to make a minor change to the draft Resolution Approving Accounting Changes.
    3. The group reviewed the draft changes to the RRCA Rules and Regulations. It was agreed that a redline version and clean version of the rules would be presented to the commissioners.
    4. The group reviewed the draft Accounting Procedures and Reporting Requirements.
      - a. Beightel commented on Table 5E language. Specifically, adding the words “generated in the sub-basin” to column 5.
      - b. The group agreed for simplicities sake to define RWS credit the first time it is mentioned.
      - c. A redline and clean version will be distributed for the commissioners.
  - iii. The group agreed to propose for adoption by the commissioners the summary documents prepared by Nebraska for years 2005-2006. Beightel suggested instead incorporating the sheet David Barfield distributed, however the group decided against this change.
  - iv. The group discussed the following changes to the summary documents Nebraska prepared for years 2007 through 2015.
    1. Noting that the accounting points that had changed were Guide Rock and North Fork.
    2. Removing “b. Stream network reconfigurations” from the cover summary since we are using model version 12S2.
    3. Agreement was reached that the final 2007 to 2015 groundwater model runs were completed.
    4. Beightel requested a footnote be added regarding the States’ positions on the Unallocated Supply of the South Fork.
    5. Schreuder noted that the Beaver Creek Reduction in Table 5A would need to be calculated by a different method for the start-up years. It was decided to use the single year allocation from approved accounting for 2003 to 2006.
    6. Schreuder noted that Nebraska’s Share of Unused Colorado Allocation in Table 5C and D would need to be populated with a number in the spreadsheet. It was decided to use zero for this value for 2005 and 2006.

7. The groundwater impacts above and below Guide Rock will be calculated on totals as we have been doing versus the sum of the sub-basins.
7. By December 31, 2016 unify accounting procedures and reporting requirements approved by all RRCA resolutions including determining the appropriate model run or runs to be performed by Principia Mathematica.
  - a. This task is considered complete
8. Harlan County Lake–Evaporation Charges and Compact Accounting Adjustments - Discussion postponed until next EC Meeting
  - a. Continue to explore options for sharing evaporation charges for Harlan County Lake when accounts exist separate from the project water supplies of Bostwick Division and explore potential means to adjust the compact accounting of Harlan County Lake for the mutual benefit of the States.
  - b. Examples for calculating the incremental increase in reservoir areas
  - c. Ongoing discussions at Three-States Meetings
9. Estimating Ground and Surface Water Irrigation Recharge and Return Flows
  - a. Draft scope and needs document regarding changes in irrigation efficiency (Kansas)
    - i. Discussion postponed until next EC Meeting
10. Creating a New RRCA-oriented Website
  - a. Draft administrative website (Kansas)
    - i. Discussion postponed until next EC Meeting
11. Draft a document memorializing when and how RRCA Accounting Procedures have changed
  - a. Discussion postponed until next EC Meeting
12. Future Augmentation Plans
  - a. Ongoing discussions at Three-States Meetings
    - i. Discussion postponed until next EC Meeting
13. Summary of Meeting Actions/Assignments
  - a. Nebraska will provide copies of the documents
14. Future Meeting Schedule
  - a. May 23, 2017 at 12:30 MST
  - b. July 18<sup>th</sup>, 2017 at 12:30 MST
15. Adjournment
  - a. Meeting concluded at 10:35 am MST

# Committee Report

Final Meeting minutes  
**QUARTERLY MEETING of the  
 ENGINEERING COMMITTEE of the  
 REPUBLICAN RIVER COMPACT ADMINISTRATION**  
 July 18, 2017, 12:30 PM Mountain

Attendees:

Ivan Franco	Colorado	Jesse Bradley	Nebraska
Willem Schreuder	Principia Mathematica	Chris Beightel	Kansas
Jennifer Schellpeper	Nebraska	Chelsea Erickson	Kansas
Kari Burgert	Nebraska	Hongsheng Cao	Kansas

1. Introductions
2. Review/Modify Agenda
3. Publication of RRCA Annual Reports
  - a. 2015 Reports (Nebraska)
    - i. November 2014 – Revisions have been made and the final version will be distributed to each state.
    - ii. March 2015 – Kansas forwarded comments to Colorado in April 2017
    - iii. August 2015 Annual – Kansas forwarded comments to Colorado in April 2017
  - b. 2016 Reports (Colorado)
    - i. November 24, 2015 – Kansas and Nebraska have provided initial comments. Further comments are forthcoming from Kansas.
    - ii. August 24, 2016 Annual - Colorado reported that a draft version is forthcoming for review
4. Modeling and Data Tasks for Principia Mathematica
  - a. Documentation
    - i. Schreuder hasn't had a chance to make any further progress on this matter. The group had a discussion regarding the future of the internal accounting that Schreuder produced. The accounting can serve as a useful tool for the public but has differences from the approved accounting. It was agreed that, for now, only posting the approved accounting to the public RRCA site was the most prudent course of action.
5. RRCA Data Exchange
  - a. 2016 Accounting
    - i. Schreuder noted that the Courtland Canal accounting values have some slight discrepancies and Hongsheng is working on addressing some of these values with Schreuder. Schreuder will update surface water inputs sheet after reviewing the final data that will be provided by Kari Burgert and rerun accounting for final review. Schreuder noted that from now going forward the approved values in the surface water inputs sheet will be password protected (rrca is the password).

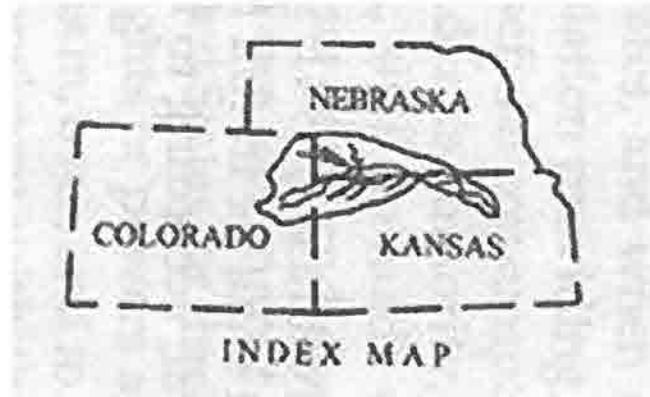




- ii. Beightel proposed drafting some questions for the commissioners to get better direction on this task.
10. Draft a document memorializing when and how RRCA Accounting Procedures have changed
  - a. Chelsea reported that a final draft is in the works but won't be ready by this year's annual meeting.
  - b. Jennifer pointed out that she believed the EC was given an additional task at the special meeting to produce short summary explaining the history of Table 4A in the approved accounting.
11. Future Augmentation Plans
  - a. Ongoing discussions at Three-States Meetings
    - i. Beightel noted that this task now seemed complete but that it could remain on the agenda as a place for each state to provide an update on augmentation activities.
12. Summary of Meeting Actions/Assignments
  - a. Honsheng and Kari will be providing Schreuder with corrected/missing data and he will provide a final version of the accounting on the website for review.
  - b. Beightel will draft an email articulating his thoughts on the website assignment and what he would like from the commissioners.
  - c. Franco will draft a copy of the Engineering Committee report for review by the group.
13. Future Meeting Schedule
  - Annual Meeting August 22<sup>nd</sup> in Burlington
14. Adjournment
  - Meeting concluded at 1:40 p.m. MST

Attachment 5 to the 2017 Engineering Committee  
Report

**Republican River Compact  
Accounting Inputs and Tables  
Summarized for Accounting Year  
2016**



**August 22, 2017**

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# INPUTS

Calendar Year		2016
<b>2016</b>		
<b>Groundwater Data</b>		
North Fork Subbasin	GW CBCU Colorado	16,820
	GW CBCU Kansas	0
	GW CBCU Nebraska	1,155
Arikaree Subbasin	GW CBCU Colorado	2,638
	GW CBCU Kansas	183
	GW CBCU Nebraska	147
Buffalo Subbasin	GW CBCU Colorado	488
	GW CBCU Kansas	0
	GW CBCU Nebraska	3,514
Rock Subbasin	GW CBCU Colorado	120
	GW CBCU Kansas	0
	GW CBCU Nebraska	4,994
South Fork Subbasin	GW CBCU Colorado	13,883
	GW CBCU Kansas	5,717
	GW CBCU Nebraska	904
Frenchman Subbasin	GW CBCU Colorado	1,611
	GW CBCU Kansas	0
	GW CBCU Nebraska	82,036
Driftwood Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	932
Red Willow Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	8,748
Medicine Creek Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	21,225
Beaver Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	6,513
	GW CBCU Nebraska	4,543
Sappa Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	1,617
	GW CBCU Nebraska	2,159
Prairie Dog Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	4,342
	GW CBCU Nebraska	0
Mainstem Subbasin	GW CBCU Colorado	(2,436)
	GW CBCU Kansas Above Guide Rock	(53)
	GW CBCU Kansas Below Guide Rock	43
	GW CBCU Nebraska Above Guide Rock	72,496
	GW CBCU Nebraska Below Guide Rock	2,233

<b>Import Water Data</b>		
North Fork Subbasin	Imported Water Nebraska	0
Arikaree Subbasin	Imported Water Nebraska	0
Buffalo Subbasin	Imported Water Nebraska	0
Rock Subbasin	Imported Water Nebraska	0
South Fork Subbasin	Imported Water Nebraska	0
Frenchman Subbasin	Imported Water Nebraska	0
Driftwood Subbasin	Imported Water Nebraska	0
Red Willow Subbasin	Imported Water Nebraska	50
Medicine Creek Subbasin	Imported Water Nebraska	10,687
Beaver Subbasin	Imported Water Nebraska	0
Sappa Subbasin	Imported Water Nebraska	28
Prairie Dog Subbasin	Imported Water Nebraska	0
Mainstem Subbasin	Imported Water Nebraska Above Guide Rock	9,128
	Imported Water Nebraska Below Guide Rock	(12)
	<b>Total</b>	<b>19,881</b>

Calendar Year		2016
<b>SW Pumping Data</b>		
North Fork Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	478
	SW Diversions - Irrigation - Small Pumps - Colorado	158
	SW Diversions - M&I - Colorado	0
Arikaree Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	62
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Buffalo Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	150
	SW Diversions - Irrigation - Small Pumps - Nebraska	10
Rock Subbasin	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
South Fork Subbasin	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals- Colorado	3
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
SW Diversions - Irrigation - Small Pumps - Nebraska	0	
Frenchman Subbasin	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
Driftwood Subbasin	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
Red Willow Subbasin	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Medicine Creek Subbasin	SW Diversions - Irrigation - Small Pumps - Nebraska	48
	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	30
	SW Diversions - M&I - Nebraska - Above Gage	0
Medicine Creek Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	189
	SW Diversions - M&I - Nebraska - Below Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0

Calendar Year		2016
<b>SW Pumping Data, continued</b>		
Beaver Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	5
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	0
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	0
	SW Diversions - M&I - Nebraska - Below Gage	0
Sappa Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	154
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	0
SW Diversions - M&I - Nebraska - Below Gage	0	
Prairie Dog Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	384
	SW Diversions - M&I - Kansas	379
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	45
	SW Diversions - M&I - Nebraska - Below Gage	0
Mainstem Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	713
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	3,078
	SW Diversions - Irrigation - Small Pumps - Nebraska	1,041
	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska Below Guide Rock	0
	SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	655
SW Diversions - M&I - Nebraska - Below Guide Rock	0	
<b>Non-Federal SW Consumptive Use</b>		
	% Non-Federal Canal Diversion Consumed	60%
	% Small Surface Water Pumps Consumed	75%
	% Municipal And Industrial SW Consumed	50%

Calendar Year		2016
<b>Non-Federal Reservoir Evaporation Data</b>		
North Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	37
Arikaree Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	13
	Non-Federal Reservoir Evaporation - Nebraska	0
Buffalo Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Nebraska	6
Rock Subbasin	Non-Federal Reservoir Evaporation - Nebraska	81
South Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	25
	Non-Federal Reservoir Evaporation - Kansas	118
	Non-Federal Reservoir Evaporation - Nebraska	0
Frenchman Subbasin	Non-Federal Reservoir Evaporation - Nebraska	47
Driftwood Subbasin	Non-Federal Reservoir Evaporation - Kansas	9
	Non-Federal Reservoir Evaporation - Nebraska	0
Red Willow Subbasin	Non-Federal Reservoir Evaporation - Nebraska	184
Medicine Creek Subbasin	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	215
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	1
Beaver Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	216
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	71
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	0
Sappa Subbasin	Non-Federal Reservoir Evaporation - Kansas	232
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	29
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	2
Prairie Dog Subbasin	Non-Federal Reservoir Evaporation - Kansas	258
	Non-Federal Reservoir Evaporation - Nebraska	11
Mainstem Subbasin	Non-Federal Reservoir Evaporation - Kansas	81
	Non-Federal Reservoir Evaporation - Nebraska - Above Guide Rock Gage - Whole Basin Value:	733
	Non-Federal Reservoir Evaporation - Nebraska - Below Guide Rock Gage - Whole Basin Value:	34

<b>Stream Gage Data</b>		
North Fork Subbasin	North Fork Republican River At Colorado-Nebraska State Line	28,091
Arikaree Subbasin	Arikaree River At Haigler	397
Buffalo Subbasin	Buffalo Creek Near Haigler	1,536
Rock Subbasin	Rock Creek At Parks	4,613
South Fork Subbasin	South Fork Republican River Near Benkelman	3,898
Frenchman Subbasin	Frenchman Creek At Culbertson	18,852
Driftwood Subbasin	Driftwood Creek Near McCook	3,280
Red Willow Subbasin	Red Willow Creek Near Red Willow	3,936
Medicine Creek Subbasin	Medicine Creek Below Harry Strunk	57,014
Beaver Subbasin	Beaver Creek Near Beaver City	809
Sappa Subbasin	Sappa Creek Near Stamford	5,376
Prairie Dog Subbasin	Prairie Dog Creek Near Woodruff	2,839
Mainstem Subbasin	Republican River At Guide Rock	47,639
	Republican River Near Hardy	80,515

<b>Hardy Gage Data</b>		
USGS Gage 06853500 Republican River Near Hardy, NE		
Mainstem Subbasin	January	5,429
	February	6,532
	March	6,415
	April	6,625
	May	13,501
	June	5,901
	July	4,844
	August	6,153
	September	9,868
	October	5,278
	November	5,286
	December	4,685
		ANNUAL





# ACCOUNTING TABLES

**Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin**

2016 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	40,370	40,370	9,040	0	9,930	21,400	17,260	0	3,550
Arikaree	3,430	3,430	2,690	170	580	(10)	2,680	200	150
Buffalo	5,650	5,650	0	0	1,860	3,790	490	0	3,620
Rock	9,310	9,310	0	0	3,720	5,590	120	0	5,080
South Fork	24,850	24,850	11,030	9,990	350	3,480	14,210	5,840	900
Frenchman	106,320	106,230	0	0	56,940	49,290	1,610	0	84,780
Driftwood	1,420	1,420	0	100	230	1,090	0	10	930
Red Willow	16,390	14,600	0	0	2,800	11,800	0	0	9,140
Medicine	42,600	46,980	0	0	4,280	42,700	0	0	21,610
Beaver	12,150	12,150	2,430	4,710	4,930	80	0	6,730	4,610
Sappa	8,700	8,700	0	3,580	3,580	1,540	0	1,850	2,310
Prairie Dog	13,570	9,950	0	4,550	760	4,640	0	7,120	40
Main Stem	130,010	116,190	0	59,370	56,820	0	(2,440)	29,570	119,400
Total All Basins	414,770	399,830	25,190	82,470	146,780	145,390	33,930	51,320	256,120
Main Stem Including Unallocated		261,580	0	133,660	127,920				
Total	414,770	399,830	25,190	156,760	217,880	0	33,930	51,320	256,120

**Table 2: Original Compact Virgin Water Supply and Allocations**

Basin	Virgin Water Supply	Colorado Allocation	% of Basin Supply	Kansas Allocation	% of Basin Supply	Nebraska Allocation	% of Basin Supply	Unallocated	% of Basin Supply
North Fork	44,700	10,000	22.4%			11,000	24.6%	23,700	53.0%
Arikaree	19,610	15,400	78.5%	1,000	5.1%	3,300	16.8%	(90)	-0.4%
Buffalo	7,890					2,600	33.0%	5,290	67.0%
Rock	11,000					4,400	40.0%	6,600	60.0%
South Fork	57,200	25,400	44.4%	23,000	40.2%	800	1.4%	8,000	14.0%
Frenchman	98,500					52,800	53.6%	45,700	46.4%
Driftwood	7,300			500	6.9%	1,200	16.4%	5,600	76.7%
Red Willow	21,900					4,200	19.2%	17,700	80.8%
Medicine	50,800					4,600	9.1%	46,200	90.9%
Beaver	16,500	3,300	20.0%	6,400	38.8%	6,700	40.6%	100	0.6%
Sappa	21,400			8,800	41.1%	8,800	41.1%	3,800	17.8%
Prairie Dog	27,600			12,600	45.7%	2,100	7.6%	12,900	46.7%
Tributaries Sub-Total	384,000							175,500	
Main Stem	94,500								
Main Stem + Unallocated	270,000			138,000	51.1%	132,000	48.9%		
<b>Total</b>	<b>478,900</b>	<b>54,100</b>		<b>190,300</b>		<b>234,500</b>			

**Table 3A: Table to Be Used to Calculate Colorado's Five-Year Running Average Allocation and Computed Beneficial**

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and CORWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit Col 1 – (Col 2- Col 3)
2012	20,620	22,300	0	(1,680)
2013	18,690	28,640	0	(9,950)
2014	21,900	32,100	7,448	(2,752)
2015	24,760	33,780	10,760	1,740
2016	25,190	33,930	10,130	1,390
Avg 2012-2016	22,230	30,150	5,670	(2,250)

**Table 3B: Table to Be Used to Calculate Kansas's Five-Year Running Average Allocation and Computed Beneficial**

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Col 1 – (Col 2- Col 3)
2012	212,210	66,810	NA	145,400
2013	137,140	60,920	NA	76,220
2014	102,760	60,060	NA	42,700
2015	163,420	50,890	NA	112,530
2016	156,760	51,320	NA	105,440
Avg 2012-2016	154,460	58,000	NA	96,460

**Table 3C: Table to Be Used to Calculate Nebraska's Five-Year Running Average Allocation and Computed Beneficial**

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and NERWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and NERWS Credit Col 1 – (Col 2- Col 3)
2012	266,320	250,110	14,765	30,975
2013	200,480	216,850	28,229	11,859
2014	168,970	206,010	75,136	38,096
2015	223,860	243,530	36,171	16,501
2016	217,880	256,120	61,816	23,576
Avg 2012-2016	215,500	234,520	43,220	24,200

**Table 4A: Colorado Compliance with the Sub-basin Non-impairment Requirement**  
 Table 4A is left unpopulated pursuant to the August 24, 2016 "RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING OPERATION AND ACCOUNTING FOR THE COLORADO COMPACT COMPLIANCE PIPELINE AND COLORADO'S COMPLIANCE EFFORTS IN THE SOUTH FORK REPUBLICAN RIVER BASIN", paragraph E.

2016

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						



**Table 4B: Kansas's Sub-Basin Non-impairment Compliance**

**2016**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	118	(10)	94	N/A	202	192	10
South Fork	8,952	3,116	0	N/A	12,068	5,536	6,532
Driftwood	62	688	0	N/A	750	12	738
Beaver	3,410	54	1,760	N/A	5,224	5,000	224
Sappa	2,284	990	0	N/A	3,274	486	2,788
Prairie Dog	4,450	4,544	0	N/A	8,994	7,074	1,920

**Table 5A: Colorado's Compliance During Water-Short Year Administration**

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Year	Is the year Water Short Pursuant to III.J?* (Yes or No)	Statewide Allocation	Beaver Creek Reduction Pursuant to Table 5F	Allocation - Beaver Creek Reduction (Col. 2 - Col.3)	Computed Beneficial Consumptive (excluding the Beaver Creek Sub-basin)	Imported Water Supply Credit - IWS Beaver Creek + CORWS Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit (Col. 4 - Col. 5 + Col. 6)
2012	No	20,620	0	20,620	22,300	0	(1,680)
2013	Yes	18,690	1,054	17,636	28,640	0	(11,004)
2014	Yes	21,900	1,228	20,672	32,100	7,448	(3,980)
2015	Yes	24,760	1,406	23,354	33,780	10,760	334
2016	Yes	25,190	1,650	23,540	33,930	10,130	(260)
Avg 2012-2016	Yes	22,230	1,070	21,160	30,150	5,670	(3,320)

**Table 5F: Colorado's Beaver Creek Reduction During Water-Short Years**

Water Short Year (WSY) Pursuant to III.J	Beaver Creek Allocation	Reduction = Average of last five WSY Beaver Creek Allocations
	Col. 1	Col. 2
2002	770	N/A
2003	260	N/A
2004	360	N/A
2005	910	N/A
2006	1,420	N/A
2007	2,320	744
2013	1,130	1,054
2014	1,250	1,228
2015	2,130	1,406
2016	2,430	1,650

**Table 5B: Kansas's Compliance During Water-Short Year Administration  
Kansas**

Year	Allocation				Computed Beneficial Consumptive Use	Imported Water Supply Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
Column	1	2	3	4	5	6	7
	Sum Sub-basins	Kansas' Share of Unallocated Supply	Kansas' Share of the Unused Colorado Allocation	Total Col 1 + Col 2 + Col 3			Col 4 - (Col 5 - Col 6)
2015	20,320	4,640	1,088	26,048	18,730	N/A	7,318
2016	23,100	5,529	1,247	29,876	21,750	N/A	8,126
Avg 2015-2016	21,710	5,084	1,168	27,962	20,240	N/A	7,722

**Table 5C: Nebraska's Compliance During Water-Short Year Administration**

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water Supply Credit and NERWS Credit	Difference Between Allocation and Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Above Guide Rock and NERWS Credit
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Nebraska's Share of Unused Colorado Allocation	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2015	223,860	33,485	190,375	1,042	243,530	2,941	240,590	36,195	(12,977)
2016	217,880	12,878	205,002	1,193	256,120	2,758	253,362	61,841	14,675
Avg 2015-2016	220,870	23,180	197,690	1,120	249,830	2,850	246,980	49,020	850

**Table 5D: Nebraska's Compliance Under a Alternative Water-Short Year Administration Plan**

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water	Difference Between Allocation
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Share of Unused Colorado Allocation	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2014	168,970	6,305	162,665	631	206,010	2,335	203,675	75,161	34,782
2015	223,860	33,485	190,375	1,042	243,530	2,941	240,590	36,195	(12,977)
2016	217,880	12,878	205,002	1,193	256,120	2,758	253,362	61,841	14,675
Avg 2014-2016	203,570	17,560	186,010	960	235,220	2,680	232,540	57,730	12,160

**Table 5E: Nebraska's Tributary Compliance During Water-Short Year Administration**

Year	Allocation			Computed Beneficial Consumptive Use	Imported Water Supply Credit and NERWS generated in	Allocation - (CBCU - IWS- NERWS)
	Sub-Basin Total	Nebraska's Share of Unallocated Supply	Total			
2015	86,920	67,609	154,529	132,710	29,223	51,042
2016	89,960	71,096	161,056	136,720	52,742	77,078
Avg 2015-2016	88,440	69,352	157,792	134,715	40,983	64,060

# ATTACHMENTS

Attachment 1: Sub-basin Flood Flow Thresholds

Sub-basin	Sub-basin Flood Flow Threshold Acre-feet per Year <sup>o</sup>
Arikaree River	16,400
North Fork of Republican River	33,900
Buffalo Creek	9,800
Rock Creek	9,800
South Fork of Republican River	30,400
Frenchman Creek	51,900
Driftwood Creek	9,400
Red Willow Creek	15,100
Medicine Creek	55,100
Beaver Creek	13,900
Sappa Creek	26,900
Prairie Dog	15,700

<sup>o</sup> Flows considered to be Flood Flows are flows in excess of the 94% flow based on a flood frequency analysis for the years 1971-2000. The Gaged Flows are measured after depletions by Beneficial Consumptive Use and change in reservoir storage.



Attachment 6: Computing Water Supplies and Consumptive Use Above Guide Rock

Year	Total Mainstem CWS	Hardy Gage	Superior Courtland Diversion Dam	Courtland Canal Diversions	Superior Canal Diversion	Courtland Canal Returns	Superior Canal Returns	Total Bostwick Returns Below Guide Rock	NE CBCU Below Guide Rock	KS CBCU Below Guide Rock	Total CBCU Below Guide Rock	Gain Guide Rock to Hardy	VWS Guide Rock to Hardy	Mainstem VWS Above Guide Rock	NE MS Allocation Above Guide Rock	KS MS Allocation Above Guide Rock	Nebraska Guide Rock to Hardy Allocation	Kansas Guide Rock to Hardy Allocation
2012	221,940	139,460	116,248	74,730	9,744	9,526	5,785	15,311	3,558	786	4,344	7,901	12,245	209,695	102,541	107,154	5,988	6,257
2013	105,610	44,745	24,835	70,402	6,161	5,048	3,679	8,727	3,000	673	3,673	11,183	14,855	90,755	44,379	46,376	7,264	7,591
2014	57,010	50,362	35,041	59,654	0	5,278	0	5,278	2,335	515	2,850	10,043	12,893	44,117	21,573	22,544	6,305	6,588
2015	141,780	104,931	29,772	57,452	6,571	5,792	4,414	10,206	2,941	582	3,523	64,953	68,476	73,304	35,846	37,459	33,485	34,991
2016	116,190	80,515	47,639	57,452	6,308	5,619	4,259	9,877	2,758	578	3,336	22,999	26,335	89,855	43,939	45,916	12,878	13,457

COURTLAND CANAL

	2012	2013	2014	2015	2016
Return Flow From Courtland Canal To Republican River Above Lovewell From Kansas	955	975	813	764	563
Return Flow From Courtland Canal To Republican River Above Hardy From Nebraska	8,572	4,073	4,465	5,027	5,055
Courtland Canal Diversions At Headgate	74,730	70,402	59,654	57,452	44,129
Courtland Canal At Kansas-Nebraska State Line	63,637	65,021	54,209	50,960	37,548
NE Courtland Canal CBCU (includes transportation loss)	640	414	0	361	416
Superior Canal CBCU	3,959	2,482	0	2,157	2,049

NEBRASKA

	2012	2013	2014	2015	2016
SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	1,271	850	476	786	655
SW Diversions - M&I - Nebraska - Below Guide Rock	0	0	0	0	0
SW Non-Federal Reservoir Evaporation - Below Guide Rock	299	50	67	14	34
SW Return - Irrigation	318	213	119	197	164
SW Return - M&I	0	0	0	0	0
GW CBCU Nebraska Below Guide Rock	2,306	2,312	1,911	2,337	2,233

KANSAS

	2012	2013	2014	2015	2016
SW CBCU - Irrigation - Small Pumps	712	582	484	554	535
SW CBCU - M&I	0	0	0	0	0
GW CBCU Kansas Below Guide Rock	74	91	31	28	43

2016

Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1-Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
Σ Irrigation Season											
Σ Non- Irrigation Season											
Culbertson	7,360	150	7,210	440	6,770	30%	132	6,902	82%	5,810	79%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Culbertson Extension	0	0	0	0	0	30%	0	0	82%	0	100%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	17,458	2,039	15,419	5,272	10,147	30%	1,582	11,729	82%	11,656	66.8%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Red Willow	0	0	0	0	0	30%	0	0	82%	0	100.0%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Bartley	8,600	2,043	6,557	2,067	4,490	30%	620	5,110	82%	6,233	72.5%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Cambridge	30,337	3,884	26,453	10,807	15,646	30%	3,242	18,888	82%	19,372	63.9%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Naponee	1,075	84	991	420	571	35%	147	718	82%	673	62.6%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Franklin	18,229	1,278	16,951	7,138	9,813	35%	2,498	12,311	82%	11,373	62.4%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Franklin Pump	1,331	47	1,284	764	520	35%	267	787	82%	693	52.0%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Almena	0	0	0	0	0	30%	0	0	82%	0	100.0%
Superior	6,308	687	5,621	1,834	3,787	31%	569	4,356	82%	4,259	67.5%
	0	0	0	0	0	31%	0	0	92%	0	100.0%
Nebraska Courtland	557	0	557	500	57	23%	115	172	82%	141	25.3%
Courtland Canal Above Lovewell (KS)	19,762	0	19,762	7,626	12,136	23%	1,754	13,890	82%	11,390	57.6%
Courtland Canal Below Lovewell	28,871	0	28,871	15,826	13,045	23%	3,640	16,685	82%	13,682	47.4%

Attachment 8

CCV and RCCV Tracking <sup>a</sup>												
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
Year	Start of Year RCCV	RCCV Adjustment	CCV	CCV Inflow Into HCL	RCCV Inflow Into HCL	Total CCV and RCCV Inflow Into HCL	Total CCV and RCCV Available for Release	CCV Released from HCL as Flow	CCV Released from HCL as Evaporation	CCV Retained in HCL (at End of Year)	CWSA	End of Year RCCV
	=Col. 12 of previous year	b	c			= Col. 4 + Col. 5	=Col. 6 + Col. 10 of previous year			= Col. 7 – (Col. 8 + Col. 9)	=Col. 10 – Col. 10 of previous year	= Col. 1 – Col. 2 + Col. 3 - Col. 6 <sup>d</sup>
2007	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	8332	0	8332	8332	0	0	8332	8332	0
2016	0	0	41,935	24752	0	24752	33084	5084	4321	23679	15347	9,300

APV and RWS					RCCV Calc
Colorado		Nebraska			
Aug. Pumping Volume (APV)	Resolution Water Supply Credit (CORWS)	Aug. Pumping Volume (APV) Rock That Passed Sub-basin Gage in the Current Year	Aug. Pumping Volume (APV) N-CORPE That Passed Sub-basin Gage in the Current Year	Resolution Water Supply Credit (NERWS)	Extra CCV Efforts Above CCV (Use with RCCV Calc)
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	15,766	0	15,766	0
7,448	7,448	19,397	42,758	62,155	0
10,760	10,760	1,098	25,932	18,698	8332
10,130	10,130	499	22,803	41,935	449

- a. Calculations for RCCV, CWSA, & RWS don't start until Oct. 1, 2015
- b. See Provision 10 of the RRCA Resolution signed August 24, 2016, titled "Resolution Approving Long-Term Agreement Related to the Operation of Harlan County Lake for Compact Call Years" for the terms of assigning RCCV Adjustment. The RCCV Adjustment for each year is equal to 20% of the unadjusted portion of the RCCV, if it is a non-Compact Call Year, plus any remaining volumetric reductions from the previous four years.
- c. In years when the contributions from Nebraska's water management activities, consistent with the 2016 CCY HCL Operations Resolution, are greater than CCV and the NERWS is equal to the greater contribution volume, CCV in Column 3 should also be set equal to the contribution.
- d. The formula for calculation of RCCV is based on calendar year operations and will vary when operations occur in a different calendar year than NERWS Credit is applied.

Flood Flow Calculations Based on Accounting Procedures III.B.1 and Attachment 1.

Hardy Gage Monthly Data (acre-feet)					
	2012	2013	2014	2015	2016
January	17,407	1,926	1,704	1,390	5,429
February	16,861	1,829	4,733	2,093	6,532
March	40,124	1,993	4,560	2,027	6,415
April	32,868	4,479	1,638	2,364	6,625
May	12,327	8,376	2,138	34,054	13,501
June	6,329	3,215	5,818	36,781	5,901
July	5,155	2,648	5,726	7,906	4,844
August	2,900	9,386	6,893	7,712	6,153
September	1,182	3,588	4,491	2,180	9,868
October	1,289	2,523	4,717	1,690	5,278
November	1,525	3,771	4,167	1,944	5,286
December	1,492	1,012	3,779	4,790	4,685
ANNUAL	139,459	44,746	50,364	104,931	80,515
Over 400K	0	0	0	0	0

5-month Consecutive Period Flows (acre-feet)					
	2012	2013	2014	2015	2016
Jan-May	119,587	18,603	14,773	41,928	38,501
Feb-Jun	108,509	19,892	18,887	77,319	38,973
Mar-Jul	96,803	20,711	19,880	83,132	37,285
Apr-Aug	59,579	28,104	22,213	88,817	37,023
May-Sep	27,893	27,213	25,066	88,633	40,266
Jun-Oct	16,855	21,360	27,645	56,269	32,043
Jul-Nov	12,051	21,916	25,994	21,432	31,428
Aug-Dec	8,388	20,280	24,047	18,316	31,269

2-month Consecutive Period Flows (acre-feet)					
	2012	2013	2014	2015	2016
Jan-Feb	34,268	3,755	6,437	3,483	11,960
Feb-Mar	56,985	3,822	9,293	4,120	12,946
Mar-Apr	72,992	6,472	6,198	4,391	13,039
Apr-May	45,195	12,855	3,776	36,418	20,126
May-Jun	18,656	11,591	7,956	70,835	19,402
Jun-Jul	11,484	5,863	11,544	44,687	10,744
Jul-Aug	8,055	12,034	12,619	15,618	10,996
Aug-Sep	4,082	12,974	11,384	9,892	16,020
Sep-Oct	2,471	6,111	9,208	3,870	15,146
Oct-Nov	2,814	6,294	8,884	3,634	10,564
Nov-Dec	3,017	4,783	7,946	6,734	9,971

Final Sub-basin Flood Flows					
	2012	2013	2014	2015	2016
North Fork Flood Flow	0	0	0	0	0
Arikaree Flood Flow	0	0	0	0	0
Buffalo Flood Flow	0	0	0	0	0
Rock Flood Flow	0	0	0	0	0
Southfork Flood Flow	0	0	0	0	0
Frenchman Flood Flow	0	0	0	0	0
Driftwood Flood Flow	0	0	0	0	0
Red Willow Flood Flow	0	0	0	0	0
Medicine Creek Flood Flow	0	0	0	0	0
Beaver Flood Flow	0	0	0	0	0
Sappa Flood Flow	0	0	0	0	0
Prairie Dog Flood Flow	0	0	0	0	0
Mainstem Flood Flow	0	0	0	0	0

Sub-basin Flows Above Attachment 1 Flood Flow Thresholds					
	2012	2013	2014	2015	2016
North Fork	0	0	0	0	0
Arikaree	0	0	0	0	0
Buffalo	0	0	0	0	0
Rock	0	0	0	0	0
South Fork	0	0	0	0	0
Frenchman	0	0	0	0	0
Driftwood	0	0	0	0	0
Red Willow	0	0	0	0	0
Medicine Creek	0	0	0	0	0
Beaver	0	0	0	0	0
Sappa	0	0	0	0	0
Prairie Dog	0	0	0	0	0
Sub-basin Sum	0	0	0	0	0

5-month Consecutive Period Test					
	2012	2013	2014	2015	2016
Jan-May	0	0	0	0	0
Feb-Jun	0	0	0	0	0
Mar-Jul	0	0	0	0	0
Apr-Aug	0	0	0	0	0
May-Sep	0	0	0	0	0
Jun-Oct	0	0	0	0	0
Jul-Nov	0	0	0	0	0
Aug-Dec	0	0	0	0	0
TOTAL	0	0	0	0	0

2-month Consecutive Period Test					
	2012	2013	2014	2015	2016
Jan-Feb	0	0	0	0	0
Feb-Mar	0	0	0	0	0
Mar-Apr	0	0	0	0	0
Apr-May	0	0	0	0	0
May-Jun	0	0	0	0	0
Jun-Jul	0	0	0	0	0
Jul-Aug	0	0	0	0	0
Aug-Sep	0	0	0	0	0
Sep-Oct	0	0	0	0	0
Oct-Nov	0	0	0	0	0
Nov-Dec	0	0	0	0	0
TOTAL	0	0	0	0	0

Combined Test					
	2012	2013	2014	2015	2016
FINAL TOTAL	0	0	0	0	0

## RESOLUTION OF THE REPUBLICAN RIVER COMPACT ADMINISTRATION

## HONORING

Dick Wolfe

WHEREAS, Dick Wolfe, Broomfield, Colorado, has resigned his position as Colorado State Engineer and Director of the Colorado Division of Water Resources, and thus Colorado Commissioner for the Republican River Compact Administration (RRCA) after having served faithfully in that position for 10 years; and

WHEREAS, as the Colorado Commissioner to the RRCA and the Director of the Colorado Division of Water Resources, Dick has diligently represented the Compact interests of the State of Colorado and the residents of the Republican River basin in Colorado, and

WHEREAS, while diligently representing the State of Colorado and its constituents, Dick exhibited professionalism, integrity, and provided leadership and guidance in addressing the complex issues of water administration and compact compliance, continually reaching out to the States of Kansas and Nebraska to reach fair and reasonable solutions to the many issues associated with administering the Republican River Compact; and

WHEREAS, Dick's expertise in water matters, diligence, positive attitude, and willingness to explore alternative resolution to problems has been an asset to the RRCA and the State of Colorado;

NOW THEREFORE, be it hereby resolved that the Republican River Compact Administration does hereby express its sincerest gratitude and appreciation to Dick Wolfe for his dedicated service to the RRCA in his position of Colorado Commissioner, and extends its best wishes to Dick Wolfe in all his future endeavors.

Be it further resolved that the RRCA honors Dick Wolfe's service by including this resolution and appropriate dedicatory remarks in the RRCA annual report for Compact year 2016 and hereby instructs the Colorado Commissioner to send copies of this resolution to the Wolfe family and the Governor of the State of Colorado.

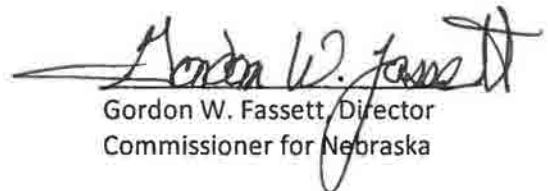
Entered, this 22<sup>nd</sup> day of August 2017, at the annual meeting of the RRCA held in Burlington, Colorado.



Kevin G. Rein, State Engineer  
Commissioner for Colorado (Chairman)



David W. Barfield, Chief Engineer  
Commissioner for Kansas



Gordon W. Fassett, Director  
Commissioner for Nebraska



The 56<sup>th</sup> Annual Report of the Republican River Compact Administration is hereby approved by unanimous vote of the RRCA on this 21st day of August, 2018.

 DATE SIGNED: 8-21-18  
Kevin Rein, Chairperson and Colorado Commissioner

 DATE SIGNED: 8/21/18  
Gordon W. "Jeff" Fassett, Nebraska Commissioner

 DATE SIGNED: 8/21/2018  
David Barfield, Kansas Commissioner