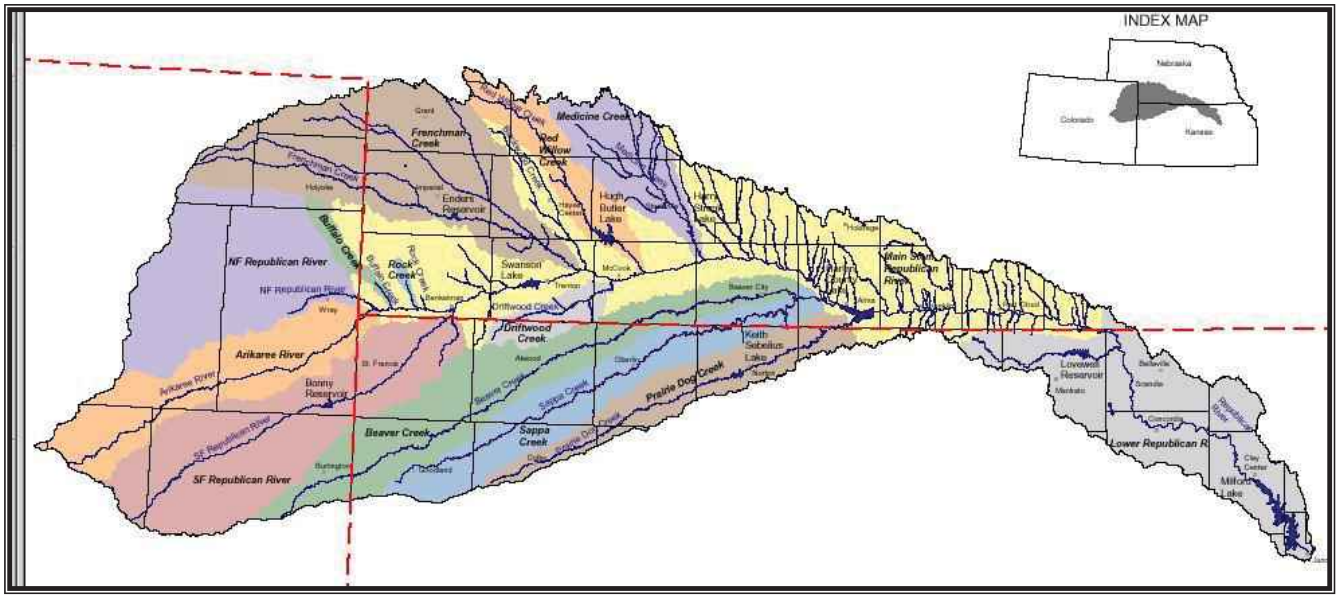
REPUBLICAN RIVER COMPACT ADMINISTRATION

54th ANNUAL REPORT

FOR THE YEAR 2014



LINCOLN, NEBRASKA

AUGUST 27, 2015

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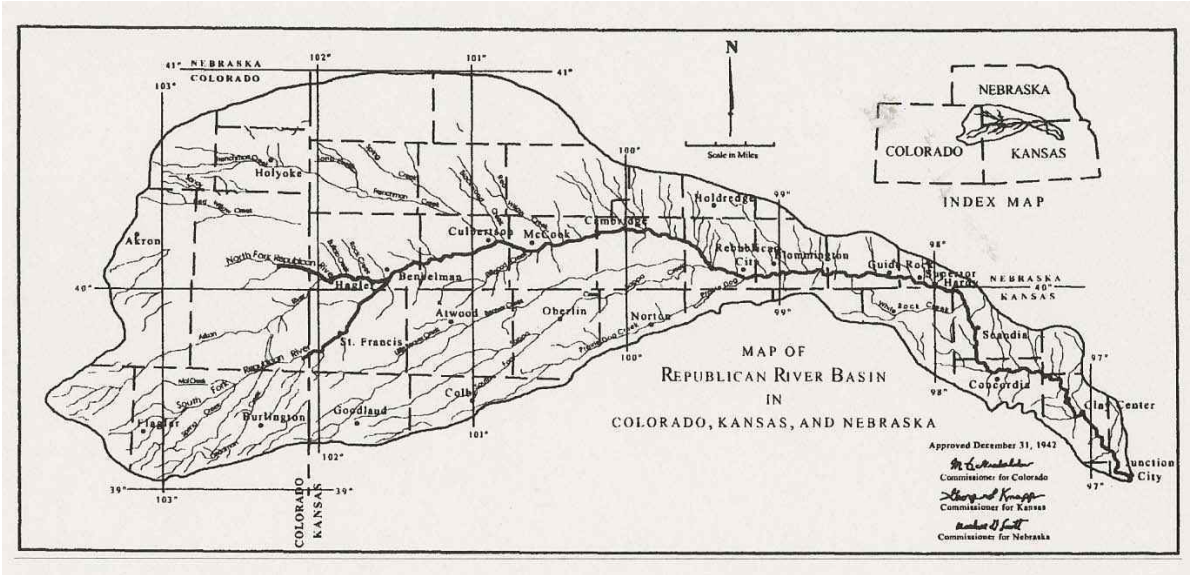
REPUBLICAN RIVER COMPACT ADMINISTRATION

Special Meeting
October 22, 2014



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

OCTOBER 22, 2014

HELD AT 1313 SHERMAN ST.
ROOM 318, DENVER,
COLORADO
AND VIA CONFERENCE CALL

Summary & Minutes

A transcript of this meeting was prepared by K. Michelle Dittmer, Registered Merit Reporter and Notary Public within Colorado (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 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 Nebraska Commissioner and Chairman Jim Schneider at 1:19 p.m. (Mountain Time). October 22nd, 2014. Chairman Schneider asked all attendees from the various listening locations to identify themselves. A complete list of those attendees is attached as Exhibit B. Some of the attendees included:

Name	Representing
Jim Schneider	Nebraska Commissioner and Chairman Nebraska Engineering Committee Member and Chairman
Dick Wolfe	Colorado Commissioner
Ivan Franco	Colorado Engineering Committee Member
David Barfield	Kansas Commissioner
Chris Beightel	Kansas Engineering Committee Member

Agenda Item 2: Adoption of the Agenda

Chairman Schneider introduced a motion for adoption of the draft agenda. Commissioner David Barfield moved to adopt and the motion was seconded by Commissioner Dick Wolfe. The motion was unanimously approved. A copy of the final agenda is attached as Exhibit C.

Agenda Item 3 (a): Action Items–Resolution for the Colorado CCP Project For 2015

Chairman Schneider turned the meeting over to Commissioner Wolfe for introduction of the resolution to approve a temporary augmentation plan and related accounting for Compact

Compliance Pipeline (CCP) for 2015 (Exhibit D). The CCP resolution for 2015 is based on an RRCA resolution that the Commissioners adopted in December 2013 for pipeline operations during 2014. The 2015 resolution was not read into the record, but it will be available as part of the meeting record. Commissioner Wolfe highlighted three changes from the resolution for 2014. The first change adds Item 21, which describes work that Colorado's consultant will do to compare various options for modeling the CCP. The second change adds an attachment describing Kansas Method 3 for modeling the CCP. The third change adds a scope of work for discussions between Kansas and Colorado in 2015. Commissioner Wolfe moved to adopt the resolution and Commissioner Barfield seconded the motion. Commissioner Barfield expressed his gratitude for the hard work done by Colorado officials in coming to the resolution. Commissioner Barfield expressed his belief that the resolution provides a path forward for Kansas and Colorado to continue to work to resolve concerns related to South Fork Republican River and to develop a long-term agreement to resolve ongoing issues. Chairman Schneider stated that Nebraska is committed to those discussions as well. The motion was unanimously approved.

Agenda Item 3 (b): Action Items–Resolution Related to Accounting Adjustments and Harlan County Operation

Chairman Schneider asked Commissioner Barfield for introduction of the resolution for agreements related to the accounting and operation of Harlan County Lake in 2014 (Exhibit E). Commissioner Barfield stated that the resolution addresses multiple issues regarding accounting adjustments and operations of Harlan County Lake for 2014. Initial drafts of the resolution aimed to resolve these issues for both 2014 and 2015. The proposed resolution for 2014 only was provided to Nebraska and Colorado staff prior to the special meeting. All parties agreed to continue working to finalize the 2015 agreement in the near future.

Commissioner Barfield moved to adopt the resolution at hand and the motion was seconded by Commissioner Wolfe. Chairman Schneider offered a final comment that the discussions about these issues has been productive between the all parties and feels positive about the outcome for 2014 and 2015 operations. Hearing no further comments from the commissioners, the motion was then unanimously approved

Agenda Item 4: Adjournment

The meeting was adjourned at 1:34 p.m. (Mountain Time).

The October 22, 2014, Special Meeting report is hereby approved by unanimous vote of the RRCA on this 22nd day of August, 2017.

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 G. Rein, Chairman and Colorado Commissioner — DATE SIGNED: 8-22-17

Jeff Fassett, Nebraska Commissioner — DATE SIGNED: 8/22/17

David Barfield, Kansas Commissioner — DATE SIGNED: 8/22/17

Exhibits

Exhibit A:	Transcript of the October 22, 2014, Special Meeting
Exhibit B:	Attendance of the October 22, 2014, Special Meeting and Sign-In Sheets
Exhibit C:	Agenda for the October 22, 2014, Special Meeting
Exhibit D:	Resolution by the Republican River Compact Administration Approving a Temporary Augmentation Plan and Related Accounting Procedures for the Colorado Compact Compliance Pipeline
Exhibit E:	Resolution by the Republican River Compact Administration Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2014

Exhibit A

STATE OF COLORADO)

) SS. REPORTER'S CERTIFICATE

COUNTY OF DENVER)

I, K. Michelle Dittmer, do hereby certify that I am a Registered Merit Reporter and Notary Public within the state of Colorado; that these proceedings were taken in shorthand by me at the time and place herein set forth and were thereafter reduced to typewritten form, and that the foregoing constitutes a true and correct transcript.

I further certify that I am not related to, employed by, nor of counsel for any of the parties or attorneys herein, nor otherwise interested in the result of the within action.

In witness whereof, I have affixed my signature this 5th day of November, 2014.

K. Michelle Dittmer
Registered Professional Reporter
and Notary Public

SPECIAL MEETING OF THE REPUBLICAN RIVER COMPACT

ADMINISTRATION

October 22, 2014

1:19 P.M.

The above-entitled meeting was held at 1313 Sherman Street, Room 318, Denver, Colorado, before K. Michelle Dittmer, Registered Merit Reporter and Notary Public within Colorado.

COMMISSIONERS:

James Schneider,
Acting Nebraska Member
Acting Chairman, RRCA

David Barfield, P.E.
Kansas Member

Dick Wolfe, P.E.
Colorado Member

Present:

Present in Denver:
James Schneider
Peter Ampe
Don Blankenau
Jasper Fanning
Marc Groff
Jesse Bradley
Tom Wilmoth
Justin Lavene
Dick Wolfe
Scott Steinbrecher
Willem Schreuder
Ivan Franco
David Cookson
Jackie McClaskey
Greg Foley
Earl Lewis
Chris Grunewald
David Barfield
Chris Beightel
Lane Letourneau

Present Telephonically via Listening Locations:

Nebraska Bostwick Irrigation District:
Mike Delka
Tracy Smith

Kansas Bostwick Irrigation District:
Kenny Nelson
Pete Gile

Groundwater Management District No. 4:
Katherine Durham
Ray Luhman

Middle Republican Natural Resources District:
Robert Merrigan
Sylvia Johnson

Bureau of Reclamation in Billings:
Patrick Erger
Mike Ryan
Tara Kinsey

Bureau of Reclamation in McCook, Nebraska:
Aaron Thompson
Craig Scott
Marla Simpson

Kansas Department of Agriculture Stockton Field Office:
Chelsea Erickson

Republican River Water Conservation District:
Deb Daniel
Dawn Webster
Nate Midcap

Republican River Water Conservation District at the Basin:
Dave Keeler

Frenchman-Cambridge Irrigation District:
Brad Edgerton

Kansas Department of Agriculture:
Beth Riffle

Lower Republican Natural Resources District:
Scott Dicke

Present Telephonically via Listening Locations: (Cont.)

Nebraska Department of Natural Resources:
Melissa Mosier

Tri-Basin Natural Resources District:
John Thorburn

Upper Republican Natural Resources District:
Nate Jenkins

I N D E X

ATTACHMENTS	MOTION	APPROVED
Resolution by the Republican River Compact Administration Approving a Temporary Augmentation Plan and Related Accounting Procedures for the Colorado Compact Compliance Pipeline	14	15
Resolution by the Republican River Compact Administration Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2014	17	18

(Attached to original transcript.)

P R O C E E D I N G S

* * *

CHAIRMAN SCHNEIDER: Okay. Thank you, everyone, for waiting. My name is Jim Schneider. I'm the Nebraska commissioner and the RRCA chairman for the purposes of this meeting, and I'd like to call this Special Meeting of the Republican River Compact Administration to order.

First up on the agenda are introductions. We're going to start with introductions here in the Centennial Building in Denver, Colorado. Here with me for Nebraska are Jesse Bradley with the Nebraska Department of Natural Resources; Justin Lavene and David Cookson from the Nebraska Attorney General's Office; Tom Wilmoth and Don Blankenau, counsel for Nebraska; Jasper Fanning, manager of the Upper Republican Natural Resources District; and Marc Groth with the Flatwater Group.

Turning to Colorado, Commissioner Wolfe?

COMMISSIONER WOLFE: Thank you, Chairman.

This is Dick Wolfe, Colorado commissioner and state engineer for Colorado. I'd like to introduce who's here in the Centennial Building on behalf of Colorado:

Mike Sullivan, deputy state engineer. Ivan

Franco, engineer adviser to the Commission for Colorado. Willem Schreuder, who is with Principia Mathematica, who does a lot of the modeling and counting work for all three states. And Scott Steinbrecher, who's the assistant attorney general with the Colorado Attorney General's Office. And Pete Ampe, who is counsel for the Republican River Water Conservation District in Colorado.

I think I've caught everybody from Colorado here in the Centennial Building.

CHAIRMAN SCHNEIDER: All right. Thank you.

Turning to Kansas and Commissioner Barfield.

COMMISSIONER BARFIELD: Sure. Yeah.

My name is David Barfield, chief engineer, with the Kansas Division of Water Resources, Kansas Department of Agriculture, and commissioner for Kansas.

I have with us today here in Denver, with the Kansas Department of Agriculture is Secretary Jackie McClaskey, Greg Foley, Lane Letourneau, and Chris Beightel. With the Kansas Water Office is Earl Lewis, and with the Kansas Attorney General's Office is Chris Grunewald.

CHAIRMAN SCHNEIDER: All right. Thank you. Moving on to the next item on the agenda, Modification

and Adoption of the Agenda -- oh, I'm sorry. I got ahead of myself -- listening locations.

Okay. The listening locations, first with Colorado, the Republican River Water Conservation District. Are you on the line?

MS. DANIEL: Yes, we are. This is Deb Daniel, general manager of the Republican River Water Conservation District. I'm here with Dawn Webster, who is my administrative assistant, and Nate Midcap, the general manager of the Big 4 Groundwater Districts.

CHAIRMAN SCHNEIDER: Thank you.

Are there any others on the phone from Colorado?

MR. KEELER: Yes. Dave Keeler, with the Republican River Water District, with the basin down here.

CHAIRMAN SCHNEIDER: All right. Thank you.

Turning to the listening locations in Kansas, the Kansas Department of Agriculture. Division -- go ahead.

MS. RIFFLE: Yes. This is Beth Riffle, director of communications, with the Department.

CHAIRMAN SCHNEIDER: And then the Kansas Department of Ag Stockton Field Office?

MS. ERICKSON: This is Chelsea Erickson.

CHAIRMAN SCHNEIDER: Thank you.

The Groundwater Management District No. 4?

MS. DURHAM: Yes, right here. This is Kate Durham, and I'm with Ray Luhman as well.

CHAIRMAN SCHNEIDER: And finally, the Kansas Bostwick Irrigation District?

MR. NELSON: Kenny Nelson, superintendent of Kansas Bostwick, and Pete Gile is here also, assistant superintendent.

CHAIRMAN SCHNEIDER: Okay. Thank you.

Is there anyone else on the phone from Kansas?

Okay. Turning to Nebraska, the Nebraska Department of Natural Resources?

MS. MOSIER: Yes. This is Melissa Mosier here.

CHAIRMAN SCHNEIDER: Thanks, Melissa.

The Lower Republican Natural Resources District?

MR. DICKE: Yes. This is Scott Dicke, assistant manager.

CHAIRMAN SCHNEIDER: The Tri-Basin Natural Resources District.

MR. THORBURN: Hi. John Thorburn here, Tri-Basin in Holdrege.

CHAIRMAN SCHNEIDER: Hi, John.

The Middle Republican Natural Resources District.

MR. MERRIGAN: Assistant Manager Bob Merrigan and Sylvia Johnson.

CHAIRMAN SCHNEIDER: Thank you. The Upper Republican Natural Resources District?

MR. JENKINS: Nate Jenkins, assistant manager.

CHAIRMAN SCHNEIDER: Okay. The Nebraska Bostwick Irrigation District.

MR. DELKA: Mike Delka and Tracy Smith.

CHAIRMAN SCHNEIDER: Thank you. And the Bureau of Reclamation office in McCook, Nebraska?

MR. THOMPSON: Good afternoon. Aaron Thompson, Craig Scott, and Marla Simpson.

CHAIRMAN SCHNEIDER: Hi, Aaron.

Is there anyone else on the phone from Nebraska?

MR. EDGERTON: Yes. Brad Edgerton with Frenchman-Cambridge Irrigation District.

CHAIRMAN SCHNEIDER: Okay. Thank you. And we also have a listening located in Bureau of Reclamation in Billings?

MR. ERGER: Yes. Good afternoon, Jim.

Patrick Erger here, Regional Director Mike Ryan, and Tara Kinsey.

CHAIRMAN SCHNEIDER: Patrick, good afternoon. Thank you.

Again, a reminder, if you haven't filled out your sign-in sheets at the listening locations, please do so and send them back to the -- to our office in Lincoln.

All right. Now moving on to Agenda Item 2: Modification and Adoption of the Agenda.

Is there any discussion on the agenda?

COMMISSIONER BARFIELD: No, there's no discussion. I think the agenda is fine. There's some wording differences, but the two action items are essentially as described.

CHAIRMAN SCHNEIDER: Okay.

COMMISSIONER BARFIELD: So I would move adoption of the agenda.

CHAIRMAN SCHNEIDER: Okay.

COMMISSIONER WOLFE: Second.

CHAIRMAN SCHNEIDER: Motion and a second to adopt the agenda.

All in favor, say aye.

COMMISSIONER BARFIELD: Aye.

CHAIRMAN SCHNEIDER: Aye.

COMMISSIONER WOLFE: Aye.

CHAIRMAN SCHNEIDER: Okay. The agenda is adopted.

Moving on to Agenda Item 3, Action Items, first on that agenda item is a resolution for the Colorado CCP Project for 2015, and I'll turn that over to Commissioner Wolfe.

COMMISSIONER WOLFE: Thank you, Chairman Schneider.

I first want to thank both Kansas water officials and Nebraska water officials for coming to Denver today, and I appreciate the robust discussion we had this morning and apologize for those that are on the phone that had to endure our delay in getting to the meeting today. But I think we had very fruitful discussions, and Colorado is prepared to introduce a resolution for approval of the Compact Compliance Pipeline for 2015.

And I guess I'll initially just characterize this, this is based off of the resolution that the Commission adopted in December of 2013 for operation in 2014. Through our discussions over the last few weeks and through today, working with principally the Kansas water officials, with concurrence from Nebraska, we are ready to present a resolution.

We're not going to read it in the record. We will make it available after signature by all states. We do have a representative here from the Republican River Water Conservation District, Mr. Pete Ampe, who has also been involved in those discussions, so we think it meets all the requirements of the districts in Colorado.

And I'll indicate we basically have made some of the changes -- just to represent -- this goes into 2015. We have also -- as one of the additional provisions, we've added to this resolution, resolution -- or part of the resolution, Item 21, that talks about some work that Colorado will do as it relates to comparing some various runs.

One of the attachments that is to this new resolution is the description of the Kansas Method 3, so we want to make folks aware that that is an attachment to this document and will be reflected as such.

We also have an added provision in here that talks about the scope of work that Kansas and Colorado will engage in into next year. Those items are also included as an attachment to this resolution, as well, and will be circulated with the signed version.

So I'll just, for the record, reflect the title of the resolution and then ask -- and then I'll

move to adopt it.

This is a Resolution by the Republican River Compact Administration Approving a Temporary Augmentation Plan and Related Accounting Procedures for the Colorado Compact Compliance Pipeline.

And if there are no other questions or comments, I would move adoption by the Commission of this Resolution.

CHAIRMAN SCHNEIDER: Thank you.

So we have a motion for adoption of the Resolution as described by Commissioner Wolfe.

COMMISSIONER BARFIELD: I would second.

CHAIRMAN SCHNEIDER: So we have a motion and a second.

Is there any further discussion on this Resolution?

COMMISSIONER BARFIELD: I'd make a few comments.

I, too, appreciate the hard work of Colorado officials in terms of allowing us to get to this Resolution today. It will allow Colorado to, again, operate the pipeline in 2015, providing some -- I think some additional valuable experience with that operation and its accounting.

It also provides a path forward for the two

states, I think, to continue to work to resolve our concerns related to South Fork.

And so anyway, appreciate everybody's hard work to get there, and we look forward to continuing the work to develop a long-term agreement and to resolve the things that continue to divide us, so . . .

COMMISSIONER WOLFE: Thank you.

CHAIRMAN SCHNEIDER: And I would say that Nebraska is committed to doing its part in those discussions as well.

So hearing no further discussion, all those in favor of the motion signify by saying aye.

MR. WOLFE: Aye.

CHAIRMAN SCHNEIDER: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRMAN SCHNEIDER: Opposed, same sign.

Motion carries.

Okay. Moving on to Agenda Item 3(b) under the Action Items, which is a Resolution related to accounting adjustments and Harlan County Lake operations for 2014.

And with that, I will turn to Commissioner Barfield.

COMMISSIONER BARFIELD: Sure. Thank you, Commissioner Schneider.

Yes. I think most people that are listening are aware that, you know, the states have had some disagreements and arbitrated a number of those in the last two years, as well as the states' diligent work, I think, of the last several months to reach resolution of those concerns, at least for the current situation and in the immediate future, and I think our joint commitment to trying to find long-term solutions to the issues that divide us as well.

We've been working actively on some -- a package of issues related to resolving 2014 and '15 accounting adjustments, as well as operations of Harlan County, Kansas. As a result of our discussions, I prepared a draft and Nebraska provided some edits.

Yesterday, we sent Nebraska and Colorado a new version of the Resolution and, in fact, divided the resolutions into accounting adjustments and agreements related to Harlan for 2014 and a separate one on much of the same issues for 2015.

We have reached agreement on the 2014 elements and resolution, and I'll be offering that in a moment. We're going to continue to work to finalize the 2015 agreement, but have a little more work to do in that regard.

So this provides, I think, significant

benefits to both states to provide a path forward to use the water supplies that are currently in Harlan Well and, again, I think hopefully a path forward to additional productive dialogue related to these issues.

So with those comments, I would offer -- and I just, again, will not read into the record the full agreement. All the states have had it and are aware of what we've been working on here.

But the title of the Resolution that we are going to be acting on today is Resolution by the Republican River Compact Administration Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2014.

So with that, I'd offer that for adoption by the administration.

COMMISSIONER WOLFE: Second.

CHAIRMAN SCHNEIDER: Thank you. We have a motion and a second.

And I would just like to echo some of Commissioner Barfield's comments. We've had a lot of productive discussions between the three states, and between Kansas and Nebraska and in particular, on these issues. We think this is a really positive step forward for the Compact accounting year 2014 and provides significant benefits for water users in both states, and

I think it's a very good sign of positive things to come.

And with regard to the agreements for 2015, I'm very optimistic that those will be forthcoming as well very shortly.

So with that, is there any further discussion?

COMMISSIONER BARFIELD: None from Kansas.

COMMISSIONER WOLFE: None from Colorado.

CHAIRMAN SCHNEIDER: Okay. Hearing none, all those in favor of the motion, signify by saying aye.

COMMISSIONER WOLFE: Aye.

CHAIRMAN SCHNEIDER: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRMAN SCHNEIDER: Opposed, same sign.

Okay. Motion carries.

Very good. With no further business for this special meeting, we would, I guess, move to Agenda Item 4 for adjournment.

I would entertain a motion to adjourn.

COMMISSIONER BARFIELD: I would so move.

COMMISSIONER WOLFE: Second.

CHAIRMAN SCHNEIDER: Thank you.

This special meeting of the RRCA is now adjourned.

(WHEREUPON, the meeting adjourned at 1:34 p.m.)

STATE OF COLORADO)
) SS. REPORTER'S CERTIFICATE
COUNTY OF DENVER)

I, K. Michelle Dittmer, do hereby certify that I am a Registered Merit Reporter and Notary Public within the state of Colorado; that these proceedings were taken in shorthand by me at the time and place herein set forth and were thereafter reduced to typewritten form, and that the foregoing constitutes a true and correct transcript.

I further certify that I am not related to, employed by, nor of counsel for any of the parties or attorneys herein, nor otherwise interested in the result of the within action.

In witness whereof, I have affixed my signature this 5th day of November, 2014.

_____
K. Michelle Dittmer
Registered Professional Reporter
and Notary Public

PATTERSON REPORTING & VIDEO

Highpoint
2170 South Parker Road, Suite 263
Denver, Colorado 80231

November 5, 2014

Ms. Carol Flaute
via carol.flaute@nebraska.gov

Re: Special Meeting of Republican River Compact Administration

Dear Ms. Flaute:

____Previously filed. Forwarding signature page and amendment sheet(s).

____Signed, no changes.

____Signed, with changes, copy of which is enclosed.

_XX__No signature required.

Enclosures: (As above noted)

Exhibit B

SPECIAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
October 22, 2014

Attendance by Location

Name	Representing
Denver, Colorado – Centennial Building	
Jim Schneider	Nebraska Commissioner
Jesse Bradley	Nebraska Department of Natural Resources
Justin Lavene	Nebraska Attorney General's Office
David Cookson	Nebraska Attorney General's Office
Tom Wilmoth	Counsel for Nebraska
Don Blankenau	Counsel for Nebraska
Jasper Fanning	Upper Republican NRD, Nebraska
Marc Groff	Flatwater Group, Nebraska
Dick Wolfe	Colorado Commissioner & State Engineer
Mike Sullivan	Colorado Deputy State Engineer
Mike Sullivan	Colorado Deputy State Engineer
Ivan Franco	Engineer Advisor to Colorado
Willem Schreuder	Principia Mathematica, Colorado
Scott Steinbrecher	Colorado Attorney General's Office
Pete Ampe	Counsel for RRWCD, Colorado
David Barfield	Kansas Commissioner, Chief Engineer
Jackie McClaskey	Kansas Department of Agriculture
Chris Beightel	Kansas Division of Water Resources
Greg Foley	Kansas Director of Conservation
Lane Letourneau	Kansas Water Appropriation Program
Earl Lewis	Kansas Water Office
Chris Grunewald	Kansas Attorney General's Office
Red Cloud, Nebraska – Nebraska Bostwick Irrigation District Office	
Mike Delka	Nebraska Bostwick Irrigation District
Tracy Smith	Nebraska Bostwick Irrigation District
Wray, Colorado – Republican River Water Conservation District	
Deb Daniel	Republican River Water Conservation District
Dawn Webster	Republican River Water Conservation District
Nate Midcap	Big 4 Groundwater Districts
***Independent Location* – Republican River Water Conservation District**	
Dave Keeler	Republican River Water District

Manhattan, Kansas – Kansas Department of Agriculture

Beth Riffle	Director of Communications Kansas Department of Ag

Stockton, Kansas – Kansas Department of Agriculture Field Office

Chelsea Erickson	Kansas Division of Water Resource

Colby, Kansas – The Groundwater Management District No. 4

Katherine Durham	Groundwater Management District No. 4
Ray Luhman	Groundwater Management District No. 4

Courtland, Kansas – Kansas Bostwick Irrigation District Office

Kenny Nelson	Kansas Bostwick Irrigation District
Pete Gile	Kansas Bostwick Irrigation District

Lincoln, Nebraska – Nebraska Department of Natural Resources

Melissa Mosier	Nebraska Department of Natural Resources

Alma, Nebraska – Lower Republican Natural Resources District

Scott Dicke	Lower Republican Natural Resources District

Holdrege, Nebraska – Tri-Basin Natural Resources District Office

John Thorburn	Tri-Basin Natural Resources District

Curtis, Nebraska – Middle Republican Natural Resources District

Bob Merrigan	Middle Republican Natural Resources District
Sylvia Johnson	Middle Republican Natural Resources District

Imperial, Nebraska – Upper Republican Natural Resources District

Nate Jenkins	Upper Republican Natural Resources District

McCook, Nebraska – United States Bureau of Reclamation Office

Aaron Thompson	Bureau of Reclamation
Craig Scott	Bureau of Reclamation
Marla Simpson	Bureau of Reclamation
Brad Edgerton	Frenchman-Cambridge Irrigation District

Billings, Montana – United States Bureau of Reclamation Office

Patrick Erger	Bureau of Reclamation
Mike Ryan	Bureau of Reclamation
Tara Kinsey	Bureau of Reclamation

Republican River Compact Administration – Special Meeting Attendance Sheet

October 22, 2014

Listening Location Denver

NAME – please print legibly	Affiliation/Group
Jim Schneider	NDNR
Peter Anyon	Hill & Robbins
Don Blankenau	Nebraska
Jasper Fanning	Nebraska
Marc Groff	Nebraska
Jessie Bradley	Nebraska
Tom Wilmoth	"
Justin Lavene	"
Dick Wolfe	Colorado
Scott Steinbrecher	Colorado Atty Gen.
William Schneider	Principia
Ivan Franco	Colorado DWR
David Carlson	Nebraska

Republican River Compact Administration – Special Meeting Attendance Sheet
October 22, 2014

Listening Location Denver

NAME – please print legibly	Affiliation/Group
JACKIE McCLASKEY, SECRETARY OF AGRICULTURE	KANSAS
GREG FOLEY, DIRECTOR OF CONSERVATION	KANSAS
EARL LEWIS, ASSISTANT DIRECTOR OF KANSAS WATER OFFICE	KANSAS
CHRIS GRUNEWALD, [redacted] AG'S OFFICE	KANSAS
DAVID BARFIELD, CHIEF ENGINEER	KANSAS
CHRIS BEIGHTEL, WATER MANAGMENT PROGRAM	KANSAS
LANE LETOURNEAU, WATER APPROPRIATION PROGRAM	KANSAS

Republican River Compact Administration – Special Meeting Attendance Sheet
October 22, 2014
Listening Location Bostwick Irrigation District in Nebraska

NAME – please print legibly	Affiliation/Group
Mike Delka	Bostwick Irrig. in NE
Tracy Smith	Bostwick Irrig. in NE

Republican River Compact Administration – Special Meeting Attendance Sheet

October 22, 2014

Listening Location Republican River Water Conservation District

NAME – please print legibly	Affiliation/Group
Deb Daniel	RRWCD
Dawn Webster	RRWCD
Nate Midcap	Big 4 Groundwater Districts

NAME – please print legibly	Affiliation/Group
Beth Riffle – Public Information Officer	Kansas Dept of Ag – Manhattan HQ

Republican River Compact Administration – Special Meeting Attendance Sheet

October 22, 2014

Listening Location Stockton Field Office KS

NAME – please print legibly	Affiliation/Group
Chelsea Erickson	KDA-DWR

NAME – please print legibly	Affiliation/Group
Katherine Durham	GMD4
Ray Luhman	GMD4

Republican River Compact Administration – Special Meeting Attendance Sheet

October 22, 2014

Listening Location Kansas Bostwick Irrigation Dist.

NAME – please print legibly	Affiliation/Group
Kenny Nelson	Ks. Bostwick Ir Dist
Pete Gile	" " " "

Republican River Compact Administration – Special Meeting Attendance Sheet
October 22, 2014
Listening Location Nebraska Department of Natural Resources

NAME – please print legibly	Affiliation/Group
Melissa M Mosier	NDNR

Republican River Compact Administration – Special Meeting Attendance Sheet
October 22, 2014

Listening Location Lower Republican NRD, Alma, Ne

NAME – please print legibly	Affiliation/Group
Scott Dicke	LRNRD Ast Manager

Republican River Compact Administration – Special Meeting Attendance Sheet
October 22, 2014

Listening Location Tri-Basin NRD - Holdrege NE

NAME – please print legibly	Affiliation/Group
John Thorburn	Tri-Basin NRD

OCT/22/2014/WED 02:38 PM MR NRD FAX No. 1-308-367-4285 P. 001/001
Page 42 of 99

Republican River Compact Administration – Special Meeting Attendance Sheet
October 22, 2014

Listening Location Curtis, MRNRD

NAME – please print legibly	Affiliation/Group
Robert D Merrigan	MRNRD
Sylvia Johnson	MRNRD

RECEIVED
OCT 22 2014
DEPARTMENT OF NATURAL RESOURCES

Republican River Compact Administration – Special Meeting Attendance Sheet

October 22, 2014

Listening Location Upper Republican NRD

NAME – please print legibly	Affiliation/Group
Nate Jenkins	Upper Republican NRD

Republican River Compact Administration – Special Meeting Attendance Sheet

October 22, 2014

Listening Location McCook, USBR

NAME – please print legibly	Affiliation/Group
Aaron Thompson	Reclamation
Brad Edgerton	Frenchman-Cambridge I.D.
Craig Scott	U.S.B.R.
Gilda Simpson	U.S.B.R.

Republican River Compact Administration – Special Meeting Attendance Sheet
October 22, 2014

Listening Location Billings, MT

NAME – please print legibly	Affiliation/Group
Tara Kinsey - Lead Repayment Specialist	Reclamation
Patrick Erger	Reclamation
Mike Ryan	RECLAMATION

Exhibit C

AGENDA FOR
SPECIAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
October 22, 2014, 11:00 AM Mountain (12:00 PM Central)

Centennial Building, Room 318
1313 Sherman Street, Denver, Colorado
and via Conference Call
(Number: 1-888-820-1398; Passcode: 1363142 #)

1. Introductions

2. Modification and Adoption of the Agenda

3. Action Items

   a. Colorado CCP Project for 2015: "Resolution by the Republican River Administration Approving a Temporary Augmentation Plan and Related Accounting Procedures for the Colorado Compact Compliance Pipeline"

   b. Accounting Adjustments and Harlan County Lake Operation: "Resolution by the Republican River Compact Administration Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2014 and 2015"

4. Adjournment

Exhibit D

RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING A TEMPORARY AUGMENTATION PLAN AND RELATED ACCOUNTING PROCEDURES FOR THE COLORADO COMPACT COMPLIANCE PIPELINE

Whereas, the States of Kansas, Nebraska, and Colorado 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 of Kansas, Nebraska, and Colorado adopted a Moratorium on New Wells in Subsection III.A of the FSS, with certain exceptions set forth in subsection III.B of the FSS;

Whereas, Subsection III.B.1.k of the FSS provides that the Moratorium shall not apply to wells acquired or constructed by a State for the sole purpose of offsetting stream depletions in order to comply with its Compact Allocations, provided that such wells shall not cause any new net depletion to stream flow either annually or long term;

Whereas, Subsection III.B.1.k of the FSS further provides that augmentation plans and related accounting procedures submitted under this Subsection III.B.1.k shall be approved by the Republican River Compact Administration ("RRCA") prior to implementation;

Whereas, Subsection I.F of the FSS also provides that: "The RRCA may modify the RRCA Accounting Procedures, or any portion thereof, in any manner consistent with the Compact and this Stipulation;" and

Whereas, the State of Colorado and the RRWCD WAE submitted an application for approval of an augmentation plan and related accounting procedures for the Pipeline to account for water delivered to the North Fork of the Republican River for the purpose of offsetting stream depletions in order to comply with Colorado's Compact Allocations;

Whereas, the States agreed to operate the Pipeline during 2014; **Whereas**, the States have agreed to another one-year agreement to operate the Pipeline during 2015 on certain terms, which are described below; and

Whereas, Kansas reports that water users in the South Fork Subbasin have expressed to Kansas their dependence on streamflows for the livelihoods, and remain concerned about diminishing flows at the Colorado-Kansas stateline;

Whereas, because of the short-term nature of the temporary augmentation plan, the States have agreed to approve the temporary augmentation plan using the procedures described below instead of adopting revised RRCA Accounting Procedures and Reporting Requirements.

Now, therefore, it is hereby resolved that the RRCA approves a temporary augmentation plan and the related accounting procedures for the Colorado Compact Compliance Pipeline subject to the terms and conditions set forth herein. The Colorado Compact Compliance Pipeline project is described in the revised application submitted by the State of Colorado and the RRWCD WAE, which is attached hereto as Exhibit 1. The augmentation plan for the Pipeline and the terms and conditions for the operation of the augmentation plan are described below. The related changes to the accounting procedures and groundwater model are included in the revised RRCA Accounting Procedures and Reporting Requirements ("revised RRCA Accounting Procedures"), which are attached hereto as Exhibit 2, and "Modeling the Colorado Compliance Pipeline in the RRCA Groundwater Model", which is attached hereto as Exhibit 4. The Compact accounting for 2015 will follow the terms and conditions described in this resolution and its exhibits. This temporary approval of the augmentation plan and the related changes to the accounting procedures and groundwater model 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 3.

2. Diversions from any individual Compact Compliance Well shall not exceed 2,500 acre-feet during 2015.

3. Diversions during any calendar year under the groundwater rights listed on Exhibit 3 and any additional groundwater rights approved for diversion through the Compact Compliance Wells pursuant to paragraph 11 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 2; also Exhibit 4).

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 during 2015, 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. The measured deliveries from the Colorado Compact Compliance Pipeline during 2015 shall be added to the RRCA Groundwater Model in all model runs described in the revised RRCA Accounting Procedures (See Exhibit 2; also Exhibit 4). For the purpose of operating this temporary augmentation plan during 2015, the "base" run, the "no NE import" run, and the "no State pumping" run referred to in paragraph III.A.3. (Imported Water Supply Credit Calculation) and paragraph III.D.1. (Groundwater CBCU) of the RRCA Accounting Procedures and the RRCA Groundwater Model will be modified to include the "outflow of the CCP" as described in Exhibit 4.

8. Colorado shall determine the Projected Augmentation Water Supply Delivery ("Projected Delivery") for 2015 to estimate the volume of augmentation water that will be delivered from the Pipeline during 2015 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 2015 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 during 2015 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 1, of the Projected Delivery as provided in paragraph 8.A of this resolution. Unless Colorado determines by April 1 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 in 2015. After the initial minimum delivery of 4,000 acre-feet, Colorado will collect

preliminary data for Compact accounting for 2015 and, no later than September 1, 2015, will update the Projected Delivery required for the remainder of 2015, less the initial minimum delivery of the 4,000 acre-feet that has already been delivered; provided that for 2015, the RRWCD WAE may limit deliveries to the updated Projected Delivery for 2015 or the updated Projected Delivery for 2015 plus a percentage of the deficit owed from the previous 4 years; but not to exceed the average annual historical consumptive use of the groundwater rights as shown on Exhibit 3.

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 2015. 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 2015, 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.

9. The as-built design for the Colorado Compact Compliance Pipeline, including the location of the Compact Compliance Wells and the river outlet structure, is described in the revised application attached hereto as Exhibit 1. No future changes to the Pipeline that would materially change the location of the Compact Compliance Wells or the river outlet structure shall be made without prior approval of the RRCA.

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 (Table 3A).

11. The approval of this augmentation plan 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. The approval of this augmentation plan and the related accounting procedures for the Pipeline shall not waive any State's rights to seek damages from any other State for violations of the Compact or the FSS subsequent to December 15, 2002.

13. Except for the approval of the augmentation plan and the related accounting procedures as provided herein, nothing in this Resolution shall relieve the State of Colorado from complying with the obligations set forth in the Compact or FSS.

14. Unless otherwise agreed to by States, operation of the augmentation plan and its related accounting and modeling will automatically cease at 12:00 AM on January 1, 2016.

15. 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, 2015, will provide all spreadsheets and calculations related to the initial "Projected Delivery" of augmentation water as described in Exhibit 1. Colorado will provide to Kansas all updates to that projection within one week of the completion of any update.

16. The States agree that this one-year agreement does not obligate any State to support or approve any augmentation plan, including the CCP, at any time in the future.

17. The States agree that this one-year operation of the augmentation plan will not be considered precedent for the RRCA's approval of the CCP or any other augmentation proposal in the future, including a different version of the CCP if one should be submitted for consideration by the RRCA.

18. Kansas does not agree to implementation of the Bonny Reservoir Accounting Proposal.

19. The States do not waive any objections, positions, or arguments related to the CCP, augmentation plans or their approval under the FSS, or the Bonny Reservoir Accounting Proposal.

20. The States further agree that if any changes to the RRCA accounting procedures or RRCA groundwater model applicable to the compact accounting for 2015 are mandated by any order or decree of the United States Supreme Court, such changes will be implemented in the Compact Accounting for 2015.

21. The States agree to direct Principia Mathematica to model operations of the CCP during 2014 and 2015 according to Kansas' "Method 3," described in the attached document entitled "Kansas Method to Determine the CCP Credit," and provide preliminary results to the RRCA by November 30, 2014, and subsequent results to the RRCA by April 30, 2015 for the 2014 operation; and preliminary results to the RRCA by September 30, 2015 and subsequent results to the RRCA by April 30, 2016 for the 2015 operations; and

22. The States agree that Colorado and Kansas have agreed on the attached scope (Attachment 1) for discussions to occur during 2015.

23. The States agree that if a plan to address South Fork Republican River issues is agreed upon by Colorado and Kansas by November 1, 2015, the Colorado Compliance Pipeline is hereby authorized by the RRCA to operate under the same terms as defined in the this Resolution of the RRCA approving the same. If implementation of that plan requires action by the RRCA, Kansas and Colorado agree to submit a resolution to the RRCA for vote by all three states.

Approved by the RRCA this 22nd day of October, 2014.

Dr. James C. Schneider — 10-22-14
Acting Nebraska Member — date
Acting Chairman, RRCA

David Barfield — 10/22/2014
David Barfield, P.E. — date
Kansas Member

Dick Wolfe — 10-22-14
Dick Wolfe, P.E. — date
Colorado Member

Scope of Discussion Topics

October 22, 2014

Colorado and Kansas agree in good faith to discuss the following items with the goal of reaching agreement by November 1, 2015:

1. Identify options to increase streamflow on the South Fork at the stateline.
2. RRCA modeling and accounting for Bonny Reservoir
3. Access to the unallocated portion of the South Fork Republican River.
4. An action plan to resolve the above issues.

David Barfield, P.E.
Kansas Member

10/22/2014
date

Dick Wolfe, P.E.
Colorado Member

10-22-14
date

Exhibit E

RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING ACCOUNTING ADJUSTMENTS AND AGREEMENTS RELATED TO THE OPERATION OF HARLAN COUNTY LAKE IN 2014

Be it hereby resolved that the Republican River Compact Administration ("RRCA") approves the following Republican River Compact accounting ("Compact Accounting") adjustments for 2014. To the extent that the Compact Accounting performed by the RRCA for the accounting years affected by this resolution is also affected by any other changes to the Accounting Procedures that have been, or are, adopted by the RRCA or required by Order of the United States Supreme Court, the temporary changes in this resolution will be executed in conjunction with those other changes. The States hereby agree as follows:

I. Nebraska will not take any action to cause the release of any water in Harlan County Lake during the remainder of 2014, and also will not take any action to cause any inflows to Harlan County Lake to be bypassed during the remainder of 2014;

II. 63,500 acre-feet will be added to the "Imported Water Supply Credit" and to the "Imported Water Supply Credit Above Guide Rock" columns in Tables 3 and 5c respectively, of the 2014 Compact Accounting for Nebraska.

III. The 2014 Virgin Water Supply ("VWS") of Rock Creek will be reduced by 21,000 acre-feet and the 2014 VWS of Medicine Creek will be reduced by 42,500 acre-feet.

IV. The States agree to work jointly, in good faith, and with any other necessary parties, including the United States, to develop all needed agreements to implement, by December 1, 2014, or as soon thereafter as possible, the establishment of a separate water storage account in Harlan County Lake that shall be under the exclusive control of Kansas ("Kansas Account").

V. 14,100 acre-feet of water in the irrigation pool of Harlan County Lake on December 31, 2014 will be available for Kansas' use in 2015 or subsequent years, provided:

   a. If the Kansas Account, described in IV. is implemented in 2014, then 14,100 acre-feet shall be deposited into that account; or

   b. If the Kansas Account is not implemented in 2014, then 14,100 acre-feet shall be available through a modification to the existing Warren Act contract between the Kansas Bostwick Irrigation District ("KBID") and Reclamation.

   c. If neither of V.a. or V.b. is implemented by the parties, the disposition of the 14,100 acre-feet of water will be determined pursuant to section VI.

VI. Except as the States and the United States may further agree, the water in the irrigation pool of Harlan County Lake as of December 31, 2014, less any water made available to Kansas pursuant to section V., shall become "project water," as that term is defined by Reclamation. The States intend that this "project water" will be made available to the Kansas Bostwick Irrigation District ("KBID") and Nebraska Bostwick Irrigation District ("NBID") in accordance with existing Reclamation procedures.

VII. Kansas will be assessed for all 2014 HCL evaporation.

VIII. The States agree to work to develop a forward-looking delivery approach to provide more certainty for both Kansas and Nebraska water users.

IX. The States agree that this temporary agreement does not obligate any State to support or approve any augmentation plan, any plan proposed under Appendix M of the Final Settlement Stipulation, at any time in the future, or develop a forward-looking delivery approach.

X. The States agree that this temporary agreement will not be considered precedent for the RRCA's approval of any augmentation proposal or Appendix M plan in the future or the development of a forward-looking delivery approach.

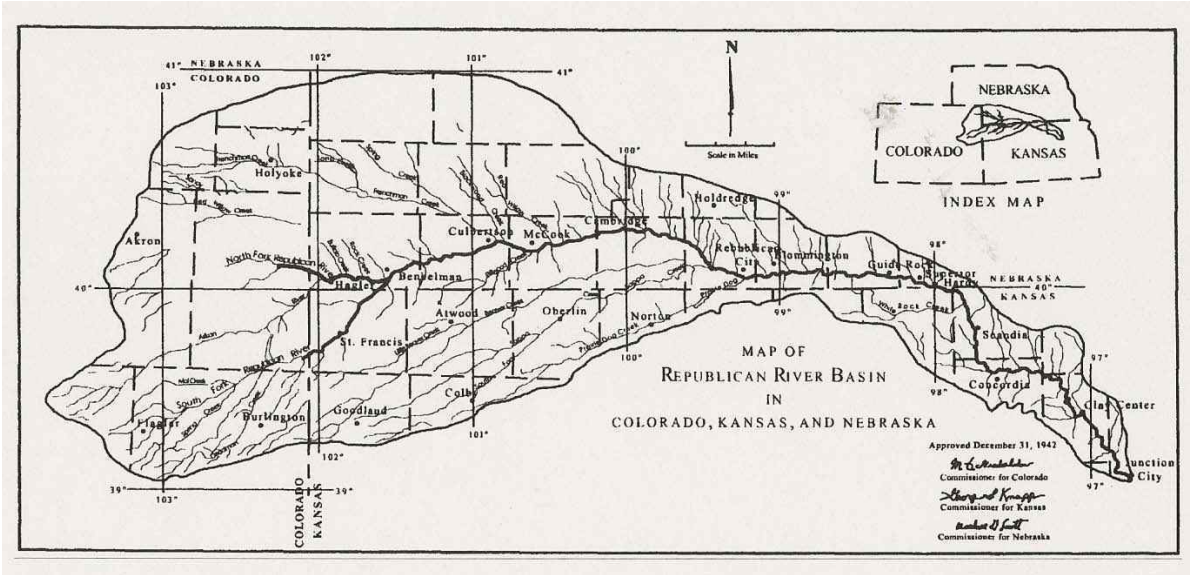
XI. The States do not waive any objections, positions, or arguments related to any matters previously adjudicated or arbitrated.

Approved by the RRCA this 22nd day of October, 2014.

Dr. James C. Schneider Acting Nebraska Member Acting Chairman, RRCA	10-22-14 date
David Barfield, P.E. Kansas Member	10/22/2014 date
Dick Wolfe, P.E. Colorado Member	10-22-14 date

REPUBLICAN RIVER COMPACT ADMINISTRATION

Special Meeting
November 19, 2014



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

NOVEMBER 19, 2014

HELD AT 1320 RESEARCH PARK
MANHATTAN, KANSAS
AND VIA CONFERENCE CALL

Summary & Minutes

A transcript of this meeting was prepared by Dana L. Burkdoll, CSR, RPR, CCR of Midwest Reporters, Inc. (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 Nebraska Commissioner and Chairman Brian Dunnigan at 9:35 a.m. on November 19th, 2014. Chairman Dunnigan asked all attendees from the various listening locations to identify themselves. A complete list of those attendees is attached as Exhibit B. Some of the attendees included:

Name	Representing
Brian Dunnigan	Nebraska Commissioner and Chairman
Jim Schneider	Nebraska Engineering Committee Member and Chairman
Dick Wolfe	Colorado Commissioner
Ivan Franco	Colorado Engineering Committee Member
David Barfield	Kansas Commissioner
Chris Beightel	Kansas Engineering Committee Member

Agenda Item 2: Modifications and Adoption of the Agenda

Commissioner David Barfield moved to adopt the agenda as proposed. The motion was seconded by Commissioner Dick Wolfe and was unanimously approved. A copy of the final agenda is attached as Exhibit C.

Agenda Item 3 (a): Discuss Resolution to Approve Accounting Adjustments Related to the Operation of the Harlan County Lake in 2015

Chairman Dunnigan turned the meeting over to Commissioner Barfield for introduction of Agenda Item 3 (a). Commissioner Barfield explained that the resolution presented for approval at this meeting is a product of ongoing discussions related to a similar resolution that was approved at the

October RRCA special meeting. Commissioner Barfield said this one-year agreement will provide the states additional valuable experience as long-term agreements are pursued by the states. Commissioner Barfield moved to adopt the resolution approving accounting adjustment and agreements related to the operation of Harlan County in 2015. The motion was seconded by Commissioner Wolfe. The motion was then unanimously approved. A copy of the signed resolution is attached as Exhibit D.

Agenda Item 4: Adjournment

Chairman Dunnigan asked for a motion to adjourn. Commissioner Barfield so moved and was seconded by Commissioner Wolfe. The motion carried and the meeting adjourned at 9:45 a.m.

The November 19th, 2014, Special Meeting report is hereby approved by unanimous vote of the RRCA on this 22nd day of August, 2017.

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 G. Rein, Chairman and Colorado Commissioner — DATE SIGNED: 8-22-17

Jeff Fassett, Nebraska Commissioner — DATE SIGNED: 8/22/17

David Barfield, Kansas Commissioner — DATE SIGNED: 8/22/17

Exhibits

Exhibit A:	Transcript of the November 19, 2014, Special Meeting
Exhibit B:	Attendance of the November 19, 2014, Special Meeting
Exhibit C:	Agenda for the November 19, 2014, Special Meeting
Exhibit D:	Resolution by the Republican River Compact Administration Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2015

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(785) 564-6700

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Department of Agriculture
agriculture.ks.gov

900 SW Jackson, Room 456
Topeka, Kansas 66612
(785) 296-3556

Jackie McClaskey, Secretary

Governor Sam Brownback

Chelsea Erickson
Stockton Field Office
Kansas Division of Water Resources

To RRCA Commissioners:

Upon review of the 2015 annual report, I identified two edits to the November 19, 2014 transcript that were not addressed in the editorial process of those files. Since that transcript cannot be changed at this point, I am providing this memo with the editorial remarks for posterity.

In the November 19, 2014 transcript the editorial remarks are as follows:

1. On page 6, line 15 the wording of "Have a motion of second..." should read "Have a motion and a second...".
2. On page 6, line 17 the wording of "...signify by say Aye..." should read "...signify by saying Aye".

At this time, these were the only editorial remarks I had on the 2015 annual report as presented by Nebraska for approval at the RRCA annual meeting in Burlington, Colorado on August 22, 2017.

Sincerely,

Chelsea Erickson

Exhibit A

In The Matter Of:

Special Meeting of the: Republican River Compact Administration

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Manhattan, Kansas
November 19, 2014

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www.midwestreporters.net
office@midwestreporters.net

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(Commenced on the record at 9:35 a.m.)

CHAIR DUNNIGAN: Good morning. This is Brian Dunnigan and I'm the current Chair of the Republican River Compact Administration and I'll call this special meeting of the RRCA to order.

First of all, I'd like to thank Kansas for the arrangements for the special meeting today and for our meeting last night, that was very productive.

With that, I'll move to, Jesse Bradley before we get into the introductions here, would you go over the list that you have recorded on the phone, that are on the phone.

MR. BRADLEY: Yeah, I can go through that for you, Brian.

Here in Lincoln with the State of Nebraska Kathy Bensen and Jesse Bradley.

With the Nebraska Bostwick Irrigation District, we have Mike Delka and Tracy Smith.

With the Lower Republican Natural Resources District, we have Mike Clements.

With the State of Colorado we have Ivan Franco.

The Middle Republican Natural Resources District we have Jack Russell.

With the Kansas Bostwick Irrigation District we have Kenny Nelson and Pete Giles.

With the Upper Republican Natural Resources District we have Nate Jenkins.

With the State of Kansas in their Stockton field office, we have Chelsea Erickson.

With the Bureau of Reclamation in Billings, we have Pat Erger.

And I believe that's all we have on the line thus far.

CHAIR DUNNIGAN: Thank you, Jesse.

Moving along with Agenda Item 1, I would like to introduce our court reporter that we have here, Dana Burkdoll. Thank you for being here.

And I will start out by introducing the people that I have from the Nebraska contingent with me.

I have Jasper Fanning, Mark Roth, Justin Lavine, Tom Wilmoth, Tom Riley, Don Blankenau and Jim Schneider.

Commissioner Wolfe, if you would

introduce who's with you, please.

COMMISSIONER WOLFE: Thank you, Chairman Dunnigan.

Dick Wolfe, Colorado Commissioner For the RRCA and here with me today is Mike Sullivan, Deputy State Engineer, Scott Steinbrecher, Assistant Attorney General and William Schreuder from Principia Mathematica.

CHAIR DUNNIGAN: Commissioner Barfield.

COMMISSIONER BARFIELD: Thank you, Chairman Dunnigan.

Here today from the Kansas Department of Agriculture is Secretary Jackie McClaskey, Chris Beightel, Greg Foley and Lane Letourneau. With the Kansas Water Office is Director Tracy Streeter and Earl Lewis.

And with the Attorney General's Office is Chris Grunwald and Burke Griggs.

CHAIR DUNNIGAN: Thank you.

Moving along to Agenda Item 2, which is labeled Modifications and Adoption of the Agenda.

Do we have any additions or deletions to the agenda?

COMMISSIONER BARFIELD: I have none. I move adoption of the agenda as it is.

COMMISSIONER WOLFE: Second.

CHAIR DUNNIGAN: We have a motion and second. All those in favor?

ALL: Aye.

CHAIR DUNNIGAN: Approved. Agenda is approved.

Moving along to Action Item 3. 3A is discuss resolution to approve accounting adjustments related to the operation of Harlan County Lake in 2015.

Commissioner Barfield.

COMMISSIONER BARFIELD: Thank you, Chairman Dunnigan. Let me just make a few introductory comments related to what we're doing here today. The states have been working on this resolution for more than a month now.

Last month the RRCA acted on a resolution where in the states agreed to provide Nebraska credit in the compact accounting for its compliance activities in 2014 in exchange for an agreement to allot a means for Kansas to carryover water next year that was unused, compliance water that was

unused, and in addition, allot for carrying over to next year the rest of the water in Harlan County for use by the Nebraska Bostwick Irrigation District and the Kansas Bostwick Irrigation District. Action brought significant benefits to both states and the basin of the whole as we preserve the remaining water in Harlan County for future use. Of course today is a very similar resolution related to Nebraska's anticipated 2015 compliance operations. That again would provide an accounting adjustment for those operations in exchange for delivery of water to Harlan County by June 1 for Kansas use.

New operations in the basin require new arrangements to be made for those operations. This month's resolution provides to the states additional valuable experience as we seek to reach long-term agreements aligning Nebraska's chosen method of compact compliance with the needs of Kansas and the best use of the limited water supply in dry periods.

This resolution provides again, a statement of the states resolve on these matters. We understand there's additional

coordination to be done with the Federal partners and others to implement the short-term agreements and more significantly reach long-term agreements that are fair to all, reflect good management on the basin's water supply. We in Kansas look forward to continuing to work with the states of Nebraska and Colorado and others to see this come about.

With that I move adoption of the resolution entitled Resolution by the RRCA approving accounting adjustments and agreements related to the operation of Harlan County in 2-15.

COMMISSIONER WOLFE: Second.

CHAIR DUNNIGAN: Have a motion of second, any further discussion? All those in favor signify by say Aye.

COMMISSIONER BARFIELD: Aye.

ALL: Aye.

CHAIR DUNNIGAN: Opposed? Motion carries.

That concludes Agenda Item 3 and I would look for a motion for adjournment.

COMMISSIONER BARFIELD: So moved.

COMMISSIONER WOLFE: Second.

CHAIR DUNNIGAN: All those in favor?
COMMISSIONER BARFIELD: Aye.
COMMISSIONER WOLFE: Aye.
CHAIR DUNNIGAN: Motion carries. Meeting adjourned.
All right. Thank you very much.

(The proceedings adjourned at 9:45 a.m.)

C E R T I F I C A T E

I, DANA L. BURKDOLL, a Certified Court Reporter (#1364) and a Registered Professional Reporter (830156), do hereby certify that the within-named witness was by me first duly sworn to testify the truth, that the testimony given in response

To the questions propounded, as herein set forth, was first taken in machine shorthand and reduced to writing with computer-aided transcription, and is a true and correct record of the testimony given by the witness.

I certify that review of the testimony was requested by the witness or the parties. If any changes are made by the deponent during the time period allowed, they will be appended to the transcript.

I further certify that I am not a relative or employee or attorney or counsel of any of the parties, or a relative or employee of such attorney or counsel, or financially interested in the action.

WITNESS my hand and official seal this 19th day of November, 2014.

_____

DANA L. BURKDOLL, CSR, RPR, CCR
MIDWEST REPORTERS, INC.
800-528-3194

Exhibit B

SPECIAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
November 19, 2014

Attendance by Location

Name	Representing
Manhattan, KS – Kansas Division of Water Resources	
Brian Dunnigan	Nebraska Commissioner
Jim Schneider	Nebraska Department of Natural Resources
Justin Lavene	Nebraska Attorney General's Office
Tom Wilmoth	Counsel for Nebraska
Don Blankenau	Counsel for Nebraska
Jasper Fanning	Upper Republican NRD, Nebraska
Marc Groff	Flatwater Group, Nebraska
Tom Riley	Flatwater Group, Nebraska
Dick Wolfe	Colorado Commissioner & State Engineer
Mike Sullivan	Colorado Deputy State Engineer
Willem Schreuder	Principia Mathematica, Colorado
Scott Steinbrecher	Colorado Attorney General's Office
David Barfield	Kansas Commissioner, Chief Engineer
Jackie McClaskey	Kansas Department of Agriculture
Chris Beightel	Kansas Division of Water Resources
Greg Foley	Kansas Director of Conservation
Lane Letourneau	Kansas Water Appropriation
Earl Lewis	Kansas Water Office
Tracy Streeter	Kansas Water Office
Chris Grunewald	Kansas Attorney General's Office
Burke Griggs	Kansas Attorney General's Office
Red Cloud, Nebraska – Nebraska Bostwick Irrigation District Office	
Mike Delka	Nebraska Bostwick Irrigation District
Tracy Smith	Nebraska Bostwick Irrigation District
Denver, Colorado – Colorado Division of Water Resources	
Ivan Franco	Colorado Division of Water Resources
Stockton, Kansas – Kansas Department of Agriculture Field Office	
Chelsea Erickson	Kansas Division of Water Resource
Courtland, Kansas – Kansas Bostwick Irrigation District Office	
Kenny Nelson	Kansas Bostwick Irrigation District
Pete Gile	Kansas Bostwick Irrigation District
Jack Russell	Kansas Bostwick Irrigation District
Lincoln, Nebraska – Nebraska Department of Natural Resources	
Jesse Bradley	Nebraska Department of Natural Resources

Alma, Nebraska – Lower Republican Natural Resources District
Mike Clements Lower Republican Natural Resources District

Imperial, Nebraska – Upper Republican Natural Resources District
Nate Jenkins Upper Republican Natural Resources District

Billings, Montana – United States Bureau of Reclamation Office
Patrick Erger Bureau of Reclamation

RRCA SPECIAL MEETING

Meeting Date: November 19, 2014

Place/Room: Division of Water Resources, Manhattan, KS

Name:	Representing:	E-Mail:
Brian Dunnigan	Nebraska	
Jim Schneider	"	
Don Blankenau	"	
Tom Riley	NE	
Tom Wilmoth	NE	tom@aqualawyers.com
Justin Lavene	NE	
Marc Groff	NE	
Jasper Fanning	NE	
Lane Letourneau	Kansas DOA	
Greg Foley	Kansas DOA	
Chris Grunewald	KS AG	
Tracy Streeter	KS Water Office	
Burke Griggs	KS Atty Gen	
Willem Schreuder	CO	
Scott Steinbrecher	CO Atty. Gen.	
Dick Wolfe	CO SEO	
Mike Sullivan	CO SEO	
Chris Beightel	KS KDA/DWR	
Jeff Reilly	KDA - KS	
Earl Lewis	KWO - KS	

RRCA SPECIAL MEETING

Meeting Date: November 19, 2014

Place/Room: Division of Water Resources, Manhattan, KS

Name:	Representing:	E-Mail:
David Barfield	KDA-DWR	

Name:	Representing:	E-Mail:
Mike Delka	NE Bostwick Irrigation Dist.	
Tracy Smith	NE Bostwick Irrigation Dist.	
Mike Clements	LRNRD	
Ivan Franco	CO Division of Water Resources	
Jack Russell	KS Bostwick Irrigation Dist.	
Chelsea Erickson	KS Division of Water Resources	
Kenny Nelson	KS Bostwick Irrigation Dist.	
Pete Gile	KS Bostwick Irrigation Dist.	
Nate Jenkins	Upper Republican NRD	
Patrick Erger	Billings BOR	
Jesse Bradley	DNR	

Exhibit C

AGENDA FOR
SPECIAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
November 19, 2014, 9:30 AM Central Time (8:30 AM Mountain Time)

Kansas Department of Agriculture, Division of Water Resources
1320 Research Park Drive, Manhattan, KS
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 Resolution to Approve Accounting Adjustments Related to the Operation of Harlan County Lake in 2015

4. Adjournment

Exhibit D

RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING ACCOUNTING ADJUSTMENTS AND AGREEMENTS RELATED TO THE OPERATION OF HARLAN COUNTY LAKE IN 2015

Be it hereby resolved that the Republican River Compact Administration ("RRCA") approves the following Republican River Compact accounting ("Compact Accounting") adjustments for 2015. To the extent that the Compact Accounting performed by the RRCA for the accounting years affected by this resolution is also affected by any other changes to the Accounting Procedures that have been, or are, adopted by the RRCA or required by Order of the United States Supreme Court, the temporary changes in this resolution will be executed in conjunction with those other changes. The States hereby agree as follows:

I. Of the water available for irrigation in Harlan County Lake ("HCL") on December 31, 2014 and which is legally stored under Reclamation's Nebraska water right A-4190; 14,100 acre-feet is hereby reserved for Kansas for use by the Kansas Bostwick Irrigation District ("KBID") for project purposes in 2015 or subsequent years.

II. The accounting offset for Nebraska's 2015 compliance operations shall be recorded in the "Imported Water Supply Credit" and "Imported Water Supply Credit Above Guide Rock" columns of Nebraska's Table 3 and Table 5c respectively which, for the 2015 Compact Accounting for Nebraska, will be increased by the amount of Nebraska's December 31, 2014 projected compliance obligation for 2015 that is delivered to HCL by June 1, 2015.

III. The water delivered to Harlan County Lake pursuant to II. shall be reserved for Kansas use as follows:

   a. If a Kansas Account is implemented in 2015 then the water shall be deposited into that account for use by KBID for project purposes; or

   b. If the Kansas Account is not implemented in 2015, then the water shall be legally stored under Reclamation's Nebraska water right A-4190 for use by KBID for project purposes.

IV. Water delivered to HCL in 2015 and deposited into a Kansas Account, reserved as "project water" for KBID's use, or made available to KBID via a Warren Act

contract shall be available for Kansas' use in 2015 or subsequent years, provided that:

a. KBID exhausts its supply of "project water" in 2015 first, and

b. KBID exhausts any carryover of 2014 Kansas Account, 2014 Kansas "project water", or KBID Warren Act contract water second.

V. Water reserved for Kansas' use pursuant to I., II., and III. shall not be subject to the apportionment terms of the memorandum of agreement between KBID and the Bostwick Irrigation District in Nebraska unless the MOA is modified pursuant to its article 3.J. to reflect the agreement described herein.

VI. Provided any Warren Act Contract for 2015 between KBID and Reclamation is consistent with those Warren Act Contracts between KBID and Reclamation from 2013 and 2014, Nebraska will not interfere with such contract.

VII. The 2015 Virgin Water Supply ("VWS") of each of Rock Creek and Medicine Creek will be reduced by the amount of 2015 Rock Creek and 2015 N-CORPE augmentation discharges respectively provided that those discharges occur by June 1, 2015 and are consistent with Nebraska's December 31, 2014 projected compliance obligation.

VIII. Evaporation in HCL will be divided between water reserved for Kansas and other water on a monthly basis in proportion to the relative volume of water in each pool.

a. Evaporation of water reserved for Kansas use pursuant to I., II., and III. will be charged to Kansas.
b. Evaporation of other water will be divided between Kansas and Nebraska according to the methods set forth in the FSS.

IX. This temporary agreement does not obligate any State to support or approve any augmentation plan, any plan proposed under Appendix M of the Final Settlement Stipulation, at any time in the future, or develop a forward-looking delivery approach.

X. This temporary agreement will not be considered precedent for the RRCA's approval of any augmentation proposal or Appendix M plan in the future or the development of a forward-looking delivery approach.

XI. The States do not waive any objections, positions, or arguments related to any matters previously adjudicated or arbitrated.

Approved by the RRCA this 19th day of November, 2014.

Brian P. Dunnigan 11/19/2014

Brian Dunnigan, P.E. date
Nebraska Member
Chairman, RRCA

David W Barfield 11/19/2014

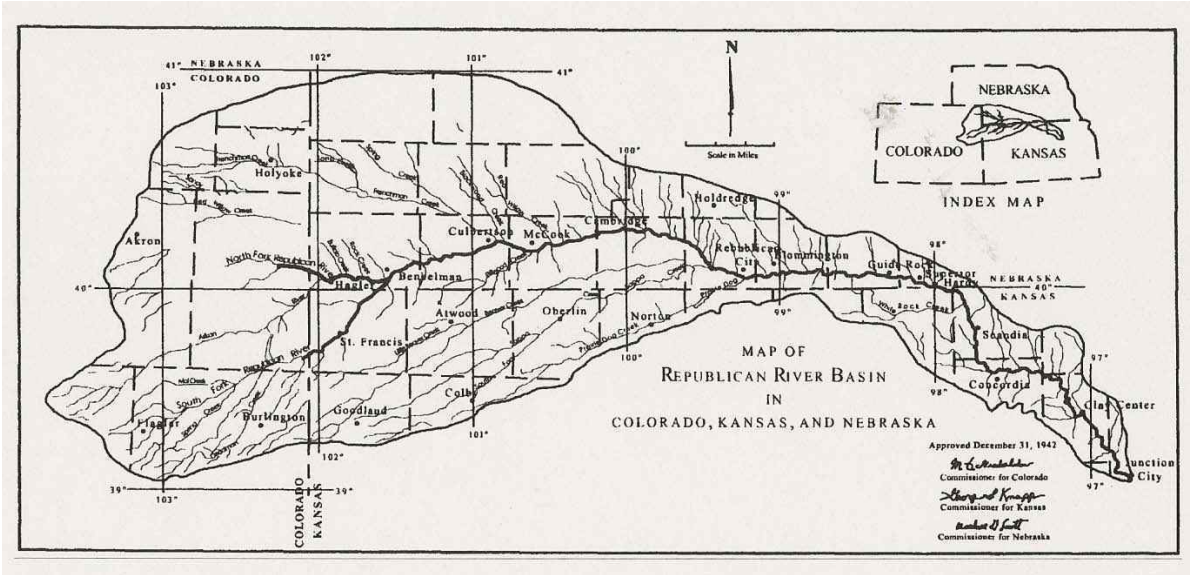
David Barfield, P.E. date
Kansas Member

Dick Wolfe 11-19-14

Dick Wolfe, P.E. date
Colorado Member

REPUBLICAN RIVER COMPACT ADMINISTRATION

Special Meeting
March 6, 2015



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

MARCH 6, 2015, 2:00 PM (CST)

VIA CONFERENCE CALL

Summary & Minutes

A transcript of this meeting was prepared by Wendy C. Cutting 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 RRCA Chairperson and Nebraska Commissioner Jim Schneider at 2:00 p.m. on March 6, 2015. Chairperson Schneider asked all attendees from the various listening locations to identify themselves. A complete list of those attendees is attached as Exhibit B. Some of the attendees included:

Name	Representing
Jim Schneider	Nebraska Commissioner and RRCA Chairperson Nebraska Engineering Committee Member and EC Chairperson
Dick Wolfe	Colorado Commissioner
Ivan Franco	Colorado Engineering Committee Member
David Barfield	Kansas Commissioner
Chris Beightel	Kansas Engineering Committee Member

Agenda Item 2: Modifications & Adoption of the Agenda

Chairperson Schneider introduced adoption of the agenda. Commissioner Barfield moved to adopt, the motion was seconded by Commissioner Wolfe, and it was unanimously approved. A copy of the agenda is attached as Exhibit C.

Agenda Item 3 (a): Addendum to Resolution Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2015 Dated November 19, 2014

Schneider started by thanking everyone for the work put into the agreement being voted on today. He specifically thanked the Bureau of Reclamation and the irrigation districts in Nebraska and Kansas for coming together to amend the memorandum of understanding, although he noted that

Nebraska does not necessarily agree with some of the factual assertions included therein. He also recognized that agreement as an important first step towards the RRCA being able to take action on the resolution at hand (Exhibit D). He informed the attendees that a letter turning all the water in the reservoirs back to the projects would be sent to the Bureau of Reclamation upon adoption of the resolution. Schneider then asked Commissioner Barfield to give an explanation of the resolution at hand.

Barfield began by providing background information about three resolutions that the RRCA passed during the previous October and November regarding Harlan County Lake operations, including the November 19, 2014, resolution, to which the resolution under discussion is an addendum. He then summarized that the current resolution afford Nebraska some additional flexibility to achieve Compact obligations and protect Kansas' water interest, with the desirable effect of ensuring that Nebraska surface water users will not have additional regulatory water supply reductions in 2015. Barfield then moved the RRCA adopt the resolution, Wolfe seconded the motion, and all were in favor.

Upon adoption of the resolution, Barfield expressed appreciation for the work of the states, the Bureau of Reclamation, and the irrigation districts to get to this point. He also noted that the states would be releasing a joint press release shortly, which Schneider confirmed. Wolfe also expressed appreciation for everyone's cooperation in the spirit of continuing to move forward to resolve the issues in the basin.

Agenda Item 4: Adjournment

The meeting adjourned at 2:13 p.m.

The March 6th, 2015, Special Meeting report is hereby approved by unanimous vote of the RRCA on this 22nd day of August, 2017.

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

Terri A. Lesi DATE SIGNED: 8-22-17
Kevin G. Rein, RRCA Chairperson and Colorado Commissioner

Gordon W. Fassett DATE SIGNED: 8/22/17
Jeff Fassett, Nebraska Commissioner

David Barfield DATE SIGNED: 8/24/17
David Barfield, Kansas Commissioner

Exhibits

Exhibit A:	Transcript of the March 6, 2015, Special Meeting
Exhibit B:	Attendance of the March 6, 2015, Special Meeting
Exhibit C:	Agenda for the March 6, 2015, Special Meeting
Exhibit D:	Addendum to Resolution Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2015 Dated November 19, 2014.

Exhibit A

SPECIAL MEETING OF THE

REPUBLICAN RIVER COMPACT ADMINISTRATION

March 6, 2015
2:00 p.m. Central Time
Via Telephone
Lincoln, Nebraska

MEMBERS PRESENT

IN NEBRASKA: Commissioner James Schneider, Chairperson
Jesse Bradley
Tom Wilmoth
David Kracman
Tom Riley
Don Blankenau
Brad Edgerton
Dale Cramer
Aaron Thompson
Marla Simpson
Craig Scott
Jay Schilling
Mike Delka
Tracy Smith
Walter Knehans
Jim Miller
Scott Dicke
Justin Lavene
Don Felker

IN COLORADO: Commissioner Dick Wolfe
Ivan Franco
Scott Steinbrecher

IN KANSAS: Commissioner David Barfield
Chris Beightel
Chris Grunewald
Burke Griggs
Lane Letourneau
Greg Foley
Chelsea Erickson
Pete Gile

(IN KANSAS: Cont.)
Kenny Nelson
Monty Dahl
Gary Housholder
Brad Peterson

REPORTER'S CERTIFICATE:

State of Nebraska)
) ss.
County of Lancaster)

I, WENDY C. CUTTING, 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 those proceedings.

IN TESTIMONY WHEREOF, I have hereunto set my hand at Lincoln, Nebraska, this _____ day of March, 2015.

_____
Reporter

- - -

PROCEEDINGS:

CHAIRPERSON SCHNEIDER: Thanks everyone for joining. We'll go ahead and call the meeting to order. And Kathy here was trying to write as quickly as she could, but we'll go through introductions again, so she has a good record of who attended the meeting, if that's okay with everyone. I'll start here in the meeting room here in Lincoln. We've got Jesse Bradley, Tom Wilmoth, David Kracman, Tom Riley, and Don Blankenau. And also Wendy Cutting is doing the court reporting.

And then I hear Brad Edgerton, and who did you have with you, Brad?

MR. EDGERTON: I have Dale Cramer.

CHAIRPERSON SCHNEIDER: Welcome. And Aaron, in McCook, Aaron Thompson. Who did you have there with you?

MR. THOMPSON: Marla Simpson, Craig Scott, and Jay Schilling.

CHAIRPERSON SCHNEIDER: Thank you.

And with Nebraska Bostwick?

MR. DELKA: With Nebraska Bostwick we have Mike Delka, Tracy Smith, Walter Knehans, and Jim Miller.

CHAIRPERSON SCHNEIDER: Great, thank you.

And then we had Scott Dicke with the Lower Republican. Is anyone with you, Scott?

MR. DICKE: No one, myself.

CHAIRPERSON SCHNEIDER: Okay. Is there anyone else with Nebraska?

MR. LAVENE: Justin Lavene with the AG's Office.

CHAIRPERSON SCHNEIDER: Oh, how could I forget you, Justin?

MR. LAVENE: I don't know.

CHAIRPERSON SCHNEIDER: Was there someone else?

MR. FELKER: Don with Frenchman Valley, Culbertson.

CHAIRPERSON SCHNEIDER: Thank you, Don Felker. Thanks for joining.

It sounds like that's everyone for the State of Nebraska. Well, I'll turn it over to you, David.

COMMISSIONER BARFIELD: Sure. This is David Barfield and I'm in Manhattan. Today, I'm actually the only one here in our office, but that's okay. Chris Beightel is in Lawrence. In Topeka, my understanding, is Chris Grunewald, Burke Griggs, Lane Letourneau, and Greg Foley, is that correct?

UNIDENTIFIED VOICE: Yes.

COMMISSIONER BARFIELD: Okay, Chelsea in Stockton, is there anyone else there?

MS. ERICKSON: No, just Chelsea.

COMMISSIONER BARFIELD: And then, the Kansas Bostwick Irrigation District, who do you have present there?

MR. GILE: Okay, Pete Gile, Kenny Nelson, and our board members Monty Dahl, Gary Housholder, and Brad Peterson. We're all here in Courtland.

COMMISSIONER BARFIELD: Very good. Is there anyone else on from Kansas?

(No response.)

All right, I think that's it.

CHAIRPERSON SCHNEIDER: Thank you, David.

Turning to you, Dick?

COMMISSIONER WOLFE: Yes, this is Dick Wolfe here in Denver. And Ivan Franco is with me, and then we've got Scott Steinbrecher, who's on the phone at a different location. And I'm not aware that there's anybody else that's joined from Colorado, but I'll open it up at this point if there's anybody else joining from Colorado.

Hearing none, I think that's all that we have, Jim.

CHAIRPERSON SCHNEIDER: Okay, thanks, Dick.

Is there anyone that we missed?

MR. RAUN: This is Andy Raun calling from the *Hastings Tribune* in Nebraska.

CHAIRPERSON SCHNEIDER: Great, thanks for joining us.

MR. RAUN: Thank you.

CHAIRPERSON SCHNEIDER: Well, we are certainly

excited about today's meeting. I'll move on to Agenda Item 2. Is there any modifications or should we adopt the agenda as it was mailed?

COMMISSIONER BARFIELD: This is David Barfield. I'd move we adopt the agenda as presented.

COMMISSIONER WOLFE: Second, this is Dick Wolfe.

CHAIRPERSON SCHNEIDER: All in favor, say aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON SCHNEIDER: Aye.

COMMISSIONER WOLFE: Aye.

CHAIRPERSON SCHNEIDER: Opposed, same sign.

(No response.)

All right, thanks.

Well, we will -- before we get into Item 3, I want to thank all of the -- I just want to thank everyone, I guess, for all the work that went into this agreement that we have before us today. I particularly want to thank the Bureau of Reclamation and the irrigation districts in Nebraska and Kansas. We did receive the amendment to the MOA, and certainly we're not party to that, so we don't -- I'd say, we don't necessarily agree with some of the factual assertions in there, but we really appreciate that the districts worked together to come to that agreement. And it's a really important first step for us to be able to take action on this resolution before us. And I

also have a letter that will be sent immediately following this meeting, assuming we adopt this resolution, that will go to you, Aaron, turning all the water in the reservoirs back to the projects.

So, with that, on Agenda Item 3(a), I would ask, Commissioner Barfield, if you would just give us a short rundown of what this resolution will do.

COMMISSIONER BARFIELD: And just to provide just a bit of background for the record, during October/November of last year, the RRCA passed three resolutions regarding operations for last year and this year. The November 19 resolution provided Nebraska with 100 percent credit for water it delivered from its augmentation projects to Harlan County Lake after January 1, but prior to June 1, with that water being dedicated to Kansas irrigators' use. So, further discussion between the states and the Bureau and the irrigation district, as Jim alluded to, we've found it advantageous to enter into this additional agreement for 2015.

There's sort of two components, as Jim alluded to. The first is the resolution that we'll talk about here in a second, and the second is a modification to the contractual provisions between the Bureau and Nebraska and Kansas irrigation districts. So, today's resolution, in essence, just put simply, provides Nebraska with additional

flexibility to achieve Compact obligations while protecting Kansas water interest as well. And the effect of it -- the desirable effect of it is that it will ensure that Nebraska does not have to engage in any additional regulatory water supply reductions for its surface water users for the 2015 irrigation season.

So, really, I think, unless you think it necessary, I won't go into any further details than that. I think the resolution sort of speaks for itself.

So, with that, I guess, I would move that the RRCA adopt the resolution that was developed by the states and circulated with a meeting notice entitled "Addendum to Resolution Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2015, Dated November 19, 2014."

CHAIRPERSON SCHNEIDER: Thanks, David. We have a motion. Is there a second?

COMMISSIONER WOLFE: Second.

CHAIRPERSON SCHNEIDER: Thanks, Dick. We have a motion and a second to adopt the resolution. Is there any discussion?

(No response.)

Hearing none, all in favor, say aye.

Aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON SCHNEIDER: Opposed, same sign.

(No response.)

All right, we have it. Fantastic. Well, I think this is certainly a momentous occasion, and I'm really pleased that we could get here. Is there any other -- anything else, Dick, that you or David would like to say for the good of the order?

COMMISSIONER BARFIELD: This is David. No, just I sort of -- we, basically, in Kansas, have the same appreciation for the work of the states as well as the Bureau and the irrigation districts to help us get here. We look forward to building on this toward the longer-term solutions that we will get to next.

I guess I'd just let the reporter know, I think the states plan a joint press release very shortly, as well, right?

CHAIRPERSON SCHNEIDER: That's right.

MR. RAUN: Very good.

CHAIRPERSON SCHNEIDER: Anything from you, Dick?

COMMISSIONER WOLFE: Nothing more to add. I think both of you stated my sentiments as well. So, thank you, and I appreciate everyone's cooperation in the spirit that we're continuing to move forward to resolve the issues in the basin. So, I look forward to that continuing dialog on

resolution of the remaining issues that are out there.

CHAIRPERSON SCHNEIDER: Great. Now, if everyone would join me for a quick round of Kumbaya.

(Laughter.)

Just kidding.

COMMISSIONER BARFIELD: I forgot the words.

CHAIRPERSON SCHNEIDER: Well, I think, with that, we stand adjourned.

(Whereupon, at 2:13 p.m. on March 6, 2015, the proceedings were concluded.)

- - -

Exhibit B

SPECIAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
March 6, 2015

Attendance by Location

Name	Representing
Lincoln, Nebraska – Nebraska Department of Natural Resources	
Jim Schneider	Nebraska Commissioner
Jesse Bradley	Nebraska Department of Natural Resources
Tom Wilmoth	Counsel for Nebraska
Don Blankenau	Counsel for Nebraska
David Kracman	Flatwater Group
Tom Riley	Flatwater Group
Cambridge, Nebraska – Frenchman-Cambridge Irrigation District	
Brad Edgerton	Frenchman-Cambridge Irrigation District
Dale Cramer	Frenchman-Cambridge Irrigation District
McCook, Nebraska – Bureau of Reclamation	
Aaron Thompson	Manager, Bureau of Reclamation
Marla Simpson	Bureau of Reclamation
Craig Scott	Bureau of Reclamation
Jay Schilling	Bureau of Reclamation
Red Cloud, Nebraska - Nebraska Bostwick Irrigation District Office	
Mike Delka	Manager, Nebraska Bostwick Irrigation District
Tracy Smith	Nebraska Bostwick Irrigation District
Walter Knehans	Nebraska Bostwick Irrigation District
Jim Miller	Nebraska Bostwick Irrigation District
Alma, Nebraska - Lower Republican Natural Resources District	
Scott Dicke	Lower Republican Natural Resources District
Lincoln, Nebraska – Attorney General's Office	
Justine Lavene	Nebraska Attorney General's Office
Culbertson, Nebraska - Frenchman Valley Irrigation District	
Don Felker	Frenchman Valley Irrigation District
Hastings, Nebraska - Hastings Tribune Newspaper	
Andy Raun	Hastings Tribune
Manhattan, Kansas – Kansas Division of Water Resources	
David Barfield	Kansas Commissioner, Chief Engineer
Lawrence, Kansas – Kansas Division of Water Resources	
Chris Beightel	Kansas Division of Water Resources

Topeka, Kansas – Kansas Attorney General's Office

Chris Grunewald	Kansas Attorney General's Office
Burke Griggs	Kansas Attorney General's Office
Lane Letourneau	Kansas Water Appropriation
Greg Foley	Kansas Director of Conservation

Stockton, Kansas – Kansas Department of Agriculture Field Office

Chelsea Erickson	Kansas Division of Water Resource

Courtland, Kansas - Kansas Bostwick Irrigation District Office

Pete Gile	Kansas Bostwick Irrigation District
Kenny Nelson	Kansas Bostwick Irrigation District
Monty Dahl	Kansas Bostwick Irrigation District Board Member
Gary Housholder	Kansas Bostwick Irrigation District Board Member
Brad Peterson	Kansas Bostwick Irrigation District Board Member

Denver, Colorado – Colorado Division of Water Resources

Dick Wolfe	Colorado Commissioner & State Engineer
Ivan Franco	Colorado Division of Water Resources
Scott Steinbrecher	Colorado Attorney General's Office

Exhibit C

AGENDA FOR SPECIAL MEETING OF THE REPUBLICAN RIVER COMPACT ADMINISTRATION

March 6, 2015, 2:00 PM (CST)
Conference call: 1-888-820-1398; Passcode: 1363142#

1. Introductions

2. Modification and Adoption of the Agenda

3. Action Items

   a. Adopt:
   ADDENDUM TO RESOLUTION APPROVING ACCOUNTING ADJUSTMENTS AND AGREEMENTS RELATED TO THE OPERATION OF HARLAN COUNTY LAKE IN 2015 DATED NOVEMBER 19, 2014

4. Adjournment

Exhibit D

RESOLUTION OF THE REPUBLICAN RIVER COMPACT ADMINISTRATION

ADDENDUM TO RESOLUTION APPROVING ACCOUNTING ADJUSTMENTS AND AGREEMENTS RELATED TO THE OPERATION OF HARLAN COUNTY LAKE IN 2015 DATED NOVEMBER 19, 2014.

March 6, 2015

Whereas, the States of Kansas, Nebraska, and Colorado 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 States, in consultation with the United States, have determined for the years 2014 and 2015 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 pursuant to the terms of the Resolution Approving Accounting Adjustments and Agreements related to the Operation of Harlan County Lake in 2015 dated November 19, 2014;

Whereas, the RRCA previously adopted the Resolution Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake in 2015, and the States desire to elaborate on that Resolution and pursue development and administration of the "Kansas Account" as referenced in III(a); and

Whereas, in order to administer the Compact in a more flexible manner, which provides a greater benefit to all water users, yet remains in conformance with the FSS and the Compact, the States desire to establish the parameters under which water will be administered pursuant to the November 19, 2014 Resolution until further agreement of the Parties.

NOW THEREFORE BE IT RESOLVED:

1) Nebraska has established, pursuant to the applicable Integrated Management Plans, the amount of water in excess of natural flows and storage releases, that Nebraska believes must pass into Kansas to ensure Nebraska remains in compliance with the Compact (the "Compact Call Forecast Volume"). This amount of water is specified in Nebraska's annual "Forecast of Allowable Depletions in the Republican Basin";

2) Nebraska shall make good faith efforts to ensure that, no later than June 1, 2015, an amount of water equal to the 2015 Compact Call Forecast Volume (17,600 acre feet) arrives at Harlan County Lake;

3) The United States Bureau of Reclamation shall be entitled to store the 2015 Compact Call Forecast Volume as "project water" for distribution pursuant to its contracts with irrigation districts in Nebraska and Kansas as established in Paragraphs IV and V of the November 19, 2014 Resolution;

4) Once the 2015 Compact Call Forecast Volume has reached Harlan County Lake, any closing notices issued by Nebraska pursuant to a Compact Call shall be lifted, subject to Paragraph 6(a) below;

5) Nebraska shall continuously evaluate actual hydrologic conditions and determine the actual volume of water that Nebraska believes must pass into Kansas to ensure compliance (the "Compact Compliance Volume"). Nebraska shall provide the results to Kansas and Colorado and to the United States not later than the tenth day of each month. If the Compact Compliance Volume is greater than the sum of the natural flows, storage releases and the Compact Call Forecast Volume, the difference between the former and the sum of the latter is the "2015 Compliance Shortfall". Nebraska shall provide the final accounting of the 2015 Compliance Shortfall, if any, to the States by December 31, 2015.

6) If Nebraska identifies a 2015 Compliance Shortfall, Nebraska may take one or more of the following actions individually or in combination to ensure the full Compact Compliance Volume reaches Harlan County Lake:

    a. Nebraska may reinstate closing notices applied to Nebraska surface water users, provided, the closing notices shall not be reinstated prior to September 15, 2015; or

    b. Take any other actions agreed upon by the three States.

7) In the event any action taken under Paragraph 6 fails to ensure the full Compact Compliance Volume reaches Harlan County Lake:

    a. Nebraska shall increase the 2016 Compact Call Forecast Volume to include the 2015 Compliance Shortfall; and

    b. The RRCA shall offset against Nebraska's 2015 Compact compliance obligation the portion of the 2015 Compliance Shortfall that is delivered to Harlan County Lake by April 15, 2016, as project water for Kansas' exclusive use, provided that Nebraska's 2016 Compact compliance obligation shall not be reduced by the 2015 Compliance Shortfall.

8) To the extent that any portion of the 17,600 acre feet referenced in Paragraph 2 remains in Harlan County Lake on January 1, 2016 (" Unused Portion"):

    a. The amount of Nebraska's offset credit in the Compact accounting for 2015 shall be reduced by 70% of the Unused Portion;

b. Nebraska shall not be charged in the Compact accounting for the consumptive use of any part of the Unused Portion.

c. The determination of the Unused Portion, if any, shall be based on Reclamation's December 1, 2015 estimate.

Approved by the RRCA, this 6th day of March, 2015.

4-1-15

James C. Schneider, Ph.D.
Acting Nebraska Member
Acting Chairman, RRCA

date

David Barfield

3/15/2015

David Barfield, P.E.
Kansas Member

date

Dick Wolfe

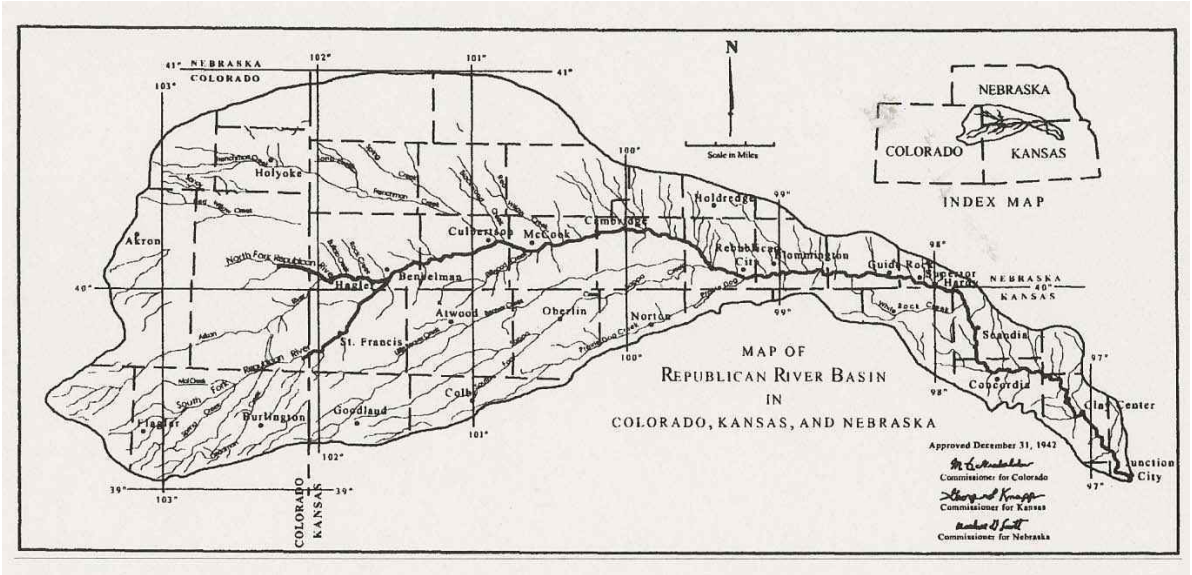
3/27/15

Dick Wolfe, P.E.
Colorado Member

date

REPUBLICAN RIVER COMPACT ADMINISTRATION

Annual Meeting
August 27, 2015



SUMMARY AND MINUTES OF
THE 2015 ANNUAL MEETING OF
THE REPUBLICAN RIVER
COMPACT ADMINISTRATION

AUGUST 27, 2015

HELD AT THE
CORHUSKER MARRIOT HOTEL
LINCOLN, NEBRASKA

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 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 Nebraska Commissioner and Chairman Gordon "Jeff" Fassett at 9:00 a.m., August 27, 2015. Commissioner Fassett asked for introductions around the room. A complete list of attendees is attached as Exhibit B. Some of the attendees included:

Name	Representing
Jeff Fassett	Nebraska Commissioner and Chairman
Jim Schneider	Nebraska Engineering Committee Member and Chairman
Justin Lavene	Nebraska Attorney General's Office
Dick Wolfe	Colorado Commissioner
Ivan Franco	Colorado Engineering Committee Member
Scott Steinbrecher	Colorado Attorney General's Office
David Barfield	Kansas Commissioner
Chris Beightel	Kansas Engineering Committee Member
Burke Griggs	Kansas Attorney General's Office

Agenda Item 2: Adoption of the Agenda

Chairman Fassett introduced the agenda. Commissioner Barfield moved to adopt the final agenda as is and the motion was seconded by Commissioner Wolfe, who then clarified that for the record that the task for Item 8.c., "Resolution Amending Rules & Regulations," was to approve the amended Rules and Regulations, rather than to pass a resolution to amend them. It was unanimously approved. A copy of the final agenda is attached as Exhibit C.

Agenda Item 3: Status of Report and Transcripts for 2014 Annual Meeting and Subsequent Special Meetings

Jim Schneider reported that draft materials for the 2014 report have been shared with other states. He anticipates having a final report ready for adoption at the 2016 Compact meeting.

Agenda Item 4: Report of Chairman and Commissioners' Reports

a. Kansas: Commissioner Barfield first described some Kansas intrastate issues, then highlighted some interstate progress. The state's 50-year vision plan, which was finalized in January 2015, has two main focuses: strategies for dealing with the reduced yield of the federal reservoir system due to siltation, and management of the Ogallala Aquifer to make best use of it moving forward. The plan is now in phase one of implementation, with regional teams developed that will determine how to implement the plan's broad vision at a local level.

Senate Bill 156 established water conservation areas, which allow a water right holder or a group of water right holders in an area to initiate development of a plan for reducing their use to extend the life of the resource.

Climate conditions in the Republican River Basin in Kansas have been more normal 2014 and 2015 than in previous years. Some limited water administration has been necessary, with minimum desirable stream flows on the Republican administered from March to September of 2014 and March to late May of 2015.

Groundwater Management District 4 (GMD4), in northwest Kanas, has decided to formally close the district to new appropriations. There is currently a moratorium while they work through the formal closing process. In addition, GMD4 has committed to establishing targets for reducing use in certain areas by the end of 2016.

The state's first Local Enhanced Management Area (LEMA), which is in Sheridan County, is in its third year. It is on target to reach the goal of reducing water use within the LEMA by 20 percent.

South Fork Republican River issues continue to be important to Kansas. Governor Brownback, Secretary McClaskey, Kansas Water Office Director Tracy Streeter, and Commissioner Barfield held a public forum on April 7th, 2015. Approximately 150 people attended and provided input on their needs and desires for the basin. Kansas and Colorado also worked together to do some seepage runs on the South Fork to better understand how the system works.

Commissioner Barfield noted for the record that the Supreme Court ruled on Kansas v. Nebraska and Colorado on February 24, 2015, denying all exceptions by the states and affirming the Special Master's recommendation. He appreciates that the states can now move on to implementing the Court's decisions and figuring out how to work together. He noted that the three states have been meeting monthly since June 2014 to work through disputes on compliance issues, accounting, and modeling. Commissioner Barfield highlighted the RRCA resolutions that passed during the previous year as examples of the progress made by the three states.

b. Colorado: Commissioner Wolfe expressed gratitude to his staff, federal agencies, and stakeholders in all three states for their work on trying to solve issues cooperatively rather than through litigation. Specifically, Kansas and Colorado hope to have an action plan in place by November 1st for addressing South Fork Republican River issues. He reminded everyone that, under the October 2014 resolution, if they come to an agreement on the South Fork issues by November 1, it would effectively result in automatic approval of the Colorado Compliance Pipeline for 2016.

Commissioner Wolfe highlighted Colorado's Compact compliance efforts, which are primarily focused on trying to preserve the aquifer and reduce depletions associated with well-pumping, which is Colorado's primary use. Colorado's efforts have manifested through conservation measures, water-right buyouts, and programs like CREP other fallowing programs. They have been successful in obtaining additional funding for the Ogallala Aquifer Initiative from NRCS and the Republican River Water Conservation District, which will be used to permanently remove 510 acres of groundwater irrigation from production.

Colorado's compliance efforts also include the Compact Compliance Pipeline. Operations of the pipeline from January through April 2015 have produced 6,970 acre-feet, pursuant to the October 2014 agreement. Colorado anticipates the need to pump additional water through the Pipeline starting in October, and will make a projection on September 1 of what production will remain for the calendar year. In addition, Colorado's well-measurement rules are being amended to help with compliance by including additional wells for measurement, with the hearing set for September 10th. In addition, through Colorado's Water Preservation Partnership for the basin, the Republican River Water Conservation District, and Colorado's groundwater management districts have been actively considering various conservation measures within the basin and are currently seeking funding for various studies and action items.

Commissioner Wolfe reported that the Water Conservation Board, which is part of the Department of Natural Resources, has been leading the effort to develop Colorado's first water plan, which is close to being finalized. When complete, the plan will help address Colorado's water needs over the next 40-50 years.

Following Commissioner Wolfe's report, Commissioner Barfield affirmed Kansas' commitment to the November 1 deadline for reaching agreement with Colorado.

c. Nebraska: Commissioner Fassett stated that Nebraska continues to be in compliance. He observed that even within the past three weeks of his new duties as the Department's Director, he has seen evidence of commitment from the three states of working hard together on complex issues, with the ultimate goal of working together for the benefit of water users in all three states.

Commissioner Fassett reported that Nebraska's compliance efforts, which have been accomplished primarily through implementation of the basin's integrated management plans and the efforts of the natural resources districts, afforded Kansas full access to their allocations during the past year. The Rock Creek Basin augmentation project and N-CORPE in the Medicine Creek drainage have provided supplemental water supplies in 2014 and 2015. Nebraska will continue to focus its compliance efforts on these augmentation projects as well as programs Nebraska has implemented with either temporary or permanent irrigated land retirements or short-term leases. Nebraska will also continue working with the Bureau of Reclamation through the WaterSMART Basin Studies Program. Nebraska's Water Sustainability Fund was authorized in 2014, and procedures for administering the Fund are close to being finalized. Nebraska hopes to be accepting applications to the Fund from across the state by early 2016. Nebraska is also in the process of developing a basin-wide plan for its portion of the Republican River Basin.

Commissioner Fassett noted the collaborative progress made by the efforts of the three states and asserted that continued progress is important to Nebraska. Nebraska's position is that Compliance is a goal, but that helping water users throughout the basin is the bottom line. Commissioner Fassett believes that is the direction of the current collaborative work of the three states.

Jesse Bradley gave highlights from Nebraska's water administration report for calendar year 2014 and noted that the full report was provided with the annual data exchange on April 15th. There was a high level of water administration activity within the basin in 2014, with letters going out January 1st and throughout the spring to users in the basin. The Bureau of Reclamation was notified on December 31st that Harlan County Reservoir was closed except to allow storage of inflows for the sole purpose of delivery to Kansas-Bostwick Irrigation District. On June 27th, 21 natural flow permits were opened for irrigation, and on July 2nd, an additional 409 irrigation permits were opened. Starting on July 8th, about one hundred additional closing notices went out, which were largely the result of priority calls for the protection of senior water rights. On October 23rd, subsequent to the October 22nd resolution, opening notices were issued to an additional 165 irrigators and 87 storage permits. Water use reports were mailed to irrigation users throughout the basin on December 8th. Data from those reports has been provided through the data exchange.

Agenda Item 5: Federal Reports

a. Bureau of Reclamation: Aaron Thompson distributed the Bureau's summary report of its operations in the Republican River Basin for 2014 and through the end of July for 2015 (Exhibit D) and reviewed some of the report's highlights. Water-Short Year administration was in effect for both 2014 and 2015. Kansas-Bostwick Irrigation District entered into a temporary Warren Act contract to store up to 30,000 acre-feet of non-project water, which was later amended to 60,000 acre-feet. Extending the contract through December 31, 2015, allows the irrigation district the flexibility to use non-project water during the irrigation season. Thompson also provided an update on the Republican River Basin Study through the WaterSMART program. The Bureau expects the final report to be completed by November of 2015. Finally, Thompson mentioned that the Bureau and the State of Colorado Department of Wildlife and parks have reached agreement on their contract dispute and hope to have a new contract in place by the end of the calendar year 2015. Following a request from Bradley, Thompson agreed to share the final WaterSMART basin study on the Bureau's website.

b. U.S. Army Corps of Engineers: Ken Stark shared that progress is being made on the Corps' repairs at Harlan County Dam despite the challenges incurred due to the age, size, and steepness of the dam. The spillway gates at Tuttle Creek have been repaired. At Harlan County Dam, the main effort is to repair the dam's18 tainter (spillway) gates, but the Corps is also working on the nine sluice gates and the Franklin and Naponee irrigation canals. The target completion date for the tainter gate repairs is mid-2018. The Corps is hopeful that the irrigation gate repairs can be added to the existing tainter gate repair project. The budget for the repairs is approximately $43 million. Stark's PowerPoint is included as Exhibit E.

c. U.S. Geological Survey: Jason Lambrecht 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).. After describing the source of funds for maintaining each gage, Lambrecht presented highlights from the report, noting that there is a summary table on the first page. The report displays information about water year 2014 mean discharge for each site. Water year 2014 was dry, with nine of the stream gages were within the top 10 for lowest mean discharge. Some unusual circumstances were then noted. Rock Creek at Parks had a mean discharge 261 percent higher than the long-term mean discharge. South Fork near Benkelman had a mean discharge of zero cubic feet per second, which has only happened five times in 77 years, and those times were all since 2004. The Courtland Canal had the 16th highest mean discharge on record in 60 years, at 120 percent above the long-term mean. Lambrecht noted that, due to an increase in National Streamflow Information Program funding from Congress, USGS was able to assume operations at three Nebraska DNR stream gages in the Republican Basin. These gages are located at Beaver Creek, Republican River at Benkelman, and Republican River at Guide Rock. He noted that, after several years of augmentation on Rock Creek, the January 2014 flows at the Rock Creek gage appear to have dropped from a typical range of 20 to 35 cfs to a range of about 4 to 6 cfs. USGS gage records

have been worked through May of 2015 for the Republican Basin but have only been approved through about November 2014.

Agenda Item #6: Engineering Committee Report

a. Assignments from 2014 Annual Meeting: Jim Schneider shared the Engineering Committee (Committee) Report (Exhibit G). The Committee met four times in 2015, with two assignments being completed:(1) holding quarterly meetings, and (2) exchanging information listed in Section 5 of the Accounting Procedures and Reporting Requirements. The Committee recommended continuing four assignments from the previous year: (1) continued efforts to resolve concerns in the methods of estimating ground and surface water recharge and return flows, (2) continue working on finalizing accounting for 2005 through 2014, (3) working to resolve issues preventing agreement on final accounting for that time period, and (4) discussing accounting changes that may be needed for surface water diversions for the purpose of groundwater recharging. Of the three issues preventing agreement on accounting that were identified in the Committee's report for the 2014 Annual Meeting, the Committee has resolved one issue and continues to work on the other two.

b. Committee recommendations to RRCA: The Committee recommends that the RRCA discuss: (1) the exchange of data and documentation in the modeling runs completed by Principia Mathematica for 2014, (2) Nebraska's proposal to revise the RRCA accounting procedures and reporting requirements, and the RRCA rules and regulations documents, (3) and the recommended Engineering Committee assignments for the following year.

c. Recommended assignments for Engineering Committee: The Committee's recommendations about assignments for the coming year are outlined in the report. In addition to the assignments the Committee has recommended for continuation, which are described under "Assignments from 2014 Annual Meeting," above, the Committee also recommends some new assignments for the upcoming year and identifies some assignments from the previous year that the Committee does not recommend continuing.

Agenda Item #7: Old Business

a. Status of unapproved previous accounting: Accounting from 2006 through 2014 still needs approval and finalizing. During the litigation, there was no uniform set of data, as each state maintained its own data. Principia Mathematica has helped to compile a single set of data, which is nearly finalized. Schneider anticipates that all the final input data will be ready next year. Once the input data are finalized, the ability to approve previous accounting will depend on whether the issues preventing approval of final accounting have been resolved.

b. Approve Annual Report for 2013: Commissioner Barfield described the report and noted that it had been distributed on CDs. Schneider pointed out that there had been a couple of duplicate pages found on the version that was distributed. Commissioner Barfield moved that the 2013 report be approved, minus the duplicate pages. Commissioner Wolfe seconded. The motion passed unanimously.

Agenda Item #8: New Business and Assignments to Compact Committees

a. Action on Engineering Committee Report and assignments: Commissioner Wolfe moved to approve the Engineering Committee report and associated assignments for the upcoming year. Commissioner Barfield seconded, and the motion passed unanimously.

b. Resolution Approving & Finalizing Accounting Changes: Schneider gave an update on the resolution to approve two changes to the accounting procedures. The first change would implement the Supreme Court's ruling regarding consumption of imported water by Nebraska, and the second is a chance to Attachment 7 of the accounting procedures to utilize data on wasteway spills. These changes were discussed in the previous day's work session. Commissioner Wolfe moved to adopt the resolution, and Commissioner Barfield seconded. The motion passed unanimously.

c. Resolution Amending Rules & Regulations: Commissioner Fassett reminded everyone that the issue under consideration is the adoption of some revisions to the Rules and Regulations, rather than a resolution. Schneider explained the updates to the rules and regulations are to accommodate the updated accounting procedures. Commissioner Wolfe noted that paragraph 14 of the current version of the Rules and Regulations refers to Version 12 (S) (2) of the Groundwater Model. Because Version 12 (S) (2) is being used through accounting year 2011, but Version 12 (S) (3) will potentially be used for calendar years 2012 and later, there are likely to be future amendments to the Rules and Regulations reflect the model version change. Commissioner Barfield moved to adopt the Rules and Regulations dated August 27, 2015. Commissioner Wolfe seconded, and the motion passed unanimously.

d. Resolution honoring Brian Dunnigan: Chairman Fassett recited the resolution into the record and on behalf of the RRCA expressed gratitude and appreciation for Dunnigan's work to the State of Nebraska and the RRCA. Commissioner Barfield moved to adopt the resolution, and Commissioner Wolfe seconded. The motion passed unanimously.

e. Resolution on Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake for Compact Year 2016 (for potential action): Schneider gave a brief summary of the resolution. The states have worked out an agreement related to Compact compliance efforts by Nebraska through augmentation pumping, as well as the methods of accounting for that water and ensuring its delivery to Kansas water issues, contingent upon successful execution of an amendment to the MOA between the Bostwick Irrigation Districts. Commissioner Barfield voiced support for the resolution and described that the primary difference between the resolution under consideration and the similar resolutions adopted in 2015 is that the resolution under consideration allows Nebraska to provide augmentation deliveries in two parts. Commissioner Barfield noted that this resolution is a one-year agreement to allow time for the states to work on a long-term agreement; Chairman Fassett agreed and commented that it builds on past experience and continues momentum. Commissioner Barfield moved to adopt the resolution. Commissioner Wolfe seconded and the motion passed unanimously.

Agenda Item #9: Remarks from the Public

Brad Edgerton is the Manager of Frenchman Cambridge Irrigation District, which serves 45,600 acres in the Republican River Basin and has contracts with the Bureau of Reclamation to take storage water out of three of the reservoirs in the basin. He thanked the Compact Administration for their worked that allowed Nebraska to open up permits that had been closed in January for the benefit of Frenchman Cambridge water users. He also encouraged the Compact Administration to ensure that all aspects of the IMP are adhered to. Specifically, he noted that the compliance standards to reduce pumping by 25 percent by 2015 is important to the Board of Directors for Frenchman Cambridge Irrigation District and that the District has concerns about pumping above the federal reservoirs that provide water to the Frenchman Cambridge systems. On behalf of the Board of Directors of the Frenchman Cambridge Irrigation District, he looks forward to working with the Compact Administration in the future to ensure Nebraska's Compact compliance.

Mike Delka, Manager of Bostwick Irrigation District in Nebraska, asked for more knowledge of the resolution. He requested to see some model runs to know the impacts with and without the augmentation programs, in order for his board to be able to make an informed decision. In addition, the District would like for the augmentation programs to replace some of the depletions. Delka noted concerns that the MOA with Kansas Bostwick might become a burden to Kansas Bostwick if the supply is not sufficient to support an ability to pay and repay the federal government. He believes there is a lot more work to be done and would have liked it to have been done prior to this meeting for a more complete picture of future expectations. He also thanked all parties for working together on the resolution.

Pete Giles, Assistant Superintendent of Kansas Bostwick Irrigation District, thanked the Compact Administration for the efforts put forth and hopes for a more long-term agreement and future working relationships with the Compact Administration, Nebraska Bostwick, and the Bureau of Reclamation.

Dennis Coryell, President of the Republican River Water Conservation District in Colorado, reviewed some of the compliance activities of his District, which fall into three categories: conservation programs, improving meter-reading accuracy and well permit enforcement, and augmentation through the Compact Compliance Pipeline, which is in its second year. Conservation program include the conservation reserve enhancement program, a water enhancement program through NRCS, and the Ogallala Aquifer Initiative. The District's application to the Regional Conservation Partnership Program was not fulfilled last year, but the District plans to reapply in the coming year. He urged the Administration to develop a permanent agreement for the Compact Compliance Pipeline, rather than a band-aid agreement each year, noting that the District's efforts to retire land from irrigation within the basin are permanent retirements.

Agenda Item #10: Future Meeting Arrangements

Nebraska's chairmanship term has ended and Colorado will be hosting the RRCA annual meeting for the next two years (2016 and 2017). Commissioner Wolfe stated the tentative date for next year is August 24 and 25th for the workshop and annual meeting, to take place in either Burlington, Wray, or Holyoke.

Agenda Item #11: Adjournment

The meeting was adjourned at 10:36 a.m. on August 27, 2015.

The August 27, 2015 Annual Meeting report is hereby approved by unanimous vote of the RRCA on this 22nd day of August, 2017.

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 G. Rein, Chair and Colorado Commissioner — DATE SIGNED: 8-22-17

Jeff Fassett, Nebraska Commissioner — DATE SIGNED: 8/22/17

David Barfield, Kansas Commissioner — DATE SIGNED: 8/22/17

Exhibits

Exhibit A:	Transcript of the 2015 Annual Meeting
Exhibit B:	Attendance of the 2015 Annual Meeting with Sign-In Sheets
Exhibit C:	Agenda for the 2015 Annual Meeting
Exhibit D:	Bureau of Reclamation Report, *Nebraska-Kansas Area Report to the Republican River Compact Administration*, August 27, 2015
Exhibit E:	U.S. Army Corps of Engineers Presentation, *Harlan County Dam Tainter Gate Repairs*, August 27, 2015
Exhibit F:	U.S. Geological Survey Report, *Republican River Compact, Nebraska Stream-Gaging Data, Water Year 2014*, August 27, 2015
Exhibit G:	Engineering Committee Report for the 2015 Annual Meeting

Exhibit A

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 16th day of September, 2015.

Linda W. Rohman
Reporter

- - -

2015 ANNUAL MEETING OF THE

REPUBLICAN RIVER COMPACT ADMINISTRATION

August 27, 2015
9:00 a.m. Central Time
Cornhusker Hotel
333 S 13th St
Lincoln, Nebraska

MEMBERS PRESENT

FOR NEBRASKA: Commissioner Gordon W. "Jeff" Fassett, Chair
Justin Lavene
Jesse Bradley
Jim Schneider

FOR COLORADO: Commissioner Dick Wolfe
Ivan Franco
Scott Steinbrecher

FOR KANSAS: Commissioner David Barfield
Burke Griggs
Chris Beightel

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 February, 2016.

_____
Reporter

- - -

PROCEEDINGS:

CHAIRPERSON FASSETT: Good morning, everybody. I'm Jeff Fassett, the new Director of the Nebraska Department of Natural Resources and your chairman. I've only been on the job less than a month, so you'll need to bear with me, and you'll actually be hearing a lot from the gang on my left and right here to help me get through this first meeting. But I'm very pleased to be here. Nebraska is very pleased to be hosting you for this meeting, and we'll get going.

So, let's start with introductions. Maybe, Jim, let's start here. We'll go around this table first, and then, for my benefit, I'd like everybody to introduce themselves, not only for the record, but for my education.

MR. SCHNEIDER: Jim Schneider with Nebraska.

COMMISSIONER WOLF: Good morning. I'm Dick Wolfe, Colorado Commissioner, and thank you, Chairman, for hosting this year's meeting. And here with me from Colorado is Scott Steinbrecher, who's an Assistant Attorney General with the Colorado Attorney General's Office, and Ivan Franco, who's the Colorado engineer advisor. Also have my deputy, Mike Sullivan, who's out there. We also have some other guests with us: Dennis Coryell, who's the President of the Republican River Water Conservation District, and Pete Ampe, who's their General Counsel, in the back there. So, I don't

know if anybody -- if I've missed anybody else that's from Colorado, maybe, as we're doing introductions, if I missed you, -- who's over in the corner?

MR. STEINBRECHER: Willem.

COMMISSIONER WOLFE: Oh, Willem. Here, he's hiding out over here. See? I couldn't see him. Willem Schreüder, who's our -- from Principia Mathematica -- who's our consultant that does work, not only for Colorado, but the RRCA in terms of the groundwater model and work. So, with that, I'd turn it over to Commissioner Barfield.

COMMISSIONER BARFIELD: Sure. David Barfield, Kansas Commissioner. Welcome, Jeff, to the administration and your new duties there. We look forward to working with you. With me is Chris Beightel, Program Manager for the Water Management Services Program, and Burke Griggs, from the Kansas Attorney General's Office. And in the crowd, with the Department of Agriculture's Division of Water Resources, is Sam Perkins; our modeler, Ginger Pugh; Hongsheng Cao and Chelsea Erickson of our Stockton Field Office.

CHAIRPERSON FASSETT: Gentlemen, with me? Go ahead, Justin.

MR. LAVENE: Justin Lavene with the Attorney General's Office in Nebraska.

MR. BRADLEY: Jesse Bradley with the Nebraska

Department of Natural Resources.

CHAIRPERSON FASSETT: And, again, for my benefit, I know you've highlighted some folks, but if I could just ask everybody to introduce themselves, starting here in the front.

Brad?

MR. EDGERTON: Okay. I'm Brad Edgerton, Manager of Frenchman Cambridge Irrigation District.

MR. DELKA: Mike Delka, Manager of the Bostwick Irrigation District in Nebraska.

MR. LAMBRECHT: Jason Lambrecht with the U.S. Geological Survey, the Nebraska Water Science Center, here in Lincoln.

MR. MERRIGAN: Bob Merrigan, Assistant Manager of Middle Republican Natural Resources District.

MR. PERKINS: Sam Perkins, Kansas DWR.

MR. SCHREÜDER: I'm still Willem.

MS. ERICKSON: Chelsea Erickson with the Kansas Division of Water in Stockton Field Office.

MS. PUGH: Ginger Pugh, Kansas DWR.

MR. CAO: Hongsheng Cao, DWR Kansas.

MR. CORYELL: Dennis Coryell, Republican River Water Conservation District.

MR. GUNDERSON: David Gunderson with the Nebraska Department of Natural Resources Cambridge Field Office.

MR. STANTON: Shane Stanton with the Cambridge Field Office.

MR. WELLS: I'm Bruce Wells with the Natural Resources Conservation Service out in Kansas.

MR. THAYER: Chance Thayer with the Flatwater Group.

MR. SCOTT: Craig Scott with the Reclamation in McCook.

MR. GILE: Pete Gile, Assistant Superintendent, Kansas Bostwick Irrigation District.

MR. CLEMENTS: Mike Clements, General Manager, Lower Republican NRD in Alma.

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

MR. WILCOX: Dustin Wilcox, Nebraska Association of Resources Districts.

MR. DICKE: Scott Dicke, Assistant Manager with the Lower Republican Natural Resource District.

MR. THOMPSON: Aaron Thompson with the Bureau of Reclamation.

MR. STARK: Ken Stark, U.S. Army Corps of Engineers.

MR. BLANKENAU: Don Blankenau, outside counsel for Nebraska.

MR. FANNING: Jasper Fanning of the Republican

NRD.

MR. WILMOTH: Tom Wilmoth, outside counsel, Nebraska.

MR. AMPE: Peter Ampe, Hill & Robbins, counsel for the Republican River Water Conservation District.

MR. RILEY: Tom Riley with the Flatwater Group.

MR. KRACMAN: David Kracman with the Flatwater Group.

MR. GROFF: Marc Groff, also with the Flatwater Group.

CHAIRPERSON FASSETT: Okay. Great. Thank you all very much. I appreciate that.

Moving on. Number -- Item number 2 on our agenda is adoption of the agenda. Is there any comments, Commissioners?

COMMISSIONER BARFIELD: I think the final agenda that we have in front of us reflects a few changes from the proposed agenda, but I think, as it's presented here, it's appropriate. I'd move adoption.

COMMISSIONER WOLFE: And I'll second that. To, maybe, just clarification, under Item 8 (c), I don't think we actually have a resolution for approving the amended rules and regulations. I just wanted to make sure that that was clear for the record, that we just are adopting the rules and regulations in their -- in final form.

CHAIRPERSON FASSETT: Yeah, without the cover sheet of a resolution itself.

COMMISSIONER WOLFE: Without a reso- -- actual resolution, so, yeah.

CHAIRPERSON FASSETT: Understand. I think that's --

COMMISSIONER WOLFE: Other than that, I have no other corrections to the agenda.

CHAIRPERSON FASSETT: Motion and a second. All in favor, signify by saying aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON FASSETT: Any opposed?

(No response.)

Agenda is approved for our 2015 Annual Meeting.

Moving on, Agenda Item 3, status report dealing with our transcripts from prior meetings. I'm going to have Jim comment on that.

MR. SCHNEIDER: Sure. We had a annual meeting last year here in Lincoln and, I think, a couple of special meetings under the 2014 year, and we've been working through preparing the report for 2014. And we've shared draft materials with the other states and anticipate having a final report ready for adoption at next year's Compact meeting.

Any questions on that?

(No response.)

CHAIRPERSON FASSETT: No? Okay. Good.

Jim, thank you.

MR. SCHNEIDER: Sure.

CHAIRPERSON FASSETT: Next agenda item is the report of the commissioners. We'll start with the State of Kansas. David?

COMMISSIONER BARFIELD: Very good. Thank you, Commissioner Fassett.

Well, it's been another very busy year. And that's not been unusual. We've had lots of busy years in recent years. So, the thing that I'd like to highlight in my report is the busyness has not been so much in court, but the negotiating table, which I think everybody is quite happy about. I'll talk about some Kansas intrastate issues and then highlight some of our interstate progress.

First, on a statewide basis, one thing I reported on last year was our process to develop a 50-year vision related to our water resources that was called upon by Governor Brownback in the fall of 2013. There are two sort of focuses to that 50-year vision. Our reservoir systems, we rely on a system of federal reservoirs, in particular, to provide a water supply to our population centers and industries, especially the eastern and central Kansas.

Unfortunately, that -- the yield of that system is reduced with siltation and won't be sufficient in the future, so we've been investigating strategies for dealing with that. And our Ogallala management, it's just another important area. That aquifer's critical and declining, and how do we make the best use of that moving forward.

In January this year, that 50-year vision document was finalized, and that's available. We're busy working now on implementing the phase one action items, and the agencies have been going -- there's been a development of regional teams to determine how to take the broad vision document and implement that within the various more local areas.

It was a busy year with legislation. I will just highlight one piece of water-related legislation, and that was in Senate Bill 156. An outgrowth of the vision process, we've been looking for tools to facilitate improved management of the declining Ogallala I just mentioned. I think I highlighted in 2012, there was a new tool provided called Local Enhanced Management Areas, or LEMAs, that allowed our groundwater management district, our local entities that seek to guide groundwater development in their areas, to develop a plan to reduce use in a particular area to address groundwater declines and provide some flexibility tools within that statute. We have one of those I'll speak about in a minute.

This year, we added something called water conservation areas. It allows a water right holder with a suite of water rights or a group of water right holders in an area, again, to sort of develop a plan for reducing their use to extend the life of that resource and, again, provide some of the flexibilities that the LEMA statute provides. The difference here is that the -- it does not have to be initiated or endorsed by the groundwater management district, but can be initiated by the water users themselves. It's implemented via consent agreement between the water users and the chief engineer. So, again, it requires a hundred percent consensus, since it's a consent agreement, but this is just another tool to allow for better use of our declining resource. So, we're in discussions with 15 sort of individuals and groups of water users to figure out how to use this new tool.

Looking at the Republican River Basin in Kansas, climate conditions 2014 and this year have been much more normal, as opposed to previous years. We've got some areas currently in normal conditions, some dry, some moderate drought, but a limited area. Our water administration has still had to occur in the basin, but on a much more limited extent. Minimum desirable stream flows on the Republican, we administered from March to September of 2014 and March to late May of 2015.

Moving to northwest Kansas, that area is managed by our Northwest Kansas Groundwater Management District No. 4. They have allowed some very limited number of new appropriations based on safe yield in a specific area. That's -- there's been very few new applications granted in GMD4 in recent years, but they actually decided to go take the step to formally close the district. I issued a moratorium on processing new applications while they worked through that process, but we expect that to happen later this year. In addition, the GMD4 Board is looking very aggressively at establishing targets for reducing use according to the specific areas and the degree of over-appropriation. They've committed, by the end of 2016, to establish those goals, and then they'll look at some of these tools I've been mentioning as a means to implement those. So, we'll see what they do in the coming years.

Sheridan County has our first local enhanced management area. It's now in its third year. Its goal was to reduce water use within that area 20 percent, and, from everything we've heard, they're on target to accomplish that, and the area's working well in terms of the flexibilities to see their economy still move forward with -- even with that reduced use.

We have a new man- -- he's not here today, but we have a new manager for Groundwater Management District No.

4, Ray Luhman, their long-term assistant manager, started on January 1.

Now, the South Fork issues have been very important to us. They're very important for our discussions with Colorado and their augmentation pipeline. On April 7th, Governor Brownback, Secretary McClaskey, Kansas Water Office Director Tracy Streeter, and I went out and held a public forum in St. Francis to sort of hear from them, in terms of, you know, their needs and desires for the basin. We had about 150 of our citizens attend that meeting, and we got quite a bit of input from them. On the South Fork, we also did a couple of seepage runs, in cooperation with our Colorado officials, just to get a better understanding of how that system works.

Interstate progress. I'd just like to, for the record, just to, you know, talk about sort of what's been accomplished here from our perspective. I would note, for the record, that Kansas v. Nebraska, Colorado on the Republican is over. February 24, the Supreme Court denied all exceptions by the states and affirmed the special master's recommendation. So, there's been plenty of press about that, so I really don't feel the need to wax on about that. I think we're all just appreciative to have that phase behind us and, now, to implement, not only the Court's decisions, but also to figure out how to work together

better.

Last year, we talked about the start of a new initiative by the three states to work through the disputes that we've had as we've sought to work out the compliance activities of Colorado and Nebraska, particularly their augmentation projects, to agree on the accounting and modeling and figure out how we can make sure that downstream users make good use of that -- those water resources. So, that started a series of monthly meetings and focused discussions to reach agreements. And that started in June of last year, and it's continued even to yesterday when we had some meetings. Those discussions have been challenging at times, but, you know, everybody has worked hard to represent their interests and to be open to listen and to come up with solutions. And, as we persevered through those discussions, I think we've made very good progress.

I think that's best evidenced in the series of resolutions that we passed this last year, and I'll just highlight them very briefly. On October 24 (sic) of 2014, we reached two agreements. The first was related to Nebraska's augmentation and compliance activities for 2014 and how they would be credited and how Kansas could make a few -- effective use of that water resource. Also, on that same date, in October 22nd, 2014, we reached agreement related to Colorado's augmentation pipeline to allow them to

deliver in 2015, get appropriate credit, and we -- the two states committed to some very specific work tasks for this year to address concerns with their augmentation pipeline and, particularly, concerns on the South Fork. And in November, the following month, we reached a third resolution -- passed a third resolution related to Nebraska's planned augmentation deliveries, compliance activities for 2015 and how they would be credited. And, again, how Kansas could make effective use of that -- the water supply that was provided. Finally, on March 6th of this year, we did an addendum to that resolution to allow Nebraska to make deliveries late this year should that be necessary and, again, how that would be accounted.

So -- and we'll be talking about another resolution for the 2016. We're starting to get ahead of the curve, in terms of these agreements. These agreements are very important. These are important matters. They've -- they're giving us the opportunity to gain some experience that, I think, has been very helpful and necessary, and to continue discussions to reach long-term resolution of these matters. So, we've been working aggressively with Colorado in our discussions with them to fulfill the, you know, the requirements of the October 22nd resolution so we can continue to make progress with them on their issues as -- and our issues as well. So, I appreciate the work of all

three states and the commitment to deal with these important matters and look forward to continuing.

With that, I'll conclude my remarks.

CHAIRPERSON FASSETT: Great. Thank you, Commissioner Barfield. Appreciate that. Some of that background is very helpful for me personally. So thank you.

Commissioner Wolfe, Colorado.

COMMISSIONER WOLFE: Thank you, Chairman. Yeah.

Appreciate, Commissioner Barfield, in your report, highlighting, certainly, a lot of the efforts undertaken -- that we've undertaken as a Commission this past year. I think that's -- exemplifies kind of the spirit in which we've been trying to work under this last year and what we hope to continue and try to solve these things in a cooperative manner instead of through litigation. So, I appreciate those remarks. And, also, certainly, we couldn't do all that without our staff that support us in what we do. So, I want to take this opportunity to thank our staff, certainly those that are here today that I recognized, but there's a lot of other folks behind the scenes that help make this happen. And we know that that is even beyond this; we've got to work with our federal agencies, as well, in these efforts, and the other water users and stakeholders in all three states. So, we appreciate their cooperation as they're patient with us as we work through these resolutions

that you'll hear more about today and throughout the year.

And, again, I'd just like to highlight and echo Commissioner Barfield's remarks in regards to our discussions this week, particularly yesterday, as we continue to work through trying to look at, potentially, longer-term agreements in regards to our Compact compliance efforts. Appreciate the cooperation in both states, particularly Kansas, though, as we work through towards November 1st, based on the October resolution that you had mentioned. That we're working on an action plan, how we're going to address the issues surrounding the South Fork. And so, we're -- I thought we had productive discussions yesterday on that and hope that we will, by November 1st, get that plan in place, so that the way our agreement and resolution was structured from last October is, if we come to an agreement on that, effectively, it's an automatic approval for operation of the CCP for 2016 under the same terms and conditions that we've operated under this past year.

I'd like to just also highlight some of Colorado's continued commitment to Compact compliance. We continue with a lot of the similar programs that other states are doing in terms of conservation measures and trying to preserve the aquifer and reduce depletions, particularly associated with well-pumping in Colorado. That's our

primary use. We have some limited surface water irrigation that goes on, but the district continues to do buy-outs of surface water rights and groundwater rights through various programs, the CREP and other fallowing programs that the district avails itself to in the basin.

One recent effort that the district is -- was successful in getting some additional funding is in regards to the Ogallala Aquifer Initiative. The -- they received approximately $1 million from NRCS, from that funding for this year. In addition, the district is adding $510,000, and those funds will be used to permanently take out of production 510 acres of groundwater irrigation. So that, again, is complementing the other CREP and EQIP programs that have been underway for a number of years in the basin.

We've had a little bit of, I guess, lesser activity in regards to the CREP program, principally due -- I was talking to Dennis Coryell about this this morning -- that, because we've made a request to the FSA to increase that rental rate on that, I think some of the users are waiting to see what the FSA's decision is on that. Because, if they do increase that, certainly that'll provide a greater incentive for those folks after that increase, if they do act on that. So, we're awaiting that. We understand that the FSA is under a -- kind of a nationwide review of the CREP program. And so, there is some delay in

getting action on our request, but we hope that that is soon to come.

As far as our Compact compliance, the pipeline, operations of that, starting January 1 through April, we produced 6,970 acre feet pursuant to our agreement that we signed last October. According to our agreement, we will make another projection of September 1 on what we anticipate the remainder of production will be throughout the rest of the calendar year. We anticipate at this point that, probably, production from the pipeline will start back up in October, but we will provide that projection, working with the district and their consultant, along with Willem Schreüder and our staff, on making that projection.

Also, we've -- part of these overall efforts for Compact compliance, as I mentioned at the last meeting, our efforts in regards to amending our well-measurement rules. That hearing is now set for September 10th in Burlington.

Is that correct?

(No response.)

I think is where it's located. However, we have reached agreement with all the objectors who filed in that, so it should be a pretty straightforward hearing, we hope. And that really was to -- one of the primary reasons was to include additional wells, particularly in the southern part of the basin, that hadn't been included in the original

measurement rules that we adopted back in 2008. So, that's been going pretty smoothly, now that we've worked through all of the objections, and our staff and Scott Steinbrecher have been taking the lead on those efforts.

Also, the Water Preservation Partnership that's been established in the basin, the district and all our groundwater management districts are -- have been actively working on efforts similar to what Kansas Commissioner Barfield reported and some of the programs and trying to look at conservation measures within the basin. Everything from taking end guns off to, you know, water deficit irrigation, those type of things. So, they've been actively working on that and seeking funding for various feasibility studies and actionable items on that.

And, lastly, just to follow up after Commissioner Barfield reminded me when he was talking about Kansas' efforts on their water plan, Colorado's been embarked on an active effort in terms of their, really, first water plan developed by Colorado. This has been led by the Water Conservation Board, which is a sister agency of ours in the Department of Natural Resources in Colorado. But that plan is close to being finalized. They are accepting final comments on the draft that are due by September 17th, and then a final report will be submitted to Governor Hickenlooper in December of this year. So, that's been a

huge effort, but, again, trying to address Colorado's water needs and what we identified as gaps in meeting those needs 40, 50 years into the future.

So, with that, Mr. Chairman, that's my report, unless there's any questions.

CHAIRPERSON FASSETT: Great. Thank you.

Any questions for Dick?

COMMISSIONER BARFIELD: No, no questions. I just affirm that November 1 deadline that, you know, we're -- we've expressed to Colorado our commitment to get there, and I believe we will. So --

COMMISSIONER WOLFE: Thank you.

CHAIRPERSON FASSETT: Good. Very good.

On behalf of Nebraska, I've got a report here that builds upon some of the past work, obviously, that I'm not as familiar with. But let me just start off by, certainly, indicating that we are in compliance with the Compact as well; that that's an important action on our behalf. And I think, more importantly, I think the tone that I've heard from you and, really, in the three weeks that I've been here in this position, I think, of watching these states really work together as hard as you have, as we did this week on a number of these complex issues, I appreciate, not only the work of my staff in helping me get up to speed, but the input from the other states has been very useful. But I

think the tone that I've heard today from your reports and -- is one that we're certainly committed to. The collaboration, the opportunities of us working together for the benefit of all the water users in all three of our states, I think, is ultimately the goal. And compliance is important, but we need to be helping the users in these states.

Our compliance work this year has afforded Kansas water users their full access to the Kansas allocations. This has been accomplished primarily through the implementation of the -- I think it's the second or third generation of the integrated water plans that we've been working on for a number of years here in the State of Nebraska, working closely with the natural resource districts and the other water users in this basin and elsewhere. We really have appreciated the commitments from the natural resource districts, through their efforts to assist the State in compliance and, of course, the substantial investments that they've made to develop the projects that we've reported on to this group over the years.

The augmentation project in the Rock Creek Basin continues to comply and provide supplemental aug water. The last couple of years, the NCORPE project also is making contributions through the Medicine Creek drainage. That

operation began in '14 and continued through '15 as well. So, those projects, along with other programs, that Nebraska has implemented with either temporary or permanent water right irrigated land retirements or short-term leases, I think, are all the package of activities that we're going to continue to focus on with the districts and the other key water users throughout the basin.

Some of you have commented on our partnerships with the federal agencies. We certainly are going to continue to work with the Bureau of Reclamation through the WaterSMART Basin Studies Program, begin to work with some of the tools that are developed through those activities. Those are important. The partnership, while strained at times perhaps, I think is really important to us, and working with our federal partners together with the states is really an important aspect of what we do. So, those partnerships, working with our local water users, and the districts, and the federal agencies, is really part of the comprehensive strategy that we hope to implement for the long term. That's the only way, in my view, although new to the area, that many of these difficult issues are going to get sort of resolved.

I think you heard a report last year from Nebraska about the new Water Sustainability Fund that was passed in 2014. The process of getting that new funding program up

and running is ongoing. The effort is being led by the State's Natural Resource Commission with sort of companion involvement by our Department as well. They are close to finalizing the governance of this new fund; the application process, the rules and regulations, all the things that our legislature authorized in '14 is sort of slowly coming together. We hope to have final rules by the -- for the end of the year and begin accepting applications for projects all across the state early next year. So, we'll hopefully have some additional reports of some ongoing new projects that are going to be helpful across the state and that will certainly include this basin.

I think you heard a report from us in the past that that same legislation authorized a new Republican River Basin planning process. In addition to the integrated water management plans and the cooperative works -- excuse me -- the cooperative activities between the Department and the natural resource districts, there's now a basinwide process that is just getting started. We've had two to three broad stakeholder meetings. We have active participation now from 50 to 60 people. I was able to attend my first meeting just a week or so after I arrived. And, again, sort of a broader perspective wrestling the same issues that have been handled on an individual basis through the planning processes that we have. But we're generating some good dialogue, I think,

and, if you will, within the state of Nebraska that's really critical to help us continue to move forward.

Several of you have commented on the past and the resolutions we'll be considering later today. I have certainly learned a lot about all of that in the last couple of days working with you. I'm certainly hopeful that these resolutions will continue the pattern that we're now on. Perhaps I'm the lucky one of the group, showing up after the conclusion of the litigation, as David noted, back in February. There's still a lot of work for all of us to do. Certainly, I'm learning a lot about what we need to do, and I've learned a lot about what you are all doing. But I think the past work and the current set of resolutions, while complicated, still somewhat controversial, they are moving the ball forward, and that is important to the state of Nebraska. So, we do appreciate the collaboration and cooperation of working through these matters in a real -- in a positive manner. We've all learned the hard way. I've learned the hard way in my past experience with similar interstate disputes that I've been a part of that those are less than satisfactory processes. So, I think the work that we're doing now is really the better path for all of us, and I believe it will be ultimately a better path for the water users that we all represent. Those are the -- that's the bottom line, in our view. Compliance is a goal. We don't

want to be out of compliance. But we've really got to be helping the water users, and I think that's what we believe these resolutions and all the work that we're working on now really are pointing to.

So, I think, with that, I'll close my comments. Maybe, if you give me the privilege, I'll ask if my deputy, Mr. Schneider, maybe, has any other thoughts that you might want to add for our report that I may have overlooked or --

MR. SCHNEIDER: No, I think that was very well said.

CHAIRPERSON FASSETT: Okay. All right. Very good.

MR. SCHNEIDER: Jesse has the water administration report.

CHAIRPERSON FASSETT: He does.

MR. SCHNEIDER: Yeah.

MR. BRADLEY: Okay. Yeah, I'll just, you know, 2014 saw a fairly high level of activity with regard to water administration in the Republican River Basin. You know, I'll just kind of go through the report and note some of the highlights, if you will, within the report. I would like to say though that a full copy of the report of water administration activities for the Republican River Basin in Nebraska for calendar year 2014 was provided with the annual data exchange on April 15th.

2014, it started out with the Department issuing letters to all of the users in the basin, storage and natural flow permit holders. Those were based on our Compact call year order, which came out of our forecast, which was completed on December 31st, 2013. So, everyone in the basin got those on January 1st. On January 31st, the Department issued an additional closing notice to the Bureau of Reclamation that notified them that Harlan County Reservoir was closed, but storage could retain inflows for the sole purpose of delivering those to Kansas Bostwick Irrigation District. Throughout the spring, we issued a number of additional mailings and notices to water users in the basin as we sought to finalize our water-use data through the spring. Those were in a variety of mailings.

Fast forwarding to early summer, on June 27th, we were able to open up 21 natural flow permits for irrigation. Those went out with opening and regulating notices on June 27th. Then, about a week later, on July 2nd, we were able to open up an additional 409 irrigation permits in the basin, notifying that they were open under their conditions of their permit. Starting on July 8th then, there were some additional closing notices that went out through the month of July, about a hundred of them that went out, and those were largely for protection of senior rights in the basin based on priority calls.

Again, kind of fast forwarding then into the fall, you know, we talked about the resolution that occurred on October 22nd amongst the three states. That really was a big step for us in terms of what we could do under our water administration as well. And so, subsequent to that resolution, on October 23rd, we issued opening notices to 165 irrigators in the basin and an additional 87 storage permits in the basin that allowed them to open and use their permits.

Wrapped up the year on December 8th by mailing out our water use reports to all of the irrigation users in the basin. And then, subsequently, have collected that data and provided it through the data exchange.

That's really all I have in terms of the high points, I guess, of the report. I would like to, however, express appreciation to the Cambridge Field Office. They're the ones who do all the heavy lifting, in terms of carrying out this water administration activity and getting all those notices out. And it's no small task, I know.

With that, any questions?

(No response.)

CHAIRPERSON FASSETT: All right, Jesse. Thank you very much. Appreciate that.

Anything else in the reports from the states?

(No response.)

All right. Let's move ahead to Agenda Item 5, federal reports. I'll first call upon the Bureau of Reclamation.

Mr. Thompson, can you come up here, Aaron? It helps with the microphone for our court reporter, as well as everybody, to hear.

MR. THOMPSON: Good morning. I'm Aaron Thompson, Area Manager for the Nebraska-Kansas Area Office, located in McCook, Nebraska. We operate and maintain seven reservoirs in the Republican River Basin located in all three states. This year, like many before, Reclamation has prepared a summary report of our operations in the Republican River Basin. I believe each commissioner has been handed a copy, and we've put a few additional copies at the table just outside the back of the room. The report represents a complete summary for 2014 and a summary through the end of July for 2015.

Rather than go through the report line by line, I'll just hit a few of the highlights, as Jesse did just a minute ago. Water short year administration was in effect for both 2014 and 2015. In 2014, Kansas Bostwick Irrigation District, again, entered into a temporary Warren Act contract to store up to 30,000 acre feet of non-project water, which was later amended to store up to 60,000 acre feet of non-project water. Amendment No. 2 then extended

the term of the contract to December 31st, 2015. This allowed the Kansas Bostwick Irrigation District the flexibility to use the non-project water during the irrigation season when it was most needed.

Just a brief update on the Republican River Basin Study through the WaterSMART Program. A recent draft report has been circulated for review. We are currently reviewing and incorporating comments with an expected final report that's scheduled to be completed by November of 2015.

And the last thing I'll mention is I recently held our sixth negotiation session with the State of Colorado's -- State of Colorado Department of Wildlife and Parks. During that negotiation session, we agreed that we've reached agreement on our contract dispute between the two -- between Reclamation and the State, and we're hopeful to have that new contract in place prior to the end of this calendar year.

So, it's a short summary, but any questions?

CHAIRPERSON FASSETT: Any questions for Mr. Thompson?

MR. BRADLEY: Just on the basin study plan, I know that a lot of people have been interested. Is that something that the Bureau of Reclamation will end up then putting on their website? As being posted, that final report?

MR. THOMPSON: I don't know if we'll -- where we plan to store it, but I -- we can definitely make it available on our website, if that would be a preferred location.

MR. BRADLEY: Yeah. I was just curious. I know there's been a lot of interest from stakeholders.

MR. THOMPSON: Yeah. I think that's something we'll definitely do now.

CHAIRPERSON FASSETT: Yeah, that's a great suggestion. That's such an easy way for a broader public to look at the report.

MR. THOMPSON: Yep.

CHAIRPERSON FASSETT: Yes, Mr. Wolfe.

COMMISSIONER WOLFE: I wanted to thank Aaron again this year for all of your help and, particularly, your staff too, in operations out at Bonny Reservoir working with our staff. We greatly appreciate the cooperation there as we continue to manage those activities there at the dam. So, thank you.

MR. THOMPSON: Yeah, thanks, Dick. And same to your staff as well out there.

CHAIRPERSON FASSETT: All right. Thank you very much.

MR. THOMPSON: Thank you, Chairman.

CHAIRPERSON FASSETT: Appreciate it.

Next, we'll hear from the Corps of Engineers. Mr. Stark?

MR. STARK: Good morning. I'm Ken Stark. I'm the Project Manager for the Tainter Gate Repair Project at Harlan County.

(Pause in proceedings due to technical difficulties.)

MR. SCHNEIDER: Were you going to do a PowerPoint too?

MR. LAMBRECHT: I don't have a PowerPoint. Do you want USGS to step up and --

MR. SCHNEIDER: Sure.

MR. LAMBRECHT: -- just talk?

COMMISSIONER WOLFE: Yeah.

CHAIRPERSON FASSETT: Yeah, let's do that. Thank you for your flexibility. While we're resolving those issues, why don't we have our report from the U.S. Geological Survey? So, Jason?

MR. LAMBRECHT: You betcha. I'm Jason Lambrecht. I'm with the U.S. Geological Survey, the Nebraska Water Science Center, here in Lincoln, Nebraska. Oh, the USGS is -- for the Compact -- operates 15 stream gauges, and, annually, we provide a report of the information. Generally, we just provide an annual mean discharge for each of those sites. And, typically, we have a PowerPoint.

Thank God, I don't today. This isn't the day for it.

So, sorry, Corps.

(Laughter.)

The USGS operates 13 of these 15 gauges, actually. The Nebraska DNR operates two of the stream gauges. They provide the record to us for approval of the record. I'm just going through some highlights. I have a handout that was on the table, and everybody at the table has it, but I'm just going to touch on some highlights, because it's very dry stuff, actually.

The records from these stream gauges -- well, the operation of these stream gauges has been anywhere from 53 to 81 years, and so a really long-term system. Ten of these stream gauges are solely funded by the National Streamflow Information Program, and that's money allocated directly to the U.S. Geological Survey to operate stream gauges. Three of these gauges are funded by a combination of this NSIP, that I just spoke of, and other agencies, the Army Corps, the Nebraska DNR, and, also, the U.S. Bureau of Rec. Then, in regards to the -- then, the last -- the two DNR gauges there, they provide data to us. Those gauges are -- well, the records work is funded by the Nebraska DNR, but, also, by the Army Corps and through this NSIP program again. The USGS reviews and provides the records, and they're available in our annual reports. And, in addition, we also maintain

DCPs at these stream gauges, these two stream gauges that I mentioned.

On the handout that I have around, I was just going to give a few of the highlights from that. There's a summary table on the first page of that thing. And it's a -- just tapping on that, that's where most of the meat of it all is at. But, in addition, there's also a graphic display for each of the stream gauges showing information about the water year 2014 mean discharge for each site. Now, bear in mind, this is water year 2014 data that I'm providing. That's from October 1 of '13 until September 30th of 2014. Of note from water year 2014, that nine of these 15 stream gauges were -- they were within the top 10 for the lowest mean discharge on record, meaning, of course, that 2014 was another one of those dry years following that 2012 drought, and it just persisted into '14. Been a nice summer so far, though.

Rock Creek at Parks had a mean discharge of 32.1 cubic feet per second, which was actually 261 percent higher than the long-term mean discharge of 12.3 cubic feet per second. That's after 74 years of record.

The South Fork Republican River near Benkelman had a zero mean discharge, zero cubic feet per second, for water year 2014. In 77 years of record, that's only happened, actually, five times, and they were all since 2004.

The Cortland Canal had the 16th highest mean discharge, at 91 cubic feet per second, on record in 60 years. Sixteenth out of 60 years might not sound interesting, but that's still 120 percent above the long-term mean.

Of note for 2015, moving into this current year, thanks to a bump in the NSIP funding, that National Streamflow Information Program funding from Congress, the USGS was able to assume operation at three of the Nebraska DNR stream gauges in the Republican Basin so that they could allocate funds elsewhere. Those gauges were the Beaver Creek near Beaver City, Republican River at Benkelman, and the Republican River at Guide Rock. It's assumed that these three gauges should be included in future USGS reports for the Committee. So, we'll probably do so.

After several years of -- is it several years of augmentation on Rock Creek? I don't know. There's been a couple. I lose track. But, it looks like, in January, that the flows dropped from what we were seeing from 20 to 35 cfs at Rock Creek down to about -- an average of about four to six cfs again at that site.

As far as records work for water year 2015, I know that David Kracman was looking for information, and we weren't able to provide finalized stuff yet for water year 2015, but the -- so far, the records have all been worked

through May of 2015 for the Republican Basin. But, due to recent personnel shortages, we're -- we haven't been able to approve those yet. So, they are approved, generally, up to about November of 2014.

And that pretty much concludes my highlights. And, now, the cool stuff from USGS, if there's any questions?

(No response.)

It's cool.

CHAIRPERSON FASSETT: Any questions for Jason?

(No response.)

Very good. Thank you very much.

MR. LAMBRECHT: You're welcome.

CHAIRPERSON FASSETT: We appreciate your report.

Ken, we're up and running.

MR. STARK: Right.

CHAIRPERSON FASSETT: Thank you for your patience.

We'll now go back to the Corps of Engineers.

Thank you, Jesse.

MR. STARK: Alrighty.

MR. SCHNEIDER: Other duties, as assigned.

(Laughter.)

MR. BRADLEY: That's right.

MR. STARK: Appreciate that.

This morning, we'll talk a little bit about the

dam, the features out there that we're working with, the repairs that we're trying to do, and then where we're at on the construction status -- the repair status.

Harlan County, I frequently get it from the folks down in Kansas City, "Hey, where is Harlan County?" I always tell them, "Just go out I-70, get to Hays, head north to the state line." So, we're in that mid frame here. Next slide will kind of zoom in here. And what I want to point out here, the dam itself is about two miles, 12,000 feet approximately. The spillway right in the middle of the dam, that's about 856 feet of concrete. And that's where tainter gates or spillway gates are. We have 18. And you notice the dam's already pretty steep. The spillway and the concrete portion is much steeper. The challenges we face at Harlan County is we've got water upstream and downstream. We've replaced the -- repaired the spillway gates at Tuttle Creek, but we could just simply drive up. There was concrete -- dry concrete on the upstream side, dry concrete on the downstream side. You could just take a cherry picker up there and start working on your gates. Can't do that at Harlan County, so that makes it more difficult.

Next slide. Harlan County Dam, built back in the 1940s. Over 60 years old. It does not have -- did not have a way to de-water those gates. So, the normal level, the typical level, that should be at Harlan County is 1945.73.

That's kind of where that dark line is on those gates. This week, it is about 13 feet below that. The record low is 20 feet. And then, back in 1960, the record high was 10 feet above the normal pool. So, quite a range. But, typically, below.

Harlan County Dam, our big repair effort is the spillway gates, but we're really working on all the water features. The sluice gates, there's nine sluiceways. We're engineers. We've got some redundancy there. So, each sluiceway has two gates. There's two irrigation canals: The Franklin, which is a five-and-a-half foot diameter conduit; and the Naponee, which is a two-foot, 10-inch diameter conduit. Those are the methods of getting water through Harlan County.

The tainter gates, the spillway gates, they're basically just radial gates, curved gates, on that middle portion of the dam. That's where the major repairs are, the major expense. Designed back in the 1940s with no friction in those bearings, so that pivot point, the original designers assumed that would be nice and smooth. There is tons of friction in those bearings. Essentially, the gates -- the brakes that we have out there, we're not even using, because there's so much friction, you don't need brakes. They just -- it's very rough. It's very hard to get those gates up.

Construction status, our first phase, we talked about normal pool being up on the gates. There was no de-watering. Our first phase, we started with stoplogs. Went under contract back in September of '13, and in March of '15, we took into service three sets of eight stoplogs. So, those stoplogs are individual, kind of like I-beams. They're H sections. They just go into the slots. And if you look closely at the photo, you'll see more slots there. So, there's guide beams and support beams. We have support beams and guide beams for six bays. So, they can simply take those stoplogs and move them back and just continue hopping as they make the repairs to the spillway.

Currently working on bay one through four on those tainter gates, radial gates. The first three have been blasted. They blast all the paint off. The paint's actually -- go back to the 1940s, it's got lead. And so, there's a containment center. There's a lot of effort to get that paint off. After the paint's off, they can inspect the welds. They'll inspect them, determine which welds need to be repaired. Those first three bays, they've done those weld repairs.

Essentially, we're going to also do a lot on restricting on those arms. They'll be replacing the bearings. So, essentially, we'll get as close as we can to having minimal friction and just being able to operate those

gates. The controls to those gates, original 1940s controls, many of them have failed. When we have done our annual exercises, we have redundancy. We'll take controls, and sometimes we can't even get the backup to the backup to work. They're just that bad. So, once we've replaced -- conducted the repairs, it'll be all-new controls. We'll have confidence that we'll be able to get those gates up when we need them up.

This is just it's in- -- version, where you can see that the actual gate has been blasted. That's bay number two. Bay number four has that containment unit on it. They're getting ready to blast that. They've also blasted -- we have a bulkhead. And down below the dam, there's nine sluiceways that are used for normal flows. That single bulkhead will be placed, and then they can pull those sluice gates out of the interior of the dam. And that will be going sluiceway by sluiceway. But the first step to that phase is getting that bulkhead ready. It's been blasted. They're going to inspect it and make any repairs, and then they can use it.

We're also in the process of placing -- getting new irrigation stoplogs, so that we can eventually inspect the gates and make necessary repairs. The gate -- irrigation gate work and the repairs to the irrigation lines are not under contract yet, but we're gearing up for that

effort.

So, overall, we're working on all of the water management features at Harlan County Dam. Is there questions about current points or any of the water features?

(No response.)

Okay. Thank you for the opportunity for an update.

CHAIRPERSON FASSETT: Ken, I might just ask, what is the overall schedule for completing all of this work and the budgets and things?

MR. STARK: Overall, we awarded the large tainter gate repair contract last September. Looking to get that -- current completion date is the middle of '18. So, it's a three-and-a-half year contract. The irrigation gate repairs, we're hopeful we can just kind of tag that on, very small portion to this work. You know, less than one percent. Overall, dollar-wise, our total estimate from fiscal year '12 up to '18, we're looking at about 43 million. That's our current estimate of everything, even the work that's not under contract. And there's some give or take there. There's some contingency dollars. You know, so far, I think the team has done well at keeping the cost down. We've actually sent back money that we -- the bids have come down lower than we thought on those gates, and so, this year, we were able to send back close to four, four-

and-a-half million. So, -- but the overall cost, we're looking at 43. There's definitely -- it depends on how the next bids come in, what problems we run into the next few years. So, it -- definitely some give or take there.

Any other questions on schedule or dollars?

(No response.)

Okay. Thank you.

CHAIRPERSON FASSETT: Thank you very much.

MR. BRADLEY: And anybody that's interested, this is available on our website if you want to have access to his presentation.

CHAIRPERSON FASSETT: That completes our federal reports for the meeting. Let's move on to Agenda Item No. 6, report of our Engineering Committee. I'll ask Mr. Schneider to give the report of the committee.

MR. SCHNEIDER: Thank you.

The Commissioners have the final Engineering Committee report, along with a CD that contains all of the attachments. I'll just go through the Executive Summary.

The Engineering Committee met four times since last August's Republican River Compact Administration Annual Meeting. We completed two assignments: One, being holding quarterly meetings; and, two, exchanging information listed in Section 5 of the Accounting Procedures and Reporting Requirements, including all required data and documentation.

Four assignments from last year that we recommend be ongoing are: To continue efforts to resolve concerns related to varying methods of estimating ground and surface water recharge and return flows and related issues. Two, to continue working on finalizing accounting for 2006 through '14. And, actually, we modified that to be '05 to '14 in the assignment. Working to resolve issues preventing agreement on final accounting for those -- that time period of 2006 or 2014. There are -- the committee identified three issues in our report last year that we needed to resolve. We did resolve one of those, and we're continuing to work on the other two. And the fourth ongoing assignment, discussing any accounting changes that may be needed for surface water diversions for the purpose of recharging groundwater.

There are a couple of additional assignments that we added to the list that you'll see, and there are a couple of assignments that we received last year that we did not complete, and we are not recommending those for assignment for this year.

To conclude, the Engineering Committee recommends discussion by the RRCA on the exchange of data and documentation and the modeling runs completed by Principia Mathematica for 2014, discussion of Nebraska's proposal to revise the RRCA accounting procedures and reporting

requirements and RRCA rules and regulations documents, and the recommended Engineering Committee assignments for the following year.

With that, I will be glad to answer any questions.

COMMISSIONER BARFIELD: No questions from Kansas. You know, we'll act on the report and the assignments later in the agenda.

MR. SCHNEIDER: Absolutely.

COMMISSIONER WOLFE: Thank you for your efforts again this year. We greatly appreciate the Engineering Committee's work.

MR. SCHNEIDER: Yep. It was, again, I think, a very good year in terms of getting things done.

CHAIRPERSON FASSETT: Okay. Moving along, Item No. 7, under old business. We do have just a couple of items here on the agenda that we approved, status of unapproved previous accounting.

Maybe, Jim, do you want to just sort of quickly touch on that issue and --

MR. SCHNEIDER: Certainly. In terms of unapproved accounting, we have the accounting for 2006 through 2014 that the Engineering Committee is still working on. I think we made great strides in that effort in terms of identifying all the final data. You know, through the period of the litigation, there was not a uniform set of data being

maintained within the Engineering Committee. Each state kind of had their own data, sometimes several versions of it, that was being used. So -- and, actually, Willem Schreüder assisted the Engineering Committee greatly in putting together a single set, and that's nearly finalized. So, at a minimum, I anticipate next year we'll have all of the final input data ready, and then it will just be a matter of whether or not we work through those issues that are preventing approval of the final accounting.

So, with that, are there any questions?

COMMISSIONER BARFIELD: No. No questions.

COMMISSIONER WOLFE: (Shakes head in the negative.)

CHAIRPERSON FASSETT: The new guy's dying to ask, but I'll pass.

(Laughter.)

Sometimes it's not helpful to talk about history.

(Laughter.)

COMMISSIONER WOLFE: We can't change it.

CHAIRPERSON FASSETT: I was interested in that whole topic, going back so far. So, anyway, no. I appreciate that. I know there's been an awful lot of work put into these things, and I suspect we're all greatly looking forward to the point where all of those past accounting things can be behind us. So, I'm glad, like --

as you said, Commissioner Wolfe, appreciative of the Engineering Committee's work to really grind through really the minutia that is ultimately very important for all of us. So, we do appreciate that.

COMMISSIONER BARFIELD: And as Jim has said, even though we have -- we're not ready to approve those yet, we are making progress toward the goal.

CHAIRPERSON FASSETT: Okay. Very good. The next item under old business was to approve the annual report from '13.

Commissioner Barfield, did you want to comment on that?

COMMISSIONER BARFIELD: Yes. We did prepare an annual report. We had four special meetings that year, plus the annual meeting. Each of those has transcripts the states have approved. We prepared summaries for each special meeting and the annual meeting that were drafted and distributed and approved by each state. We compiled all of that. It's a record of over 800 pages this year. It smashes the old record of 535 pages and, hopefully, will never be repeated again. I think we're in agreement. We distributed the report on some CDs. I think there may be a couple of changes we need to note for the record.

Is that true?

MR. SCHNEIDER: I think it was just a couple of

duplicate pages that they sorted out.

COMMISSIONER BARFIELD: All right. So, anyway, I think, with that, I would move that we approve the annual report that was distributed minus the duplicate pages that were found.

COMMISSIONER WOLFE: Second.

CHAIRPERSON FASSETT: Motion and second to approve the 2013 Annual Report with some very minor modifications. All in favor, signify by saying aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON FASSETT: Any opposed?

(No response.)

Very good. Thank you. Yeah, I hope a record number of pages is not the goal.

(Laughter.)

I have to admit, I didn't -- I only got through 800. I didn't get to 830 in my own review of that report.

(Laughter.)

Okay. Very good. Thank you. Let's move on. Agenda Item 8, new business. We got the first action here under Item, sub, (a), is action on the Engineering Committee reports. Commissioners, is there some direction or motion you want or need in that regard?

COMMISSIONER WOLFE: Mr. Chairman, I move that we

approve the Engineering Committee report and the associated assignments for the upcoming year.

COMMISSIONER BARFIELD: I would second.

CHAIRPERSON FASSETT: Motion and second. Any discussion?

(No response.)

All in favor, signify by saying aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON FASSETT: Any opposed?

(No response.)

Very good. Go forth, Engineering Committee.

(Laughter.)

Item (b), this is a resolution approving the updated accounting procedures that we've been working on collectively here for a while. I'll call on Mr. Schneider to give a quick update regarding that resolution that's pending before us.

MR. SCHNEIDER: Certainly. This resolution would approve, essentially, two changes to the accounting procedures. The first change would implement the Court's ruling regarding the matter of consumption of imported water by Nebraska. And the second is a change to Table -- Attachment 7 of the accounting procedures, that now utilizes a column that was formerly un-utilized, which is the data on

wasteway spills and some associated changes in the computations within that table so that those spills are recognized and properly accounted for.

Any questions on that resolution?

COMMISSIONER BARFIELD: No questions. We discussed this at length in our work session yesterday. I think we're all in agreement. We're ready to move forward with it.

CHAIRPERSON FASSETT: Commissioner Wolfe?

COMMISSIONER WOLFE: Mr. Chairman, I move adoption of the referred-to resolution that Mr. Schneider has just introduced before us.

COMMISSIONER BARFIELD: I would second.

CHAIRPERSON FASSETT: A motion and a second to approve the resolution associated with the updated version of our accounting procedures and the new attachment. Any further discussion?

(No response.)

All in favor signify by saying aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON FASSETT: Very good. Motion passes.

The issue for our consideration under Sub-item (c) is not really a resolution, as Commissioner Wolfe pointed out, but really the suggestion and the drafting of some

revised -- excuse me -- some minor revisions to our rules of the RRCA to deal with this matter of accounting. Again, I'll ask Mr. Schneider to maybe comment briefly on what's before us.

MR. SCHNEIDER: Sure. The rules and regulations specifically point to accounting procedures that are to be utilized by the Compact Administration, so with the update of the accounting procedures, we need to update the rules and regulations to reflect that. And we almost have three commissioners with the middle initial W, but Dick's had been put in there inadvertently. He doesn't have a middle name, I think.

COMMISSIONER WOLFE: My last name starts with a W. That's --

MR. SCHNEIDER: So, one minor typographic correction as well.

CHAIRPERSON FASSETT: Very well. Any questions about the rule changes? We're now updating ourselves to, I think, there was some suggestions and discussion at our meetings about maintaining dates so that we can keep track of the right versions of all these various changes over time. This will now be the August 27th, 2015, version of our accounting procedures. So, any other comments or questions?

Yes, Commissioner Wolfe.

COMMISSIONER WOLFE: Yes, thank you, Mr. Chairman. I think, as we had discussed yesterday in the work session, just for the record, wanted to highlight in regards to paragraph 14, where it refers to the Groundwater Model, Version 12(S)(2). That particular version is being used through accounting year 2011 for that purpose, and, as Mr. Schreüder had indicated to us -- Dr. Schreüder -- that we are now into Version 13 that will potentially be used for water years -- or calendar years 2012 and onward. But just wanted to reflect that we'll probably have to be making some future amendments to this to reflect as we evolve into that next version of the model. So, I just wanted to get that on the record, so in case there's any question as we move forward on what version that accounting -- what model version that'll utilize.

CHAIRPERSON FASSETT: Okay. Very good. Yeah, I thought we had some good discussion about that issue.

COMMISSIONER WOLFE: I was also just informed that there's -- that that may be Version 12(S)(3), instead of 12(S)(2). I guess I just want to make sure --

MR. STEINBRECHER: No, instead of 13 -- the new model.

COMMISSIONER WOLFE: I'm sorry. Instead of Version 13, it's 12(S)(3) as for 2012 onward.

CHAIRPERSON FASSETT: Oh, okay.

COMMISSIONER WOLFE: I misspoke in terms of the version number, so --

CHAIRPERSON FASSETT: But, for our purposes today, what's here in the modification to the rules is correct?

COMMISSIONER WOLFE: Yes.

CHAIRPERSON FASSETT: Okay.

COMMISSIONER WOLFE: Thank you.

COMMISSIONER BARFIELD: So, with that, I would move that we adopt the rules and regulations, as revised, for August -- dated August 27th, 2015.

COMMISSIONER WOLFE: Second.

CHAIRPERSON FASSETT: Motion and a second to approve the rules, as revised through today, August 27th, 2015. All in favor, signify by saying aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON FASSETT: Any opposed?

(No response.)

Hearing none, they are approved.

COMMISSIONER BARFIELD: Mr. Chairman, I probably should have done this earlier. In the past, as we -- we basically assign exhibit numbers to each exhibit we're going to attach to the report. I wonder if we can just go through, for the purpose of the court reporter and I think the record, just, you know, establish which of these things

in front of us we're going to attach to the annual report and give them, you know, exhibit numbers or attachment numbers.

MR. SCHNEIDER: You mean for the transcript?

COMMISSIONER BARFIELD: Well, for the annual report, ultimately. I mean, for the transcript, but, ultimately, for the annual report as well. I think we've done that in each case.

CHAIRPERSON FASSETT: Yeah, I'm familiar of the past practices of how that's handled.

COMMISSIONER BARFIELD: Right. So, we could just go through right now and say the Bureau of Reclamation's I think was the first report that came before us, and that could be Attachment A to the transcript and, ultimately, to the report.

MR. SCHNEIDER: I mean, we can probably handle that as we type up the meeting --

COMMISSIONER BARFIELD: We could.

MR. SCHNEIDER: -- minutes and we'll -- and circulate that. We'll assign attachment variables to those and --

CHAIRPERSON FASSETT: Yeah, if you -- I think we'd like to have the discretion while we're putting the report together, if that's okay, instead of labeling things now. When you get that first package, you'll see the connections

that you're suggesting.

COMMISSIONER BARFIELD: Sure. Okay. We can do that.

CHAIRPERSON FASSETT: The next item, Sub-item (d), 8 (d), is a resolution honoring my predecessor, Brian Dunnigan, as the Director of the Department of Natural Resources and a member of this Commission. If -- I think it's appropriate, if you'll bear with me, I'd like to sort of read that resolution into the record on behalf of Nebraska.

Again, the resolution that we're circulating for action today is a resolution of the Republican River Compact Administration honoring Brian P. Dunnigan. "Whereas Brian Dunnigan of Lincoln, Nebraska, has resigned his position as Director of the Department of Natural Resources and, thus, the Nebraska Commissioner of the Republican River Compact Administration, after having served faithfully in that position for six years and served the people of Nebraska through his continued committed public service at the Department for 32 years; and, whereas, as the Nebraska Commissioner to the RRCA and the Director of the Nebraska DNR, Brian has diligently and considerately represented the Compact interest of the State of Nebraska and the residents of the Republican River Valley in Nebraska, utilizing science-based information and utilizing his genuine high

regard for water users; and, whereas, while consciously representing the State of Nebraska and its constituents, Brian exhibited professionalism, integrity, and provided leadership and guidance toward addressing the complexities of water administration and the Compact's compliance issues, continually reaching out to the States of Colorado and Kansas to compile the most accurate accounting possible of the waters of the Republican River, and to reach fair and reasonable solutions to many issues associated with the Republican River Compact; and, whereas, Brian carefully and successfully guided the Department of Natural Resources through major river management issues with his years as Director that he referred to as 'the highlight of my career'; and, whereas, with more than a hundred employees, DNR manages the state's rivers, reservoirs, and flood plains, along with the interstate water agreements; and, whereas, Brian consistently led the DNR in his straightforward and honest way, always listening carefully and thoughtfully to the various competing interests for Nebraska's water, as well as with our water partners in the surrounding states; whereas, former Governor Heineman, whose administration Brian served, considers Brian an outstanding Director and that, under his leadership, Natural Resources had many successes, most notably the spirit of cooperation that basin (sic) has supported -- has fostered with the

water users across our state and with our friends in the neighboring states; now, therefore, be it resolved that the Republican River Compact Administration does hereby express its sincere gratitude and appreciation to Brian P. Dunnigan for his dedicated service to the RRCA in his position of Nebraska Commissioner and others and extends its best wishes to Mr. Dunnigan for all his future endeavors. Be it further resolved that the RRCA honors Mr. Dunnigan's service by including this resolution and appropriate dedicatory remarks in their RRCA Annual Report of the Compact for 2014 and hereby instructs the Nebraska Commissioner to send copies of this resolution to the Dunnigan family and the Governor of the State of Nebraska."

I can tell you, as a personal note, I've had the pleasure of meeting all of the former Directors as I've engaged in my new position. I had lunch with Brian just last week. He was giving me some sympathies, as well as congratulations. But he did speak, as this resolution suggests, quite passionately about his service to the State, to the Department that I now have the pleasure of leading, but to the work of this group through some, obviously, very difficult times. But those truly were a good part, an important part, of his life, and he was more than honored to pass that along to me. So, with that, the -- I would request consideration of this resolution.

COMMISSIONER BARFIELD: I would have the pleasure of just moving the adoption of the resolution recognizing Mr. Dunnigan's achievements and his work with us on these important issues.

COMMISSIONER WOLFE: I second that motion.

CHAIRPERSON FASSETT: Motion and a second to approve the resolution honoring Mr. Dunnigan. All in favor, signify by saying aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON FASSETT: Aye.

Thank you very much.

Lastly, we have a resolution before us approving accounting adjustments and agreements related to the operations of Harlan County Lake. Again, I'd like to ask Mr. Schneider to sort of quickly touch on the background and in presenting this resolution for our consideration.

MR. SCHNEIDER: Sure. We discussed this at great length yesterday, both in the morning and also in the afternoon in the working session. And the states have worked out an agreement related to Compact compliance efforts by Nebraska through augmentation, pumping, as well as the methods of accounting for that water and ensuring its delivery to Kansas water users. It's fairly similar to the agreement that we reached kind of in combination in November

and, also, March previously for 2015. I think I would just like to note that I think we're all very glad of the fact that we were able to come to this agreement at a much earlier date so that we can go forward and tell our water users how things are going to be working this year. The one caveat I will mention is that it is contingent on successful execution of an amendment to the MOA between the Bostwick Irrigations Districts that will effectuate the way that this agreement seeks to allocate inflows to Harlan County Lake in 2016.

Any questions?

COMMISSIONER BARFIELD: No questions here. Again, as you said, we've worked through this. I think it's a good agreement. It's, as you said, very similar to previous. The big difference here is that it allows Nebraska to provide any augmentation deliveries needed in two parts, one, to provide a full supply for this year and the rest later in the year, which I think is a good move forward. Again, like you said, it requires an MOA. But, again, part of our moving forward, in terms of how to marry compliance activities with needs. And, again, we need another year to get to the long-term agreements and work all of that out, but this certainly moves us forward.

MR. SCHNEIDER: And, I'm sorry, I might add that we certainly look forward to working with the districts and

the Bureau on what's necessary to make sure this works out.

CHAIRPERSON FASSETT: Yeah. It is, as Mr. Schneider indicated, a one-year agreement. It sort of builds on our past experience. I think that momentum is important. There's still some complexities and some difficulties in the details of these things, but we think this is nudging things in the right direction. We do appreciate greatly the dialogue and the action here today. We think it is important to provide as early a notice about these matters for the water users. And so, doing it under this time frame we think is very, very beneficial. So, we appreciate your consideration and the work that goes into this.

Any other questions?

COMMISSIONER BARFIELD: No. I would move adoption of the resolution that we've mentioned here approving the accounting adjustments and agreements on the operation of Harlan for Compact year 2016.

COMMISSIONER WOLFE: Second.

CHAIRPERSON FASSETT: Motion and a second to approve the resolution associated with Harlan County Lake. All in favor, signify by saying aye.

COMMISSIONER WOLFE: Aye.

COMMISSIONER BARFIELD: Aye.

CHAIRPERSON FASSETT: Aye.

Motion carries. Thank you very much.

Then to Item 9, remarks from the public. Those that are with us today are free to come forward. I would ask you to come to the table and use the microphone. It helps with our court reporting accuracy and, also, so we can hear. But if there's anybody here today that would like to make some comments to the Commission, we'd appreciate it.

Brad.

MR. EDGERTON: My name is Brad Edgerton. I'm the Manager of Frenchman Cambridge Irrigation District, and we serve 45,600 acres in the Republican River Basin and have contracts with the Bureau of Reclamation to take storage water out of three reservoirs in the basin.

So, I'd like to thank the Compact Administration for the work they've done this last spring to allow Nebraska to open up our permits that were closed in January. That was very beneficial for the water users of Frenchman Cambridge. Based on those agreements that we had back then, we were able to allocate eight inches to Cambridge Canal and six inches to Meeker Canal. And the, also, we operated the Bartley Canal with whatever water was available in the river to make that available to whoever could use it. You know, we would have liked more time to plan on how to use that water, but it still served the district well to have those permits opened in March. So, we appreciate that.

I'd like to also point out one aspect that's important to the Board of Directors for Frenchman Cambridge Irrigation District that's in the IMP, and that's the pumping standard volumes or requirement to reduce pumping by 25 percent by 2015. And I'd like to ask this Administration to make sure that all aspects of the IMP are adhered to. You know, we're concerned about pumping above our federal reservoirs that provide water to our systems. So, we'd just ask that you'd be aware that it's important to us that those compliance standards are adhered to going forward.

And on behalf of the Board of Directors for Frenchman Cambridge Irrigation District, we look forward to working with you in the future to ensure that Nebraska is in compliance with the Compact. So, thank you.

CHAIRPERSON FASSETT: Thank you very much. Appreciate that.

MR. DELKA: My name is Mike Delka, and I'm the Manager of the Bostwick Irrigation District in Nebraska. I have not seen the resolution yet, so I don't know exactly how it fits into it, but I'm pretty sure that we're in the middle of it. But I would appreciate having more knowledge of it. I think to -- for my board, to make an informed decision, we would probably like to see some model runs to know the impacts, both with and without these augmentation programs. We'd like to see the augmentation programs try to

replace some of the depletions, not just to meet that minimum requirement of the Compact. And we'd like to see that be a benefit to all the surface water users.

Also, there's -- to us, there's -- if we're opening up the MOA with Kansas Bostwick, if the supply is not sufficient to support an ability to pay and repay the federal government, then that would also become a burden then to Kansas Bostwick.

So, I think there's a lot of work to be done in a very short period of time, and we would have appreciated probably having that -- a lot of that done prior to today, so that we were more aware of the volume of water being anticipated and the way that it's to be held away, if that's the case.

But we do appreciate the hard work that has gone into it, and we look forward to having a resolution, to get these issues resolved in a constructive manner. Thank you.

CHAIRPERSON FASSETT: Thank you. Appreciate your comments today.

MR. GILES: I'm Pete Giles, Assistant Superintendent, Kansas Bostwick. I'm going to kind of reiterate what's been spoke here today. But thanks to the continued efforts from the whole Compact Administration, and we look forward to, hopefully, getting a more long-term agreement. And, obviously, that'll take some work with

Nebraska Bostwick and amending our MOA, but we look forward to working with you folks and the Bureau and Nebraska Bostwick through that process.

CHAIRPERSON FASSETT: Good. Thank you.

MR. CORYELL: Yes. I'm Dennis Coryell, President of the Republican River Water Conservation District in Colorado. I'd like to kind of reiterate some of the things that Commissioner Wolfe said earlier. Our district's efforts toward Compact compliance and our fulfilling our obligations primarily lie in three areas. One would be in conservation. We have, over the last nine years, entered into contracts for conservation reserve enhancement program retirements. We've now -- we did a water enhancement program through NRCS. We've, most recently, done the Ogallala Aquifer Initiative. Last year, we applied for the RCPP, the Regional Conservation Partnership Program. We got down to the last step and did not make it, but we will be reapplying this year for that.

All of these programs would offer permanent retirements. That's where we're funding our money within the district. And I might add that all of our money is from local water users. The State of Colorado has chosen to put this in the hands of local water users to solve our Compact obligations, and we take that very seriously.

The second area that we've focused on is accuracy

of our meter-reading program and enforcement of our groundwater irrigation and large-capacity wells. The groundwater management districts, there are seven of them in our basin. Each one of those districts has worked closely with the commissioners for the Republican Basin in Colorado in enforcing those permits and the conditions on those. And we work closely with the Colorado Groundwater Commission, as well as the state engineer's staff, to coordinate that and achieve, not only intrastate, but interstate permits that we have for individuals.

The third area would be our Compact compliance pipeline, our augmentation program. This is the second year that we have operated it. Although it being a temporary agreement, RRWCD is committed to fulfilling Colorado's obligations on an annual basis and, eventually, our five-year running average.

But I do have a question for you, as Commissioners. Why not a permanent agreement? I want to point out a few things. We have, just this year, completed another $825,000 purchase of surface water within the basin. We've previously purchased over $3 million of surface water purchases. And these are all on the South Fork Basin, and we still have allocated $3 million for future purchases. We have retired nearly 32,000 acres of irrigation within our basin overall. And, gentlemen, that's not temporary

retirement. That's permanently retired. Of that 32,000, almost 20,000 acres of that is in the South Fork Basin alone. If you associate each large-capacity well as using 15 inches of allocation, or one-and-a-quarter acre feet, that's 25,000 acre feet per year since those acres were retired. Most of those were retired in 2007, so over nine years, we've retired and saved the basin nearly 225,000 acre feet of water that would previously have been consumed. And it was not merely for Compact compliance. Those efforts are to ensure the continued use of the Ogallala Aquifer and to help to sustain it. Altogether, our district has committed over $100 million by the time we pay out all of the obligations under those programs to reach Compact compliance and help to sustain the Ogallala Aquifer.

So, in closing, I just would urge you as three states that -- I commend you for your renewed spirit of cooperation, and I would just ask that, rather than putting a band-aid on it each year, give us a permanent agreement. Thank you.

CHAIRPERSON FASSETT: Very good. Thank you very much.

Any others like to comment to the Commission?

(No response.)

Very good. Appreciate that. Input is important.

Future meeting arrangements. If I understand the

sequencing, it's -- Nebraska's term is ending. And we work counterclockwise?

Is that correct, Commissioner Wolfe?

COMMISSIONER WOLFE: Yes.

CHAIRPERSON FASSETT: All right. So, you'll be assuming the chairmanship and the host for the next two years. Is that the practice of the Commission?

COMMISSIONER WOLFE: Yes. And maybe if I could, Mr. Chairman, just briefly comment on that? It will be our pleasure to host the RRCA annual meeting in Colorado the next couple of years, 2016 and 2017. We'll -- tentatively right now, we've identified August 24th and 25th of 2016 as for the workshop and the annual meeting. We will circulate amongst the commissioners those dates and make sure that that works. And we're anticipating that -- to either have it in Burlington, Wray, or Holyoke. Each of those communities can support that meeting on those dates. But we'll talk amongst ourselves and coordinate with the -- both of you and see if we can finalize those dates soon so we can get that on everyone's calendars. And we will also be celebrating the 135th anniversary of the State Engineer's Office next year, so, hopefully, we can do a little bit of celebration as part of our annual meeting to recognize that anniversary as well. So, that's all I have, unless there's any questions?

COMMISSIONER BARFIELD: No questions.

CHAIRPERSON FASSETT: Okay. Sounds good. Any one of those locations would be a new stop for me, Commissioner Wolfe.

COMMISSIONER WOLFE: All right.

CHAIRPERSON FASSETT: So, that would be good.

Any further business to come before the Commission?

(No response.)

All right. Thank you. Very well. I appreciate the meeting, getting to reengage with you all. I've known both Commissioners for a long time, even though I was wearing a different hat, and I really and truly believe we're on a great path, and I look forward to injecting myself into more of the details as I mature in this position.

So, thank you very much for a nice meeting and I'll call for adjournment.

COMMISSIONER WOLFE: So moved.

CHAIRPERSON FASSETT: Thank you.

(Whereupon, on August 27, 2015, at 10:36 a.m., the meeting was adjourned.)

- - -

Exhibit B

ANNUAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
August 27, 2015

Attendance

Name	Representing
Jeff Fassett	Nebraska Commissioner
Dick Wolfe	Colorado Commissioner
David Barfield	Kansas Commissioner
Jesse Bradley	Nebraska Department of Natural Resources
Jim Schneider	Nebraska Department of Natural Resources
Jennifer Schellpeper	Nebraska Department of Natural Resources
Ryan Werner	Nebraska Department of Natural Resources
Jen Rae Wang	Nebraska Department of Natural Resources
Kathy Benson	Nebraska Department of Natural Resources
Shane Stanton	Nebraska Department of Natural Resources Field Office
David Gunderson	Nebraska Department of Natural Resources Field Office
Ivan Franco	Colorado Division of Water Resources
Mike Sullivan	Colorado Division of Water Resources
Peter Ampe	Colorado RRWCD, General Counsel
Scott Steinbrecher	Colorado Attorney General's Office
Chris Beightel	Kansas Division of Water Resources
Sam Perkins	Kansas Division of Water Resources
Chelsea Erickson	Kansas Division of Water Resources
Ginger Pugh	Kansas Division of Water Resources
Hongsheg Cao	Kansas Division of Water Resources
Bruce Wells	Kansas Natural Resources Conservation Service
Justin Lavene	Nebraska Attorney General's Office
Burke Griggs	Kansas Attorney General's Office
Jaren "Pete" Gile	Kansas Bostwick Irrigation
Marc Groff	Flatwater Group, Nebraska
David Kracman	Flatwater Group, Nebraska
Tom Riley	Flatwater Group, Nebraska
Chance Thayer	Flatwater Group, Nebraska
Dustin Wilcox	Nebraska Association of Resources Districts
Tom Wilmoth	Blankenau and Wilmoth, Nebraska
Don Blankenau	Blankenau and Wilmoth, Nebraska
Scott Dicke	Lower Republican NRD, Nebraska
Mike Clements	Lower Republican NRD, Nebraska
Robert Merrigan	Middle Republican NRD, Nebraska
Jasper Fanning	Upper Republican NRD, Nebraska

Mike Delka	Bostwick Irrigation District, Nebraska
Brad Edgerton	Frenchman-Cambridge Irrigation District, Nebraska
Dennis Coryell	Republican River Water Conservation District, Colorado
Willem Schrueder	Principia Mathematica
Ken Stark	US Army Corps of Engineers
Jason Lambrecht	USGS, Nebraska Water Science Center
Aaron Thompson	US Bureau of Reclamation
Craig Scott	US Bureau of Reclamation

RRCA ANNUAL MEETING

Meeting Date: August 27, 2015

Place/Room: The Cornhusker Hotel, Lincoln, NE

Name:	Representing:	E-Mail:
Aaron Thompson	Reclamation	athompson@usbr.gov
Craig Scott	USBR	
Scott Steinbrecher	CO Atty Gen.	scott.steinbrecher@state.co.us
Robert Merrigan	MRNRD	rmerrigan@mrnrd.org
Pete Anye	RRWCD	petrange@hillandrallp.com
Dave Barfield	Kansas	
Jeff FASSETT	Nebraska	Jeff.Fassett@nebraska.gov
Sam Perkins	Kansas KDA-DWR	Sam.Perkins@kda.ks.gov
Chelsea Erickson	KS-DWR Stockton	Chelsea.Erickson@kda.ks.gov
Brad Edgerton	Frenchman Cambridge ID	
Mike DeKA	Bostwick I.D. in NE	
Ginger Pugh	KS-DWR	ginger.pugh@kda.ks.gov
Bruce Wells	KS-NRCS	bruce.wells@ks.usda.gov.
Jared "Pete" Lisle	KS Bostwick	
Ivan Franco	Colorado DWR	ivan.franco@state.co.us
Chris Beightel	KS Dept. of Ag-DWR	chris.beightel@kda.ks.gov
Hongcheng Cao	KS Dep. of Ag-KS	—
Curtis Wilcox	NAKD	/
JASON LAMBRECHT	USGS	jmlambre@usgs.gov

RRCA ANNUAL MEETING

Meeting Date: August 27, 2015

Place/Room: The Cornhusker Hotel, Lincoln, NE

Name:	Representing:	E-Mail:
Burke Griggs	Kansas AH'y Gen	burke.griggs@ag.ks.gov
Scott Dicke	Lower Republican NRD	sdicke@lrnrd.org
Mike Clements	LRNRD	mclements@lrnrd.org
Chance Thayer	TFG	cthayer@flatwatergroup.com
Jasper Fanning	LRNRD	
Dennis Cooyell	RRWCD	dennis.cooyell@gmail.com
Jennifer Schellpeper	NDNR	jennifer.schellpeper@nebraska.gov
Tom RILEY	FLATWATER GROUP	
David Kracman	" "	"
Ryan Werner	NDNR	ryan.werner@nebraska.gov
Kathy Benson	NDNR	Kathy.benson@Nebraska.gov
Jen Rae Wang	NDNR	jenrae.wang@nebraska.gov

Exhibit C

FINAL AGENDA FOR

2015 ANNUAL MEETING OF THE

REPUBLICAN RIVER COMPACT ADMINISTRATION

August 27, 2015, 9:00 a.m. Central Time

Cornhusker Marriott Hotel

Hawthorne Conference Room

333 S 13th St.

Lincoln, Nebraska 68508

1. Introductions
2. Adoption of the Agenda
3. Status of Report and Transcripts for 2014 Annual Meeting and subsequent 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. Engineering Committee Report
        i. Assignments from 2014 Annual Meeting
        ii. Committee recommendations to RRCA
        iii. Recommended assignments for Engineering Committee
7. Old Business
    a. Status of unapproved previous accounting
    b. Approve Annual Report for 2013
8. New Business and Assignments to Compact Committees
    a. Action on Engineering Committee Report and assignments
    b. Resolution Approving & Finalizing Accounting Changes
    c. Resolution Amending Rules & Regulations
    d. Resolution Honoring Brian Dunnigan
    e. Resolution on Approving Accounting Adjustments and Agreements Related to the Operation of Harlan County Lake for Compact Year 2016 (for potential action)
9. Remarks from the Public
10. Future Meeting Arrangements
11. Adjournment

Exhibit D

RECLAMATION

Managing Water in the West

Nebraska-Kansas Area Office

Report

To The

Republican River

Compact Administration

Lincoln, NE

U.S. Department of the Interior
Bureau of Reclamation
Great Plains Region
Nebraska-Kansas Area Office

August 27, 2015

Bureau of Reclamation
Nebraska-Kansas Area Office

Republican River Compact Administration
August 27, 2015

REPUBLICAN RIVER COMPACT MEETING

August 27, 2015
Lincoln, Nebraska

2014 Operations

As shown on the attached Table 1, precipitation in the Republican River Basin varied from 81 percent of normal at Harlan County Dam to 137 percent of normal at Bonny Dam. Total precipitation at Reclamation project dams ranged from 18.46 inches at Enders Dam to 29.34 inches at Lovewell Dam.

Inflows varied from 26 percent of the most probable forecast at Bonny Reservoir to 175 percent of the most probable forecast at Harry Strunk Lake. Inflows into Bonny Reservoir totaled 2,664 AF while inflows at Harlan County Lake totaled 92,209 AF.

Average farm delivery values for total irrigable acres were as follows:

District	Farm Delivery
Frenchman Valley	0.0 inches
H&RW	0.0 inches
Frenchman-Cambridge	1.4 inches
Almena	1.2 inches
Bostwick in NE	0.0 inches
Kansas-Bostwick	7.3 inches

2014 Operation Notes

Bonny Reservoir – Remained empty at elevation 3638.00 feet, 34.0 feet below the top of conservation. The annual computed inflow totaled 2,664 AF. Reservoir inflows were bypassed the entire year as ordered by the State of Colorado. A total of 596 AF was bypassed into Hale Ditch from April 15th through July 18th.

Note – The Nebraska Department of Natural Resources (NDNR) declared a Compact Call Year on the Republican River Basin on January 1, 2014 and issued storage closing notices on Reclamation reservoirs in the Basin. On October 24, 2014, the NDNR notified Reclamation that storage in the reservoirs could resume.

Enders Reservoir – Started the year at elevation 3088.55 feet, 23.8 feet below the top of conservation. The 2014 computed inflow totaled 6,319 AF. No additional impoundment of water was allowed through October 24, 2014. Prior to the irrigation season, the Middle Republican Natural Resource District purchased all of the previously stored water in the irrigation pool to be used for compact compliance. The purchased water (4,380 AF) was released from Enders Reservoir during May. This release decreased the reservoir elevation to

3082.40 feet on May 29th, 2014. No water was released from Enders Reservoir for irrigation. This was the thirteenth consecutive year that H&RW Irrigation District did not divert water. It was also the eleventh consecutive year that storage releases were not made for Frenchman Valley Irrigation District. The district cooperated with the NDNR by allowing natural flows to remain in the stream to assist with compact compliance. The end of the year reservoir level was 29.6 feet (3082.72 feet) below the top of conservation.

Swanson Lake – Started the year at elevation 2729.45 feet, 22.6 feet below the top of conservation. The annual computed inflow totaled 33,083 AF (includes water pumped from the Rock Creek Augmentation Project and Colorado's Compact Compliance Pipeline). No additional impoundment of water was allowed in the lake through October 24, 2014. The reservoir level decreased during the irrigation season reaching elevation 2726.95 feet on August 29th. The district diverted 8,035 AF into Meeker-Driftwood Canal from June 27th through August 29th. At the end of the year the reservoir level was 23.0 feet below the top of conservation at 2728.96 feet.

Hugh Butler Lake – Started the year at elevation 2555.06 feet, 26.7 feet below the top of conservation. The 2014 computed inflow was 9,588 AF. No additional impoundment of water was allowed through October 24, 2014. No irrigation releases were made from Hugh Butler Lake in 2014. The reservoir elevation at the end of year was 2556.88 feet, 24.9 feet below the top of conservation.

Harry Strunk Lake – Started the year at elevation 2356.34 feet, 9.8 feet below the top of conservation. The annual computed inflow totaled 65,044 AF (includes water pumped from the Nebraska Cooperative Republican Platte Enhancement Project). No additional impoundment of water was allowed in the lake through October 24, 2014. Irrigation releases began in early July and ran through September 4th reducing the reservoir level to elevation 2356.28 feet by early September. The district diverted 12,242 AF into Cambridge Canal. Late fall and early winter inflows increased the level of Harry Strunk Lake to 1.8 feet above the top of conservation at the end of the year (2367.85 feet).

Keith Sebelius Lake – Started the year at elevation 2290.78 feet, 13.5 feet below the top of conservation. The total 2014 computed inflow was 4,076 AF. The reservoir level slowly increased to elevation 2291.38 feet on June 11th. Irrigation releases were made during July reducing the lake level to 2289.02 feet. A total of 1,385 AF was diverted into Almena Canal. The reservoir level continued to gradually decrease the remainder of the year. Keith Sebelius Lake ended the year at elevation 2288.02 feet (16.3 feet below the top of conservation).

Harlan County Lake – Started the year at elevation 1927.85 feet, 17.9 feet below the top of conservation. The 2014 computed inflow totaled 92,209 AF (includes water that was bypassed from upstream reservoirs). The lake level peaked at elevation 1933.97 feet on July 2nd. Irrigation releases for Kansas Bostwick Irrigation District (KBID) began on June 20th and continued through September 4th decreasing the pool level to elevation 1930.49 feet. KBID entered into an Excess Capacity Contract (Warren Act Authority) with Reclamation for the use of "Compact Call" water stored in Harlan County Lake in 2014. A total of 16,487 AF was released under this contract during the irrigation season. Bostwick in Nebraska Irrigation District did not divert irrigation water in 2014. The district cooperated with the NDNR by

allowing natural flows to remain in the stream to assist with compact compliance. The reservoir elevation was 1930.81 feet (14.9 feet below the top of conservation) on December 31, 2014. A ten year summary of Harlan County Lake operations is shown on Table 3.

Lovewell Reservoir – Started the year at elevation 1577.56 feet, 5.0 feet below the top of conservation. The annual computed inflow total for 2014 was 48,535 AF. Republican River diversions were made via the Courtland Canal into Lovewell Reservoir during early January and resumed from mid-March through June. The pool level gradually increased to elevation 1582.89 feet on June 16th. Releases to the canal began on June 9th and continued through September 5th. The reservoir elevation at the end of the irrigation season was 1580.56 feet. Republican River diversions began again in mid-December. The Kansas Bostwick Irrigation District diverted a total of 47,633 AF in 2014. A total of 32,108 AF was diverted into Courtland Canal from Lovewell Reservoir. The reservoir level at the end of the year was 1580.46 feet (2.1 feet below top of conservation).

Current Operations (As of 7/31/15)

Bonny Reservoir – The reservoir is currently empty. Inflows continue to be bypassed through the reservoir as ordered by the State of Colorado. Approximately 980 AF has been released into Hale Ditch in 2015. Bonny Dam has recorded 17.20 inches of precipitation during the first seven months of the year (148% of average).

Enders Reservoir - The reservoir level is currently 27.6 feet below full and 2.2 feet above last year at this time. Enders Dam recorded 13.18 inches of precipitation during the first seven months of the year (102% of normal). Due to the water supply shortage, H&RW Irrigation District is not irrigating for the fourteenth year in a row. This is also the twelfth consecutive year that Frenchman Valley Irrigation District has not received storage water for irrigation.

Swanson Lake – The lake level is currently 14.9 feet from full and is 8.7 feet above last year at this time. Precipitation for the year is at 106% of normal (14.32 inches). Irrigation releases began on June 24th.

Hugh Butler Lake – The lake level is currently 19.3 feet below full. The precipitation total so far this year is 14.20 inches (111% of normal). The lake level is 7.5 feet above last year at this time. Irrigation releases are not being made from Hugh Butler Lake this season.

Harry Strunk Lake – The lake level is currently 1.5 feet below the top of conservation. Precipitation at the dam during the first seven months of the year was 14.79 inches (107% of normal). Irrigation releases began on June 29th. The lake level is currently 7.2 feet above last year at this time.

Keith Sebelius Lake – Currently 16.2 feet below full. Lake level is .7 foot below last year at this time. Due to a short water supply, irrigation releases are not being made in 2015. Precipitation at the dam during the first seven months of the year was 14.77 inches (91% of

normal).

Harlan County Lake – The current water surface level is approximately 11.2 feet below full. The lake level is 1.3 feet above last year at this time. Harlan County Dam has recorded 17.57 inches of precipitation so far this year (118% of normal). Irrigation releases began on June 21st. The available irrigation supply from Harlan County Lake on June 30, 2015 was 79,600 AF, indicating that "Water-Short Year Administration" would be in effect.

Lovewell Reservoir – The reservoir level is currently .5 foot below the top of conservation and approximately 3.6 feet above last year's elevation at this time. Lovewell Dam recorded 24.16 inches of precipitation during the first seven months of the year (140% of average). Lovewell Dam recorded 7.78 inches of rainfall overnight on May 6th. The reservoir level increased 5.9 feet as a result of the storm runoff peaking at 7.2 feet into the flood pool. Flood releases were staged up to 1,250 cfs on May 9th and the reservoir level dropped to elevation 1584.60 feet (2.0 feet into the flood pool) on May 19th. Irrigation releases began on May 19th.

A summary of data for the first seven months of 2015 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 up to 60,000 AF of water to be temporarily stored for KBID's use during the 2014 irrigation season. The Contract was extended into 2015 allowing for the temporary storage of 14,100 AF for KBID's use as agreed upon by KBID, Bostwick in Nebraska Irrigation District, Reclamation and the RRCA.

WaterSMART Basin Study Program - The States of Colorado, Nebraska, and Kansas and the U.S. Department of the Interior, Bureau of Reclamation are continuing work on the Republican River Basin Study. 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 Study evaluates the viability of water management strategies to optimize surface and groundwater use in consideration of meeting multiple demands and the potential effects of climate change/variability. It will:

- Project future water supply and demands in the Republican River Basin.
- Analyze how existing water operations and infrastructure will perform in the face of uncertain or variable water supply and/or demands.
- Identify and evaluate options to improve operations and infrastructure to address future water supply needs.
- Recommend options (operations and infrastructure) to supply adequate water in the future.

A draft report is currently being reviewed with the study completion date scheduled for November 2015.

TABLE 1
NEBRASKA-KANSAS PROJECTS
Summary of Precipitation, Reservoir Storage and Inflows
CALENDAR YEAR 2014

Reservoir	Total Precip. Inches	Percent Of Average %	Storage 12-31-13 AF	Storage 12-31-14 AF	Gain or Loss AF	Maximum Content AF	Storage Date	Minimum Content AF	Storage Date	Total Inflow AF	Percent Of Most Probable %
Box Butte	18.23	108	8,807	10,846	2,039	16,522	JUN 27	6,629	AUG 29	15,006	97
Merritt	24.15	118	60,831	61,100	269	68,191	JUN 9	40,537	AUG 22	190,509	103
Calamus	21.02	87	100,449	97,906	-2,543	121,304	JUN 30	79,960	OCT 16	249,858	91
Davis Creek	27.72	112	9,501	9,751	250	31,409	JUL 8	8,762	APR 15	51,779	113
Bonny	23.51	137	0	0	0	0	N/A	0	N/A	2,664	26
Enders	18.46	97	13,320	9,150	-4,170	13,666	MAR 9	8,829	OCT 16	6,319	72
Swanson	22.29	112	28,877	27,688	-1,189	31,255	JUN 30	22,673	OCT 15	33,083	116
Hugh Butler	19.42	99	6,961	8,141	1,180	8,141	DEC 31	6,892	JAN 7	9,588	71
Harry Strunk	25.40	123	20,382	37,984	17,602	38,004	DEC 30	19,690	AUG 24	65,044	175
Keith Sebelius	20.92	85	12,502	9,676	-2,826	13,191	JUN 11	9,504	DEC 1	4,076	50
Harlan County	18.53	81	124,522	148,842	24,320	178,030	JUL 2	124,221	JAN 27	92,209	74
Lovewell	29.34	107	22,495	29,620	7,125	36,539	JUN 16	21,126	AUG 9	48,535	73
Kirwin	18.68	79	50,011	41,266	-8,745	52,842	JUN 17	33,881	AUG 26	20,092	68
Webster	22.22	94	16,537	18,680	2,143	19,697	SEP 2	15,454	JUN 4	8,421	38
Waconda	21.78	85	187,122	191,097	3,975	206,663	JUL 1	186,897	JAN 6	65,510	43
Cedar Bluff	22.58	108	54,342	61,117	6,775	66,332	JUL 9	51,377	JUN 4	20,137	121

TABLE 2
NEBRASKA-KANSAS AREA OFFICE
Summary of Precipitation, Reservoir Storage and Inflows

JANUARY - JULY 2015

Reservoir	Precip. Inches	Percent Of Average %	Storage 7/31/2014 AF	Storage 7/31/2015 AF	Gain or Loss AF	Inflow AF	Percent Of Most Probable %
Bonny	17.20	148	0	0	0	4,964	74
Enders	13.18	102	8,961	10,435	1,474	3,956	82
Swanson	14.32	106	26,312	50,540	24,228	38,001	172
Hugh Butler	14.20	111	6,961	12,501	5,540	6,984	81
Harry Strunk	14.79	107	21,758	32,025	10,267	35,615	145
Keith Sebelius	14.77	91	10,474	9,797	(677)	2,808	50
Harlan County	17.57	118	164,168	176,493	12,325	75,958	90
Lovewell	24.16	140	24,627	34,075	9,448	51,617	145

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)	Precip. (% of Average) (22.76 inches)	Rep. Basin Reclamation Dams (% of Average)	End of Year Content (AF)	**Projected Irrig. Water Supply On June 30th (AF)**
2005	53,682	0	32,620	22.51	99%	107%	128,111	**14,100**
2006	30,077	12,280	29,609	20.62	91%	101%	116,299	**14,400**
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**

*NOTE: On June 30, 2015 Projected Irrigation Water Supply was 79,600 AF.

Exhibit E

Harlan County Dam Tainter Gate Repairs

Ken Stark,
Project Manager

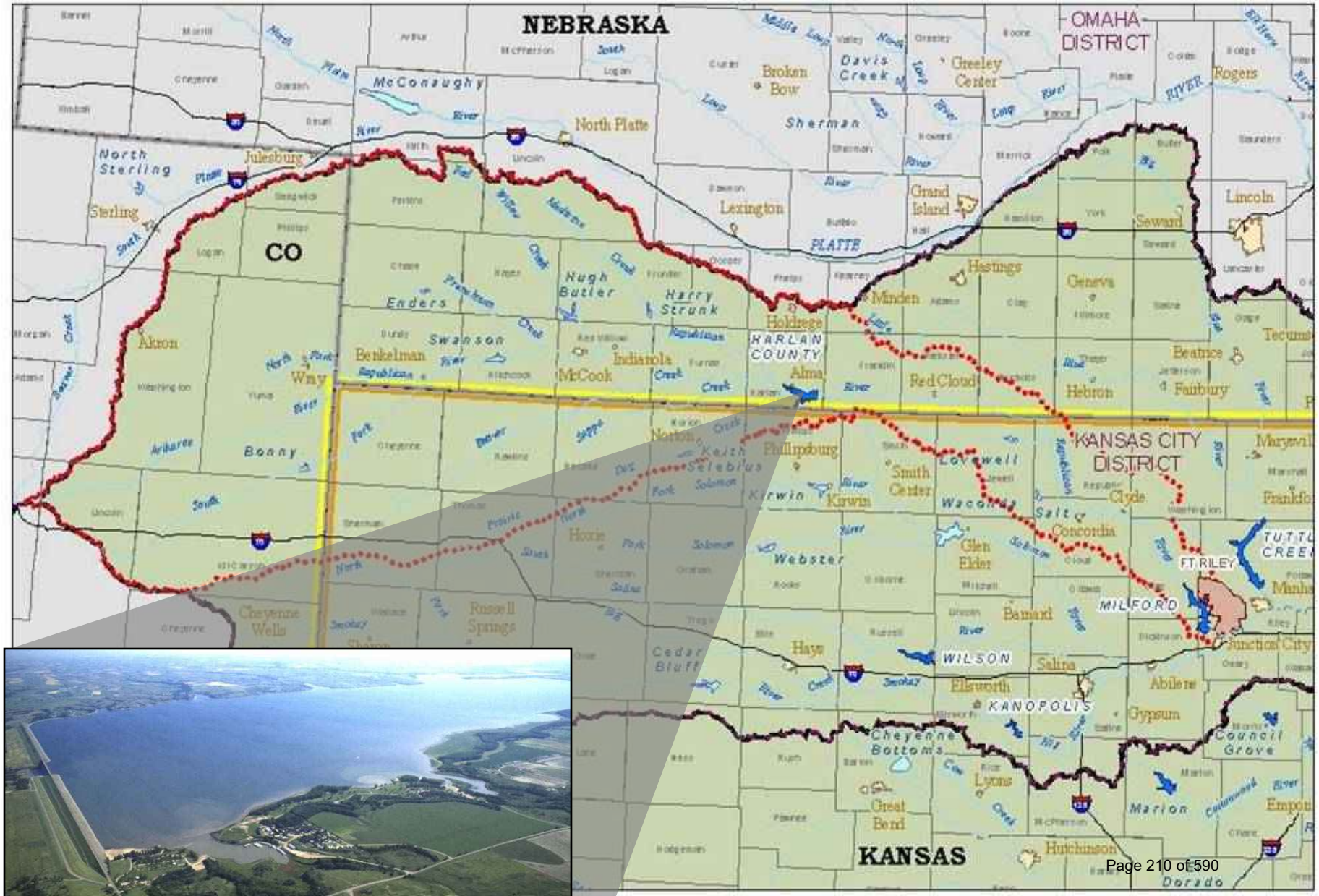
August 27, 2015

US Army Corps of Engineers
BUILDING STRONG®

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

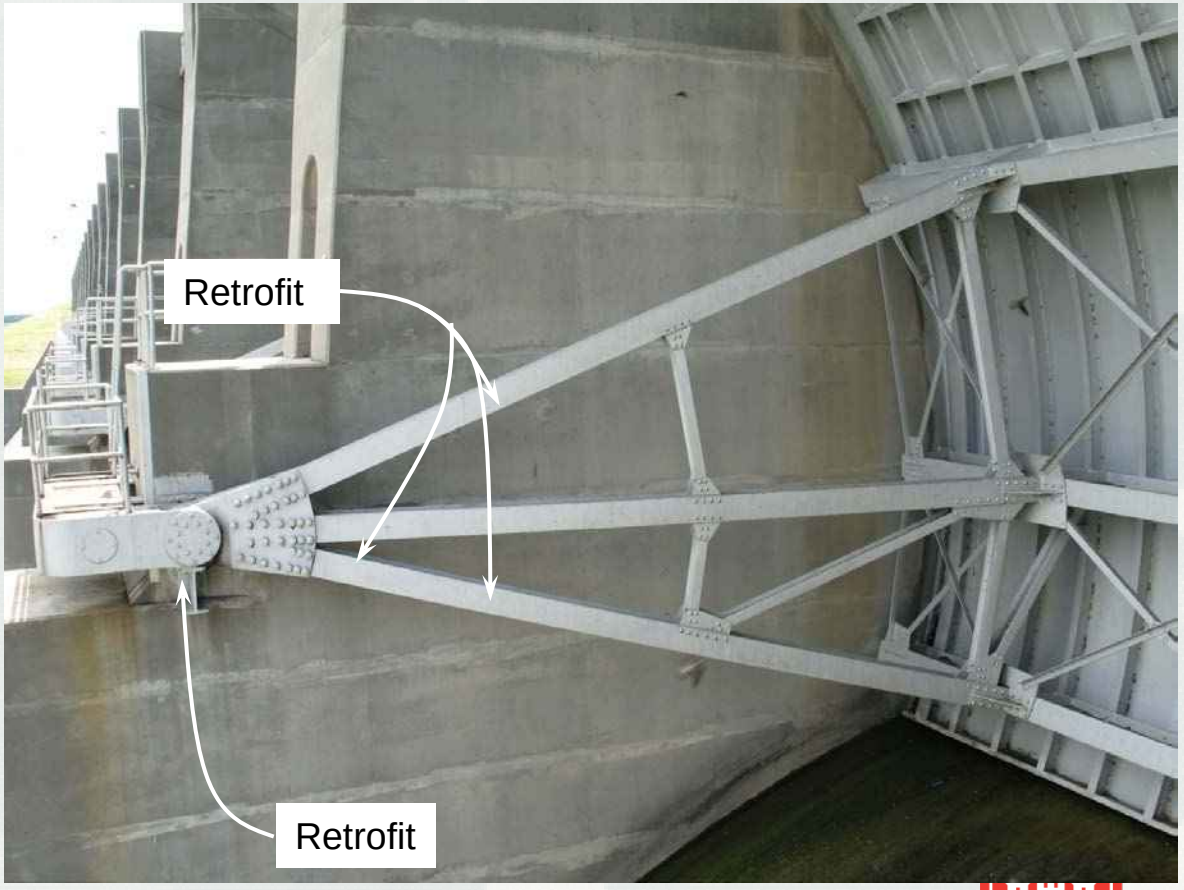
2 - Irrigation conduits

18 - Tainter gates

- Flood control release
- Each 40’ x 30’

Harlan County Dam Repairs

- Tainter Gate Stoplogs
- Tainter Gates
- Sluice Gates
- Irrigation Facilities



Construction Status

Construction Status

Construction Status

Exhibit F

Republican River Compact Nebraska Stream-Gaging Data Water Year 2014

Presented to
Republican River Compact Administration

By Jason Lambrecht, Associate Director for Hydrologic Data
Nebraska Water Science Center

August 27, 2015
Lincoln, NE

USGS science for a changing world

Summary handout – stations published by U.S. Geological Survey (USGS)

Republican River Basin streamflow-gaging stations with records published by USGS for water year (WY) 2014

[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^3/s) WY 2014	Mean discharge (ft^3/s) Long-term	WY 2014 as percentage of long-term mean	WY 2014 as rank/years (1 highest)	WYs used for long-term mean	Remarks
USGS Compact stations supported by the National Streamflow Information Program (NSIP)							
06821500	Arikaree River at Haigler, Nebr	0.1	16.2	0.6%	81/82	1933 - 2014	
06823000	North Fork Republican River at Colo-Nebr State Line	32.3	41.3	78.0%	63/79	1935 - 2014	
06823500	Buffalo Creek near Haigler, Nebr	2.1	6.0	35.6%	72/74	1941 - 2014	
06824000	Rock Creek at Parks, Nebr	32.1	12.3	261.0%	1/74	1941 - 2014	
06827500	South Fork Republican River near Benkelman, Nebr	0.0	34.2	0.0%	77/77	1938 - 2014	
06835500	Frenchman Creek at Culbertson, Nebr	41.1	64.6	63.6%	51/64	1951 - 2014	Since Enders Reservoir
06836500	Driftwood Creek near McCook, Nebr	1.6	8.2	19.1%	64/68	1947 - 2014	
06838000	Red Willow Creek near Red Willow, Nebr	9.8	13.5	72.3%	35/53	1962 - 2014	Since Hugh Butler Lake
06847500	Sappa Creek near Stamford, Nebr (USACE funds DCP)	2.3	37.9	6.0%	59/68	1947 - 2014	
06852500	Courtland Canal at Nebr-Kans State Line (USBR DCP)	91.0	75.8	120.0%	16/60	1955 - 2014	
USGS stations supported by USGS and/or other Federal or State agencies							
06828500	Republican River at Stratton, Nebr	42.1	92.8	45.4%	52/64	1951 - 2014	Funded by USACE and NSIP
06837000	Republican River at McCook, Nebr	55.6	122.6	45.4%	50/60	1955 - 2014	Funded by USBR, NDNR, and NSIP
06844500	Republican River near Orleans, Nebr	106.6	225.5	47.3%	57/67	1948 - 2014	Funded by USACE and NSIP
NDNR stations with USGS/USACE support for DCP, Web display, review, and publishing							
06834000	Frenchman Creek at Palisade, Nebr	26.9	59.6	45.1%	54/64	1951 - 2014	
06843500	Republican River at Cambridge, Nebr	110.6	208.1	53.1%	57/65	1950 - 2014	Since Harry Strunk Lake

Online Annual Water Data Reports available at or through:

http://wdr.water.usgs.gov

http://ne.water.usgs.gov

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Summary Charts – Compact Stations

- Published data for Water Year (WY) 2014
- Operated by the USGS Nebraska Water Science Center (NE WSC)
- Stations funded by the USGS National Streamflow Information Program (NSIP)

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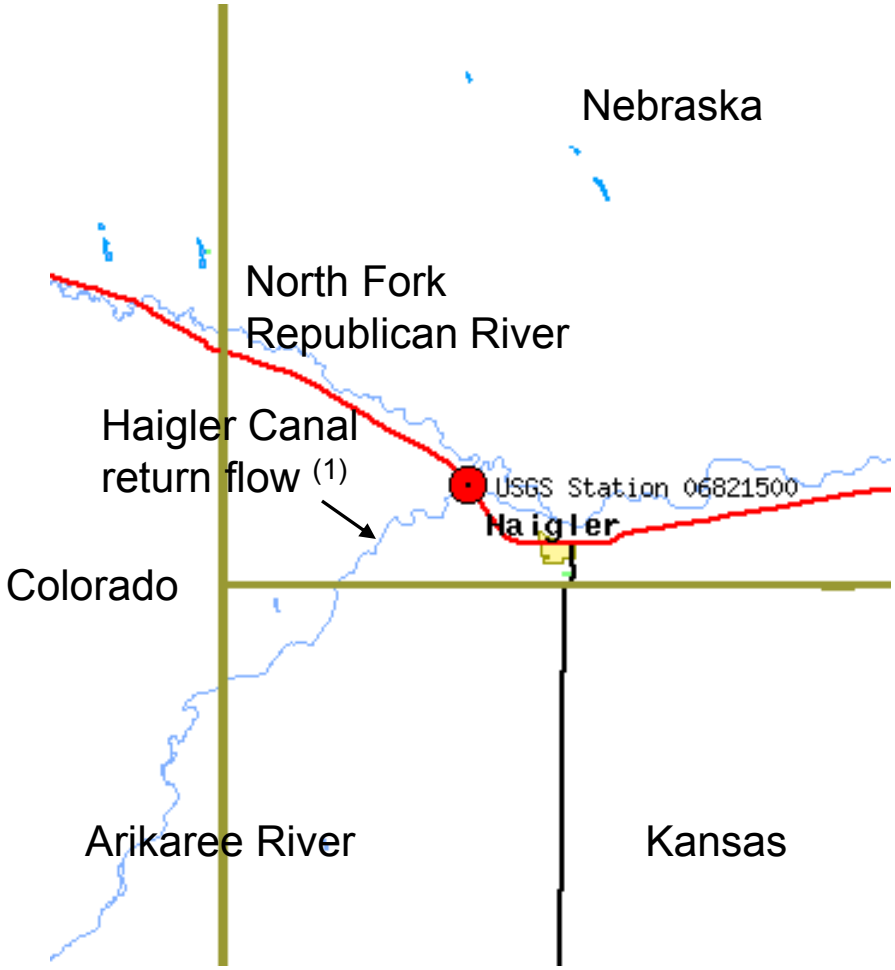
Arikaree River at Haigler, NE



(1) Haigler Canal diverts from North Fork Republican River above CO-NE Stateline: return flows enter Arikaree River

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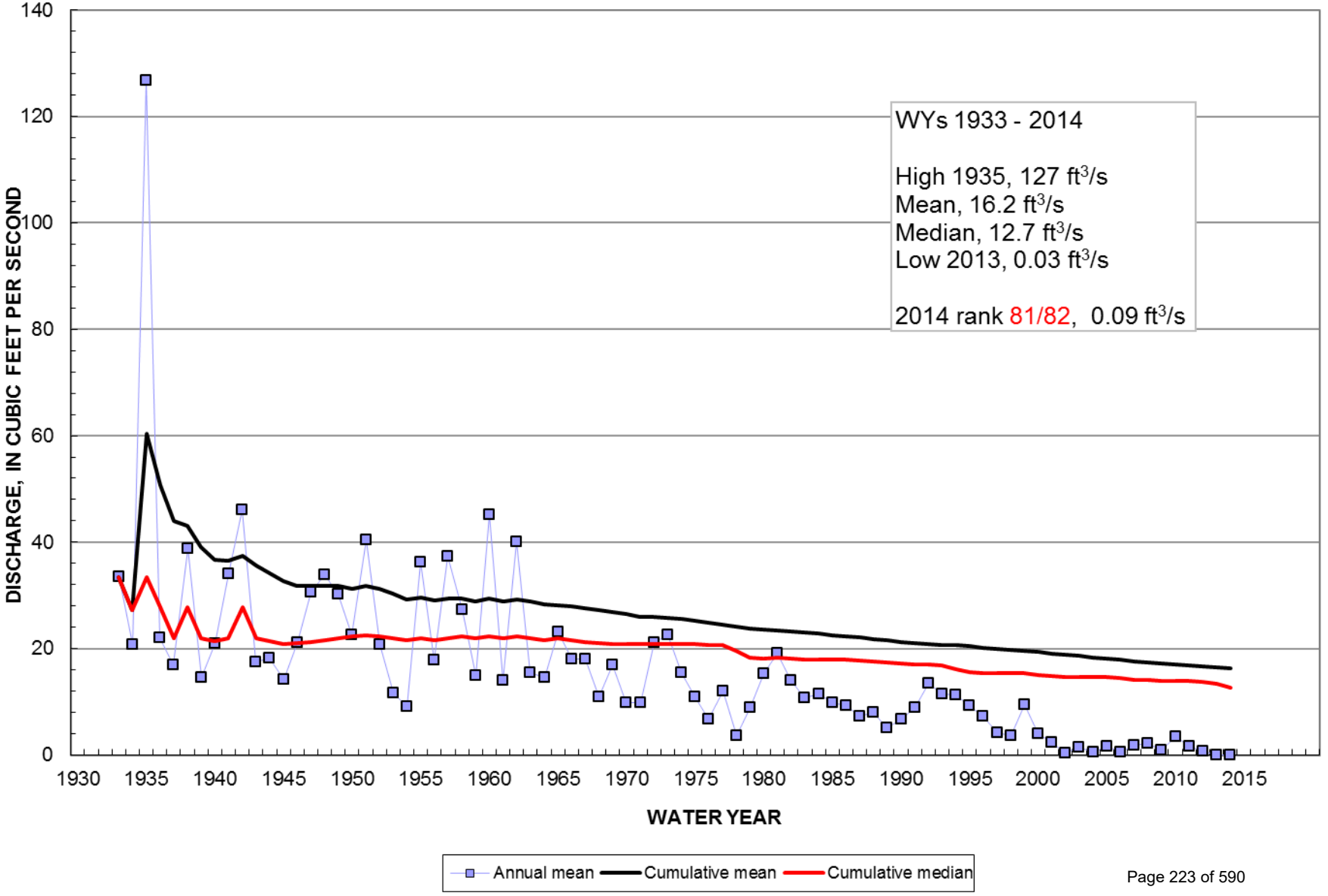
06821500 Arikaree River at Haigler, NE



N Fk Republican River at CO-NE State Line

(1) Haigler Canal diverts flow upstream of station in Colorado; return flows enter Arikaree River in Nebraska

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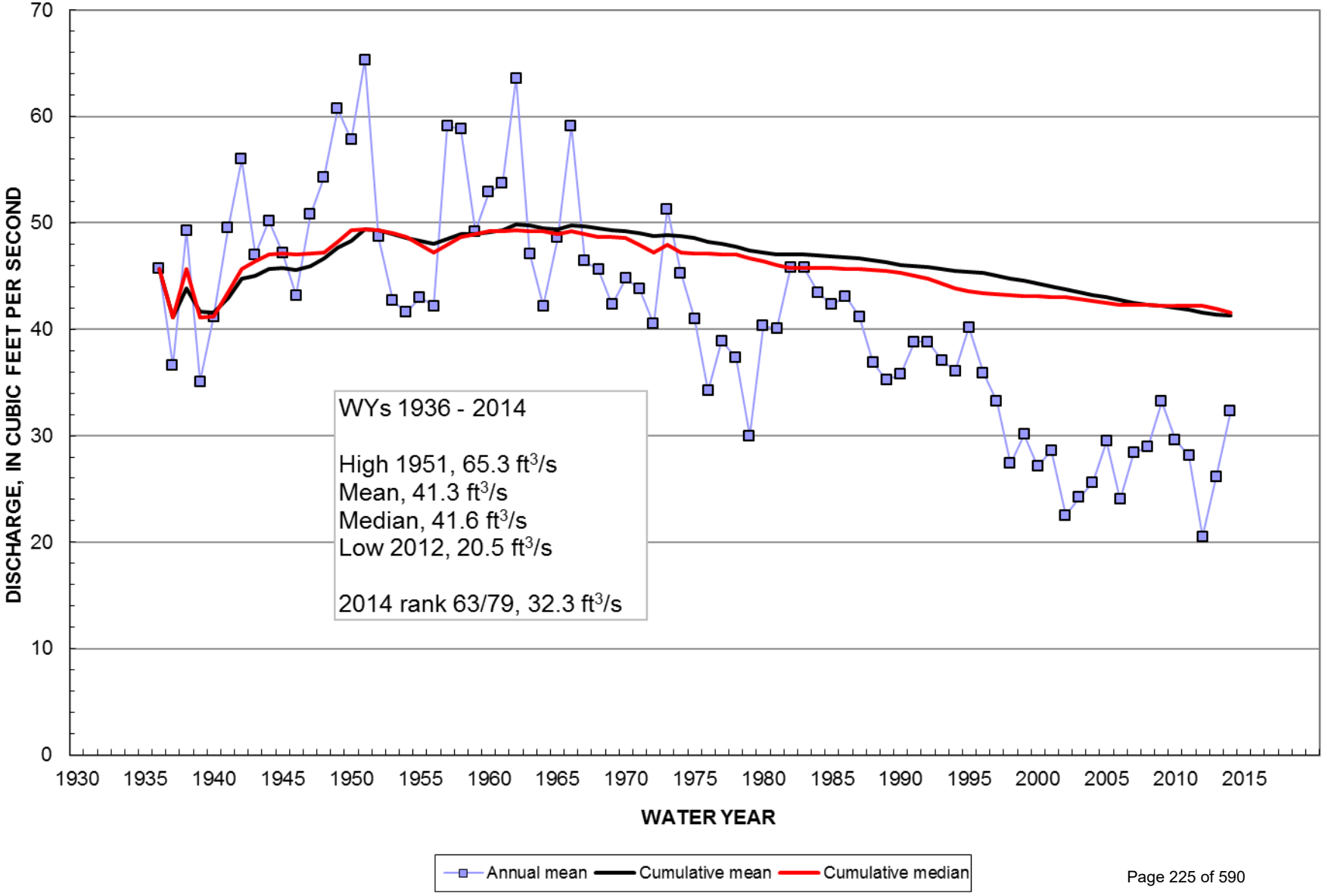
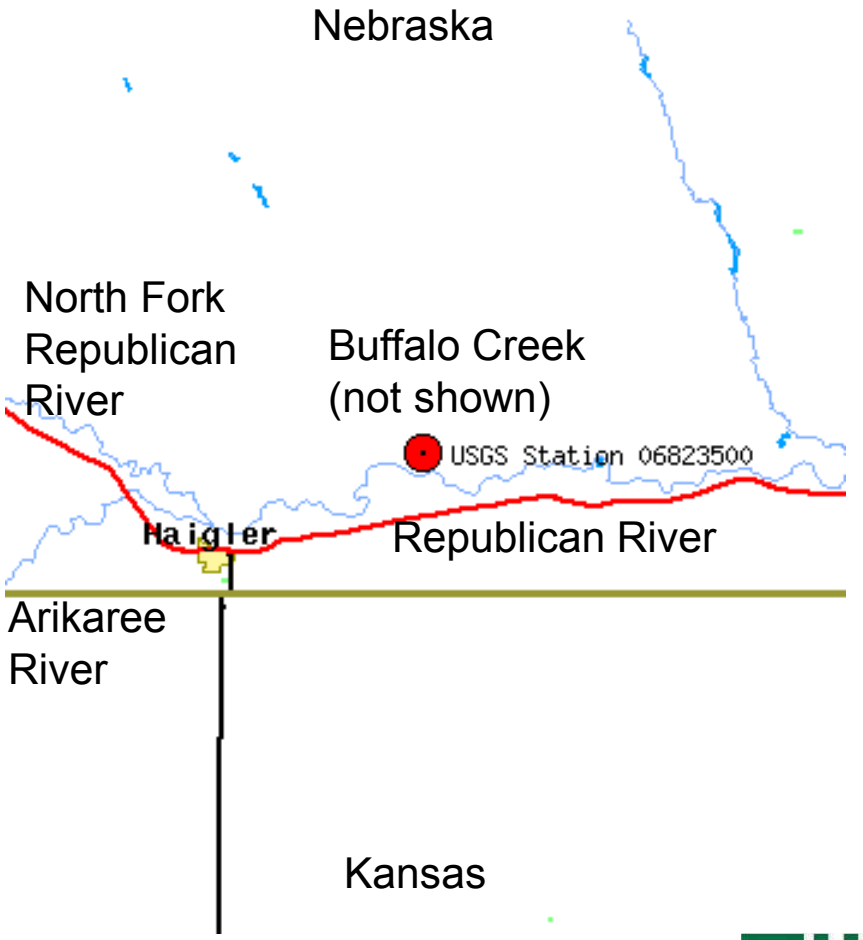
06823000 N Fk Republican River at CO-NE State Line



Buffalo Creek near Haigler, NE



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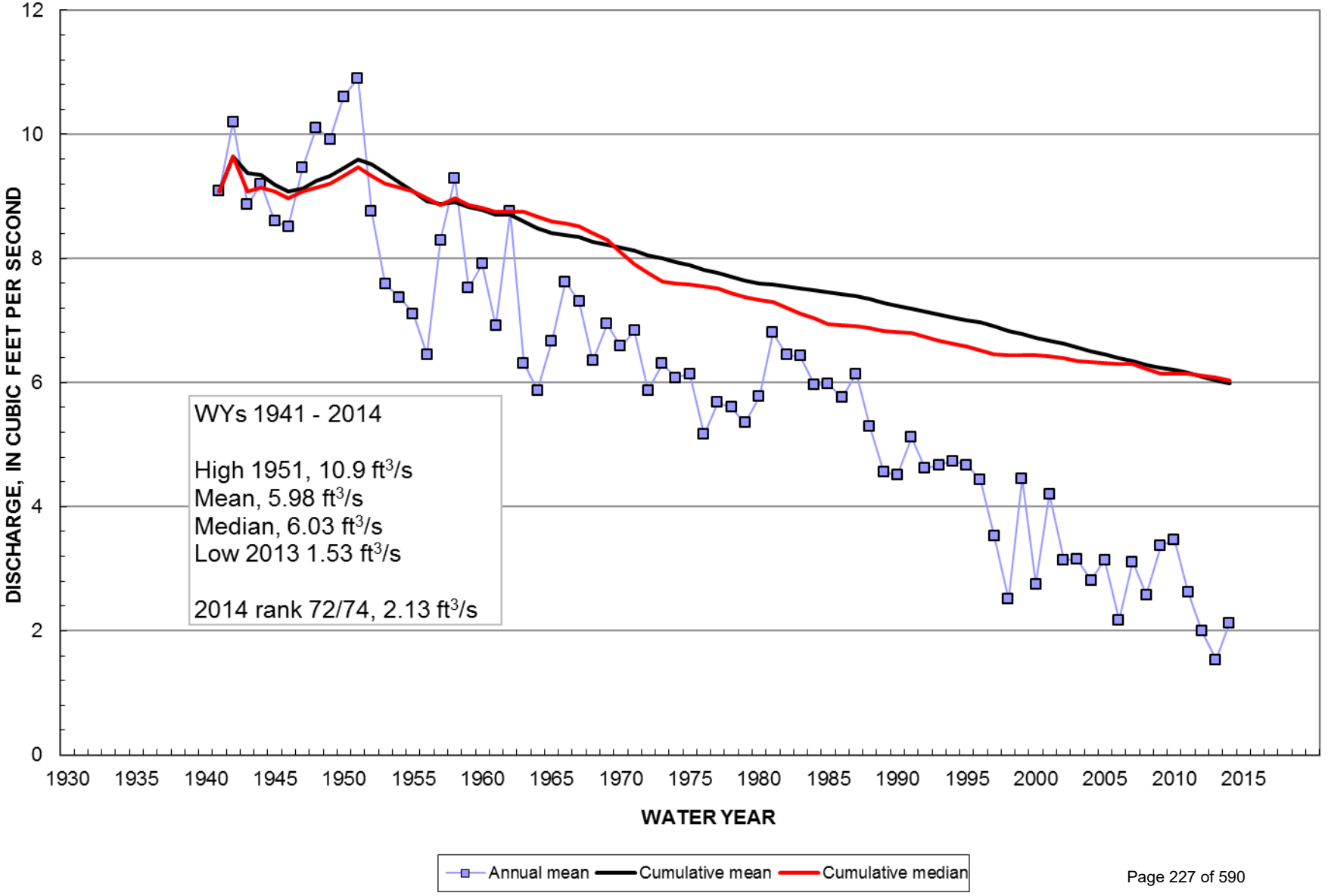
06823500 Buffalo Creek near Haigler, NE



Rock Creek at Parks, NE

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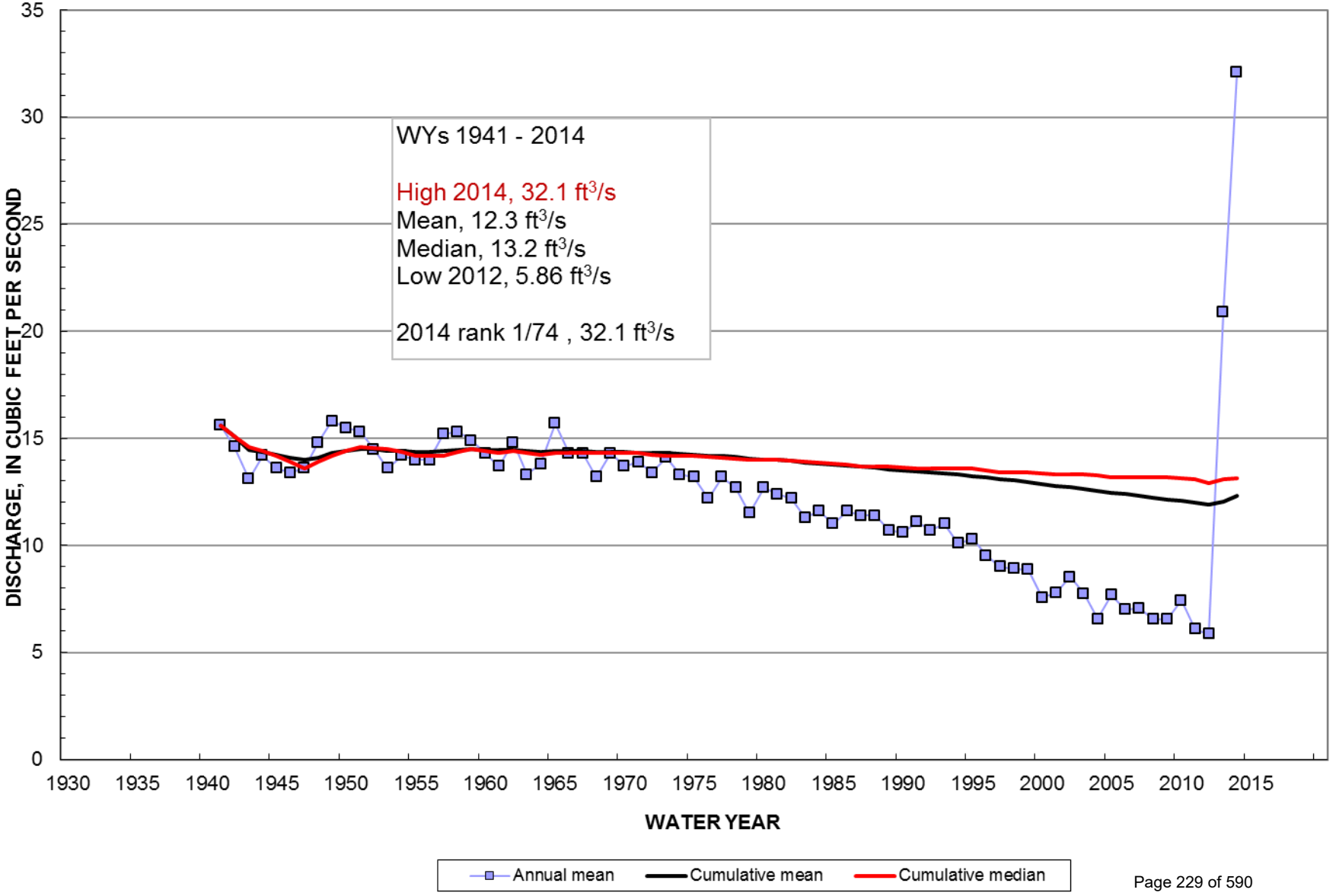
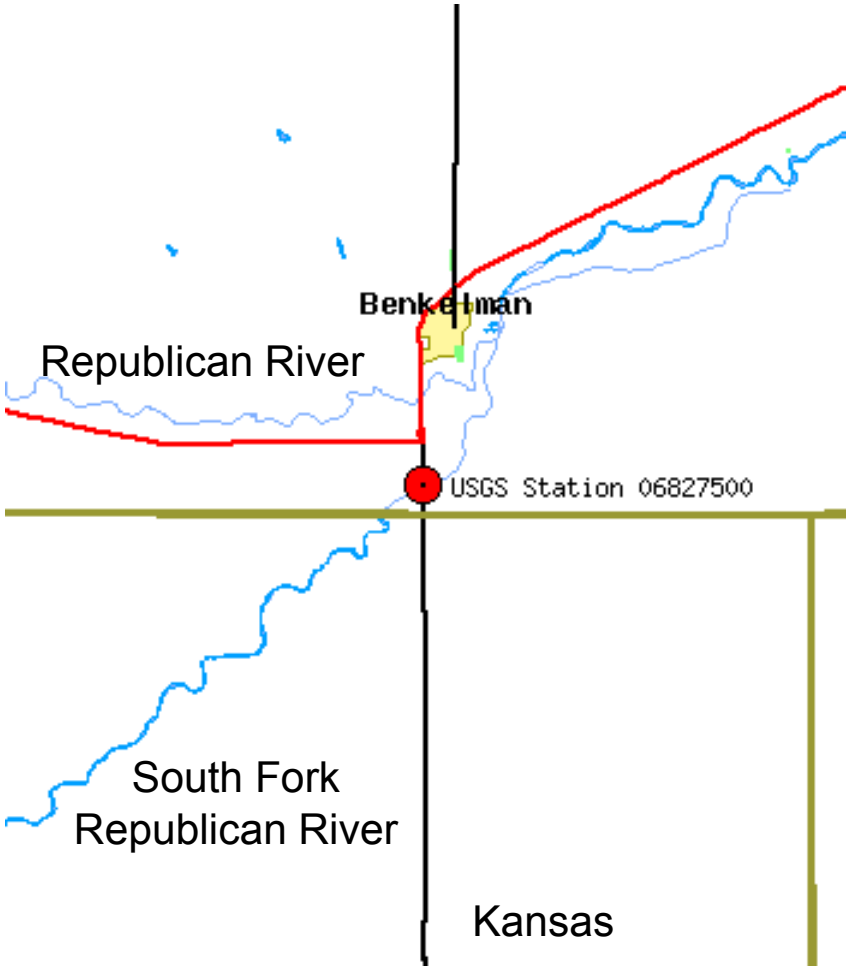
06824000 Rock Creek at Parks, NE



South Fork Republican River near Benkelman, NE



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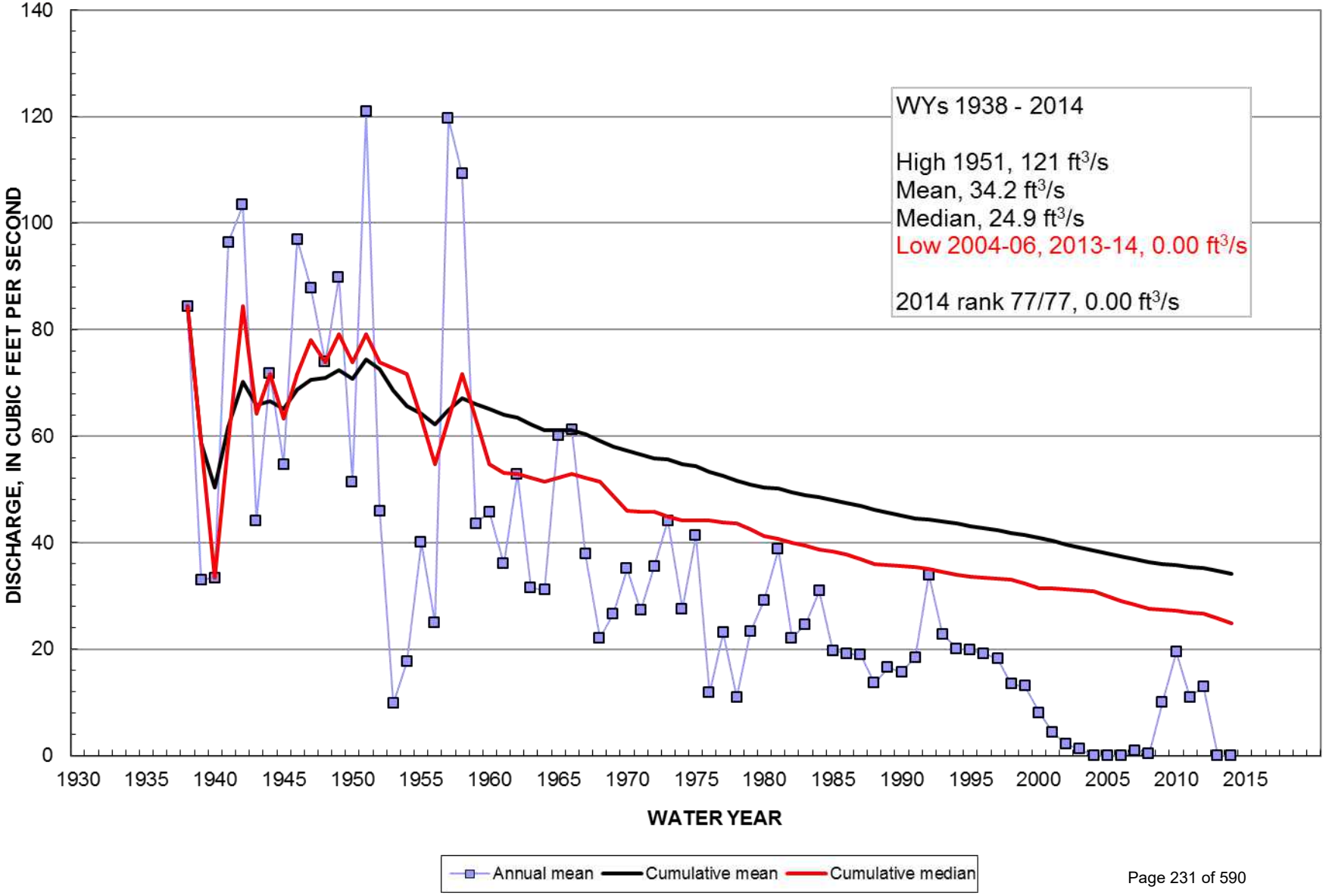
06827500 S Fk Republican River near Benkelman, NE



Frenchman Creek at Culbertson. NE

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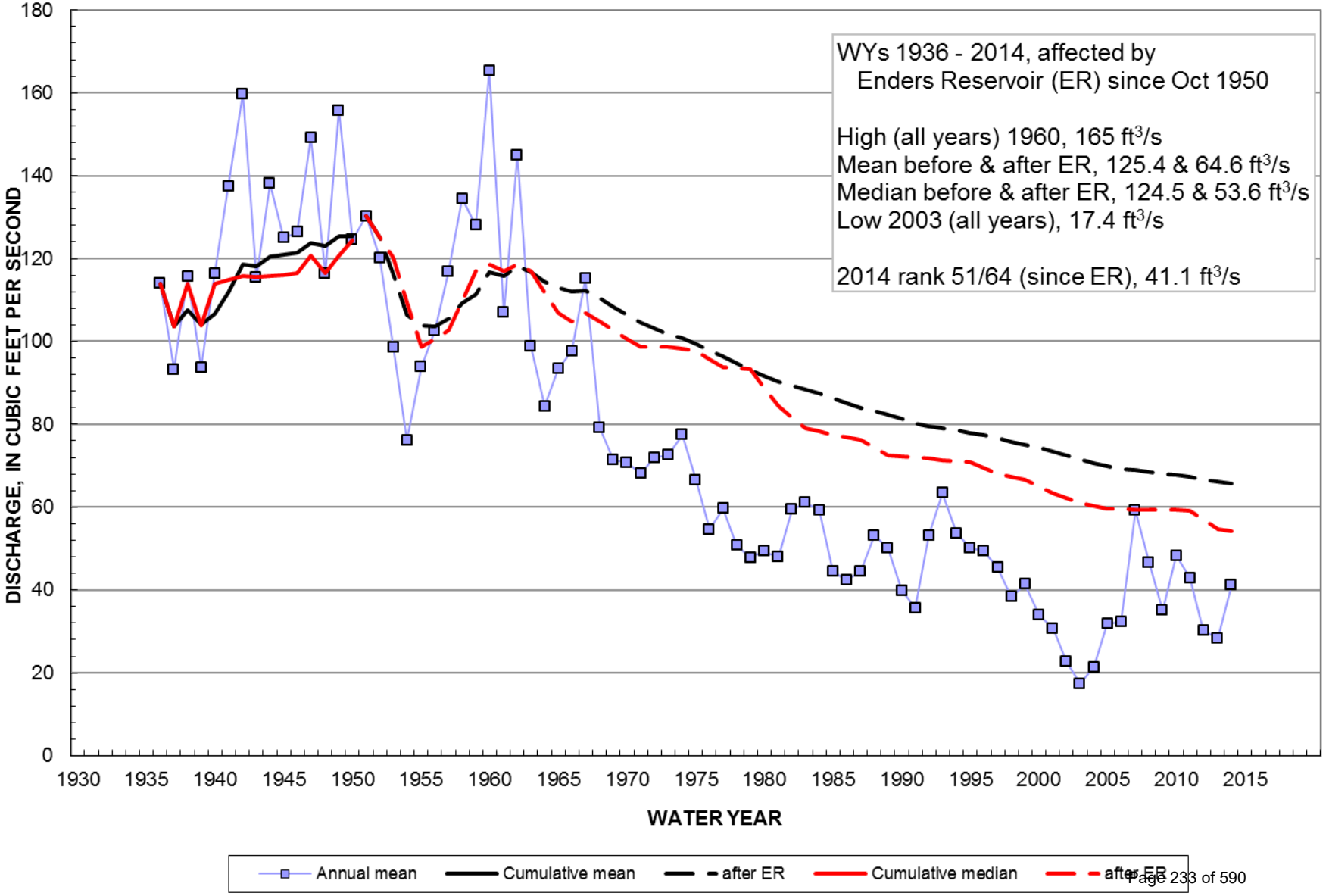
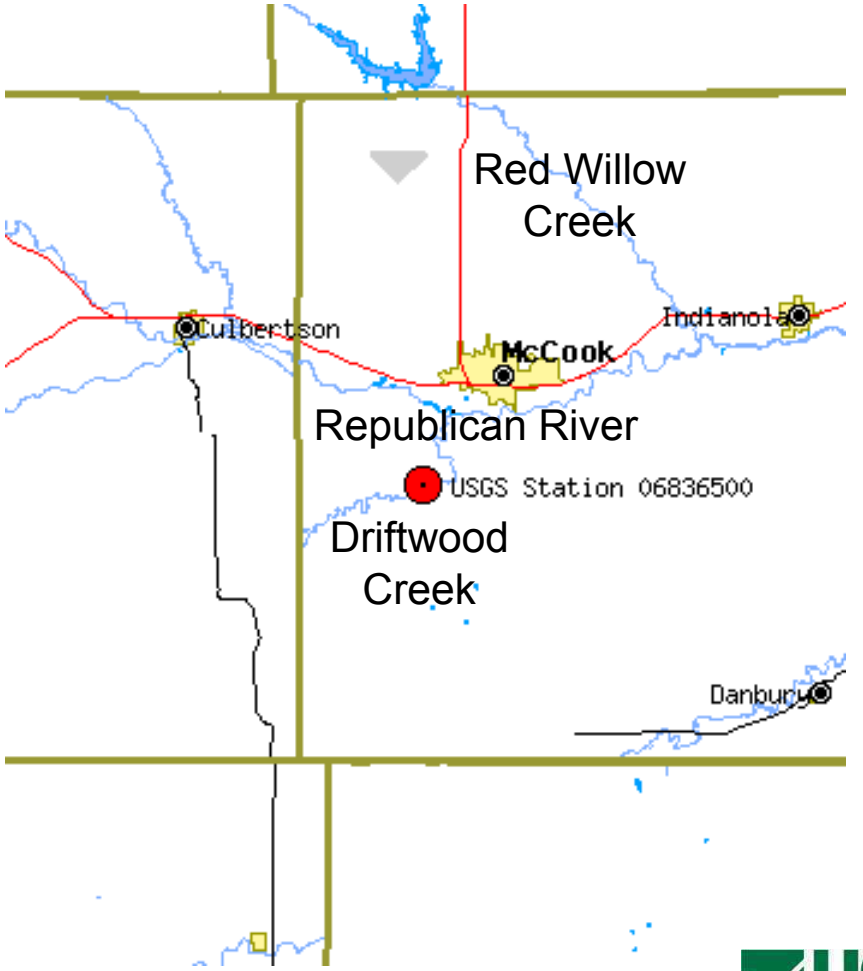
06835500 Frenchman Creek at Culbertson, NE



Driftwood Creek near McCook, NE



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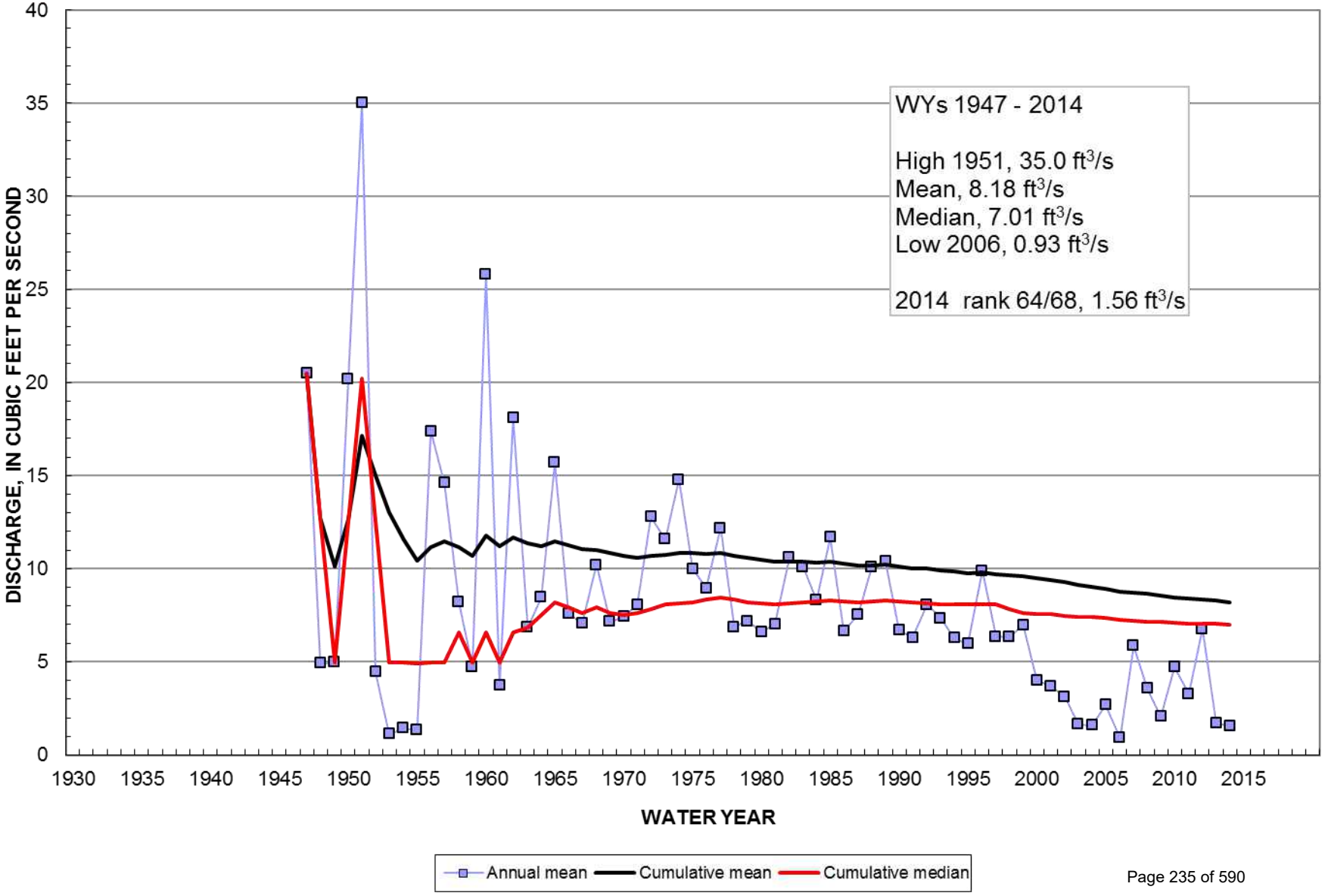
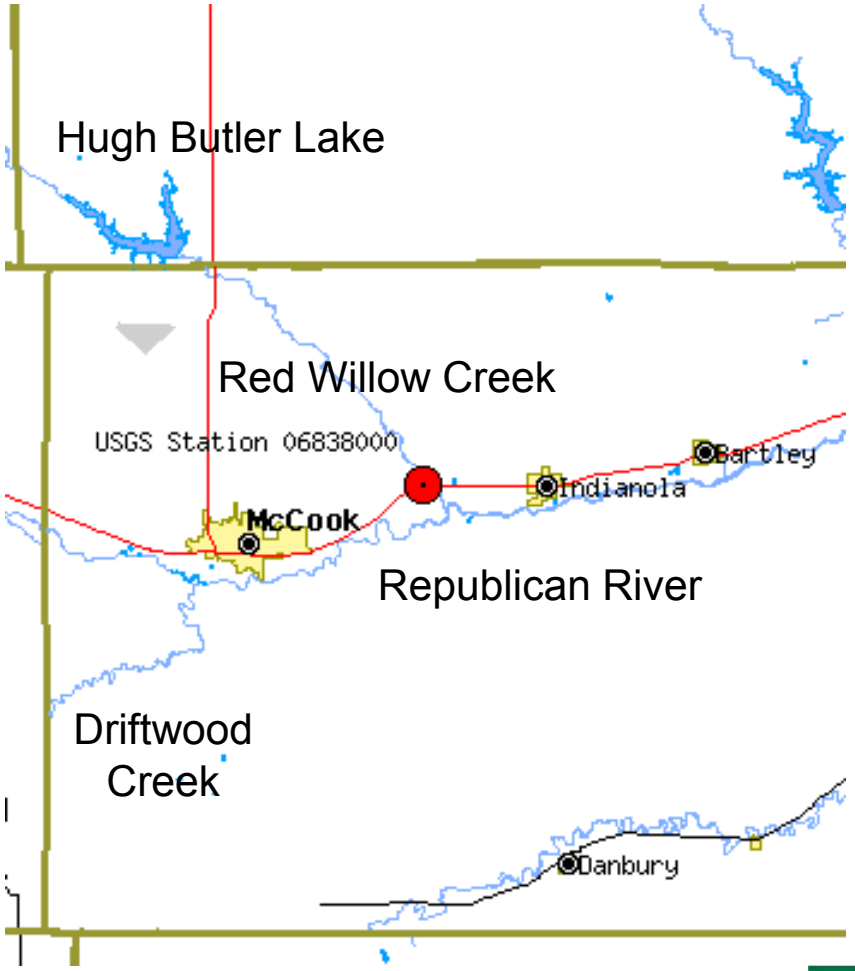
06836500 Driftwood Creek near McCook, NE



Red Willow Creek near Red Willow, NE



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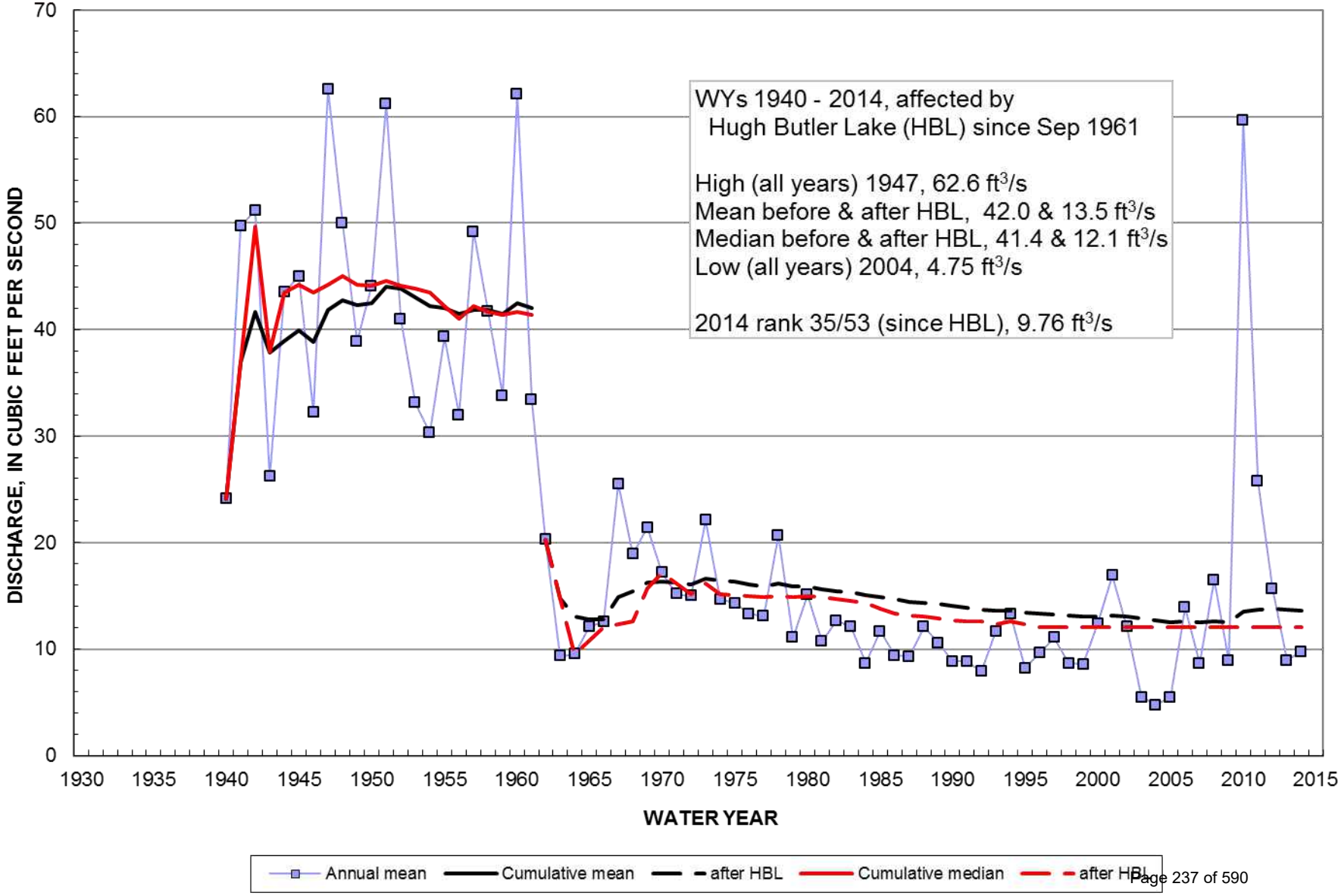
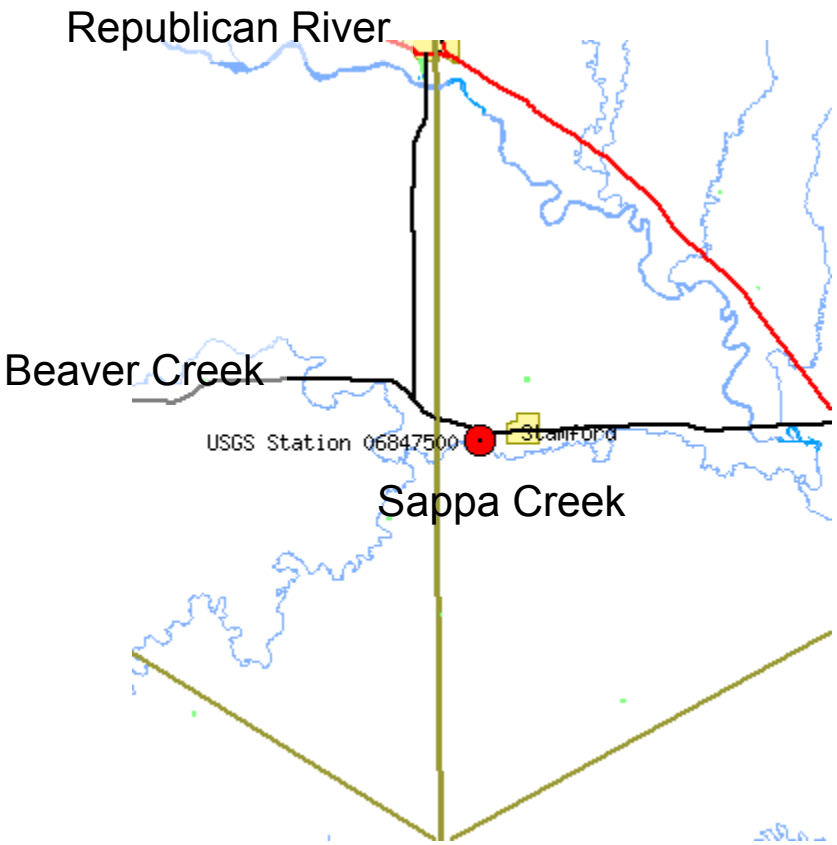
06838000 Red Willow Creek near Red Willow, NE



Sappa Creek near Stamford, NE



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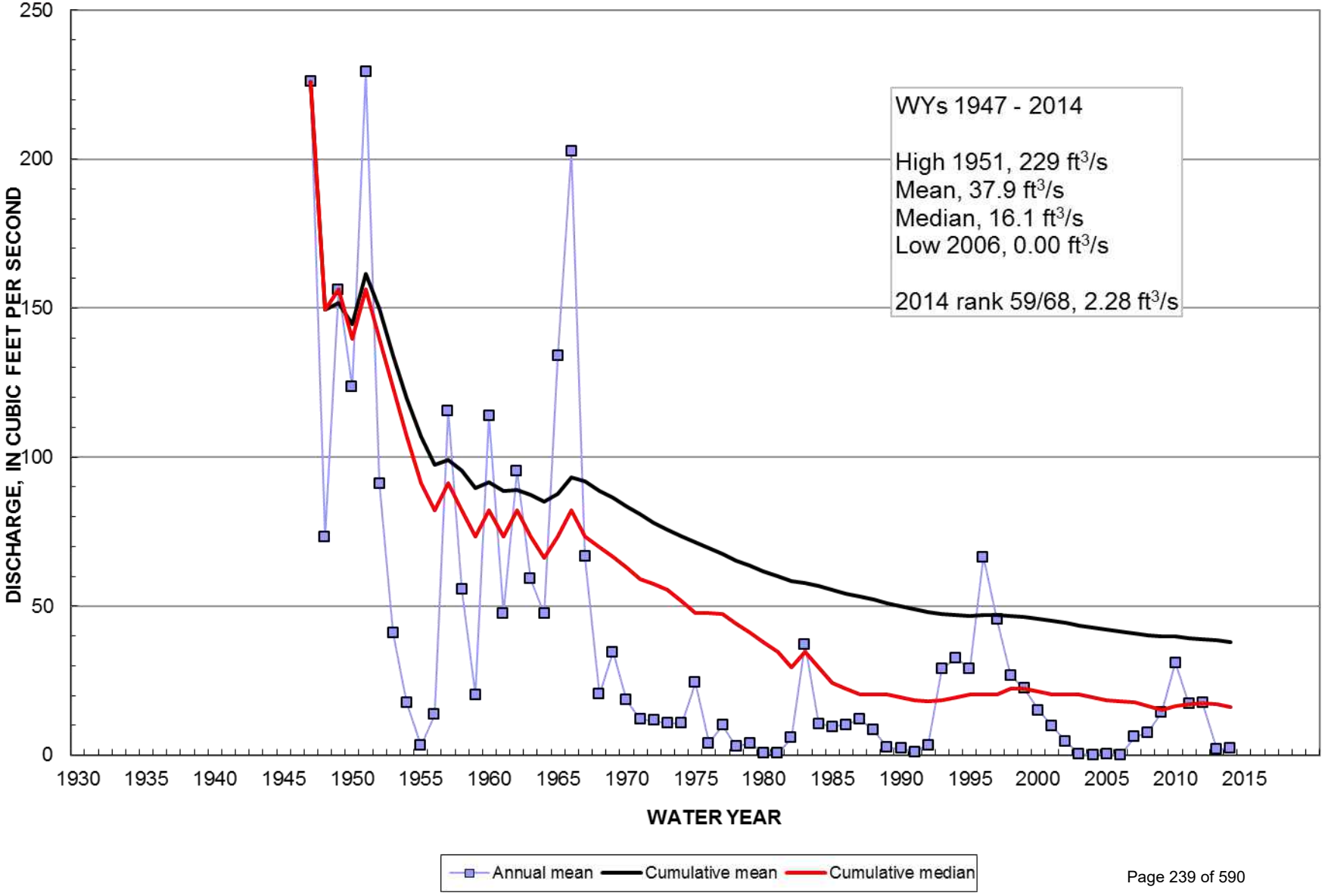
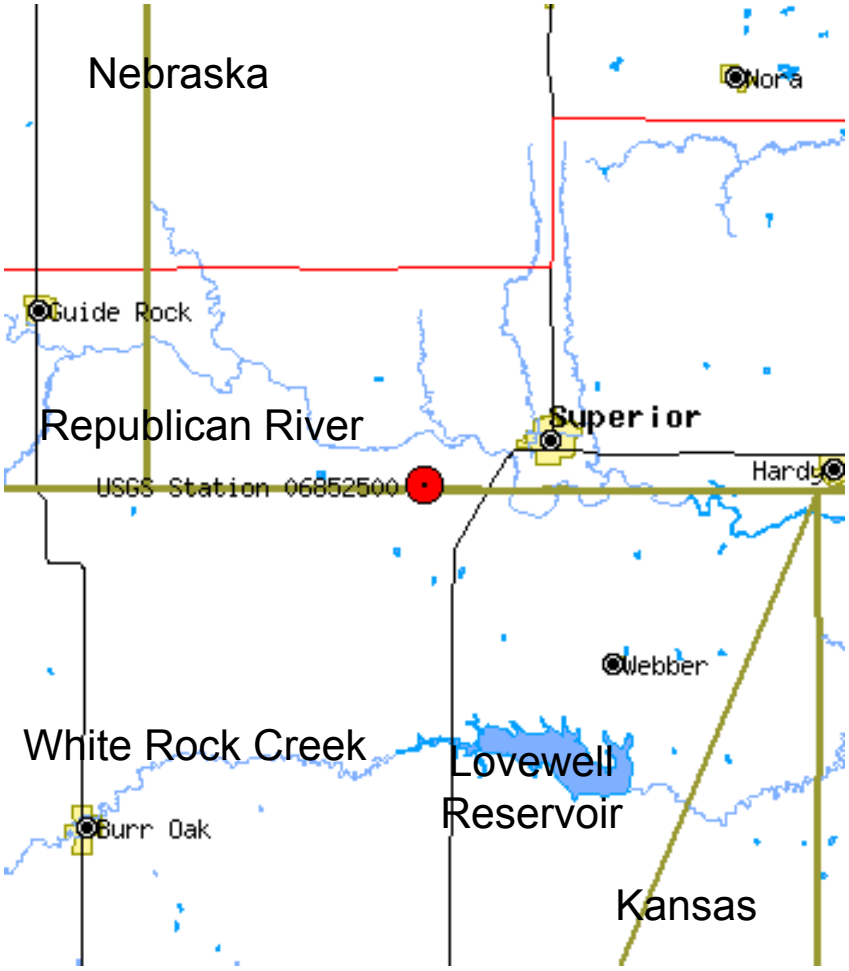
06847500 Sappa Creek near Stamford, NE



Courtland Canal at NE-KS Stateline



Courtland Canal: diverts flow from Republican River; and connects to and extends beyond Lovewell Reservoir in Kansas

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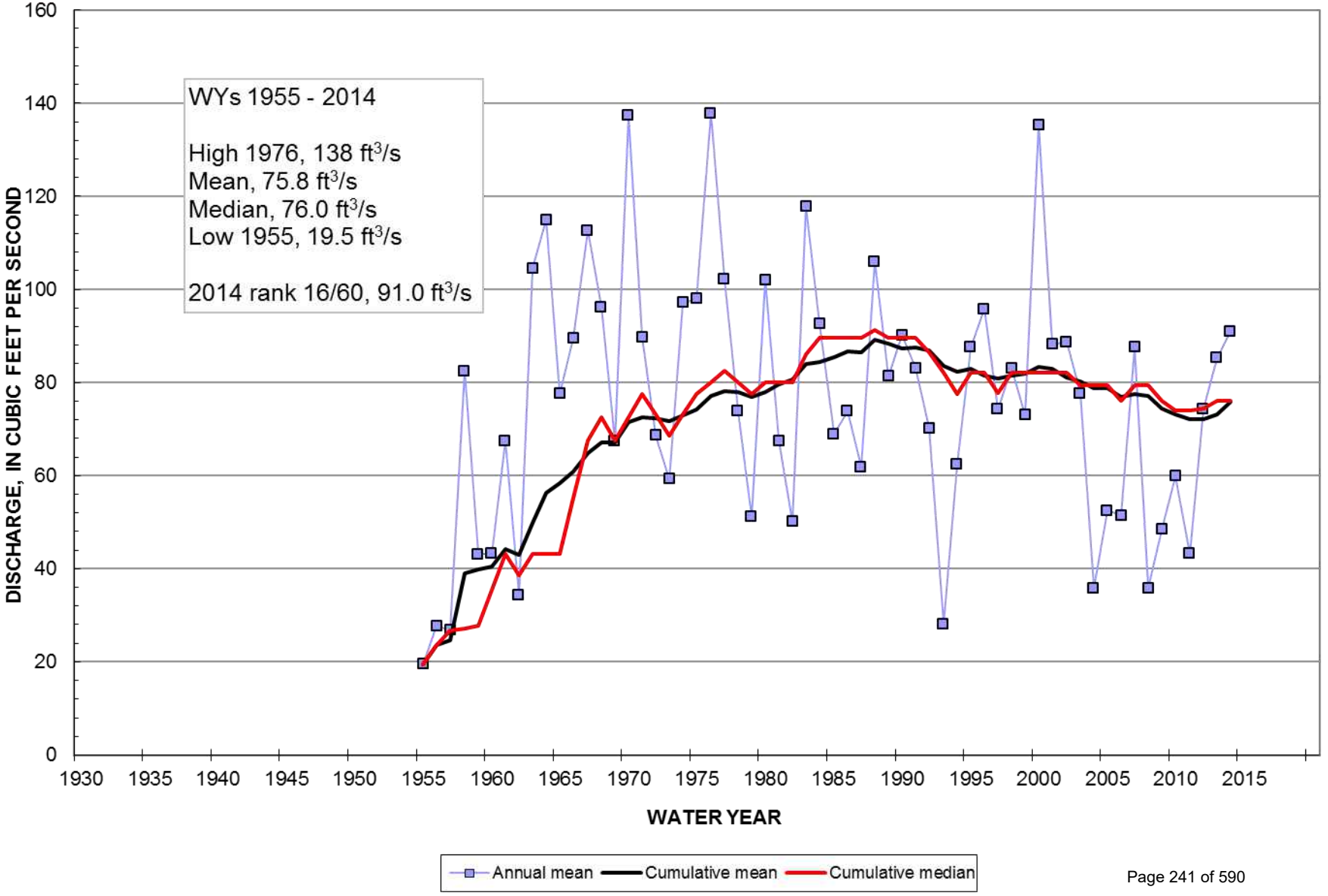
06852500 Courtland Canal at NE-KS State Line



Summary Charts – Other USGS Stations

- Published data for Water Year 2014
- Operated by the USGS Nebraska Water Science Center
- Stations funded by:
  - other Federal agencies
  - State and local agencies with USGS match from the Cooperative Water Program

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Republican River at Stratton, NE

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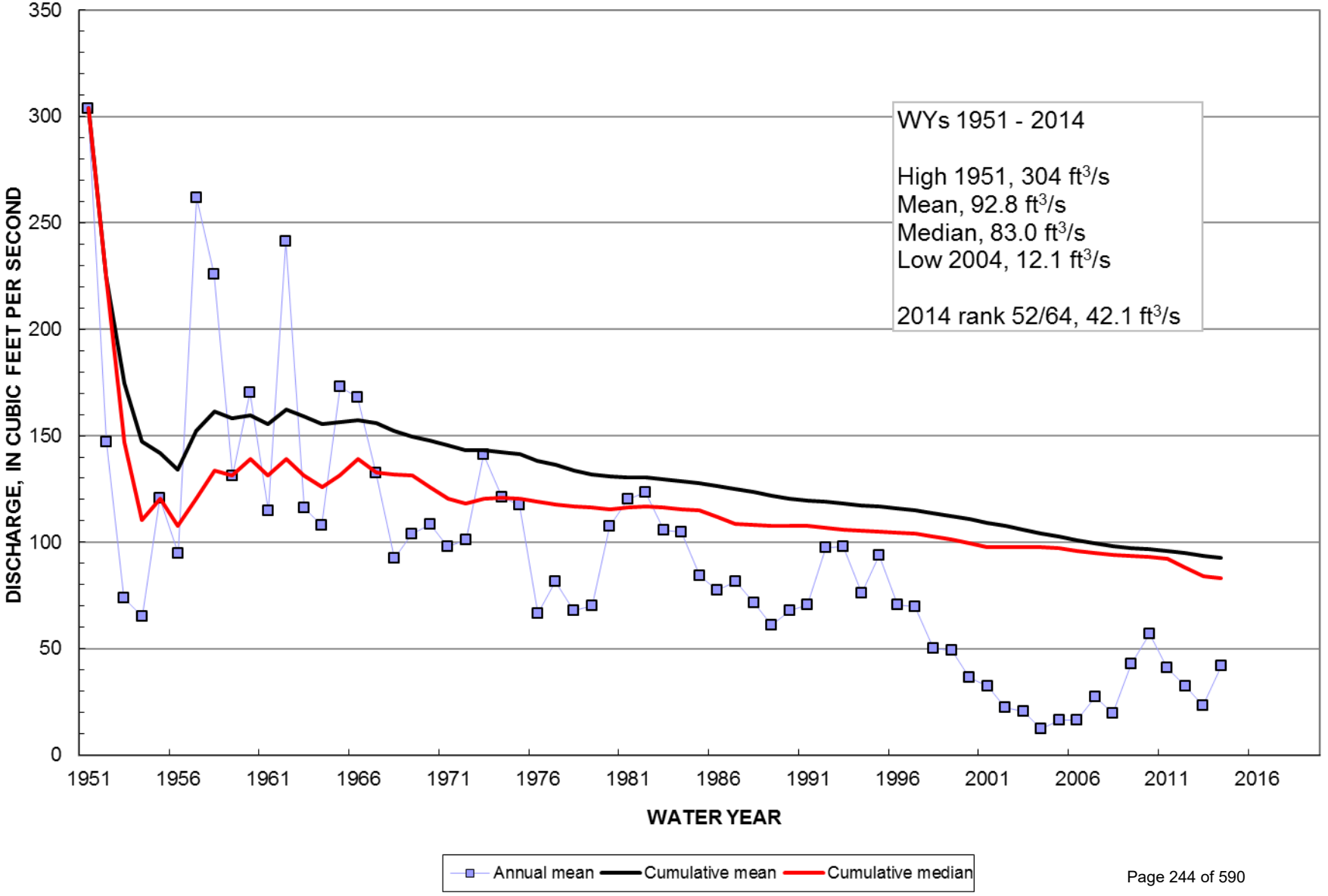
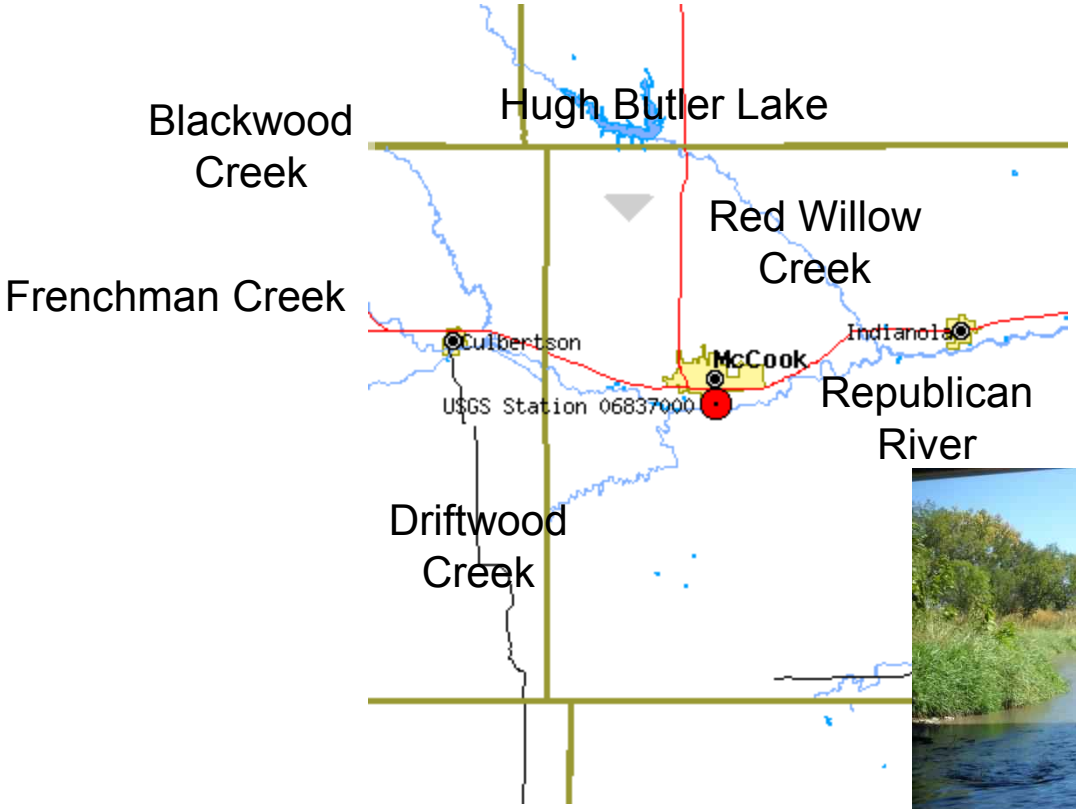
06828500 Republican River at Stratton, NE



Republican River at McCook, NE



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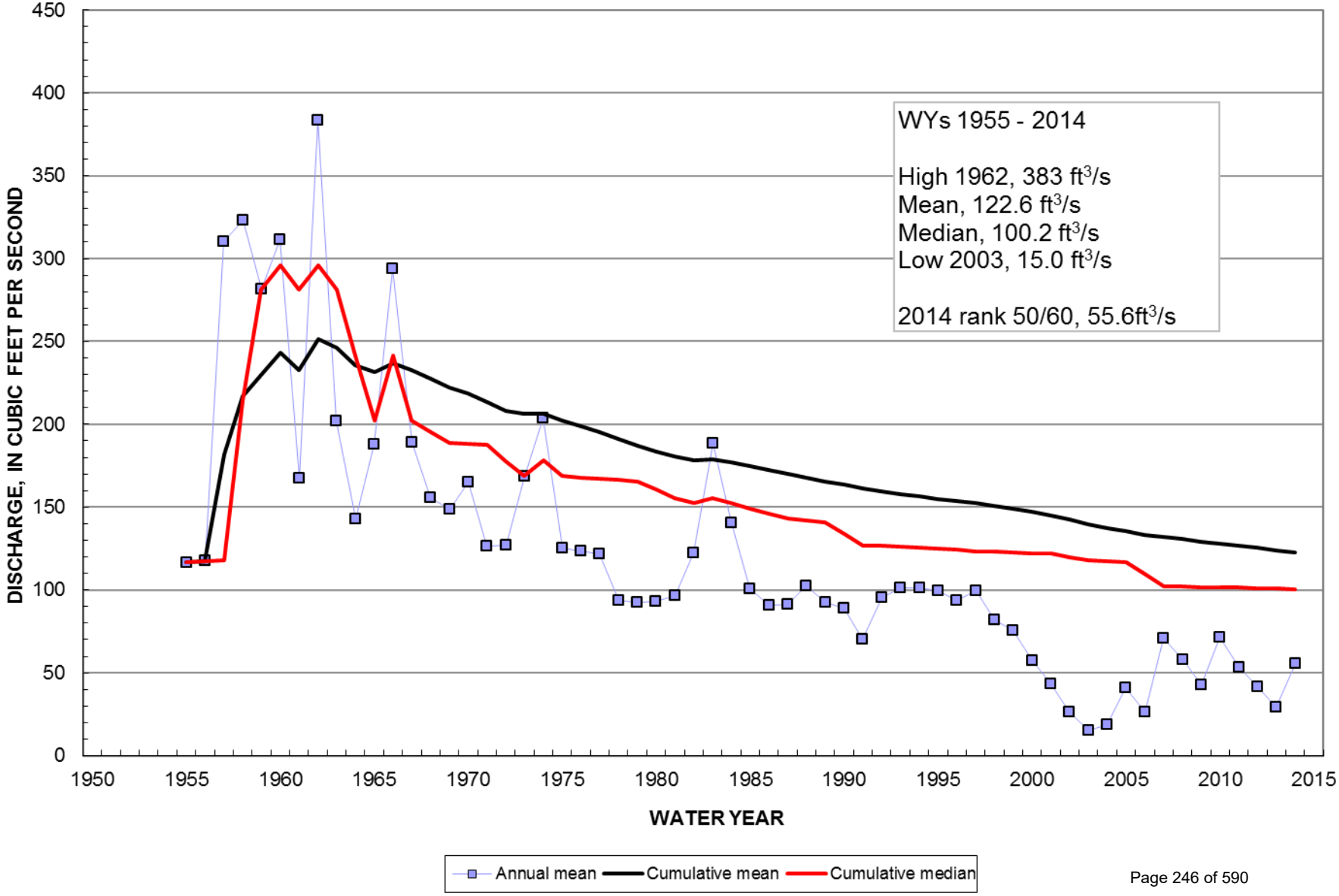
06837000 Republican River at McCook, NE



Republican River near Orleans, NE

Republican River

Sappa Creek

Harlan County Lake

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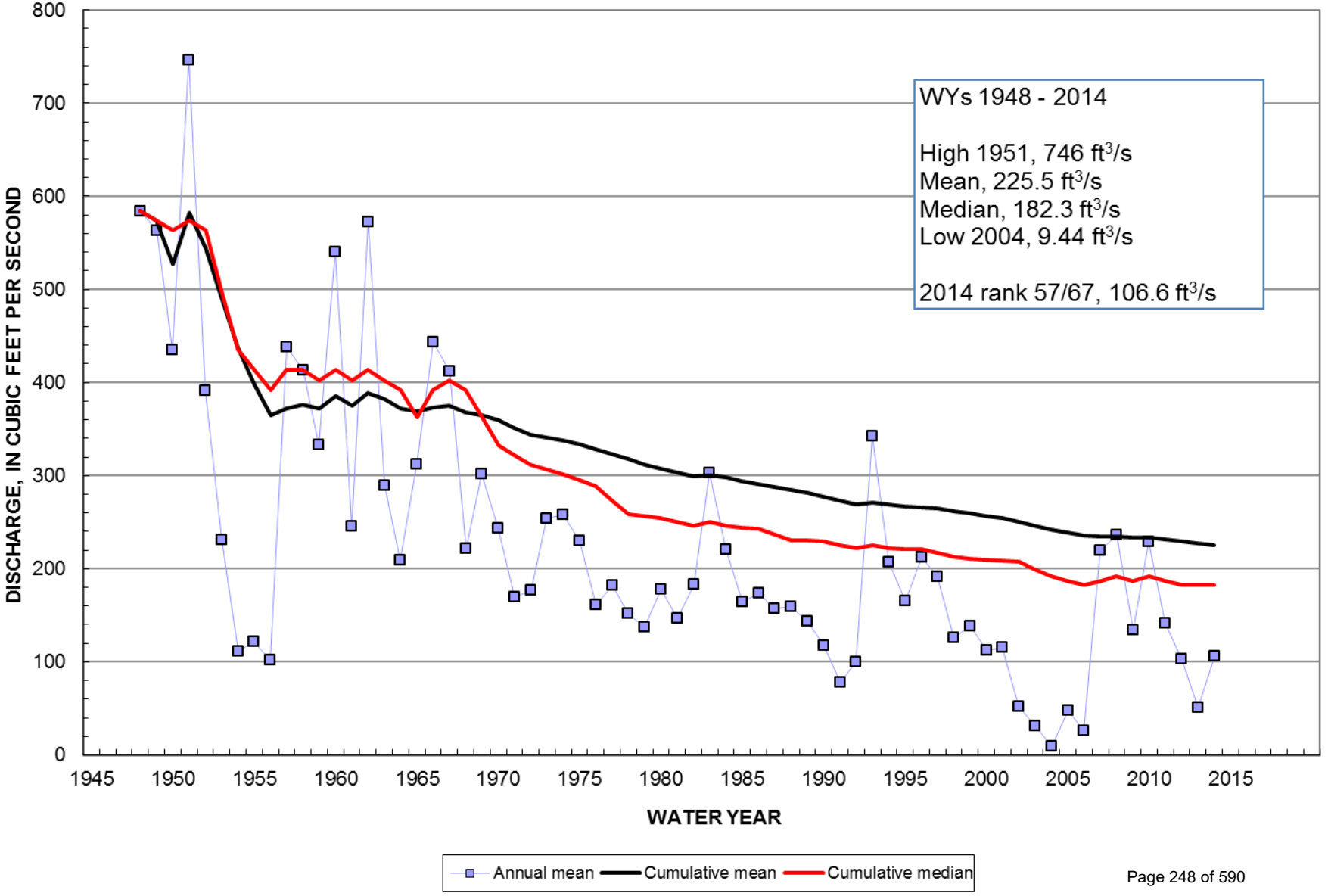
06844500 Republican River near Orleans, NE



Summary Charts – NDNR Stations

- Published data for Water Year 2014
- Operated by Nebraska Department of Natural Resources (NDNR)
- Stations funded by:
  - NDNR – Field operation
  - USGS, USACE, and NDNR – DCP support, Web display, data review, and publication by USGS

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Frenchman Creek at Palisade, NE

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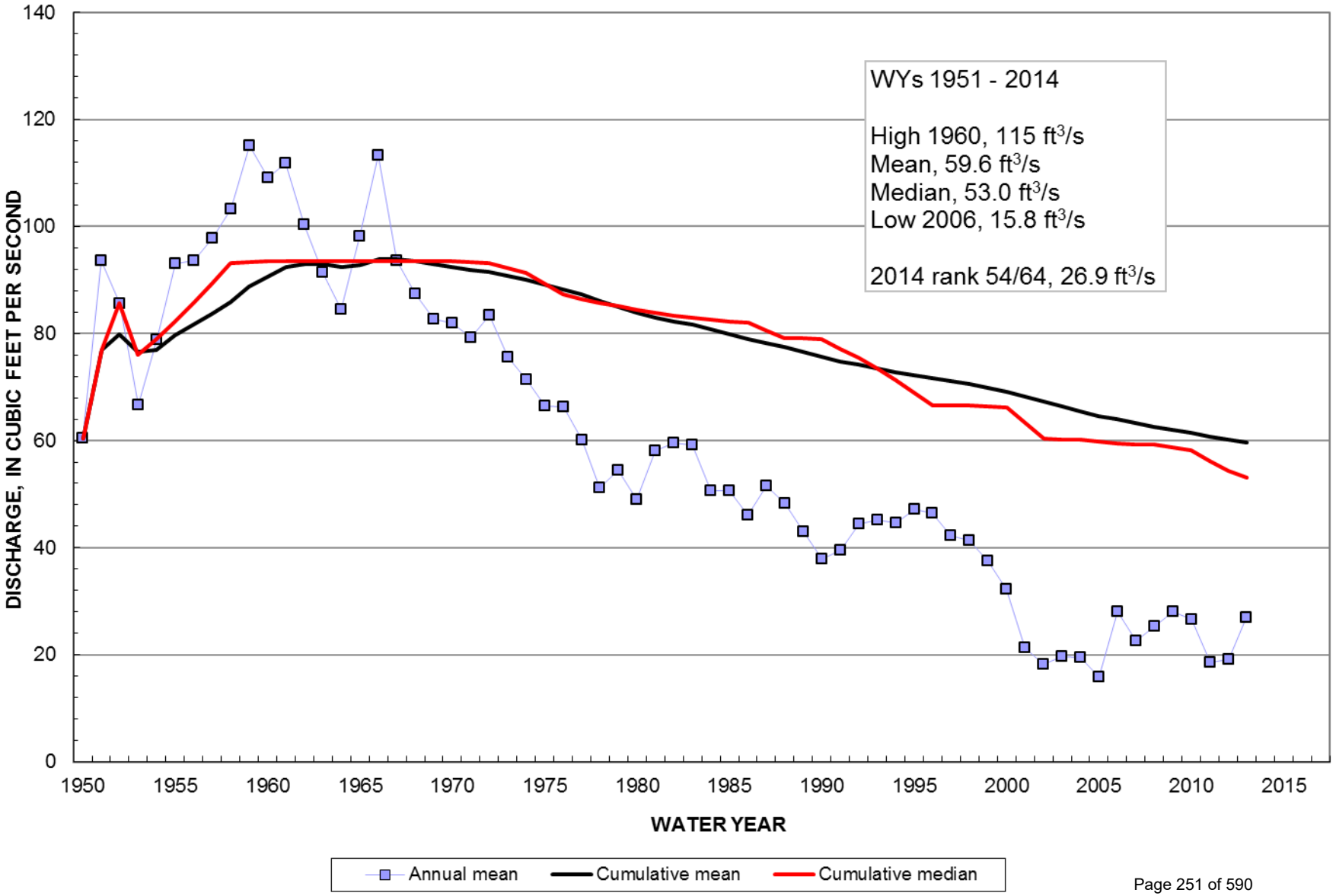
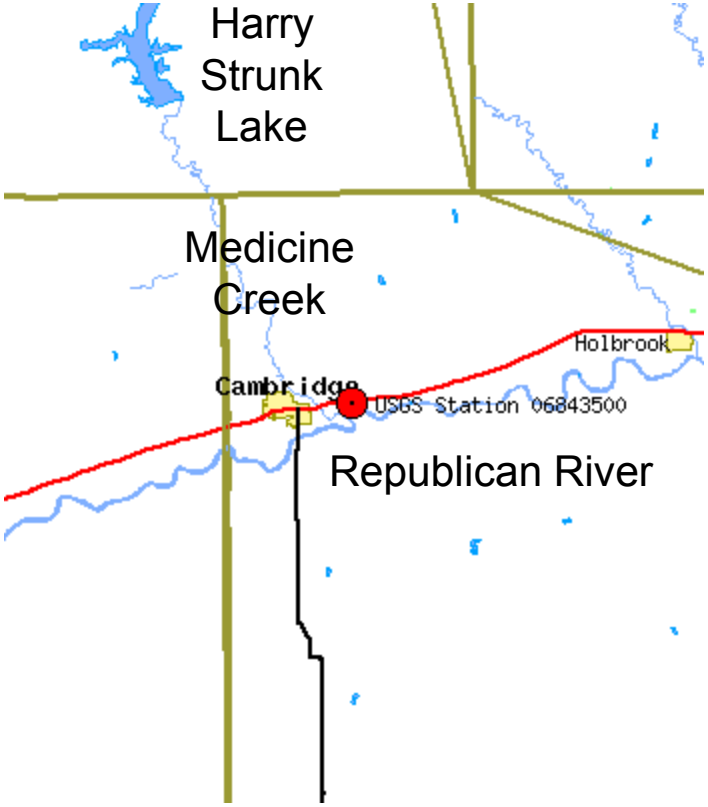
06834000 Frenchman Creek at Palisade, NE



Republican River at Cambridge, NE



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06843500 Republican River at Cambridge, NE

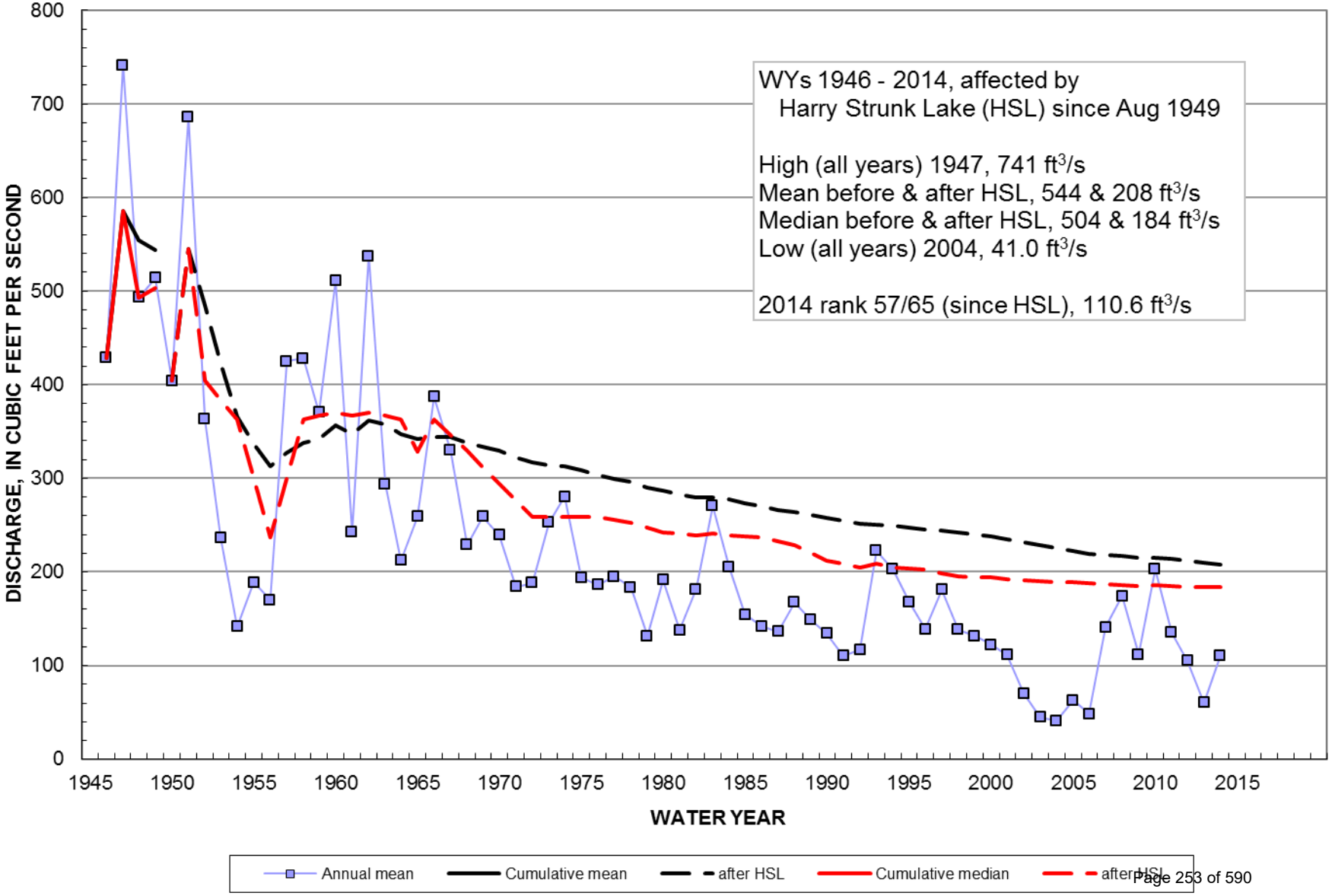

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Exhibit G

Engineering Committee Report

Republican River Compact Administration

August 27, 2015

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) holding quarterly meetings and 2) exchanging information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, including all required data and documentation.

Ongoing assignments include 1) continuing efforts to resolve concerns related to varying methods of estimating ground and surface water recharge and return flows and related issues, 2) continuing to finalize accounting for 2006-2014, 3) working to resolve issues preventing agreement on final accounting for 2006-2014, and 4) discussing any accounting changes that may be needed for surface water diversions for the purpose of recharging groundwater.

The EC recommends discussion by the RRCA on the exchange of data and documentation and the modeling runs completed by Principia Mathematica for 2014, discussion of Nebraska's proposal to revise the RRCA Accounting Procedures and Reporting Requirements and RRCA Rules and Regulations documents, 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 2014 RRCA Annual Meeting. Notes from the four EC meetings are attached: November 4, 2014 (Attachment 1), January 28, 2015 (Attachment 2), May 14, 2015 (Attachment 3), and August 19, 2015 (Attachment 4).
2. Exchange by April 15, 2015, 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, 2015, the states will exchange any updates to these data.
    a. Assignment completed.

b. Kansas, Nebraska, and Colorado posted preliminary data by April 15, 2015. The status and details of the preliminary data exchange was discussed at the May 14 and August 19, 2015, EC meetings (Attachments 3 and 4). All three states had final data posted by August 25, 2015.

c. In advance of the January 2015 meeting, Willem Schreüder of Principia Mathematica executed model runs as prescribed by the committee for 2014 using full-year temperature and precipitation data, river data, and pipeline information. He also executed preliminary model runs for 2015 using temperature data, long-term average precipitation data, 2014 evaporation data, river data, and pipeline information. This information has been posted to the RRCA website.

d. The Committee discussed the process of 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 to present.

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 2006-2013.

    a. Assignment ongoing.

    b. The EC discussed Schreüder's concerns about which values to use for accounting, due to issues with items like the USGS streamflow gages date, which are subject to change. Schreüder prepared an accounting spreadsheet for discussion at the July 2015 EC meeting.

5. Work to resolve issues preventing agreement on final accounting for 2006-2013, as identified in the 2014 EC Report. These issues include:

    a. Evaluation of whether to include direct return data from canals in accounting calculations and modeling (Column C of Attachment 7 to the RRCA Accounting Procedures).

        i. Assignment complete.

        ii. Nebraska submitted a proposal for changes to the RRCA Accounting Procedures and Reporting Requirements document, which included changes proposed in the Report of the Special Master, as well as changes to Attachment 7 of the document for Spill to Waste-way data, and Percent Field and Canal Loss that Returns to Stream for the Non-Irrigation Season. This proposal is available as Attachment A to the May 2015 EC Minutes (Attachment 3). The EC discussed this proposal at the August 2015

meeting and has agreed that the proposal should be recommended for approval by the RRCA.

b. Kansas's request for beginning and ending meter data from other states.

   i. Assignment ongoing.

   ii. Kansas reviewed and approved Nebraska's beginning and ending meter data, does not see a need for further review of these data, and

   iii. Kansas is reviewing Colorado's meter data. Colorado's 2012, 2013, and 2014 meter data are now available on the RRCA website. As Colorado has no meter data older than 2012, Kansas is examining how the 2012-2014 data correspond with the 75 percent Gross Irrigation Requirement assumption.

c. Reaching consensus about how to model Bonny Reservoir.

   i. Assignment ongoing.

   ii. Kansas and Colorado discussed this issue in ongoing confidential conversations.

6. Discuss any accounting changes that may be needed for surface water diversions for the purpose of recharging groundwater, as data become available from Nebraska projects.

   a. Assignment ongoing.

   b. Nebraska submitted a proposal for changes to the RRCA Accounting Procedures and Reporting Requirements document, which included changes proposed in the Report of the Special Master, as well as changes to Attachment 7 of the document for Spill to Waste-way data, and Percent Field and Canal Loss that Returns to Stream for the Non-Irrigation Season. This proposal is available as Attachment A to the May 2015 EC Minutes (Attachment 3). The EC discussed this proposal at the August 2015 meeting and recommends that discussions continue within the EC on this topic.

7. 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.

8. 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 not completed

   b. Kansas and Nebraska have discussed the issues related to calculating the incremental increase in reservoir arears, and they are close to being resolved. Discussion of these issues will continue at Three-States meetings.

9. Continue to explore the development of an RFP to determine contractor options for the annual model update and model repository.
    a. Assignment not completed

OTHER COMMITTEE ACTIVITIES

1. A Conservation Committee Terraces Study Report was provided to the RRCA for their consideration at the August 2014 Annual Meeting. Since the August meeting, the EC has been working on two follow-up tasks related to this report. First, preliminary data from the report have been posted on the RRCA website, with final data forthcoming when Schreüder receives it from the Bureau of Reclamation. Second, the EC has developed an author and participants' page for the report and it is posted to the RRCA website (http://www.republicanrivercompact.org/misc/Reference%20Page_Conservation%20Committee_Jun2014FinalReport.pdf). A copy is included in this report as Attachment 5.
2. The EC discussed changes in status for three stream gages: Beaver Creek, Republican River at Guide Rock, and Republican River at Benkelman. The Beaver Creek and Guide Rock gages were formerly maintained by Nebraska, now, due to an increased allocation of funds, the USGS has been able to assume responsibility for them. Benkelman had been discontinued by the USGS, but was started again due to the increase in funds. In addition, Nebraska kept the EC informed about WISKI, its new website for real-time data for Nebraska stream gages.
3. Updates on the status of the development and review of RRCA annual reports for 2013, 2014, and 2015 were given by the states at each quarterly EC meeting.
4. The EC discussed Nebraska's 2015 water administration during the January 2015 meeting. This is a Compact Call Year, but the Rock Creek and N-CORPE augmentation projects will provide for the forecasted water shortage. Nebraska and Kansas expressed mutual interest in being relieved of the burden of Warren Act contracts.
5. Kansas suggested that the RRCA develop an administrative website that would be an informational page for the general public. Kansas is developing a draft to share with the EC for discussion.
6. Nebraska has developed a new method for tracking non-federal reservoirs. The new method was discussed at the August EC meeting.
7. Willem Schreüder of Principia Mathematica executed model runs for the years 2007 – 2013 incorporating the new values for the accounting change required by the February 2015 Court order.

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 2014 are complete. The EC has examined the data exchanged and the results from Principia Mathematica and agrees that the 2014 modeling runs are complete.
2. Discussion and direction on the specific modeling and data tasks to be assigned to Principia Mathematica for new data in year 2015.
3. Discussion of Nebraska's proposal to revise the RRCA Accounting Procedures and Reporting Requirements document and RRCA Rules and Regulations to include changes proposed in the Report of the Special Master as well as Attachment 7 of the Accounting Procedures to include direct return data from canals in accounting calculations and modeling.
4. 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 7 items in this report as recommended assignments for 2015.

RECOMMENDED ASSIGNMENTS FOR THE COMING YEAR

The Engineering Committee recommends 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, 2016, 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, 2016, the states will exchange any updates to these data.
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.
4. When possible, continue efforts to finalize accounting for 2005-2014.
5. Work to resolve issues preventing agreement on final accounting for 2006-2014, as identified in the 2015 EC Report. These issues include:
    a. Kansas's review of Colorado meter data.
    b. Reaching consensus about how to model Bonny Reservoir.
6. Discuss any accounting changes that may be needed for surface water diversions for the purpose of recharging groundwater, as data become available from Nebraska projects.

7. 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.
8. Draft a letter to the USGS to discuss how the RRCA can get finalized gage data by April 15 of each year.
9. Create a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures

The Engineering Committee Report and the exchanged data will be posted on the web at www.republicanrivercompact.org.

SIGNED BY

James Schneider
Chair, Engineering Committee Member for Nebraska

Ivan Franco
Engineering Committee Member for Colorado

Chris Beightel
Engineering Committee Member for Kansas

Attendees:

Jim Schneider	Nebraska	Chris Beightel	Kansas
Jennifer Schellpeper	Nebraska	Chelsea Erickson	Kansas
Kathy Benson	Nebraska	Willem Schreuder	Principia Mathematica
Ivan Franco	Colorado		

1. Introductions

2. Review/Modify Agenda – no modifications were made at the meeting.

3. Publication of RRCA Annual Reports
    a. Erickson stated that work continues on the 2013 (4 & 5) annual reports. Franco continues work also on the meetings he is processing (2 & 3) and **they are both to have them ready for the August annual meeting.** Nebraska sent their comments on the December 2012 meeting to Erikson.
    b. Nebraska has the transcripts for the 2014 reports and the summaries are currently being worked on. **Processing on the annual meeting will be next and drafts for will review will be forthcoming.**

4. Modeling and Data Tasks for Principia Mathematica
    a. **Schreuder continues to work on documentation.** He has had little time to make much progress.

5. Conservation Committee Terraces Study
    a. Data is posted on the website **with final data forthcoming when Schreuder receives it from the BOR.**
    b. Need to add author and participants page to the report. The 2004/05 Conservation committee formed. Martin/Koelleker are the authors. **Kansas will draft an author page and route it for review. Schreuder can post it to the website.**

6. Data Exchange
    a. Colorado still needs NASS data for crop distribution. NASS may no longer have irrigated/non-irrigated data differentiated so process is taking longer. Not a measurable difference in pumping from 2013 data. The original canal leakage calculations for the CNPPID system were incorrect. Nebraska supplied corrected canal leakage values and Schreuder re-ran the analysis. Model results stayed nearly the same.
    b. 2014 Accounting-Schreuder ran models repeating the 2013 values in 2014, CCP used historical data. 2014-2015 ran website model as committee wanted. Data is on the website.
    c. 2015 runs-repeat 2014/2013 data. First cut is done for 2015.

7. Estimating Ground and Surface Water Irrigation Recharge and Return Flows
    a. Beightel hasn't had time to work on this

8. Accounting changes for Nebraska Groundwater Recharge Project
    a. Nebraska has pulled together some data and **will have ready for the next meeting.**

9. Future Augmentation Plans – no discussion at this time.

10. Harland County Lake-Evaporation Charges and Compact Accounting Adjustments – no discussion at this time

11. Evaluation of Whether to Include Direct Return Data from Canals in Accounting Calculations and Modeling
    a. Schneider asked Kansas for feedback. Response by Beightel was to use the Meeker Driftwood example. He also suggested Nebraska offer a resolution and propose a solution and it be done in that manner. Schneider stated he was not sure that Meeker Driftwood was the best example but maybe the Cambridge Canal spills would be better. **Schneider offered to put something together and have it tested next year.**

12. Beginning and Ending Meter Data
    a. Nebraska has given some data to Kansas, and **Kansas would like to continue their audit until the end of the year then will return it to Nebraska**. **Beightel needs to review the Colorado data** as there is a question on over pumping. Colorado data is online for 2013 but it is not complete, 2012 data is complete but not out yet. 95% of the data is complete. Beightel requested data as far back as possible. **Franco will get the numbers to Beightel**. There is data on Schreuder's website.

13. Modeling Bonny Reservoir
    a. **Kansas and Colorado discussions are ongoing**

14. Streamgages-Status Updates
    a. Schneider stated that USGS took over the responsibility for Beaver Creek and the Republican River at Guide Rock and Benkelman.
    b. DNR will be responsible for the gage at Medicine Creek below Harry Strunk Reservoir. A website has been developed and data migration software is going through an upgrade (WISKI 6 to 7). Hopefully real-time data will be posted by the end of the year. Beightel asked how many real-time gages there were. Schneider shared there are approximately 10 real-time gages in the Republican River Basin and statewide approximately 100 streamgages. Should be good data availability soon with Phase I becoming available.

15. Summary of Meeting Actions/Assignments
    a. Assignments and agenda stay the same

16. Future Meeting schedule
    The next meeting is a Three-States Meeting on January 13th, 2015, in Lincoln. The meeting was adjourned at 1:40 p.m.

Drafted 02/12/15

Meeting Notes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
January 28, 2015, 1:00 PM Central Time, 12:00 PM Mountain Time

Attendees:

Jim Schneider	Nebraska	Chris Beightel	Kansas
Jennifer Schellpeper	Nebraska	Ginger Pugh	Kansas
Ryan Werner	Nebraska	Willem Schreuder	Principia Mathematica
Kathy Benson	Nebraska	Ivan Franco	Colorado
Bill Peck	BOR, McCook	Tom Riley	Flatwater Group
Craig Scott	BOR, McCook		

1. Introductions

2. Review/Modify Agenda
    a. Schneider requested to add to the agenda discussion about Three-States meeting dates and discussion on water administration activities year-to-date. A proposal letter was sent to the Department from the Bureau that suggested being more in sync with tracking water administration or we may have the same situation as before with Kansas water in Nebraska.

3. Publication of RRCA Annual Reports
    a. 2013 Reports (Kansas)
        i. Erickson was to give an update but was not able to attend the meeting. **This item will stay on the agenda.**
    b. 2014 Reports (Nebraska)
        i. Benson gave the report on the status of the meeting minutes. The November EC minutes were emailed to everyone on 12/12 and 1/16 and are ready for a final copy. For the special meeting minutes, the December 2013 minutes were emailed on January 8th with attachments and sent to Kansas for review. **Kansas still has possession of them and is to send them on to Colorado.** For the October 2014 special meeting, Nebraska is currently drafting the summary, and Nebraska is still waiting on the transcript for the November 2014 special meeting. The August 2014 annual meeting summary has been drafted **and will be ready to send to everyone in the near future.**

4. Modeling and Data Tasks for Principia Mathematica

a. Documentation
    i. Schreuder reports no progress on this.

5. Conservation Committee Terraces Study
    a. Posting of final data from BOR to website
        i. Schrueder continues to wait on the GIS data.
    b. Draft Author Page
        i. Beightel reported Erickson has been able to collect data from her contacts with Drs. Martin and Koelliker as well as some of the farmers and plans on giving them space on the author page. **Erickson is working on the draft and hopes to have it ready by the next EC meeting.**

6. Data Exchange
    a. 2014 Accounting
        i. Schrueder ran 2014 using full-year temperature/precipitation data, river data, and pipeline information.
        ii. Franco referred to the information Schrueder sent out on January 7th. There have not been any new data from Schrueder with the 2014 correct data crop statistics. Schrueder reported that he heard from Jim Slattery who is working on county totals on the Colorado crop data but the problem exists wherein irrigated acres are no longer specified. Total values are being used for both dry and irrigated values. Beightel suggested to Schrueder to use pumping data to differentiate dry and irrigated land. Schrueder was not sure if that would work the way he would want it to.
    b. 2015 Accounting
        i. Schrueder ran the same data as in 2014 verbatim except he used the long-term average data for precipitation. For evapotranspiration he used 2014 data. This information is posted to the website. He also cleaned up the output as there was starting to be too many large columns.

7. Estimating Ground and Surface Water Irrigation Recharge and Return Flows
    a. Draft scope and needs document regarding changes in irrigation efficiency.
        i. Beightel reported there has not been any progress made on this. **He reassured the attendees that it will get done.**

8. Accounting changes for Nebraska Groundwater Recharge Project
    a. Discuss how accounting procedures address evaporation and diversion at different times of the year
        i. Werner put together the data that were sent out on Friday showing how evaporation varies throughout the year. Schneider stated these data are foundational information for a proposal that Nebraska is working on for a different way of accounting for diversions outside of the irrigation season (October to April). Nebraska will be specifically looking at the value of Table 7, which states an 82% loss of water not returning to the stream. **The goal is to**

present an accounting change proposal to the RRCA by August and so hopefully to the engineering committee at the April meeting. Jim encouraged the group to contact Werner if they had any questions on the data.

9. Future Augmentation Plans – Application and Approval Process
    a. Schneider stated **this item will be discussed at the Three-States Meeting.**

10. Harlan County Lake - Evaporation Charges and Compact Accounting Adjustments
    a. Examples for calculating the incremental increase in reservoir areas
        i. Beightel reported no progress.

11. Evaluation of Whether to Include Direct Return Data from Canals in Accounting Calculations and Modeling
    a. Proposed resolution and example (Nebraska)
        i. Schneider reported this has to do with Table 7 and direct returns to the stream. A minor change was added to compute canal loss. **Nebraska will have a proposal ready by the April meeting using Meeker Driftwood/Cambridge**, which will be running and do have monitored drains on them. It will be a fairly small change, as the BOR will be running the canals "tight" to minimize spills. Scott has reported in the past that data do exist for the Franklin canal and other canals on the Bostwick system. Peck confirmed this. Schneider asked if Beightel was willing to entertain this option on a trial basis if the proposal looks good. Beightel stated he was open to this. Schneider stated that **a formal proposal and example would be sent out before the next meeting, and a recommendation made to the RRCA before August.**

12. Beginning and Ending Meter Data
    a. Audit of Nebraska data (Kansas)
        i. Beightel approved the data. He does not feel there is need for any further review, and sees no roadblock for the accounting.
    b. Review of Colorado Data (Kansas)
        i. Beightel and Franco seemed unsure as to what data were given and what needed to be given and said they would check on this. Schrueder thought Kansas was given 2012 and 2013 back in August. Franco stated 2011 data were not used because that was a year of trying to get meter data figured out. Schneider stated **this will be kept on the agenda.**

13. Modeling Bonny Reservoir
    a. Kansas and Colorado discussions
        i. Schneider stated that, as ongoing conversations between Kansas and Colorado are confidential, this agenda item will be skipped today and **kept on the agenda for the next meeting.**

14. Stream gages - Status updates
    a. Real-time data availability for Nebraska's gages
        i. Schneider reported there is a real-time data website up and running. The Nebraska gage data will be operated similarly to USGS stream gage data. The site also provides links to USGS gage data. The goal is to include historical data at some point and make the map interactive. **Schneider encouraged the committee to contact Jeremy Gehle at the Department if there were any questions or comments.**

15. New Agenda Item:
    a. 2015 Water Administration
        i. Schneider stated this is a Compact Call Year with a forecasted shortage of 17,600 acre-feet. The augmentation projects will provide for this shortage. Schneider's understanding is that Rock Creek is running into this year in order to meet the target from last year, which was not met due to equipment issues. When Rock Creek hits its target they will shut it down, as it has been pumping 36,000 acre-feet over the last two years. The N-CORPE project is operating. They also had issues with wells, but are now pumping water for 2015 compliance. Harlan County Lake is accruing water, and the BOR has been reporting their monthly tracking data. Nebraska received the data at the end of 2014 with 30,000 acre-feet of water. 14,100 acre-feet will be retained under the Warren Act contract and the rest back under project water, and then the BOR will start tracking the accruals to the various accounts. Schneider said **this will be revisited in April.** Nebraska is not planning any changes in the Water Administration until the 17,600 acre-feet is into Harlan County Lake. It appears Nebraska is 5,000 acre-feet on the way towards that goal, as inflows have picked up since the beginning of the month. The BOR proposes releasing water out of Harry Strunk to help meet that goal faster and allow for water rights to be opened to store water for project use this year. Schneider is not sure the release is necessary, but it might help Harlan County Lake operations. Data were received from Craig Scott showing how they would expect to operate, based on historic conditions, if there was no water administration before the irrigation season and possibly during the irrigation season. **Jesse Bradley is looking at that data and the goal is to provide more certainty to the irrigation districts**. **More discussion is needed throughout the year** or we may end up in the same situation, wherein Kansas water is still in Nebraska with Kansas having no place to store it. Schneider asked if this was okay to add to the agenda items.

        Beightel was in favor of this being on the agenda. No response from Franco. Beightel had questions for the BOR. He suggested the arrangement seems to be a *quid pro quo* to release water from Harry Strunk in lieu of Nebraska opening up the basin. Beightel asked whether closing notices being off would mean that the water released would automatically become project water and under the BOR's full control. He also asked if all the enclosed water in Harlan County Lake is

accrued to the Kansas Bostwick District's account, what is that account? He wanted more clarification on what the BOR was referring to in their correspondence and how Kansas will be impacted. **Bill Peck said he would pass this question on.** Peck did confirm on the first question that his understanding was that once the 17,600 acre-feet is met, the rest would be project water. Beightel also asked Peck for more clarification on the N-CORPE pumping and **Peck stated he would get more clarification.**

Beightel asked Schneider about the Rock Creek and N-CORPE pumping to meet targets for last year and asked if those were Nebraska targets. Schneider stated that Nebraska has already administered the water through to Kansas, but still needs to keep its commitment so the administration has minimal impact to the water users. Riley also commented on Beightel's question, stating that Nebraska still needs to fulfill its commitment even though Kansas has its water.

Schneider feels the issues that have come up over time for the BOR and water users that have been causing an impact, such as a need to enter into new contracts or the increased uncertainty in terms of water supplies, are all related to Nebraska's water administration. He stated that water administration is the only tool Nebraska has to ensure its compact obligations, but that Nebraska would be happy with not having to use that tool if it knew that compact compliance would be ensured. He stated that under the IMPs, augmentation projects are used to pump water in the river, administration to shepherd it through, and administration to address any uncertainty in the forecast. If Nebraska knew it would happen some other way, Schneider would be thrilled not to send opening and closing letters throughout the year. He feels that if there were not the burden of Warren Act contracts, Kansas might then provide more flexibility on how Nebraska sends the water, such as making up shortfalls in the fall or winter. Everyone can get what they want by giving something. **This will be a topic of discussion for upcoming meetings.**

Beightel supports Schneider's statements, and stated that Kansas would be interested in looking at what kinds of flexibilities they could afford if they did not have to deal with the Warren Act contracts, which are quite a burden to the Kansas district. Beightel states that Kansas also needs to look long-term to protect its allocations.

Schneider asked Peck to relay these comments to the BOR. (Craig Scott had stepped out of the meeting).

16. Summary of Meeting Actions/Assignments
    a. Schneider reported that meeting notes will be sent out again to cover assignments.

17. Future Meeting Schedule
    a. The Engineering Committee has meetings scheduled for April and July of this year, which will fulfill the four meetings for the year. Schneider asked if anyone needed more meetings scheduled. Beightel felt the EC meetings and Three-States meetings were enough for now. The proposed Three-States meetings for the next three months will be in Denver next month, Manhattan the following month and then back in Lincoln. Schreuder will not be able to make all these meetings due to his schedule. Schneider stated phone access will be made available if needed.

       Beightel asked that the next Three-States meeting be done in a day for cost effectiveness. Beightel did speak with Mandi Maser of Jim Schneider's office about arranging this for February 26th. Kansas would rather do meetings in one day, and if others want to, they can get together the evening before. Schneider said the extra time on the second day was being allocated for the BOR and saw no reason it could not all be done in one day. Schneider asked for feedback on whether the EC is ready for the BOR to come in and have more discussion. Beightel stated they (BOR) should be there as often as they can so issues can be resolved.

18. Adjournment
    a. The meeting adjourned at 2:02 p.m.

Attendees:

Jim Schneider	Nebraska	Chris Beightel	Kansas
Jennifer Schellpeper	Nebraska	Chelsea Erickson	Kansas
Kathy Benson	Nebraska	Willem Schreuder	Principia Mathematica
Craig Scott	BOR, McCook	Ivan Franco	Colorado

1. Introductions

2. Review/Modify Agenda
    a. Erickson requested to add discussion of creating a new RRCA-oriented website. The Agenda modification was approved.

3. Publication of RRCA Annual Reports
    a. 2013 Reports (Kansas)
        i. Erickson reported that Kansas is still finalizing the report from the Colby, KS meeting and will pass it to Colorado. Colorado is currently reviewing the March, May, and July 2013 reports and will pass them to Nebraska. All States have reviewed the December 2012 report, and Erickson is finalizing it with edits.
    b. 2014 Reports (Nebraska); Benson reported that:
        i. The December 2013 Special Meeting minutes were emailed to Kansas for review, and they are to send these minutes on to Colorado.
        ii. The August 2014 Annual Meeting minutes were emailed to Kansas for review, with no return edits as of this writing.;
    c. 2015 Reports (Nebraska); Benson reported that:
        i. The October 2014 Special Meeting summary has been drafted and the exhibits are ready for inclusion.
        ii. The November 2014 Special Meeting summary has been drafted,
        iii. The March 2015 Special Meeting summary has not yet been drafted.

4. Modeling and Data Tasks for Principia Mathematica
    a. Documentation
        i. Schreuder explained that the write-up for the update would have two versions of the processing programs, like what is currently on the website for 2001 to 2006 and 2007 to present. He asked if everyone was okay that the methodology used today be used for 2007 to present, and gave an example of precipitation recharge,

etc. Beightel asked for more clarification in email form. **Schreuder stated he would send clarification via email to everyone.**

5. Conservation Committee Terraces Study
    a. Posting of final data from BOR to website
        i. Schreuder continues to wait on the GIS data to be posted to the website. **Erickson will ask Scott about this.** Erickson stated she does have a copy of the model documentation from the BOR and **will send it to Schreuder.**
    b. Draft Author Page
        i. Erickson reported there is a draft of the author page. She is waiting on final approval **and then will send it to the EC for review.** It will then be posted with the final report.
6. Data Exchange
    a. 2014 Accounting
        i. Schreuder ran a preliminary model run on 2014 data using full-year temperature and precipitation data, river data, and pipeline information. He had nothing new to add. Nebraska is not working on any updates at this point, so the Nebraska data are considered final. Beightel stated that Kansas continues to work on updates until at least mid-July. Beightel requested that **the Nebraska data be posted as a zip file**, as has been done in past years. Schneider explained that the process has been more streamlined and that Marc Groff (Flatwater Group) could walk through the process with the EC if needed. It was suggested to **contact Schellpeper about any further data exchange issues**.
        ii. Franco reported that Colorado now has 2012, 2013, and 2014 meter data available on the website.
    b. 2015 Accounting
        i. Per an RRCA resolution, Nebraska has been sending out preliminary estimates for 2015 accounting by the 10th of each month. There are not a lot of data to update at this point, as it is early in the year, but that will change in the summer months of June, July, August, and September.
    c. Finalization of 2014 and previous years accounting (2007-2014)
        i. Schneider stated that a list of issues preventing finalization was made in the past and that **the EC needs to revisit this list**. Schreuder expressed some of his concerns about having the correct numbers for the accounting sheet due to issues with items like the USGS streamflow gage data, which can change when the USGS works their records. **Schreuder will develop and share with the EC an accounting spreadsheet from 1995 to 2014 for discussion**. **Schneider**

suggested that everyone review Schreuder's data before the next meeting. If the EC is to finalize accounting before the upcoming RRCA Annual Meeting, **more time would need to be scheduled for the EC to meet – Nebraska will extend the meeting**.

7. Estimating Ground and Surface Water Irrigation Recharge and Return Flows
    a. Draft scope and needs document regarding changes in irrigation efficiency.
        i. **Beightel reported there has not been any progress made on this**.

8. Accounting changes for Nebraska Groundwater Recharge Project
    a. Discussion on how accounting procedures address evaporation and diversion at different times of the year
        i. Accounting change proposal (Nebraska) – Attachment A
            1. Schellpeper gave explanation of the procedure in Werner's absence. Three proposed accounting procedures were presented: the first incorporated changes from the Special Master's Report, the second included revisions for the additional spill-to-wasteway values, and the third included non-irrigation season diversions. Schneider stated that **in July, the EC should come prepared to discuss the proposed procedures and what may be carried forward to the Annual RRCA meeting in August for consideration.**

9. Future Augmentation Plans – Application and Approval Process
    a. Ongoing discussions at the Three-States Meeting
        i. Schneider stated **this item will be discussed at the Three-States Meeting.**

10. Harlan County Lake – Evaporation Charges and Compact Accounting Adjustments
    a. Examples for calculating the incremental increase in reservoir areas
        i. Schneider reported that he spoke with Barfield and Beightel on the 13th and these issues are being wrapped up. **Discussions will continue at the Three-States Meetings.**

11. Evaluation of Whether to Include Direct Return Data from Canals in Accounting Calculations and Modeling
    a. Proposed resolution and example (Nebraska)
        i. Schneider reported on this item under agenda item 8.

12. Beginning and Ending Meter Data
    a. Review of Colorado Data (Kansas)
        i. Beightel shared that the **older accounting from 2007 to 2010 needs approval**. The FSS requirement is that some metering is required so that samples can be reviewed. Since Colorado has no meter data older than 2012, Kansas needed to look at the data from 2012 to 2014 that Colorado recently provided and examine how those data corresponds with the 75 percent GIR assumption. If a discrepancy is found, Kanas will then look into it further.

13. Modeling Bonny Reservoir
    a. Kansas and Colorado discussions
        i. Schneider asked about the seepage run that was done by Kansas for the South Fork. Erickson said that she had circulated the measurements to Kansas, and there appear to be gaining reaches on the south end and losing reaches on the upper end. The gauges at the Kansas-Colorado line and Benkelman were similar (11 and 12 cfs). Erickson stated that the Arikaree is still 7 or 8 miles from the gauge but was hopeful due to the rain. Beightel had no other updates.

14. 2015 Water Administration (Harlan County Lake)
    a. Schneider, Beightel, and Franco decided to remove this item from the agenda.

15. Creating a New RRCA-oriented Website
    a. Beightel suggested that the Compact develop an administrative website that would be an information page for the general public. **Erikson will develop a draft to share with the EC.** Schneider stated that Jen Rae Wang would be the Nebraska staff person to work on this item. Schreuder will share with the EC information based upon his previous experience with similar projects.

16. Summary of Meeting Actions/Assignments
    a. **Schreuder will email out his data input page, and everyone else will review it and discuss it in July**
    b. **Accounting change proposal that was drafted by Nebraska will be reviewed by everyone and discussed in July.**
    c. **Erickson will finalize the Conservation Committee Terraces Report author page and then include it as an attachment to that report.**
    d. **The 2015 EC Report to the RRCA will be drafted by Nebraska and discussed at the July meeting**

e. **Erickson will follow up with Scott about the BOR data**

17. Future Meeting Schedule
    a. The next meeting of the RRCA Engineering Committee is scheduled for Wednesday, July 29th, 2015, at 1:00 p.m. Central Time.

18. Adjournment
    a. The meeting adjourned at 2:20 p.m.

DNR MEMO

DATE: May 14, 2015

TO: Jennifer Schellpeper, Integrated Water Management Coordinator and Acting IWM Division Head, Nebraska Department of Natural Resources

FROM: Ryan Werner, Integrated Water Management Planner

SUBJECT: Changes to the RRCA Accounting Procedures Documentation Including those Ordered by the U.S. Supreme Court and those Regarding Attachment 7 of the August 12, 2010 RRCA Accounting Procedures and Reporting Requirements Document

➢ Executive Summary

The purpose of this Memorandum is to provide documentation of the August 2012 RRCA Accounting Procedures and Reporting Requirements edited to comply with the Special Master Report findings on RRCA accounting procedures and to suggest changes to Attachment 7 in the document.

Proposed changes to Attachment 7 include editing the spreadsheet in order to utilize Spill to Waste-way (SWW) data provided for USBR Canals while also adjusting the Estimated Percent Loss for Column 9 of the original attachment to 92.2875% for diversions which take place during the Non-Irrigation period (October – April).

The following sections provide justification for both the required and proposed changes to the RRCA Accounting Procedures documentation. For the proposed changes, editing the table to incorporate SWW data will not result in any necessary changes to §IV.B of the document, while adjusting the Percent Field and Canal Loss that Returns to the Stream will result in additions to the specific formulas for each sub-basin and the main stem.

Attachments A, B, and C provide examples from the year 2009 using the proposed changes to Attachment 7. Attachment D contains the edited Republican River Compact Administration Accounting Procedures and Reporting Requirements document in its entirety, including all required changes proposed in the Report of the Special Master. Attachments E, F, and G contain the aforementioned document including all required changes proposed in the Report of the Special Master in addition to proposed changes for

editing Attachment 7 for Spill to Waste-way data, Percent Field and Canal Loss that Returns to Stream for the Non-Irrigation Season, and all changes, required and proposed, in this document, respectively.

➢ Special Master Report Findings on RRCA Accounting Procedures

Special Master Report Findings on RRCA Accounting Procedures

The following language included in this section has been required by the Supreme Court of the United States in Kansas v. Nebraska ET AL. On Exceptions to Report of Special Master Decided February 24, 2015.

APPENDICES TO REPORT OF THE SPECIAL MASTER November 15, 2013

APPENDIX F, Exhibit A: Changes to the Accounting Procedures

III A 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." ~~This will be the same "base" run used to determine groundwater Computed Beneficial Consumptive Uses.~~

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 F2 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.

III 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 "~~base~~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 ~~base~~"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 "~~base~~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. *Taken from the August 12, 2010 Accounting Procedures

A copy of the RRCA Accounting Procedures and Reporting Requirements document containing only the required changes proposed in the Report of the Special Master can be viewed in Attachment D of this document.

➢ Edits to Attachment 7 Regarding Column 3, "Spill to Waste-Way"

The RRCA Compact Accounting Document Attachment 7, Column 3 labeled Spill to Waste-Way (SWW) in its current state in the table, does not directly contribute to %BRF, "Return as Percent of Canal Diversion." Therefore, as it does not directly affect %BRF, the column is seldom used to incorporate the spill data reported by USBR.

Several changes to the table format in Attachment 7 must be made in order for the total volume returned to stream to reflect the original spill data entered in Column 3.The following list of formulas display the necessary changes to the columns in Attachment 7. The addition of a new column (now Column 4), along with all columns and formulas can be viewed in Attachment A of this document.

A. Column 4, ~~Field Deliveries~~ "Canal Initial Volume"
   i. (Col 2 – Col 3) or Canal Diversion – Spill to Waste-way

B. Column ~~5~~ 6, "Canal Loss"
   i. (Col 2 – Col ~~4~~ 5 + Col 3) or Canal Diversion – Field Deliveries + Spill to Waste-Way

C. Column ~~7~~ 8, "Field Loss"
   i. (Col ~~4~~ 5 * Col ~~6~~ 7) or Field Deliveries * Average Field Loss Factor

D. Column ~~8~~ 9, "Total Loss from District"
   i. (Col ~~5~~ 6 + Col ~~7~~ 8) or Canal Loss + Field Loss

E. Column ~~10~~ 11, "Total Return to Stream from Canal and Field Loss"
   i. (Col ~~8~~ 9 * Col ~~9~~ 10) + (Col 3 * 0.18) or Total Loss from District * Percent Field and Canal Loss that Returns to the Stream + (Spill to Waste-Way * 0.18)

F. Column ~~11~~ 12, "Return as Percent of Canal Diversion" (BRF)
   i. (Col ~~10~~ 11 / Col 2) or Total Return to Stream from Canal and Field Loss / Canal Diversion

Using these formulas, the volume listed in Column 3 will be represented in equal value in Column 11, as shown in the following example in Attachment A. For this example we will assume a Canal Diversion value of 100 Ac-ft., SWW of 5 Ac-ft., Field Deliveries of 60 Ac-ft., and an Average Field Loss factor of 30%.

Almena Canal data 2009
Data from the year 2009 is also entered in Attachment A for Almena Canal. A value of 36 Ac-ft. is inserted in Col 3. The result of this addition is then reflected in Col 11 where the difference between the adjusted value (1,136 Ac-ft.) and the original value (1,100 Ac-ft.) is equal to the SWW amount of 36 Ac-ft.

%BRF, or Percent of Diversion from Bureau Canals that Returns to the Stream (Col 12), is the only value from Attachment 7 which is represented in the special formulas in §IV.B of the RRCA Accounting Procedures Document. Therefore, the changes to Attachment 7 are sufficient when calculating the specific formulas for each sub-basin and the main stem. No further edits to the formulas must be made to implement this data into the accounting process.

A copy of the RRCA Accounting Procedures and Reporting Requirements document containing the required changes proposed in the Report of the Special Master, in addition to the changes necessary to implement Spill to Waste-way data can be viewed in Attachment E of this document.

➢ Edits to Attachment 7 Regarding Column 9, "Percent Field and Canal Loss that Returns to the Stream"

In a previous Memorandum entitled "Documentation of Procedures Producing Charts Depicting Net Evaporation, with Executive Summary of Comparisons between Irrigation and Non-Irrigation Seasons or Months for Reservoirs along the Republican River," it was determined that during the Irrigation Season (May-September), much larger amounts of water are annually lost to evaporative effects than during the Non-Irrigation Season (October-April). On an annual basis, an average ratio of Irrigation Season Evaporation to Non-Irrigation Season Evaporation was determined to be 70/30 after analyzing data for the 10-year period from 2004-2013.

Given that the current evaporation rate of 18% (Percent Field and Canal Loss that Returns to the Stream = 82%) applied in Column 9 of Attachment 7 of the RRCA Accounting Procedures document is a seasonal value normally used for diversions during the Irrigation season, and that the ratio of Irrigation Season to Non-Irrigation Season is equal to 70/30, the following proof can be implied to determine an appropriate value for

the evaporation rate (1-Percent Field and Canal Loss that Returns to the Stream) during the Non-Irrigation Season.

Proof:

X = Irrigation Season Evaporation Rate (18%)

Y = Non-Irrigation Season Evaporation Rate (__%)

70/30 = Ratio of Irr. Season to Non-Irr. Season Evaporation Rates

Where,

X / Y = 70 / 30

And

Y = X / (70/30)

Therefore,

Y = 0.18 / (70/30)

Or

Y = 0.077143

From this proof, it can be implied then that if Col 9 of Attachment 7 = 82% (1-0.18) for the Irrigation Season, Col 9 of Attachment 7 would then equal 92.2857% (1-0.077143) for the Non-Irrigation Season. Calculations for each canal must then be broken down according to Irrigation Season diversions and Non-Irrigation Season diversions as shown in the following example in Attachment B for the year 2009.

For this example we will assume a Canal Diversion value of 100 Ac-ft., SWW of 0 Ac-ft., Field Deliveries of 0 Ac-ft., and an Average Field Loss factor of 30%.

**Note: For Non-Irrigation Season calculations, Column 2 "Spill to Waste-way" is null and Column 4 "Field Deliveries" will always be zero, as water is not diverted for field use.*

Because Column 4 is equal to zero, Column 5 “Canal Loss” will always be equal to the original diversion amount, and Column 7 “Field Loss” will also be zero. Therefore, Column 8 “Total Loss from District” will be equal to the original diversion amount.

Then, because of these implications, Column 10 “Total Return to Stream from Canal and Field Loss” is equal to the original diversion amount multiplied by the value present in column 9 (92.2857%).

Finally, it is then implied that Column 11 “Return as Percent of Canal Diversion” (%BRF) will always be equal to 92.2857% as it is equal to the Column 10 value divided by the original diversion amount. %BRF, or Percent of Diversion from Bureau Canals that returns to the Stream (Col 11), is the only value from Attachment 7 which is represented in §IV.B of the RRCA Accounting Procedures Document. Therefore, the changes to Attachment 7 must be reflected when calculating the specific formulas for each sub-basin and the main stem. Edits to the formulas must be made to implement this data into the accounting process.

The following example formula from §IV.B #8 of the RRCA Accounting Procedures document for Frenchman Creek in Nebraska depicts the necessary formula additions needed to calculate CBCU Nebraska.

CBCU Nebraska = Culbertson Canal Diversions (IRR Season) x (1-%BRF) + Culbertson Canal Diversions (Non-IRR Season) x (1-92.2857%) + Culbertson Extension (IRR Season) x (1-%BRF) + Culbertson Extension (Non-IRR Season) x (1-92.2857%) + 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

This correction should be applied to all CBCU Nebraska and CBCU Kansas calculations for Sub-Basins and Main-Stem in §IV.B of the RRCA Accounting Procedures documentation.

A copy of the RRCA Accounting Procedures and Reporting Requirements document containing the required changes proposed in the Report of the Special Master, in addition to the changes necessary to edit the Percent Field and Canal Loss that Returns to the Stream for the Non-Irrigation Season can be viewed in Attachment F of this document.

➢ Edits to Attachment 7 Regarding both Column 3, "Spill to Waste-Way" and Column 9, "Percent Field and Canal Loss that Returns to the Stream"

Sections II and III of this Memorandum can be combined to implement both changes to Attachment 7 of the RRCA Accounting Procedures document as seen in Attachment C.

The spreadsheet format will be equivalent to that expressed in Section II of this Memorandum with the addition of a second row for each canal in the attachment to include the Non-Irrigation Season diversion data expressed in Section III. In this case, changing one of these conditions has no effect on the other. Because SWW data is null for all Non-Irrigation Season entries, the newly introduced Column 4 "Canal Initial Volume" (Col 2 – Col 3) will be equivalent to the original canal diversion amount, and the final %BRF is still equal to 92.2857%.

When implementing both Sections I and II into the new Attachment 7, the same procedures apply for editing §IV.B "Specific Formulas for Each Sub-basin and the Main Stem" of the RRCA Accounting Procedures documentation as described in their respective sections.

A copy of the RRCA Accounting Procedures and Reporting Requirements document containing the required changes proposed in the Report of the Special Master, in addition to the proposed changes for editing Attachment 7 for Spill to Waste-way data and Percent Field and Canal Loss that Returns to the Stream for the Non-Irrigation Season can be viewed in Attachment G of this document.

➢ Conclusions and Final Documentation

Attachments A, B, and C provide examples from the year 2009 using the proposed changes to Attachment 7. Attachment D contains the edited Republican River Compact Administration Accounting Procedures and Reporting Requirements document in its entirety, including all required changes proposed in the Report of the Special Master.

Attachments E, F, and G contain the aforementioned document including all required changes proposed in the Report of the Special Master in addition to proposed changes for editing Attachment 7 for Spill to Waste-way data, Percent Field and Canal Loss that Returns to Stream for the Non-Irrigation Season, and all changes, required and proposed, in this document, respectively.

All changes made are red-lined in the attachments, including specific formula changes to CBCU Nebraska and CBCU Kansas calculations regarding the addition of Non-Irrigation Season diversion data to Attachment 7.

The objective of this document is to justify certain changes which are either required or proposed to what is considered to be the most recent document concerning Republican River Compact Administration Accounting Procedures. The aforementioned additions to the accounting procedures provide a more accurate representation of water use in the Republican River Basin.

Attachment A

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		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 2 - Col 5 + Col 3	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 * 0.18)	Col 11/Col 2
Example	100	5	95	60	45	30%	18	63	82%	53	53%
	100		100	60	40	30%	18	58	82%	48	48%
Culbertson											
Culbertson Extension											
Meeker - Driftwood											
Red Willow											
Bartley											
Cambridge											
Naponee											
Franklin											
Franklin Pump											
Almena	1,551	36	1,515	300	1,287	30%	90	1,377	82%	1,136	73%
	1,551		1,551	300	1,251	30%	90	1,341	82%	1,100	71%
Superior											
Nebraska Courtland											
Courtland Canal Above Lovewell (KS)											
Courtland Canal Below Lovewell											

Attachment B

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
Canal	Canal Diversion	Spill to Waste-Way	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 ∑ Irrigation Season ∑ Non-Irrigation Season	Headgate Diversion	Sum of measured spills to river	Sum of Deliveries to the field	Col 2 - Col 4	1 -Weighted Average Efficiency of Application System for the District*	Col 4 x Col 6	Col 5 + Col 7	Estimated Percent Loss*	Col 8 x Col 9	Col 10/Col 2
Example	100	5	60	40	30%	18	58	82%	48	48%
	100	0	0	100	30%	0	100	92%	92	92%
	9,624		537	9,087	30%	161	9,248	82%	7,583	79%
Culbertson	1,444			1,444	30%	0	1,444	92%	1,332	92%
Culbertson Extension	0		0	0	30%	0	0	82%	0	
	0			0	30%	0	0	92%	0	
Meeker - Driftwood	23,274		5,603	17,671	30%	1,681	19,352	82%	15,869	68%
	3,491			3,491	30%	0	3,491	92%	3,222	92%
	5,166		1,256	3,910	30%	377	4,287	82%	3,515	68%
Red Willow	775			775	30%	0	775	92%	715	92%
	10,711		2,088	8,623	30%	626	9,249	82%	7,585	71%
Bartley	1,607			1,607	30%	0	1,607	92%	1,483	92%
	23,961		8,846	15,115	30%	2,654	17,769	82%	14,570	61%
Cambridge	3,594			3,594	30%	0	3,594	92%	3,317	92%
	1,095		246	849	35%	86	935	82%	767	70%
Naponee	164			164	35%	0	164	92%	152	92%
	23,246		7,227	16,019	35%	2,529	18,548	82%	15,210	65%
Franklin	3,487			3,487	35%	0	3,487	92%	3,218	92%
	909		250	659	35%	88	747	82%	612	67%
Franklin Pump	136			136	35%	0	136	92%	126	92%

Attachment C

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		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 Irrigation Season Non-Irrigation Season	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 2 - Col 5 + Col 3	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 * 0.18)	Col 11/Col 2
Example	100	5	95	60	45	30%	18	63	82%	53	53%
	15	0	15	0	15	30%	0	15	92%	14	92%
Culbertson											
Culbertson Extension											
Meeker - Driftwood	23,274		23,274	5,603	17,671	30%	1,681	19,352	82%	15,869	68%
	3,491	0	3,491	0	3,491	30%	0	3,491	92%	3,222	92%
Red Willow											
Bartley											
Almena	1,551	36	1,515	300	1,287	30%	90	1,377	82%	1,136	61%
	233	0	233	0	233	30%	0	233	92%	215	92%
Superior											
Nebraska Courtland											

Attachment D

Republican River Compact Administration

ACCOUNTING PROCEDURES

AND

REPORTING REQUIREMENTS

Revised August 12, 2010

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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 and Computed Beneficial Consumptive Use. These computations shall be used to determine supply, allocations, use and compliance with the Compact according to the Stipulation. 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:

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;

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

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;

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;

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, and less the Flood Flows;

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;

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;

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;

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
Main Stem VWS	=	Hardy Gage – Σ Sub-basin gages + All CBCU in the Main Stem +ΔS – IWS
CWS	=	VWS - Δ S – FF
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

Abbreviations:

CBCU = Computed Beneficial Consumptive Use
FF = Flood Flows
Gage = Gaged Flow
IWS = Imported Water Supply Credit
CWS = Computed Water Supply
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
Δ S = Change in Federal Reservoir Storage

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. 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." ~~This will be the same "base" run used to determine groundwater Computed Beneficial Consumptive Uses.~~

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.

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.

1. Flood Flows

If in any calendar year there are five consecutive months in which the total actual stream flow[1] 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 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

[1] These actual stream flows reflect Gaged Flows after depletions by Beneficial Consumptive Use and change in reservoir storage above the gage.

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.

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.

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 "~~base~~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 ~~base~~"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 "~~base~~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 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.

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 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 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.

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. 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 ICE							
NOV	2.81			NO ICE							
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.

The total 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:

CBCU = Computed Beneficial Consumptive Use
CWS = Computed Water Supply
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

3. North Fork of Republican River in Colorado [2]

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

CBCU Kansas = GWk

CBCU Nebraska = 0.6 x Haigler Canal Diversion Nebraska + GWn

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

VWS = North Fork of the Republican River at the State Line, Stn. No. 06823000 + CBCUc + CBCUk + CBCUn + Nebraska Haigler Canal RF– IWS

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

CWS = VWS - FF

Allocation Colorado = 0.224 x CWS

Allocation Nebraska = 0.246 x CWS

Unallocated = 0.53 x CWS

4. Arikaree River [2]

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 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn

VWS = Arikaree Gage at Haigler Stn. No. 06821500 + CBCUc + CBCUk + CBCUn – IWS

[2] 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.

CWS = VWS - FF

Allocation Colorado = 0.785 x CWS

Allocation Kansas = 0.051 x CWS

Allocation Nebraska = 0.168 x CWS

Unallocated =-0.004 x CWS

5. Buffalo Creek

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

CBCU Kansas = GWk

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

VWS = Buffalo Creek near Haigler Gage Stn. No. 06823500 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.330 x CWS

Unallocated = 0.670 x CWS

6. Rock Creek

CBCU Colorado = GWc

CBCU Kansas = GWk

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

VWS = Rock Creek at Parks Gage Stn. No. 06824000 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.400 x CWS

Unallocated = 0.600 x CWS

7. South Fork Republican River

CBCU Colorado = 0.6 x Hale Ditch Diversion + 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + Bonny Reservoir Ev + 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 = South Fork Republican River near Benkelman Gage Stn. No. 06827500 + CBCUc + CBCUk + CBCUn + ΔS Bonny Reservoir – IWS

CWS = VWS - ΔS Bonny Reservoir - FF

Allocation Colorado = 0.444 x CWS

Allocation Kansas = 0.402 x CWS

Allocation Nebraska = 0.014 x CWS

Unallocated = 0.140 x CWS

8. Frenchman Creek in Nebraska

CBCU Colorado = GWc

CBCU Kansas = GWk

CBCU Nebraska = Culbertson Canal Diversions x (1-%BRF) + Culbertson Extension x (1-%BRF) + 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

9. 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

CWS = VWS – FF

Allocation Kansas = 0.069 x CWS

Allocation Nebraska = 0.164 x CWS

Unallocated = 0.767 x CWS

10. Red Willow Creek in Nebraska

CBCU Colorado = GWc

CBCU Kansas = GWk

CBCU Nebraska = 0.1 x Red Willow Canal CBCU + 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn + 0.1 x Hugh Butler Lake Ev + GWn

	Note: Red Willow Canal CBCU = Red Willow Canal Diversion x (1- % BRF) 90% of the Red Willow Canal CBCU and 90% of Hugh Butler Lake Ev charged to Nebraska's CBCU in the Main Stem
VWS	= Red Willow Creek near Red Willow Gage Stn. No. 06838000 + CBCUc + CBCUk + CBCUn + 0.9 x Red Willow Canal CBCU + 0.9 x Hugh Butler Lake Ev + 0.9 xRed Willow Canal RF + ΔS Hugh Butler Lake – IWS Note: 90% of the Red Willow Canal RF returns to the Main Stem
CWS	= VWS - ΔS Hugh Butler Lake - FF
Allocation Nebraska	= 0.192 x CWS
Unallocated	= 0.808 x CWS

11. 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 Note: 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

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

12. 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 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

VWS = Beaver Creek near Beaver City gage Stn. No. 06847000 + BCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 x CWS

Allocation Kansas = 0.388 x CWS

Allocation Nebraska = 0.406 x CWS

Unallocated = 0.006 x CWS

13. Sappa 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 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

VWS = Sappa Creek near Stamford gage Stn. No. 06847500 – Beaver Creek near Beaver City gage Stn. No. 06847000 + CBCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 Kansas = 0.411 x CWS

Allocation Nebraska = 0.411 x CWS

Unallocated = 0.178 x CWS

14. Prairie Dog Creek

CBCU Colorado = GWc

CBCU Kansas = Almena Canal Diversion x (1-%BRF) + 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + Keith Sebelius Lake Ev + GWk

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

VWS = Prairie Dog Creek near Woodruff, Kansas USGS Stn. No.

06848500 + CBCUc + CBCUk + CBCUn - 0.6 x Dn below gage - % x Pn below gage - 0.5 x M&In below gage - EvNFRn below gage + ΔS Keith Sebelius Lake – 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- ΔS Keith Sebelius Lake - FF

Allocation Kansas = 0.457 x CSW

Allocation Nebraska = 0.076 x CWS

Unallocated = 0.467 x CWS

15. 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

CBCU Colorado = GWc

CBCU Kansas =
(Deliveries from the Courtland Canal to Kansas above 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 x (1- %BRF)
+ Franklin Pump Canal x (1- %BRF)
+ Franklin Canal x (1- %BRF)
+ Naponee Canal x (1- %BRF)
+ Cambridge Canal x (1- %BRF)
+ Bartley Canal x (1- %BRF)
+ Meeker-Driftwood Canal x (1- %BRF)
+ 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 (1- % BRF)

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. 68-485000

+ CBCUc
+ CBCUn

+ 0.6 x Dk
+ % x Pk
+ 0.5 x M&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&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&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&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&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

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 15th 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		
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.

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

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	Unallo-cated	% 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

Colorado				
	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 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	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 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 (5-year running average)	Total Supply Available = Col 1+ Col 2 + Col 3 (5-year running average)	Colorado Computed Beneficial Consumptive Use (5-year running average)	Difference Between Available Supply and Computed Beneficial Consumptive Use = Col 4 – Col 5 (5-year running average)
North Fork Republican River Colorado						
Arikaree River						
South Fork Republican River						
Beaver Creek						

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							

Revised August 2010

Table 5A: Colorado Compliance During Water-Short Year Administration

Colorado				
	Col. 1	Col. 2	Col. 3	Col 4
Year	Allocation minus Allocation for Beaver Creek	Computed Beneficial Consumptive minus Computed Beneficial Consumptive Use for Beaver Creek	Imported Water Supply Credit excluding Beaver Creek	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit for All Basins Except Beaver Creek Col 1 – (Col 2 – Col 3)
Year T= -4				
Year T= -3				
Year T= -2				
Year T= -1				
Current Year T= 0				
Average				

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
	Sum Sub-basins	Kansas's Share of the Unallocated Supply	Total Col 1 + Col 2			Col 3 – (Col 4 – Col 5)
Previous Year						
Current Year						
Average						

Revised August 2010

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

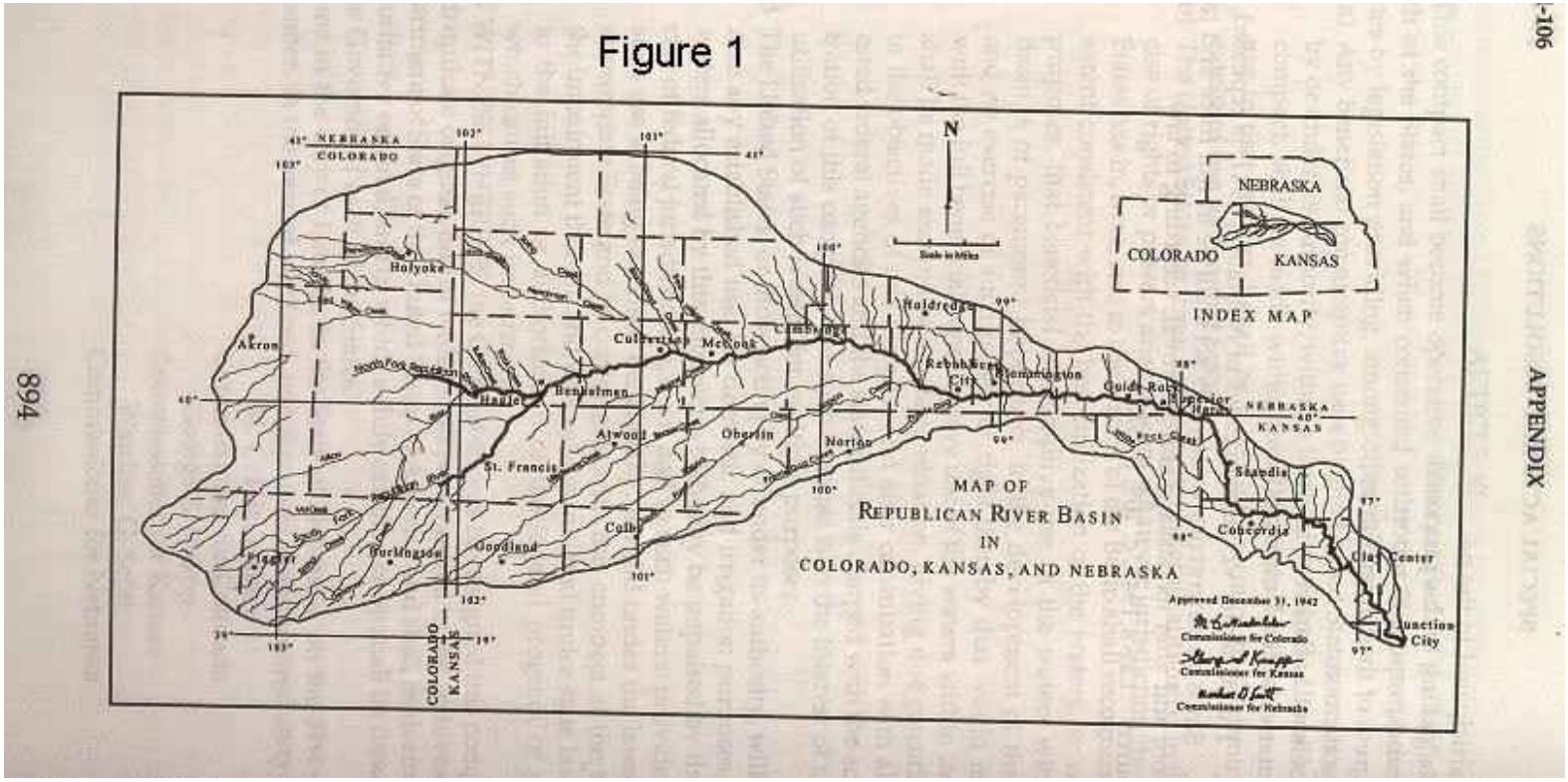
Nebraska								
Year	Allocation			Computed Beneficial Consumptive Use			Imported Water Supply Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation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

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 Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6- Col 7)
Year = -2								
Year = -1								
Current Year								
Three-Year Average								
Sum of Previous Two-year Difference								
Expected Decrease in CBCU Under Plan								

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

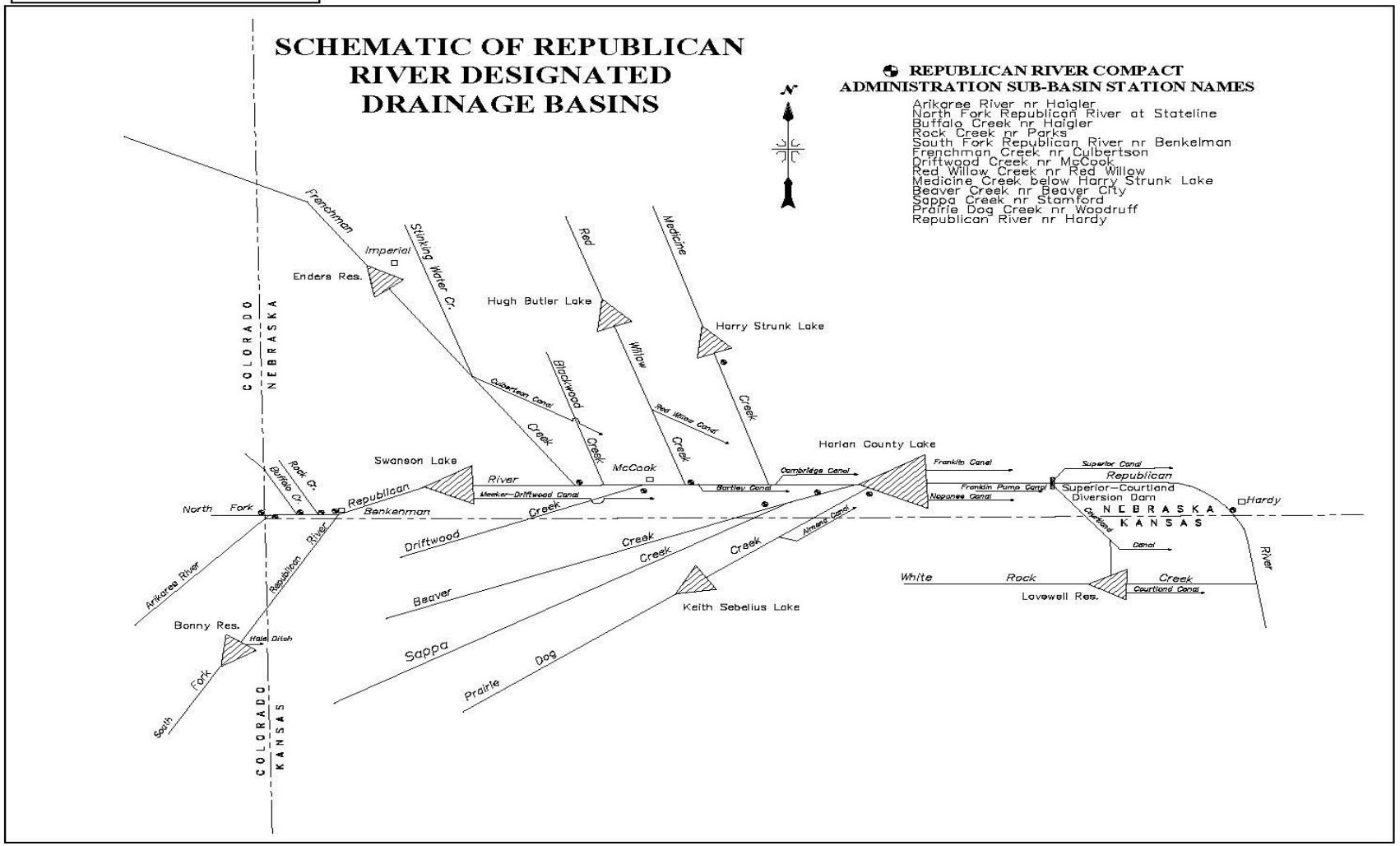
Year	Sum of Nebraska Sub-basin Allocations	Sum of Nebraska's Share of Sub-basin Unallocated Supplies	Total Available Water Supply for Nebraska	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Difference between Allocation And the Computed Beneficial Consumptive Use offset by Imported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

Figure 1

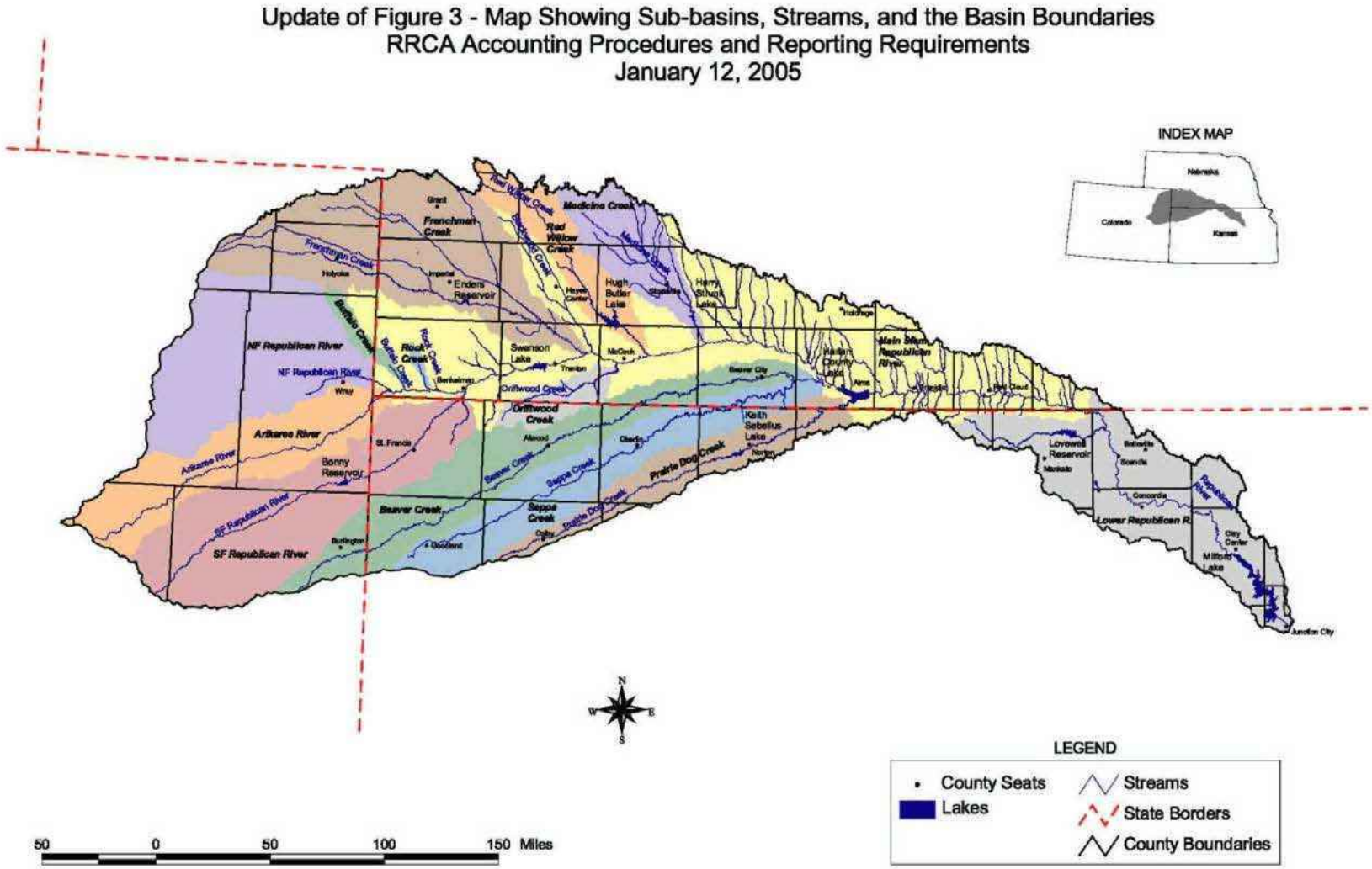


Basin Map Attached to Compact that Shows the Streams and the Basin Boundaries

Figure 2



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



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[3]
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

[3] 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.

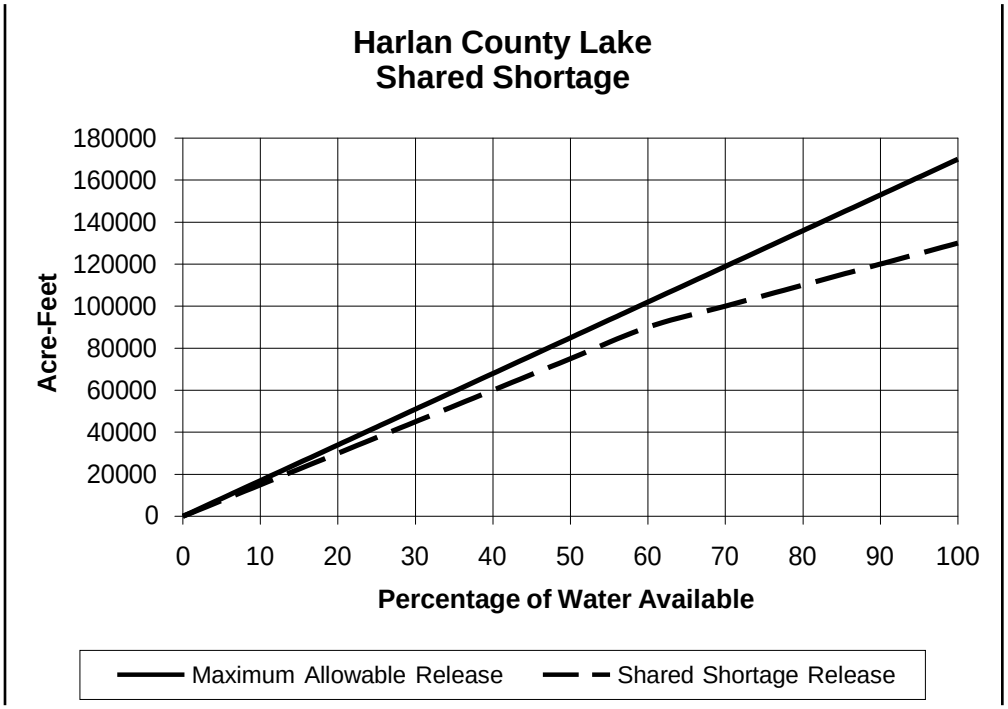
Since the construction of Harlan County Lake, inflows to the lake have been depleted by upstream irrigation wells and farming practices. Reclamation has recently completed an in-depth study of these depleted flows as a part of their contract renewal process. The study concluded that if the current conditions 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 then 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:

Storage + Summer Sediment Pool Evaporation + Inflow – Spring Evaporation=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 elevation1,927.0 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

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

BASELINE - 1993 LEVEL FLOWS - HARLAN COUNTY EVAPORATION

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

Trigger Calculations Based on Harlan County Lake Irrigation Supply	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	

	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
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	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
(1931-93)													
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

Year 2001-2002 Oct - Jun Trigger and Irrigation Supply Calculation									
Calculation Month	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
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

Year 2002 Jul - Sep Final Trigger and Total Irrigation Supply Calculation			
Calculation Month	**Jul**	**Aug**	**Sep**
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
Canal	Canal Diversion	Spill to Waste-way	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	Sum of deliveries to the field	+Col 2 - Col 4	1 -Weighted Average Efficiency of Application System for the District*	Col 4 x Col 6	Col 5 + Col 7	Estimated Percent Loss*	Columns 8 x Col 9	Col 10/Col 2
Example	100	5	60	40	30%	18	58	82%	48	48%
Culbertson					30%					
Culbertson Extension					30%					
Meeker-Driftwood					30%					
Red Willow					30%					
Bartley					30%					
Cambridge					30%					
Naponne					35%					
Franklin					35%					
Franklin Pump					35%					
Almena					30%					
Superior					31%					
Nebraska Courtland					23%					
Courtland Canal Above Lovewell (KS)					23%					
Courtland Canal Below Lovewell					23%					

*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 E

Republican River Compact Administration

ACCOUNTING PROCEDURES

AND

REPORTING REQUIREMENTS

Revised August 12, 2010

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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 and Computed Beneficial Consumptive Use. These computations shall be used to determine supply, allocations, use and compliance with the Compact according to the Stipulation. 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:

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;

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

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;

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;

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, and less the Flood Flows;

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;

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;

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;

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
Main Stem VWS	=	Hardy Gage – Σ Sub-basin gages + All CBCU in the Main Stem +ΔS – IWS
CWS	=	VWS - Δ S – FF
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

Abbreviations:

CBCU = Computed Beneficial Consumptive Use
FF = Flood Flows
Gage = Gaged Flow
IWS = Imported Water Supply Credit
CWS = Computed Water Supply
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
Δ S = Change in Federal Reservoir Storage

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. 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." ~~This will be the same "base" run used to determine groundwater Computed Beneficial Consumptive Uses.~~

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.

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.

1. Flood Flows

If in any calendar year there are five consecutive months in which the total actual stream flow[1] 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 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

[1] These actual stream flows reflect Gaged Flows after depletions by Beneficial Consumptive Use and change in reservoir storage above the gage.

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.

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.

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 "~~base~~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 ~~base~~"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 "~~base~~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 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.

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 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 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.

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. 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 ICE							
NOV	2.81			NO ICE							
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.

The total 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:

CBCU = Computed Beneficial Consumptive Use
CWS = Computed Water Supply
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

3. North Fork of Republican River in Colorado [2]

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

CBCU Kansas = GWk

CBCU Nebraska = 0.6 x Haigler Canal Diversion Nebraska + GWn

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

VWS = North Fork of the Republican River at the State Line, Stn. No. 06823000 + CBCUc + CBCUk + CBCUn + Nebraska Haigler Canal RF– IWS

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

CWS = VWS - FF

Allocation Colorado = 0.224 x CWS

Allocation Nebraska = 0.246 x CWS

Unallocated = 0.53 x CWS

4. Arikaree River [2]

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 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn

VWS = Arikaree Gage at Haigler Stn. No. 06821500 + CBCUc + CBCUk + CBCUn – IWS

[2] 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.

CWS = VWS - FF

Allocation Colorado = 0.785 x CWS

Allocation Kansas = 0.051 x CWS

Allocation Nebraska = 0.168 x CWS

Unallocated =-0.004 x CWS

5. Buffalo Creek

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

CBCU Kansas = GWk

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

VWS = Buffalo Creek near Haigler Gage Stn. No. 06823500 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.330 x CWS

Unallocated = 0.670 x CWS

6. Rock Creek

CBCU Colorado = GWc

CBCU Kansas = GWk

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

VWS = Rock Creek at Parks Gage Stn. No. 06824000 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.400 x CWS

Unallocated = 0.600 x CWS

7. South Fork Republican River

CBCU Colorado = 0.6 x Hale Ditch Diversion + 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + Bonny Reservoir Ev + 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 = South Fork Republican River near Benkelman Gage Stn. No. 06827500 + CBCUc + CBCUk + CBCUn + ΔS Bonny Reservoir – IWS

CWS = VWS - ΔS Bonny Reservoir - FF

Allocation Colorado = 0.444 x CWS

Allocation Kansas = 0.402 x CWS

Allocation Nebraska = 0.014 x CWS

Unallocated = 0.140 x CWS

8. Frenchman Creek in Nebraska

CBCU Colorado = GWc

CBCU Kansas = GWk

CBCU Nebraska = Culbertson Canal Diversions x (1-%BRF) + Culbertson Extension x (1-%BRF) + 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

9. 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

CWS = VWS – FF

Allocation Kansas = 0.069 x CWS

Allocation Nebraska = 0.164 x CWS

Unallocated = 0.767 x CWS

10. Red Willow Creek in Nebraska

CBCU Colorado = GWc

CBCU Kansas = GWk

CBCU Nebraska = 0.1 x Red Willow Canal CBCU + 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn + 0.1 x Hugh Butler Lake Ev + GWn

	Note: Red Willow Canal CBCU = Red Willow Canal Diversion x (1- % BRF) 90% of the Red Willow Canal CBCU and 90% of Hugh Butler Lake Ev charged to Nebraska's CBCU in the Main Stem
VWS	= Red Willow Creek near Red Willow Gage Stn. No. 06838000 + CBCUc + CBCUk + CBCUn + 0.9 x Red Willow Canal CBCU + 0.9 x Hugh Butler Lake Ev + 0.9 xRed Willow Canal RF + ΔS Hugh Butler Lake – IWS Note: 90% of the Red Willow Canal RF returns to the Main Stem
CWS	= VWS - ΔS Hugh Butler Lake - FF
Allocation Nebraska	= 0.192 x CWS
Unallocated	= 0.808 x CWS

11. 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 Note: 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

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

12. 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 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

VWS = Beaver Creek near Beaver City gage Stn. No. 06847000 + BCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 x CWS

Allocation Kansas = 0.388 x CWS

Allocation Nebraska = 0.406 x CWS

Unallocated = 0.006 x CWS

13. Sappa 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 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

VWS = Sappa Creek near Stamford gage Stn. No. 06847500 – Beaver Creek near Beaver City gage Stn. No. 06847000 + CBCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 Kansas = 0.411 x CWS

Allocation Nebraska = 0.411 x CWS

Unallocated = 0.178 x CWS

14. Prairie Dog Creek

CBCU Colorado = GWc

CBCU Kansas = Almena Canal Diversion x (1-%BRF) + 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + Keith Sebelius Lake Ev + GWk

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

VWS = Prairie Dog Creek near Woodruff, Kansas USGS Stn. No.

06848500 + CBCUc + CBCUk + CBCUn - 0.6 x Dn below gage - % x Pn below gage - 0.5 x M&In below gage - EvNFRn below gage + ΔS Keith Sebelius Lake – 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- ΔS Keith Sebelius Lake - FF

Allocation Kansas = 0.457 x CSW

Allocation Nebraska = 0.076 x CWS

Unallocated = 0.467 x CWS

15. 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

CBCU Colorado = GWc

CBCU Kansas =
(Deliveries from the Courtland Canal to Kansas above 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 x (1- %BRF)
+ Franklin Pump Canal x (1- %BRF)
+ Franklin Canal x (1- %BRF)
+ Naponee Canal x (1- %BRF)
+ Cambridge Canal x (1- %BRF)
+ Bartley Canal x (1- %BRF)
+ Meeker-Driftwood Canal x (1- %BRF)
+ 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 (1- % BRF)

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. 68-485000

+ CBCUc
+ CBCUn

+ 0.6 x Dk
+ % x Pk
+ 0.5 x M&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&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&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&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&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

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 15th 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		
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.

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

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	Unallo-cated	% 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

Colorado				
	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 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	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 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 (5-year running average)	Total Supply Available = Col 1+ Col 2 + Col 3 (5-year running average)	Colorado Computed Beneficial Consumptive Use (5-year running average)	Difference Between Available Supply and Computed Beneficial Consumptive Use = Col 4 – Col 5 (5-year running average)
North Fork Republican River Colorado						
Arikaree River						
South Fork Republican River						
Beaver Creek						

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							

Revised August 2010

Table 5A: Colorado Compliance During Water-Short Year Administration

Colorado				
	Col. 1	Col. 2	Col. 3	Col 4
Year	Allocation minus Allocation for Beaver Creek	Computed Beneficial Consumptive minus Computed Beneficial Consumptive Use for Beaver Creek	Imported Water Supply Credit excluding Beaver Creek	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit for All Basins Except Beaver Creek Col 1 – (Col 2 – Col 3)
Year T= -4				
Year T= -3				
Year T= -2				
Year T= -1				
Current Year T= 0				
Average				

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
	Sum Sub-basins	Kansas's Share of the Unallocated Supply	Total Col 1 + Col 2			Col 3 – (Col 4 – Col 5)
Previous Year						
Current Year						
Average						

Revised August 2010

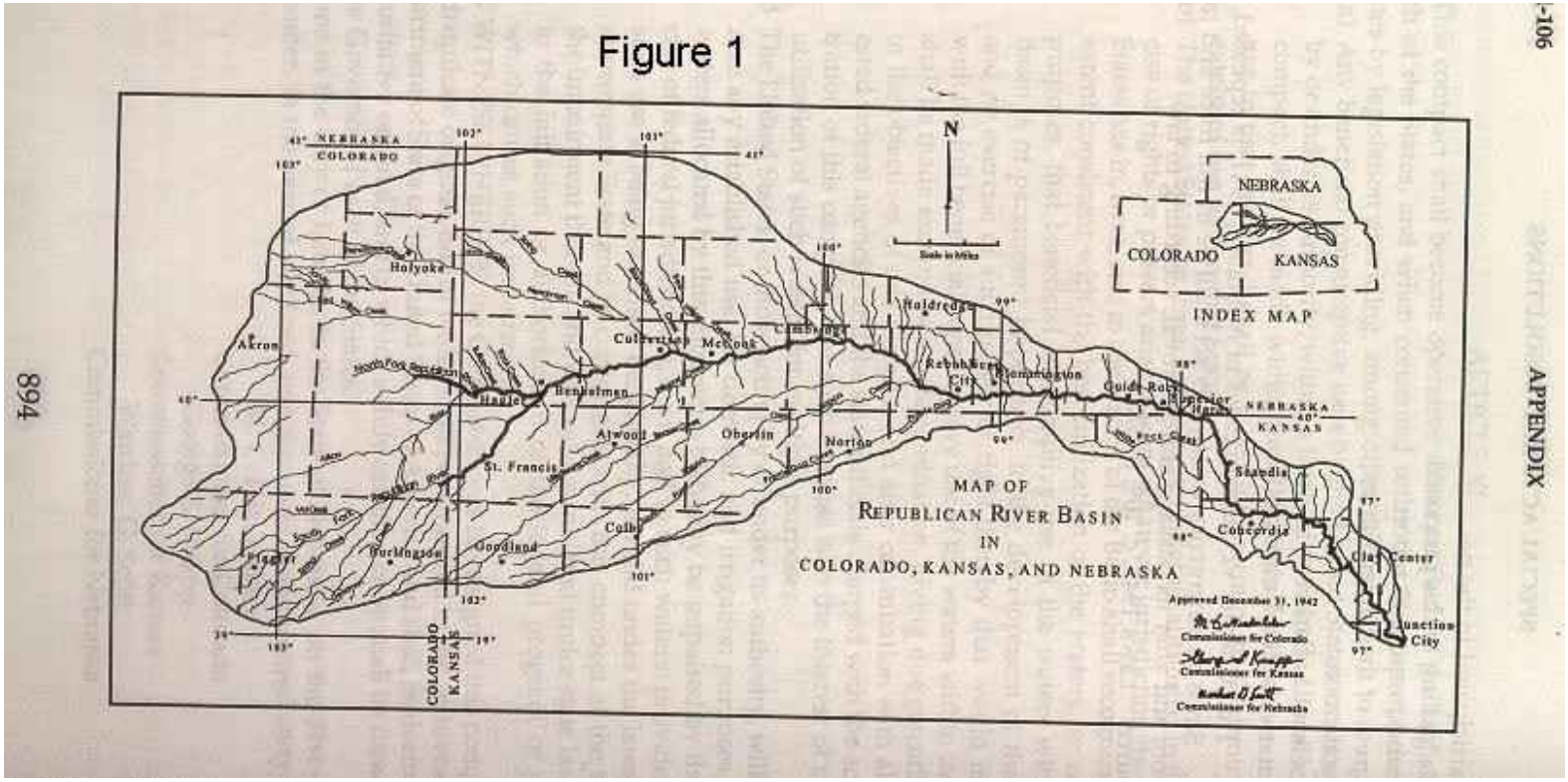
Table 5C: Nebraska Compliance During Water-Short Year Administration

Nebraska								
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 Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6 – Col 7)
Previous Year								
Current Year								
Average								

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 Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6- Col 7)
Year = -2								
Year = -1								
Current Year								
Three-Year Average								
Sum of Previous Two-year Difference								
Expected Decrease in CBCU Under Plan								

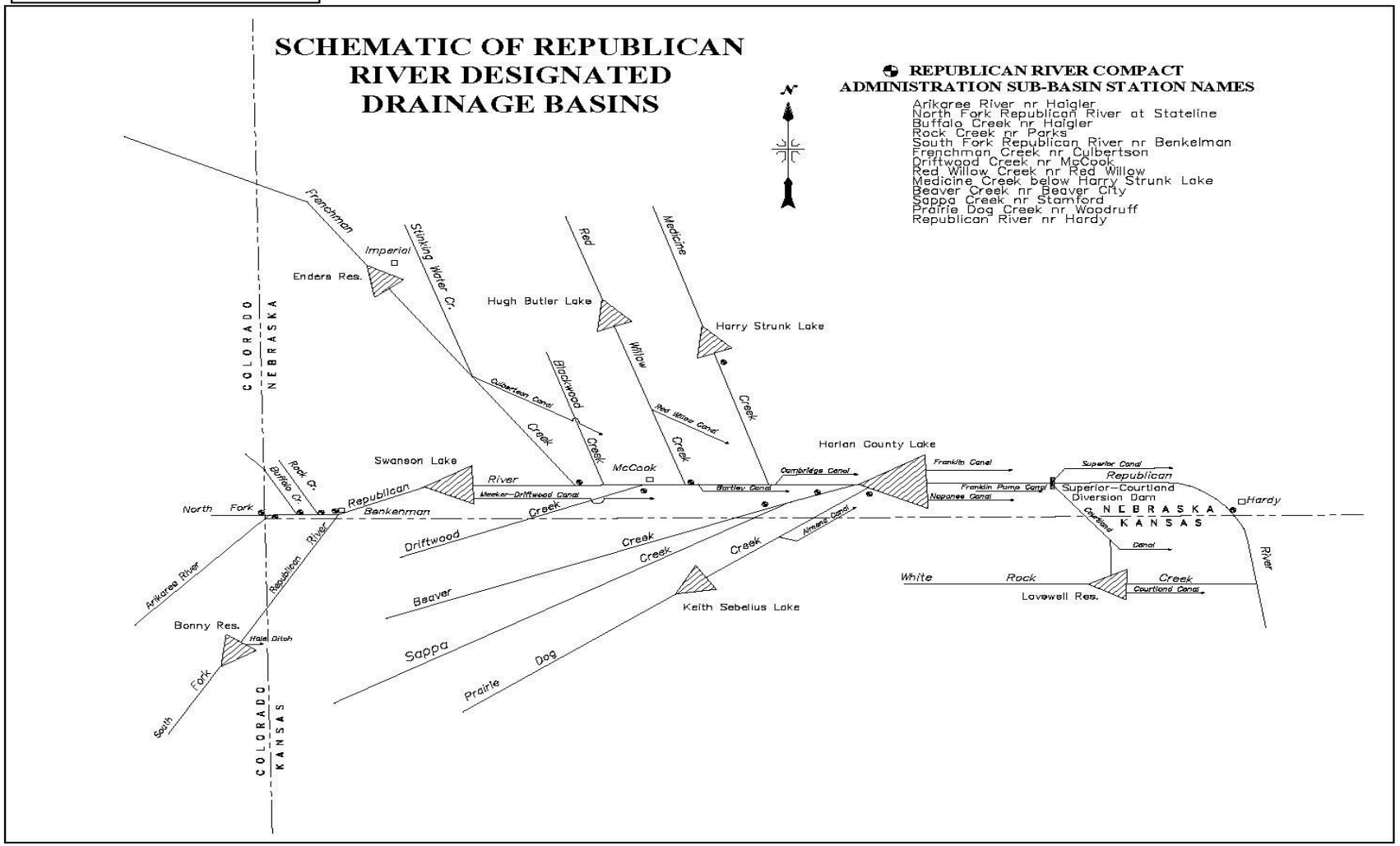
Table 5E: Nebraska Tributary Compliance During Water-Short Year Administration

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	Difference between Allocation And the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
	Col 1	Col 2	`Col 3	Col 4	Col 5	Col 6
Previous Year						Col 3 -(Col 4-Col 5)
Current Year						
Average						

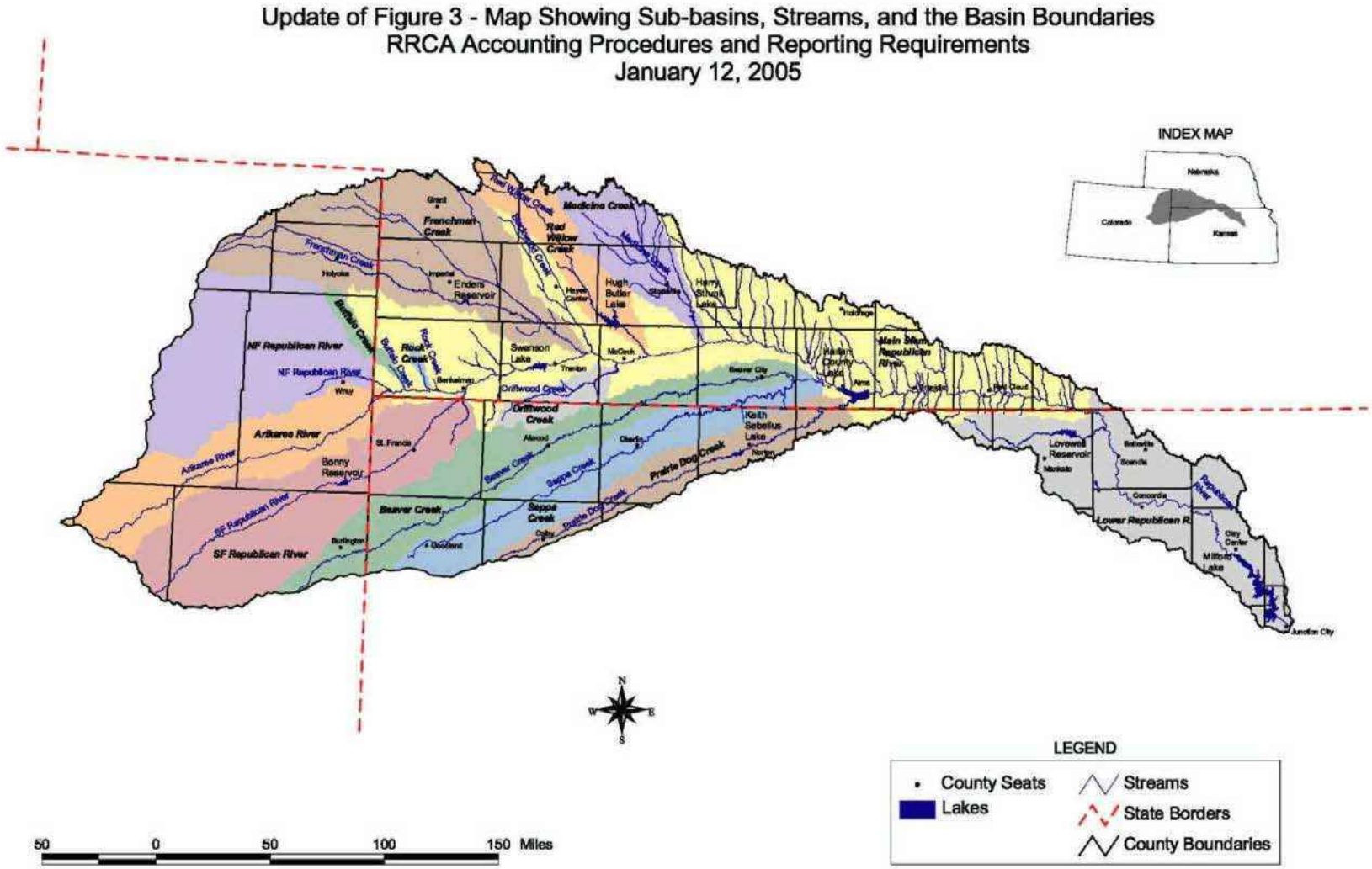


Basin Map Attached to Compact that Shows the Streams and the Basin Boundaries

Figure 2



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



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[3]
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

[3] 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.

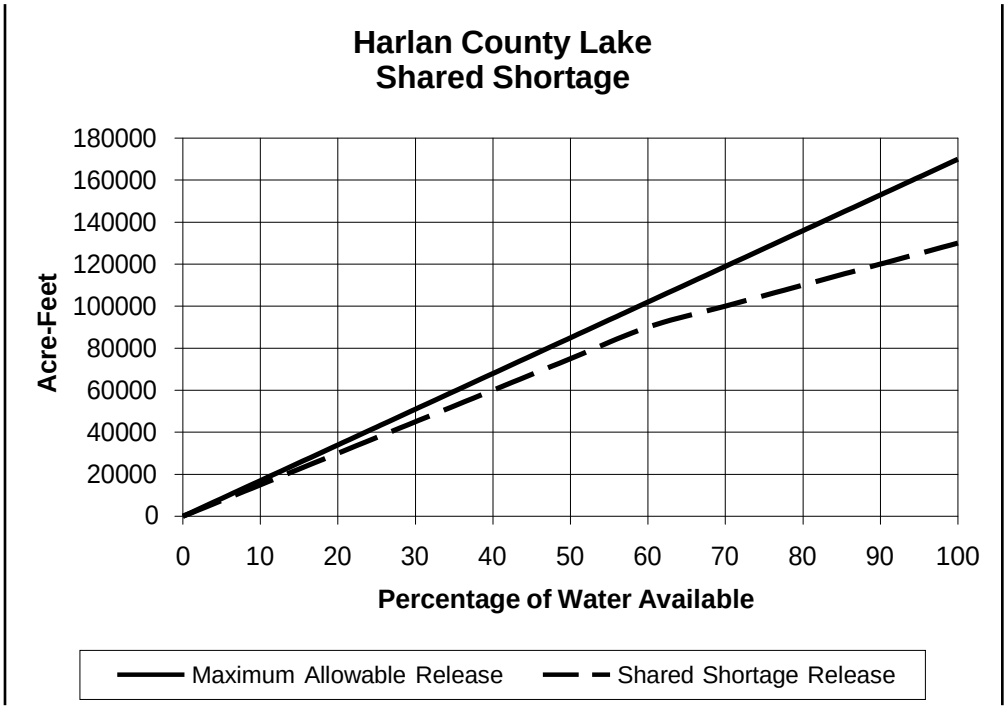
Since the construction of Harlan County Lake, inflows to the lake have been depleted by upstream irrigation wells and farming practices. Reclamation has recently completed an in-depth study of these depleted flows as a part of their contract renewal process. The study concluded that if the current conditions 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 then 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:

Storage + Summer Sediment Pool Evaporation + Inflow – Spring Evaporation=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 elevation1,927.0 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

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

BASELINE - 1993 LEVEL FLOWS - HARLAN COUNTY EVAPORATION

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

Trigger Calculations Based on Harlan County Lake Irrigation Supply	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	

	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
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	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
(1931-93)													
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

Year 2001-2002 Oct - Jun Trigger and Irrigation Supply Calculation									
Calculation Month	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
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

Year 2002 **Jul - Sep** **Final Trigger and** **Total Irrigation Supply** **Calculation**			
Calculation Month	**Jul**	**Aug**	**Sep**
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	Canal Initial Volume	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 2 - Col 5 + Col 3	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 * 0.18)	Col 11/Col 2
Example	100	5	95	60	45	30%	18	63	82%	53	53%
Culbertson						30%			82%		
Culbertson Extension						30%			82%		
Meeker - Driftwood						30%			82%		
Red Willow						30%			82%		
Bartley						30%			82%		
Cambridge						30%			82%		
Naponee						35%			82%		
Franklin						35%			82%		
Franklin Pump						35%			82%		
Almena						30%			82%		
Superior						31%			82%		
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 F

Republican River Compact Administration

ACCOUNTING PROCEDURES

AND

REPORTING REQUIREMENTS

Revised August 12, 2010

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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 and Computed Beneficial Consumptive Use. These computations shall be used to determine supply, allocations, use and compliance with the Compact according to the Stipulation. 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:

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;

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

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;

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;

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, and less the Flood Flows;

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;

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;

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;

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
Main Stem VWS	=	Hardy Gage – Σ Sub-basin gages + All CBCU in the Main Stem +ΔS – IWS
CWS	=	VWS - Δ S – FF
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

Abbreviations:

CBCU = Computed Beneficial Consumptive Use
FF = Flood Flows
Gage = Gaged Flow
IWS = Imported Water Supply Credit
CWS = Computed Water Supply
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
ΔS = Change in Federal Reservoir Storage

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. 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." ~~This will be the same "base" run used to determine groundwater Computed Beneficial Consumptive Uses.~~

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.

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.

1. Flood Flows

If in any calendar year there are five consecutive months in which the total actual stream flow[1] 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 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

[1] These actual stream flows reflect Gaged Flows after depletions by Beneficial Consumptive Use and change in reservoir storage above the gage.

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.

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.

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 "~~base~~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 ~~base~~"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 "~~base~~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 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.

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 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 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.

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. 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 ICE							
NOV	2.81			NO ICE							
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.

The total 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:

CBCU = Computed Beneficial Consumptive Use
CWS = Computed Water Supply
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

3. North Fork of Republican River in Colorado [2]

CBCU Colorado	= 0.6 x Haigler Canal Diversion Colorado + 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + GWc
CBCU Kansas	= GWk
CBCU Nebraska	= 0.6 x Haigler Canal Diversion Nebraska + GWn Note: The diversion for Haigler Canal is split between Colorado and Nebraska based on the percentage of land irrigated in each state
VWS	= North Fork of the Republican River at the State Line, Stn. No. 06823000 + CBCUc + CBCUk + CBCUn + Nebraska Haigler Canal RF– IWS Note: The Nebraska Haigler Canal RF returns to the Main Stem
CWS	= VWS - FF
Allocation Colorado	= 0.224 x CWS
Allocation Nebraska	= 0.246 x CWS
Unallocated	= 0.53 x CWS

4. Arikaree River [2]

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 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn
VWS	= Arikaree Gage at Haigler Stn. No. 06821500 + CBCUc + CBCUk + CBCUn – IWS

[2] 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.

CWS = VWS - FF

Allocation Colorado = 0.785 x CWS

Allocation Kansas = 0.051 x CWS

Allocation Nebraska = 0.168 x CWS

Unallocated =-0.004 x CWS

5. Buffalo Creek

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

CBCU Kansas = GWk

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

VWS = Buffalo Creek near Haigler Gage Stn. No. 06823500 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.330 x CWS

Unallocated = 0.670 x CWS

6. Rock Creek

CBCU Colorado = GWc

CBCU Kansas = GWk

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

VWS = Rock Creek at Parks Gage Stn. No. 06824000 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.400 x CWS

Unallocated = 0.600 x CWS

7. South Fork Republican River

CBCU Colorado = 0.6 x Hale Ditch Diversion + 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + Bonny Reservoir Ev + 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 = South Fork Republican River near Benkelman Gage Stn. No. 06827500 + CBCUc + CBCUk + CBCUn + ΔS Bonny Reservoir – IWS

CWS = VWS - ΔS Bonny Reservoir - FF

Allocation Colorado = 0.444 x CWS

Allocation Kansas = 0.402 x CWS

Allocation Nebraska = 0.014 x CWS

Unallocated = 0.140 x CWS

8. 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 (1-92,2857%) + Culbertson Extension (IRR Season) x (1-%BRF) + Culbertson Extension (Non-IRR Season) x (1-92,2857%) + 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

9. 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
CWS	= VWS – FF
Allocation Kansas	= 0.069 x CWS
Allocation Nebraska	= 0.164 x CWS
Unallocated	= 0.767 x CWS

10. Red Willow Creek in Nebraska

CBCU Colorado	= GWc
CBCU Kansas	= GWk
CBCU Nebraska	= 0.1 x Red Willow Canal CBCU + 0.6 x Dn + % x Pn + 0.5

x M&In + EvNFRn + 0.1 x Hugh Butler Lake Ev + GWn

Note:

Red Willow Canal CBCU = Red Willow Canal Diversion (IRR Season) x (1- % BRF) + Red Willow Canal Diversion (Non-IRR Season) x (1-92,2857%)

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

VWS = Red Willow Creek near Red Willow Gage Stn. No. 06838000 + CBCUc + CBCUk + CBCUn + 0.9 x Red Willow Canal CBCU + 0.9 x Hugh Butler Lake Ev + 0.9 xRed Willow Canal RF + ΔS Hugh Butler Lake – IWS

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

CWS = VWS - ΔS Hugh Butler Lake - FF

Allocation Nebraska = 0.192 x CWS

Unallocated = 0.808 x CWS

11. 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

Note: 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

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

12. 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 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

VWS = Beaver Creek near Beaver City gage Stn. No. 06847000 + BCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 x CWS

Allocation Kansas = 0.388 x CWS

Allocation Nebraska = 0.406 x CWS

Unallocated = 0.006 x CWS

13. Sappa 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 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

VWS = Sappa Creek near Stamford gage Stn. No. 06847500 – Beaver Creek near Beaver City gage Stn. No. 06847000 + CBCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 Kansas = 0.411 x CWS

Allocation Nebraska = 0.411 x CWS

Unallocated = 0.178 x CWS

14. Prairie Dog Creek

CBCU Colorado = GWc

CBCU Kansas = Almena Canal Diversion (IRR Season) x (1-%BRF) + Almena Canal Diversion (Non-IRR Season) x (1-92.2857%) + 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + Keith Sebelius Lake Ev + GWk

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

VWS	= Prairie Dog Creek near Woodruff, Kansas USGS Stn. No. 06848500 + CBCUc + CBCUk + CBCUn - 0.6 x Dn below gage - % x Pn below gage - 0.5 x M&In below gage – EvNFRn below gage + ΔS Keith Sebelius Lake – 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- ΔS Keith Sebelius Lake - FF
Allocation Kansas	= 0.457 x CSW
Allocation Nebraska	= 0.076 x CWS
Unallocated	= 0.467 x CWS

15. 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

CBCU Colorado	= GWc
CBCU Kansas	= (Deliveries from the Courtland Canal to Kansas above Lovewell) (IRR Season) x (1-%BRF) + (Deliveries from the Courtland Canal to Kansas above Lovewell) (Non-IRR Season) x (1-92.2857%) + 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 (IRR Season) x (1-%BRF) + Deliveries from Courtland Canal to Nebraska lands (Non-IRR Season) x (1- 92.2857%)

+ Superior Canal (IRR Season) x (1- %BRF) + Superior Canal (Non-IRR Season) x (1-92,2857%)

+ Franklin Pump Canal (IRR Season) x (1- %BRF) + Franklin Pump Canal (Non-IRR Season) x (1-92,2857%)

+ Franklin Canal (IRR Season) x (1- %BRF) + Franklin Canal (Non-IRR Season) x (1-92,2857%)

+ Naponee Canal (IRR Season) x (1- %BRF) + Naponee Canal (Non-IRR Season) x (1-92,2857%)

+ Cambridge Canal (IRR Season) x (1- %BRF) + Cambridge Canal (Non-IRR Season) x (1-92,2857%)

+ Bartley Canal (IRR Season) x (1- %BRF) + Bartley Canal (Non-IRR Season) x (1-92,2857%)

+ Meeker-Driftwood Canal (IRR Season) x (1- %BRF) + Meeker-Driftwood Canal (Non-IRR Season) x (1-92,2857%)
+ 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 (IRR Season) x (1- % BRF) + Red Willow Canal Diversion (Non-IRR Season) x (1-92,2857%)

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. 68-485000
+ CBCUc
+ CBCUn
+ 0.6 x Dk
+ % x Pk
+ 0.5 x M&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&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&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&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&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

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 15th 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		
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.

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

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	Unallo-cated	% 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

Colorado				
	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 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	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 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 (5-year running average)	Total Supply Available = Col 1+ Col 2 + Col 3 (5-year running average)	Colorado Computed Beneficial Consumptive Use (5-year running average)	Difference Between Available Supply and Computed Beneficial Consumptive Use = Col 4 – Col 5 (5-year running average)
North Fork Republican River Colorado						
Arikaree River						
South Fork Republican River						
Beaver Creek						

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							

Revised August 2010

Table 5A: Colorado Compliance During Water-Short Year Administration

Colorado				
	Col. 1	Col. 2	Col. 3	Col 4
Year	Allocation minus Allocation for Beaver Creek	Computed Beneficial Consumptive minus Computed Beneficial Consumptive Use for Beaver Creek	Imported Water Supply Credit excluding Beaver Creek	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit for All Basins Except Beaver Creek Col 1 – (Col 2 – Col 3)
Year T= -4				
Year T= -3				
Year T= -2				
Year T= -1				
Current Year T= 0				
Average				

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
	Sum Sub-basins	Kansas's Share of the Unallocated Supply	Total Col 1 + Col 2			Col 3 – (Col 4 – Col 5)
Previous Year						
Current Year						
Average						

Revised August 2010

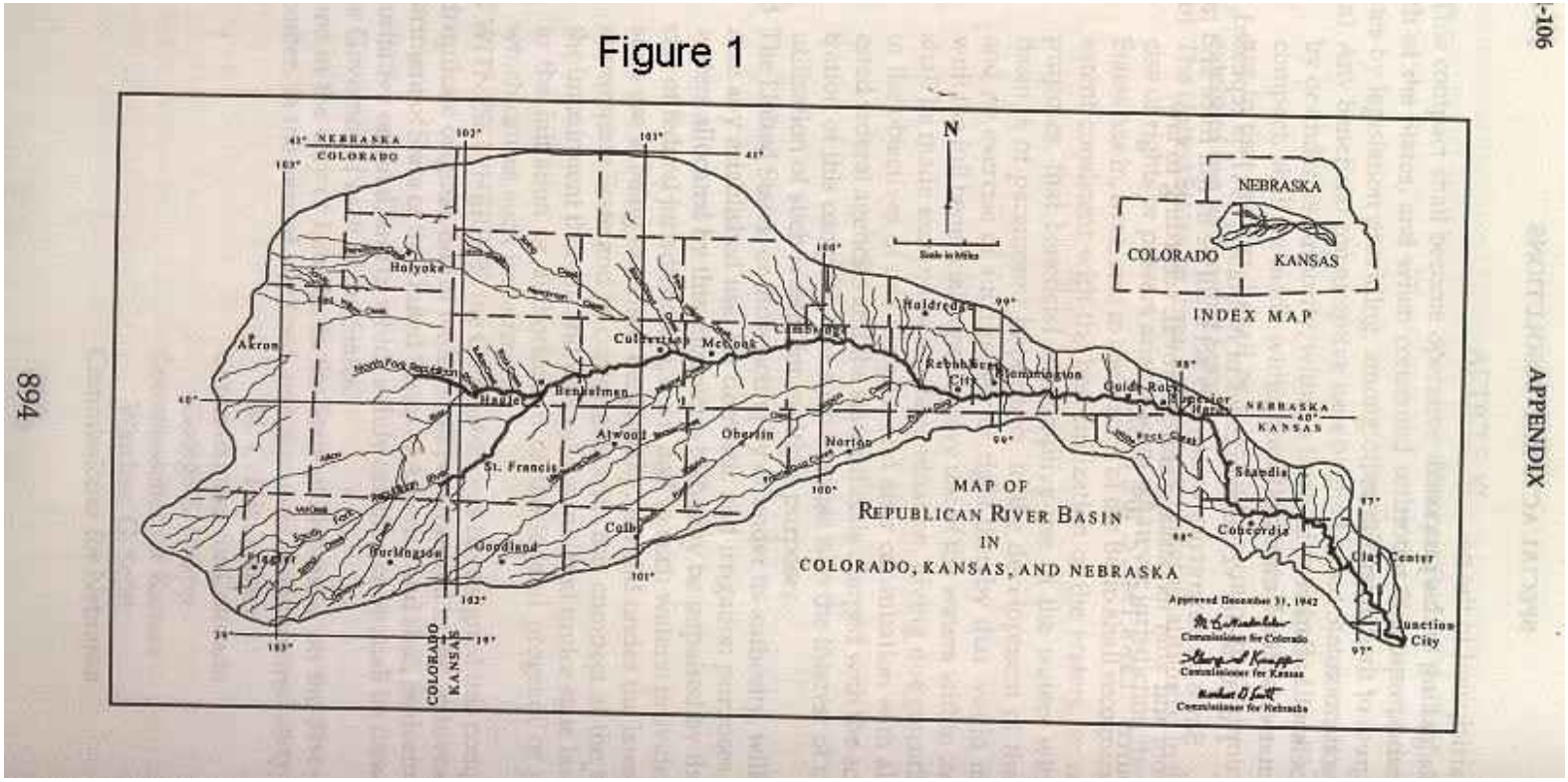
Table 5C: Nebraska Compliance During Water-Short Year Administration

Nebraska								
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 Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6 – Col 7)
Previous Year								
Current Year								
Average								

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 Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6- Col 7)
Year = -2								
Year = -1								
Current Year								
Three-Year Average								
Sum of Previous Two-year Difference								
Expected Decrease in CBCU Under Plan								

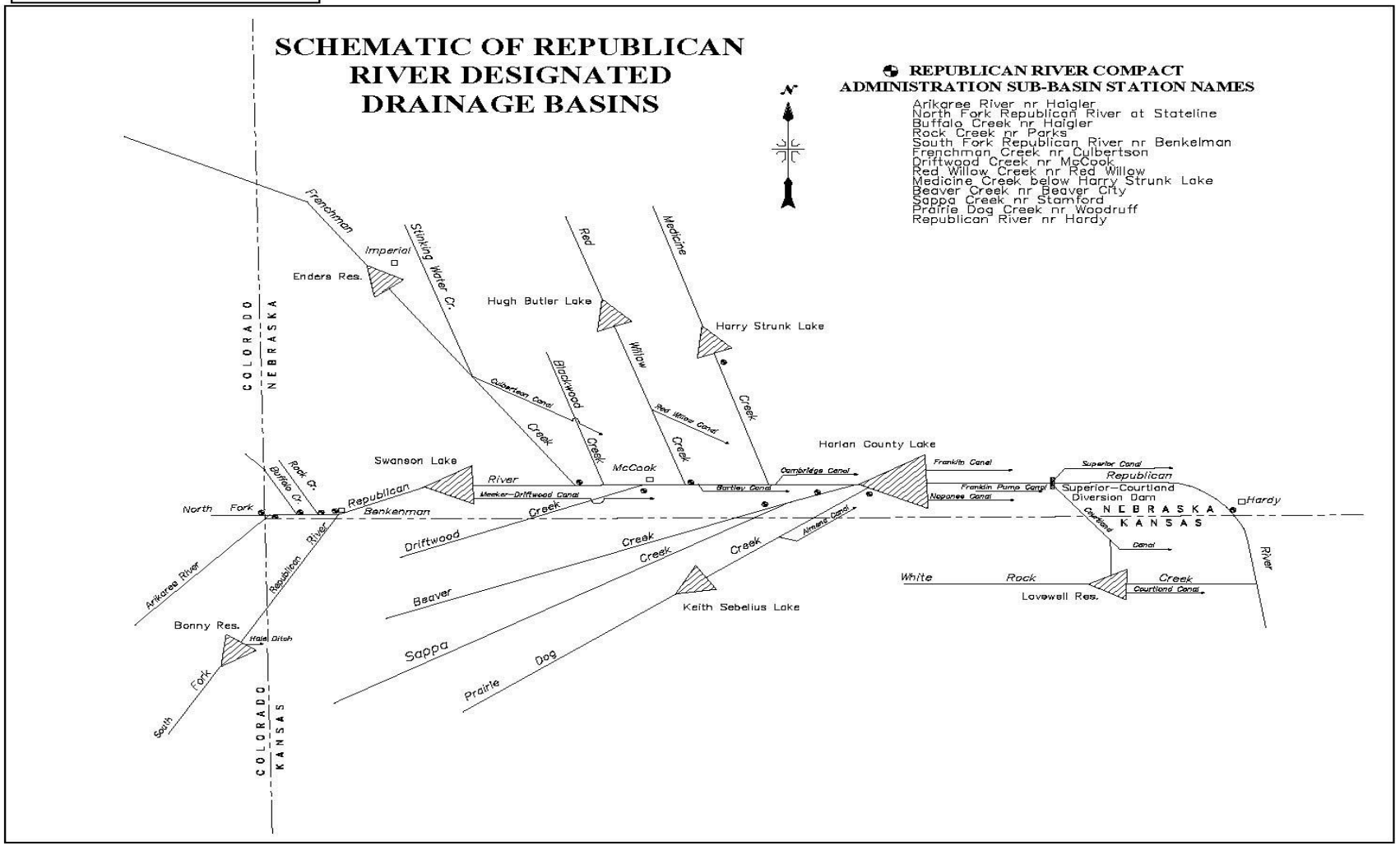
Table 5E: Nebraska Tributary Compliance During Water-Short Year Administration

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	Difference between Allocation And the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
	Col 1	Col 2	`Col 3	Col 4	Col 5	Col 6
Previous Year						Col 3 -(Col 4-Col 5)
Current Year						
Average						

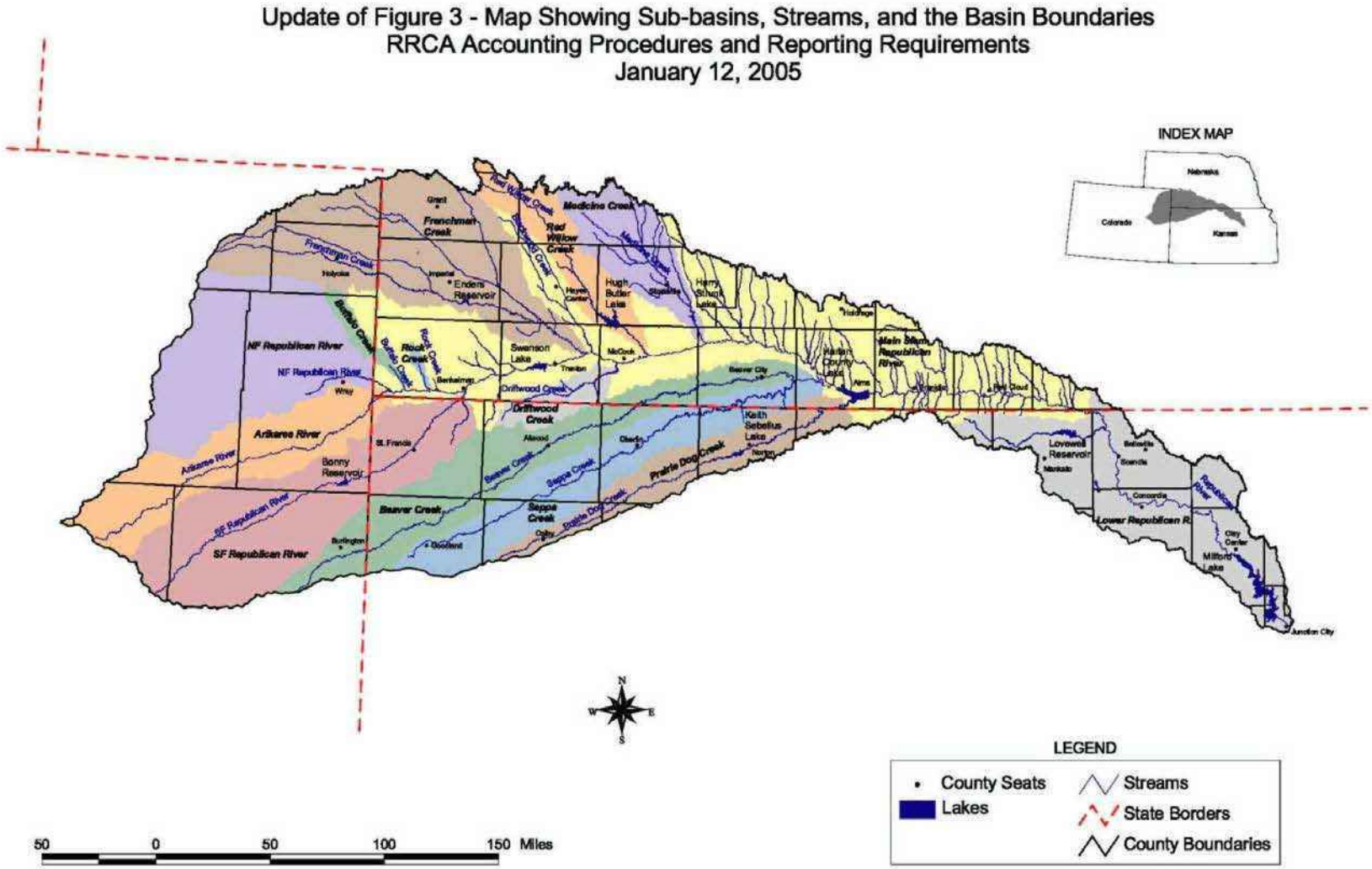


Basin Map Attached to Compact that Shows the Streams and the Basin Boundaries

Figure 2



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



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[3]
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

[3] 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.

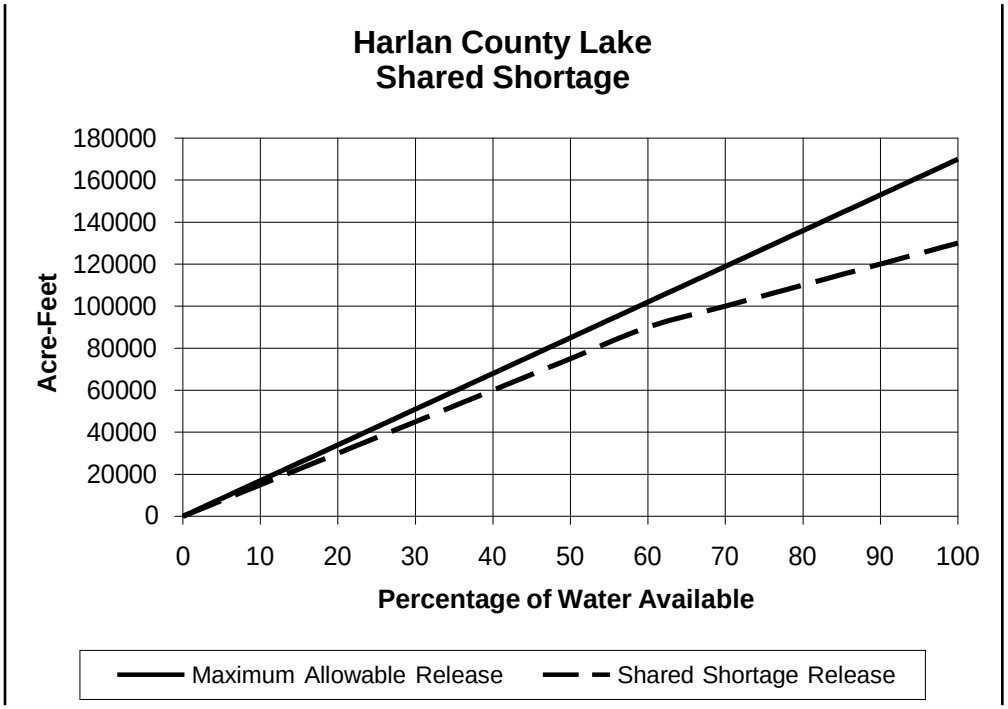
Since the construction of Harlan County Lake, inflows to the lake have been depleted by upstream irrigation wells and farming practices. Reclamation has recently completed an in-depth study of these depleted flows as a part of their contract renewal process. The study concluded that if the current conditions 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 then 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:

Storage + Summer Sediment Pool Evaporation + Inflow – Spring Evaporation=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 elevation1,927.0 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

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

BASELINE - 1993 LEVEL FLOWS - HARLAN COUNTY EVAPORATION

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

Trigger Calculations Based on Harlan County Lake Irrigation Supply	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	

	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
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	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
(1931-93)													
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

Year 2001-2002 Oct - Jun Trigger and Irrigation Supply Calculation									
Calculation Month	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
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

Year 2002 Jul - Sep Final Trigger and Total Irrigation Supply Calculation			
Calculation Month	**Jul**	**Aug**	**Sep**
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

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11
Canal	Canal Diversion	Spill to Waste-Way	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 ∑ Irrigation Season ∑ Non-Irrigation Season	Headgate Diversion	Sum of measured spills to river	Sum of Deliveries to the field	Col 2 - Col 4	1 -Weighted Average Efficiency of Application System for the District*	Col 4 x Col 6	Col 5 + Col 7	Estimated Percent Loss*	Col 8 x Col 9	Col 10/Col 2
Example	100	5	60	40	30%	18	58	82%	48	48%
	100	0	0	100	30%	0	100	92%	92	92%
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%		
					30%			92%		
Superior					31%			82%		
					31%			92%		
Nebraska Courtland					23%			82%		

Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals (continued)

					23%			92%		
Courtland Canal Above Lovewell (KS)					23%			82%		
					23%			92%		
Courtland Canal Below Lovewell					23%			82%		
					23%			92%		

*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 G

Republican River Compact Administration

ACCOUNTING PROCEDURES

AND

REPORTING REQUIREMENTS

Revised August 12, 2010

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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 and Computed Beneficial Consumptive Use. These computations shall be used to determine supply, allocations, use and compliance with the Compact according to the Stipulation. 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:

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;

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

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;

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;

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, and less the Flood Flows;

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;

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;

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;

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
Main Stem VWS	=	Hardy Gage – Σ Sub-basin gages + All CBCU in the Main Stem +ΔS – IWS
CWS	=	VWS - Δ S – FF
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

Abbreviations:

CBCU = Computed Beneficial Consumptive Use
FF = Flood Flows
Gage = Gaged Flow
IWS = Imported Water Supply Credit
CWS = Computed Water Supply
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
Δ S = Change in Federal Reservoir Storage

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. 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." ~~This will be the same "base" run used to determine groundwater Computed Beneficial Consumptive Uses.~~

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.

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.

1. Flood Flows

If in any calendar year there are five consecutive months in which the total actual stream flow[1] 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 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

[1] These actual stream flows reflect Gaged Flows after depletions by Beneficial Consumptive Use and change in reservoir storage above the gage.

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.

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.

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 "~~base~~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 ~~base~~"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 "~~base~~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 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.

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 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 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.

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. 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 ICE							
NOV	2.81			NO ICE							
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.

The total 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:
CBCU = Computed Beneficial Consumptive Use
CWS = Computed Water Supply
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

3. North Fork of Republican River in Colorado [2]

CBCU Colorado	= 0.6 x Haigler Canal Diversion Colorado + 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + GWc
CBCU Kansas	= GWk
CBCU Nebraska	= 0.6 x Haigler Canal Diversion Nebraska + GWn Note: The diversion for Haigler Canal is split between Colorado and Nebraska based on the percentage of land irrigated in each state
VWS	= North Fork of the Republican River at the State Line, Stn. No. 06823000 + CBCUc + CBCUk + CBCUn + Nebraska Haigler Canal RF– IWS Note: The Nebraska Haigler Canal RF returns to the Main Stem
CWS	= VWS - FF
Allocation Colorado	= 0.224 x CWS
Allocation Nebraska	= 0.246 x CWS
Unallocated	= 0.53 x CWS

4. Arikaree River [2]

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 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn
VWS	= Arikaree Gage at Haigler Stn. No. 06821500 + CBCUc + CBCUk + CBCUn – IWS

[2] 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.

CWS = VWS - FF

Allocation Colorado = 0.785 x CWS

Allocation Kansas = 0.051 x CWS

Allocation Nebraska = 0.168 x CWS

Unallocated =-0.004 x CWS

5. Buffalo Creek

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

CBCU Kansas = GWk

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

VWS = Buffalo Creek near Haigler Gage Stn. No. 06823500 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.330 x CWS

Unallocated = 0.670 x CWS

6. Rock Creek

CBCU Colorado = GWc

CBCU Kansas = GWk

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

VWS = Rock Creek at Parks Gage Stn. No. 06824000 + CBCUc + CBCUk + CBCUn – IWS

CWS = VWS - FF

Allocation Nebraska = 0.400 x CWS

Unallocated = 0.600 x CWS

7. South Fork Republican River

CBCU Colorado = 0.6 x Hale Ditch Diversion + 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + Bonny Reservoir Ev + 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 = South Fork Republican River near Benkelman Gage Stn. No. 06827500 + CBCUc + CBCUk + CBCUn + ΔS Bonny Reservoir – IWS

CWS = VWS - ΔS Bonny Reservoir - FF

Allocation Colorado = 0.444 x CWS

Allocation Kansas = 0.402 x CWS

Allocation Nebraska = 0.014 x CWS

Unallocated = 0.140 x CWS

8. 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 (1-92,2857%) + Culbertson Extension (IRR Season) x (1-%BRF) + Culbertson Extension (Non-IRR Season) x (1-92,2857%) + 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

9. 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
CWS	= VWS – FF
Allocation Kansas	= 0.069 x CWS
Allocation Nebraska	= 0.164 x CWS
Unallocated	= 0.767 x CWS

10. Red Willow Creek in Nebraska

CBCU Colorado	= GWc
CBCU Kansas	= GWk
CBCU Nebraska	= 0.1 x Red Willow Canal CBCU + 0.6 x Dn + % x Pn + 0.5

x M&In + EvNFRn + 0.1 x Hugh Butler Lake Ev + GWn

Note:

Red Willow Canal CBCU = Red Willow Canal Diversion (IRR Season) x (1- % BRF) + Red Willow Canal Diversion (Non-IRR Season) x (1-92,2857%)

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

VWS = Red Willow Creek near Red Willow Gage Stn. No. 06838000 + CBCUc + CBCUk + CBCUn + 0.9 x Red Willow Canal CBCU + 0.9 x Hugh Butler Lake Ev + 0.9 xRed Willow Canal RF + ΔS Hugh Butler Lake – IWS

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

CWS = VWS - ΔS Hugh Butler Lake - FF

Allocation Nebraska = 0.192 x CWS

Unallocated = 0.808 x CWS

11. 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

Note: 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

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

12. 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 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

VWS = Beaver Creek near Beaver City gage Stn. No. 06847000 + BCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 x CWS

Allocation Kansas = 0.388 x CWS

Allocation Nebraska = 0.406 x CWS

Unallocated = 0.006 x CWS

13. Sappa 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 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

VWS = Sappa Creek near Stamford gage Stn. No. 06847500 – Beaver Creek near Beaver City gage Stn. No. 06847000 + CBCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x 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 Kansas = 0.411 x CWS

Allocation Nebraska = 0.411 x CWS

Unallocated = 0.178 x CWS

14. Prairie Dog Creek

CBCU Colorado = GWc

CBCU Kansas = Almena Canal Diversion (IRR Season) x (1-%BRF) + Almena Canal Diversion (Non-IRR Season) x (1-92.2857%) + 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + Keith Sebelius Lake Ev + GWk

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

VWS	= Prairie Dog Creek near Woodruff, Kansas USGS Stn. No. 06848500 + CBCUc + CBCUk + CBCUn - 0.6 x Dn below gage - % x Pn below gage - 0.5 x M&In below gage – EvNFRn below gage + ΔS Keith Sebelius Lake – 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- ΔS Keith Sebelius Lake - FF
Allocation Kansas	= 0.457 x CSW
Allocation Nebraska	= 0.076 x CWS
Unallocated	= 0.467 x CWS

15. 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

CBCU Colorado	= GWc
CBCU Kansas	= (Deliveries from the Courtland Canal to Kansas above Lovewell) (IRR Season) x (1-%BRF) + (Deliveries from the Courtland Canal to Kansas above Lovewell) (Non-IRR Season) x (1-92.2857%) + 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 (IRR Season) x (1-%BRF) + Deliveries from Courtland Canal to Nebraska lands (Non-IRR Season) x (1- 92.2857%)

+ Superior Canal (IRR Season) x (1- %BRF) + Superior Canal (Non-IRR Season) x (1-92,2857%)

+ Franklin Pump Canal (IRR Season) x (1- %BRF) + Franklin Pump Canal (Non-IRR Season) x (1-92,2857%)

+ Franklin Canal (IRR Season) x (1- %BRF) + Franklin Canal (Non-IRR Season) x (1-92,2857%)

+ Naponee Canal (IRR Season) x (1- %BRF) + Naponee Canal (Non-IRR Season) x (1-92,2857%)

+ Cambridge Canal (IRR Season) x (1- %BRF) + Cambridge Canal (Non-IRR Season) x (1-92,2857%)

+ Bartley Canal (IRR Season) x (1- %BRF) + Bartley Canal (Non-IRR Season) x (1-92,2857%)

+ Meeker-Driftwood Canal (IRR Season) x (1- %BRF) + Meeker-Driftwood Canal (Non-IRR Season) x (1-92,2857%)
+ 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 (IRR Season) x (1- % BRF) + Red Willow Canal Diversion (Non-IRR Season) x (1-92,2857%)

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. 68-485000
+ CBCUc
+ CBCUn
+ 0.6 x Dk
+ % x Pk
+ 0.5 x M&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&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&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&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&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

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 15th 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		
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.

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

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	Unallo-cated	% 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

Colorado				
	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 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	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 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 (5-year running average)	Total Supply Available = Col 1+ Col 2 + Col 3 (5-year running average)	Colorado Computed Beneficial Consumptive Use (5-year running average)	Difference Between Available Supply and Computed Beneficial Consumptive Use = Col 4 – Col 5 (5-year running average)
North Fork Republican River Colorado						
Arikaree River						
South Fork Republican River						
Beaver Creek						

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							

Revised August 2010

Table 5A: Colorado Compliance During Water-Short Year Administration

Colorado				
	Col. 1	Col. 2	Col. 3	Col 4
Year	Allocation minus Allocation for Beaver Creek	Computed Beneficial Consumptive minus Computed Beneficial Consumptive Use for Beaver Creek	Imported Water Supply Credit excluding Beaver Creek	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit for All Basins Except Beaver Creek Col 1 – (Col 2 – Col 3)
Year T= -4				
Year T= -3				
Year T= -2				
Year T= -1				
Current Year T= 0				
Average				

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
	Sum Sub-basins	Kansas's Share of the Unallocated Supply	Total Col 1 + Col 2			Col 3 – (Col 4 – Col 5)
Previous Year						
Current Year						
Average						

Revised August 2010

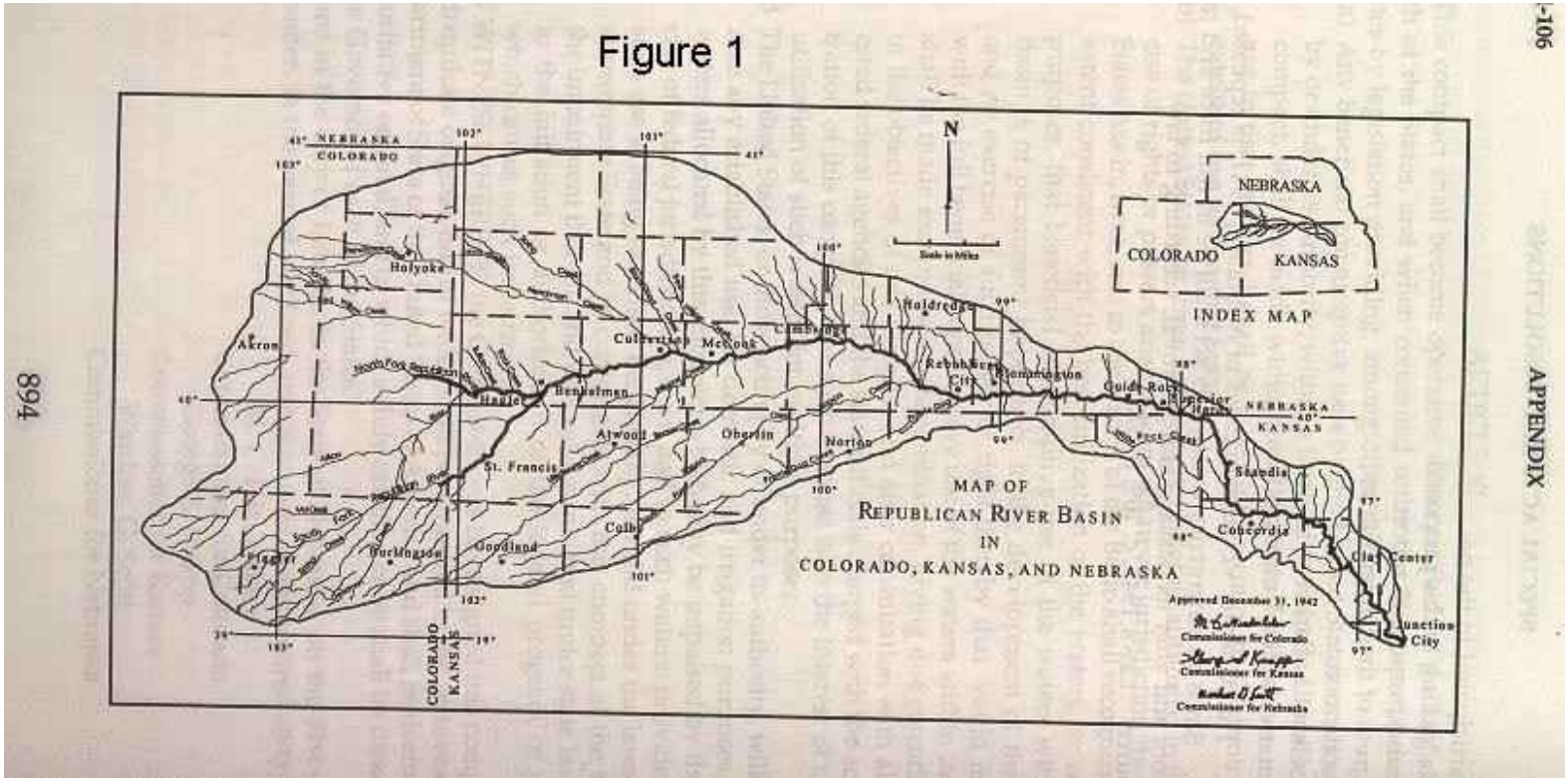
Table 5C: Nebraska Compliance During Water-Short Year Administration

Nebraska								
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 Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6 – Col 7)
Previous Year								
Current Year								
Average								

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 Above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU below Guide Rock	State Wide CBCU above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6- Col 7)
Year = -2								
Year = -1								
Current Year								
Three-Year Average								
Sum of Previous Two-year Difference								
Expected Decrease in CBCU Under Plan								

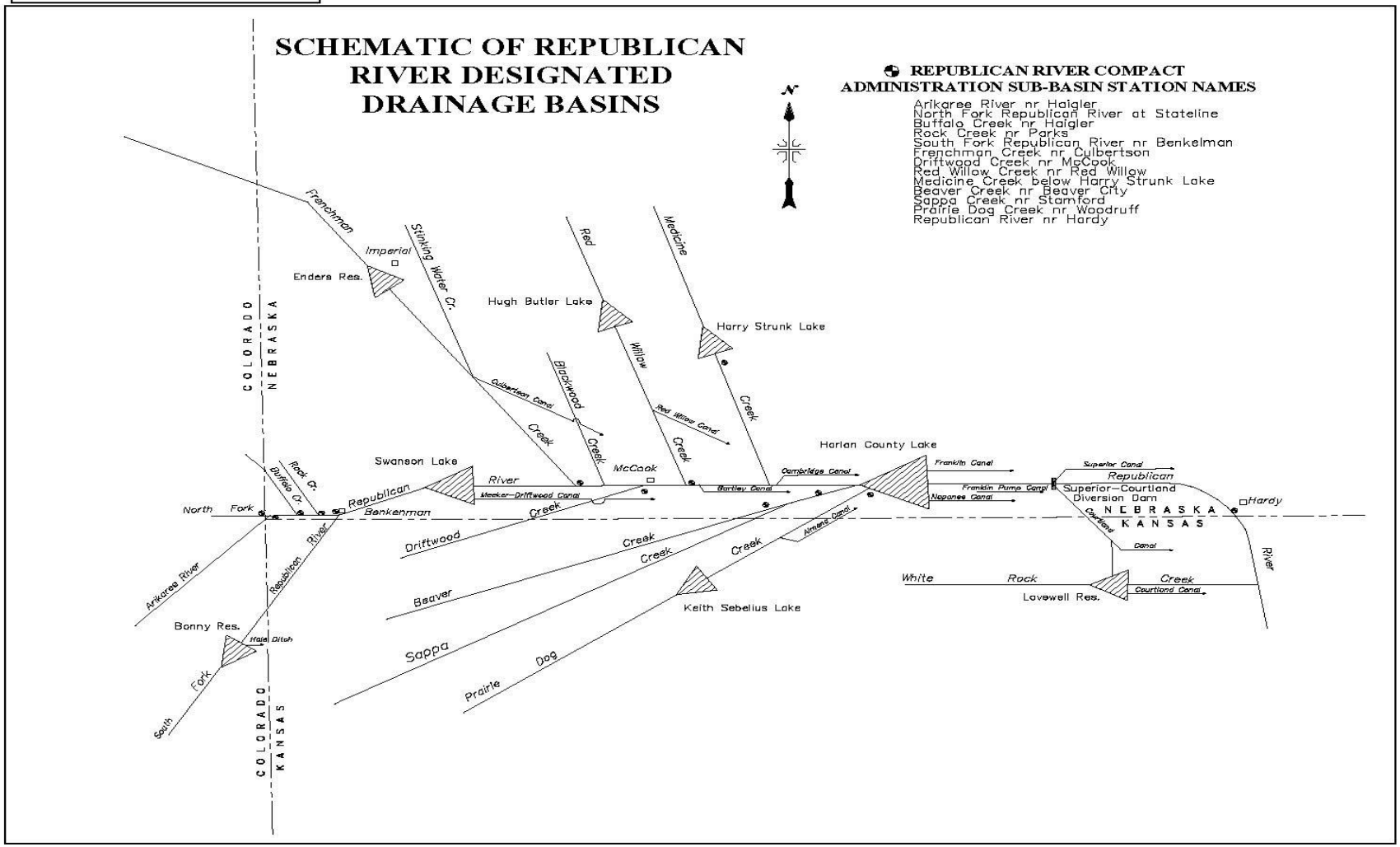
Table 5E: Nebraska Tributary Compliance During Water-Short Year Administration

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	Difference between Allocation And the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
	Col 1	Col 2	`Col 3	Col 4	Col 5	Col 6
Previous Year						Col 3 -(Col 4-Col 5)
Current Year						
Average						

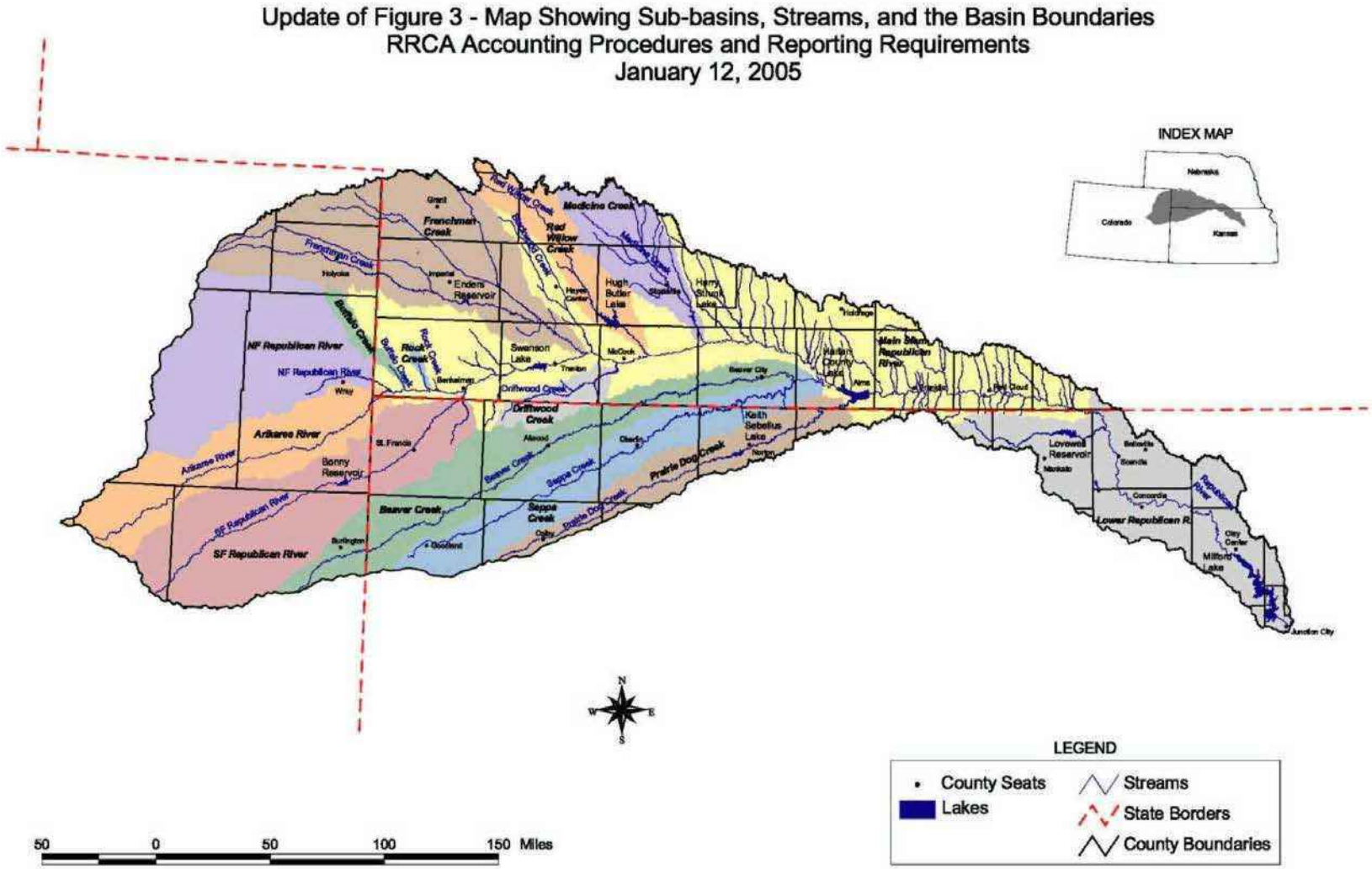


Basin Map Attached to Compact that Shows the Streams and the Basin Boundaries

Figure 2



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



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[3]
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

[3] 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.

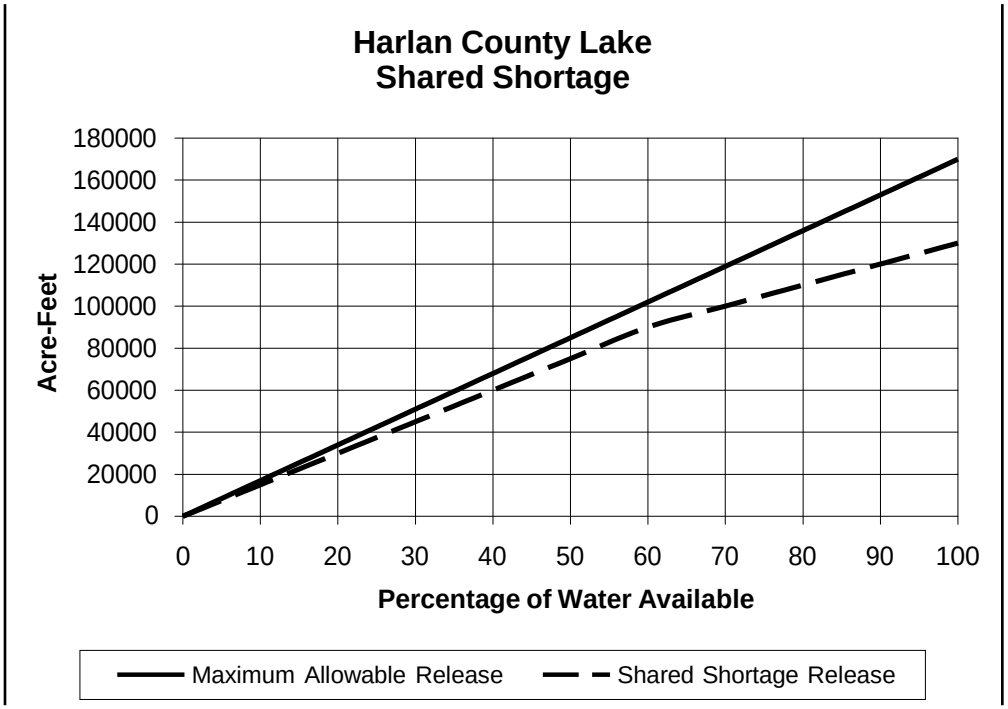
Since the construction of Harlan County Lake, inflows to the lake have been depleted by upstream irrigation wells and farming practices. Reclamation has recently completed an in-depth study of these depleted flows as a part of their contract renewal process. The study concluded that if the current conditions 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 then 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:

Storage + Summer Sediment Pool Evaporation + Inflow – Spring Evaporation=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 elevation1,927.0 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

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

BASELINE - 1993 LEVEL FLOWS - HARLAN COUNTY EVAPORATION

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

Trigger Calculations Based on Harlan County Lake Irrigation Supply	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	

	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
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	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
(1931-93)													
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

Year 2001-2002 Oct - Jun Trigger and Irrigation Supply Calculation									
Calculation Month	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
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

Year 2002 Jul - Sep Final Trigger and Total Irrigation Supply Calculation			
Calculation Month	**Jul**	**Aug**	**Sep**
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		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 Irrigation Season Non-Irrigation Season	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 2 - Col 5 + Col 3	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 * 0.18)	Col 11/Col 2
Example	100	5	95	60	45	30%	18	63	82%	53	53%
	100	0	100	0	100	30%	0	100	92%	92	92%
Culbertson											
Culbertson Extension											
Meeker - Driftwood											
Red Willow											
Bartley											
Cambridge											
Naponee											
Franklin											
Franklin Pump											
Almena											
Superior											
Nebraska Courtland											
Courtland Canal Above Lovewell (KS)											
Courtland Canal Below Lovewell											

*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.

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Meeting Notes for the
QUARTERLY MEETING of the
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REPUBLICAN RIVER COMPACT ADMINISTRATION
August 19th, 2015, 1:00 PM Central Time, 12:00 PM Mountain Time

Attendees:

Jim Schneider	Nebraska	Chris Beightel	Kansas
Jennifer Schellpeper	Nebraska	Ginger Pugh	Kansas
Amy Zoller	Nebraska	Sam	Kansas
Ryan Werner	Nebraska	Ivan Franco	Colorado
Kathy Benson	Nebraska	Willem Schreuder	Principia Mathematica
David Kracman	The Flatwater Group	Craig Scott	BOR
Chance Thayer	The Flatwater Group		

1. Introductions

2. Review/Modify Agenda
    a. No changes

3. Publication of RRCA Annual Reports
    a. 2013 Reports (Kansas)
        i. Beightel reported that they continue to review reports and the hope is to get the completed minutes on CD's for the annual meeting.
    b. 2014 Reports (Nebraska); Benson reported that:
        i. The December 2013 Special Meeting minutes are being reviewed by Colorado.
        ii. The August 2014 Annual Meeting minutes are being reviewed by Colorado.
    c. 2015 Reports (Nebraska); Benson reported that:
        i. The October 2014 Special Meeting summary is with Colorado for review.
        ii. The November 2014 Special Meeting summary is with Colorado for review.
        iii. The March 2015 Special Meeting summary is drafted and in internal review with Nebraska.

4. Modeling and Data Tasks for Principia Mathematica
    a. Documentation
        i. Schreuder reported that he sent out the model runs for review on August 4th which covered 2007 to 2014 as well as a preview of 2015. He continues to work on surface water inputs. **Schellpeper stated DNR will be sending out revised data on surface water delivery pumping and augmentation well project pumping for 2014 before next week.** Willem completed the new 2014 IMPACTS run with the updated information from Nebraska's augmentation

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wells on August 20, 2015 (Attachment 1). Schreuder stated there has not been an update on the documentation tasks. He suggested that it needed to be decided who has the best data and they would then be responsible to populate the fields to eliminate discrepancies in the numbers given. **Schneider suggested including this as a recommended task for the Engineering Committee for the upcoming year. Beightel and Franco both agreed.**

5. Conservation Committee Terraces Study
    a. Posting of final data from BOR to website
        i. Schreuder reported the GIS data on the Conservation Study was posted to the website.
    b. Draft Author Page
        i. Beightel reported that Erickson is waiting for States' approval on the author page and then will post it to the website. Both Schneider and Franco gave their consent on the author page. Schneider stated that Item #5 can now be removed from the Agenda.
6. Non-Federal Reservoir Tracking
    a. Updated Methodology
        i. Zoller reported past activities for tracking reservoirs by using digital technology and pan evaporation estimates from the nearest federal reservoir and applied the rate to the area of the digitized reservoirs. The NDNR Dam Safety Division has been using Lidar and field investigations to track dams/reservoirs and this data has been accessed for use in collecting presumptive criteria which covers what is outlined in the RRCA Compact. Field crews do go out and look at reservoirs that are 200 acre-feet and over and have been categorized as either full or dry (nearly full are considered full). This information is set up by sub-basin. The reference number is Pages 24 & 25 of the Accounting Procedures, Section IV.A.2f. The work done this year is for 2014. **Schneider stated he would get a write-up of the methodology to send out.**
7. Data Exchange
    a. 2014 Accounting
        i. There was no other accounting input other than what Schellpeper referred to earlier in that revised data would be sent out in the next week. Schreuder reported that Colorado's data is final for this year with the CIR method for one last year and next year the hope is to use meters.
        ii. Franco reported that Colorado now has 2012, 2013, and 2014 meter data available on the website.

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b. 2015 Accounting
    i. Per an RRCA resolution, Nebraska has been sending out preliminary estimates for 2015 accounting by the 10th of each month. A model run for 2015 from Schreuder was used showing the CBCU was much different than what was used (showing a lower number) and the IWSC credit higher so at this point it is still under review. Two spreadsheets were sent out for others to review. Schneider explained the difference between the two spreadsheets and asked for questions. No questions were posed.
c. Finalization of 2014 and previous years accounting (2007-2014)
    i. Schreuder sent out a spreadsheet to the EC on accounting inputs for 1995 to 2014 for discussion (Attachment 2). Schneider stated that the Flatwater Group reviewed the data and found potential discrepancies which they sent out for review. Beightel stated that they started to look over the data and found some discrepancies. They need to continue their review. Schneider asked if it was reasonable to pursue this at the meeting next week or consider it an assignment next year for the Engineering Committee. Beightel asked if he could make that decision next week. There was discussion about requesting that the USGS have their stream gage data ready in a timely fashion for accounting purposes.

8. Estimating Ground and Surface Water Irrigation Recharge and Return Flows
    a. Draft scope and needs document regarding changes in irrigation efficiency.
        i. **Beightel reported no update at this time.**

9. Accounting changes for Nebraska Groundwater Recharge Project
    a. Discussion on how accounting procedures address evaporation and diversion at different times of the year
        i. Accounting change proposal (Nebraska) – Schneider asked if there were any questions on the proposal that was discussed in the last EC meeting. Beightel's concerns were about the 18% charged to the canal loss being considered all evaporation and felt there may be other considerations and the percentage wouldn't be as high. Schneider reminded the committee this was a pilot project and not pressing. Due to the remaining questions, this issue will not be taken to the RRCA for action next week.

10. Accounting for Direct Return Data from Canals
    a. Accounting change proposal (Nebraska). Frenchmen-Cambridge Irrigation District had a payback for the Nebraska Bostwick Irrigation District so water was deliberately

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discharged down a waste-way back to the Republican River. Beightel asked about how the data was collected on situations of this nature. Beightel did call Scott at the BOR to gain some insight on the procedure and asked for back-up data. Schneider stated that NDNR would do what was necessary to get the best data collected. Beightel asked for reassurance that this would be handled fairly. Franco stated he did not have questions or concerns about this. Schneider stated a resolution has been prepared for a new version of the accounting procedures as a result of the court ruling and including accounting for discharge down a waste-way. These accounting changes will be brought forward to the Annual Meeting next week. The EC agreed that it would be best to start using the new direct return accounting data in 2015 and this will be stated in the resolution. **Schneider asked if further changes need to be made to Page 43 of the accounting. The resolution will be out by the end of the week.**

11. Future Augmentation Plans – Application and Approval Process
    a. Ongoing discussions at the Three-States Meeting
        i. Schneider stated **this item will be discussed at the Three-States Meeting.**

12. Harlan County Lake – Evaporation Charges and Compact Accounting Adjustments
    a. Examples for calculating the incremental increase in reservoir areas
        i. Schneider stated **this item will be discussed at the Three-States Meetings.**

13. Beginning and Ending Meter Data
    a. Review of Colorado Data (Kansas)
        i. Beightel stated that review has been done on 2012 to 2014 of CIR versus the meter data. The meter data indicates more pumping than the CIR data. Kansas continues to review the data and is **putting together analyses that will be sent out by the end of the week**. The data before 2012 is still under consideration.

14. Modeling Bonny Reservoir
    a. Kansas and Colorado discussions
        i. No update at this time.

15. Creating a New RRCA-oriented Website
    a. Draft administrative website (Kansas). Pugh reported that an outline is written and asked for updated files for irrigation districts. **The outline needs to be sent out for review.**

16. DRAFT Engineering Committee Report to the RRCA

Meeting Notes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
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a. Beightel asked questions about Assignments #6 and #3. Franco suggested Assignment #3b be dropped and this was agreed upon by all. In regards to the rest of the assignments, it was agreed that Assignments on the Draft EC Report that need to be ongoing are #3a, #4, #5, part of #6. It was agreed by all to drop #7, #8, #9.

17. Summary of Meeting Actions/Assignments
    a. **DNR will send out revised data on surface water delivery pumping and augmentation well project pumping for 2014 before next week.**
    b. **Engineering Committee will recommend that the RRCA make an assignment to the EC to designate responsible parties for generation of specific input data**
    c. **The 2015 EC Report to the RRCA will be drafted by Nebraska and discussed at the RRCA workshop meeting**
    d. **DNR will get write-up on methodology of Non-Federal Reservoir Tracking**
    e. **DNR will prepare accounting resolution for Annual Meeting next week**
    f. **Kansas will continue to review Colorado data and email their analysis by next week.**

18. Future Meeting Schedule
    a. The next meeting of the RRCA Engineering Committee is scheduled for Wednesday, August 26th, 2015, at 1:00 p.m. Central Time, Lower Level F, in the Nebraska State Office Building, Lincoln, NE. The hosting of the EC meetings will then go to Colorado.

19. Adjournment
    a. The meeting adjourned at 2:20 p.m.

Impact 2014 (acre-feet)

Location	Colorado Pumping			Kansas Pumping			Nebraska Pumping			Nebraska Mound			CCP Credit		
	Dry Bonny CCP	Full Bonny CCP	Dry Bonny Kansas Method	Dry Bonny CCP	Full Bonny CCP	Dry Bonny Kansas Method	Dry Bonny CCP	Full Bonny CCP	Dry Bonny Kansas Method	Dry Bonny CCP	Full Bonny CCP	Dry Bonny Kansas Method	Dry Bonny CCP	Full Bonny CCP	Dry Bonny Kansas Method
Arikaree	1138	1141	1141	225	225	225	128	128	128	0	0	0	0	0	33
Beaver	0	0	0	3462	3462	3462	2054	2054	2054	0	0	0	0	0	0
Buffalo	446	446	446	0	0	0	3393	3393	3393	0	0	0	0	0	0
Driftwood	0	0	0	0	0	0	1023	1023	1023	0	0	0	0	0	0
Frenchman	927	927	927	0	0	0	77055	77055	77055	0	0	0	0	0	0
North Fork	16283	16283	16283	0	0	0	1096	1096	1096	0	0	0	7000	7000	0
Above Swanson	-871	-1157	-1143	139	60	108	9840	9693	9673	0	0	0	0	0	5206
Swanson - Harlan	-22	-22	-22	-2302	-2302	-2302	23207	23209	23108	1824	1824	1813	0	0	0
Harlan - Guide Rock	0	0	0	0	0	0	24693	24693	24676	371	371	371	0	0	0
Guide Rock - Hardy	0	0	0	31	31	31	1922	1922	1919	-11	-11	-11	0	0	0
Medicine	0	0	0	0	0	0	20485	20485	20485	10718	10718	10718	0	0	0
Prairie Dog	0	0	0	524	524	524	0	0	0	0	0	0	0	0	0
Red Willow	0	0	0	0	0	0	6435	6435	6432	29	29	29	0	0	0
Rock	107	108	108	0	0	0	4587	4587	4587	0	0	0	0	0	0
Sappa	0	0	0	-1047	-1047	-1047	909	909	909	0	0	0	0	0	0
South Fork	7033	12405	7043	3752	8547	3751	488	783	495	0	0	0	0	0	117
Hugh Butler	0	0	0	0	0	0	2003	2003	2003	0	0	0	0	0	0
Bonny	-1459	1408	-1459	0	14	0	0	0	0	0	0	0	0	0	0
Keith Sebelius	0	0	0	460	460	460	0	0	0	0	0	0	0	0	0
Enders	0	0	0	0	0	0	4761	4761	4761	0	0	0	0	0	0
Harlan	0	0	0	83	83	83	793	793	793	26	26	26	0	0	0
Harry Strunk	0	0	0	0	0	0	296	296	296	0	0	0	0	0	0
Swanson	20	19	20	0	0	0	252	253	253	0	0	0	0	0	0
Mainstem	**-893**	**-1179**	**-1165**	**-2124**	**-2203**	**-2156**	**59662**	**59516**	**59377**	**2184**	**2184**	**2172**	**0**	**0**	**5206**
Total	**23611**	**31568**	**23353**	**5342**	**10071**	**5309**	**185421**	**185571**	**185140**	**12971**	**12971**	**12959**	**7000**	**7000**	**5363**

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Subbasin	Area	Quantity	Variable	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork	Colorado	Irrigation – Non-Federal Canals	NFDc	1929	2454	3084	2866	2884	3350	2964	3776	2410	2888	2790	2496	2376	570	394	474	530	886	553	412	412
		Irrigation – Small Pumps	NFPc	0	0	0	0	0	0	0	0	0	0	0	0	73	21	0	0	0	0	0	0	0
		M&I	NFMIc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arikaree	Colorado	Irrigation – Non-Federal Canals	ARDc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	55	105	75	35	35
		Irrigation – Small Pumps	ARPc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	ARMIc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kansas	Irrigation – Non-Federal Canals	ARDk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	ARPk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	ARMIk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska	Irrigation – Non-Federal Canals	ARDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	ARPn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	ARMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo Creek	Colorado	Irrigation – Non-Federal Canals	BODc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	BOPc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	BOMIc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska	Irrigation – Non-Federal Canals	BODn	0	0	0	0	0	769	517	584	587	334	171	170	271	361	248	354	446	542	416	481	481
		Irrigation – Small Pumps	BOPn	0	970	780	804	804	0	0	58	70	56	34	0	0	0	0	0	0	0	0	0	0
		M&I	BOMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock Creek	Nebraska	Irrigation – Non-Federal Canals	RCDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	RCPn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	RCMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Fork	Colorado	Irrigation – Non-Federal Canals	SFDc	2437	2457	2071	2100	0	2836	542	3814	996	1283	458	864	401	87	0	14	16	0	0	0	0
		Irrigation – Small Pumps	SFPc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	SFMIc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kansas	Irrigation – Non-Federal Canals	SFDk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	SFPk	94	94	0	0	111	13	65	41	39	25	13	0	0	0	0	0	0	0	0	0	0
		M&I	SFMIk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska	Irrigation – Non-Federal Canals	SFDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	SFPn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	SFMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Frenchman C	Nebraska	Irrigation – Non-Federal Canals	FCDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	FCPn	0	760	1110	798	798	53	81	36	3	21	1	0	3	1	5	0	0	18	0	19	19
		M&I	FCMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Driftwood Cre	Kansas	Irrigation – Non-Federal Canals	DCDk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	DCPk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	DCMIk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska	Irrigation – Non-Federal Canals	DCDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	DCPn	0	100	130	51	51	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0
		M&I	DCMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Willow C	Nebraska	Irrigation – Non-Federal Canals	RWDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	RWPn	0	960	1450	645	645	129	164	303	341	167	123	121	0	0	6	0	1	18	35	41	41
		M&I	RWMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicine Cree	Nebraska	Irrigation – Non-Federal Canals	MCDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	MCPn	0	1890	2730	1293	1293	455	684	657	291	255	259	305	25	91	34	43	94	609	65	35	35
		M&I	MCMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska below gage	Irrigation – Non-Federal Canals	MCDnb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	MCPnb	0	340	1110	625	625	0	0	0	106	58	78	94	25	40	37	18	4	14	24	38	38
		M&I	MCMInb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaver Creek	Colorado	Irrigation – Non-Federal Canals	BRDc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	BRPc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	BRMIc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kansas	Irrigation – Non-Federal Canals	BRDk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	BRPk	46	77	0	5	14	0	8	25	26	22	12	7	0	0	3	2	2	11	8	6	6
		M&I	BRMIk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska	Irrigation – Non-Federal Canals	BRDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	BRPn	0	260	600	180	180	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0
		M&I	BRMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Nebraska below gage	Irrigation – Non-Federal Canals	BRDnb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	BRPnb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		M&I	BRMInb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kansas	Irrigation – Non-Federal Canals	SCDk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	SCPk	104	64	105	163	63	99	108	75	14	28	3	0	6	0	0	0	0	0	0
		M&I	SCMIk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sappa Creek	Nebraska	Irrigation – Non-Federal Canals	SCDn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	SCPn	0	1280	3840	1781	1781	398	488	138	0	20	54	22	189	0	115	221	58	552	0	135	135
		M&I	SCMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska below gage	Irrigation – Non-Federal Canals	SCDnb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	SCPnb	0	240	550	168	168	11	100	102	20	0	0	0	0	0	0	0	0	0	0	0
		M&I	SCMInb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kansas	Irrigation – Non-Federal Canals	PDDk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	PDPk	728	255	637	279	416	460	452	517	273	87	159	94	165	300	560	360	328	419	489	296	296
		M&I	PDMIk	450	426	454	511	488	518	525	586	548	496	382	420	362	203	354	327	158	203	365	352	352
Prairie Dog C	Nebraska below gage	Irrigation – Non-Federal Canals	PDDnb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	PDPnb	0	150	500	293	293	88	224	102	59	44	21	22	43	63	149	9	52	166	15	29	29
		M&I	PDMInb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kansas	Irrigation – Non-Federal Canals	MSDk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	MSPk	1341	1057	1163	1386	1471	1169	1165	1405	1064	668	767	776	518	449	688	872	539	949	776	776	776
		M&I	MSMIk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mainstem	Nebraska	Irrigation – Non-Federal Canals	MSDn	0	11060	21310	11464	11464	967	2380	1674	3719	3066	1661	2460	835	682	1683	2146	2387	1524	1600	1423	1423
		Irrigation – Small Pumps	MSPn	0	0	0	0	0	5687	5070	6163	1401	1931	1918	590	1033	1053	848	846	1078	2997	568	314	314
		M&I	MSMIn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska below Guide Rock	Irrigation – Non-Federal Canals	MSDnb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Irrigation – Small Pumps	MSPnb	0	0	0	0	0	1502	1041	1860	1562	689	1278	697	358	244	456	350	496	1271	850	476	476
		M&I	MSMInb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Subbasin	Area	Variable	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork	Colorado	NFNFREVc	0	0	0	0	0	0	0	0	0	46	43	50	38	37	28	41	36	51	45	38	38
	Colorado	ARNFREVc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arikaree	Kansas	ARNFREVk	0	0	0	0	0	0	0	0	0	41	41	46	18	14	7	11	14	24	17	11	11
	Nebraska	ARNFREVn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo	Colorado	BONFREVc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nebraska	BONFREVn	0	0	0	0	0	0	0	0	0	22	21	0	18	15	10	21	24	15	3	2	2
Rock Creek	Nebraska	RCNFREVn	0	0	0	0	0	0	0	0	0	64	82	79	55	46	20	57	64	125	102	97	97
	Colorado	SFNFREVc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	154	107	51	51	51
South Fork	Kansas	SFNFREVk	0	0	0	0	0	0	0	0	0	285	285	325	143	121	65	98	119	213	147	100	100
	Nebraska	SFNFREVn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Frenchman Creek	Nebraska	FCNFREVn	0	0	0	0	0	0	0	0	0	244	135	21	152	126	32	217	238	243	66	50	50
Driftwood Creek	Kansas	DWNFREVk	0	0	0	0	0	0	0	0	0	7	7	11	13	11	6	11	11	17	13	10	10
	Nebraska	DWNFREVn	0	0	0	0	0	0	0	0	0	8	2	0	5	3	2	10	10	17	8	0	0
Red Willow Creek	Nebraska	RWNFREVn	0	0	0	0	0	0	0	0	0	155	182	23	75	40	48	118	118	159	269	209	209
Medicine Creek	Nebraska	MCNFREVn	0	0	0	0	0	0	0	0	0	233	292	139	251	155	104	321	314	313	315	241	241
	Nebraska - Below Gage	MCNFREVnb	0	0	0	0	0	0	0	0	0	4	7	0	6	5	3	8	8	0	0	0	0
Beaver Creek	Colorado	BRNFREVc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kansas	BRNFREVk	0	0	0	0	0	0	0	0	0	135	135	234	254	260	141	251	253	409	313	223	223
	Nebraska	BRNFREVn	0	0	0	0	0	0	0	0	0	23	51	23	59	47	38	65	64	51	110	92	92
	Nebraska - Below Gage	BRNFREVnb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sappa Creek	Kansas	SCNFREVk	0	0	0	0	0	0	0	0	0	278	278	483	351	279	152	269	272	439	336	240	240
	Nebraska	SCNFREVn	0	0	0	0	0	0	0	0	0	22	43	22	32	28	32	60	63	77	51	46	46
	Nebraska - Below Gage	SCNFREVnb	0	0	0	0	0	0	0	0	0	7	5	1	3	2	6	4	5	13	15	5	5
Prairie Dog Creek	Kansas	PDNFREVk	0	0	0	0	0	0	0	0	0	371	371	333	260	114	90	217	137	442	294	293	293
	Nebraska	PDNFREVn	0	0	0	0	0	0	0	0	0	17	21	11	44	39	25	17	23	58	27	21	21
Mainstem	Kansas	MSNFREVk	0	0	0	0	0	0	0	0	0	148	148	122	84	84	64	85	80	150	145	111	111
	Nebraska - Above Guide Rock	MSNFREVn	0	0	0	0	0	0	0	0	0	2331	1891	830	1524	1287	1269	1867	2127	2149	1477	1159	1159
	Nebraska - Below Guide Rock Gage	MSNFREVnb	0	0	0	0	0	0	0	0	0	340	137	115	163	147	209	180	244	299	50	60	60

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Gage Name	Variable	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork Republican River At Colorado-Nebraska State Line	06823000	29133	25548	22232	20747	21588	19435	19752	15904	17700	19759	21060	17280	20333	21638	24405	20418	19722	14376	18433	26707	32707
Arikaree River At Haigler	06821500	6440	5667	2950	2699	6805	3631	553	231	1060	341	1151	404	1308	1567	779	2358	1074	494	91	0	110
Buffalo Creek Near Haigler	06823500	3160	3179	2419	1910	3138	2255	2999	2049	2090	2276	2227	1731	2007	2190	2353	2374	1972	1045	1268	1463	1463
Rock Creek At Parks	06824000	7327	6811	6608	6335	6292	5609	5658	6316	4710	5419	5466	5355	4764	4852	4916	5253	4345	4173	19724	23088	3691
South Fork Republican River Near Benkelman	06827500	15639	15944	10276	9967	9005	4855	3097	1579	905	0	0	0	674	1397	8407	12756	9916	6441	0	0	5000
Frenchman Creek At Culbertson	06835500	35491	38281	29992	27128	31703	21497	20878	12266	13360	19926	23235	22606	44910	33174	27522	33840	31148	16825	22287	31021	31021
Driftwood Creek Near McCook	06836500	4448	7568	4551	4147	4944	2870	2589	2007	1100	1201	1911	1714	4312	2528	1874	3436	2389	4658	1159	1232	1232
Red Willow Creek Near Red Willow	06838000	6141	7472	7445	6006	6259	9265	12045	8453	3970	3555	3791	10018	6453	12411	26873	24790	18297	8682	6408	7643	7643
Medicine Creek Below Harry Strunk	06842500	38482	25897	43331	35981	21225	37974	31373	24794	19850	23300	19992	22648	50356	65150	36450	44469	37420	37444	26198	40561	40561
Beaver Creek Near Beaver City	06847000	2091	13904	6650	2153	2369	1561	844	331	220	163	173	303	1227	1118	1154	1438	899	461	224	412	412
Sappa Creek Near Stamford	06847500	20412	57959	25513	17825	16196	9191	7219	2893	179	84	262	0	4450	7732	10673	21762	15587	7656	1316	1687	1687
Prairie Dog Creek Near Woodruff	06848500	15542	29650	15702	12319	11032	7415	9916	2807	1087	147	3436	153	5457	7571	6871	25698	15864	5066	2596	1363	1363
Republican River At Guide Rock	06853020	178231	332655	169431	144713	108368	66134	118877	24614	21346	15019	1779	2711	61470	229144	105400	284800	214462	116248	24835	35041	35041
Republican River Near Hardy	06853500	239242	395103	213775	198251	161652	94757	178140	50620	52394	41964	16980	14089	100257	272571	130578	340610	274226	139460	44745	50362	50362
Colorado North Fork Augmentation Water Supply	CNFAWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7000	13000
Nebraska Rock Creek Augmentation Water Supply	NRCAWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15766	19397	0
Nebraska N-CORPE Augmentation Water Supply	NMCAWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40878	20000
Water Short Year	WSY	0	0	0	0	0	0	0	2	2	2	2	2	2	0	0	0	0	0	2	2	2

Subbasin	Variable	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Fork	NFFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arikaree	ARFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo Creek	BOFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock Creek	RCFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Fork	SFFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Frenchman Creek	FCFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Driftwood Creek	DCFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Willow Creek	RWFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medicine Creek	MCFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaver Creek	BRFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sappa Creek	SCFF	0	31059	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prairie Dog Creek	PDFF	0	13950	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mainstem	MSFF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Excel File Name:SWinput.xls Tab Name:Reservoir

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Reservoir	Quantity	Variable	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bonny	Evaporation	BONNYe	3732	3498	4523	4963	5236	5557	3972	5750	3375	3158	3430	3031	2428	1766	1020	1921	1965	67	0	0	0
	Change in Storage	BONNYs	-1000	400	-2500	-2300	-700	-4900	-3200	-4300	-2226	-2900	-1500	-2400	-1743	1161	836	449	-11360	-100	0	0	0
Enders	Evaporation	ENDERSe	1699	1340	2092	2051	1331	2023	1448	2118	1485	967	1248	1366	1589	1217	428	1135	1342	2796	1761	1332	1332
	Change in Storage	ENDERSs	-1400	3800	-2800	-4200	-1000	-6000	-1200	-400	-218	300	0	-500	5800	-1500	262	1081	757	-2378	-1802	-4170	-4170
High Butler	Evaporation	BUTLERe	3198	1994	3413	3958	3013	3822	2447	3433	2377	2026	2230	2494	2369	1205	1458	1069	1089	2101	1580	1275	1275
	Change in Storage	BUTLERs	-1300	4400	-3600	-3300	-500	-5000	-5500	-5400	2947	2800	1800	-7100	11900	1500	-20143	-323	-34	98	863	1180	1180
Harry Strunk	Evaporation	STRUNKe	2677	2052	3736	3950	2396	3372	2850	4423	3755	2059	2772	3035	1549	1591	1096	3139	2809	4550	2688	2044	2044
	Change in Storage	STRUNKs	-6500	13200	-6200	-5800	11400	-8900	100	-7200	3385	-300	5600	-3000	10400	-1000	430	306	-836	-13161	443	17602	17602
Keith Sebelius	Evaporation	SEBELIUSe	2804	970	4175	4068	3265	5000	3115	5806	2823	2089	1727	1791	2213	1224	1004	2765	1772	5416	2991	2423	2423
	Change in Storage	SEBELIUSs	-700	15700	-7000	-2400	-2600	-5300	-800	-8600	-4338	-1000	100	-200	1600	6600	1086	3214	2600	-6738	-3960	-2826	-2826
Swanson	Evaporation	SWANSONe	6920	3783	9082	8774	6255	8599	4816	7044	6086	2588	5638	5381	6444	5527	2599	6676	6850	9924	6078	3625	3625
	Change in Storage	SWANSONs	-3900	18100	-21400	-21900	-2600	-27600	-1800	-2100	4735	3900	4600	1200	8900	6800	3314	6771	115	-24403	-8920	-1189	-1189
Harlan County	Evaporation	HARLANe	14944	2534	19720	16677	15242	20786	12341	29081	23664	17017	17706	16182	14701	12239	14439	10475	14831	31127	25919	18541	18541
	Change in Storage	HARLANs	-21700	42700	-20600	-15700	22300	-77300	27900	-82400	-47110	-6200	21000	-11800	139100	63900	958	-1858	4700	-131975	-66603	24230	24230
Lovewell – Republican River Portion	Evaporation	LOVEWELLe	170	310	370	320	270	900	320	0	670	1110	2020	1770	130	10	130	330	-160	760	800	160	160
Harlan County Split	Evaporation Charged to Kansas	HARLANeK	7353	1440	10505	8879	7611	11233	6079	15433	11463	8598	8946	16182	14701	6863	7567	7025	7305	17783	14887	18541	18541
	Evaporation Charged to Nebraska	HARLANeN	7591	1094	9215	7798	7631	9553	6262	13648	12201	8419	8760	0	0	5376	6873	3451	7526	13344	11032	0	0

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Quantity	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Haigler Canal Diversions - Colorado	1276	1207	1749	1520	1714	1853	1718	1510	1948	2071	2423	2654	2512	465	0	0	0	0	0	0	0
Haigler Canal Diversions - Nebraska	3836	5099	5533	6079	6479	5921	5011	5646	4965	3732	4745	4418	4522	4995	4193	5041	4826	6129	3839	3110	3110
Haigler Canal Diversions	5112	6306	7282	7599	8193	7774	6729	7156	6913	5803	7168	7072	7034	5460	4193	5041	4826	6129	3839	3110	3110
Hale Ditch Diversions	523	705	2022	1804	1864	1718	1092	0	0	0	89	0	43	0	169	1322	23	0	0	184	700
Champion Canal Diversions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverside Canal Diversions	2217	2539	2698	2113	1454	3743	3042	805	1838	1443	2096	0	0	0	2336	2471	2419	0	0	0	0
Culbertson Canal Diversions	9527	10179	10082	9786	8089	9340	6964	8964	8002	8674	6562	0	0	0	9624	9609	9889	5470	0	0	0
Culbertson Canal Extension Diversions	12024	12016	13722	11504	13056	10002	7098	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Culbertson Canal % Return Flow	55.9%	57.3%	53.5%	56.0%	45.7%	54.4%	59.5%	63.5%	56.0%	65.8%	78.1%	100.0%	100.0%	100.0%	78.8%	77.4%	75.6%	76.6%	100.0%	100.0%	100.0%
Culbertson Canal Extension % Return Flow	56.5%	59.5%	57.3%	58.5%	63.0%	57.5%	60.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Meeker-Driftwood Canal Diversions	35371	26998	32218	30144	23202	27529	17816	9894	0	0	0	0	0	0	23274	19469	21538	32955	9210	8035	8035
Meeker-Driftwood Canal % Return Flow	50.4%	51.5%	48.5%	49.3%	45.7%	43.4%	48.7%	48.6%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	68.2%	62.2%	60.7%	63.2%	67.1%	72.2%	72.2%
Red Willow Canal Diversions	8974	5217	8628	8247	6121	7785	5355	3429	0	0	0	0	0	4089	5166	0	0	0	0	0	0
Red Willow Canal % Return Flow	43.7%	43.2%	41.2%	44.0%	47.3%	46.5%	50.1%	49.2%	100.0%	100.0%	100.0%	100.0%	100.0%	64.9%	68.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Almena Canal Diversions	4965	4860	8781	4697	5455	4517	5321	4065	3379	0	0	0	1099	2217	1551	3330	2277	3172	2274	1385	1385
Almena Canal % Return Flow	58.4%	61.7%	59.2%	62.0%	60.5%	58.3%	61.1%	55.3%	52.0%	100.0%	100.0%	100.0%	61.0%	60.6%	70.9%	66.9%	63.8%	49.3%	49.0%	57.3%	57.3%
Bartley Canal Diversion	10677	6250	10245	9181	7258	8608	5872	3584	0	0	0	5830	0	0	10711	8589	9718	8137	0	0	0
Bartley Canal % Return Flow	41.9%	44.2%	48.9%	45.6%	49.1%	48.2%	47.1%	30.5%	100.0%	100.0%	100.0%	56.2%	100.0%	100.0%	70.8%	65.5%	65.6%	56.0%	100.0%	100.0%	100.0%
Cambridge Canal Diversion	31748	14542	29527	27464	21536	26292	19629	21152	18332	21964	19732	19692	0	19387	23961	24280	28850	27618	12575	12242	12242
Cambridge Canal % Return Flow	45.4%	60.0%	43.1%	46.8%	46.1%	49.7%	48.1%	46.7%	51.0%	52.5%	53.6%	55.2%	100.0%	56.1%	60.8%	61.9%	60.5%	51.7%	56.3%	62.8%	62.8%
Naponee Canal Diversion	3185	1462	3202	2319	2829	3638	2988	2444	2162	0	0	0	0	316	1095	690	1182	1985	755	0	0
Naponee Canal % Return Flow	54.9%	62.9%	56.4%	54.0%	55.8%	56.1%	53.3%	51.4%	53.0%	100.0%	100.0%	100.0%	100.0%	55.2%	70.0%	68.8%	50.2%	51.6%	65.2%	100.0%	100.0%
Franklin Canal Diversion	35712	27440	33031	31605	32368	38479	28544	24631	15262	0	0	0	0	16085	23246	13879	18853	30870	15796	0	0
Franklin Canal % Return Flow	63.3%	70.2%	63.9%	66.1%	65.1%	64.4%	63.9%	58.1%	64.0%	100.0%	100.0%	100.0%	100.0%	70.9%	65.4%	67.5%	65.9%	56.3%	58.2%	100.0%	100.0%
Franklin Pump Canal Diversions	3963	2224	3025	2630	2962	3946	3409	3273	1687	0	0	0	0	576	909	751	729	1648	1206	0	0
Franklin Pump Canal % Return Flow	54.5%	53.0%	50.0%	49.3%	46.9%	48.1%	49.6%	47.2%	57.0%	100.0%	100.0%	100.0%	100.0%	67.9%	67.3%	69.8%	58.9%	56.8%	52.3%	100.0%	100.0%
Superior Canal Diversions	17272	14234	12307	14200	15283	18466	11303	11252	8174	5800	4712	0	0	5666	6336	6489	7070	9744	6161	0	0
Superior Canal % Return Flow	61.6%	62.3%	64.4%	59.5%	60.1%	58.5%	59.0%	54.2%	57.0%	67.8%	64.2%	100.0%	100.0%	71.4%	59.5%	57.9%	64.6%	57.6%	58.4%	100.0%	100.0%
Courtland Canal Diversions At Headgate	62772	72949	67626	65785	62291	126839	61217	87742	66500	31501	48737	50631	65851	32224	51647	47290	35907	74730	70402	59654	59654
Diversions to Nebraska Courtland	2082	1404	1556	2381	2355	3463	1982	2263	1591	0	0	0	0	311	718	202	428	884	558	0	0
Nebraska Courtland % Return Flow	36.2%	31.8%	35.1%	35.9%	32.6%	35.4%	39.3%	27.5%	32.6%	100.0%	100.0%	100.0%	100.0%	34.7%	28.4%	32.3%	50.0%	27.6%	25.8%	0.0%	0.0%
Courtland Canal, Loss in NE assigned to upper Courtland KS	3505	2317	3485	3333	3866	2687	4064	3704	2841	184	415	2242	2087	3671	2852	3794	2014	4545	1998	1099	1099
Courtland Canal, Loss in NE assigned to delivery to Lovewell	86	3498	4516	4259	3044	9574	4419	8002	10116	5877	8236	9916	7628	2945	5385	4558	2215	5663	2956	4346	4346
Courtland Canal At Kansas-Nebraska State Line	57099	65730	58070	55812	53026	111115	50752	73315	51952	25440	40086	38472.587	56136	25297	42692	38736	31250	63637	65021	54209	54209
Courtland Canal Diversions to the Upper Courtland District	33179	24996	26085	26444	30593	32417	25456	26077	17511	779	1864	10595	14748	17433	18833	20190	17889	26777	20093	15525	15525
Courtland Canal Above Lovewell % Return Flow	53.1%	46.8%	53.2%	51.6%	52.3%	46.3%	52.3%	49.6%	51.8%	79.2%	63.0%	62.0%	57.2%	65.3%	61.5%	54.3%	58.0%	51.4%	51.1%	51.7%	51.7%
Courtland Canal, Loss assigned to deliveries of water to Lovewell, Stateline to Lovewell	4537	4202	6624	4131	5448	7906	3243	5986	10687	10715	9372	11026	8788	3878	9103	4310	5059	4052	8108	3334	3334
Courtland Canal Deliveries To Lovewell Reservoir	14130	14130	14130	14130	14130	14130	14130	14130	26596	14130	29265	19093	34688	7657	17608	18030	10316	37353	38432	36450	36450
Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	18200	36510	26310	31720	49000	41250	25920	32420	21270	25590	25590	28066	35960	11280	12560	20410	12710	26840	37250	32108	32108
Courtland Canal Below Lovewell % Return Flow	45.3%	45.3%	44.7%	45.4%	43.5%	42.1%	45.6%	40.5%	45.7%	49.6%	52.7%	48.9%	51.1%	53.8%	52.2%	42.7%	50.5%	45.1%	46.4%	45.7%	45.7%
To allocate Harlan County evaporation:																					
Kansas Bostwick Diversions During Irrigation Season	60164	61454	60455	60401	55556	79822	46739	49425	27100	41084	41084	11535	30156	29253	35504	44732	26097	59938	32966	40605	40605
Nebraska Bostwick Diversions During Irrigation Seasor	62111	46685	53031	53044	55701	67880	48146	43706	28844	40232	40232	0	0	22915	32248	21973	26884	44974	24430	0	0
Percent of Harlan Evap Charged to Kansas	49.2%	56.8%	53.3%	53.2%	49.9%	54.0%	49.3%	53.1%	48.4%	50.5%	50.5%	100.0%	100.0%	56.1%	52.4%	67.1%	49.3%	57.1%	57.4%	100.0%	100.0%
Percent of Harlan Evap Charged to Nebraska	50.8%	43.2%	46.7%	46.8%	50.1%	46.0%	50.7%	46.9%	51.6%	49.5%	49.5%	0.0%	0.0%	43.9%	47.6%	32.9%	50.7%	42.9%	42.6%	0.0%	0.0%

Canal	Quantity	Variable	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Diversions-Colorad	HAIGLERc	1276	1207	1749	1520	1714	1853	1718	1510	1948	2071	2423	2654	2512	465	0	0	0	0	0	0	0
Haigler Canal	Diversions-Nebraska	HAIGLERn	3836	5099	5533	6079	6479	5921	5011	5646	4965	3732	4745	4418	4522	4995	4193	5041	4826	6129	3839	3110	3110
	Diversions-Colorad	HAIGLER	5112	6306	7282	7599	8193	7774	6729	7156	6913	5803	7168	7072	7034	5460	4193	5041	4826	6129	3839	3110	3110
Hale Ditch	Diversions	HALE	523	705	2022	1804	1864	1718	1092	0	0	0	89	0	43	0	169	1322	23	0	0	184	700
Champion Cana	Diversions	CHAMPION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverside Cana	Diversions	RIVERSIDE	2217	2539	2698	2113	1454	3743	3042	805	1838	1443	2096	0	0	0	2336	2471	2419	0	0	0	0
Culbertson Canal	Diversions	CULBERTSON	9527	10179	10082	9786	8089	9340	6964	8964	8002	8674	6562	0	0	0	9624	9609	9889	5470	0	0	0
	Return Flow	CULBERTSONr	5330	5831	5395	5479	3696	5076	4142	5690	4481	5712	5124	0	0	0	7583	7437	7480	4190	0	0	0
Culbertson Canal Extension	Diversions	CULBERTEXT	12024	12016	13722	11504	13056	10002	7098	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Return Flow	CULBERTEXTr	6793	7155	7864	6727	8225	5753	4319	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meeker-Driftwood Canal	Diversions	MEEKER	35371	26998	32218	30144	23202	27529	17816	9894	0	0	0	0	0	0	23274	19469	21538	32955	9210	8035	8035
	Return Flow	MEEKERr	17840	13895	15624	14847	10613	11955	8676	4810	0	0	0	0	0	0	15869	12116	13070	20833	6184	5801	5801
Red Willow Canal	Diversions	RWCANAL	8974	5217	8628	8247	6121	7785	5355	3429	0	0	0	0	0	4089	5166	0	0	0	0	0	0
	Return Flow	RWCANALr	3924	2255	3551	3630	2895	3620	2682	1687	0	0	0	0	0	2656	3515	0	0	0	0	0	0
Almena Canal	Diversions	ALMENA	4965	4860	8781	4697	5455	4517	5321	4065	3379	0	0	0	1099	2217	1551	3330	2277	3172	2274	1385	1385
	Return Flow	ALMENAr	2901	2998	5202	2911	3298	2634	3251	2249	1757	0	0	0	670	1343	1100	2227	1453	1564	1115	794	794
Bartley Canal	Diversions	BARTLEY	10677	6250	10245	9181	7258	8608	5872	3584	0	0	0	5830	0	0	10711	8589	9718	8137	0	0	0
	Return Flow	BARTLEYr	4472	2761	5006	4188	3561	4150	2764	1093	0	0	0	3277	0	0	7585	5622	6374	4554	0	0	0
Cambridge Canal	Diversions	CAMBRIDGE	31748	14542	29527	27464	21536	26292	19629	21152	18332	21964	19732	19692	0	19387	23961	24280	28850	27618	12575	12242	12242
	Return Flow	CAMBRIDGEr	14416	8723	12732	12840	9929	13074	9447	9877	9349	11522	10579	10879	0	10870	14570	15038	17457	14285	7075	7688	7688
Naponee Canal	Diversions	NAPONEE	3185	1462	3202	2319	2829	3638	2988	2444	2162	0	0	0	0	316	1095	690	1182	1985	755	0	0
	Return Flow	NAPONEEr	1749	920	1805	1251	1577	2042	1593	1255	1146	0	0	0	0	174	767	475	593	1024	492	0	0
Franklin Canal	Diversions	FRANKLIN	35712	27440	33031	31605	32368	38479	28544	24631	15262	0	0	0	0	16085	23246	13879	18853	30870	15796	0	0
	Return Flow	FRANKLINr	22593	19265	21105	20898	21079	24790	18251	14308	9768	0	0	0	0	11405	15210	9369	12421	17370	9195	0	0
Franklin Pump Canal	Diversions	FRANKLINPMP	3963	2224	3025	2630	2962	3946	3409	3273	1687	0	0	0	0	576	909	751	729	1648	1206	0	0
	Return Flow	FRANKLINPMPr	2161	1179	1513	1296	1388	1898	1690	1545	962	0	0	0	0	391	612	524	429	936	630	0	0
Superior Canal	Diversions	SUPERIOR	17272	14234	12307	14200	15283	18466	11303	11252	8174	5800	4712	0	0	5666	6336	6489	7070	9744	6161	0	0
	Return Flow	SUPERIORr	10639	8864	7927	8452	9182	10794	6671	6095	4659	3932	3025	0	0	4046	3768	3754	4570	5617	3600	0	0
	Headgate Diversior	COURTLANDhg	62772	72949	67626	65785	62291	126839	61217	87742	66500	31501	48737	50631	65851	32224	51647	47290	35907	74730	70402	59654	59654
	Diversions to Nebraska	COURTLANDn	2082	1404	1556	2381	2355	3463	1982	2263	1591	0	0	0	0	311	718	202	428	884	558	0	0
	Returns from Nebraska	COURTLANDnr	754	447	545	854	767	1226	779	622	519	0	0	0	0	108	204	65	214	244	144	0	0
	Flow at Kansas-Nebraska State Lin	COURTLANDsl	57099	65730	58070	55812	53026	111115	50752	73315	51952	25440	40086	38473	56136	25297	42692	38736	31250	63637	65021	54209	54209
	Loss in Nebraska assigned to upper Courtland Kansa	COURTLANDclUC	3505	2317	3485	3333	3866	2687	4064	3704	2841	184	415	2242	2087	3671	2852	3794	2014	4545	1998	1099	1099
Courtland Canal	Loss in Nebraska assigned to delivery to Lovewel	COURTLANDclLW	86	3498	4516	4259	3044	9574	4419	8002	10116	5877	8236	9916	7628	2945	5385	4558	2215	5663	2956	4346	4346
	Diversions to the Upper Courtland Distric	COURTLANDa	33179	24996	26085	26444	30593	32417	25456	26077	17511	779	1864	10595	14748	17433	18833	20190	17889	26777	20093	15525	15525
	Courtland Canal Above Lovewell Return Flov	COURTLANDar	17602	11700	13884	13655	15994	15000	13301	12931	9071	617	1174	6571	8438	11385	11580	10957	10369	13757	10263	8026	8026
	Loss assigned to deliveries of water to Lovewell Stateline to Lovewe	COURTLANDclSL	4537	4202	6624	4131	5448	7906	3243	5986	10687	10715	9372	11026	8788	3878	9103	4310	5059	4052	8108	3334	3334
	Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	COURTLANDb	18200	36510	26310	31720	49000	41250	25920	32420	21270	25590	25590	28066	35960	11280	12560	20410	12710	26840	37250	32108	32108
	Courtland Canal Below Lovewell Return Flov	COURTLANDbr	8237	16524	11770	14385	21323	17357	11818	13145	9713	12696	13477	13718	18385	6072	6557	8710	6420	12114	17268	14673	14673

Quantity	Quantity	Variable	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Haigler Canal	Diversions-Colorado	HAIGLERc	1276	1207	1749	1520	1714	1853	1718	1510	1948	2071	2423	2654	2512	465	0	0	0	0	0	0	0
	Diversions-Nebraska	HAIGLERn	3836	5099	5533	6079	6479	5921	5011	5646	4965	3732	4745	4418	4522	4995	4193	5041	4826	6129	3839	3110	3110
	Diversions-Colorado	HAIGLER	5112	6306	7282	7599	8193	7774	6729	7156	6913	5803	7168	7072	7034	5460	4193	5041	4826	6129	3839	3110	3110
Hale Ditch	Diversions	HALE	523	705	2022	1804	1864	1718	1092	0	0	0	89	0	43	0	169	1322	23	0	0	184	700
Champion Cana	Diversions	CHAMPION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverside Cana	Diversions	RIVERSIDE	2217	2539	2698	2113	1454	3743	3042	805	1838	1443	2096	0	0	0	2336	2471	2419	0	0	0	0
Culbertson Canal	Diversions	CULBERTSON	9527	10179	10082	9786	8089	9340	6964	8964	8002	8674	6562	0	0	0	9624	9609	9889	5470	0	0	0
	Deliveries	CULBERTSONd	4324	4383	5004	4435	5117	4499	2733	2892	3188	2441	447	0	0	0	537	771	1096	515	0	0	0
Culbertson Canal Extension	Diversions	CULBERTEXT	12024	12016	13722	11504	13056	10002	7098	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Deliveries	CULBERTEXTd	5343	4700	5903	4715	4322	4266	2615	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meeker-Driftwood Canal	Diversions	MEEKER	35371	26998	32218	30144	23202	27529	17816	9894	0	0	0	0	0	0	23274	19469	21538	32955	9210	8035	8035
	Deliveries	MEEKERd	19449	14362	18807	17197	14657	18500	10336	5755	0	0	0	0	0	0	5603	6705	7998	10784	2384	1372	1372
Red Willow Canal	Diversions	RWCANAL	8974	5217	8628	8247	6121	7785	5355	3429	0	0	0	0	0	4089	5166	0	0	0	0	0	0
	Deliveries	RWCANALd	5984	3525	6139	5458	3700	4814	2977	1960	0	0	0	0	0	1215	1256	0	0	0	0	0	0
Almena Canal	Diversions	ALMENA	4965	4860	8781	4697	5455	4517	5321	4065	3379	0	0	0	1099	2217	1551	3330	2277	3172	2274	1385	1385
	Deliveries	ALMENAd	2038	1719	3482	1639	2048	1864	1938	1889	1759	0	0	0	403	827	300	877	722	1806	1306	595	595
Bartley Canal	Diversions	BARTLEY	10677	6250	10245	9181	7258	8608	5872	3584	0	0	0	5830	0	0	10711	8589	9718	8137	0	0	0
	Deliveries	BARTLEYd	7462	4119	7571	5820	4165	5067	3574	2216	0	0	0	2620	0	0	2088	2475	2778	3691	0	0	0
Cambridge Canal	Diversions	CAMBRIDGE	31748	14542	29527	27464	21536	26292	19629	21152	18332	21964	19732	19692	0	19387	23961	24280	28850	27618	12575	12242	12242
	Deliveries	CAMBRIDGEd	20240	5577	20001	16865	13467	14783	11584	13009	10023	11304	9758	9178	0	8759	8846	8487	10801	14568	5638	4094	4094
Naponee Canal	Diversions	NAPONEE	3185	1462	3202	2319	2829	3638	2988	2444	2162	0	0	0	0	316	1095	690	1182	1985	755	0	0
	Deliveries	NAPONEEd	1619	524	1540	1220	1393	1765	1608	1405	1173	0	0	0	0	159	246	171	705	1132	238	0	0
Franklin Canal	Diversions	FRANKLIN	35712	27440	33031	31605	32368	38479	28544	24631	15262	0	0	0	0	16085	23246	13879	18853	30870	15796	0	0
	Deliveries	FRANKLINd	12553	6070	11220	9414	10250	12689	9671	11049	5144	0	0	0	0	3349	7227	3775	5701	14904	7050	0	0
Franklin Pump Canal	Diversions	FRANKLINPMP	3963	2224	3025	2630	2962	3946	3409	3273	1687	0	0	0	0	576	909	751	729	1648	1206	0	0
	Deliveries	FRANKLINPMPd	2043	1210	1815	1615	1953	2509	2073	2136	793	0	0	0	0	152	250	172	316	779	673	0	0
Superior Canal	Diversions	SUPERIOR	17272	14234	12307	14200	15283	18466	11303	11252	8174	5800	4712	0	0	5666	6336	6489	7070	9744	6161	0	0
	Deliveries	SUPERIORd	6229	4963	3826	5641	5921	7685	4590	5535	3622	1457	1483	0	0	1060	2523	2769	2169	4194	2566	0	0
Courtland Canal	Headgate Diversion	COURTLANDhg	62772	72949	67626	65785	62291	126839	61217	87742	66500	31501	48737	50631	65851	32224	51647	47290	35907	74730	70402	59654	59654
	Diversions to Nebraska	COURTLANDn	2082	1404	1556	2381	2355	3463	1982	2263	1591	0	0	0	0	311	718	202	428	884	558	0	0
	Deliveries to Nebraska	COURTLANDnd	1566	1116	1157	1740	1844	2556	1341	1954	1245	0	0	0	0	233	609	159	217	761	497	0	0
	Loss in Nebraska assigned to upper Courtland Kansas	COURTLANDclUC	3505	2317	3485	3333	3866	2687	4064	3704	2841	184	415	2242	2087	3671	2852	3794	2014	4545	1998	1099	1099
	Loss in Nebraska assigned to delivery to Lovewell	COURTLANDclLW	86	3498	4516	4259	3044	9574	4419	8002	10116	5877	8236	9916	7628	2945	5385	4558	2215	5663	2956	4346	4346
	Flow at State Line	COURTLANDsl	57099	65730	58070	55812	53026	111115	50752	73315	51952	25440	40086	38472.587	56136	25297	42692	38736	31250	63637	65021	54209	54209
	Diversions to the Upper Courtland District	COURTLANDa	33179	24996	26085	26444	30593	32417	25456	26077	17511	779	1864	10595	14748	17433	18833	20190	17889	26777	20093	15525	15525
	Above Lovewell Deliverie	COURTLANDad	15421	13932	11887	12717	14400	18343	11994	13386	8375	144	561	3353	5789	4609	6118	8868	6811	12987	9840	7459	7459
	Loss assigned to deliveries of water to Lovewell Stateline to Lovewell	COURTLANDclSL	4537	4202	6624	4131	5448	7906	3243	5986	10687	10715	9372	11026	8788	3878	9103	4310	5059	4052	8108	3334	3334
	Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	COURTLANDb	18200	36510	26310	31720	49000	41250	25920	32420	21270	25590	25590	28066	35960	11280	12560	20410	12710	26840	37250	32108	32108
	Delivery of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	COURTLANDbd	8237	16524	11770	14385	21323	17357	11818	13145	9713	12696	13477	13718	18385	6072	6557	8710	6420	12114	17268	14673	14673
To allocate Harlan County evaporation:																							
Kansas Bostwick Diversions During Irrigation Season			60164	61454	60455	60401	55556	79822	46739	49425	27100	41084	41084	11535	30156	29253	35504	44732	26097	59938	32966	40605	40605
Nebraska Bostwick Diversions During Irrigation Season			62111	46685	53031	53044	55701	67880	48146	43706	28844	40232	40232	0	0	22915	32248	21973	26884	44974	24430	0	0
Percent of Harlan Evap Charged to Kansas			49.2%	56.8%	53.3%	53.2%	49.9%	54.0%	49.3%	53.1%	48.4%	50.5%	50.5%	100.0%	100.0%	56.1%	52.4%	67.1%	49.3%	57.1%	57.4%	100.0%	100.0%
Percent of Harlan Evap Charged to Nebraska			50.8%	43.2%	46.7%	46.8%	50.1%	46.0%	50.7%	46.9%	51.6%	49.5%	49.5%	0.0%	0.0%	43.9%	47.6%	32.9%	50.7%	42.9%	42.6%	0.0%	0.0%

Addendum to "Impacts of Non-Federal Reservoirs and Land Terracing on Basin Water Supplies" Final Report

The purpose of this document is to provide background information for the Final Report, including how to reference the report, location of background documents and listing of authors & staff, study cooperators and Republican River Compact Administration commissioners & staff.

Suggested Reference for "Conservation Committee Report"

Guenthner, R. Scott, James Koelliker and Derrel Martin, 2014. Impacts of Non-Federal Reservoirs and Land Terracing on Basin Water Supplies. Final report, July 2014, 159 p. U.S. Bureau of Reclamation, Great Plains Regional Office, P.O. Box 36900, Billings, MT 59107-6900.

Background Documents for the Final Report

The Final Report along with the following reference documents and backup data are posted on the website of the Republican River Compact Administration: www.republicanrivercompact.org.

- Plan of Study (Plan Proposal) dated April 28, 2004 including the following appendices:
    - A. Republican River Compact Settlement Conservation Committee Members
    - B. List of Previous Studies Reviewed
    - C. Universities Joint Research Project Proposal
    - Modeling and Field Experimentation to Determine Effects of Terracing and Nonfederal Reservoirs on Water Supplies in the Republican River Basin above Hardy, Nebraska.
    - D. Reservoir Surface Area and Water Level Monitoring
    - E. Available Data
    - F. Inventory Program for Representative Sample of Land Terraces
    - G. Methodology for Assessing Area-Capacity Relationship for Non-Federal Reservoirs
    - H. Study Timeline
    - I. Cooperative Agreements
    - I1. Draft Cooperative Agreement with University of Nebraska – Lincoln
    - I2. Draft Cooperative Agreement with Kansas State University
- RRCA approval of Study proposals and modifications, Memorandum of Understanding (MOU) July 2004
- Final approved contracts with Kansas State University and University of Nebraska
- V2 Water Budget Simulation Model User's Manual by J.K. Koelliker
- 2004 Republican River Compact Administration annual report – Study Approval by RRCA

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The 54th Annual Report of the Republican River Compact Administration for 2014 is hereby approved by unanimous vote on this the 22nd day of August, 2017.

Kevin G. Rein, Chairperson & Colorado Commissioner — DATE SIGNED: 8-22-17

Gordon W. Fassett, Nebraska Commissioner — DATE SIGNED: 8/22/17

David Barfield, Kansas Commissioner — DATE SIGNED: 8/22/17