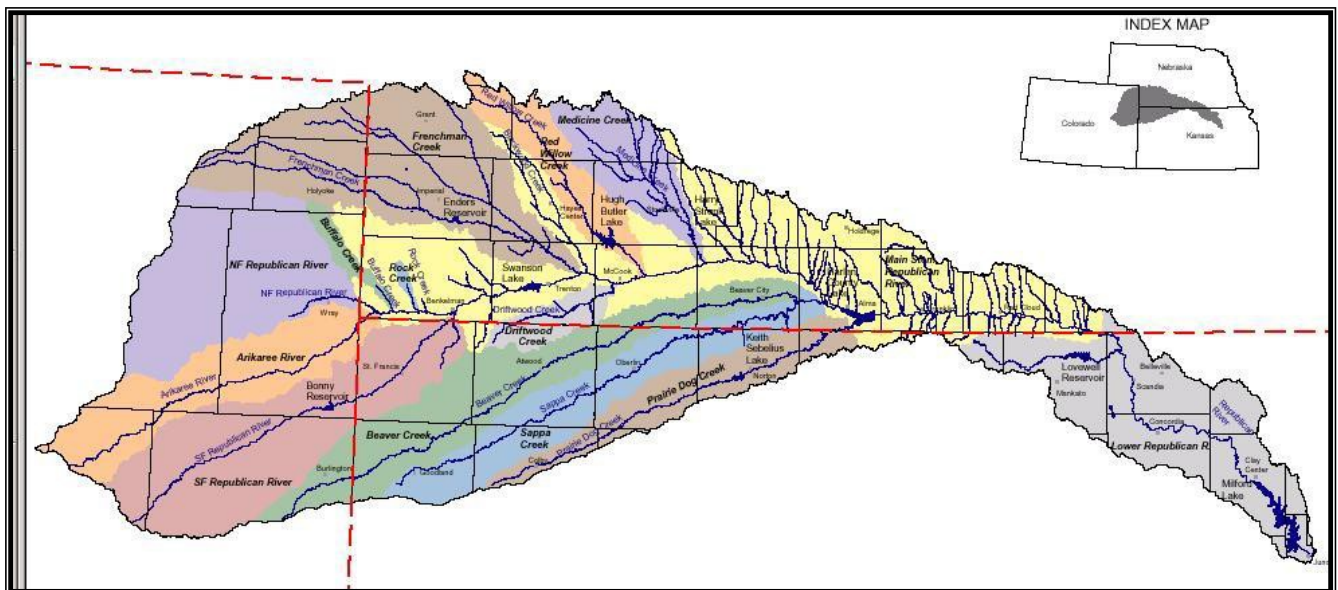


REPUBLICAN RIVER COMPACT ADMINISTRATION

59TH ANNUAL REPORT

FOR THE YEAR 2019



virtual meeting

AUGUST 21, 2020

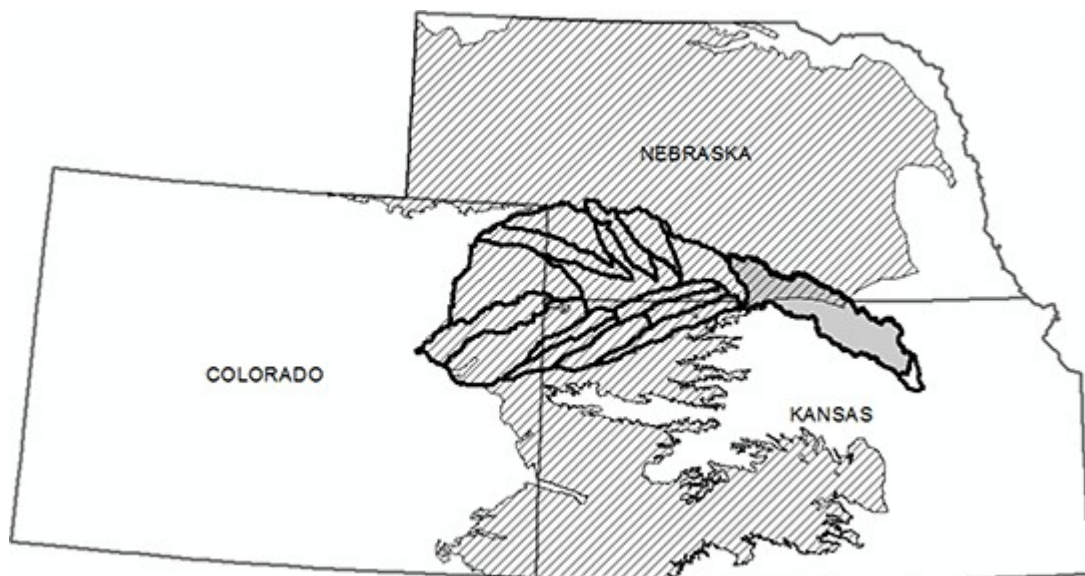
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REPUBLICAN RIVER COMPACT ADMINISTRATION

**Annual Meeting August 21,
2020 (virtual meeting)**



SUMMARY AND MINUTES OF THE 2020 ANNUAL MEETING OF THE REPUBLICAN RIVER COMPACT ADMINISTRATION

AUGUST 21, 2020
(virtual meeting via Zoom)

Summary & Minutes

A transcript of this meeting was prepared by General Reporting Service (Exhibit A). This summary and minutes were based on the transcript of the meeting. The summary and minutes were reviewed by each of the states, and upon final approval by the Compact Administration will serve as the official minutes of this Annual Meeting of the Compact Administration.

Agenda Item 1: Introductions

The annual meeting of the Republican River Compact Administration (RRCA) was called to order by Nebraska Commissioner and Chair Jesse Bradley at 10:35 a.m., August 21, 2020. Commissioner Bradley asked for each commissioner to introduce attendees from their states. A typed list of all attendees is attached as Exhibit B, which also includes the original signed attendance sheets. Highlighted attendees include:

Name	Representing
Chris Beightel	Kansas Commissioner and Engineering Committee (EC) Member
Jesse Bradley	Nebraska Commissioner and Chair
Carol Flaute	Nebraska Engineering Committee Member and EC Chair
Ivan Franco	Colorado Engineering Committee Member
Justin Lavene	Nebraska Attorney General's Office
Kevin Rein	Colorado Commissioner
Dan Steuer	Colorado Attorney General's Office
Mike Sullivan	Colorado Deputy State Engineer
Kenneth Titus	Kansas Department of Agriculture Chief Counsel
Kurtis Wiard	Kansas Attorney General's Office

Agenda Item 2: Adoption of the Agenda

Commissioner Bradley introduced the proposed draft agenda and asked if there were any changes to the draft agenda. Hearing no requests for changes, the commissioners unanimously approved the agenda. A copy of the final agenda is attached as Exhibit C.

Agenda Item 3: Status of Annual Report for 2019 Annual Meeting

Commissioner Bradley asked for an update on the RRCA 2019 annual report. Chelsea Erickson reported that Kansas staff were responsible for creation of the report, which consisted of two meetings. The first meeting was a special meeting held in Broomfield, Colorado, on November 6th, 2018. The second meeting was the annual meeting of the RRCA held on August 22nd, 2019, in Colby, Kansas. Erickson concluded her report by thanking all those who assisted with the assembly and reviewing of the final report. Commissioner Bradley called for action on the completed RRCA 2019 annual report. Commissioner Beightel moved to approve the report and Commissioner Rein seconded. The commissioners unanimously approved the report.

Agenda Item 4: Commissioners' Reports

a. Kansas:

- i. Commissioner Beightel thanked Nebraska for hosting this year's meeting as the first-ever virtual Republican River Compact meeting.
- ii. Commissioner Beightel mentioned that climate conditions during the 2020 growing season started off dry, but there has been some improvement in western Kansas. Kansas has not had to do any minimum desirable stream flow yet this year.
- iii. Commissioner Beightel reported on an unusually dramatic storm event in the South Fork Republican River Basin last July. On July 23, 2019, the gage at Benkelman went from zero to 5,360 cubic feet per second (cfs) in approximately 4 hours, which caused a lot of flooding in the area. At the time of the Annual Meeting, the drought monitor indicated that the subbasin was abnormally dry.
- iv. Commissioner Beightel noted that the pandemic slowed down the Kansas legislature considerably this year. Of the total 683 bills introduced or carried over from the previous session, 11 were passed by both houses and presented to the governor. Seven bills were signed by the governor, four of which were vetoed.
- v. Commissioner Beightel gave an update on the state's local enhanced management areas (LEMAs). He provided a brief history of the development of the LEMA law. The Sheridan 6 LEMA was renewed for 2018 through 2022. Groundwater Management District No. 4 (GMD4) developed a district-wide LEMA that will also run from 2018 to 2022; this LEMA places pumping restrictions based on water level declines at the township scale. A challenge in district court to the constitutionality of the LEMA law was not successful.
- vi. Commissioner Beightel noted that GMD4 has started a certified irrigator program, which is similar to master irrigator programs in Texas and Colorado. The goals of the certified irrigator program are to help producers find water efficiency tools and strategies for their operations, educate producers about being better water managers, and foster a commitment to water-use efficiency with the goal of extending the life of the aquifer. He affirmed his program's support of GMD4's efforts.
- vii. Commissioner Beightel reported on the LEMA plan approved by West Central Kansas GMD1 in March 2020, which is now in the two-hearing process. GMD1 could achieve a reduction in pumping of more than 20 percent if the LEMA is designated and the plan is ordered, and all vested water rights participate.
- viii. Commissioner Beightel gave an update on the Division's continued efforts to develop

- and refine methods to determine if their water management tools are working as intended. The Division has developed a technique to evaluate changes in irrigation behavior by establishing a relationship between seasonal precipitation and irrigation application, using that relationship to predict future behavior, and observing whether implementing the management tool caused a change in behavior. Using this technique, analyses of water use by GMD4 and Sheridan 6 LEMA from 2013 to 2018 indicated that water use was approximately 30 percent less than predicted. The Division has observed that water use for the GMD4 LEMA was over 30 percent less than predicted in 2019, for a savings of 120,000 acre-feet. Commissioner Beightel noted that he plans to share results of analysis in the Republican River Basin with the Engineering Committee this year.
- ix. Commissioner Beightel reported that in the Lower Republican River Basin water supplies were very good for Kansas Bostwick Irrigation District (KBID) in 2019 and 2020, thanks to a very wet 2019. KBID has used settlement money, WaterSMART grants from the Bureau of Reclamation, and the District's own labor and equipment to make improvements to the district's water conveyance systems, replacing five miles of canal with buried pipe since 2019, which could save as much as 725 acre-feet per year.
 - x. Commissioner Beightel gave an update on Kansas's Water Conservation Areas (WCA). WCA was created by the state legislature in 2015; a water owner or group of water owners can enter into an agreement with the chief engineer to reduce groundwater withdrawals to extend the usable life of the aquifer, and usually the parties have increased flexibility to manage the reduced use. The state has 53 WCAs covering over 86,000 acres and over 12,000 acre-feet of estimated water savings.
 - xi. Commissioner Beightel asked Kansas Water Office Director Earl Lewis to add to Kansas's report. Director Lewis noted that the Water Office invested funds from the 2018 Kansas-Colorado settlement in irrigation technology through a cost-share program with producers in the South Fork. The Water Office has dedicated approximately \$250,000 of matching funds to soil moisture probes and improvements to nozzle packages to optimize irrigation application, with the goal of conserving water and making irrigation more efficient. The Water Office plans to share additional funds with local stakeholders in the coming year. Stakeholders have also expressed interest in the removal of phreatophytes, especially Russian Olive and Salt Cedar, for habitat and water conservation. In addition, stakeholders have expressed interest in a series of low-head dams within the South Fork Republican River to improve aquifer recharge. Director Lewis noted that they are in the early stages of investigating whether this is a viable option and want to make sure that Kansas maintains compact compliance and delivery of water to Nebraska. Director Lewis also gave an update on Kansas's water technology farms, which are a public-private partnership with the goal of demonstrating different water technologies. Vendors bring technologies to the state, partnerships are formed with producers and technical colleges, and the effectiveness of the technologies is shared with producers across the state through field days, videos, and other mechanisms. The goal is to encourage adoption of additional technologies with the long-term goal of reducing use of the Ogallala Aquifer. At this time there are 17 water technology farms, and Director Lewis described the farms as one of the most successful public-private partnerships run through the Water Office, with most funding coming from vendors and outside stakeholders.

- xii. Commissioner Beightel gave an update on the Engineering Committee's Flood Flows assignment from last year's RRCA Annual Meeting. While the states spent significant time working on this issue, the states did not reach an agreement on the resolution of the issue. The states did agree to continue to work on the issue with the goal of resolving the issue before Nebraska's compliance balance could be affected by it.
 - xiii. Commissioner Beightel also described a difference in interpretation of the 2016 Harlan County Lake (HCL) resolution between Kansas and Nebraska. Kansas believes that when the basin is dry and Nebraska anticipates needing to pump augmentation water or take other compliance actions, Kansas water users will have access to a minimum baseline amount of water in time for the irrigation season. Nebraska has informed Kansas that it doesn't agree with Kansas's interpretation. Commissioner Beightel stated that Kansas needs a commitment from the states to work on Kansas's HCL resolution issue, with a robust discussion of Kansas's issue to take place by the October 1, 2020, HCL agreement deadline.
 - xiv. Commissioner Beightel concluded his remarks by noting changes to the Kansas delegation. Kansas Chief Engineer David Barfield retired on February 29, 2020. Kansas will offer a resolution honoring Mr. Barfield's service to the Compact later in the meeting. Commissioner Beightel was appointed acting chief engineer on March 2, 2020 and will serve as Kansas's commissioner to the Compact Administration until a permanent appointment is made for the chief engineer position.
 - xv. Commissioner Bradley asked Mr. Lewis a follow-up question about whether the low-head dam structures he mentioned would be on-channel or off-channel structures. Mr. Lewis clarified that the inquiry about developing low-head dams came from the Kansas Department of Wildlife, Parks, and Tourism, and the goal of the dams would be to provide habitat and groundwater recharge. The preliminary suggestion is that the low-head dams would be on-channel.
- b. Colorado:
- i. Commissioner Rein began his report by thanking Mike Sullivan and the rest of the Colorado group for participating in the meeting, and he thanked Nebraska for hosting the meeting. He mentioned that it would have been difficult for Colorado participants to get permission to travel.
 - ii. Commissioner Rein explained that staff from his agency and others across the state are continuing to work from home and will be working from home until at least January 1, 2021. Travel is not allowed. He said that they're very fortunate that they can do their work from home.
 - iii. Commissioner Rein described how COVID-related closures have had a financial impact on state revenues. His agency is withstanding a five percent cut. They are holding 14 positions vacant; these 14 positions would normally be staffed, so they are being creative to get work done. He stated that he is very grateful to the DWR staff that continue to get the work done.
 - iv. Commissioner Rein gave an update on the state legislature. This year no bills were directly related to the Republican River Basin, but there were several bills related to Colorado's Instream Flow Program. He said it was interesting that those bills passed, given the abbreviated legislative session. One bill that was noteworthy was Senate Bill 48 that called on the state to examine the anti-speculation doctrine and the laws used to manage anti-speculation and determine if the laws are robust enough for

Colorado.

- v. Commissioner Rein stated that 2020 has been another horrible drought year in Colorado. However, in the Yampa River Basin, in the northwest part of the state, there has still not been a call on the river.
 - vi. Commissioner Rein gave an update on the wildfire situation in the state. The Pine Gulch fire in the west end of the state has affected 25,000 acres, which makes it the second largest fire in Colorado history behind the Hayman fire in 2002. He mentioned that there are several other fires of significance. The Glenwood Canyon fire is problematic because I-70 goes through the canyon, and the interstate is closed. The fires have created problems. The state has also experienced rural flooding with major storms out east on the South Fork and the North Fork, which caused increased gage flows but also minor damage.
 - vii. Commissioner Rein reported that the state remains in compliance and is now in compliance with its five-year running average. He recognized the efforts of the Republican River Water Conservation District and said that the department continues to work with them on ways to reduce use, find supplies, and keep Colorado in compliance.
 - viii. Commissioner Rein gave an update on Colorado's Compact Compliance rules. In his comments at the last annual meeting he had informed the group that they had filed their Compact Compliance rules with the water court in January 2019, and numerous parties had opposed the rules, in some cases to become a party to the case as opposed to being in direct opposition to the rules. Since January 2019, all opposing parties have been brought in through stipulations, except one. He said that he and Mike Sullivan had met directly with the party, and they're very hopeful that the matter will be settled, and the rules can continue moving through the water court process.
 - ix. Commissioner Rein asked if anyone had questions about his report. Commissioner Beightel asked if the intent of examining the state's anti-speculation laws was to strengthen or weaken them. Commissioner Rein responded that the purpose is to determine whether the anti-speculation laws need to be strengthened.
- c. Nebraska:
- i. Commissioner Bradley thanked his staff who helped facilitate the annual meeting. He also thanked Kansas and Colorado for agreeing to the virtual meeting format considering COVID-19.
 - ii. Commissioner Bradley also recognized the states' federal partners in their efforts to continue supporting the states with management efforts in the basin and assisting with data collection and other activities throughout the basin.
 - iii. Commissioner Bradley thanked the natural resources district (NRD) partners, irrigation district partners, and producers who continue to work to protect water resources and ensure that Nebraska continues to meet its compliance obligations under the compact.
 - iv. Commissioner Bradley noted that 2020 has been an interesting year for the Nebraska Department of Natural Resources (NeDNR). Former director Jeff Fassett retired on February 28, which was a significant change for the agency. The agency has done a great job being able to move quickly to the telecommuting environment that everyone is working in. The state never closed the office, with field offices staying open also. The agency has been trying to reduce the footprint of staff in the building and encouraging staff to work remotely when that works. Remote working may be part of

- the agency's long-term work strategy to reduce the agency's square footage in the State Office Building and reduce rental spaces. While there have been a lot of challenges with COVID-19, there may be some potential benefits in the future.
- v. Commissioner Bradley described water supply conditions in 2019 as a spectacular year as far as the amount of water in the basin. He mentioned that the overall annual flow at Hardy, the most downstream gage in the basin, was almost six times the flow in 2018. There was more than 600,000 acre-feet total stream flow leaving the basin, with peak instantaneous discharge of over 11,000 cfs. These conditions triggered Flood Flow provisions for the first time under compact accounting.
 - vi. Commissioner Bradley described conditions in 2020. The rain stopped early in the year and things started to dry out. Nebraska has seen drought creep in, although not to the same degree as in Colorado. Drought conditions are present in the Upper Republican area and across the state in interesting patterns typically not seen. Rainfall has been very spotty, with some parts of the state remaining very wet.
 - vii. Commissioner Bradley mentioned the significant storm near Benkelman in July. He was out of the office at the time and thought the website reporting stream flows was malfunctioning when he saw the report for that storm event.
 - viii. Commissioner Bradley stated that Nebraska is in good shape with irrigation water supplies. The state started the year in good shape, and careful management in Harlan County Reservoir resulted in good water supplies in the Reservoir heading into the fall. That bodes well for next year.
 - ix. Commissioner Bradley described the Republican River Basin-Wide Plan that was finalized in late 2018 and took effect in March 2019. The first annual meeting for that plan was held this year. Developing the basin-wide plan consisted of over 40 stakeholders participating in 15 stakeholder meetings over multiple years. Key outcomes from the process include the development of measurable hydrologic objectives for assessing future progress. He thanked staff for the effort that went into getting the plan developed, completed, and now implemented. The basin-wide plan has been a great success and is leading the department to revisit the individual integrated management plans in the basin, which are currently being updated.
 - x. Commissioner Bradley noted that the department has been investing settlement funds from Colorado back into surface water infrastructure in the basin. One major investment was a \$2 million distribution to the Frenchman-Cambridge Irrigation District for automation of their Meeker-Driftwood System. That project is underway and should be completed in the next year or two. Settlement funds may also be used to evaluate conjunctive management options for the Nebraska Bostwick Irrigation District (NBID) system. Nebraska hopes to bring some of those concepts to the states for discussion in the future. The goal is for NBID to have more reliable supplies in the future and hopefully maintain greater water supplies in Harlan County Reservoir.
 - xi. Commissioner Bradley described investments by the NRDs in their water management. NeDNR has partnered with Middle Republican NRD to provide \$3.3 million, which is matched with 40 percent local dollars. NeDNR also has a contract with Lower Republican NRD for the same amounts. The Department has a larger contract with the Upper Republican NRD to support work the District is doing to target long-term retirements of groundwater use. That project was a \$6 million State-funded project with a 40 percent match from the NRD. These projects include retirements and improving

- technology that producers can use to reduce their water applications.
- xii. Commissioner Bradley noted that the Nebraska legislative session was split because of the pandemic. NeDNR has not seen the major financial hits yet that some surrounding states have seen. State revenues were up by 20 percent, coming in at just above forecasts. The Department is trying to be very financially prudent and can appreciate what Commissioner Rein is going through. Some positions are being kept vacant to make sure there is budget flexibility going forward.
 - xiii. Commissioner Bradley described one bill from the 2020 session that requires NeDNR to take the lead in developing a flood-mitigation plan for the state. This will be a subsection to the overall state Hazard Mitigation Plan. Efforts to develop the plan will be getting underway over the next few months and the plan will be finalized by the middle of 2022.
 - xiv. Commissioner Bradley noted that the governor announced yesterday that the new director for NeDNR will be Tom Riley, who has worked with many folks on Republican issues over the years. Tom will start as director on November 1, 2020. Commissioner Bradley stated that the Department is excited about the announcement and the prospect of having another person to help move these efforts forward.
 - xv. Commissioner Bradley concluded his remarks by thanking Kansas and Colorado for the states' continued partnership and commitment to work through issues and be productive in managing the waters of the basin for the benefit of the states' constituencies. He said that the states are trying to focus on doing the right things for producers across the basin and getting the best possible outcomes for them. He committed to having the conversations requested by Commissioner Beightel about the Harlan County Lake resolution and continuing to move those efforts forward.
 - xvi. Commissioner Bradley asked if anyone had questions about his remarks. Commissioner Beightel said that he didn't have any questions and appreciated Nebraska's commitment to continuing the discussion about the Harlan County Lake resolution. Commissioner Beightel offered his congratulations to Mr. Riley and thanked Commissioner Bradley for serving as interim director. Commissioner Rein also offered his congratulations to Mr. Riley and thanked Commissioner Bradley for the work he's done and will continue to do.

Agenda Item 5: Federal Reports

- a. Bureau of Reclamation:
 - i. Craig Scott discussed the Bureau's summary report of its operations in the Republican River Basin for 2019 (Exhibit E) and noted that the report included a brief synopsis of operations through July 2020. The report was shared on the computer screen.
 - ii. Mr. Scott noted that there was above-average rainfall throughout the basin in 2019. Historic high elevation was reached in Harlan County; the computed inflow at Harlan County exceeded 400,000 acre-feet. Since irrigation supplies exceeded the trigger level of 119,000 acre-feet, 2019 was not a Water-Short year.
 - iii. Mr. Scott referred to the summary in Table 2 of his report for details on current capacity for the reservoirs in the Republican River basin. Irrigation supplies from Harlan County in 2020 also exceeded 119,000 acre-feet, so 2020 is a non-Water-Short year.

- iv. Mr. Scott mentioned that in 2020 the central and eastern parts of the basin did not receive the same amount of precipitation as they did in 2019, but timely rainfall in July reduced irrigation demand. The storms mentioned previously in the upper basin in eastern Colorado and western Nebraska produced significant inflow into Swanson Reservoir.
 - v. Mr. Scott updated the commissioners on the status of the Bostwick memorandum of agreement (MOA) that was revised in 2018. The MOA outlines the procedures for sharing the annual supply for Harlan County Lake, identifies the procedures for accounting of that water supply, and establishes separate storage accounts for each irrigation district. Because of the flood operations during most of 2019, day-to-day accounting wasn't necessary. However, the accounting procedures were implemented in 2020, and Mr. Scott believes the changes in the new MOA have gone smoothly. Each irrigation district had a full water supply prior to the 2020 irrigation season. Mr. Scott commended the Nebraska Bostwick Irrigation District and the Kansas Bostwick Irrigation District for their efforts in adopting and adapting to the changes in the MOA and making the first year with the MOA a success.
 - vi. Mr. Scott recognized the ongoing investments of the federal irrigation districts in recent years. Frenchman-Cambridge Irrigation District has completed several automation projects in their canal systems. Recently the district finished the automation of the Meeker-Driftwood Canal, which will be fully implemented for the 2021 irrigation season. Frenchman-Valley Irrigation District continues to implement early diversions of natural flows into their canal system for the re-timing and recharging of the aquifer along their canal. Nebraska Bostwick Irrigation District is in the final stages of automating the Franklin Canal System, which has been a major investment.
 - vii. Mr. Scott described activities of the federal irrigation districts in Kansas. Almena Irrigation District recently adopted changes to their operations so they can use early season diversions for irrigation deliveries later in the year. Kansas Bostwick Irrigation District continues to convert open canal systems to buried pipes and they are considering a project to automate the Courtland Canal System.
 - viii. Mr. Scott concluded his report by stating that millions of dollars have been spent upgrading the federal irrigation districts, and those upgrades will benefit all users in the basin for years to come.
- b. U.S. Army Corps of Engineers: no report was presented
- c. U.S. Geological Survey:
- i. John Miller of the U.S. Geological Survey (USGS) discussed the written report for 2019 and gave highlights of what happened during the 2019 water year (Exhibit F). The report was shared on the computer screen.
 - ii. Mr. Miller reiterated that in 2019 the eastern part of the Republican Basin had significant rain events which improved overall flows. Sappa Creek had an annual mean flow that ranked fifteenth out of seventeen over 73 years of record. The Republican River at Guide Rock was the seventh highest annual mean flow in 69 years of record. The Republican River at Orleans had the 13th highest mean discharge in 72 years of record. The USGS made the fourth highest discharge measurement that had ever been made at the Republican River at Orleans in July 2019.

- iii. Mr. Miller reported highlights from the western part of the Republican Basin. Rock Creek near Parks had the second lowest annual mean flow in 79 years of record. The South Fork of the Republican and the Arikaree River both continue to be in the lower 10 percentile for the period of record.
- iv. Mr. Miller reported that to the east, Red Willow Creek near Red Willow reported the lowest annual mean discharge in 58 years of record. Based on preliminary data, the July 2020 rain event in the Benkelman area will be in the top 10 of all reported events over the period of record. The flows from that event at the Arikaree River are still being computed. Mr. Miller's office did an indirect measurement at the Buffalo Creek gage near Haigler, which may be the peak gage height and peak discharge in the period of record. The high flows at those sites created a lot of activity for Mr. Miller's office for several days.

Agenda Item 6: Committee Reports

- a. Engineering Committee
 - i. Chair Carol Flaute shared the Engineering Committee (EC) Report (Exhibit G) from her computer screen. Since the EC Report was reviewed in detail during the preceding working session, Ms. Flaute said that she would provide highlights of the report during this meeting. The EC Report begins with an executive summary which paraphrases the actual assignments given to the EC by the commissioners. Ms. Flaute said she would indicate where to find the full assignments in the EC Report.
 - ii. Ms. Flaute stated that the EC met five times since the last annual meeting and completed the following assignments: (1) holding quarterly meetings; (2) exchanging information for the accounting (including data and documentation); (3) finalizing the 2019 accounting; (4) reviewing the Flood Flows provisions of the RRCA Accounting Procedures so that 2019 accounting results can be approved at this year's annual meeting; (5) continuing to work on documenting historical changes to the RRCA Accounting Procedures; (6) providing updates on the progress of new and ongoing management strategies for maintaining compact compliance; (7) continuing to develop and maintain the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC on that website; (8) continuing providing updates on improving accounting tools developed by the EC; and (9) preparing the 2019 Annual Meeting Report.
 - iii. Ms. Flaute summarized the following EC recommendations for the RRCA which begin on the fourth page of the report:
 - The proposed 2019 accounting be approved. Upon approval of the accounting, the spreadsheet titled "RRCA Accounting 2019 Final.xlsx" will be placed on the website.
 - Continue modeling and data tasks with the committee's consultant, Principia Mathematica, at the same level of service as in 2019.
 - The commissioners to provide the committee with feedback on the public website.
 - Discussion on the EC's finding that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flows provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock and that Attachment 6 calculates the Virgin Water Supply Guide Rock to

Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas. This recommendation is related to agenda items to be discussed on updating the Accounting Procedures and the Rules and Regulations. Ms. Flaute indicated that Attachment 3 of the EC Report includes a summary of all work completed on the assignment during the past year.

- Discussion of the recommended EC assignments for the following year and agreement on the set of assignments that the committee proposed, which is covered in the next agenda item.
- iv. Ms. Flaute noted that all the proposed assignments are either repeated or continuations of assignments from last year. The only proposed assignment that is different is the Flood Flows assignment, which is number four, because the committee did accomplish half of the assignment for this year. The modified proposed assignment is continuing to work on developing a recommendation for the Flood-Flows provisions to bring them into conformance with the intent of the Final Settlement Stipulation (FSS).

Agenda Item 7: Old Business

There were no items presented under Old Business.

Agenda Item 8: New Business and Assignments to Compact Committees

- a. Action on updated Accounting Procedures
 - i. Commissioner Bradley reminded attendees that Ms. Flaute had just outlined the recommended actions from the EC related to updating the Accounting Procedures to identify the Flood-Flows issue and the commitment to work on it in the future.
 - ii. Commissioner Rein moved that the updated Accounting Procedures be accepted, and Commissioner Beightel seconded the motion.
 - iii. The commissioners voted, and the motion passed unanimously.
- b. Action on updated Rules and Regulations
 - i. Commissioner Bradley noted that the Rules and Regulations must be updated to reflect the newly adopted Accounting Procedures.
 - ii. Commissioner Beightel moved that the updated Rules and Regulations for the RRCA be adopted, and Commissioner Rein seconded the motion.
 - iii. The commissioners voted, and the motion passed unanimously.
- c. Action on Engineering Committee Report and assignments
 - i. Commissioner Rein moved that the Engineering Committee Report and associated assignments be accepted, and Commissioner Beightel seconded the motion.
 - ii. The commissioners voted, and the motion passed unanimously.
- d. Action on 2019 Accounting
 - i. Commissioner Beightel moved that the 2019 accounting results be approved and adopted, and Commissioner Rein seconded the motion.
 - ii. The commissioners voted, and the motion passed unanimously.
- e. Action on Resolutions honoring David Barfield and Gordon “Jeff” Fassett
 - i. Commissioner Beightel read the resolution honoring Former Commissioner David Barfield into the record.
 - ii. Commissioner Bradley read the resolution honoring Former Commissioner Gordon

- “Jeff” Fassett into the record.
- iii. Commissioner Rein expressed his appreciation and admiration for Mr. Fassett and Mr. Barfield and motioned that the resolutions honoring Mr. Fassett and Mr. Barfield be adopted.
 - iv. Commissioner Beightel seconded the motion.
 - v. The commissioners voted, and the motion passed unanimously.

Agenda Item 9: Remarks from the Public

Mr. Rod Lenz, president of the Republican River Water Conservation District (RRWCD) in Colorado, gave an update on several of the RRWCD’s projects. He described the efforts of the South Fork River Restoration Coalition (SFRRC). The coalition is dedicated to the reclamation of the former Bonny Reservoir area. The coalition will focus on flood control, sediment mitigation, phreatophyte control, reestablishment of a river channel through the former reservoir, and increased water flow. Secondary considerations include recreation and economic opportunities. The coalition met with a project manager and has applied for funding for the project, which could cost between six and \$11 million. RRWCD has been promoting the Environmental Quality Incentives Program (EQIP) and the Conservation Reserve Enhancement Program (CREP), the RRWCD’s two water retirement programs. Funding for those retirement programs includes money from Kansas and the Colorado Conservation Board. Mr. Lenz mentioned that the District has worked with Senator Michael Bennet to promote the implementation of a provision in the 2018 farm bill that would allow dryland farming of CREP acres. Mr. Lenz reported that the Colorado Master Irrigator Program completed its first class this spring, which included 23 producers throughout the basin. The program coordinators are making plans for 2021.

Agenda Item 10: Future Meeting Arrangements

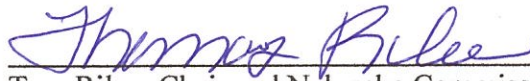
Commissioner Bradley mentioned that the 2021 meeting will be hosted by Nebraska, and hopefully the meeting will be in person. He said that the date of next year’s meeting will likely be the same time of year (the second half of August). Ms. Flaute reminded commissioners that documents will be emailed to them to sign electronically later today.


Agenda Item 11: Adjournment

The meeting was adjourned at 12:15 p.m. on August 21, 2020.

The August 21, 2020 Annual Meeting report is hereby approved by unanimous vote of the RRCA on this 25th day of August, 2021.

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

 DATE SIGNED: 25 Aug 2021
Tom Riley, Chair and Nebraska Commissioner

 DATE SIGNED: 8/25/2021
Earl Lewis, Kansas Commissioner

 DATE SIGNED: 9-1-2021
Kevin Rein, Colorado Commissioner

Exhibits

- Exhibit A: Transcript of the 2020 Annual Meeting
- Exhibit B: Annual Meeting Attendance
- Exhibit C: Agenda for the 2020 Annual Meeting
- Exhibit D: Bureau of Reclamation Report 2019
- Exhibit E: U.S. Geological Survey Report 2019
- Exhibit F: Engineering Committee Report 2019
- Exhibit G: Accounting Procedures Revisions
- Exhibit H: Rules and Regulations Revisions
- Exhibit I: Resolution Honoring David Barfield
- Exhibit J: Resolution Honoring Gordon "Jeff" Fassett

Exhibit A: Transcript

2020 ANNUAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION

August 21, 2020
10:30 a.m., Central Time
Video-Conference via Zoom Video Communications
Lincoln, Nebraska

PERSONS PRESENT:

IN NEBRASKA: Acting Commissioner Jesse Bradley, Chairperson
Tom Riley, Flatwater Group
Justin Lavene, NE Attorney General's Office
Carol Flaute, Engineering Committee, RRCA
Elizabeth Esseks, NeDNR
Kari Burgert, NeDNR
Carrie Wiese, NeDNR Water Planning Group
Shane Stanton, Cambridge, NE, Field Office
Brad Edgerton, Frenchman-Cambridge Irr. Dist.
Chance Thayer, Flatwater Group
David Kracman, Flatwater Group
Don Blankenau, Blankenau Wilmoth Jareke, LLP
Dustin Wilcox, NE Asso. of Resource Districts
Jessie Winter, NeDNR Water Planning Group
Keith Koupal, NE Game and Parks Commission
Michelle Koch, NE Game and Parks Commission
Scott Dicke, Lower Republican NRD
Tom Wilmoth, Blankenau Wilmoth Jareke, LLP
Kennon Meyer, Blankenau Wilmoth Jareke, LLP
Craig Scott, Bureau of Reclamation, McCook, NE
Miles Morgan, Bureau of Reclamation
Jason Lambrecht, USGS, Lincoln, NE
John Miller, USGS, North Platte, NE
Brett Roberg, NE Game and Parks Commission
John Thorburn, Tri-Basin NRD

IN COLORADO: Commissioner Kevin Rein
Mike Sullivan, CO Div. of Water Resources
Ivan Franco, Engineering Committee, RRCA
Les Owen, CO Department of Agriculture
David Robbins, Hill & Ampe
Pete Ampe, Hill & Ampe
Rod Lenz, RRWCD
Suzanna Baker, RRWCD
Brooke Campbell, RRWCD
Deb Daniel, RRWCD
Willem Schreüder, Principia Mathematica, Inc.

IN KANSAS: Acting Commissioner Chris Beightel
 Kenneth Titus, Chief Counsel, KS Dept. of Ag.
 Sam Perkins, KS Div. of Water Resources
 Chelsea Erickson, KS Div. of Water Resources
 Hongsheng Cao, KS Div. of Water Resources
 Kelly Stewart, KS Div. of Water Resources
 Lane Letourneau, KS Div. of Water Resources
 Kurtis Wiard, KS Attorney General's Office
 Earl Lewis, KS Water Office
 Katie Goff, KS Water Office
 Pete Gile, KS Bostwick Irrigation District

UNKNOWN: Sara Spicer

- - -

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
those proceedings.

IN TESTIMONY WHEREOF, I have hereunto set my hand
at Lincoln, Nebraska, this 1st day of September, 2020.

By: Linda W. Rohman
Reporter and Transcriber

- - -

1 PROCEEDINGS:

2 CHAIRPERSON BRADLEY: Okay. Good morning,
3 everybody. Appreciate everybody getting on for the 2020
4 Annual Meeting of the Republican River Compact
5 Administration. My name is Jesse Bradley. I'm currently
6 the interim director of the Nebraska Department of Natural
7 Resources and serving as the chair of the Republican River
8 Compact Administration this year.

9 I guess just a few kind of housekeeping items
10 before we get going into the agenda. With us today we have
11 Linda Rohman. She'll be doing a transcript of this meeting.
12 Linda may ask to make sure that you identify yourself when
13 you're talking and make sure we can get a good transcript,
14 make sure that your audio is working well.

15 We'll also be doing a recording of this meeting
16 using Zoom. That's to assist with developing that
17 transcript. And then, we'll also plan on posting the
18 recording on the website of the Republican River Compact
19 Administration afterward.

20 I'm sitting here at a listening location in
21 McCook, Nebraska. I don't have any public here with me.
22 But I do have Tom Riley of the Flatwater Group, currently,
23 and Justin Lavene of the Nebraska Attorney General's Office
24 with me. I'm going to go ahead and suggest that, as we do
25 introductions, I'll go ahead and do my best to introduce all

1 the folks that I recognize and can identify from Nebraska in
2 the various agencies, and then I'll turn it over to Kevin
3 and Chris to do likewise. And if we miss anybody, we'll
4 certainly try to do our best to make sure we get you
5 identified. We'd like to have a full listing of attendees
6 for the transcript, if possible.

7 So, I'm going to go ahead and start down the list
8 of participants. With us today, I have our Engineering
9 Committee rep, Carol Flaute, is with me. And then,
10 Elizabeth Esseks and Kari Burgert are assisting with the
11 Zoom operations and will be handling some of the documents.
12 Also have Carrie Wiese from our Water Planning Group on. I
13 see Shane Stanton from our Cambridge Field Office is on.
14 I'm not sure if we have other staff on, but certainly other
15 Nebraska folks. I see we have Brad Edgerton with the
16 Frenchman-Cambridge Irrigation District; Chance Thayer with
17 the Flatwater Group; David Kracman with the Flatwater Group;
18 looks like Don Blankenau with the -- outside counsel; Dustin
19 Wilcox from the Nebraska Association of Resource Districts;
20 Jessie Winter, who's also with our Planning Group at the
21 Department of Natural Resources. I see Keith Koupal. That
22 would be with our Nebraska Game and Parks Commission.
23 Michelle Koch with our Nebraska Game and Parks Commission.
24 Scott Dicke is with the Lower Republican Natural Resources
25 District. Tom Wilmoth with outside counsel.

1 And I believe that's everybody I saw on from
2 Nebraska. Did I miss any Nebraska folks that would want to
3 go ahead and identify themselves?

4 (No response.)

5 Okay. Well, with that --

6 MS. BURGERT: We just added a 4-0-2 number, which
7 I'm assuming is Nebraska. So, when they get connected --

8 CHAIRPERSON BRADLEY: Yeah, it looks like we just
9 had a number come on 402-476-0042. That -- can we get the
10 name of that person? If possible.

11 MS. MEYER: Kennon Meyer.

12 CHAIRPERSON BRADLEY: Okay. Thank you.

13 With that, I'm going to go ahead and I'll move on
14 to you, Chris, if you want to go ahead and do your best
15 introductions for the folks from Kansas.

16 COMMISSIONER BEIGHTEL: Sure. Thank you, Jesse.
17 I'm Chris Beightel with the Kansas Department of
18 Agriculture's Division of Water Resources. I'm serving as
19 acting chief engineer for the Division of Water Resources
20 and also as the Kansas commissioner for the time being.

21 With me on the call today -- on the Zoom, we have
22 Kenneth Titus, who is chief counsel for KDA. We have DWR
23 staff, Sam Perkins, Chelsea Erickson, Hongsheng Cao. I
24 think I saw Kelly Stewart and Lane Letourneau. We also have
25 Kurtis Wiard from the Kansas Attorney General's Office. We

1 have Director of the Kansas Water Office Earl Lewis and
2 Katie Goff, also of the Kansas Water Office. And I saw Pete
3 Gile from the Kansas Bostwick Irrigation District giving us
4 the thumbs up.

5 So I think that is all I saw from Kansas. And if
6 there's anyone else from Kansas that I missed, please go
7 ahead and identify yourself at this time.

8 (No response.)

9 Okay. I think that's it for us, Jesse.

10 CHAIRPERSON BRADLEY: Okay, thanks, Chris.

11 Kevin, I guess I'll turn it over to you if you
12 want to do your best to introduce folks from Colorado that
13 are on.

14 COMMISSIONER REIN: Thank you, Jesse. Happy to do
15 that.

16 We have -- of course, I'm the State engineer,
17 director of the Division of Water Resources. And with us
18 today, Mike Sullivan, deputy State engineer and deputy
19 director of the Division of Water Resources. From our staff,
20 we have Ivan Franco. He's our representative on the
21 Engineering Committee. And, from the Attorney General's
22 Office, Dan Steuer. And Scott Steinbrecher may or may not
23 be joining us. I know that he was splitting time between a
24 few obligations. And, also, Les Owen from the Colorado
25 Department of Agriculture is with us today. And, also from

1 Colorado, I see that we have David Robbins and also Pete
2 Ampe, I believe, from Hill & Robbins. I see that Rod Lenz
3 and Suzanna Baker from the Republican River Water
4 Conservation District is here. And then, also, Willem
5 Schreüder from Principia Mathematica is joining us today.

6 And I believe that's -- as I go down the list,
7 that's who I see from Colorado right now. And I'll open it
8 up, as Chris did, to anyone I may have missed.

9 (No response.)

10 CHAIRPERSON BRADLEY: Okay. Thanks, Kevin.

11 I guess I'll turn it over to the federal agencies
12 that are on. Craig, do you want to introduce yourself and
13 who's there with you?

14 MR. SCOTT: Yes, thanks, Jesse. So, I'm Craig
15 Scott, O&M manager here at the Bureau of Reclamation here in
16 McCook, part of the Nebraska-Kansas Area Office. And
17 joining me today is Miles Morgan.

18 CHAIRPERSON BRADLEY: Okay. Thank you very much,
19 Craig.

20 I don't believe we have anybody on from the Corps
21 of Engineers. If there is, you could please identify
22 yourself and make sure we didn't have anybody on. I see we
23 had a couple folks on from the USGS. I think, Jason
24 Lambrecht, do you want to introduce your folks from the GS
25 there?

1 MR. LAMBRECHT: Absolutely, thanks, Jesse.

2 Good morning, all. I -- myself, I'm the data
3 chief out of the Lincoln office in Nebraska for the USGS.
4 And, also on the call, we have John Miller, who's our field
5 office chief for the North Platte Field Office. And his
6 office actually monitors most of the rivers of the
7 Republican across Nebraska.

8 CHAIRPERSON BRADLEY: Okay. Thanks, Jason.

9 Okay. I think that should complete introductions,
10 but I will check one more time, just to make sure we didn't
11 miss anybody. Is there anybody we didn't catch on the
12 introductions?

13 MS. KOCH: Jesse, this is Michelle Koch. I'm not
14 sure if you got Brett Roberg. He's also from the Nebraska
15 Game and Parks Commission. He's stationed in the Kearney
16 office. He's a fish and wildlife biologist.

17 CHAIRPERSON BRADLEY: Okay. Yep. I believe I
18 missed Brett. So I'm glad you caught that, Michelle.

19 Okay. Well, with that, we'll go ahead and move on
20 down our agenda. Our next item on the agenda is to adopt
21 the agenda, so I guess I would be looking for a motion to
22 adopt the agenda for today's meeting.

23 COMMISSIONER BEIGHTEL: I'd move to adopt the
24 agenda.

25 COMMISSIONER REIN: I'll second that. Kevin Rein.

1 CHAIRPERSON BRADLEY: Okay. So we have Chris,
2 motion, and Kevin, second. Okay. Go ahead and take that
3 vote on that. All in favor of adopting today's agenda and
4 moving forward with the meeting, say aye.

5 Aye.

6 COMMISSIONER BEIGHTEL: Aye.

7 COMMISSIONER REIN: Rein says aye.

8 CHAIRPERSON BRADLEY: Okay. So we've adopted our
9 agenda and we can keep moving forward here. Next step up on
10 the agenda is to discuss the status of the 2019 Annual
11 Report and the possible action we'll take there. I think
12 that's maybe something for Kansas or Chelsea or Chris. Do
13 you want to take the lead on that?

14 COMMISSIONER BEIGHTEL: Chelsea, would you go
15 ahead and present the 2019 Annual Report? Chelsea?

16 MS. ERICKSON: Kansas was responsible for the
17 creation of the 2019 RRCA Annual Report. The report
18 consisted of two meetings. The first was a special meeting
19 held in Broomfield, Colorado, on November 6th, 2018. The
20 summary and minutes were created using a voice recording.
21 The second meeting was the annual meeting of the RRCA on
22 August 22nd, 2019, held in Colby, Kansas. The official
23 minutes of that meeting is the transcript. The summary was
24 also created from the transcript. I would like to thank
25 everyone who has had a hand in reviewing and assembling the

1 final report, specifically the annual meeting transcript and
2 the two summaries. The final product was definitely a group
3 effort and we all can be proud to present the 2019 Annual
4 Report to the RRCA commissioners for their approval.

5 COMMISSIONER BEIGHTEL: Mr. Chairman, I move that
6 we accept the 2019 Annual Report as presented.

7 COMMISSIONER REIN: Mr. Chairman, Kevin Rein. I
8 second that.

9 CHAIRPERSON BRADLEY: Okay. So we've got a first
10 and second on adoption of the 2019 Annual Report. Any
11 discussion -- further discussion on that?

12 (No response.)

13 Okay. With that, I'll take a vote. All those in
14 favor, say aye.

15 COMMISSIONER BEIGHTEL: Kansas says aye.

16 COMMISSIONER REIN: Colorado says aye.

17 CHAIRPERSON BRADLEY: Nebraska's aye. Okay. So
18 that motion passes and we've adopted our 2019 Annual Report.
19 We're making good progress. We'll just keep chugging away
20 here on the agenda. Next up is our Commissioners' Report.
21 It looks like we're going to start off with the State of
22 Kansas. Chris if you want to lead off for Kansas on the
23 Commissioners' Report?

24 COMMISSIONER BEIGHTEL: Yes, thank you, Jesse.

25 Good morning and thank you to Nebraska for braving

1 the first-ever virtual Republican River Compact meeting.
2 It's nice to see you all, even if it's not in person, but
3 the compact must go on.

4 So, I'll start out with climate conditions and
5 water supply. The water supply conditions during the 2020
6 growing season started off a little dry over large parts of
7 the state, but has since improved over much of western
8 Kansas anyway. Significant portions of western and
9 southeastern Kansas remain moderate -- moderately to
10 severely dry to this day. Even though conditions have, at
11 times, been dry across the state, thanks to timely rains, we
12 haven't had to do any minimum desirable stream flow
13 administration yet this year, so we're thankful for that.

14 The drought monitor shows that the South Fork
15 Republican River Basin started getting dry in late September
16 2019. South Fork flows were in the single digits at
17 Benkelman from mid-April 2020 until they finally went to
18 zero in mid-June of this year and stayed there until July
19 23th when, between 7:45 and eight o'clock a.m., the gauge
20 went from zero to 772 cubic feet per second. Then, 15
21 minutes later, it went to 2,260 cubic feet per second,
22 topping out at about eleven o'clock in the morning at 5,360
23 cubic feet per second. The storm event caused a lot of
24 flooding in the area, but moved on pretty quickly and flows
25 tailed off steadily afterwards, dropping down to single

1 digits in early August, where they remain today. Despite
2 that storm and all that water that came with it, the drought
3 monitor still shows the sub-basin as abnormally dry.

4 Moving on to legislation. The COVID19 virus and
5 ensuing pandemic slowed our legislature down considerably
6 this year. We were following just three water-related bills
7 through the process, but they were not among the very few
8 bills that were acted on this year. Just to give a sense of
9 how it affected the legislature, there were 328 bills
10 carried over from 2019 and 355 new bills introduced this
11 year; and, of those total 683 bills, 11 were passed by both
12 houses and presented to the governor. Seven were signed and
13 four were vetoed. So not the greatest productive season for
14 the legislature this year.

15 In the Upper Republican River Basin, I want to
16 talk a little bit about the local enhanced management areas
17 that we have. In 2012, the Kansas Groundwater Management
18 District Act was amended to allow the districts to initiate
19 the creation of these special management areas in over-
20 appropriated areas, providing a two-hearing process for
21 their consideration. As we reported last year, the Sheridan
22 6 LEMA was renewed for 2018 through 2022 and it continues to
23 operate. Building on the success of the Sheridan 6 LEMA,
24 GMD No. 4 developed a district-wide LEMA, which will also
25 run from 2018 to 2022, and places pumping restrictions based

1 on the rate of water-level declines at the township scale.
2 A group of intervenors challenged the constitutionality of
3 the LEMA law in district court. But, in its October 15,
4 2019, order, the court upheld the chief engineer's decision
5 and the LEMA law. So we're happy about that.

6 Building on their success -- their successful LEMA
7 process, GMD4 has started a certified irrigator program in
8 the spirit of the master irrigator programs that have been
9 developed in Texas and, now, starting to be developed in
10 Colorado as well. They're just getting started putting the
11 curriculum together, and the goals, similar to the master
12 irrigator programs, are to help producers find water
13 efficiency tools and strategies for their operations;
14 educate these producers on how to become better water
15 managers; and foster a local community committed to water-
16 use efficiency, along with building networks of
17 organizations, other stakeholders, all working together
18 towards extending the life of the aquifer. So these actions
19 generate a lot of work and, consequently, a lot heat. So we
20 commend GMD No. 4 for taking action to secure their future,
21 and we are committed to supporting them as they work so hard
22 for their community.

23 Not quite in the Republican River Basin, but just
24 south of it, the West Central Kansas GMD No. 1 approved a
25 LEMA plan and sent it to the chief engineer in late March

1 2020. That started the formal two-hearing process. GMD1's
2 Wichita County LEMA Plan proposes to reduce pumping from the
3 2009 to 2015 levels by between 15 percent and a little over
4 20 percent. And that range depends on the voluntary
5 participation of vested water rights. If all the vested
6 water rights participated, you'd get to that little over 20
7 percent reduction.

8 The initial hearing was held just one week ago
9 today. It was a hybrid virtual hearing, kind of like this
10 one. In person, they were in Leoti; and the hearing officer
11 and the court reporter were at KDA headquarters in
12 Manhattan. It went pretty well, free of technical
13 difficulties. If the first hearing, which focuses mostly on
14 findings of fact, is favorable, then a second hearing to
15 consider the merits of the plan will be held. And if the
16 second hearing is favorable, then the LEMA will be
17 designated and the plan will be ordered. GMD1 is hoping
18 that the plan will be in effect beginning in 2021, so next
19 year.

20 We continue to develop and refine methods to
21 determine if our water management tools are working as
22 intended. We've developed a technique that we've been
23 working on for the last couple of years to evaluate the
24 changes in irrigation behavior by establishing relationship
25 between seasonal precipitation and irrigation application,

1 using that relationship to predict future behavior, and then
2 observing whether implementing the management tool caused a
3 change in behavior. Using this technique, we've observed
4 that the water use by the irrigators in the GMD No. 4 and
5 Sheridan 6 LEMA was 30 percent less, on average over the
6 period 2013 to 2018, than the water use that was predicted
7 over that time. And, similarly, we've observed that the
8 district-wide LEMA -- GMD4 district-wide LEMA, which started
9 in 2018, the water use was over 30 percent less than
10 predicted as well in 2019 alone. And that's a savings in
11 one year of 120,000 acre feet. So we're very encouraged by
12 the savings that we're seeing and the ability to be able to
13 measure that.

14 We've recently been doing some analysis in the
15 Republican River Basin and we're planning to share that in
16 the Engineering Committee this year and have a discussion on
17 that.

18 In the Lower Republican River Basin, thanks to a
19 very wet 2019, water supplies were very good for Kansas
20 Bostwick Irrigation District, both in 2019 and in 2020.
21 Harlan County Lake remained in the flood pool well into the
22 irrigation season this year and is still around 95 percent
23 of the multipurpose pool last time I checked. KBID has been
24 very successful in leveraging litigation damages money paid
25 by Nebraska to make improvements to the district's water

1 conveyance systems. In 2019 and so far this year, KBID has
2 replaced about five miles of leaky and difficult to maintain
3 open canal with buried pipe. KBID secured WaterSMART Grants
4 from the Bureau of Reclamation and contributed about 40
5 percent of the cost of the projects through their own labor
6 and equipment. KBID estimates that these improvements will
7 save on the order of 725 acre feet per year.

8 On our water conservation areas. In 2015, our
9 legislature created the water conservation area, which is
10 where a water owner or a group of water owners can enter
11 into an agreement with the chief engineer to reduce
12 groundwater withdrawals to extend the usable life of the
13 aquifer, typically with increased flexibility to manage the
14 reduced use. We now have 53 water conservation areas
15 covering over 86,000 acres and over 12,000 acre feet of
16 estimated annual water savings. So we're encouraged to see
17 expanded use of this tool and its potential to save water.

18 At this time, I would like to invite Director of
19 the Water Office Earl Lewis to update us on a few other
20 items, and then I'll just have a few things to close up
21 with. Earl?

22 MR. LEWIS: Thanks, Chris.

23 Appreciate the opportunity to talk to you all
24 today and give you a quick update on a couple of items that
25 the Water Office is involved with that overlap here with the

1 things we're talking about with the Republican River
2 Compact. The first one is the -- what we're doing with the
3 settlement funds from the 2018 Kansas-Colorado settlement
4 for -- regarding Colorado's past overuse of the Republican
5 River, particularly the South Fork Republican River. Over
6 the past year or so, we've been investing some of those
7 funds in irrigation technology through a cost-share program
8 with local producers in the South Fork. To date, we have
9 dedicated roughly \$250,000 of matching funds towards things
10 such as soil moisture probes, improvements to nozzle
11 packages to optimize our irrigation application with the
12 ultimate goal of conserving water and making those more
13 efficient. We continue to work with the local stakeholders
14 and community to identify opportunities to improve our water
15 management and water conservation in the area. We'll be
16 sharing additional funds with them in the coming year.

17 A couple of the other things, besides irrigation
18 technology, that the stakeholders locally are interested in
19 working on are removal of phreatophytes, Russian olive and
20 salt cedar in particular, that -- both for habitat and also
21 for water conservation. And, obviously, that's an issue in
22 a lot of parts of western Kansas and, I know, in Nebraska
23 and Colorado as well.

24 And then, the third thing is maybe a series of
25 low-head dams within the South Fork Republican River to

1 improve aquifer recharge. That's something we're in the
2 very early stages of looking at and seeing if that's a
3 viable option, but obviously making sure that we maintain
4 our compact compliance and delivery of water to Nebraska
5 that we need to as well. So we'll keep you updated on that
6 as that progresses.

7 The other thing that we wanted to give you an
8 update on is water technology farms. I think maybe we've
9 mentioned this in the past. But water technology farms are
10 an initiative that was started about four years ago. It's a
11 public-private partnership in which we work with private
12 vendors and individual producers to demonstrate different
13 water technologies, much like we just mentioned with soil
14 moisture probes, nozzle packages, remote sensing, different
15 pivot-management schemes, those type of things. We work
16 with vendors. The vendors bring these technologies to us.
17 We partner with the producers and we also partner with some
18 of the technical colleges and, of course, K-State University
19 to monitor the effectiveness of these technologies on the
20 property and we ultimately share those results and the
21 technologies through field days and videos and other ways to
22 producers across the state with the goal of trying to
23 encourage the adoption of additional technologies, again,
24 with the long-term goal of reducing our draw on the Ogallala
25 Aquifer.

1 They started a few years ago with three of them.
2 We now have 17, started primarily in southwest Kansas with
3 the Ogallala High Plains. Now, have expanded into northwest
4 Kansas; south central; and, just this year, a couple in
5 north central Kansas. Again, we think this is one of the --
6 our most successful private -- public-private partnerships
7 run through the Water Office; but, again, most of the
8 funding comes from the vendors and outside stakeholders.

9 So, with that, Chris, I'll turn it back over to
10 you. And, again, I appreciate everybody's time and good to
11 see everybody here today.

12 COMMISSIONER BEIGHTEL: Thanks, Earl.

13 Just a couple more things from me. This year, I
14 had the privilege of serving on the Engineering Committee,
15 and then, in March of this year, assuming the duties of
16 Kansas Commissioner to the compact. In addition to the
17 normal work of the EC, there were two issues discussed among
18 the states in different forms. At last year's RRCA Annual
19 Meeting in Colby, Nebraska raised an issue with the way that
20 flood flows are handled in the compact accounting. As you
21 will hear during the EC report later in the meeting, the
22 states invested significant time working to understand the
23 implications of the issue and developing proposals to
24 resolve it. You will also hear that, although the states
25 did not reach an agreement on the resolution to the issue,

1 we did agree to continue to work on the issue with the
2 common goal to resolve the issue before Nebraska's
3 compliance balance could be affected by it.

4 Over the same period, Kansas also raised an issue
5 important to our water users. Kansas believes that the
6 August 24th, 2016, Harlan County Lake Resolution, the long-
7 term deal providing full accounting credit to Nebraska for
8 augmentation water they produce and for other compliance
9 activities, also provides Kansas with a guarantee that, when
10 the basin dries up, as it frequently does, and if Nebraska
11 reasonably believes that it will have to pump augmentation
12 water or take other compliance actions, Kansas water users
13 will be guaranteed at least a minimal supply by having
14 access to the water generated by Nebraska's compliance
15 actions in time for the upcoming irrigation season.
16 Nebraska has informed us that they don't necessarily agree
17 with Kansas's interpretation.

18 As part of the review required by the Harlan
19 County Lake agreement, Kansas raised its issue in the form
20 of the three-states' meetings where the Harlan County Lake
21 and the Colorado Compliance Pipeline agreements were both
22 developed after significant work and a series of temporary
23 agreements among the states. Kansas has articulated our
24 issue to the three-states group in person and in email
25 correspondence, but we have not seen much progress towards

1 resolving our concerns, partly due to the restrictions put
2 in place by COVID19. However, it is time to move forward
3 with this discussion.

4 Like Nebraska with its flood-flows issue, Kansas
5 needs a commitment from the states to work on Kansas's
6 issue. During the upcoming EC report, Nebraska will read
7 into the record the language the states have agreed on
8 dealing with Nebraska's flood-flow issue. Kansas
9 understands that these issues need to be documented for our
10 successors, and we agree with that. In the same spirit,
11 Kansas also needs to state, on the record, that our issue
12 with the interpretation of the Harlan County Lake agreement
13 also needs to be addressed and the required review of the
14 Harlan County Lake agreement needs to be completed.

15 The Harlan County Lake agreement has an annual
16 deadline of October 1 for Kansas and Nebraska to discuss the
17 next year's water supply. We need a commitment from
18 Nebraska that we will have a robust discussion of Kansas's
19 issue by that October 1 deadline so that Kansas can assure
20 our water users that the long-term agreement is still
21 working as intended and with the desired effect.

22 And, finally, just a couple of changes to the
23 Kansas delegation. On February 29th, 2020, Kansas Chief
24 Engineer David Barfield retired after 35 years of State
25 service, including 12 years as chief engineer and ex officio

1 commissioner of the Republican River Compact. Kansas will
2 offer a resolution honoring Mr. Barfield's service to the
3 compact later in today's meeting. On March 2nd, 2020, I was
4 appointed acting chief engineer and am honored to serve the
5 compact administration as Kansas ex-officio commissioner
6 until a permanent appointment is made for the chief engineer
7 position.

8 With that, Mr. Chairman, my report is done, and I
9 would entertain any questions or save that for later.

10 CHAIRPERSON BRADLEY: Okay. Thanks, Chris and
11 Earl, for the report. I guess, maybe I did have one
12 question. Earl, you had mentioned some low-head dam
13 structures. Where were you envisioning those could be
14 developed, and would those be kind of on-channel structures,
15 off-channel structures? What's, kind of, the concepts? I'm
16 just curious.

17 MR. LEWIS: Yeah. I think -- obviously, it's
18 pretty early. We haven't got to the point of identifying
19 locations and that sort of thing. But the initial thought
20 -- well, really, it was first brought to us by Kansas
21 Department of Wildlife, Parks, and Tourism. They've got a
22 couple of small wildlife refuges that are on the South Fork
23 Republican River, and the ability to maybe put a little bit
24 of a structure there to hold some water; provide, again,
25 some habitat; provide some groundwater recharge. And so,

1 they -- it could be either, but I think, initially, the
2 thought would be, potentially on-channel low-head dams.

3 CHAIRPERSON BRADLEY: Okay. Thank you.

4 Okay, Kevin, any questions for Chris? Or did you
5 want to move on to the Colorado report?

6 COMMISSIONER REIN: I have no follow-up questions
7 for Chris. If you're ready for me to move on to my report,
8 I can do that.

9 CHAIRPERSON BRADLEY: That would be great. Thank
10 you.

11 COMMISSIONER REIN: Okay. Thanks again. And
12 thanks to Mike Sullivan and, again, the rest of the Colorado
13 group for being here today.

14 And I want to thank Nebraska for hosting this
15 meeting as it is. Jesse, thank you and all your people for
16 doing the work to make this so we can actually conduct our
17 meeting and move ahead. As I'll say in a minute, it would
18 be pretty difficult for us, otherwise, to get permission to
19 travel.

20 And, on that, just related to COVID, at our agency
21 and throughout much of the state, we are continuing to work
22 from home and will continue to work from home until, at the
23 earliest, January 1st. And, in a nutshell, the direction we
24 were given from the start and continue to have is, if you
25 can do your job from home, then do your job from home. And,

1 of course, people have critical tasks that they need to do
2 in the office, so we are -- we do have an allowance for
3 people to do that. That keeps us going.

4 But I bring that up for a couple of reasons.
5 Again, it was just absolutely -- almost impractical for us
6 to seek the permission to travel to McCook, so this is
7 helpful. Travel is just not allowed. And, also, it's good
8 for people to know that we are very fortunate that we're
9 able to do our work from home. That -- I can't say we
10 haven't missed a beat, but we're really close to it at the
11 Division of Water Resources, so we're grateful for that.

12 The closures, of course, have had a financial
13 impact on Colorado revenues. As you know, our organization
14 is funded by general fund from the State, which is funded by
15 -- largely by tax revenues. And so, that's had an impact on
16 us. And to that -- that budget crisis, so to speak, has our
17 agency withstanding a five percent cut. And the way we are
18 staffed, that just comes down to personnel. So we're
19 currently holding 14 positions vacant. Those are not 14
20 soft positions. Those are 14 positions that we normally
21 have staffed live, and so we are just really scrambling and
22 being creative to balance things to make sure that we're
23 getting our work done across the state from the
24 administration standpoint. Really grateful to our 250-some
25 -- actually, now, in the 240s or 230s -- DWR staff that do

1 that.

2 I'll touch on legislation really quickly, just
3 around the state. And, this year, no legislation that was
4 directly related to the Republican River Basin, but we did
5 have three or four bills that were related to Colorado's
6 Instream Flow Program, really just making it a little more
7 robust for people to take advantage of. And I mention that
8 it's interesting that these bills passed, because we had
9 this abbreviated session in Colorado that, you know, in
10 June, reconvened largely to get us a budget passed that we
11 could use for this fiscal year that we're in right now. But
12 they managed to get some of these bills passed.

13 I'll mention an interesting one to the group. It
14 was our Senate Bill 48 that calls on Colorado to examine our
15 anti-speculation doctrine and the laws that we use to manage
16 anti-speculation and just evaluate whether those laws are
17 where they need to be, whether they need to be more robust
18 for Colorado. So, that's something important that will take
19 place next year. Very interesting from a water law/water
20 administration standpoint.

21 More around the state, when it comes to drought,
22 it's just another horrible year. As I look at the NRCS map
23 and we see that drought-monitor areas just seem to go from
24 orange to red to brown. And very difficult to watch that,
25 but in our Yampa River Basin in the northwest part of the

1 state, an area that, in almost all the worst years, they
2 still are not on call. Two years ago, we had a call on the
3 Yampa. And, this year, we're wondering whether we're going
4 to see that again. So that's how bad it is around the
5 state.

6 Of course, this has just led to some -- or created
7 conditions where some large fires have just run away. Very
8 difficult to manage. The Pine Gulch fire out in the west
9 end of the state, Mesa County, over 25,000 acres. It's now
10 the second-largest fire in Colorado history, behind the
11 Hayman fire from 2002. That was up in the 138,000-acre
12 range. And we have two to three other -- three other fires
13 of significance. One, in Glenwood Canyon, which is not only
14 a beautiful canyon, but it's very important to
15 transportation because I-70 goes through there and it's
16 closed down. So the fires are just creating a whole
17 situation in Colorado. And, you know, at the other end of
18 the spectrum, we had rural flooding, we had some major
19 storms just out east on the South Fork and the North Fork
20 and saw increased gauge flows, but we also saw a little bit
21 of minor damage, in places, from that.

22 I'll mention on compact compliance, we -- I was
23 able to report last year that we were in compliance, that we
24 could say we're now in compliance on our five-year number.
25 And we remain in compliance. And, you know, we really have

1 to recognize the Republican River Water Conservation
2 District for all their efforts. We continue to work with
3 them on ways to reduce use, find supplies, keep Colorado in
4 compliance. So that's a very positive item.

5 Lastly, I'll mention our compact compliance rules.
6 Again, last year in my report, I notified the group, I
7 explained that we had filed our compact compliance rules
8 with the water court in January of 2019 and that we had
9 numerous parties opposing them. And by opposing, I mean
10 just going through that legal mechanism to become a party to
11 a case, not that all of them were in direct opposition.
12 Since then, in the past year, we have brought all those
13 parties in through stipulations, except one. And so that's
14 a big positive. We do have one party that still is
15 concerned about the rules. Mike Sullivan and I have met
16 directly with that party and, of course, our attorney
17 general's office is leading communication with them. So
18 we're very hopeful that we can maybe get that matter settled
19 and continue with rules through water court.

20 That is my report for this year, Mr. Chair, and
21 I'll be happy to take any questions.

22 COMMISSIONER BEIGHTEL: Okay, this is Chris. I
23 just had a question about the anti-speculation laws that you
24 were mentioning earlier. I didn't get the gist of whether
25 they're being examined to strengthen them or weaken them.

1 What was your sense on that?

2 COMMISSIONER REIN: Very good question. And I
3 don't even have to relay what my sense is on it, because
4 it's pretty explicit in the language of the bill that it --
5 and let me just say that my boss, the Department of Natural
6 Resources Director Dan Gibbs, is directed to convene a work
7 group. And the purpose of the work group is to investigate
8 and write a report on whether anti-speculation laws need to
9 be strengthened. So they're given that direction.

10 COMMISSIONER BEIGHTEL: Okay. Thank you.

11 COMMISSIONER REIN: You bet.

12 CHAIRPERSON BRADLEY: Okay. Thanks, Kevin.

13 Any other questions for Kevin from anyone?

14 (No response.)

15 Okay. Well, I can go ahead and give a brief
16 report here from Nebraska. You know, again, I guess I'd
17 want to start off by, first, thanking all of my staff that
18 have helped put this together. I know it's no small feat to
19 put together all the documents and meeting notices and
20 everything that goes into a meeting like this. So,
21 certainly want to express my appreciation to them.

22 Also would like to, you know, express appreciation
23 to Kansas and Colorado for agreeing to proceed in this
24 manner with this meeting in light of COVID19. It's
25 obviously a bit of a unique set of circumstances, but I

1 think this is pretty workable, and I appreciate the
2 agreement there to kind of move forward in this direction,
3 holding the meeting both in a virtual and in-person setting
4 there.

5 I also want to recognize our federal partners in
6 their roles and continuing to help support the states with
7 our management efforts in the basin and assisting with data
8 collection and other activities they do to help out
9 throughout the basin.

10 And, of course, I, finally, would want to thank
11 all of our natural resource district partners, irrigation
12 district partners, and producers who continue to work, you
13 know, to protect the water resources of the basin and ensure
14 that we continue to meet our compliance obligations under
15 the compact as we have been. So, really want to express my
16 appreciation there. There's a lot of great things going on
17 throughout the basin and certainly appreciate those efforts.

18 Obviously, we had some -- it's been an interesting
19 year for us, just like it has been for everyone. We, too,
20 like Kansas, had a retirement of our director of our agency.
21 So, Jeff Fassett retired on February 28th. I guess he beat
22 David by one day. But, yeah, that was a significant change
23 for our agency. And, you know, I joke with Jeff -- I've
24 talked with him a few times since -- that he must have had a
25 fantastic crystal ball to have known to get out, you know,

1 two weeks before COVID19 was going to strike and we were
2 going to have to do all this on-the-fly reorganization.
3 But, you know, we've done a great job, I think, as an
4 agency, quickly being able to move to this telecommuting
5 environment that we're all working in. Did that fairly
6 seamlessly. And, actually, our state may be a little bit
7 unique. We continued to maintain full operations throughout
8 the period. We've never sort of closed the office. Field
9 office folks stayed open. Staff continued to report,
10 although, of course, we, too, have been trying to decrease
11 sort of the footprint of staff in the building. When that
12 works for staff to be able to work remotely, we're certainly
13 continuing to encourage that, and we're actually strongly
14 considering making that part of our longer-term work
15 strategies, of having folks working in a telecommuting
16 capacity to help reduce sort of the square footage and
17 footprint of our building, reduce rental spaces, and other
18 things of that nature. So I think there's a lot of
19 challenges that have come from this, certainly, dealing with
20 COVID19, but I think -- obviously, I think there's
21 potentially some good on the other side for us, too, into
22 the future.

23 I guess, just in terms of water supply conditions,
24 I think it's worth kind of noting, because we're here to
25 talk, in large part, about 2019 accounting. I mean, 2019

1 was a fairly spectacular year in terms of amount of water we
2 had in this basin. A lot of interesting little facts and
3 figures, I think, that, you know, that I guess I'd just
4 maybe highlight a couple of them. I mean, the overall
5 annual flow that we saw at Hardy, the downstream gauge in
6 the basin, was almost six times the flow we saw in 2018.
7 That's a pretty interesting number, up over 600,000 acre
8 feet total stream flow going out of the basin. We had peak
9 instantaneous discharge of over 11,000 cfs. So, you know,
10 we mentioned before and we're going to discuss later in this
11 agenda, too, they actually triggered, for the first time,
12 the necessity to use flood-flow provisions under the compact
13 accounting. So, really interesting year, '19. A lot of
14 rainfall, a lot of stream flow.

15 So, you know, then we, then, transition into 2020.
16 And I swear it was the day after Jeff retired that it
17 stopped raining and seemed to start drying out slowly. So,
18 we've been seeing, like Colorado, maybe not to the same
19 degree certainly, but we've been seeing the drought kind of
20 creep in, especially in the upper end of the basin, kind of
21 southwest Nebraska, the Upper Republican area. But it's
22 also been distributed across the state in some interesting
23 patterns that we don't typically see. So there's been a
24 very spotty year, overall, in terms of rainfall events and
25 areas that are dry and not getting rainfall. Some areas are

1 very wet, actually, across the state still. So it's been a
2 very interesting year in that regard.

3 Obviously, Chris mentioned the significant storm
4 we saw by Benkelman here about a month ago. So that was a
5 bit of a surprise. I was actually on vacation when that
6 happened. I thought in my -- thought the website wasn't
7 working correctly when I saw the report of the stream flow
8 out there. So it was definitely quite a (indiscernible) of
9 precipitation that came through there.

10 So, you know, but I think, overall, we continue to
11 be in good shape with irrigation water supplies. We came
12 into the year in good shape. I think the careful management
13 in Harlan County Reservoir this year, you know, we've been
14 seeing that and still have very good water supplies in
15 Harlan County Reservoir as we're heading into the fall,
16 which should mean good things for us next year for all of
17 us. So we're excited about that still.

18 I guess, kind of shifting from water supply to our
19 integrated water management planning, you know, we do a lot
20 of planning all across the state with all the 23 natural
21 resource districts. And I think we've discussed in the past
22 that we actually had some law changes here a few years back
23 that required us to develop a basin-wide plan, the
24 Republican Basin. So that effort finalized the plan in late
25 2018 and sort of formally took effect in March of 2019. And

1 then, this year, we held our first annual meeting under that
2 plan. You know, that process consisted of over 40
3 stakeholders, 15 stakeholder meetings, over multiple years.
4 So a pretty extensive process. Sort of key outcomes from
5 that, which are develop measurable hydrologic objectives, is
6 what they're call in the plan, for assessing future
7 progress. You know, there's a whole host of those laid out
8 in the plan, but a few of the highlights are sort of laying
9 out different monitoring goals and timelines for achieving
10 various actions. And those are kind of all spelled out in
11 more specifics of the plan.

12 But, again, want to thank staff for all the effort
13 that went into getting that plan developed, completed, and
14 now being implemented. So that's been a great success and
15 will be leading us to revisit our individual integrated
16 management plans in the basin, and we're currently working
17 on making updates there as well.

18 In terms of kind of investments in the basin in
19 water management, I guess I'd just highlight a few of those.
20 There's always a lot of activity going on, a lot of
21 investment all across the basin. We've obviously been
22 working to use the settlement funds that we received from
23 Colorado and invest those back into surface water
24 infrastructure in the basin. And one of the major
25 investments we've made so far was a \$2 million distribution

1 to the Frenchman-Cambridge Irrigation District to do
2 automation of their Meeker-Driftwood System. And so that
3 project's well under way now and look forward to getting
4 that wrapped up over the next year or so.

5 We're also looking at using those same funding
6 sources to evaluate different conjunctive management options
7 that may exist within the NBID system, the Nebraska Bostwick
8 Irrigation District System, and hope to be bringing forward
9 some of those concepts in the future for discussion amongst
10 the states. But we're excited about some of the potential
11 there to look at some options that we think will really help
12 Nebraska Bostwick Irrigation District have more reliable
13 supplies in the future and, also, hopefully maintain greater
14 water supplies in Harlan County Lake for the basin as well.

15 The NRDs continue to invest significantly in their
16 water management. We've been partnering with them on a
17 number of contracts. We have contracts in place with the
18 Middle Republican NRD to provide \$3.3 million of State
19 money, and then that is matched with 40 percent local
20 dollars. Similarly, we have a contract with the Lower
21 Republican for those same amounts. And then, we have a
22 larger contract with the Upper Republican to support some of
23 the works they're doing at targeted long-term retirements of
24 groundwater use. And that project was a \$6 million State-
25 funded project with a 40 percent match from the NRD. So

1 some pretty significant investments going in, looking at
2 things like retirements, improving technology that producers
3 can use to reduce their water applications. So, a lot of
4 exciting stuff going on, I think, in the water management
5 area.

6 I think, in terms of kind of legislation within
7 Nebraska, you know, our legislature, like most, sort of got
8 split. We were -- we stopped in April and then re-adjourned
9 [sic] in late July and then concluded last week. There were
10 17 days left in the session. They concluded that last week.
11 I think, most notably for us, has actually been -- and I'm
12 going to knock on wood here -- that, financially, we have
13 not seen the major hits yet, like some of the surrounding
14 states. Our revenues were up by 20. Actually, came in just
15 above forecasts. They were trending much above forecast
16 prior to COVID, but we did still come in above forecast
17 slightly. And then, early projections were up by 21 are a
18 one-percent reduction.

19 But, you know, there's still a lot to be seen
20 here, in terms of how this is going to fully unfold and
21 affect budgets going forward. So, we're still trying to be
22 very financially prudent and, certainly, can appreciate what
23 Kevin's going through with staffing and monitoring, you
24 know, positions that we need to retain in vacancy to make
25 sure we have a little bit more budget flexibility going

1 forward. And even though it's not necessarily a requirement
2 yet, we're certainly paying a lot of attention to that same
3 area to make sure we can bring people on that we'll be able
4 to support for the long term.

5 One bill that came out of the legislature that is,
6 I guess, a little more significant to our agency was a
7 requirement -- this sort of follows on the flooding of 2019,
8 kind of the historic events of 2019 -- they passed the bill
9 that requires our agency to take the lead in developing a
10 flood-mitigation plan for the state. So that's a statewide
11 plan. It would be essentially a subsection to the overall
12 state Hazard Mitigation Plan, which is done by the Emergency
13 Management Agency in Nebraska. But we will be taking the
14 lead in developing that flood-mitigation plan, which is sort
15 of a chapter in the Hazard Mitigation Plan. And so, that
16 effort will be getting underway here over the next few
17 months, and that plan will come to conclusion in sort of the
18 middle of 2022.

19 I guess, the last thing I'll just mention is, I
20 had mentioned at the outset, you know, we had Jeff retire in
21 late February. And, actually, just yesterday, our governor
22 made an announcement that we have a new director that'll be
23 taking over, and that is one Tom Riley, which many, I think,
24 would recognize that name and have met Tom and worked with
25 Tom over the years. He's been a key part of our team in

1 working on Republican issues and other issues in the state.
2 He'll be taking, actually, the director's role for our
3 agency starting November 1st. So, we're all excited about
4 that and having another person to help move these efforts
5 forward.

6 So, I guess, with that, I'd go ahead and conclude
7 and just, you know, once again, thank Kansas and Colorado
8 for our continued partnership and our commitment to work
9 through issues and be productive in managing the waters of
10 this basin and, you know, not forgetting who we're doing
11 that work for, which is our constituencies. You know, we're
12 not just focusing on spreadsheets, but we're trying to focus
13 on making sure that we're doing the right things for our
14 producers all across the basin in getting those outcomes to
15 be as good as they can be for those folks. So, we certainly
16 look forward to continuing those discussions. And I know
17 Chris was referring to some very specific conversations
18 about the resolution, which those are things that we'll
19 certainly commit to having those conversations with Kansas
20 and continuing to move those efforts forward.

21 So, I guess, with that, I'll go ahead and conclude
22 my remarks and see if anybody has any questions.

23 (No response.)

24 COMMISSIONER BEIGHTEL: No questions, really,
25 Jesse. I appreciate the commitment. Congratulations to Mr.

1 Riley. And thank you for your service as acting -- or
2 interim director. I appreciated working with you in this
3 capacity and look forward to working with you still.

4 CHAIRPERSON BRADLEY: Yeah. I was going to say, I
5 don't plan on going anywhere, so --

6 COMMISSIONER BEIGHTEL: Yeah.

7 (Laughter.)

8 CHAIRPERSON BRADLEY: But, okay. Well, we'll go
9 ahead and keep --

10 COMMISSIONER REIN: Jesse, if I -- likewise, I'd
11 like to offer my congratulations to Tom and thank you for
12 the work you've done but will continue to do, as you just
13 alluded to. Thanks.

14 CHAIRPERSON BRADLEY: Yes. Yes. Okay. Well,
15 thank you very much.

16 Well, we'll just keep moving through the agenda
17 here. We have, up next, our federal reports. And I think
18 the first one up would be Craig Scott, is likely the one to
19 provide that report for the Bureau of Reclamation.

20 I think, Elizabeth, are you going to pull Craig's
21 report up for him? Is that correct?

22 Craig, your report there.

23 MR. SCOTT: Okay. I'm Craig Scott. I'm
24 representing reclamation's Nebraska-Kansas Area Office. We
25 have provided a report for the record somewhat similar to

1 what we had provided and submitted the last several years.
2 This report contains hydrologic data for 2019, as well as
3 current reservoir information through July of 2020.

4 I'll start by looking at 2019. We experienced
5 above-average precipitation throughout the basin. Historic
6 high elevation was reached in Harlan County, surpassing the
7 previous historic high established in 1960. The computed
8 average inflow at Harlan County in 2019 exceeded 400,000
9 acre feet.

10 Irrigation supplies from Harlan County, of course,
11 exceeded the trigger level of 119,000 acre feet. So 2019
12 was not a water-short year, which is the first year since
13 2012 that we have not had sufficient water supplies to meet
14 that criteria from Harlan County in the basin.

15 Moving on to 2020, current reservoir data is
16 included in the report and it's summarized in Table 2. So I
17 won't go into a lot of detail on that, except to note that
18 irrigation supplies from Harlan County in 2020 also exceeded
19 119,000 acre feet. So, 2000- -- or this year continues to
20 be a non-water-short year.

21 The eastern -- or the central and eastern part of
22 the basin, as several has previously mentioned, you know,
23 2020 definitely is not the same type of precipitation year
24 as 2019. But we did experience some significant rainfall in
25 the central part and eastern part of the basin during July,

1 which was very timely. We started off the year with some
2 significant high irrigation demands, and it looked like we
3 were going to really pull on the reservoirs, but we were
4 fortunate enough to catch some rains in July that
5 significantly reduced irrigation demand. And so, we
6 actually slowed down on the draw of the reservoir
7 elevations. And, also, was fortunate enough to catch some
8 significant inflows into Swanson Reservoir in the upper part
9 of the basin from the previously mentioned storms that
10 occurred in the upper part of the basin in eastern Colorado
11 and western Nebraska.

12 I'd also like to just take a moment here just to
13 make a couple general comments and highlight, again, the
14 Bostwick Irrigation District's MOA that they executed at the
15 end of 2018. The MOA outlines the procedure for sharing the
16 water supply in Harlan County and identifies those proced-
17 -- or procedures for accounting of those supplies. One of
18 the new elements of the MOA was the establishment of
19 separate storage accounts for each irrigation district in
20 Harlan County Lake. And this was a change from the historic
21 procedures that was needed to align with the RRC resolution
22 approved in 2016.

23 In 2019, because of the flood operations that
24 occurred for the better part of the year, day-to-day
25 accounting was not necessary, so we didn't actually

1 implement all those procedures or accounting procedures in
2 2019. But, this year, we have implemented those accounting
3 procedures and, from our perspective, the changes developed
4 within the new MOA have gone very well. And, fortunately,
5 each irrigation district was able to start off with a full
6 water supply prior to the irrigation season. So, I'd like
7 to commend both the Bostwick Irrigation Districts, Nebraska
8 Bostwick in Nebraska and Kansas Bostwick Irrigation
9 District, for their efforts in adopting and adapting to
10 those changes and making the first year of MOA a success.

11 Lastly, I'd just like to mention -- some of this
12 was mentioned as well, but I'd like to recognize and note
13 some of the ongoing investments each of our federal
14 irrigation districts have been making, not only in 2019 and
15 2018, but also in some previous years. But those efforts
16 are continuing, and I'd just like to note some of those
17 efforts.

18 Frenchman-Cambridge has implemented numerous
19 automation projects in each of their canal systems. Just
20 recently, they are completing a complete automation of
21 Meeker-Driftwood Canal, which should be fully implemented
22 moving into the 2021 irrigation season.

23 Frenchman Valley Irrigation District continues to
24 explore and implement the early diversions of natural flows
25 into their canal system for the re-timing and recharging of

1 their -- the aquifer along their canal.

2 And, also, as mentioned, Bostwick Irrigation
3 District in Nebraska is in the final stages of completing
4 their automation of the Franklin Canal System, which has
5 been a major investment that they've taken on here just
6 recently.

7 Moving on to Kansas, then, Almena Irrigation
8 District just recently adopted changes to their operations
9 where they are now taking advantage of early season
10 diversions and then utilizing those diversions for
11 irrigation deliveries later in the summer.

12 And then, finally, Kansas Bostwick Irrigation
13 District continues to convert open canal systems to buried
14 pipes and is also looking at potential automation of the
15 Courtland Canal System.

16 So, in all, cumulative, you know, millions of
17 dollars have been spent to upgrading these systems. And I
18 think these sys- -- these upgrades will benefit all users in
19 the basin for years to come.

20 So, with that, that concludes my report.

21 CHAIRPERSON BRADLEY: Okay. Thanks, Craig.

22 Any questions for Craig?

23 (No response.)

24 Okay. Well, we appreciate it, Craig. I know we
25 certainly appreciate the attention you're giving to the

1 accounting and the information you're sharing with regard to
2 tracking those Harlan County releases this year.

3 Okay. Next up on the agenda, we would have the
4 report out from the Corps of Engineers. I think we reached
5 out to a couple of folks and didn't hear that they were
6 planning to attend. But, I guess, I'd ask.

7 Is there anybody on from the corps that would like
8 to provide a report?

9 (No response.)

10 Okay. Well, next up, then, would be the U.S.
11 Geological Survey. I don't know, Jason, if you wanted to do
12 that report or if John would be doing that report.

13 MR. LAMBRECHT: John's going to be doing that
14 report.

15 CHAIRPERSON BRADLEY: Okay. Thank you.

16 MR. MILLER: All right, looks like everything's
17 working here. I'm John Miller with the U.S. Geological
18 Survey out of the water -- out of the Nebraska Field Office
19 responsible for the operations in the Republican River
20 Basin. Probably just going to -- rather than go through
21 site by site, just going to give some of the highlights of
22 what went on in the 2019 water year.

23 As has been kind of noted and stated, there's been
24 -- both years have been really interesting. The eastern
25 part of the Republican Basin in the 2019 year received

1 significant rain events resulting in some much-improved
2 overall flows. Sappa Creek come in 15 -- ranking of 15 out
3 of 17 -- out of 73 years of record. Guide Rock --
4 Republican River at Guide Rock was actually the seventh
5 highest annual mean flow in 69 years of record. And the
6 Republican River at Orleans was ranked 13th highest mean
7 discharge in 72 years of record. In fact we were able to --
8 this is probably more of an in-house type thing -- but we
9 made the fourth highest discharge measurement that has ever
10 been made at the Republican River at Orleans in July of
11 2019.

12 Moving to the western part of the basin, the --
13 just some of the -- kind of the highlights. Rock Creek near
14 Parks, for the 2019 water year, was -- come in with the
15 second lowest annual mean in 79 years of record. And the
16 South Fork of the Republican and the Arikaree both continue
17 to remain within the lower 10 percentile of -- for the
18 periods of records.

19 And moving east, Red Willow actually reported the
20 lowest annual mean discharge in 58 years of record. As the
21 flood of -- just some notes on the -- on that extensive rain
22 event that occurred in the Benkelman area, oh, about a month
23 ago, and these are preliminary. I guess, you could call it
24 that. But the event at South Fork of the Republican, that's
25 going to be in the top 10 of all reported events over the

1 period of record. We were able to obtain some measurements
2 at both -- discharge measurements at a number of sites that
3 really improved the positioning of those stage discharge
4 ratings. I know I've received some questions concerning the
5 flows on that event at the Arikaree River, and we were able
6 to actually -- a couple of weeks ago completed an indirect
7 measurement that did compile all the flow that did pass the
8 gauge. Those numbers haven't come to my desk yet, but they
9 are being computed.

10 With that, I think -- and we also did do a -- an
11 indirect measurement at the Buffalo Creek gauge near
12 Haigler, and I believe that's going to come in as peak of
13 record gauge height and peak of record discharge. So, it
14 was really impressive flows at those sites. Was an exciting
15 number of days for my office.

16 With that, I don't think I have anything else to
17 mention and would entertain any questions, if there is any.

18 CHAIRPERSON BRADLEY: Okay. Thanks, John.

19 Anybody have questions for John on the USGS
20 report?

21 (No response.)

22 Okay. Well, that concludes our federal reports on
23 the agenda. I guess, next up on the agenda would be to go
24 through our committee reports, and that would be our
25 Engineering Committee Report. Our current Engineering

1 Committee chair is Carol Flaute with Nebraska.

2 So, Carol, do you want to provide the Engineering
3 Committee Report, please?

4 MS. FLAUTE: Yes, thank you.

5 Hi, everyone. As Jesse said, I'm Carol Flaute.
6 I'm the Engineering Committee chair this year. And we went
7 over the Engineering Committee Report in a lot of detail at
8 this morning's working session, so I will be more hitting
9 the highlights today during this meeting.

10 But this is the report of the Engineering
11 Committee's activities for the past year. It does start
12 with an executive summary. So that first paragraph
13 highlights what we have accomplished this year. I will say
14 that what is here in the executive summary are paraphrases
15 of the actual assignments that we were given. So I'll show
16 where you can find in the Engineering Committee Report what
17 the full assignments were.

18 But in -- over the past year, since the August
19 22nd, 2019, RRCA meeting, the Engineering Committee met five
20 times, and we completed the assignments of holding quarterly
21 meetings; exchanging information for the accounting, which
22 would include data and documentation; finalizing the 2019
23 accounting; reviewing the flood-flows provisions of the RRCA
24 accounting procedures so that 2019 accounting results can be
25 approved at this year's annual meeting; continuing work on

1 documenting historical changes to the RRCA accounting
2 procedures; providing updates on the progress of new and
3 ongoing management strategies for maintaining compact
4 compliance; continue development and maintenance of the RRCA
5 administrative website that serves as an informational page
6 for the public and provide regular updates to the
7 Engineering Committee on that website; continue work on
8 providing updates on improving accounting tools developed by
9 the Engineering Committee; and preparing the 2019 Annual
10 Meeting Report.

11 So those are the assignments that we completed
12 this past year. And, starting on the second page of the
13 report, it breaks down each assignment and what we actually
14 did accomplish for that assignment and our recommendations
15 for the following year that the tasks continue or are
16 repeated.

17 With that, I will move on to the committee's
18 recommendations for the RRCA, which begin on the fourth page
19 of the report. The first one is that the EC recommends the
20 proposed 2019 accounting that's presented in Attachment 2 of
21 the Engineering Committee Report and in the spreadsheet
22 entitled "RRCA Accounting 2019 Final.xlsx" for approval by
23 the RRCA today. Upon approval of this accounting, then the
24 spreadsheet will be placed on the website.

25 Now, the second recommendation is to continue

1 modeling and data tasks with our consultant, Principia
2 Mathematica, at the same level of service as in 2019.

3 The third recommendation is that we would continue
4 to maintain and update the RRCA website and that we request
5 that the commissioners provide us with any additional
6 comments and direction on the website if they'd like to see
7 something different or additional on it.

8 The fourth item, which I'll read here as it's
9 written just because this does set up some of the further
10 items on the agenda, which are action on updating the
11 accounting procedures and the rules and regulations, is a
12 recommendation related to the flood-flows provision. So I
13 will read this one. We're recommending "discussion on the
14 Engineering Committee's finding that the accounting
15 procedures, revised May 27th, 2017, do not properly
16 implement the flood-flows provisions at the Hardy gauge with
17 respect to the calculation of computed water supply above
18 and below Guide Rock and that Attachment 6 calculates the
19 virgin water supply, Guide Rock to Hardy, rather than
20 computed water supply, Guide Rock to Hardy, which would
21 reduce the virgin water supply by the relevant flood flows,
22 as described in Section II, Definitions, and Section III,
23 Basic Formulas. Due to the infrequent occurrence of flood
24 flows, the Engineering Committee recommends deferred
25 resolution of the matter to a future date necessitated by

1 and preceding impact to Nebraska's Table 5C compliance. The
2 Engineering Committee is providing a proposed revision to
3 the RRCA Accounting Procedures and Reporting Requirements,
4 and subsequent revision to the rules and regulations, to
5 make note of these findings."

6 I'll also note with regards to that recommendation
7 is that the Attachment 3 of the Engineering Committee Report
8 includes a summary of all of the work that we've done
9 related to this issue over the past year, all of the
10 proposals communications about it from the states to help us
11 as we continue to work on this issue moving forward.

12 Okay. And then, moving on, the fifth
13 recommendation from the Engineering Committee to the
14 commissioners is discussion of the recommended EC
15 assignments and -- for the following year and agreement on
16 the set of assignments that we have proposed. And then, in
17 the report, we propose the list of recommended assignments
18 for the year, which is the next agenda item.

19 All of the proposed assignments are either repeats
20 or continuations of the assignments from last year, so that
21 would be, as listed here. Since I kind of read all of them
22 when I talked about what we accomplished this year, I won't
23 repeat them. The one to note that is slightly different
24 than last year would be the flood flows one, number four
25 here, because we did accomplish half of the flood-flows

1 assignment for this year. We have reworded this assignment
2 this year to just the part that we still need to work on,
3 which is continuing to work on developing a recommendation
4 for the flood-flow provisions to bring them into conformance
5 with the intent of the FSS.

6 And I think that concludes my report on the
7 Engineering Committee Report. Are there any questions?

8 CHAIRPERSON BRADLEY: Any questions for Carol?

9 (No response.)

10 COMMISSIONER BEIGHTEL: This is Chris. I don't
11 have a question. I just want to thank you, Carol, for all
12 the hard work you put into this, and I know these are
13 strange circumstances with the electronic document signing
14 and all the things that we had to work through, but I think
15 you pulled it off well. So, thank you.

16 MS. FLAUTE: Thank you. Thank you, Chris.

17 CHAIRPERSON BRADLEY: Yes, definitely, thank you
18 to Carol and the whole Engineering Committee for the report.
19 We appreciate that.

20 COMMISSIONER REIN: I'll add my thanks to that,
21 too.

22 CHAIRPERSON BRADLEY: Okay. We'll continue down
23 our agenda. We have a placeholder on our agenda called Old
24 Business. I don't think there was anything here, but I
25 guess I would check just to see if there's any other sort of

1 discussion topics before we go into the New Business and
2 Assignments.

3 I don't know if, Commissioner Rein or Beightel, if
4 you had anything there to --

5 COMMISSIONER BEIGHTEL: I don't have anything on
6 this item.

7 COMMISSIONER REIN: I have nothing.

8 CHAIRPERSON BRADLEY: Okay. So then, we're on to
9 our agenda item for New Business and Assignments to Compact
10 Committees. Carol just kind of outlined a lot of the
11 actions we need to take and recommendations of the
12 Engineering Committee. The first one up there is an action
13 on the updated accounting procedures. This is, again,
14 related to that flood-flow provision that Carol was
15 discussing in the Engineering Committee Report and I think
16 was aiming to identify the nature of this issue and the
17 commitment to work on it into the future, as was discussed
18 in her report.

19 So, I guess, I'd be looking for a motion to
20 approve these updated accounting procedures as provided by
21 the Engineering Committee.

22 COMMISSIONER REIN: I'll move that we accept the
23 updated accounting procedures.

24 CHAIRPERSON BRADLEY: Thank you.

25 COMMISSIONER BEIGHTEL: I'll second that.

1 CHAIRPERSON BRADLEY: Thank you, Chris.

2 Any discussion on that issue?

3 (No response.)

4 Okay. So, we'll take our vote. All those in
5 favor, say aye.

6 COMMISSIONER BEIGHTEL: Kansas, aye.

7 COMMISSIONER REIN: Aye from Colorado.

8 CHAIRPERSON BRADLEY: Aye.

9 Okay. So that motion passes. We've taken the
10 action to update our accounting procedures. And, because of
11 that, our rules and regulations of this commission require
12 us to go through and update our rules and regulations,
13 because they reference a specific, dated version of the
14 accounting procedures. So, the next item up for action
15 would be, we would be looking for a motion to adopt the
16 updated Rules and Regulations for the Republican River
17 Compact Administration.

18 COMMISSIONER BEIGHTEL: So moved.

19 COMMISSIONER REIN: I'll second that.

20 CHAIRPERSON BRADLEY: Okay. So, we have a motion
21 and a second. Any discussion on the rules and those
22 modifications to change the date?

23 (No response.)

24 No? Okay. So we'll take that vote. All those in
25 favor, please say aye.

1 COMMISSIONER BEIGHTEL: Kansas, aye.

2 COMMISSIONER REIN: Aye from Colorado.

3 CHAIRPERSON BRADLEY: Aye from Nebraska.

4 So, that motion passes. We've now updated our
5 rules and regulations in accordance with the accounting
6 procedures as well.

7 The next action up for us, then, is to take action
8 on the Engineering Committee Report and assignments that
9 were presented by Carol during her presentation of the
10 report. Do we have a motion to accept the Engineering
11 Committee Report and the assignments that were presented?

12 COMMISSIONER REIN: Mr. Chair, I'll move that we
13 accept the Engineering Committee Report and the associated
14 assignments.

15 COMMISSIONER BEIGHTEL: I'll second.

16 CHAIRPERSON BRADLEY: Okay. Thank you for the
17 first and second. So any discussion on that?

18 (No response.)

19 Okay. Take a vote. All those in favor, aye.

20 COMMISSIONER BEIGHTEL: Kansas, aye.

21 COMMISSIONER REIN: Colorado, aye.

22 CHAIRPERSON BRADLEY: Nebraska, aye.

23 So that motion, as well, passes.

24 So we're clicking right through the agenda here.

25 The next item up is action on 2019 accounting. So the

1 Engineering Committee presented the results of the 2019
2 accounting. So I guess I'd be looking for a motion to
3 approve and adopt the 2019 accounting results from the
4 Engineering Committee.

5 COMMISSIONER BEIGHTEL: So moved.

6 COMMISSIONER REIN: Second.

7 CHAIRPERSON BRADLEY: Okay. A motion and a
8 second. So any discussion related to the 2019 accounting?

9 (No response.)

10 No discussion. We'll go ahead and take the vote.
11 All those in favor of approving the 2019 accounting from the
12 Engineering Committee, say aye, please.

13 COMMISSIONER BEIGHTEL: Kansas, aye.

14 COMMISSIONER REIN: Colorado, aye.

15 CHAIRPERSON BRADLEY: Nebraska, aye.

16 So that, too, passes. We've adopted our 2019
17 accounting, which is nice that that has become a somewhat
18 routine action for us to be able to complete in this group.
19 That's a great outcome of the past several years of working
20 together.

21 Next up, then, we have action on a couple of
22 resolutions honoring former commissioners. I believe,
23 Chris, you have a resolution for Former Commissioner
24 Barfield. And, I guess, I would maybe suggest -- I think,
25 Chris, you typically like to see the resolution maybe get

1 read into the record, and you were planning to do that. I
2 can also do that with Former Commissioner Fassett's
3 resolution. And then, maybe we could take those both
4 together in one action. Would that be acceptable?

5 COMMISSIONER BEIGHTEL: That sounds good to me,
6 Mr. Chairman. Thank you. I'll go ahead and start.

7 CHAIRPERSON BRADLEY: Okay. If you're ready.

8 COMMISSIONER BEIGHTEL: Okay. This is a
9 Resolution of the Republican River Compact Administration
10 Honoring David W. Barfield. "Whereas, David W. Barfield of
11 Lawrence, Kansas, retired as Kansas Chief Engineer, thereby
12 ending his duties as the Kansas Commissioner to the
13 Republican River Compact Administration (RRCA) after having
14 served faithfully in the position of commissioner for 12
15 years; and

16 "Whereas, Mr. Barfield's extensive knowledge of
17 water laws and hydrology of the Republican River Basin have
18 been a key asset to the State of Kansas in the original 1998
19 U.S. Supreme Court case and resulting Final Settlement
20 Stipulation for the Republican River Compact; and

21 "Whereas, Mr. Barfield provided excellent
22 representation of the State of Kansas, constructive insights
23 into complex issues discussed during the several Republican
24 River arbitrations, and the continuation of the original
25 Supreme Court case; and

1 "Whereas, Mr. Barfield displayed a positive and
2 collaborative attitude while forging lasting partnerships to
3 benefit the State of Kansas during the three-states'
4 meetings and negotiations; and

5 "Whereas, Mr. Barfield facilitated discussions on
6 many occasions with local stakeholders in Kansas to provide
7 water users with a better understanding of the Republican
8 River Compact and efforts made to resolve issues between the
9 states;

10 "Now, therefore, be it resolved that the
11 Republican River Compact Administration does hereby
12 acknowledge and express its appreciation for the
13 contributions of David W. Barfield to this administration
14 and extends to him the best wishes for continued good health
15 and happiness in all his future endeavors; and that this
16 resolution be entered into the records of the 2020 Annual
17 Compact Administration Meeting Minutes and the Annual Report
18 and hereby instructs the Kansas Commissioner to send copies
19 of this resolution to Mr. Barfield and the Governor of the
20 State of Kansas.

21 "Adopted by the Republican River Compact
22 Administration at the 2020 Annual Meeting of the RRCA."

23 CHAIRPERSON BRADLEY: Okay. Thank you, Chris.

24 And, as I said, I think I'll just go ahead and
25 take the resolution for Former Commissioner Fassett as well,

1 and then we can do those maybe both under one motion. Is
2 that acceptable?

3 COMMISSIONER BEIGHTEL: Yes, that's acceptable.

4 CHAIRPERSON BRADLEY: Okay. Okay. Well, I will
5 start that resolution for Former Commissioner Fassett.

6 "Resolution of the Republican River Compact
7 Administration Honoring Gordon W. "Jeff" Fassett. Whereas,
8 Gordon W. 'Jeff' Fassett of Cheyenne, Wyoming, has resigned
9 his position as Director of the Nebraska Department of
10 Natural Resources and the Nebraska Commissioner of the
11 Republican River Compact Administration after having served
12 faithfully in that position for more than four years while
13 serving the people of Nebraska through his committed public
14 service at the Nebraska Department of Natural Resources; and

15 "Whereas, as the Nebraska Commissioner to the
16 Republican River Compact Administration and the Director of
17 Nebraska Department of Natural Resources, Jeff diligently
18 represented the compact interests of the State of Nebraska
19 and the residents of the Republican River Basin in Nebraska;
20 and

21 "Whereas, while representing the State of Nebraska
22 and its constituents, Jeff exhibited professionalism and
23 integrity and provided leadership and guidance towards
24 addressing the complexities of water administration and
25 compact compliance, continually reaching out and

1 communicating straightforwardly with the States of Colorado
2 and Kansas to reach fair and reasonable solutions to the
3 many issues associated with the Republican River Compact;
4 and

5 "Whereas, Jeff led the Nebraska Department of
6 Natural Resources with openness and directness and
7 consistently guided competing Nebraska water interests and
8 Republican River Basin stakeholders through collaborative
9 efforts, including the State of Nebraska's ongoing
10 Republican River Compact compliance, under his leadership;
11 and

12 "Whereas, Jeff promoted increased certainty and
13 predictability in water supply to allow for broader
14 investment within the Republican River Basin to more
15 efficiently and effectively manage water, our most precious
16 natural resource, and grow the State of Nebraska;

17 "Now, therefore, be it resolved that the
18 Republican River Compact Administration does hereby express
19 its sincerest gratitude and appreciation to Gordon W. 'Jeff'
20 Fassett for his dedicated service to the Republican River
21 Compact Administration in his position of Nebraska
22 Commissioner and extends its best wishes to Mr. Fassett in
23 all of his future endeavors; and that the Republican River
24 Compact Administration honors Mr. Fassett's service by
25 including this resolution and appropriate dedicatory remarks

1 in the 2020 Republican River Compact Administration Annual
2 Report Meeting Minutes and hereby instructs the Nebraska
3 Commissioner to send copies of this resolution to Mr.
4 Fassett and the Governor of the State of Nebraska.

5 "Adopted by the Republican River Compact
6 Administration at the 2020 Annual Meeting of the Republican
7 River Compact Administration."

8 Thank you. I guess, with that, I would entertain
9 a motion to adopt both resolutions honoring David Barfield
10 and Gordon W. "Jeff" Fassett.

11 COMMISSIONER REIN: Mr. Chair, this is Kevin Rein.
12 I'd like to, first, just -- if I could, I'd like to, first,
13 express my appreciation and admiration for both Jeff Fassett
14 and David Barfield and the work they've done for their
15 states and the work they've done working with Colorado. I
16 appreciate the ability to work with them during my first two
17 and a half years or so in my position. They've been an
18 obvious influence in progress with everything we've done as
19 three states. And, with that, I'd like to make a motion
20 that we adopt the resolution honoring both Jeff Fassett and
21 David Barfield.

22 COMMISSIONER BEIGHTEL: Second that.

23 CHAIRPERSON BRADLEY: We have a motion and second.
24 I guess, we'll take our vote. All those in favor, aye.

25 COMMISSIONER BEIGHTEL: Kansas, aye.

1 COMMISSIONER REIN: Colorado, aye.

2 CHAIRPERSON BRADLEY: Nebraska, aye.

3 So we will certainly make sure to get that
4 resolution to Jeff and let him know the kind words, Kevin.
5 We appreciate that. So -- and, you, too, Chris. Thank you.

6 COMMISSIONER BEIGHTEL: Thank you.

7 CHAIRPERSON BRADLEY: I guess, with that, we've
8 reached the point on the agenda where we have the item for
9 remarks from the public. You know, there's different ways
10 in which we can handle this. We can certainly see if folks
11 are interested. It might be good to express your interest
12 in the chat box, to just let you -- just let us know that
13 you plan to make public comments. We certainly don't want
14 to miss anybody that wants to make such comments. So, if
15 you wanted to indicate that in the chat box, that might be
16 beneficial to helping us manage this.

17 I guess, though, I can ask, is there anyone from
18 the public that would like to provide comments?

19 MR. LENZ: Yes. This is Rod Lenz with the RRWCD.
20 I would like to have a chance to weigh in, please.

21 CHAIRPERSON BRADLEY: Okay. Thank you. Go ahead
22 and proceed, please, Rod.

23 MR. LENZ: Okay. Like I stated, my name is Rod
24 Lenz. I'm serving as president of the RRWCD at this time,
25 and I want to thank you for allowing me to speak, first of

1 all. And I just want to share some of the information on a
2 few things that we're working on at this time.

3 First, our South Fork River Restoration Coalition,
4 or SFRRC Project. The coalition is made up of six entities.
5 And we're dedicated to the reclamation of the former Bonny
6 Reservoir area. We've selected a final concept to promote
7 in going forward. I'd like just to touch on that a little
8 bit with everybody. The concept will consider flood
9 control, sediment mitigation, phreatophyte control,
10 reestablishment of a kidney river channel throughout the
11 former reservoir, as well as increased water flow. We will
12 also consider recreation and economic opportunities.
13 Yesterday, we had the opportunity to meet with a potential
14 project manager who would head the fundraising and the
15 project development, and we do have some leads for some
16 major funding and have actually already applied for some of
17 those funds. So I just want to let you know that that
18 project is going forward. This project is slated to cost
19 somewhere between six and \$11 million, depending on the
20 degree and the amount of silt that needs to be moved and
21 stabilized.

22 Next, RRWCD has been very busy promoting our two
23 water retirement programs: first, EQUIP, or Environmental
24 Quality Incentives Program, and the CREP Program, the
25 Conservation Reserve Enhancement Program. We have enhanced

1 our dollar contribution to the retirement by using the \$2
2 million that was offered by Kansas and through the Colorado
3 Water Conservation Board. We're using that to up our share
4 of the retirement funds to \$200 an acre for the first 10,000
5 acres. And that is very much appreciated.

6 Next on the information list I'd like to share is,
7 on the 2018 farm bill, when it comes to the CREP Program,
8 there is a provision that would allow for dryland farming of
9 CREP. And that's where the acres would be permanently --
10 the water on those acres would be permanently retired and
11 then those acres could be reinstated as dryland. The
12 provision was not allowed because it was determined to be
13 contrary to the original program intent. It came to our
14 attention that Ag Secretary Sonny Perdue was never made
15 aware of the provision and, therefore, did not weigh in on
16 the issue. We are currently working with Senator Michael
17 Bennet who is on the Senate Ag Committee. He will use his
18 position, hopefully, to try to shepherd the provision closer
19 to Secretary Perdue.

20 If we can get this provision implemented, it will
21 greatly enhance our ability to attain the goal of 25,000
22 acres retired in the South Fork focus zone, according to the
23 resolution adopted in 2016. To date, RRWCD has helped to
24 retire 3,000 acres. And, also, throughout the basin to
25 date, we've invested \$72 million of our user funds, and it's

1 all be dedicated to compact compliance.

2 And, lastly, our master irrigator Colorado program
3 completed its first class this spring. It included 23
4 producers throughout the basin. Brandy Bacara (phonetic)
5 and Amy Kremen (phonetic) are heading up that group and are
6 doing a fantastic job. They are already making plans for
7 2021.

8 I just wanted to share that information with you
9 guys and I thank you for letting me do that and represent
10 the Republican River Water Conservation District in this
11 meeting.

12 CHAIRPERSON BRADLEY: Thank you, Rod, for your
13 comments.

14 Any questions for Rod?

15 (No response.)

16 Okay. Keep moving on here. I haven't seen
17 anybody else indicate their desire to talk in the chat box,
18 but I would check one more time. Does anybody else -- would
19 they like to provide public comment?

20 (No response.)

21 Okay. It looks like we've ended the public
22 comment.

23 So, next on the agenda is to discuss future
24 meeting arrangements. I think, with regard to future
25 meeting arrangements, Nebraska will continue to be the host

1 state for one more year. We certainly will make every
2 effort we can to have a meeting in the basin next year and,
3 hopefully, in person. Although, I've got to say, I think
4 this actually went pretty well today. I appreciate
5 everybody's efforts to make this go pretty seamlessly and, I
6 think, very efficiently. So, we'll be in touch, I think.
7 We'll work with the other states and, you know, identify a
8 specific date, maybe at our next three-states' meeting we
9 can do that. You know, generally, we'll probably be looking
10 at this same time of year. We tend to be kind of in the
11 second half of August. And we'll try to identify a location
12 in the basin that we might target for next year.

13 I guess, with that, I would see if there's any,
14 maybe, final comments from either of the commissioners
15 before we adjourn.

16 COMMISSIONER REIN: I have nothing to add, Jesse.

17 COMMISSIONER BEIGHTEL: I just want to say, I do
18 think the meeting went pretty well today. Congratulations,
19 Nebraska, on pulling this off. And that's really it. So,
20 thank you.

21 CHAIRPERSON BRADLEY: Thank you, Chris.

22 MS. FLAUTE: I do have one housekeeping thing to
23 note for the commissioners. Because we are doing this
24 electronically, watch your email this afternoon for the
25 documents to sign, since we'll be signing electronically.

1 So those will come later today.

2 COMMISSIONER BEIGHTEL: Will do. Thank you,
3 Carol.

4 CHAIRPERSON BRADLEY: Thank you for that, Carol.

5 MS. ESSEKS: Also handouts -- handouts that were
6 viewed and discussed during this meeting are available on
7 the RRCA website and also on the Nebraska DNR website.

8 CHAIRPERSON BRADLEY: Thank you, Elizabeth.

9 Okay. I guess, with that, I would seek a motion
10 to adjourn our meeting and bring it to closure here for the
11 2020 Annual Compact Administration Meeting.

12 COMMISSIONER REIN: I would move that we adjourn
13 today.

14 COMMISSIONER BEIGHTEL: Then, I'll second.

15 CHAIRPERSON BRADLEY: Okay. We have a motion and
16 a second. All those in favor, aye.

17 COMMISSIONER BEIGHTEL: Kansas, aye.

18 COMMISSIONER REIN: Colorado, aye.

19 CHAIRPERSON BRADLEY: Nebraska, aye.

20 So, once again, I appreciate everybody
21 participating today. Hope everybody has a great weekend.

22 (Whereupon, the meeting was adjourned at 12:15
23 p.m., on August 21, 2020.)

24 - - -

25

Exhibit B: Attendance

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

August 21, 2020 Attendance:

<u>In Colorado: Name</u>	<u>Representing</u>
Pete Ampe	Hill and Ampe
Suzanna Baker	Republican River Water Conservation District
Brook Campbell	Republican River Water Conservation District
Deb Daniel	Republican River Water Conservation District
Ivan Franco	Colorado Division of Water Resources
Rod Lenz	Republican River Water Conservation District
Les Owen	Colorado Department of Agriculture
Kevin Rein	Colorado Division of Water Resources
David Robbins	Hill and Ampe
Willem Schreüder	Principia Mathematica, Inc.
Mike Sullivan	Colorado Division of Water Resources
<u>In Kansas: Name</u>	<u>Representing</u>
Chris Beightel	Kansas Division of Water Resources
Hongsheng Cao	Kansas Division of Water Resources
Chelsea Erickson	Kansas Division of Water Resources
Pete Gile	Kansas Bostwick Irrigation District
Katie Goff	Kansas Water Office
Lane Letourneau	Kansas Division of Water Resources
Earl Lewis	Kansas Water Office
Sam Perkins	Kansas Division of Water Resources
Kelly Stewart	Kansas Division of Water Resources
Kenneth Titus	Kansas Department of Agriculture
Kurtis Wiard	Kansas Attorney General's Office
<u>In Nebraska: Name</u>	<u>Representing</u>
Don Blankenau	Blankenau Wilmoth Jareke, LLP
Jesse Bradley	Nebraska Department of Natural Resources
Kari Burgert	Nebraska Department of Natural Resources
Scott Dicke	Lower Republican Natural Resource District
Brad Edgerton	Frenchman Cambridge Irrigation District
Elizabeth Esseks	Nebraska Department of Natural Resources
Carol Flaute	Nebraska Department of Natural Resources
Michelle Koch	Nebraska Game and Parks Commission
David Kracman	The Flatwater Group
Keith Koupal	Nebraska Game and Parks Commission
Jason Lambrecht	United States Geologic Survey
Justin Lavene	Nebraska Attorney General's Office

Kennon Meyer	Blankenau Wilmoth Jareke, LLP
John Miller	United States Geologic Survey
Miles Morgan	United States Bureau of Reclamation
Tom Riley	The Flatwater Group
Brett Roberg	Nebraska Game and Parks Commission
Craig Scott	United States Bureau of Reclamation
Shane Stanton	Nebraska Department of Natural Resources
Chance Thayer	The Flatwater Group
John Thorburn	Tri-Basin Natural Resources District
Carrie Wiese	Nebraska Department of Natural Resources
Dustin Wilcox	Nebraska Association of Resource Districts
Tom Wilmoth	Blankenau Wilmoth Jareke, LLP
Jessie Winter	Nebraska Department of Natural Resources
<hr/>	
unknown location: Name	Representing
Sara Spicer	unknown

Exhibit C: Agenda

FINAL AGENDA FOR
**2020 ANNUAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION**

August 21, 2020

10:30 a.m. Central Time/9:30 a.m. Mountain Time
virtual meeting via Zoom

<https://us02web.zoom.us/j/88062143168>

meeting ID: 880 6214 3168

1. Introductions
2. Adoption of the Agenda
3. Status of 2019 annual report and possible action by the RRCA
4. Commissioners' Reports
 - a. Kansas
 - b. Colorado
 - c. Nebraska
5. Federal Reports
 - a. U.S. Bureau of Reclamation
 - b. U.S. Army Corps of Engineers
 - c. U.S. Geological Survey
6. Committee Reports
 - a. Engineering Committee
 - i. Assignments from 2019 Annual Meeting
 - ii. Committee recommendations to the RRCA
 - iii. Recommended assignments for Engineering Committee
7. Old Business
8. New Business and Assignments to Compact Committees
 - a. Action on updated Accounting Procedures
 - b. Action on updated Rules and Regulations
 - c. Action on Engineering Committee Report and assignments
 - d. Action on 2019 Accounting
 - e. Action on Resolutions honoring David Barfield and Gordon "Jeff" Fassett
9. Remarks from the Public
10. Future Meeting Arrangements
11. Adjournment

Exhibit D: U.S. Bureau of Reclamation Report

RECLAMATION

Managing Water in the West

Nebraska-Kansas Area Office

Report

To The

Republican River

Compact Administration

Virtual Meeting



— BUREAU OF —
RECLAMATION

U.S. Department of the Interior
Bureau of Reclamation
Missouri Basin Region
Nebraska-Kansas Area Office

August 21, 2020

REPUBLICAN RIVER COMPACT MEETING

August 21, 2020

Virtual Meeting

2019 Operations

As shown on the attached Table 1, precipitation in the Republican River Basin varied from 149 percent of normal at Red Willow Dam to 113 percent of normal at Trenton Dam. Total precipitation at Reclamation project dams ranged from 21.09 inches at Bonny Dam to 38.12 inches at Lovewell Dam.

Inflows varied from 60 percent of the most probable forecast at Bonny Reservoir to 385 percent of the most probable forecast at Harlan County Lake. Inflows into Bonny Reservoir totaled 3,990 AF while inflows at Harlan County Lake totaled 402,546 AF.

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

<u>District</u>	<u>Farm Delivery</u>
Frenchman Valley	0.4 inches
H&RW	0.0 inches
Frenchman-Cambridge	4.1 inches
Almena	1.2 inches
Bostwick in NE	2.2 inches
Kansas-Bostwick	3.5 inches

2019 Operation Notes

Bonny Reservoir – Remained empty at elevation 3638.00 feet, 34.0 feet below the top of conservation. The annual computed inflow totaled 3,990 AF. Reservoir inflows were bypassed the entire year as ordered by the State of Colorado. No water was bypassed into Hale Ditch in 2019.

Enders Reservoir – The start of the year elevation was 29.3 feet (elevation 3083.05 feet) below the top of conservation, the third lowest level ever recorded at the beginning of the year since initial filling. The 2019 computed inflow totaled 5,180 AF. The reservoir level increased gradually during the spring to a peak elevation of 3084.90 feet on June 9th. Evaporation decreased the reservoir level from June through early-October reaching elevation 3083.20 feet on October 28th. Due to the extremely low water supply available, no water was released from Enders Reservoir during the irrigation season. This was the eighteenth consecutive year that H&RW Irrigation District did not divert water. It was also the sixteenth consecutive year that storage releases were not made for Frenchman Valley Irrigation District. The end of the year reservoir level was 28.6 feet (3083.70 feet) below the top of conservation. This was the fourth lowest end of year level recorded since initial filling. Frenchman Valley

Irrigation District diverted 11,598 AF of natural flow between April 16th and October 15th into Culbertson Canal.

Swanson Lake – The lake level began the year at elevation 2739.74 feet (12.3 feet below the top of conservation) and gradually increased throughout the late winter and spring. The annual computed inflow totaled 34,954 AF. The peak elevation on June 26th was 2744.78 feet (7.2 feet below the top of conservation). The reservoir level decreased throughout the irrigation season and reached an elevation of 2739.01 feet on November 18th. The district diverted 16,468 AF into Meeker-Driftwood Canal from June 27th through September 9th. At the end of the year, the reservoir level was 12.0 feet below the top of conservation at 2740.00 feet.

Hugh Butler Lake –The reservoir level at the first of the year was 2569.75 feet, 12.1 feet below the top of conservation. Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2573.57 feet on July 12th. This was the highest elevation observed since 2009. For the first time in ten years, the district diverted 5,772 AF into Red Willow Canal. Late summer evaporation exceeded inflows, decreasing the lake level to 2570.02 feet on September 20th. The end of year elevation was 2572.31 feet, 9.5 feet below the top of conservation.

Harry Strunk Lake – The reservoir level at the beginning of the year was 3.4 feet below the top of conservation at 2362.74 feet. The reservoir filled to top of conservation on March 13th and began spilling over the uncontrolled spillway notch. The reservoir level peaked at elevation 2370.46 feet on May 31st. Releases over the uncontrolled spillway continued until the top of conservation was reached on August 22nd. Releases through the outlet works for additional irrigation demand began on July 28th, and continued through September 20th, reducing the reservoir level to 2,363.94 feet. The district diverted 24,399 AF into Cambridge Canal. Winter inflows increased the level of Harry Strunk Lake to elevation 2365.87 feet at the end of the year (0.2 feet below the top of conservation). The 2019 computed inflow was 61,478 AF.

Keith Sebelius Lake – The reservoir was 10.3 feet below the top of conservation pool at the first of the year (2294.05 feet). Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2,300.82 feet on June 24th. Approximately 1,718 AF was released from Norton Dam for irrigation of which 1,320 AF was diverted into the Almena Canal. Inflows exceeded evaporation for much of the fall and winter gradually increasing the elevation to the end of year elevation of 2299.94 feet, 4.4 feet below the top of conservation. The total 2019 computed inflow was 18,547 AF.

Harlan County Lake – Harlan County Lake began 2019 approximately 4.7 feet below the top of conservation pool, at 1941.05 feet. Harlan County filled the conservation pool on March 16th for the first time since 2012. Late winter, spring and summer inflows increased the lake level to a summer peak at elevation 1958.17 on July 23rd. This is 12.44 feet above the top of conservation (160% of full) with 189,551 AF stored in the flood pool (37.9%). This surpassed the previous all-time high set in 1960 by 2.51 feet.

The 2019 inflow of 402,546 AF was the largest yearly inflow since 1967. The projected irrigation supply at the end of June was 139,716 AF. It was determined that Water Short Year

Administration would not be in effect in 2019. Flood releases began in March and continued though out the year and totaled 272,471 AF. Both NBID and KBID were able to utilize some of the flood release for irrigation. Bostwick in Nebraska Irrigation District diverted 39,508 AF in 2019. A ten year summary of Harlan County Lake operations is shown on Table 3.

Lovewell Reservoir – The reservoir elevation at the beginning of 2019 was 1583.44 feet (0.8 foot above the top of conservation). The reservoir was drawn down to elevation 1577.59 during January to perform repairs to the north spillway gate cables. On July 15th, Lovewell Reservoir peaked at 10.39 feet above top of conservation which is 2.31 feet below the top of the spillway gates (surcharge pool) with nearly 80% of the flood pool filled. Canal releases from Lovewell Reservoir began on May 28th, with irrigation releases beginning in earnest on June 11th. Irrigation releases continued through September 19th. Releases to the river concurrently drew down the reservoir to a target of 1572.00. This elevation allowed maintenance crews to clean out the canal intake channel. Maintenance crews also worked on the south spillway gate while it was exposed. Republican River flow was diverted via the Courtland Canal into Lovewell Reservoir after the irrigation season to refill after the drawdown for dam maintenance. KBID diverted a total of 32,989 AF in 2019, including 19,275 AF from Lovewell Reservoir. The pool level at the end of the year was 1,582.68 feet (0.08 foot above top of conservation). The annual computed inflow total for 2019 was 132,470 AF.

Current Operations (As of 7/31/20)

Bonny Reservoir – The reservoir is currently empty. Inflows continue to be bypassed through the reservoir as ordered by the State of Colorado. No water has been released into Hale Ditch in 2020. Bonny Dam has recorded 9.36 inches of precipitation during the first seven months of the year (79% of average).

Enders Reservoir - The reservoir level is currently 28.9 feet below full and 1.1 feet below last year at this time. Enders Dam recorded 10.46 inches of precipitation during the first seven months of the year (79% of normal). Due to the water supply shortage, H&RW Irrigation District is not irrigating for the nineteenth year in a row. This is also the seventeenth consecutive year that Frenchman Valley Irrigation District has not received storage water for irrigation.

Swanson Lake – The lake level is currently 10.7 feet from full and is 1.4 feet below last year at this time. Precipitation for the year is at 62% of normal (8.46 inches). Irrigation releases began on June 15th.

Hugh Butler Lake – The lake level is currently 10.7 feet below full and is 1.29 feet above last year at this time. Irrigation releases began on June 26th. The precipitation total so far this year is 12.32 inches (95% of normal).

Harry Strunk Lake – The lake level is currently 5.4 feet below the top of conservation. Precipitation at the dam during the first seven months of the year was 17.68 inches (125% of normal). Releases were made during the spring to keep the lake level approximately one foot

below the uncontrolled spillway. Irrigation releases began on May 1st. The lake level is currently 7.0 feet below last year at this time.

Keith Sebelius Lake – The lake is currently 4.6 feet below full. Lake level is 0.6 feet below last year at this time. Irrigation releases began July 5th. Precipitation at the dam during the first seven months of the year was 17.22 inches (108% of normal).

Harlan County Lake – The current water surface level is approximately 0.3 feet below full. The lake level is 12.3 feet below last year at this time. Harlan County Dam has recorded 15.16 inches of precipitation so far this year (100% of normal). Flood releases started in 2019 and continued through June 15th of this year when the pool was split and irrigation releases commenced. The available irrigation supply from Harlan County Lake on June 30th was 143,392 AF.

Lovewell Reservoir – The reservoir level is currently 3.4 feet above the top of conservation and approximately 1.3 feet above last year's elevation at this time. Lovewell Dam recorded 16.51 inches of precipitation during the first seven months of the year (94% of average). Canal releases began on June 1st.

A summary of data for the first seven months of 2020 is shown on Table 2.

TABLE 1
NEBRASKA-KANSAS PROJECTS
Summary of Precipitation, Reservoir Storage and Inflows
CALENDAR YEAR 2019

Reservoir	Total Precip. Inches	Percent Of Average %	Storage 12-31-18 AF	Storage 12-31-19 AF	Gain or Loss AF	Maximum Content AF	Storage Date	Minimum Content AF	Storage Date	Total Inflow AF	Percent Of Most Probable %
Box Butte	23.88	138	9,478	21,979	12,501	26,424	JUL 14	9,521	JAN 1	29,379	191
Merritt	33.56	157	61,723	60,298	-1,425	68,368	JUL 9	58,322	AUG 2	246,759	132
Calamus	37.33	148	99,655	81,765	-17,890	125,237	MAY 24	75,147	OCT 13	411,224	154
Davis Creek	38.37	147	13,223	12,606	-617	31,204	JUN 19	12,395	MAR 11	43,365	90
Bonny	21.09	119	0	0	0	0	N/A	0	N/A	3,990	60
Enders	24.50	127	9,362	9,786	424	10,601	JUL 9	9,362	JAN 1	5,180	85
Swanson	22.86	113	59,359	60,264	905	78,152	JUN 21	56,858	NOV 19	30,954	119
Hugh Butler	29.73	149	19,619	22,620	3,001	24,201	JUL 12	19,619	JAN 1	12,904	114
Harry Strunk	31.01	146	28,994	34,226	5,232	43,400	JUL 11	29,085	JAN 1	61,478	155
Keith Sebelius	29.57	118	16,570	25,829	9,259	27,435	JUN 24	16,570	JAN 1	18,547	281
Harlan County	30.94	132	255,028	329,729	74,701	503,662	JUL 23	255,393	JAN 1	402,546	385
Lovewell	38.12	137	38,229	35,905	-2,324	74,979	JUL 15	11,406	OCT 1	132,470	239
Kirwin	23.23	97	104,832	98,255	-6,577	127,704	JUN 25	96,992	DEC 19	88,928	343
Webster	26.41	110	78,514	78,208	-306	105,877	MAY 31	75,556	MAR 1	135,053	785
Waconda	31.85	125	234,715	212,798	-21,917	376,669	AUG 29	203,886	FEB 11	776,754	638
Cedar Bluff	30.03	141	66,266	110,720	44,454	110,770	DEC 31	66,266	JAN 1	62,296	494

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

JANUARY - JULY 2020

Reservoir	Precip. Inches	Percent Of Average %	Storage 7/31/2019 AF	Storage 7/31/2020 AF	Gain or Loss AF	Inflow AF	Percent Of Most Probable %
Bonny	9.36	79	0	0	0	3,165	66
Enders	10.46	79	10,353	9,622	(731)	2,844	79
Swanson	8.46	62	70,200	64,905	(5,295)	23,645	113
Hugh Butler	12.32	95	22,682	21,146	(1,536)	5,409	73
Harry Strunk	17.68	125	37,767	25,997	(11,770)	24,652	93
Keith Sebelius	17.22	108	26,441	25,474	(967)	6,768	141
Harlan County	15.16	100	495,240	310,009	(185,231)	109,836	147
Lovewell	16.51	94	42,140	46,557	4,417	42,612	161

Inflow at Swanson Lake includes water from augmentation (pumping) projects.

TABLE 3
HARLAN COUNTY LAKE

Year	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	Precipitation		End of Year Content (AF)	Projected Irrig. Water Supply On June 30th (AF)
					Harlan County Dam* (% of Average)	Rep. Basin Dams (% of Average)		
2010	239,054	194,055	46,893	31.66	137%	119%	318,364	147,800
2011	174,830	120,989	49,241	30.69	133%	115%	322,964	157,700
2012	78,581	160,221	50,199	18.14	78%	64%	191,125	132,900
2013	48,794	75,355	40,042	17.46	75%	83%	124,522	81,400
2014	92,209	35,502	32,387	18.53	80%	105%	148,842	59,000
2015	106,728	54,502	33,652	28.85	125%	115%	167,416	79,600
2016	126,679	63,972	35,920	27.82	120%	109%	194,203	103,500
2017	118,889	52,764	36,081	26.60	115%	104%	224,247	111,600
2018	120,146	53,451	35,914	29.61	128%	128%	255,028	106,600
2019	402,546	272,471	55,374	30.94	134%	132%	329,729	139,716

NOTE: On June 30, 2020 Projected Irrigation Water Supply was 143,392 AF.

* Average Annual Precipitation at Harlan County Dam is 23.13 inches

Exhibit E: U.S. Geological Survey Report

Republican River Basin streamflow-gaging stations with records published by USGS for water year (WY) 2019

[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 2019 as	WY 2019 as	WYs used	Remarks
		WY 2019	Long-term	percentage of long-term mean	rank/years (1 highest)	for long-term mean	

USGS Compact stations supported by the Groundwater Streamflow Information Program (GWSIP)

06821500	Arikaree River at Haigler, Nebr	1.6	15.4	10.1%	75/87	1933 - 2019	
06823000	North Fork Republican River at Colo-Nebr State Line	40.1	41.1	97.6%	49/84	1936 - 2019	
06823500	Buffalo Creek near Haigler, Nebr	2.1	5.7	37.2%	75/79	1937 - 2019	
06824000	Rock Creek at Parks, Nebr	5.4	12.1	44.9%	78/79	1938 - 2019	
06824500	Republican River at Benkelman, Nebr	43.2	79.2	54.5%	51/52	1939 - 2019	
06827500	South Fork Republican River near Benkelman, Nebr	3.3	32.4	10.2%	72/82	1940 - 2019	
06835500	Frenchman Creek at Culbertson, Nebr	37.0	62.3	59.4%	54/69	1941 - 2019	Since Enders Reservoir
06836500	Driftwood Creek near McCook, Nebr	4.5	7.9	56.3%	54/73	1942 - 2019	
06838000	Red Willow Creek near Red Willow, Nebr	4.5	12.7	35.3%	58/58	1943 - 2019	Since Hugh Butler Lake
06847000	Beaver Creek near Beaver City, Nebr	2.3	14.4	16.0%	45/82	1944 - 2019	
06847500	Sappa Creek near Stamford, Nebr (USACE funds DCP)	57.3	36.6	156.6%	15/73	1945 - 2019	
06852500	Courtland Canal at Nebr-Kans State Line (USBR DCP)	40.7	74.5	54.6%	58/65	1946 - 2019	
06853020	Republican River at Guide Rock, Nebr	516.6	252.4	204.7%	7/69	1947 - 2019	Based on record from this and upstream station 06853000

USGS stations supported by USGS and/or other Federal or State agencies

06828500	Republican River at Stratton, Nebr	43.5	89.4	48.7%	52/69	1951 - 2019	Funded by USACE and GWSIP
06837000	Republican River at McCook, Nebr	59.4	116.7	50.9%	48/65	1955 - 2019	Funded by USBR, NDNR, and GWSIP
06844500	Republican River near Orleans, Nebr	334.0	220.9	151.2%	13/72	1948 - 2019	Funded by USACE and GWSIP

NDNR stations with USGS/USACE support for DCP, Web display, review, and publishing

06834000	Frenchman Creek at Palisade, Nebr	20.1	56.7	35.4%	61/69	1951 - 2019	
06843500	Republican River at Cambridge, Nebr	159.1	201.2	79.1%	40/70	1950 - 2019	Since Harry Strunk Lake

Online Annual Water Data Reports available at or through:

<http://wdr.water.usgs.gov>
<https://www.usgs.gov/centers/ne-water>

USGS North Platte Field Office

John Miller (jdmler@usgs.gov)
308-532-5323

USGS Lincoln Field Office

Tim Boyle (tboyle@usgs.gov)
402-328-4125

Exhibit F: Engineering Committee Report

Engineering Committee Report Republican River Compact Administration August 21, 2020

EXECUTIVE SUMMARY

The Engineering Committee (EC) met five times since the August 22, 2019, Republican River Compact Administration (RRCA) Annual Meeting. Over the past year, the EC completed these assignments: 1) hold quarterly meetings; 2) exchange information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, including all required data and documentation; 3) finalize 2019 accounting; 4) review the Flood Flows provisions of the RRCA Accounting Procedures so that 2019 accounting results can be approved at the 2020 Annual Meeting; 5) continue work on documenting historical changes to the RRCA Accounting Procedures; 6) provide updates on the progress of new and ongoing management strategies for maintaining compact compliance; 7) continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC; 8) continue work and provide updates on improving accounting tools developed by the Engineering Committee; and 9) prepare the 2019 RRCA annual meeting report.

Ongoing assignments include: 1) hold quarterly meetings; 2) continue to work on developing a recommendation for modifying the Flood Flows provisions of the RRCA Accounting Procedures to bring them into conformance with the intent of the Final Settlement Stipulation (FSS); 3) continue work on documenting historical changes to the RRCA Accounting Procedures; 4) provide updates on the progress of new and ongoing management strategies for maintaining compact compliance; 5) work on maintaining and enhancing the RRCA public website; 6) continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

The EC recommends discussion by the RRCA on the exchange of data, modeling results, and proposed accounting for 2019; modeling and data tasks to be assigned to Principia Mathematica for 2020; the ongoing maintenance and updating of the RRCA website; the EC findings regarding Flood Flows provisions in the current Accounting Procedures and proposed revisions to the Accounting Procedures and Rules and Regulations; 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:

Attachment 1: Minutes of the quarterly meetings of the EC

Attachment 2: Accounting Inputs and Accounting Tables from the RRCA Accounting for 2019 recommended by the EC for approval by the RRCA

Attachment 3: Compilation of documents exchanged regarding the Flood Flows provision

COMMITTEE ASSIGNMENTS AND RELATED WORK ACTIVITIES

1. Meet quarterly to review the tasks assigned to the committee.
 - a. The EC met October 10, 2019; January 16, 2020; April 16, 2020; July 23, 2020; and August 19, 2020. See Attachment 1 for the approved notes of these meetings.
 - b. The EC recommends that this task continue.
2. Exchange by April 15, 2020, 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, 2020, the states will exchange any updates to these data.
 - a. Nebraska posted its data on April 15, 2020 and provided an update on July 15, 2020.
 - b. Kansas posted its data on April 15, 2020 and provided an update to the data on June 22, 2020.
 - c. Colorado posted its data on April 4, 2020 and added Crop Irrigation Requirement (CIR) data on July 3, 2020.
3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
 - a. Colorado, Kansas, and Nebraska accounting data for 2019 is final and the EC hereby recommends its approval by the RRCA.
 - b. The applicable summary accounting tables are presented in Attachment 2.
4. Review the Flood Flows provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.
 - a. The EC agrees that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flows provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock and that Attachment 6 calculates the Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas.
 - b. Due to the infrequent occurrence of Flood Flows, the EC recommends deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. The EC proposes adding clarifying notes to the RRCA Accounting Procedures and Reporting Requirements, and subsequently adopting the revised Accounting Procedures into the RRCA's the Rules and Regulations, to document these findings.
 - c. Attachment 3 is provided as a compilation of the documents that were exchanged between Colorado, Kansas, and Nebraska in efforts to resolve the issue between the 2019 and 2020 annual meetings.

- d. The EC recommends that the task of modifying the Flood Flows provisions of the RRCA Accounting Procedures to bring them into conformance with the intent of the FSS continue.
5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
 - a. A draft of this document has been developed by Kansas and is currently being reviewed by Colorado and Nebraska.
 - b. The EC recommends that this task continue.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
 - a. Nebraska provided updates on projects in-progress by the Nebraska Bostwick Irrigation District (automation of headgates at Guide Rock and work on Courtland/Superior canals) and Frenchman-Cambridge Irrigation District (automation of the Meeker-Driftwood canal system). In addition, Nebraska described Middle Republican Natural Resources District's remote meter monitoring project.
 - b. Kansas provided an update on Kansas Bostwick Irrigation District's progress burying lateral pipes in the district. Kansas also provided an update on a project to evaluate water management effectiveness.
 - c. Colorado provided two updates on deliveries by the Colorado Compliance Pipeline.
 - d. The EC recommends this task as a recurring assignment.
7. Continue efforts to develop and publish an administrative website that would be an informational page for the public.
 - a. State staff have maintained and updated the website which is accessible to the public.
 - b. The EC recommends this task as a recurring assignment to maintain the website and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
 - a. The EC continues to use the website accounting tool to validate the accounting spreadsheet results.
 - b. The EC recommends this task as a recurring assignment.
9. Prepare the 2019 RRCA annual meeting report for approval by the RRCA at the 2020 annual meeting
 - a. The report has been finalized and approved by the EC and is hereby recommended for approval by the RRCA.

ITEMS FOR RRCA DISCUSSION & ACTION

1. Data exchange and modeling results for 2019. The EC recommends the proposed 2019 accounting presented in Attachment 2 and in the spreadsheet titled “RRCA Accounting 2019 Final.xlsx” for approval by the RRCA. Upon approval of the accounting, the above-mentioned spreadsheet file will be placed on the public website.
2. Modeling and data tasks to be assigned to Principia Mathematica for 2020. The EC recommends that Principia Mathematica continue to perform periodic model and accounting updates at the same level of service as in 2019.
3. The EC has continued to maintain and update the RRCA website. The website’s purpose is to provide public information, including history of the compact and the RRCA, links to compact-related data and reports, state information, etc. The EC requests any additional comments and direction from the commissioners on the content that the RRCA wants published to the website.
4. Discussion on the EC’s finding that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flows provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock and that Attachment 6 calculates the Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas. Due to the infrequent occurrence of Flood Flows, the EC recommends deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska’s Table 5C compliance. The EC is providing a proposed revision to the RRCA Accounting Procedures and Reporting Requirements, and subsequent revision to the Rules and Regulations, to make note of these findings.
5. 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 following list of recommended assignments to report on at the 2021 annual meeting of the RRCA.

RECOMMENDED ASSIGNMENTS FOR THE COMING YEAR

The Engineering Committee recommends that the Republican River Compact Administration assign the following tasks:

1. Meet quarterly to review the tasks assigned to the committee.
2. Exchange by April 15, 2021, 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, 2021, the states will exchange any updates to these data.
3. Finalize the 2020 accounting and recommend it for approval by the RRCA.
4. Continue to work on developing a recommendation for modifying the Flood Flows provisions of the RRCA Accounting Procedures to bring them into conformance with

the intent of the FSS.

5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
9. Prepare the 2020 RRCA annual meeting report for approval by the RRCA at the 2021 annual meeting

The Engineering Committee Report and the exchanged data will be posted on the web at

<http://republicanriver.org/>

SUBMITTED TO THE RRCA BY



Ivan Franco, Engineering Committee Member for Colorado



Christopher Beightel, Engineering Committee Member for Kansas



Carol Flaute, Chair and Engineering Committee Member for Nebraska

Meeting Minutes for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
10 October 2019, 1:00 PM Central Time
Meeting was held via conference call

Attendees:

Carol Myers Flaute, Nebraska
Kari Burgert, Nebraska
Jesse Bradley, Nebraska

Catherine Jensen, Nebraska
Ivan Franco, Colorado
Chris Beightel, Kansas

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda (Attachment A)
 - Flaute amended task list item 9.c. to include 2016 and 2017 annual meeting reports, in addition to the 2018 report.
3. Review and Update Progress on Engineering Committee Task List
 - 3.1. Meet quarterly to review the tasks assigned to the committee.
 - This is the first quarterly Engineering Committee (EC) meeting for the 2019 reporting year
 - 3.2. Exchange by April 15, 2020, 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, 2020, the states will exchange any updates to these data.
 - No updates.
 - 3.3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
 - No updates.
 - 3.4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

- Nebraska distributed a handout (Attachment B) about the flood flow provisions at the August 22, 2019 Annual meeting, and later emailed both the first handout and a second handout (Attachment C) to Kansas and Colorado in preparation for this meeting. The second handout outlines a timeline for addressing this assignment before the 2020 annual meeting and introduces some conceptual options for how the flood flows procedures for Guide Rock could be adjusted to address the flood flows issue.
 - Bradley reviewed the options presented in the second handout. Beightel and Franco reported that Kansas and Colorado have not yet reviewed the second handout fully and have no specific questions at this time. Nebraska requested that Kansas and Colorado complete their reviews and provide feedback within the next 45 days.
 - Bradley outlined that the next steps for completing this assignment are 1) to try to reach an agreement that the intent of the flood flows accounting procedure is not currently being met for the Guide Rock accounting point, then 2) to reach agreement on how the three states want the procedure to work conceptually, and 3) work on developing procedures. Once Nebraska receives input from the other states on the conceptual options presented, Nebraska can begin drafting technical details for the EC to review.
 - Franco noted that he appreciates the additional clarity provided at this meeting about Nebraska's proposed approach for this task.
 - **Action item: Kansas and Colorado will send Nebraska comments and guidance on which alternative or intention the other states would like to see the handling of flood flows, within 45 days.**
- 3.5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
- KS is still working on incorporating NE comments.
 - **Action item: KS will send out document for review when all comments have been incorporated.**
- 3.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
- Nebraska, reported that NBID has submitted a WaterSMART grant with the Bureau of Reclamation for automation of headgates at Guide Rock. FCID has received a grant from WaterSMART for automation of the Meeker-Driftwood canal system, and Nebraska has also committed about \$2 million from the settlement with Colorado to supporting this project.
 - Kansas reported KBID is continuing the burying of lateral pipes in the district using existing WaterSMART grants.

- Colorado had no updates at this time.
- 3.7. Continue development and maintenance of the RRCA administrative website (www.republicanriver.org) that serves as an informational page for the public and provide regular updates to the EC.
- No website committee members were present. Flaute pointed out that only the 2017 annual report is currently on the administrative site, and that the administrative site currently links to the technical site for all other reports; however, the technical data sharing site (<http://www.republicanrivercompact.org/>) does not have any reports after 2016. All EC members agreed that the preference would be to have the reports on the administrative site rather than on the technical site.
 - **Action item: Nebraska's website team member will reach out to Chelsea (Kansas) to work on adding the annual reports to the administrative site.**
- 3.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
- No updates.
- 3.9. Prepare the 2019 RRCA annual meeting (KS) report.
- 3.9.1. Status of meeting summary for November 6, 2018, Special Meeting (KS)
- Kansas expects to be sending out November 6th meeting summary to the other states soon.
- 3.9.2. Status of meeting summary for August 22, 2019, Annual Meeting (KS)
- Kansas is expecting the transcript shortly, and after they review it, they will send it to both Nebraska and Colorado at the same time for their reviews.
- 3.9.3. Reminder to distribute 2016–2018 RRCA annual meeting reports to President of the United States and Federal agencies (KS), and State Governors (CO, KS, and NE)
- Nebraska has not sent any reports after the 2015 annual meeting report to the Nebraska Governor and wants to make sure that all reports have been sent to the President's office and all federal agencies that normally get it. In the past, the annual meeting host state has sent annual reports to the President and federal agencies, and all states have sent the reports to their own Governor and any other in-state recipients. Flaute asked the other states to verify whether they have already sent reports for the 2016–2018 annual meetings to the President and federal agencies. A suggestion was made to use RRCA letterhead to create one letter, to be emailed simultaneously to all state and federal recipients, and that the letter will direct all agencies to the website to download the reports. All states agreed. Nebraska will draft the

letter for the EC to review. Following EC review, identification of which state and federal contacts have not yet received the 2016–2018 annual meeting reports, upload of the 2016–2018 annual reports to the administrative website, the letter will be emailed to the appropriate recipients.

- **Action item: Colorado will verify whether they already sent the 2016 and 2017 annual meeting reports to President and federal agencies, and Kansas will verify the same for the 2018 annual report.**
- **Action item: Nebraska will draft a letter to the President and to federal and state agencies, on RRCA letterhead, to provide a link for where to download the 2016–2018 annual meeting reports.**

4. Summary of Meeting Actions/Assignments

- Kansas and Colorado will send comments and guidance to Nebraska on which alternative or intention the other states would like to see the handling of flood flows, within 45 days.
- KS will send out Accounting Procedure documentation memorialization document for review when all comments have been incorporated.
- Nebraska's website committee representative will contact Chelsea (Kansas) to work on updating the annual reports on the administrative site.
- Kansas will provide a summary of the November 6, 2018, Special Meeting to the other states when it is ready.
- Kansas will send out the draft transcript of the 2019 Annual Meeting to both Colorado and Nebraska after their initial review.
- Colorado will verify whether they already sent the 2016 and 2017 annual meeting reports to President and federal agencies, and Kansas will verify the same for the 2018 annual report, and both will verify whether they have already sent the 2016–2018 reports to their states' governors NE will send the 2016–2018 annual reports to Nebraska Governor and related offices.

5. Future Meetings

5.1. Next meeting is January 16, 2020 at 1:30 pm

6. Adjournment 1:35 PM Central

AGENDA for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
October 10, 2019 1:00 PM Central Time

Desktop Share info: <https://zoom.us/j/106882033>

Call in #: 720 707 2699

Meeting ID: 106 882 033

1. Introductions
 2. Review/Modify Agenda
 3. Review and Update Progress on Engineering Committee Task List (Below agenda items)
 4. Summary of Meeting Actions/Assignments
 5. Future Meetings
 - a. Q2 – January 16, 2020, 1:30 pm
 - b. Q3 – April 16, 2020, 1:30 pm
 - c. Q4 – July 23, 2020, 1:30 pm
 6. Adjourn
-

ENGINEERING COMMITTEE TASK LIST

1. Meet quarterly to review the tasks assigned to the committee.
2. Exchange by April 15, 2020, 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, 2020, the states will exchange any updates to these data.
3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.
5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
9. Prepare the 2019 RRCA annual meeting (KS) report.
 - a. Status of meeting summary for November 6, 2018, Special Meeting (KS)
 - b. Status of meeting summary for August 22, 2019, Annual Meeting (KS)
 - c. Reminder to distribute 2018 RRCA annual meeting report to President of the United States and Federal agencies (KS), and State Governors (CO, KS, and NE)

Overview:

Preliminary 2019 accounting results suggest the RRCA accounting will need to employ procedures for addressing “flood flows” as described in the Final Settlement Stipulation (FSS) and Accounting Procedures and Reporting Requirements (Accounting Procedures). This will be the first time that the Accounting Procedures have needed to account for flood flows since the implementation of the FSS and Accounting Procedures. Streamflow data indicate that the flood flow trigger for the Main Stem at the Hardy gage was met at the end of July. Flood flow adjustments are also expected to occur in the Sappa Creek and Prairie Dog Sub-basins in 2019 based on current streamflow projections. In developing updated accounting estimates of the impacts of these flood flows, NeDNR staff recognized that an oversight appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock. Under the current methods, gains between Guide Rock and Hardy are subtracted from the above Guide Rock allocation when flood flows are present on the Main Stem. This apparent accounting oversight causes Guide Rock allocations to decrease after the flood flow threshold is met and could result, in extreme conditions, in producing negative allocations for the above Guide Rock portion of the Main Stem (Figure 1).

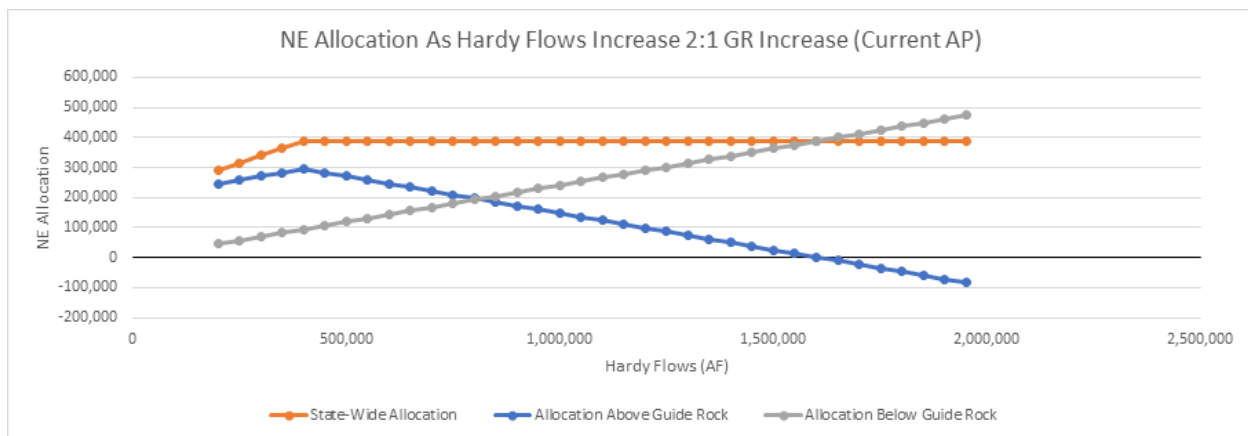


Figure 1: Results based on current Accounting Procedures when streamflow gains downstream of Guide Rock

Application of the flood flow adjustment would typically result in establishing an upper limit of allocations that the state will receive within that sub-basin once the flood flow threshold has been reached. The Accounting Procedures describe the methods used to apply the flood flow adjustment and the application of the flood flow adjustment in the accounting spreadsheet appears to conform to the methods outlined in the Accounting Procedures for all state-based tests with the exception of the Table 5C and Table 5D tests for the sub-basin upstream of Guide Rock. The result of applying the flood flow adjustment to the Table 5C and Table 5D tests seems inconsistent with the flood flow adjustment methods applied to other state-based tests and creates an unexpected result in which the allocation above Guide Rock in the Table 5C and 5D tests can be reduced as streamflow continues to accrue downstream. No other sub-basin allocations are reduced in this manner, and it appears this adjustment is inconsistent with the intent of the flood flow procedures and may not have been fully contemplated in the development of the Accounting Procedures.

Background of FSS and Accounting Procedures:

Flood flows are defined in the FSS and Accounting Procedures as follows:

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 the RRCA Accounting Procedures, Subsection III.B.1.;

Additionally, the Accounting Procedures also describe the method used to determine when flood flows occur and how they are to be adjusted from the Main Stem Virgin Water Supply to calculate the computed water supply. The following is an excerpt from the May 25, 2017 version of the Accounting Procedures (page 14).

1. Flood Flows

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

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

Additionally, the Accounting Procedures describe the methods used to determine the computed water supply between Guide Rock and Hardy and above Guide Rock. The following is an excerpt from the Accounting Procedures (page 19).

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.

Calculations contained in the current accounting spreadsheet attempt to implement the above method but appear to fail in connecting the flood flow adjustment with these calculations of the allocation above Guide Rock. This is evidenced by the fact that as streamflows increase from Guide Rock to Hardy, the results indicate a reduction of allocation above Guide Rock, which is inconsistent with results when adjustments are made to the entire Main Stem or the sub-basins. Therefore, it appears that the allocation above Guide Rock is being modified differently than other allocations and the specific methodology for making the flood flow adjustment at this location does not seem to have been fully contemplated in the Accounting Procedures.

Example of the Issue:

Three examples of the impacts on the allocation above Guide Rock are illustrated below. Example one establishes the allocation above Guide Rock as the flood flow threshold is reached. The second example illustrates that the allocation above Guide Rock is unchanged as the flood flow threshold is exceeded and the same amount of streamflow travels past both Guide Rock and Hardy. The third example illustrates how the allocation above Guide Rock decreases as streamflow continues to accrue in the Guide Rock to Hardy reach (downstream of Guide Rock). This third example is the typical characteristic of the sub-basin downstream of Guide Rock.

Example 1 – Flood Flow Threshold Met

(415,300 AF streamflow at Hardy and 300,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	334,763

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 2 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with the same amount of increased flow at Guide Rock

(535,300 AF streamflow at Hardy and 420,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	334,763

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 3 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with a lower amount of increased flow at Guide Rock (80,000 AF)

(535,300 AF streamflow at Hardy and 380,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	73,057	315,203

*Excerpt from Table 5C. These same values are included in Table 5D.

In Example 2, the same amount of additional streamflow is added to both the Hardy and Guide Rock gages. With the streamflow increase being the same at both locations, the resulting allocation above Guide Rock is unchanged. In Example 3, additional streamflow is added to Hardy and Guide Rock, but the increase at Guide Rock (80,000 AF) is less than the increase at Hardy (120,000 AF). The resulting allocation above Guide Rock is reduced by 19,560 AF $[0.489 * (120,000 - 80,000)]$ even as the amount of streamflow traveling past Guide Rock increases by 80,000 AF. This result is driven by additional allocation accruing downstream of Guide Rock as the streamflow term increases between Guide Rock and Hardy. Thus, as can be seen from Example 3, for every two acre-feet of flow past Hardy that does not flow past Guide Rock, the allocation above Guide Rock is reduced by approximately one acre-foot. This impact on the allocation appears to be erroneous, inconsistent with other sub-basin adjustments implemented in the Accounting Procedures, and not fully contemplated in the Accounting Procedures.

Proposed Path Forward:

Nebraska seeks concurrence from the RRCA Commissioners that the principle issue requires resolution to be in conformance with the intent of the FSS and Accounting Procedures and that an assignment be made to the RRCA Engineering Committee to recommend an appropriate solution to the commissioners prior to the 2020 Annual Meeting.

September 9, 2019

RRCA Engineering Committee Assignment: Review Flood Flow Provisions of the RRCA Accounting Procedures

OVERVIEW OF TASK

At the RRCA annual meeting working session Nebraska reviewed a memorandum provided to the Engineering Committee (EC) on August 19, 2019 in which concern related to a flood-flow accounting issue was identified. The memorandum provided by Nebraska explained the unexpected behavior of the allocation above Guide Rock due to mainstem flood-flow adjustments. Based on these discussions the RRCA agreed to establish the following assignment for the EC:

Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

PROPOSED TIMELINE FOR COMPLETION

The EC assignment was adopted by the RRCA at the annual meeting on August 22, 2019. The assignment must be completed in time for the 2019 accounting to be approved at the 2020 RRCA Annual Meeting. Nebraska is proposing the following subtasks and timeline for this assignment:

- October 2019: EC discuss current accounting provisions and establish conceptual understanding of how Guide Rock allocation should behave when flood flows occur in the mainstem
- January 2020: EC review and discuss potential accounting procedure changes needed to accommodate expected behavior of Guide Rock allocation.
- April 2020: EC discuss and agree to specific draft changes to Accounting Procedures methods
- July 2020: EC implement agreed upon changes in conjunction with completion of 2019 accounting
- August 2020: Recommend updated Accounting Procedures and final 2019 accounting for approval by RRCA

Since there are no specific instructions in the FSS or the Accounting Procedures about how to handle flood flows at the Guide Rock gage nor to the allocation above Guide Rock, we are proposing to start with conceptual agreement about how to apply the flood-flow adjustment. Once a conceptual agreement has been reached we will then work to make the necessary modification to the Accounting Procedures and accounting spreadsheet conform to the agreed upon concepts and implement those changes in performing final 2019 accounting.

GUIDE ROCK FLOOD-FLOW ADJUSTMENT OPTIONS

Guide Rock flood flows are not defined in the Accounting Procedures, and unlike other accounting sub-basins, no Guide Rock flood flow threshold has been established. Conceptually, the Accounting Procedures should define when Guide Rock Flood Flows should be applied and the method of determining the appropriate threshold or limit on stream flows. Nebraska has provided fictional examples in Figure 1 for purposes of furthering this conceptual conversation.

September 9, 2019

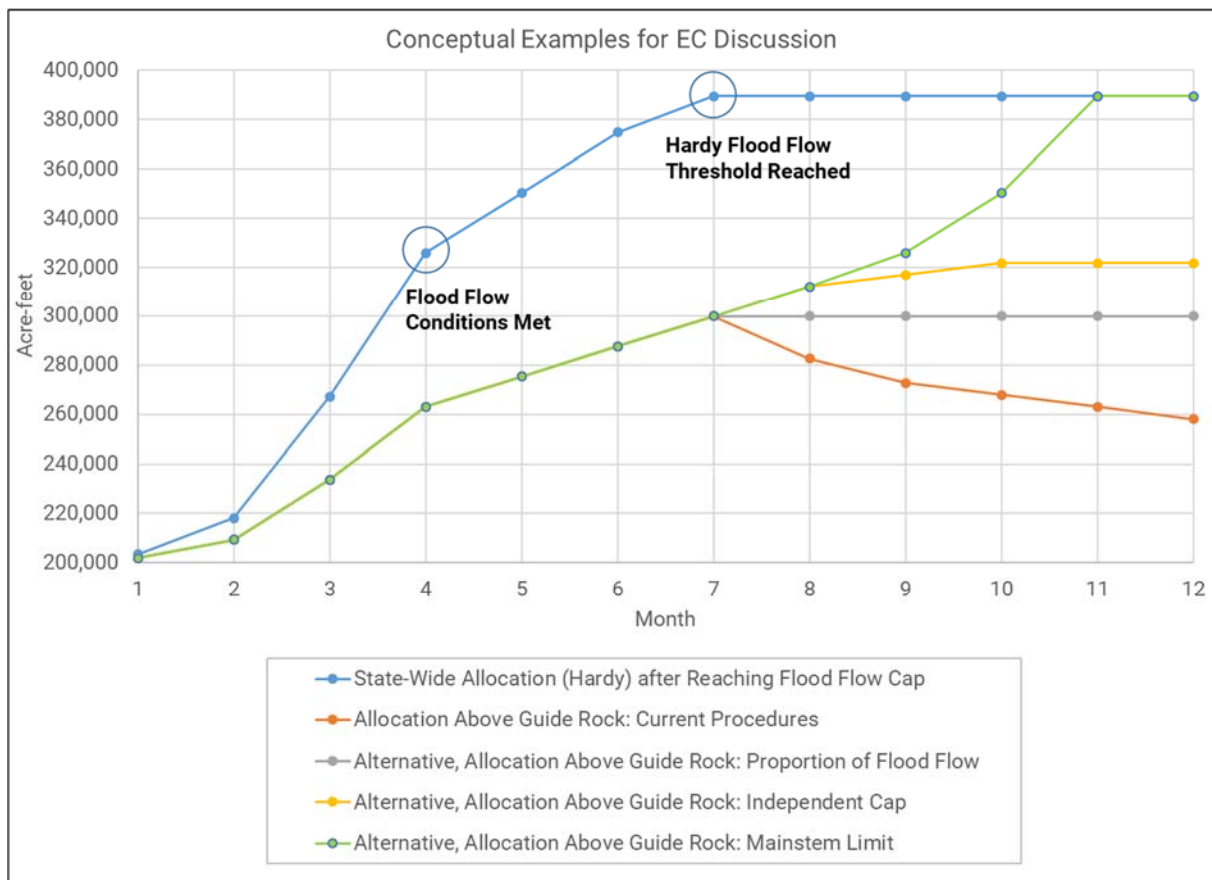


Figure 1. Conceptual examples of above Guide Rock behavior for Discussion with EC

Meeting Minutes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION

January 16, 2020, 1:30 PM Central Time

Meeting was held via Conference call

Attendees:

Carol Myers Flaute, Nebraska

Jesse Bradley, Nebraska

Kari Burgert, Nebraska

Catherine Jensen, Nebraska

Ivan Franco, Colorado

Chris Beightel, Kansas

Chelsea Erickson, Kansas

Ginger Pugh, Kansas

Willem Schreüder, Principia Mathematica

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda (Attachment A)
3. Approval of Minutes October 10, 2019
 - 3.1. Nebraska has sent the draft minutes to Kansas and Colorado.
 - 3.2. Action item: All states will review the October minutes and approve them through email.**
4. Review and update progress on engineering committee task list
 - 4.1. Meet quarterly to review the tasks assigned to the committee.
 - This is the second quarterly meeting for the 2019 reporting year.
 - 4.2. Exchange by April 15, 2020, 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, 2020, the states will exchange any updates to these data.
 - Nebraska has started to request data from Irrigation Districts, Power Companies and the Bureau of Reclamation. Kansas and Colorado did not have any updates.
 - 4.3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
 - No states had any updates at this time.

4.4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

- Kansas sent an email (Attachment B) in response to Nebraska's preliminary proposal for how to address the flood flows accounting issue. Beightel brought up a scenario showing how Nebraska's preliminary proposal could result in a negative allocation below Guide Rock. Kansas is asking Nebraska and Colorado if they concur that this is an issue. Kansas has offered an alternative proposal and asked Nebraska to review the email and see if there is agreement on whether there is a problem with the original proposition and if so, whether the Kansas proposal is the way to address it. Nebraska will need more time to consider.
- **Action item: Nebraska will aim to review Kansas proposal on flood flow proportioning by the Three-States meeting.**

4.5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.

- Kansas is still working on incorporating Nebraska comments.
- **Action item: Kansas will send out document with Nebraska comments to Colorado.**
- **Action Item: Kansas will send out document for review to all states when all comments have been incorporated.**

4.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.

- No state had any updates at this time.

4.7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.

- Annual reports from 1960 to 2017 are now on the administrative website (republicanriver.org). There are two reports that not uploaded due to technical difficulties, but Chelsea (Kansas) will continue to work on those. When the next annual meeting (August 20 - 21, 2020) has more details, Nebraska will send the info to Kansas to update the website. Kansas reported that the domain name subscription has been renewed through 2024.

- **Action item: Catherine (Nebraska) will send Chelsea (Kansas) more info on the 2020 Annual Meeting as information is available.**
- **Action item: Chelsea (Kansas) will continue work on uploading the rest of the Annual reports to the website.**

4.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

- Willem reported that the EC tool has been updated to test the flood flow scenarios. Kansas noted that the tool has been helpful in working through the flood flow proposals.

4.9. Prepare the 2019 RRCA annual meeting (Kansas) report.

- a. Status of meeting summary for November 6, 2018, Special Meeting (Kansas)
 - Kansas is close to sending meeting summary to group.
- b. Status of meeting summary for August 22, 2019, Annual Meeting (Kansas)
 - Kansas is still working on getting transcript from the transcriptionist and is hopeful that they will have that soon and be able to get meeting summary created and sent to other states in time to approve the Annual Report at the 2020 Annual meeting.
- c. Reminder to distribute 2016-2018 RRCA annual meeting report to President of the United States and Federal agencies (Kansas), and State Governors (Colorado, Kansas, and Nebraska)
 - Letterhead image from Kansas has been sent out to all states. Nebraska will work on getting a draft of the letter to distribute to the three states for approval that will come from the RRCA. The question of who signs communications from RRCA will be brought up at the Three-States meeting.
 - **Action item: Nebraska will create a draft of the letter to state and federal agencies that receive the Annual Report.**

5. Summary of Meeting Actions/Assignments

- Kansas, Colorado, and Nebraska will review the October minutes and send edits and approval of them through email.
- Nebraska will aim to review Kansas proposal on flood flow proportioning by the Three-States meeting.
- Kansas will send out Accounting Procedure documentation memorialization document with Nebraska comments to Colorado.
- Kansas will send out Accounting Procedure documentation memorialization document for review to all states when all comments have been incorporated.
- Nebraska will send Kansas more info on the 2020 Annual Meeting as information is available.

- Kansas will continue work on uploading the rest of the Annual reports to the website.
- Nebraska will create a draft of the letter to state and federal agencies that receive the Annual Report.

6. Future Meetings

- a. Q3 – April 16, 2020, 1:30 pm (Central Time)
- b. Q4 – July 23, 2020, 1:30 pm (Central Time)
- c. Annual Meeting – August 20th and 21st in McCook, Nebraska

7. Adjournment: 2:02 PM Central

AGENDA for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
January 16, 2020 1:30 PM Central Time

Desktop Share info: <https://zoom.us/j/656444668>

Call in #: 720 707 2699

Meeting ID: 656 444 668

1. Introductions
2. Review/Modify Agenda
3. Approval of Minutes
 - a. October 10, 2019
4. Review and update progress on engineering committee task list (Page 2)
5. Summary of Meeting Actions/Assignments
6. Future Meetings
 - a. Q3 – April 16, 2020, 1:30 pm (Central Time)
 - b. Q4 – July 23, 2020, 1:30 pm (Central Time)
 - c. Annual Meeting – August 20th and 21st McCook, NE
7. Adjourn

ENGINEERING COMMITTEE TASK LIST

1. Meet quarterly to review the tasks assigned to the committee.
 - a. Upcoming meeting April 16, 2020.
2. Exchange by April 15, 2020, 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, 2020, the states will exchange any updates to these data.
3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.
5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
9. Prepare the 2019 RRCA annual meeting (KS) report.
 - a. Status of meeting summary for November 6, 2018, Special Meeting (KS)
 - b. Status of meeting summary for August 22, 2019, Annual Meeting (KS)
 - c. Reminder to distribute 2016-2018 RRCA annual meeting report to President of the United States and Federal agencies (KS), and State Governors (CO, KS, and NE)

From: [Beightel, Chris \[KDA\]](#)
To: [Flaute, Carol](#); "ivan.franco@state.co.us" (ivan.franco@state.co.us)
Cc: [Barfield, David \[KDA\]](#); [Burgert, Kari](#); [Bradley, Jesse](#); [Erickson, Chelsea \[KDA\]](#); [Perkins, Sam \[KDA\]](#); [Pugh, Ginger \[KDA\]](#); [Cao, Hongsheng \[KDA\]](#)
Subject: RE: Flood flows memorandum from Nebraska
Date: Thursday, January 16, 2020 8:55:06 AM
Attachments: [image001.png](#)
[image003.png](#)

Hi All;

In our review of Nebraska's December 3, 2019 memorandum proposing to change how flood flows are treated in the RRCA Accounting, Kansas has identified a concern with how Nebraska's proposal to adjust flood flows in the Mainstem Guide Rock to Hardy reach affects the allocations in that reach, and by extension the allocations above Guide Rock.

The problem we've identified occurs when most or a large portion of the flood flows originate above Guide Rock. In such a scenario, the proposal to reduce the Guide Rock to Hardy CWS by the entire amount of the flood flows can end up distorting where the allocation is generated such that the Guide Rock to Hardy allocation is inappropriately adjusted.

The example of this behavior can be seen in the latest preliminary 2019 accounting developed by Willem Schreüder (see [here](#)). Implementing Nebraska's December 3, 2019 proposal, the preliminary accounting shows the CWS below Guide Rock is -67,510 AF resulting in an allocation to Nebraska of -33,012 AF. In this case, the WSY accounting in Table 5C would, by subtracting the Guide Rock to Hardy allocation, increase Nebraska's allocation above Guide Rock by 33,012 AF. This does not seem reasonable.

A possible alternative is to develop a method to parse where, above or below Guide Rock, the flood flows originate and make the respective adjustments to each reach. We haven't thoroughly thought through a method for doing this but we envision it might assign the flood flows according the ratio of the flows at Guide Rock to the flows at Hardy.

In 2019, according to Dr. Shreüder's latest preliminary accounting, flows at Guide Rock were 502,276 AF, and flows at Hardy were 625,783 AF. Main stem flood flows were determined to be 184,496 AF. If the simple ratio was used, then, for the purpose of Table 5C and Table 5D, we would adjust the

above Guide Rock reach by $184,496 \text{ AF} \times \frac{502,276 \text{ AF}}{625,783 \text{ AF}} = 148,083 \text{ AF}$ then the Guide Rock to Hardy reach would be adjusted by $184,496 \text{ AF} - 148,083 \text{ AF} = 36,412 \text{ AF}$. The CWS would then be reduced to $116,990 \text{ AF} - 36,412 \text{ AF} = 80,578 \text{ AF}$ and Nebraska's allocation of that that would be $.489 \times 80,578 \text{ AF} = 39,402 \text{ AF}$. This demonstration is for discussion and illustration purposes only. As I mentioned above, we haven't fully thought through this, but we're concerned the current Nebraska proposal's potential to generate negative allocations is problematic.

Incorporating the above method into Nebraska's December 3, 2019 proposal yields (changes in highlight):

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = S NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

$$= \left(\frac{\text{Hardy Flows} - \text{Guide Rock Flows}}{\text{Hardy Flows}} \right) \times \text{Mainstem Flood Flow Adjustment}$$

~~CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - Main Stem Flood Flow Adjustment~~

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow - Guide Rock gaged streamflow - Total Bostwick returns

Let us know what you think.

Chris

Chris Beightel, P.E.
Program Manager
Water Management Services
Division of Water Resources
Kansas Department of Agriculture
1320 Research Park Drive
Manhattan, KS 66502
(785) 564-6659
chris.beightel@ks.gov

From: Flaute, Carol <carol.flaute@nebraska.gov>
Sent: Tuesday, December 3, 2019 3:55 PM
To: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; 'Ivan.Franco@state.co.us' <Ivan.Franco@state.co.us>
Cc: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; Barfield, David [KDA] <David.Barfield@ks.gov>; Beam, Mike [KDA] <Mike.Beam@ks.gov>; Don Blankenau <don@aqualawyers.com>; Grother, Brittney [KDA] <Brittney.Grother@ks.gov>; Jasper Fanning <jasperfanning@urnrd.org>; Fassett, Jeff <jeff.fassett@nebraska.gov>; Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Kate Greenberg <kate.greenberg@state.co.us>; Kevin Rein <kevin.rein@state.co.us>; Lavene, Justin <Justin.Lavene@nebraska.gov>; Letourneau, Lane [KDA] <Lane.Letourneau@ks.gov>; Lewis, Earl <Earl.Lewis@kwo.ks.gov>; mike.sullivan@state.co.us; Scott Steinbrecher <Scott.Steinbrecher@coag.gov>; Titus, Kenneth [KDA] <Kenneth.Titus@ks.gov>; Tom Riley <triley@flatwatergroup.com>; Tom Wilmoth <tom@aqualawyers.com>; Goff, Katie <Katie.Goff@kwo.ks.gov>; cscott@usbr.gov; Burgert, Kari <kari.burgert@nebraska.gov>; Schellpeper, Jennifer <jennifer.schellpeper@nebraska.gov>; Willem Schreuder <willem@prinmath.com>
Subject: Flood flows memorandum from Nebraska

EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Chris and Ivan,

Before Friday's 3-States meeting, please read the attached memorandum from Nebraska describing

proposed revisions to the flood-flow accounting methodology. We will plan to discuss this memorandum at Friday's meeting.

Carol J. Myers Flaute

INTEGRATED WATER MANAGEMENT COORDINATOR

Nebraska Department of Natural Resources

301 Centennial Mall South

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Meeting minutes for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
April 16, 2020 1:30 PM Central Time

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS	Carol Myers Flaute, NE
Kari Burgert, NE	Ivan Franco, CO
David Engelhaupt, KS	Lizzie Hickman, KS
Chelsea Erickson, KS	Sam Perkins, KS
Elizabeth Esseks, NE	Willem Schreüder, CO

Agenda Items and Notes:

1. Introductions
 - 1.1. The meeting started at approximately 1:35 PM CT. Carol said that the meeting was being recorded for notetaking purposes only, and the recording will be deleted once minutes are final.
2. Review/Modify Agenda
 - 2.1. Chris said that there were no changes from Kansas.
3. Approval of Minutes
 - 3.1. October 10, 2019 meeting minutes were sent out for review. Chris and Ivan confirmed that the minutes are OK.
 - 3.1.1. **Action Item: Nebraska will format the October 10, 2019, minutes as final and send them back out to Kansas and Colorado.**
 - 3.2. January 16, 2020 meeting minutes were distributed for review on Tuesday. Chris and Ivan both indicated that they are fine with the minutes.
 - 3.2.1. **Action Item: Nebraska will format the January 16, 2020, minutes as final and send them back out to Kansas and Colorado.**
4. Review and update progress on engineering committee task list.
 - 4.1. Meet quarterly to review the tasks assigned to the committee.
 - 4.1.1. The next meeting is scheduled for July 23, 2020.
 - 4.1.2. The working session after that is scheduled for August 20, and Annual Meeting will be August 21, 2020.
 - 4.1.2.1. Tentatively plan for 2 PM working session on August 20, and 9 AM start time on August 21 for Annual Meeting.
 - 4.1.2.2. Nebraska is working on details for lodging in McCook for the Annual Meeting. Nebraska will ask the 3-states group on Monday, April 20, 2020, about proposed meeting times and whether they want to schedule a 3-states meeting in conjunction with the Annual Meeting.
 - 4.1.2.3. **Action item: Nebraska will ask at 3-states meeting on Monday, April 20, about meeting times in August, and whether the commissioners want to schedule a 3-states meeting during that time.**
 - 4.1.3. The meeting after that will likely be in October 2020.

- 4.2. Exchange by April 15, 2020, 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, 2020, the states will exchange any updates to these data.
- 4.2.1. Kansas and Nebraska emailed data yesterday (April 15, 2020).
- 4.2.2. Colorado data was finalized earlier, and final data was sent late yesterday (April 15, 2020).
- 4.2.3. No problems were reported. The next step is to review the data and each state will finalize its own data by July 15, 2020.
- 4.2.4. Willem is hoping to do an initial cut at accounting with Kari and complete a cross-check in the next week or two. Kari said she hopes to get to these tasks soon, also.
- 4.2.4.1. Action item: Willem and Kari will do an initial cut at accounting.**
- 4.2.5. Kari discussed an issue with Attachment 7. In 2019, federal canals in Nebraska did have non-irrigation season diversions (recharge diversions) with no deliveries. This past year was the first time this process was used. The diversions are listed separately in Attachment 7 (irrigation season diversions and non-irrigation season diversions). The formulas for the inputs tab were not including non-irrigation season diversions, so Kari updated the inputs tab formulas to include both irrigation and non-irrigation season diversions.
- 4.2.5.1. Action item: Colorado and Kansas will look at the modified inputs tab when Kari sends out the accounting spreadsheet, and let her know if the combined inputs is acceptable or if the inputs should be separated.**
- 4.2.5.2. Willem indicated that he updated his spreadsheets, also.
- 4.2.5.3. Chris asked if Kari will propose to change Attachment 7 and add another line on the inputs tab. Kari said that in the past, the accounting packet has included Attachment 7, and the information is already separated out in Attachment 7 (irrigation season and non-irrigation season diversions).
- 4.2.6. Willem had another question on Attachment 7. Kansas and Nebraska agree on diversions and deliveries. However, Nebraska reported 2427 acre-ft in Courtland Canal spills from Lovewell, but Kansas did not report any spills. Willem asked Sam to double-check to see if that information was omitted.
- 4.2.6.1. Action item: Kansas will check to see if they agree with Nebraska reporting of Courtland Canal spills.**
- 4.2.7. Harlan County Lake evaporation split
- 4.2.7.1. Kari did not include the Harlan County Lake evaporation split estimate in the exchange data this year. The accounting procedures indicate that estimates for the evaporation split between Kansas and Nebraska will be made based on diversions by NBID and KBID during the time irrigation releases are being made from Harlan County Lake. In 2019 there were no irrigation releases from Harlan County Lake, only flood releases. For a year with no irrigation releases, the annual net evaporation charges to Kansas and Nebraska are based on the average of the calculation of the most recent 3 years in which irrigation releases from Harlan County Lake were made (section IV.A.2.e)(1), page 25 of Accounting Procedures). Kari asked if Kansas has thought about this, and whether the approach she proposed is acceptable.**
- 4.2.7.1.1. Action item: Kansas will look at accounting procedures related to Harlan Co Lake evaporation split for a year with no irrigation releases, and reply back to Nebraska.**
- 4.2.8. Review Flood Flow provisions assignment of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify

the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

- 4.2.8.1. The last discussion about flood flow provisions was at the 3-states meeting. After that conversation, it became clear that more discussion is needed to reach agreement.
- 4.2.8.2. Carol proposed setting this issue aside since the 2019 accounting is not affected and further discussion is needed. She proposed adding a footnote to the accounting procedures, describing how there is an issue that needs to be resolved.
- 4.2.8.3. Chris agreed to this proposal.
- 4.2.8.4. Chelsea proposed to incorporate a written explanation into the document memorializing accounting procedures changes. The group needs to reach agreement on what will go into footnote.
- 4.2.8.5. Action item: Nebraska will propose to set the flood flow provisions issue aside at the 3-states meeting on Monday, April 20, 2020. If that is agreeable, Nebraska will draft language to address the issue, including Chris's email from October 2019, regarding splitting flood flows at Guide Rock, to be included in the document memorializing accounting procedures changes.**

4.2.9. Willem mentioned that there are inconsistencies regarding what accounting procedures were agreed to and what is in the spreadsheet being used. The accounting procedures refer to computed water supply, but the column in the spreadsheet refers to virgin water supply (Attachment 6). There might be an issue with translating the accounting procedures to the spreadsheet. It might be good to mention this in the footnote, also.

- 4.2.9.1. Action item: Nebraska will propose at the 3-states meeting on April 20, 2020, to include in the document memorializing accounting procedures changes Willem's observation about how accounting procedures refer to computed water supply but the spreadsheet uses virgin water supply. If this is approved, Nebraska will draft language about this issue to be included in the document memorializing accounting procedures changes.**

4.3. Continue working on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.

4.3.1. Chelsea reported that there was no significant progress on the document in past few months. Kansas aims to have a complete draft by July meeting so it can be reviewed and approved at the Annual Meeting.

- 4.3.1.1. Action item: Kansas will send out a draft of the document memorializing accounting procedures changes prior to the July 23, 2020, EC meeting so it can be reviewed prior to the August 20, 2020, Annual Meeting.**

4.4. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.

4.4.1. Willem reported that CCP delivered more than 5000 acre-ft in the first three months, and they are anticipating additional releases (another 3000). He anticipates an over-delivery of more than 1000 acre-ft, which will make overall management easier

4.4.2. Kansas reported that there is nothing new.

4.4.3. Carol reported on the Frenchman Cambridge Irrigation District project to automate the Meeker/Driftwood canal system. Nebraska is finalizing a project with Middle Republican NRD to upgrade water meters in the District's quick response area to provide real-time telemetry (funded by WRCF). NBID was awarded a WaterSmart grant to work on the headgates of the Courtland/Superior canals. Kansas is also helping fund the NBID project.

- 4.4.3.1. Action item: Nebraska will check on who has access to telemetry data for MRNRD water meter project, and report back to the group.**

4.5. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.

- 4.5.1. Nebraska is looking at times for the Annual Meeting, proposing 2 PM for the August 20 working session, and 9 AM for the August 21 Annual meeting. Carol will send dates, times, and locations to Chelsea when those are final.

- 4.5.1.1. Action item: Nebraska will send Chelsea annual meeting details when they have been finalized to put on the RRCA website.**

- 4.5.2. Chelsea reported that the annual reports from 2005 and 2014 will not load to the website. She is working with a person in her office on this problem.

- 4.5.2.1. Action item: Kansas will continue to investigate why the 2 annual reports will not load to the RRCA website.**

- 4.6. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

- 4.6.1. Willem reported that he and Kari worked on Attachment 7 (irrigation vs non-irrigation season diversion issue).

- 4.7. Prepare the 2019 RRCA annual meeting report (KS)

- 4.7.1. Status of meeting summary for November 6, 2018 special meeting (KS)

- 4.7.1.1. Chelsea emailed draft minutes to Colorado and Nebraska yesterday. Nebraska provided clarification on several questions Chelsea had, and will submit comments and edits by email.

- 4.7.1.2. Action item: Colorado and Nebraska will send comments to Chelsea on draft minutes for November 6, 2018, special meeting.**

- 4.7.2. Status of meeting summary for August 22, 2019, Annual Meeting (KS)

- 4.7.2.1. Update from Chris: They were unable to get a transcript from the court reporter from that meeting until this week. They received a plain text file of the rough draft that includes numbers instead of the names of people who were speaking. Kansas will add the names to the transcript and then send out the draft to Colorado and Nebraska to get name changes and other edits. After that round of editing, the draft will be sent back to the court reporter to get a final legally approved version of the transcript. Chris proposed that if the court reporter does not return the corrected draft promptly, the group consider using the revised draft of the transcript that was sent back to the court reporter as the final draft. Carol suggested waiting to see if the final transcript is received back from the court reporter before making a decision on Chris's proposal.

- 4.7.2.1.1. Action item: Kansas will send a draft transcript to Colorado and Nebraska from the August 22, 2019, Annual Meeting.**

- 4.7.3. Distribute 2016-2018 RRCA annual meeting reports to the President of the United States and Federal agencies (KS) and State Governors (CO, KS, and NE)

- 4.7.3.1. Nebraska has been working on a letter to be emailed jointly by the 3 states to the relevant contacts. The draft will be circulated to Colorado and Kansas to review before the Annual Meeting. The commissioners want to sign the letter at the Annual Meeting.

- 4.7.3.2. Action item: Nebraska will circulate a draft of the letter to accompany the 2016 - 2018 annual reports before the July meeting to be signed at the Annual Meeting.**

- 5. Summary of Meeting Actions/Assignments: listed above in bold

- 6. Future Meetings

- 6.1. Q4 – July 23, 2020, 1:30 pm (Central Time)

6.2. Annual Meeting – August 20th and 21st McCook, NE

7. Adjourn:

7.1. The meeting ended at approximately 2:25 PM CT.

Meeting Minutes for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
July 23, 2020 1:30 PM Central

Meeting was held via Zoom meeting.

Attendees: draft

Chris Beightel KS
Kari Burgert, NE
Chelsea Erickson, KS
Elizabeth Esseks, NE

Carol Myers Flaute, NE
Ivan Franco, CO
Sam Perkins, KS
Willem Schreüder, CO

1. Introductions

1.1 The meeting started at approximately 1:31 PM CT.

2. Review/Modify Agenda

2.1 Chris asked about scheduling a meeting before the annual meeting to finish up the report. Ivan and Carol agreed that another meeting would be a good idea.

2.1.1 Action Item: Nebraska will send an invitation for an additional EC meeting to be held Wednesday morning, August 19, 2020.

3. Approval of minutes

3.1 April 16, 2020 meeting minutes were sent out earlier this week for review. Kansas did not have comments on the April meeting minutes. Ivan would like more time to review the April meeting minutes.

3.1.1 Action Item: Colorado will provide comments by email to Nebraska on the April meeting minutes.

3.1.2. Action Item: When the April meeting minutes are approved, Nebraska will format the April meeting minutes as final and send them back out to Kansas and Colorado.

4. Review and update progress on engineering committee task list

4.1 Meet quarterly to review the tasks assigned to the committee.

4.1.1 Task fulfilled. The EC will have additional meeting on August 19, 2020.

4.1.2 July meeting minutes will be turned around quickly.

4.1.3 A draft of the August meeting minutes will be written on August 19 and sent out to Colorado and Kansas as quickly as possible. Chris suggested limiting the agenda for the August meeting so minutes can be shorter and more focused.

4.2 Exchange by April 15, 2020, 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, 2020, the states will exchange any updates to these data.

- 4.2.1 Carol noted that Kansas submitted updates on June 22 and Nebraska submitted updates on July 15. There were no follow-up questions.
- 4.2.2 Colorado added CIR (Crop Irrigation Requirement) comparison on July 3, but the data did not change.

4.3 Finalize the 2019 accounting and recommend it for approval by the RRCA.

4.3.1 Data

4.3.1.1 All data are final (updates have been made).

4.3.1.2 Nebraska is working on a draft of the 2019 accounting for the EC report.

4.3.1.2.1 Action item: Nebraska will complete a draft of the 2019 accounting for the EC report, and will send it to Colorado and Kansas for review.

4.3.1.3 Willem did a comparison of Kari's data and the continuous accounting spreadsheet, and there were no discrepancies.

4.3.2 Flood Flows language

4.3.2.1 The EC needs agreement on Flood Flows language. Kansas and Nebraska agree on the current language; Colorado also agrees with the current language.

4.3.3 Harlan County Lake (HCL) evaporation split with no irrigation releases

4.3.3.1 Kari emailed a draft and asked for comments; she had not received comments prior to the meeting.

4.3.3.2 Chris found the reference in the Accounting Procedures and had questions about which diversions are being considered and how the previous three years were calculated. Kari sent an email to the group during the meeting with the calculations.

4.3.3.3 Carol said that HCL split will go into accounting as it is now, and then it can be amended if necessary.

4.3.3.3.1 Action item: Nebraska will incorporate the HCL evaporation split into accounting for 2019.

4.3.3.4 Sam proposed reviewing Nebraska's Attachment 7 in the future. Kari explained that she just copies over data from the Bureau, and there is no reason to do the same work twice.

4.4 Review the Flood Flows provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

4.4.1 Since the Flood Flows language is approved, it will be incorporated into the Accounting Procedures.

4.4.1.1 Action item: Nebraska will incorporate the approved Flood Flows language into the draft Accounting Procedures and send the draft to Colorado and Kansas for review.

4.4.2 The specific language in the assignment for this year may need to be changed; the group discussed what the assignment for next year should be to keep this assignment moving forward.

- 4.4.3 The group discussed whether to fill out Table 5c or leave it blank. Ivan said that filling out the table seemed more consistent with the assignment. Willem suggested adding a footnote in Table 5c directing people to the footnote in Table 6 for additional information.
 - 4.4.3.1 Action item: Nebraska will fill out Table 5c for 2019 accounting and add a footnote directing the reader to the footnote in Table 6 for additional information.**
- 4.5 Continue working on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
 - 4.5.1 Chelsea sent out new draft yesterday and offered to walk the group through outstanding issues.
 - 4.5.1.1 Carol and Ivan asked for more time to review and weren't sure they would be finished with their reviews before the RRCA annual meeting.
 - 4.5.1.1.1 Action item: Colorado and Nebraska will finish reviewing the new draft document memorializing changes in Accounting Procedures and send comments to Kansas.**
- 4.6 Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
 - 4.6.1 Chris reported on a strategy for evaluating water management effectiveness by isolating climactic effects from management effects.
 - 4.6.1.1 Sam gave a quick summary. He compared estimates based on annual precipitation for 2000–2017 baseline to actual numbers observed in 2018–2019. Significant savings were observed in Kansas from GMD 4's LEMA. He also did calculations for Nebraska and Colorado.
 - 4.6.1.2 Chris proposed that Sam send out data for review, and then have the committee talk about it at the first meeting after the annual meeting.
 - 4.6.1.2.1 Action item: at the first EC meeting after the RRCA annual meeting, Sam will present about his analysis methods to evaluate water management effectiveness and his results.**
 - 4.6.2 Willem reported on the Colorado Compliance Pipeline. It is still running and may continue through November and December. The projection on the pipeline for the year is approximately 9000 Ac-ft.
 - 4.6.3 Nebraska had no updates.
- 4.7 Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.
 - 4.7.1 The information about the annual meeting needs to be updated on the website.
 - 4.7.1.1 Action item: Nebraska will generate a draft annual meeting notice and send it to Colorado and Kansas for review.**
 - 4.7.1.2 Action item: When the annual meeting notice is final, Kansas will post it on the RRCA website.**
 - 4.7.2 Chelsea reported that she found a workaround to overcome previous technical difficulties in uploading the 2005 report to the website. She did upload the 2005 report today and is still working on the 2014 report, which is very large (the 2014 report was successfully uploaded after the meeting).

4.8 Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

4.8.1 Willem reported that he made quite a few changes related to accommodating splits on Attachment 7 for irrigation season versus non-irrigation season.

4.9 Prepare the 2019 RRCA annual meeting report (KS)

4.9.1 Chelsea reported that she received comments back from CO and NE on the November 2018 special meeting summary and August 2019 annual meeting transcript and summary. She is working on incorporating comments into those documents, and then she will put together the whole package as one document and will send it out for review.

4.9.1.1 Action item: Kansas will send out the 2019 annual report to Colorado and Nebraska for review.

4.9.2 Carol discussed the backlog of annual reports that need to be sent to state and federal entities under the Rules and Regulations of the RRCA. The 2015-2018 reports need to be sent. At a previous three-states meeting, the states agreed that instead of having states send to entities in their own states, the RRCA would send a letter by email on RRCA letterhead, with all three commissioners' signatures, to all parties who should receive the annual reports, with a link to the reports on the RRCA website.

4.9.2.1 Since the letter doesn't require action at the annual meeting, the commissioners could sign the letter either prior to or after the annual meeting.

4.9.2.2 There was discussion about whether to include this year's report in the letter so as to be able to send the letter prior to the RRCA annual meeting as a test of the e-signature software, or to send the letter after the RRCA meeting so as to be able to include this year's report, too. Chris suggested that we wait until after the RRCA meeting and include this year's report with the rest of the backlog. Alternatively, Chris said that since the letter is a form letter, we could send reports that are ready now and then send another letter after the annual meeting. Carol suggested that the recipients might prefer receiving one letter instead of two, and Chris and Ivan agreed with Carol.

4.9.2.3 Chris noted that a summary of the plans for sending the letter after the meeting should be included under this assignment in the EC report. Carol noted that because this letter does not require a vote by the RRCA commissioners, it does not need to be included as an action item on the annual meeting agenda.

4.9.2.4 Carol asked we should add USGS to the recipient list (they were not included in previous years), since USGS participates in the annual meeting. The consensus was that states can add recipients to the draft letter as they deem appropriate.

4.9.2.5 Action item: After the RRCA annual meeting, Nebraska will generate a draft cover letter to be signed by the three commissioners, notifying officials previously listed as recipients and USGS of the

availability of past RRCA annual reports available on the RRCA website, and will send the draft to Kansas and Colorado for review.

4.9.2.5.1 Action item: Each state will determine who should receive the email letter about the availability of past RRCA annual reports and will add that information to the draft letter if the recipient is not already listed.

5. Summary of Meeting Actions/Assignments (listed in bold throughout minutes)

6. Future Meetings

6.1 Annual Meeting and Working Session

6.1.1 Materials for Annual Meeting

6.1.1.1 EC report

6.1.1.1.1 Carol suggested that an appendix be included in the EC Report to document progress on the Flood Flows assignment, which would include the proposals submitted by KS and NE. Carol asked whether there is anything else about Flood Flows provisions that should be included in the appendix for documentation. Chris suggested including Nebraska's memo from the annual meeting last year and the supplemental write-up to that, as well as any other emails or other relevant communication. Nebraska and Colorado agreed. Chris also suggested including the documentation in the Accounting Procedures tracking document, and Carol agreed.

6.1.1.1.1.1 Action item: Nebraska will compile all documentation related to discussion of last year's Flood Flows assignment as an appendix to the EC report and will send the draft to KS and CO for review.

6.1.1.1.1.2 Action item: Kansas will add the Flood Flows discussion documentation from this year's EC Report to the draft Accounting Procedures tracking document.

6.1.1.1.2 Updated Accounting Procedures and Rules and Regulations

6.1.1.1.2.1 Action item: NE will generate a draft of updated Accounting Procedures and Rules and Regulations to reflect the agreed-upon updates pertaining to the Flood Flows assignment, and will send the draft to Kansas and Colorado for review.

6.1.2. Assignments for next year

6.1.2.1. Meet quarterly to review the tasks assigned to the committee (unchanged from the current year's assignment)

- 6.1.2.2. Exchange by April 15, 2021, 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, 2021, the states will exchange any updates to these data (the same as the current year's assignment, except with the year updated to 2021)
- 6.1.2.3. Finalize the 2020 accounting and recommend it for approval by the RRCA (the same as the current year's assignment, but with the year updated to 2020)
- 6.1.2.4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting. We will keep this assignment, but we can't use same language moving forward because the parts of this assignment pertaining to evaluating whether the accounting methods are in conformance with the intent of the FSS have already been completed. The group discussed that it would be good to have a timeline, but decided against it because this situation may not fit a timeline.
 - 6.1.2.4.1. **Action item: Nebraska will draft language for a continuation of the Flood Flows assignment based on the footnote in the Accounting Procedures and will send it to Colorado and Kansas for review.**
- 6.1.2.5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures (unchanged from the current year's assignment)
- 6.1.2.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance (unchanged from the current year's assignment)
- 6.1.2.7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC (unchanged from current year's assignment)
- 6.1.2.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee (unchanged from current year's assignment)
- 6.1.2.9. Prepare the 2020 RRCA annual meeting report (the same as the current year's assignment, but with the year updated to 2020)
- 6.1.2.10. Are there any new assignments to recommend for next year? - Chris said he has no items to add at this time; Willem suggested asking commissioners if they want to give us a specific Flood Flows assignment for next year. There were no other comments.

- 6.1.3. Resolutions honoring David Barfield and Jeff Fassett
 - 6.1.3.1. Action item: Kansas will draft a resolution honoring David Barfield and will send it to Colorado and Nebraska for review.**
 - 6.1.3.2. Nebraska sent a draft Resolution honoring Jeff Fassett to Colorado and Kansas for review.
 - 6.1.3.2.1. Action item: Kansas and Colorado will review Nebraska's draft resolution honoring Jeff Fassett and provide comments to NE.**
- 6.1.4. Logistics of annual meeting
 - 6.1.4.1. e-signature software options for commissioners and EC representatives
 - 6.1.4.1.1. Action item: Nebraska will test e-signature software.**
 - 6.1.4.2. Transcriptionist will be listening in during the meeting; the meeting will be recorded for the transcriptionist (an announcement will be made when the meeting starts that the meeting is being recorded for note-taking purposes). Ivan and Chris agreed to this proposal.
 - 6.1.4.3. Livestreaming option on YouTube: Kansas has used this and could set up a livestream. This conversation will continue at the August EC meeting.
 - 6.1.4.4. Carol suggested that the commissioners use video during the entire meeting and other presenters use video while they are presenting.
 - 6.1.4.5. Nebraska will have a listening station in McCook for anyone who wants to listen with state staff and there will be sign-in sheets for people participating at the listening station.
 - 6.1.4.5.1. Action item: Nebraska will generate sign-in sheets for the listening station in McCook.**
 - 6.1.4.6. How to handle introductions and attendance without sign-in sheets for people participating via Zoom or livestream - This conversation will continue at the August EC meeting.
 - 6.1.4.7. Annotated agenda for commissioners
 - 6.1.4.7.1. Action item: Nebraska will generate an annotated agenda for commissioners that will include items that are not usually part of the annual meeting (e.g., Zoom components)**
 - 6.1.4.8. Presenters will be asked to submit hand-outs at least a week in advance of the meeting since the handouts will be uploaded to the RRCA website.

6.2 Next EC meeting: August 19, 2020, at 9 AM CT.

7. Adjourn

7.1. The meeting adjourned at approximately 3:07 PM CT.

Meeting Minutes for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
August 19, 2020 9:00 AM Central

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS
Kari Burgert, NE
Chelsea Erickson, KS
Elizabeth Esseks, NE

Carol Myers Flaute, NE
Ivan Franco, CO
Sam Perkins, KS
Willem Schreüder, CO

1. Introductions

1.1 The meeting started at 9:06 AM CT

2. Review/Modify Agenda

2.1 There were no changes or additions to the agenda.

3. Annual Meeting Preparation

3.1 Working Session Materials and Logistics

3.1.1 Zoom and streaming meeting

3.1.1.1 There will be a separate Zoom links for each meeting (recording Annual meeting only).

3.1.1.2 Kari Burgert and Elizabeth Esseks will be moderators.

3.1.1.3 The meetings will open up 15 minutes before the scheduled start time.

3.1.1.4 Commissioners and Engineering Committee members should be prepared to be on camera when they are speaking.

3.1.1.5 Chris asked about streaming via YouTube.

3.1.1.5.1 Carol responded that NeDNR IT turned on the Zoom option but staff haven't tested it (there is a plan to test that today).

3.1.1.5.2 If YouTube doesn't work, Nebraska can post the Zoom recording of the meeting.

3.1.1.5.3 Chris said that using YouTube to livestream is simple to do, but the directions aren't straightforward. He offered that Kansas could walk Nebraska through process if that would be helpful.

3.1.1.5.4 Action item – Nebraska will test YouTube livestreaming on Zoom.

3.2 EC report

3.2.1 Comments

3.2.1.1 Chris sent comments this morning.

3.2.1.2 Ivan said that he has no major issues, and is waiting to see attachments. Carol responded that two of the draft attachments were included in an

email this morning and the remaining attachment that still needs to be completed is the compilation of EC minutes. Nebraska plans to send all attachments this afternoon.

3.2.1.2.1 Action item – Nebraska will send all EC Report Attachments to Kansas and Colorado

3.2.1.2.2 Action item – Kansas and Colorado will review and provide comments on all EC Report attachments, including approval of the July and August minutes.

3.2.2 Flood Flows appendix

3.2.2.1 Introductory paragraph

3.2.2.1.1 This was added to explain the purpose of the appendix.

3.2.2.2 Table of Contents

3.2.2.2.1 There are formatting issues which Nebraska is trying to fix; please let us know if there are any other changes that should be made.

3.2.2.3 The appendix includes the initial memo, emails, items from Chris about Kansas's proposals, and the various comments received.

3.2.2.3.1 All documents have headers to identify what they are.

3.2.2.4 Carol asked that people review the document and let us know if anything is missing.

3.2.2.4.1 Action item – Kansas and Colorado will review the draft Flood Flows appendix and return comments to Nebraska.

3.2.2.5 Chris said that this will be useful moving forward to document progress, and avoid re-inventing the wheel.

3.2.2.6 Chris suggested that we can make formatting changes after the fact if necessary.

3.2.2.7 Ongoing/new assignments

3.2.2.7.1 No one is aware of any potential new assignments;

3.2.2.7.2 Ongoing Flood Flows assignment

3.2.2.7.2.1 Nebraska is proposing a modified flood flows assignment to continue to work on developing a recommendation to modify Flood Flows provisions to bring them into conformance with the intent of the Final Settlement Stipulation.

3.3 Annual Meeting Materials and Logistics

3.3.1 Logistic

3.3.1.1 Logistics will be the same as for the Working Session.

3.3.1.2 Nebraska is recording the session for the transcriptionist.

- 3.3.1.3 Kari and Elizabeth will be sharing documents on screen during the meeting.
- 3.3.2 Agenda
- 3.3.3 2019 RRCA report
 - 3.3.3.1 Chelsea will give the update.
 - 3.3.3.2 The motion to take action on report will be after Chelsea's update (which is a different procedure than for action on the EC report).
- 3.3.4 Commissioners reports
- 3.3.5 Federal reports
 - 3.3.5.1.1 USBR - Craig Scott plans to provide a report.
 - 3.3.5.1.2 USGS - John Miller plans to provide a report.
 - 3.3.5.1.3 USACE probably will not provide a report.
- 3.3.6 Committee Reports
 - 3.3.6.1 EC report
 - 3.3.6.1.1 Carol plans to hit highlights of report.
 - 3.3.6.1.2 Chris said that he prepared a bulleted list to keep his report complete but succinct.
 - 3.3.6.1.3 Since so many future actions are related to the Flood Flows update, Carol will read into the record the Flood Flows paragraph in the "Items for RRCA Discussion & Action" section of the EC report.
- 3.3.7 Old business
 - 3.3.7.1 No one was aware of anything to be discussed.
- 3.3.8 New business
 - 3.3.8.1 Action on updated Accounting Procedures
 - 3.3.8.1.1 Document was sent this morning
 - 3.3.8.1.2 Work done includes Flood Flows changes and formatting issues.
 - 3.3.8.1.3 Nebraska will clean up the document and not use a redlined version.
 - 3.3.8.1.4 Chris and Ivan will review documents after the call.
 - 3.3.8.2 Action on Rules and Regulations draft
 - 3.3.8.2.1 Only changes are dates referenced and signature blocks.
 - 3.3.8.3 Action on Engineering Committee report and assignments
 - 3.3.8.4 Action on 2019 Accounting

- 3.3.8.4.1 Carol proposed to combine the action on the EC report and Accounting since the Accounting is an attachment to the EC report (this was done at the 2019 RRCA Annual Meeting).

3.3.8.5 Action on Resolutions for David Barfield and Jeff Fassett

- 3.3.8.5.1 Carol proposed that the Kansas and Nebraska commissioners read their respective states' resolutions into the record.
- 3.3.8.5.2 Carol also proposed that the commissioners vote on both resolutions as single action.
- 3.3.8.5.3 Nebraska will make formatting changes so both resolutions match.

3.3.9 Public comment

- 3.3.9.1 Carol anticipates that at least one group will speak at the meeting.

3.3.10 Future meeting arrangements

- 3.3.10.1 Nebraska will host the next meeting in late August 2021.

3.4 E-signing

3.4.1 Action item - Carol will test e-signing today.

- 4. Summary of Meeting Actions/Assignments (items in bold above and below)
 - a. **Action items - Everyone will review documents sent this morning and let Nebraska know if you have comments so we can finalize them.**
- 5. Future Meetings
 - a. Annual Meeting and Working Session, August 21, 2020
- 6. Adjourn – meeting ended at approximately 9:38 AM CT.

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ACCOUNTING INPUTS

Calendar Year		2019
Groundwater Data		
North Fork Subbasin	GW CBCU Colorado	17,492
	GW CBCU Kansas	0
	GW CBCU Nebraska	1,229
Arikaree Subbasin	GW CBCU Colorado	2,084
	GW CBCU Kansas	111
	GW CBCU Nebraska	76
Buffalo Subbasin	GW CBCU Colorado	537
	GW CBCU Kansas	0
	GW CBCU Nebraska	3,660
Rock Subbasin	GW CBCU Colorado	134
	GW CBCU Kansas	0
	GW CBCU Nebraska	5,293
South Fork Subbasin	GW CBCU Colorado	13,154
	GW CBCU Kansas	3,366
	GW CBCU Nebraska	607
Frenchman Subbasin	GW CBCU Colorado	1,684
	GW CBCU Kansas	0
	GW CBCU Nebraska	81,732
Driftwood Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	826
Red Willow Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	10,339
Medicine Creek Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	21,376
Beaver Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	6,509
	GW CBCU Nebraska	4,081
Sappa Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	2,675
	GW CBCU Nebraska	1,886
Prairie Dog Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	8,738
	GW CBCU Nebraska	23
Mainstem Subbasin	GW CBCU Colorado	(2,522)
	GW CBCU Kansas Above Guide Rock	352
	GW CBCU Kansas Below Guide Rock	49
	GW CBCU Nebraska Above Guide Rock	83,486
	GW CBCU Nebraska Below Guide Rock	1,723
Import Water Data		
North Fork Subbasin	Imported Water Nebraska	0
Arikaree Subbasin	Imported Water Nebraska	0
Buffalo Subbasin	Imported Water Nebraska	0
Rock Subbasin	Imported Water Nebraska	0
South Fork Subbasin	Imported Water Nebraska	0
Frenchman Subbasin	Imported Water Nebraska	10
Driftwood Subbasin	Imported Water Nebraska	0
Red Willow Subbasin	Imported Water Nebraska	65
Medicine Creek Subbasin	Imported Water Nebraska	11,292
Beaver Subbasin	Imported Water Nebraska	0
Sappa Subbasin	Imported Water Nebraska	32
Prairie Dog Subbasin	Imported Water Nebraska	0
Mainstem Subbasin	Imported Water Nebraska Above Guide Rock	15,131
	Imported Water Nebraska Below Guide Rock	(14)
	Total	26,516

Calendar Year		2019
SW Pumping Data		
North Fork Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	217
	SW Diversions - Irrigation - Small Pumps - Colorado	19
	SW Diversions - M&I - Colorado	0
Arikaree Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Buffalo Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	295
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Rock Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
South Fork Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Frenchman Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	2
	SW Diversions - M&I - Nebraska	0
Driftwood Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Red Willow Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	1
	SW Diversions - M&I - Nebraska	0
Medicine Creek Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	0
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	160
	SW Diversions - M&I - Nebraska - Below Gage	0

Calendar Year		2019
SW Pumping Data		
Beaver Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	2
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	0
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	0
	SW Diversions - M&I - Nebraska - Below Gage	0
Sappa Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	0
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	0
	SW Diversions - M&I - Nebraska - Below Gage	0
Prairie Dog Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	908
	SW Diversions - M&I - Kansas	288
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	196
	SW Diversions - M&I - Nebraska - Below Gage	0
Mainstem Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	197
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	3,286
	SW Diversions - Irrigation - Small Pumps - Nebraska	316
	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska Below Guide Rock	0
	SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	84
	SW Diversions - M&I - Nebraska - Below Guide Rock	0
Non-Federal SW Consumptive Use		
	% Non-Federal Canal Diversion Consumed	60%
	% Small Surface Water Pumps Consumed	75%
	% Municipal And Industrial SW Consumed	50%

Calendar Year		2019
Non-Federal Reservoir Evaporation Data		
North Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	40
Arikaree Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	12
	Non-Federal Reservoir Evaporation - Nebraska	0
Buffalo Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Nebraska	7
Rock Subbasin	Non-Federal Reservoir Evaporation - Nebraska	88
South Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	107
	Non-Federal Reservoir Evaporation - Nebraska	0
Frenchman Subbasin	Non-Federal Reservoir Evaporation - Nebraska	69
Driftwood Subbasin	Non-Federal Reservoir Evaporation - Kansas	11
	Non-Federal Reservoir Evaporation - Nebraska	0
Red Willow Subbasin	Non-Federal Reservoir Evaporation - Nebraska	88
Medicine Creek Subbasin	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	93
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	1
Beaver Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	252
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	70
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	0
Sappa Subbasin	Non-Federal Reservoir Evaporation - Kansas	271
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	42
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	2
Prairie Dog Subbasin	Non-Federal Reservoir Evaporation - Kansas	194
	Non-Federal Reservoir Evaporation - Nebraska	13
Mainstem Subbasin	Non-Federal Reservoir Evaporation - Kansas	76
	Non-Federal Reservoir Evaporation - Nebraska - Above Guide Rock Gage - Whole Basin Value:	536
	Non-Federal Reservoir Evaporation - Nebraska - Below Guide Rock Gage - Whole Basin Value:	(6)
Stream Gage Data		
North Fork Subbasin	North Fork Republican River At Colorado-Nebraska State Line	25,436
Arikaree Subbasin	Arikaree River At Haigler	1,113
Buffalo Subbasin	Buffalo Creek Near Haigler	1,355
Rock Subbasin	Rock Creek At Parks	3,748
South Fork Subbasin	South Fork Republican River Near Benkelman	2,385
Frenchman Subbasin	Frenchman Creek At Culbertson	27,267
Driftwood Subbasin	Driftwood Creek Near McCook	3,284
Red Willow Subbasin	Red Willow Creek Near Red Willow	3,457
Medicine Creek Subbasin	Medicine Creek Below Harry Strunk	48,769
Beaver Subbasin	Beaver Creek Near Beaver City	1,632
Sappa Subbasin	Sappa Creek Near Stamford	42,888
Prairie Dog Subbasin	Prairie Dog Creek Near Woodruff	40,960
Mainstem Subbasin	Republican River At Guide Rock	502,644
	Republican River Near Hardy	626,375
Hardy Gage Data		
Mainstem Subbasin	USGS Gage 06853500 Republican River Near Hardy, NE	
	January	13,289
	February	6,875
	March	61,131
	April	21,669
	May	66,000
	June	69,761
	July	118,015
	August	82,834
	September	30,188
	October	21,527
	November	59,330
	December	75,757
	ANNUAL	626,376

Calendar Year		2019
Reservoir Data		
South Fork Subbasin	Bonny Reservoir Evaporation	0
	Bonny Reservoir Change In Storage	0
Frenchman Subbasin	Enders Reservoir Evaporation	1,193
	Enders Reservoir Change In Storage	424
Red Willow Subbasin	Hugh Butler Lake Evaporation	950
	Hugh Butler Lake Change In Storage	3,001
Medicine Creek Subbasin	Harry Strunk Lake Evaporation	857
	Harry Strunk Lake Change In Storage	5,232
Prairie Dog Subbasin	Keith Sebelius Lake Evaporation	2,714
	Keith Sebelius Lake Change In Storage	9,259
Mainstem Subbasin	Swanson Lake Evaporation	5,787
	Swanson Lake Change In Storage	905
	Harlan County Evaporation Subject to Nebraska/Kansas Split	16,760
	Harlan County Evaporation Charged to Kansas	0
	Harlan County Change In Storage	74,701
	Lovewell Reservoir Ev charged to the Republican River	(131)
Canal Data		
North Fork Subbasin	Haigler Canal Diversions - Colorado	0
	Haigler Canal Diversions - Nebraska	3,963
	Haigler Canal Diversions	3,963
South Fork Subbasin	Hale Ditch Diversions	0
Frenchman Subbasin	Champion Canal Diversions	0
	Riverside Canal Diversions	0
	Culbertson Canal Diversions	11,598
	Culbertson Canal Extension Diversions	0
	Culbertson Canal % Return Flow	83%
	Culbertson Canal Extension % Return Flow	100%
Driftwood Subbasin	Meeker-Driftwood Canal Diversions	16,468
	Meeker-Driftwood Canal % Return Flow	67.0%
Red Willow Subbasin	Red Willow Canal Diversions	5,772
	Red Willow Canal % Return Flow	71%
Prairie Dog Subbasin	Almena Canal Diversions	1,320
	Almena Canal % Return Flow	56.6%
Mainstem Subbasin	Bartley Canal Diversion	10,539
	Bartley Canal % Return Flow	81%
	Cambridge Canal Diversion	24,399
	Cambridge Canal % Return Flow	64.5%
	Naponee Canal Diversion	2,567
	Naponee Canal % Return Flow	89%
	Franklin Canal Diversion	28,473
	Franklin Canal % Return Flow	89%
	Franklin Pump Canal Diversions	584
	Franklin Pump Canal % Return Flow	70%
	Superior Canal Diversions	7,741
	Superior Canal % Return Flow	81%
	Courtland Canal Diversions At Headgate	55,120
	Diversions to Nebraska Courtland	143
	Nebraska Courtland % Return Flow	25%
	Courtland Canal, Loss in NE assigned to upper Courtland KS	1,491
	Courtland Canal, Loss in NE assigned to delivery to Lovewell	2,765
	Courtland Canal At Kansas-Nebraska State Line	50,721
	Courtland Canal Diversions to the Upper Courtland District	13,664
	Courtland Canal Above Lovewell % Return Flow	65.1%
	Courtland Canal, Loss assigned to deliveries of water to Lovewell, Stateline to Lovewell	7,553
	Courtland Canal Deliveries To Lovewell Reservoir	30,995
	Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	10,662
	Courtland Canal Below Lovewell % Return Flow	56.1%
	To allocate Harlan County evaporation:	
	Kansas Bostwick Diversions During Irrigation Season (actual, or 3-year average)	37,222
	Nebraska Bostwick Diversions During Irrigation Season (actual or 3-year average)	26,707

ACCOUNTING TABLES

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

2019 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	39,410	39,410	8,830	0	9,690	20,890	17,680	0	3,610
Arikaree	3,390	3,390	2,660	170	570	(10)	2,080	120	80
Buffalo	5,740	5,740	0	0	1,890	3,850	540	0	3,840
Rock	9,260	9,260	0	0	3,700	5,560	130	0	5,380
South Fork	19,620	19,620	8,710	7,890	270	2,750	13,150	3,470	610
Frenchman	115,930	115,510	0	0	61,910	53,600	1,680	0	84,930
Driftwood	1,480	1,480	0	100	240	1,140	0	10	830
Red Willow	23,130	20,130	0	0	3,860	16,270	0	0	10,690
Medicine	65,040	59,810	0	0	5,440	54,370	0	0	21,590
Beaver	12,540	12,540	2,510	4,870	5,090	70	0	6,760	4,150
Sappa	46,100	30,110	0	12,380	12,380	5,350	0	2,950	1,930
Prairie Dog	63,280	28,760	0	13,140	2,190	13,430	0	13,040	180
Main Stem	662,620	399,550	0	204,170	195,380	0	(2,520)	21,560	125,050
Total All Basins	1,067,540	745,310	22,710	242,720	302,610	177,270	32,740	47,910	262,870
Main Stem Including Unallocated		576,820	0	294,750	282,070				
Total	1,067,540	745,310	22,710	333,300	389,300	0	32,740	47,910	262,870

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

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

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and CORWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit Col 1 – (Col 2- Col 3)
2015	24,760	33,780	10,760	1,740
2016	25,190	33,930	10,130	1,390
2017	22,960	31,810	11,330	2,480
2018	25,630	35,130	13,578	4,078
2019	22,710	32,740	8,905	(1,125)
Avg 2015-2019	24,250	33,480	10,940	1,710

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

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Col 1 – (Col 2- Col 3)
2015	163,420	50,890	NA	112,530
2016	156,760	51,320	NA	105,440
2017	177,230	62,040	NA	115,190
2018	179,780	51,450	NA	128,330
2019	333,300	47,910	NA	285,390
Avg 2015-2019	202,100	52,720	NA	149,380

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

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and NERWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and NERWS Credit Col 1 – (Col 2- Col 3)
2015	223,860	243,530	36,171	16,501
2016	217,880	256,120	61,816	23,576
2017	238,540	242,140	39,439	35,839
2018	241,680	266,080	25,943	1,543
2019	389,300	262,870	26,541	152,971
Avg 2015-2019	262,250	254,150	37,980	46,090

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

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

2019

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

Table 4B: Kansas's Sub-Basin Non-impairment Compliance**2019**

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	170	(10)	230	N/A	390	174	216
South Fork	9,364	3,260	0	N/A	12,624	5,262	7,362
Driftwood	100	1,104	0	N/A	1,204	10	1,194
Beaver	4,634	68	2,390	N/A	7,092	6,574	518
Sappa	5,952	2,570	0	N/A	8,522	2,186	6,336
Prairie Dog	6,928	7,076	0	N/A	14,004	9,882	4,122

Table 5A: Colorado's Compliance During Water-Short Year Administration

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Year	Is the year Water Short Pursuant to Ill.J?* (Yes or No)	Statewide Allocation	Beaver Creek Reduction Pursuant to Table 5F	Allocation - Beaver Creek Reduction (Col. 2 - Col.3)	Computed Beneficial Consumptive (excluding the Beaver Creek Sub-basin)	Imported Water Supply Credit - IWS Beaver Creek + CORWS Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit (Col. 4 - Col. 5 + Col. 6)
2015	Yes	24,760	1,406	23,354	33,780	10,760	334
2016	Yes	25,190	1,650	23,540	33,930	10,130	(260)
2017	No	22,960	0	22,960	31,810	11,330	2,480
2018	Yes	25,630	1,852	23,778	35,130	13,578	2,226
2019	No	22,710	0	22,710	32,740	8,905	(1,125)
Avg 2015-2019	Yes	24,250	980	23,270	33,480	10,940	730

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

Water Short Year (WSY) Pursuant to Ill.J	Beaver Creek Allocation	Reduction = Average of last five WSY
	Col. 1	Col. 2
2002	770	N/A
2003	260	N/A
2004	360	N/A
2005	910	N/A
2006	1,420	N/A
2007	2,320	744
2013	1,130	1,054
2014	1,250	1,228
2015	2,130	1,406
2016	2,430	1,650
2018	2,430	1,852

Table 5B: Kansas's Compliance During Water-Short Year Administration							
Year	Allocation				Computed Beneficial Consumptive Use	Imported Water Supply Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
Column	1	2	3	4	5	6	7
	Sum Sub-basins	Kansas' Share of Unallocated Supply	Kansas' Share of the Unused Colorado Allocation	Total Col 1 + Col 2 + Col 3			Col 4 - (Col 5 - Col 6)
2018	29,280	8,156	1,400	38,836	28,780	N/A	10,056
2019	38,550	11,615	1,579	51,744	26,350	N/A	25,394
Avg 2018-2019	33,915	9,885	1,490	45,290	27,565	N/A	17,725

Table 5C: Nebraska's Compliance During Water-Short Year Administration									
Year	Allocation				Computed Beneficial Consumptive Use			Imported Water Supply Credit and NERWS Credit	Difference Between Allocation and Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Above Guide Rock and NERWS Credit
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Nebraska's Share of Unused Colorado Allocation	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2018	241,680	19,786	221,894	1,340	266,080	3,314	262,766	25,943	(13,590)
2019	389,300	56,294	333,006	1,511	262,870	1,780	261,090	26,541	99,968
Avg 2018-2019	315,490	38,040	277,450	1,430	264,480	2,550	261,930	26,240	43,190

Table 5D: Nebraska's Compliance Under a Alternative Water-Short Year Administration Plan									
Year	Allocation				Computed Beneficial Consumptive Use			Imported Water	Difference Between Allocation
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Share of Unused Colorado	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2017	238,540	11,539	227,001	1,320	242,140	3,585	238,555	39,466	29,232
2018	241,680	19,786	221,894	1,340	266,080	3,314	262,766	25,943	(13,590)
2019	389,300	56,294	333,006	1,511	262,870	1,780	261,090	26,541	99,968
Avg 2017-2019	289,840	29,210	260,630	1,390	257,030	2,890	254,140	30,650	38,540

Table 5E: Nebraska's Tributary Compliance During Water-Short Year Administration						
Year	Allocation			Computed Beneficial Consumptive Use	Water Supply Credit and AWS	Allocation - (CBCU - IWS- AWS)
	Sub-Basin Total	Share of Unallocated Supply	Total			
2017	92,370	70,186	162,556	132,440	30,481	60,597
2018	97,670	71,863	169,533	137,900	11,446	43,079
2019	107,230	86,685	193,915	137,820	11,441	67,536
Avg 2017-2019	102,450	79,274	181,724	137,860	11,444	55,308

ATTACHMENTS

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	9,800
Rock Creek	9,800
South Fork of Republican River	30,400
Frenchman Creek	51,900
Driftwood Creek	9,400
Red Willow Creek	15,100
Medicine Creek	55,100
Beaver Creek	13,900
Sappa Creek	26,900
Prairie Dog	15,700

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 6: Computing Water Supplies and Consumptive Use Above Guide Rock

Note: At its Annual Meeting on August 21, 2020, the RRCA agreed that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flow provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock. The current implementation could impact Nebraska's Table 5C compliance test, specifically the Allocation above Guide Rock. Nebraska and Kansas each offered proposals to resolve the issue but could not reach agreement on a solution. Due to the infrequent occurrence of Flood Flows, the RRCA deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. The states wish to acknowledge and memorialize the issue to encourage work toward its resolution. As it stands, Attachment 6 calculates the Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas.

Year	Total Mainstem CWS	Hardy Gage	Superior Courtland Diversion Dam	Courtland Canal Diversions	Superior Canal Diversion	Courtland Canal Returns	Superior Canal Returns	Total Bostwick Returns Below Guide Rock	NE CBCU Below Guide Rock	KS CBCU Below Ruide Rock	Total CBCU Below Guide Rock	Gain Guide Rock to Hardy	VWS Guide Rock to Hardy	Mainstem VWS Above Guide Rock	NE MS Allocation Above Guide Rock	KS MS Allocation Above Guide Rock	Nebraska Guide Rock to Hardy Allocation	Kansas Guide Rock to Hardy Allocation
2019	399,550	626,375	502,644	46,704	7,741	4,280	6,308	10,588	1,780	197	1,977	113,143	115,120	284,430	139,086	145,344	56,294	58,826

COURTLAND CANAL	
	2019
Return Flow From Courtland Canal To Republican River Above Lovewell From Kansas	761
Return Flow From Courtland Canal To Republican River Above Hardy From Nebraska	3,519
Courtland Canal Diversions At Headgate	55,120
Courtland Canal At Kansas-Nebraska State Line	50,721
NE Courtland Canal CBCU (includes transportation loss)	108
Superior Canal CBCU	1,433
NEBRASKA	
	2019
SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	84
SW Diversions - M&I - Nebraska - Below Guide Rock	0
SW Non-Federal Reservoir Evaporation - Below Guide Rock	(6)
SW Return - Irrigation	21
SW Return - M&I	0
GW CBCU Nebraska Below Guide Rock	1,723
KANSAS	
	2019
SW CBCU - Irrigation - Small Pumps	148
SW CBCU - M&I	0
GW CBCU Kansas Below Guide Rock	49

2019

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

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1 -Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
Σ Irrigation Season											
Σ Non- Irrigation Season											
Culbertson	9,734	601	9,133	279	8,854	30%	84	8,938	82%	7,930	81%
	1,864	267	1,597	0	1,597	30%	0	1,597	92%	1,736	93.1%
Culbertson Extension	0	0	0	0	0	30%	0	0	82%	0	100%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	16,468	655	15,813	4,511	11,302	30%	1,353	12,655	82%	11,032	67.0%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Red Willow	5,728	0	5,728	1,094	4,634	30%	328	4,962	82%	4,069	71.0%
	44	0	44	0	44	30%	0	44	92%	40	92.0%
Bartley	8,186	4,279	3,907	1,913	1,994	30%	574	2,568	82%	6,385	78.0%
	2,353	0	2,353	0	2,353	30%	0	2,353	92%	2,165	92.0%
Cambridge	24,399	2,276	22,123	8,157	13,966	30%	2,447	16,413	82%	15,735	64.5%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Naponee	2,399	1,602	797	236	561	35%	83	644	82%	2,130	88.8%
	168	103	65	0	65	35%	0	65	92%	163	96.9%
Franklin	28,473	18,636	9,837	2,352	7,485	35%	823	8,308	82%	25,449	89.4%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Franklin Pump	584	97	487	160	327	35%	56	383	82%	411	70.4%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Almena	1,320	0	1,320	584	736	30%	175	911	82%	747	56.6%
Superior	6,708	2,795	3,913	1,216	2,697	31%	377	3,074	82%	5,316	79.2%
	1,033	530	503	0	503	31%	0	503	92%	993	96.1%
Nebraska Courtland	143	0	143	130	13	23%	30	43	82%	35	24.6%
Courtland Canal Above Lovewell (KS)	13,664	577	13,087	3,813	9,274	23%	877	10,151	82%	8,901	65.1%
Courtland Canal Below Lovewell	19,275	2,427	16,848	8,613	8,235	23%	1,981	10,216	82%	10,804	56.1%

* 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.

CCV and RCCV Tracking ^a													APV and RWS					RCCV Calc
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Colorado		Nebraska			
Year	Start of Year RCCV	RCCV Adjustment	CCV	CCV Inflow Into HCL	RCCV Inflow Into HCL	Total CCV and RCCV Inflow Into HCL	Total CCV and RCCV Available for Release	CCV Released from HCL as Flow	CCV Released from HCL as Evaporation	CCV Retained in HCL (at End of Year)	CWSA	End of Year RCCV	Aug. Pumping Volume (APV)	Resolution Water Supply Credit (CORWS)	Aug. Pumping Volume (APV) Rock Creek That Passed Sub-basin Gage in the Current Year	Aug. Pumping Volume (APV) N-CORPE That Passed Sub-basin Gage in the Current Year	Resolution Water Supply Credit (NERWS)	Extra CCV Efforts Above CCV (Use with RCCV Calc)
	=Col 12 of previous year	b	c			= Col. 4 + Col. 5	=Col. 6 + Col. 10 of previous year			= Col. 7 – (Col. 8 + Col. 9)	=Col. 10 – Col. 10 of previous year	= Col. 1 – Col. 2 + Col. 3 - Col. 6 ^d						
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,766	0	15,766	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	7,448	7,448	19,397	42,758	62,155	0
2015	0	0	0	8332	0	8332	8332	0	0	8332	8332	0	10,760	10,760	1,098	25,932	18,698	8332
2016	0	0	41,935	24752	0	24752	33084	5084	4321	23679	15347	9,300	10,130	10,130	499	22,803	41,935	449
2017	9300	0	20,000	20,000	0	20000	43679	20000	2241	21438	-2241	9,300	11,330	11,330	4,563	11,106	20,000	0
2018	9300	0	0	0	0	0	21438	0	1339	20099	-1339	9,300	13,578	13,578	0	0	0	0
2019	9300	0	0	0	0	0	20099	0	2340	17759	-2340	9,300	8,905	8,905	0	0	0	0

a. Calculations for RCCV, CWSA, & RWS don't start until Oct. 1, 2015

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

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

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

Flood Flow Calculations Based on Accounting Procedures III.B.1 and Attachment 1.

Hardy Gage Monthly Data (acre-feet)					
	2015	2016	2017	2018	2019
January	1,390	5,429	11,315	4,619	13,289
February	2,093	6,532	6,369	5,521	6,875
March	2,027	6,415	6,420	7,386	61,131
April	2,364	6,625	6,933	3,658	21,669
May	34,054	13,501	33,286	2,309	66,000
June	36,781	5,901	11,956	7,601	69,761
July	7,906	4,844	24,712	3,805	118,015
August	7,712	6,153	5,874	5,065	82,834
September	2,180	9,868	3,532	23,848	30,188
October	1,690	5,278	8,752	17,603	21,527
November	1,944	5,286	2,399	9,231	59,330
December	4,790	4,685	5,575	20,216	75,757
ANNUAL	104,931	80,515	127,122	110,862	626,376
Over 400K	0	0	0	0	226,376

5-month Consecutive Period Flows (acre-feet)					
	2015	2016	2017	2018	2019
Jan-May	41,928	38,501	64,322	23,494	168,964
Feb-Jun	77,319	38,973	64,964	26,475	225,436
Mar-Jul	83,132	37,285	83,307	24,760	336,576
Apr-Aug	88,817	37,023	82,760	22,438	358,279
May-Sep	88,633	40,266	79,359	42,628	366,798
Jun-Oct	56,269	32,043	54,825	57,922	322,325
Jul-Nov	21,432	31,428	45,268	59,552	311,894
Aug-Dec	18,316	31,269	26,132	75,962	269,636

2-month Consecutive Period Flows (acre-feet)					
	2015	2016	2017	2018	2019
Jan-Feb	3,483	11,960	17,683	10,140	20,164
Feb-Mar	4,120	12,946	12,789	12,907	68,006
Mar-Apr	4,391	13,039	13,353	11,045	82,800
Apr-May	36,418	20,126	40,219	5,967	87,669
May-Jun	70,835	19,402	45,242	9,910	135,761
Jun-Jul	44,687	10,744	36,668	11,406	187,776
Jul-Aug	15,618	10,996	30,586	8,870	200,849
Aug-Sep	9,892	16,020	9,406	28,912	113,022
Sep-Oct	3,870	15,146	12,283	41,451	51,715
Oct-Nov	3,634	10,564	11,151	26,834	80,857
Nov-Dec	6,734	9,971	7,974	29,447	135,087

Final Sub-basin Flood Flows					
	2015	2016	2017	2018	2019
North Fork Flood Flow	0	0	0	0	0
Arikaree Flood Flow	0	0	0	0	0
Buffalo Flood Flow	0	0	0	0	0
Rock Flood Flow	0	0	0	0	0
Southfork Flood Flow	0	0	0	0	0
Frenchman Flood Flow	0	0	0	0	0
Driftwood Flood Flow	0	0	0	0	0
Red Willow Flood Flow	0	0	0	0	0
Medicine Creek Flood Flow	0	0	0	0	0
Beaver Flood Flow	0	0	0	0	0
Sappa Flood Flow	0	0	0	0	15,988
Prairie Dog Flood Flow	0	0	0	0	25,260
Mainstem Flood Flow	0	0	0	0	185,128

Sub-basin Flows Above Attachment 1 Flood Flow Thresholds					
	2015	2016	2017	2018	2019
North Fork	0	0	0	0	0
Arikaree	0	0	0	0	0
Buffalo	0	0	0	0	0
Rock	0	0	0	0	0
South Fork	0	0	0	0	0
Frenchman	0	0	0	0	0
Driftwood	0	0	0	0	0
Red Willow	0	0	0	0	0
Medicine Creek	0	0	0	0	0
Beaver	0	0	0	0	0
Sappa	0	0	0	0	15,988
Prairie Dog	0	0	0	0	25,260
Sub-basin Sum	0	0	0	0	41,248

5-month Consecutive Period Test					
	2015	2016	2017	2018	2019
Jan-May	0	0	0	0	0
Feb-Jun	0	0	0	0	0
Mar-Jul	0	0	0	0	1
Apr-Aug	0	0	0	0	1
May-Sep	0	0	0	0	1
Jun-Oct	0	0	0	0	0
Jul-Nov	0	0	0	0	0
Aug-Dec	0	0	0	0	0
TOTAL	0	0	0	0	3

2-month Consecutive Period Test					
	2015	2016	2017	2018	2019
Jan-Feb	0	0	0	0	0
Feb-Mar	0	0	0	0	0
Mar-Apr	0	0	0	0	0
Apr-May	0	0	0	0	0
May-Jun	0	0	0	0	0
Jun-Jul	0	0	0	0	0
Jul-Aug	0	0	0	0	1
Aug-Sep	0	0	0	0	0
Sep-Oct	0	0	0	0	0
Oct-Nov	0	0	0	0	0
Nov-Dec	0	0	0	0	0
TOTAL	0	0	0	0	1

Combined Test					
	2015	2016	2017	2018	2019
FINAL TOTAL	0	0	0	0	4

Documentation of Flood Flows Discussions 8/21/2020

In July 2019, the Flood Flow provisions outlined in the Final Settlement Stipulation (FSS) and Accounting Procedures and Reporting Requirements (Accounting Procedures) were triggered. This was the first time that the Accounting Procedures needed to account for Flood Flows since implementation of the FSS and Accounting Procedures. Nebraska staff noticed that an oversight appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock. At the August 21, 2019, RRCA working session in preparation for the Annual Meeting, Nebraska introduced this apparent oversight to Kansas and Colorado. Over the following year, Colorado, Kansas, and Nebraska worked together to determine that the current version of the Accounting Procedures does not properly implement the Flood Flow provisions of the FSS. The states offered and discussed proposals to resolve the issue but have not yet reached agreement on a solution. Due to the infrequent occurrence of Flood Flows, the RRCA deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. This appendix contains documents and proposals that were exchanged and discussed over the past year in attempt to reach consensus on an option for the Accounting Procedures to properly implement the Flood Flow provisions.

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Email, dated 03/23/2020, Chris Beightel to Carol Flaute, Subject: RE: KS work on NE's flood flows/Table 5C issue	27
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Email, dated 04/13/2020, Chris Beightel to Carol Flaute, Subject: KS work on NE's flood flows/Table 5C issue, with attachment	36
2020-04-13.KS-RespToNE0403-FF.pdf.....	42

Overview:

Preliminary 2019 accounting results suggest the RRCA accounting will need to employ procedures for addressing “flood flows” as described in the Final Settlement Stipulation (FSS) and Accounting Procedures and Reporting Requirements (Accounting Procedures). This will be the first time that the Accounting Procedures have needed to account for flood flows since the implementation of the FSS and Accounting Procedures. Streamflow data indicate that the flood flow trigger for the Main Stem at the Hardy gage was met at the end of July. Flood flow adjustments are also expected to occur in the Sappa Creek and Prairie Dog Sub-basins in 2019 based on current streamflow projections. In developing updated accounting estimates of the impacts of these flood flows, NeDNR staff recognized that an oversight appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock. Under the current methods, gains between Guide Rock and Hardy are subtracted from the above Guide Rock allocation when flood flows are present on the Main Stem. This apparent accounting oversight causes Guide Rock allocations to decrease after the flood flow threshold is met and could result, in extreme conditions, in producing negative allocations for the above Guide Rock portion of the Main Stem (Figure 1).

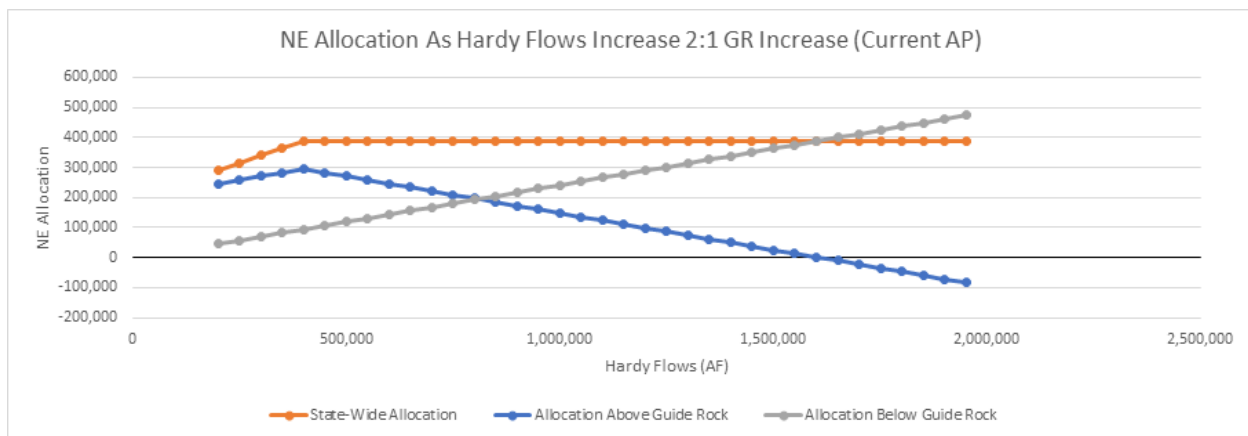


Figure 1: Results based on current Accounting Procedures when streamflow gains downstream of Guide Rock

Application of the flood flow adjustment would typically result in establishing an upper limit of allocations that the state will receive within that sub-basin once the flood flow threshold has been reached. The Accounting Procedures describe the methods used to apply the flood flow adjustment and the application of the flood flow adjustment in the accounting spreadsheet appears to conform to the methods outlined in the Accounting Procedures for all state-based tests with the exception of the Table 5C and Table 5D tests for the sub-basin upstream of Guide Rock. The result of applying the flood flow adjustment to the Table 5C and Table 5D tests seems inconsistent with the flood flow adjustment methods applied to other state-based tests and creates an unexpected result in which the allocation above Guide Rock in the Table 5C and 5D tests can be reduced as streamflow continues to accrue downstream. No other sub-basin allocations are reduced in this manner, and it appears this adjustment is inconsistent with the intent of the flood flow procedures and may not have been fully contemplated in the development of the Accounting Procedures.

Background of FSS and Accounting Procedures:

Flood flows are defined in the FSS and Accounting Procedures as follows:

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 the RRCA Accounting Procedures, Subsection III.B.1.;

Additionally, the Accounting Procedures also describe the method used to determine when flood flows occur and how they are to be adjusted from the Main Stem Virgin Water Supply to calculate the computed water supply. The following is an excerpt from the May 25, 2017 version of the Accounting Procedures (page 14).

1. Flood Flows

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

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

Additionally, the Accounting Procedures describe the methods used to determine the computed water supply between Guide Rock and Hardy and above Guide Rock. The following is an excerpt from the Accounting Procedures (page 19).

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.

Calculations contained in the current accounting spreadsheet attempt to implement the above method but appear to fail in connecting the flood flow adjustment with these calculations of the allocation above Guide Rock. This is evidenced by the fact that as streamflows increase from Guide Rock to Hardy, the results indicate a reduction of allocation above Guide Rock, which is inconsistent with results when adjustments are made to the entire Main Stem or the sub-basins. Therefore, it appears that the allocation above Guide Rock is being modified differently than other allocations and the specific methodology for making the flood flow adjustment at this location does not seem to have been fully contemplated in the Accounting Procedures.

Example of the Issue:

Three examples of the impacts on the allocation above Guide Rock are illustrated below. Example one establishes the allocation above Guide Rock as the flood flow threshold is reached. The second example illustrates that the allocation above Guide Rock is unchanged as the flood flow threshold is exceeded and the same amount of streamflow travels past both Guide Rock and Hardy. The third example illustrates how the allocation above Guide Rock decreases as streamflow continues to accrue in the Guide Rock to Hardy reach (downstream of Guide Rock). This third example is the typical characteristic of the sub-basin downstream of Guide Rock.

Example 1 – Flood Flow Threshold Met

(415,300 AF streamflow at Hardy and 300,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	334,763

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 2 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with the same amount of increased flow at Guide Rock

(535,300 AF streamflow at Hardy and 420,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	334,763

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 3 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with a lower amount of increased flow at Guide Rock (80,000 AF)

(535,300 AF streamflow at Hardy and 380,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	73,057	315,203

*Excerpt from Table 5C. These same values are included in Table 5D.

In Example 2, the same amount of additional streamflow is added to both the Hardy and Guide Rock gages. With the streamflow increase being the same at both locations, the resulting allocation above Guide Rock is unchanged. In Example 3, additional streamflow is added to Hardy and Guide Rock, but the increase at Guide Rock (80,000 AF) is less than the increase at Hardy (120,000 AF). The resulting allocation above Guide Rock is reduced by 19,560 AF $[0.489 * (120,000 - 80,000)]$ even as the amount of streamflow traveling past Guide Rock increases by 80,000 AF. This result is driven by additional allocation accruing downstream of Guide Rock as the streamflow term increases between Guide Rock and Hardy. Thus, as can be seen from Example 3, for every two acre-feet of flow past Hardy that does not flow past Guide Rock, the allocation above Guide Rock is reduced by approximately one acre-foot. This impact on the allocation appears to be erroneous, inconsistent with other sub-basin adjustments implemented in the Accounting Procedures, and not fully contemplated in the Accounting Procedures.

Proposed Path Forward:

Nebraska seeks concurrence from the RRCA Commissioners that the principle issue requires resolution to be in conformance with the intent of the FSS and Accounting Procedures and that an assignment be made to the RRCA Engineering Committee to recommend an appropriate solution to the commissioners prior to the 2020 Annual Meeting.

From: [Flaute, Carol](#)
To: [Beightel, Chris \[KDA\]](#); ["Ivan.Franco@state.co.us"](mailto:Ivan.Franco@state.co.us)
Cc: [Burgert, Kari](#); [Bradley, Jesse](#); [Jensen, Catherine](#)
Subject: Memo pertaining to Flood Flow Provisions assignment
Date: Tuesday, September 17, 2019 11:14:19 AM
Attachments: [20190910_FloodFlowCorrectionOptionsMemorandum.pdf](#)
[2019_08_19_Working_Session_Document_GR_Flood_Flows.pdf](#)

Chris and Ivan,

In preparation for October's EC meeting, please read the attached memorandum pertaining to the EC's assignment to review the flood flow provisions of the RRCA Accounting Procedures.

Also attached for reference is a copy of the related document that Nebraska distributed during this year's RRCA working session.

Carol J. Myers Flaute

INTEGRATED WATER MANAGEMENT COORDINATOR

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September 9, 2019

RRCA Engineering Committee Assignment: Review Flood Flow Provisions of the RRCA Accounting Procedures

OVERVIEW OF TASK

At the RRCA annual meeting working session Nebraska reviewed a memorandum provided to the Engineering Committee (EC) on August 19, 2019 in which concern related to a flood-flow accounting issue was identified. The memorandum provided by Nebraska explained the unexpected behavior of the allocation above Guide Rock due to mainstem flood-flow adjustments. Based on these discussions the RRCA agreed to establish the following assignment for the EC:

Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

PROPOSED TIMELINE FOR COMPLETION

The EC assignment was adopted by the RRCA at the annual meeting on August 22, 2019. The assignment must be completed in time for the 2019 accounting to be approved at the 2020 RRCA Annual Meeting. Nebraska is proposing the following subtasks and timeline for this assignment:

- October 2019: EC discuss current accounting provisions and establish conceptual understanding of how Guide Rock allocation should behave when flood flows occur in the mainstem
- January 2020: EC review and discuss potential accounting procedure changes needed to accommodate expected behavior of Guide Rock allocation.
- April 2020: EC discuss and agree to specific draft changes to Accounting Procedures methods
- July 2020: EC implement agreed upon changes in conjunction with completion of 2019 accounting
- August 2020: Recommend updated Accounting Procedures and final 2019 accounting for approval by RRCA

Since there are no specific instructions in the FSS or the Accounting Procedures about how to handle flood flows at the Guide Rock gage nor to the allocation above Guide Rock, we are proposing to start with conceptual agreement about how to apply the flood-flow adjustment. Once a conceptual agreement has been reached we will then work to make the necessary modification to the Accounting Procedures and accounting spreadsheet conform to the agreed upon concepts and implement those changes in performing final 2019 accounting.

GUIDE ROCK FLOOD-FLOW ADJUSTMENT OPTIONS

Guide Rock flood flows are not defined in the Accounting Procedures, and unlike other accounting sub-basins, no Guide Rock flood flow threshold has been established. Conceptually, the Accounting Procedures should define when Guide Rock Flood Flows should be applied and the method of determining the appropriate threshold or limit on stream flows. Nebraska has provided fictional examples in Figure 1 for purposes of furthering this conceptual conversation.

September 9, 2019

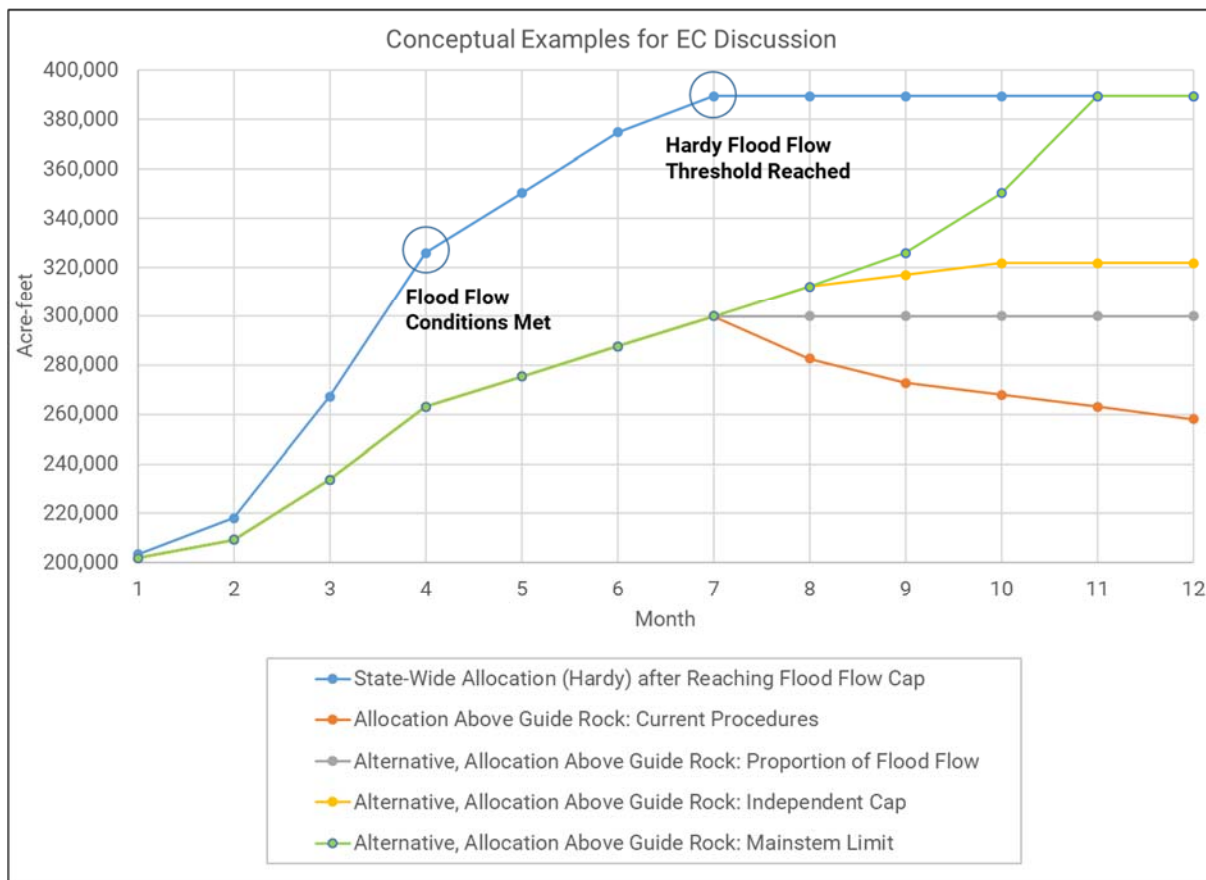


Figure 1. Conceptual examples of above Guide Rock behavior for Discussion with EC

For email attachment *2019_08_19_Working_Session_Document_GR_Flood_Flows.pdf*
see *Flood Flows Issue Introduction for 2019 Working Session*, Page 1

From: [Flaute, Carol](#)
To: [Beightel, Chris \[KDA\]](#); ["Ivan.Franco@state.co.us"](#)
Cc: [Beightel, Chris \[KDA\]](#); [Barfield, David \[KDA\]](#); [Beam, Mike \[KDA\]](#); [Don Blankenau](#); [Grother, Brittney \[KDA\]](#); [Jasper Fanning](#); [Fassett, Jeff](#); [Bradley, Jesse](#); [Kate Greenberg](#); [Kevin Rein](#); [Lavene, Justin](#); [Letourneau, Lane \[KDA\]](#); [Lewis, Earl](#); [mike.sullivan@state.co.us](#); [Scott Steinbrecher](#); [Titus, Kenneth \[KDA\]](#); [Tom Riley](#); [Tom Wilmoth](#); [Goff, Katie](#); [cscott@usbr.gov](#); [Burgert, Kari](#); [Schellpeper, Jennifer](#); [Willem Schreuder](#)
Subject: Flood flows memorandum from Nebraska
Date: Tuesday, December 3, 2019 3:55:15 PM
Attachments: [20191203_FloodFlow_ProposedRevision.pdf](#)

Chris and Ivan,

Before Friday's 3-States meeting, please read the attached memorandum from Nebraska describing proposed revisions to the flood-flow accounting methodology. We will plan to discuss this memorandum at Friday's meeting.

Carol J. Myers Flaute

INTEGRATED WATER MANAGEMENT COORDINATOR

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RRCA Engineering Committee Assignment: *Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.*

At the RRCA annual meeting working session Nebraska reviewed a memorandum provided to the Engineering Committee (EC) on August 19, 2019, in which concern related to a flood-flow accounting issue was identified. The memorandum provided by Nebraska explained the unexpected behavior of the allocation above Guide Rock due to Main Stem flood-flow adjustments. In particular, it was noted that as the gains between Guide Rock and Hardy are subtracted from the Guide Rock allocation and the flood flow adjustment is applied to the Main Stem, the result can cause allocations above Guide Rock to be reduced.

A second memorandum was provided by Nebraska to the Engineering Committee that outlined a schedule toward recommending any Accounting Procedures revisions and 2019 Accounting for approval at the 2020 annual meeting and generalized some concepts for changing how the flood flow adjustment is applied in calculation of the Guide Rock allocations. Following this memo and subsequent Engineering Committee meeting, on October 30, 2019, Kansas provided feedback that the accounting issue "...appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock" and that reasonable solutions include "implementing the "Proportion of Flood Flow" or the "Independent Cap" as illustrated in Nebraska's September 10, 2019 memorandum." Following the Engineering Committee meeting, Colorado (Willem Schreuder) provided feedback that a correction to calculating Computed Water Supply above and below Guide Rock, in a manner more consistent with the rest of the Accounting, is to include the flood flow adjustment in those calculations (in Attachment 6 of the Accounting Procedures).

Proposed Revision to Attachment 6

Using this feedback from the States, we are recommending the following revision be made: include the Flood Flow Adjustment for the basin above Hardy in the calculation of CWS for the basin between Guide Rock and Hardy in the Attachment 6 calculation. This proposed revision prevents allocation above Guide Rock from decreasing with increasing supply below Guide Rock and is consistent with the rest of the Accounting Procedures descriptions and equations.

Calculating Above Guide Rock Allocation: Current Procedures

Accounting Procedures (revised May 25, 2017) Section III.H., second paragraph:

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.

In equation form, the accounting spreadsheet is set up to calculate Nebraska's Above Guide Rock Allocation as is prescribed in Attachment 6 (presented in the Appendix):

$$\text{NE AbvGR Allocation} = \text{NE Total Allocation} - 48.9\% * \text{VWS GRtoHdy}$$

$$\text{NE Total Allocation} = \sum \text{NE Subbasins Allocations} + \text{NE Main Stem Allocation} + \text{NE Unallocated}$$

$$\text{NE Main Stem Allocation} = 48.9\% * \text{Main Stem CWS}$$

$$\text{Main Stem CWS} = \text{Main Stem VWS} - \Delta \text{Reservoir Storage} - \text{Main Stem Flood Flow Adjustment} - \text{CWSA}$$

$$\text{Main Stem Flood Flow Adjustment (when applicable)} = \text{Hardy gaged streamflow} - 400,000 \text{ acre-feet} - \text{the sum of subbasin flood flow adjustments}$$

$$\text{VWS GRtoHdy} = \text{CBCU GRtoHdy} + \text{Gain GRtoHdy}$$

$$\text{Gain GRtoHdy} = \text{Hardy gaged streamflow} - \text{Guide Rock gaged streamflow} - \text{Total Bostwick returns}$$

where

AbvGR : Main Stem above Guide Rock

GRtoHdy : Main Stem between Guide Rock and Hardy

Main Stem : Main Stem above Hardy

As shown in these equations, since the Main Stem Flood Flow Adjustment is applied to the CWS Main Stem but not applied to VWS Guide Rock to Hardy, VWS above Guide Rock is reduced by the Flood Flow Adjustment which is measured at the Hardy gage (Hardy gaged streamflow in excess of 400,000 acre-feet less subbasin flood flow).

Proposed Accounting Procedures Changes

We simply propose to subtract the Main Stem Flood Flow Adjustment from the VWS Guide Rock to Hardy. This subtraction will effectively be used to calculate *Computed* Water Supply above and below Guide Rock as defined in the Accounting Procedures. Red font indicates changes from current procedures.

Accounting Procedures Section III.H., second paragraph would become:

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, **and subtracting the Main Stem Flood Flow Adjustment**. 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.

The changes to Attachment 6 are presented in the Appendix and subsequent proposed changes in equation form would be: (red font indicates changes from current procedures)

$$\text{NE AbvGR Allocation} = \text{NE Total Allocation} - 48.9\% * \text{CWS GRtoHdy}$$

$$\text{NE Total Allocation} = \sum \text{NE Subbasins Allocations} + \text{NE Main Stem Allocation} + \text{NE Unallocated}$$

$$\text{NE Main Stem Allocation} = 48.9\% * \text{Main Stem CWS}$$

$$\text{Main Stem CWS} = \text{Main Stem VWS} - \Delta \text{Reservoir Storage} - \text{Main Stem Flood Flow Adjustment} - \text{CWSA}$$

$$\text{Main Stem Flood Flow Adjustment (when applicable)} = \text{Hardy gaged streamflow} - 400,000 \text{ acre-feet} - \text{the sum of subbasin flood flow adjustments}$$

$$\text{CWS GRtoHdy} = \text{CBCU GRtoHdy} + \text{Gain GRtoHdy} - \text{Main Stem Flood Flow Adjustment}$$

$$\text{Gain GRtoHdy} = \text{Hardy gaged streamflow} - \text{Guide Rock gaged streamflow} - \text{Total Bostwick returns}$$

Benefit of Proposed Revision

The proposed revision of including the Flood Flow Adjustment in the calculation of Computed Water Supply Guide Rock to Hardy corrects the problem of decreasing above Guide Rock allocation with gains between Guide Rock and Hardy when the Main Stem Flood Flow Adjustment is applied. Consider the example in Table 1 and Figure 1 following where all accounting variables are constant after July except gains in Hardy streamflow.

The proposed correction also allows for allocations above Guide Rock to increase with continued flow past Guide Rock without discounting for gains below Guide Rock when the Flood Flow Adjustment is applied.

Conclusion

Based on the feedback provided by Kansas and Colorado since the last Engineering Committee meeting, Nebraska requests that the Engineering Committee consider including the Flood Flow Adjustment for the basin above Hardy in the calculation of CWS for the basin between Guide Rock and Hardy in the Attachment 6 calculation. This proposed revision prevents allocation above Guide Rock from decreasing with increasing supply below Guide Rock, is consistent with the rest of the Accounting Procedures descriptions and equations, and efficient to implement.

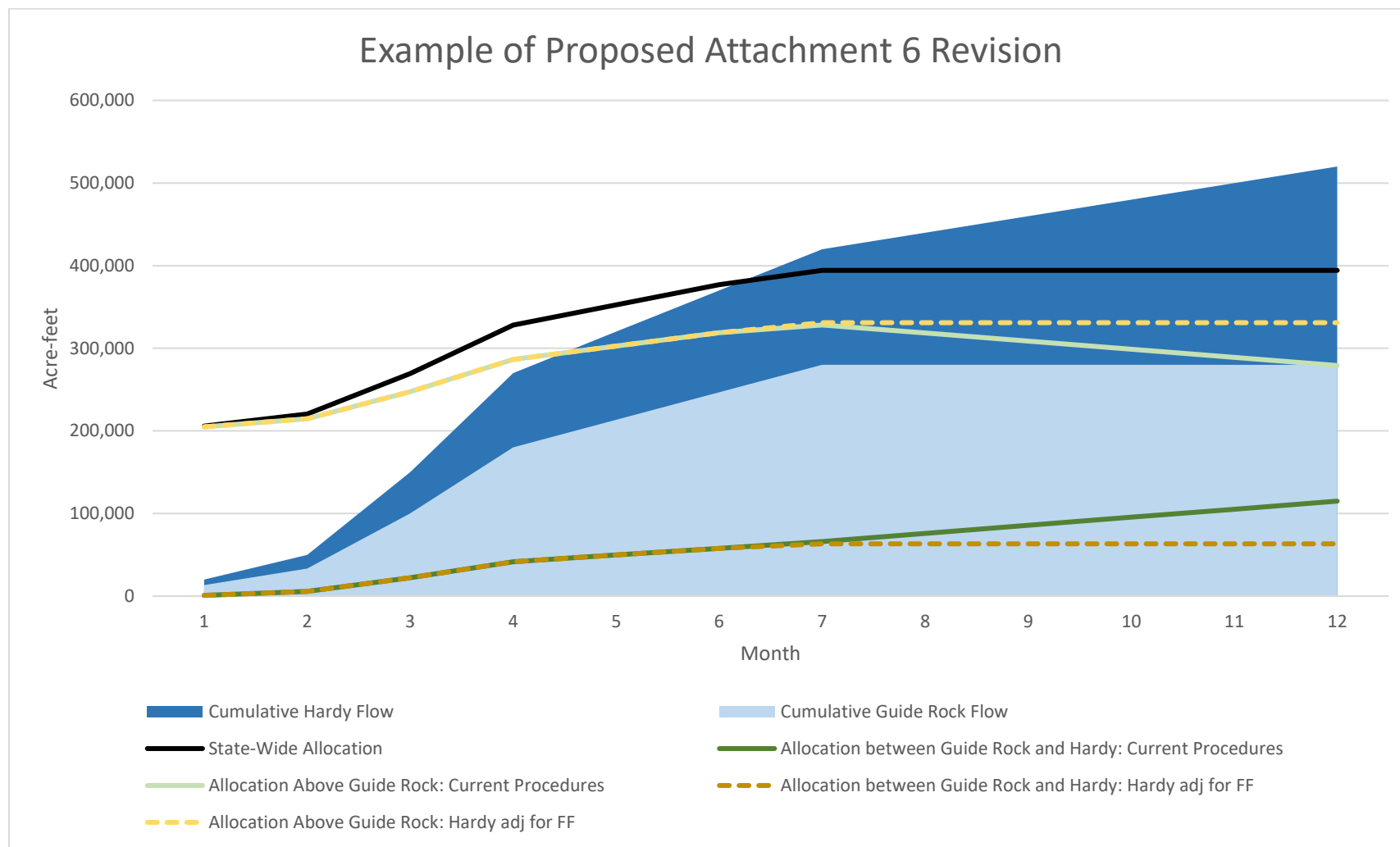


Figure 1. Example corresponding to streamflows and resulting allocations in Table 1, where all accounting variables are constant after July except gains in Hardy streamflow.

Table 1. Example in corresponding streamflows and resulting allocations displayed in Figure 1, where all accounting variables are constant after July except gains in Hardy streamflow. Note there is no flow past the Guide Rock gage after July, thus Guide Rock Allocation would be expected to remain constant.

	Guide Rock Monthly Streamflow	Hardy Monthly Streamflow	Cumulative Guide Rock Flow	Cumulative Hardy Flow	State-Wide Allocation	Allocation between Guide Rock and Hardy: Current Procedures	Allocation Above Guide Rock: Current Procedures	State- Wide Allocation	Allocation between Guide Rock and Hardy: Proposed Adj for FF	Allocation Above Guide Rock: Proposed Adj for FF
January	13,333	20,000	13,333	20,000	205,830	914	204,916	205,830	914	204,916
February	20,000	30,000	33,333	50,000	220,500	5,804	214,696	220,500	5,804	214,696
March	66,667	100,000	100,000	150,000	269,400	22,104	247,296	269,400	22,104	247,296
April	80,000	120,000	180,000	270,000	328,080	41,664	286,416	328,080	41,664	286,416
May	33,333	50,000	213,333	320,000	352,530	49,814	302,716	352,530	49,814	302,716
June	33,333	50,000	246,667	370,000	376,980	57,964	319,016	376,980	57,964	319,016
July	33,333	50,000	280,000	420,000	394,300	66,114	328,186	394,300	63,327	330,973
August	0	20,000	280,000	440,000	394,300	75,894	318,406	394,300	63,327	330,973
September	0	20,000	280,000	460,000	394,300	85,674	308,626	394,300	63,327	330,973
October	0	20,000	280,000	480,000	394,300	95,454	298,846	394,300	63,327	330,973
November	0	20,000	280,000	500,000	394,300	105,234	289,066	394,300	63,327	330,973
December	0	20,000	280,000	520,000	394,300	115,014	279,286	394,300	63,327	330,973

APPENDIX**Current 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

Proposed Attachment 6: Red font indicates changes from current procedures.

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	CWS Guide Rock to Hardy	Main Stem Computed	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 - Main Stem Flood Flow Adjustment	Col A - Col M	.489 x Col N	.511 x Col N	.489 x Col M	.511 x Col M

From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Thursday, January 16, 2020 8:55 AM
To: Flaute, Carol; 'ivan.franco@state.co.us' (ivan.franco@state.co.us)
Cc: Barfield, David [KDA]; Burgert, Kari; Bradley, Jesse; Erickson, Chelsea [KDA]; Perkins, Sam [KDA]; Pugh, Ginger [KDA]; Cao, Hongsheng [KDA]
Subject: RE: Flood flows memorandum from Nebraska

Follow Up Flag: Follow up
Flag Status: Completed

Hi All;

In our review of Nebraska's December 3, 2019 memorandum proposing to change how flood flows are treated in the RRCA Accounting, Kansas has identified a concern with how Nebraska's proposal to adjust flood flows in the Mainstem Guide Rock to Hardy reach affects the allocations in that reach, and by extension the allocations above Guide Rock.

The problem we've identified occurs when most or a large portion of the flood flows originate above Guide Rock. In such a scenario, the proposal to reduce the Guide Rock to Hardy CWS by the entire amount of the flood flows can end up distorting where the allocation is generated such that the Guide Rock to Hardy allocation is inappropriately adjusted.

The example of this behavior can be seen in the latest preliminary 2019 accounting developed by Willem Schreüder (see [here](#)). Implementing Nebraska's December 3, 2019 proposal, the preliminary accounting shows the CWS below Guide Rock is -67,510 AF resulting in an allocation to Nebraska of -33,012 AF. In this case, the WSY accounting in Table 5C would, by subtracting the Guide Rock to Hardy allocation, increase Nebraska's allocation above Guide Rock by 33,012 AF. This does not seem reasonable.

A possible alternative is to develop a method to parse where, above or below Guide Rock, the flood flows originate and make the respective adjustments to each reach. We haven't thoroughly thought through a method for doing this but we envision it might assign the flood flows according the ratio of the flows at Guide Rock to the flows at Hardy.

In 2019, according to Dr. Shreüder's latest preliminary accounting, flows at Guide Rock were 502,276 AF, and flows at Hardy were 625,783 AF. Main stem flood flows were determined to be 184,496 AF. If the simple ratio was used, then, for the purpose of Table 5C and Table 5D, we would adjust the above Guide Rock reach by $184,496 \text{ AF} \times \frac{502,276 \text{ AF}}{625,783 \text{ AF}} = 148,083 \text{ AF}$ then the Guide Rock to Hardy reach would be adjusted by $184,496 \text{ AF} - 148,083 \text{ AF} = 36,412 \text{ AF}$. The CWS would then be reduced to $116,990 \text{ AF} - 36,412 \text{ AF} = 80,578 \text{ AF}$ and Nebraska's allocation of that that would be $.489 \times 80,578 \text{ AF} = 39,402 \text{ AF}$. This demonstration is for discussion and illustration purposes only. As I mentioned above, we haven't fully thought through this, but we're concerned the current Nebraska proposal's potential to generate negative allocations is problematic.

Incorporating the above method into Nebraska's December 3, 2019 proposal yields (changes in highlight):

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = Σ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – Δ Reservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

$$= \left(\frac{\text{Hardy Flows} - \text{Guide Rock Flows}}{\text{Hardy Flows}} \right) \times \text{Mainstem Flood Flow Adjustment}$$

~~CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - Main Stem Flood Flow Adjustment~~

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

Let us know what you think.

Chris

Chris Beightel, P.E.
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Water Management Services
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Kansas Department of Agriculture
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Manhattan, KS 66502
(785) 564-6659
chris.beightel@ks.gov

From: Flaute, Carol <carol.flaute@nebraska.gov>

Sent: Tuesday, December 3, 2019 3:55 PM

To: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; 'Ivan.Franco@state.co.us' <Ivan.Franco@state.co.us>

Cc: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; Barfield, David [KDA] <David.Barfield@ks.gov>; Beam, Mike [KDA] <Mike.Beam@ks.gov>; Don Blankenau <don@aqualawyers.com>; Grother, Brittney [KDA] <Brittney.Grother@ks.gov>; Jasper Fanning <jasperfanning@urnrd.org>; Fassett, Jeff <jeff.fassett@nebraska.gov>; Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Kate Greenberg <kate.greenberg@state.co.us>; Kevin Rein <kevin.rein@state.co.us>; Lavene, Justin <Justin.Lavene@nebraska.gov>; Letourneau, Lane [KDA] <Lane.Letourneau@ks.gov>; Lewis, Earl <Earl.Lewis@kwo.ks.gov>; mike.sullivan@state.co.us; Scott Steinbrecher <Scott.Steinbrecher@coag.gov>; Titus, Kenneth [KDA] <Kenneth.Titus@ks.gov>; Tom Riley <triley@flatwatergroup.com>; Tom Wilmoth <tom@aqualawyers.com>; Goff, Katie <Katie.Goff@kwo.ks.gov>; cscott@usbr.gov; Burgert, Kari <kari.burgert@nebraska.gov>; Schellpeper, Jennifer <jennifer.schellpeper@nebraska.gov>; Willem Schreuder <willem@prinmath.com>

Subject: Flood flows memorandum from Nebraska

EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Chris and Ivan,

Before Friday's 3-States meeting, please read the attached memorandum from Nebraska describing proposed revisions to the flood-flow accounting methodology. We will plan to discuss this memorandum at Friday's meeting.

Carol J. Myers Flaute

INTEGRATED WATER MANAGEMENT COORDINATOR

Nebraska Department of Natural Resources

301 Centennial Mall South

P.O. Box 94676

Lincoln, Nebraska 68509

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carol.flaute@nebraska.gov

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From: [Beightel, Chris \[KDA\]](#)
To: [Flaute, Carol](#); Ivan.Franco@state.co.us
Cc: [Bradley, Jesse](#); [Barfield, David \[KDA\]](#); [Willem Schreuder](#)
Subject: KS work on NE's flood flows/Table 5C issue
Date: Wednesday, February 5, 2020 1:59:36 PM
Attachments: [20200203.KS.compare_KS-NE_FFmethods.xlsx](#)

Carol and Ivan,

Attached is an Excel workbook file that Kansas has developed to analyze proposed methods for dealing with the Flood Flows in WSY test issue.

Kansas has observed that Nebraska's 6 December 2019 proposed method could potentially increase Nebraska's Above Guide Rock allocation in a flood flow year if that flood flow year was part of the Table 5C test.

We have also observed that Kansas' 16 January 2020 proposed method does partially address Nebraska's original concern.

We also recognize that in a flood flow year, there could be a level of flow in the Guide Rock to Hardy reach that is reasonably unusable to Nebraska and that should be adjusted for. Kansas' 3 February 2020 proposed method is based on Kansas' 16 January method but adds a cap to the Computed Water Supply of the Guide Rock to Hardy reach. The cap in the proposal is set at the largest Computed Water Supply in the Guide Rock to Hardy reach in the record for a non-flood flow year.

Please review this work and let me know if you have any questions about it or would like to discuss it further.

Chris

Contents:

Tab "NE method 20191206" implements Nebraska's proposal

Tab "KS method 20200116" implements Kansas' proposal as presented to NE by email on January 16, 2020.

Tab "KS method cap 20200203" - Kansas' Jan 16 proposal plus a cap on the Guide Rock to Hardy computed water supply.

Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF										41278
1	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000		8722	8722	8722	8722	8722	8722	8722	8722	8722
500000		58722	58722	58722	58722	58722	58722	58722	58722	58722
550000		108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783		184505	184505	184505	184505	184505	184505	184505	184505	184505
650000		208722	208722	208722	208722	208722	208722	208722	208722	208722
700000		258722	258722	258722	258722	258722	258722	258722	258722	258722
750000		308722	308722	308722	308722	308722	308722	308722	308722	308722
800000		358722	358722	358722	358722	358722	358722	358722	358722	358722
850000		408722	408722	408722	408722	408722	408722	408722	408722	408722
900000		458722	458722	458722	458722	458722	458722	458722	458722	458722

Computed water supply GRtoHdy (assume CBCU GRtoHdy =										3840 AF)
3	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-6,519	-56,519	-108,795	-156,519	-206,519	-256,519	-306,519	-356,519	-406,519
450000		43,481	-6,519	-58,795	-106,519	-156,519	-206,519	-256,519	-306,519	-356,519
500000		93,481	43,481	-8,795	-56,519	-106,519	-156,519	-206,519	-256,519	-306,519
550000		143,481	93,481	41,205	-6,519	-56,519	-106,519	-156,519	-206,519	-256,519
625,783		219,264	169,264	116,988	69,264	19,264	-30,736	-80,736	-130,736	-180,736
650000		243,481	193,481	141,205	93,481	43,481	-6,519	-56,519	-106,519	-156,519
700000		293,481	243,481	191,205	143,481	93,481	43,481	-6,519	-56,519	-106,519
750000		343,481	293,481	241,205	193,481	143,481	93,481	43,481	-6,519	-56,519
800000		393,481	343,481	291,205	243,481	193,481	143,481	93,481	43,481	-6,519
850000		443,481	393,481	341,205	293,481	243,481	193,481	143,481	93,481	43,481
900000		493,481	443,481	391,205	343,481	293,481	243,481	193,481	143,481	93,481

WSY allocation (Swide alloc - BlwGR alloc)										SW alloc	391940
5	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000	
Hardy											
400000		395,128	419,578	445,141	468,478	492,928	517,378	541,828	566,278	590,728	
450000		370,678	395,128	420,691	444,028	468,478	492,928	517,378	541,828	566,278	
500000		346,228	370,678	396,241	419,578	444,028	468,478	492,928	517,378	541,828	
550000		321,778	346,228	371,791	395,128	419,578	444,028	468,478	492,928	517,378	
625,783		284,720	309,170	334,733	358,070	382,520	406,970	431,420	455,870	480,320	
650000		272,878	297,328	322,891	346,228	370,678	395,128	419,578	444,028	468,478	
700000		248,428	272,878	298,441	321,778	346,228	370,678	395,128	419,578	444,028	
750000		223,978	248,428	273,991	297,328	321,778	346,228	370,678	395,128	419,578	
800000		199,528	223,978	249,541	272,878	297,328	321,778	346,228	370,678	395,128	
850000		175,078	199,528	225,091	248,428	272,878	297,328	321,778	346,228	370,678	
900000		150,628	175,078	200,641	223,978	248,428	272,878	297,328	321,778	346,228	

Gain GRtoHdy (assume Bostwick returns of										10359 AF)
2	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000		39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000		89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000		139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783		215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000		239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000		289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000		339,641	289,641	237,365	189,641	139,641	89,641	39,641	-10,359	-60,359
800000		389,641	339,641	287,365	239,641	189,641	139,641	89,641	39,641	-10,359
850000		439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000		489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

Allocation GRtoHdy =										0.489 X CWS GRtoHdy
4	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-3,188	-27,638	-53,201	-76,538	-100,988	-125,438	-149,888	-174,338	-198,788
450000		21,262	-3,188	-28,751	-52,088	-76,538	-100,988	-125,438	-149,888	-174,338
500000		45,712	21,262	-4,301	-27,638	-52,088	-76,538	-100,988	-125,438	-149,888
550000		70,162	45,712	20,149	-3,188	-27,638	-52,088	-76,538	-100,988	-125,438
625,783		107,220	82,770	57,207	33,870	9,420	-15,030	-39,480	-63,930	-88,380
650000		119,062	94,612	69,049	45,712	21,262	-3,188	-27,638	-52,088	-76,538
700000		143,512	119,062	93,499	70,162	45,712	21,262	-3,188	-27,638	-52,088
750000		167,962	143,512	117,949	94,612	70,162	45,712	21,262	-3,188	-27,638
800000		192,412	167,962	142,399	119,062	94,612	70,162	45,712	21,262	-3,188
850000		216,862	192,412	166,849	143,512	119,062	94,612	70,162	45,712	21,262
900000		241,312	216,862	191,299	167,962	143,512	119,062	94,612	70,162	45,712

Reduction to Statewide allocation from flood flow year										SW alloc	391940
5	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000	
Hardy											
400000		-3,188	-27,638	-53,201	-76,538	-100,988	-125,438	-149,888	-174,338	-198,788	
450000		21,262	-3,188	-28,751	-52,088	-76,538	-100,988	-125,438	-149,888	-174,338	
500000		45,712	21,262	-4,301	-27,638	-52,088	-76,538	-100,988	-125,438	-149,888	
550000		70,162	45,712	20,149	-3,188	-27,638	-52,088	-76,538	-100,988	-125,438	
625,783		107,220	82,770	57,207	33,870	9,420	-15,030	-39,480	-63,930	-88,380	
650000		119,062	94,612	69,049	45,712	21,262	-3,188	-27,638	-52,088	-76,538	
700000		143,512	119,062	93,499	70,162	45,712	21,262	-3,188	-27,638	-52,088	
750000		167,962	143,512	117,949	94,612	70,162	45,712	21,262	-3,188	-27,638	
800000		192,412	167,962	142,399	119,062	94,612	70,162	45,712	21,262	-3,188	
850000		216,862	192,412	166,849	143,512	119,062	94,612	70,162	45,712	21,262	
900000		241,312	216,862	191,299	167,962	143,512	119,062	94,612	70,162	45,712	

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from <https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm> on January 21,2020
Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

This mehod allows the Guide Rock adjustment to grow with the increasing difference between the Hardy and Guide Rock gages. It does appear that at the extremes, this proposal probably takes too much from NE's allocation. This was the phenomenon that they were trying to address.

In the example above, by the time the difference between Hardy and Guide Rock gages is 350,000 AF, NE's statewide allocation is reduced by nearly 120,000 AF for purposes of the WSY test. This is unlikely to happen, nevertheless there's probably a better solution.

Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF										41278
1	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000		8722	8722	8722	8722	8722	8722	8722	8722	8722
500000		58722	58722	58722	58722	58722	58722	58722	58722	58722
550000		108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783		184505	184505	184505	184505	184505	184505	184505	184505	184505
650000		208722	208722	208722	208722	208722	208722	208722	208722	208722
700000		258722	258722	258722	258722	258722	258722	258722	258722	258722
750000		308722	308722	308722	308722	308722	308722	308722	308722	308722
800000		358722	358722	358722	358722	358722	358722	358722	358722	358722
850000		408722	408722	408722	408722	408722	408722	408722	408722	408722
900000		458722	458722	458722	458722	458722	458722	458722	458722	458722

Gain GRtoHdy (assume Bostwick returns of										10359 AF
2	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000		39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000		89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000		139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783		215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000		239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000		289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000		339,641	289,641	237,365	189,641	139,641	89,641	-10,359	-60,359	-110,359
800000		389,641	339,641	287,365	239,641	189,641	139,641	89,641	-10,359	-110,359
850000		439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000		489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

Computed water supply GRtoHdy (assume CBCU GRtoHdy =										3840 AF)
3	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
450000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
500000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
550000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
625,783		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
650000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
700000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
750000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
800000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
850000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
900000		34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241

Allocation GRtoHdy =										0.489 X CWS GRtoHdy
4	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
450000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
500000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
550000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
625,783		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
650000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
700000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
750000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
800000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
850000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
900000		16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603

WSY alloc (Swide alloc - BlwGR alloc)										SW alloc	391940
5	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000	
Hardy											
400000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
450000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
500000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
550000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
625,783		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
650000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
700000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
750000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
800000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
850000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	
900000		374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543	

Nebraska's proposal subtracts the entire main stem flood flow adjustment from the virgin water supply of the Guide Rock to Hardy reach. This method decreases the computed water supply Guide Rock to Hardy as the Guide Rock gaged flow increases and produces negative allocations effectively increasing Nebraska's statewide allocation beyond what it was in the actual year that it was calculated.

For example: in 2019, the year that that flood flows occurred, Nebraska's statewide allocation after flood flow adjustment, was 319,940 AF.

If 2020 was a WSY, Nebraska would be required to forgo its allocation below Guide Rock in 2019 and under its proposal the amount that it would forgo is -33,016 AF. Subtracting the negative allocation from its 2019 statewide allocation yeilds 424,956 AF for the 2019 allocation above Guide Rock. So instead of forgoing allocation as the WSY test for Nebraska intends, Nebraska's proposal instead increases available allocation by over 33,000 AF.

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm on January 21,2020
Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

Nebraska's proposed method

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = ∑ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

NE Main Stem Allocation = 48.9% * Main Stem CWS

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - Main Stem Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF										41278
1	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000		8722	8722	8722	8722	8722	8722	8722	8722	8722
500000		58722	58722	58722	58722	58722	58722	58722	58722	58722
550000		108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783		184505	184505	184505	184505	184505	184505	184505	184505	184505
650000		208722	208722	208722	208722	208722	208722	208722	208722	208722
700000		258722	258722	258722	258722	258722	258722	258722	258722	258722
750000		308722	308722	308722	308722	308722	308722	308722	308722	308722
800000		358722	358722	358722	358722	358722	358722	358722	358722	358722
850000		408722	408722	408722	408722	408722	408722	408722	408722	408722
900000		458722	458722	458722	458722	458722	458722	458722	458722	458722

Gain GRtoHdy (assume Bostwick returns of										10359 AF
2	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000		39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000		89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000		139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783		215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000		239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000		289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000		339,641	289,641	237,365	189,641	139,641	89,641	39,641	-10,359	-60,359
800000		389,641	339,641	287,365	239,641	189,641	139,641	89,641	39,641	-10,359
850000		439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000		489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

Computed water supply GRtoHdy (assume CBCU GRtoHdy =										3840 AF)
3	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-6,519	-61,679	-119,349	-171,998	-227,158	-282,318	-337,478	-392,637	-447,797
450000		42,512	-6,519	-57,782	-104,581	-153,612	-202,643	-251,673	-300,704	-349,735
500000		81,737	37,609	-8,528	-50,647	-94,775	-138,902	-183,030	-227,158	-271,286
550000		113,830	73,713	31,771	-6,519	-46,635	-86,751	-126,868	-166,984	-207,100
625,783		152,694	117,436	80,573	46,920	11,662	-23,596	-58,854	-94,112	-129,370
650000		163,203	129,259	93,769	61,370	27,425	-6,519	-40,463	-74,408	-108,352
700000		182,600	151,080	118,126	88,041	56,521	25,001	-6,519	-38,039	-69,559
750000		199,411	169,992	139,235	111,155	81,737	52,318	22,900	-6,519	-35,938
800000		214,120	186,540	157,705	131,380	103,801	76,221	48,641	21,061	-6,519
850000		227,099	201,141	174,002	149,226	123,269	97,311	71,354	45,396	19,439
900000		238,635	214,120	188,489	165,089	140,574	116,058	91,543	67,027	42,512

Allocation GRtoHdy =										0.489 X CWS GRtoHdy
4	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-3,188	-30,161	-58,362	-84,107	-111,080	-138,053	-165,026	-192,000	-218,973
450000		20,788	-3,188	-28,255	-51,140	-75,116	-99,092	-123,068	-147,044	-171,021
500000		39,969	18,391	-4,170	-24,766	-46,345	-67,923	-89,502	-111,080	-132,659
550000		55,663	36,046	15,536	-3,188	-22,805	-42,421	-62,038	-81,655	-101,272
625,783		74,668	57,426	39,400	22,944	5,703	-11,538	-28,780	-46,021	-63,262
650000		79,806	63,208	45,853	30,010	13,411	-3,188	-19,787	-36,385	-52,984
700000		89,291	73,878	57,763	43,052	27,639	12,225	-3,188	-18,601	-34,014
750000		97,512	83,126	68,086	54,355	39,969	25,584	11,198	-3,188	-17,573
800000		104,705	91,218	77,118	64,245	50,758	37,272	23,785	10,299	-3,188
850000		111,051	98,358	85,087	72,972	60,278	47,585	34,892	22,199	9,505
900000		116,693	104,705	92,171	80,729	68,741	56,752	44,764	32,776	20,788

		WSY allocation (Swide alloc - BlwGR alloc)					SW alloc		391940	
5	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		395,128	422,101	450,302	476,047	503,020	529,993	556,966	583,940	610,913
450000		371,152	395,128	420,195	443,080	467,056	491,032	515,008	538,984	562,961
500000		351,971	373,549	396,110	416,706	438,285	459,863	481,442	503,020	524,599
550000		336,277	355,894	376,404	395,128	414,745	434,361	453,978	473,595	493,212
625,783		317,272	334,514	352,540	368,996	386,237	403,478	420,720	437,961	455,202
650000		312,134	328,732	346,087	361,930	378,529	395,128	411,727	428,325	444,924
700000		302,649	318,062	334,177	348,888	364,301	379,715	395,128	410,541	425,954
750000		294,428	308,814	323,854	337,585	351,971	366,356	380,742	395,128	409,513
800000		287,235	300,722	314,822	327,695	341,182	354,668	368,155	381,641	395,128
850000		280,889	293,582	306,853	318,968	331,662	344,355	357,048	369,741	382,435
900000		275,247	287,235	299,769	311,211	323,199	335,188	347,176	359,164	371,152

This method allows the Guide Rock adjustment to grow with the increasing difference between the Hardy and Guide Rock gages. It does appear that at the extremes, this proposal probably takes too much from NE's allocation. This was the phenomenon that they were trying to address.

In the example above, by the time the difference between Hardy and Guide Rock gages is 350,000 AF, NE's statewide allocation is reduced by nearly 100,000 AF for purposes of the WSY test.

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm on January 21,2020

Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

Table 3 implements the KS proposal to scale the GRtoHdy Flood Flow Adjustment by the ratio of GR flows to Hardy flows

Kansas' proposed method

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = Σ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

NE Main Stem Allocation = 48.9% * Main Stem CWS

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

= $\left(\frac{\text{Hardy Flows} - \text{Guide Rock Flows}}{\text{Hardy Flows}} \right) \times \text{Mainstem Flood Flow Adjustment}$

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – Main Stem Flood Flow Adjustment

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF										41278
1	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000		8722	8722	8722	8722	8722	8722	8722	8722	8722
500000		58722	58722	58722	58722	58722	58722	58722	58722	58722
550000		108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783		184505	184505	184505	184505	184505	184505	184505	184505	184505
650000		208722	208722	208722	208722	208722	208722	208722	208722	208722
700000		258722	258722	258722	258722	258722	258722	258722	258722	258722
750000		308722	308722	308722	308722	308722	308722	308722	308722	308722
800000		358722	358722	358722	358722	358722	358722	358722	358722	358722
850000		408722	408722	408722	408722	408722	408722	408722	408722	408722
900000		458722	458722	458722	458722	458722	458722	458722	458722	458722

Gain GRtoHdy (assume Bostwick returns of										10359 AF
2	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000		39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000		89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000		139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783		215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000		239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000		289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000		339,641	289,641	237,365	189,641	139,641	89,641	-10,359	-60,359	-110,359
800000		389,641	339,641	287,365	239,641	189,641	139,641	89,641	-10,359	-110,359
850000		439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000		489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

CWS GRtoHdy (assume CBCU GRtoHdy =										3840 AF) cap 68470
3	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-6,519	-61,679	-119,349	-171,998	-227,158	-282,318	-337,478	-392,637	-447,797
450000		42,512	-6,519	-57,782	-104,581	-153,612	-202,643	-251,673	-300,704	-349,735
500000		68,470	37,609	-8,528	-50,647	-94,775	-138,902	-183,030	-227,158	-271,286
550000		68,470	68,470	31,771	-6,519	-46,635	-86,751	-126,868	-166,984	-207,100
625,783		68,470	68,470	68,470	46,920	11,662	-23,596	-58,854	-94,112	-129,370
650000		68,470	68,470	68,470	61,370	27,425	-6,519	-40,463	-74,408	-108,352
700000		68,470	68,470	68,470	56,521	25,001	-6,519	-38,039	-69,559	-103,579
750000		68,470	68,470	68,470	68,470	52,318	22,900	-6,519	-35,938	-68,470
800000		68,470	68,470	68,470	68,470	68,470	68,470	48,641	21,061	-6,519
850000		68,470	68,470	68,470	68,470	68,470	68,470	68,470	45,396	19,439
900000		68,470	68,470	68,470	68,470	68,470	68,470	68,470	67,027	42,512

Allocation GRtoHdy =										0.489 X CWS GRtoHdy
4	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		-3,188	-30,161	-58,362	-84,107	-111,080	-138,053	-165,026	-192,000	-218,973
450000		20,788	-3,188	-28,255	-51,140	-75,116	-99,092	-123,068	-147,044	-171,021
500000		33,482	18,391	-4,170	-24,766	-46,345	-67,923	-89,502	-111,080	-132,659
550000		33,482	33,482	15,536	-3,188	-22,805	-42,421	-62,038	-81,655	-101,272
625,783		33,482	33,482	33,482	22,944	5,703	-11,538	-28,780	-46,021	-63,262
650000		33,482	33,482	33,482	30,010	13,411	-3,188	-19,787	-36,385	-52,984
700000		33,482	33,482	33,482	33,482	27,639	12,225	-3,188	-18,601	-34,014
750000		33,482	33,482	33,482	33,482	33,482	25,584	11,198	-3,188	-17,573
800000		33,482	33,482	33,482	33,482	33,482	33,482	23,785	10,299	-3,188
850000		33,482	33,482	33,482	33,482	33,482	33,482	33,482	22,199	9,505
900000		33,482	33,482	33,482	33,482	33,482	33,482	33,482	32,776	20,788

WSY allocation (Statewide alloc - GRtoHdy alloc)										Statewide alloc (2019) 391940
5	Guide R	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
Hardy										
400000		395,128	422,101	450,302	476,047	503,020	529,993	556,966	583,940	610,913
450000		371,152	395,128	420,195	443,080	467,056	491,032	515,008	538,984	562,961
500000		358,458	373,549	396,110	416,706	438,285	459,863	481,442	503,020	524,599
550000		358,458	358,458	376,404	395,128	414,745	434,361	453,978	473,595	493,212
625,783		358,458	358,458	358,458	368,996	386,237	403,478	420,720	437,961	455,202
650000		358,458	358,458	358,458	361,930	378,529	395,128	411,727	428,325	444,924
700000		358,458	358,458	358,458	358,458	364,301	379,715	395,128	410,541	425,954
750000		358,458	358,458	358,458	358,458	366,356	380,742	395,128	409,513	424,286
800000		358,458	358,458	358,458	358,458	358,458	368,155	381,641	395,128	410,541
850000		358,458	358,458	358,458	358,458	358,458	358,458	358,458	369,741	382,435
900000		358,458	358,458	358,458	358,458	358,458	358,458	358,458	359,164	371,152

This method implements the same proportional assignment of flood flows as Kansas' Jan 16 initial proposal, but also caps the CWS in the Guide Rock to Hardy reach at the highest historical allocation that was generated in a non-flood flow year, which is currently 68,470 AF.

This method ensures that the allocation below Guide Rock is always positive, but is also reasonably capped.

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm on January 21,2020

Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

Table 3 implements the KS proposal to scale the GRtoHdy Flood Flow Adjustment by the ratio of GR flows to Hardy flows

Kansas' proposed method

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = Σ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

NE Main Stem Allocation = 48.9% * Main Stem CWS

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

= $\left(\frac{\text{Hardy Flows} - \text{Guide Rock Flows}}{\text{Hardy Flows}} \right) \times \text{Mainstem Flood Flow Adjustment}$

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – Main Stem Flood Flow Adjustment

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

From: [Flaute, Carol](#)
To: [Beightel, Chris \[KDA\]](#)
Cc: [Bradley, Jesse](#); Ivan.Franco@state.co.us; [Burgert, Kari](#)
Subject: RE: KS work on NE's flood flows/Table 5C issue
Date: Thursday, March 12, 2020 10:41:28 AM

Chris,

As you will recall, Nebraska's original concern about the flood flows accounting adjustment is that Guide Rock supply decreases with increasing streamflow between Guide Rock and Hardy when the flood flow adjustment is in effect. Upon further review of Kansas's January 2020 and February 2020 proposals for how to address this flood flows accounting issue, Nebraska does not think that either of Kansas's two proposals addresses Nebraska's original concern, because the problematic accounting behavior persists when applying both methods. Furthermore, we still believe that Nebraska's December 2019 proposal does address the original concern.

Nebraska's focus is on continuing to try to resolve the original, agreed-upon problem. We understand that Kansas has additional concerns about Nebraska's proposed method, but we do not have a clear understanding of them. Can you please clarify what Kansas's additional concerns are and how they fit in with solving the original problem? We would be happy to schedule a time for further discussion.

Carol J. Myers Flaute

INTEGRATED WATER MANAGEMENT COORDINATOR

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From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Wednesday, February 5, 2020 1:58 PM
To: Flaute, Carol <carol.flaute@nebraska.gov>; Ivan.Franco@state.co.us
Cc: Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Barfield, David [KDA] <David.Barfield@ks.gov>; Willem Schreuder <willem@prinmath.com>
Subject: KS work on NE's flood flows/Table 5C issue

Carol and Ivan,

Attached is an Excel workbook file that Kansas has developed to analyze proposed methods for dealing with the Flood Flows in WSY test issue.

Kansas has observed that Nebraska's 6 December 2019 proposed method could potentially increase Nebraska's Above Guide Rock allocation in a flood flow year if that flood flow year was part of the Table 5C test.

We have also observed that Kansas' 16 January 2020 proposed method does partially address Nebraska's original concern.

We also recognize that in a flood flow year, there could be a level of flow in the Guide Rock to Hardy reach that is reasonably unusable to Nebraska and that should be adjusted for. Kansas' 3 February 2020 proposed method is based on Kansas' 16 January method but adds a cap to the Computed Water Supply of the Guide Rock to Hardy reach. The cap in the proposal is set at the largest Computed Water Supply in the Guide Rock to Hardy reach in the record for a non-flood flow year.

Please review this work and let me know if you have any questions about it or would like to discuss it further.

Chris

From: [Beightel, Chris \[KDA\]](#)
To: [Flaute, Carol](#)
Cc: [Bradley, Jesse](#); Ivan.Franco@state.co.us; [Burgert, Kari](#)
Subject: Re: KS work on NE's flood flows/Table 5C issue
Date: Monday, March 23, 2020 1:25:03 PM

Carol,

Here finally is our response to your March 12 email:

The agreed-upon problem

Kansas has acknowledged that the inclusion of a Flood Flow year in a water-short year test was probably not contemplated when the Accounting Procedures were developed and that because of this omission, there should be an adjustment for Flood Flows in the Table 5C test in the RRCA APs. That's the agreed-upon problem as I understand it.

Nebraska's proposal

Nebraska's December 2019 proposal ("Nebraska's Proposal") solves Nebraska's concern, but its impact on allocations appears to be inconsistent with other sub-basin adjustments implemented in the Accounting Procedures. The inconsistency is that; in the case of normal-year accounting the Flood Flow adjustment is applied to the entire mainstem, but in water short year ("WSY") accounting, the entire Flood Flow adjustment is applied to only the Guide-Rock to Hardy "subbasin".

Kansas' fundamental concern is that Nebraska's Proposal erroneously assumes that all Flood Flows originate below Guide Rock.

The result of subtracting all of the Flood Flows from Hardy when determining the Guide Rock to Hardy allocation for the Table 5C test, is that when the difference between the Guide Rock and Hardy gages is less than the Flood Flows (as happened in 2019), the Guide Rock to Hardy allocation is calculated to be negative, as if no water was beneficially used by Nebraska between Guide Rock and Hardy. Even more concerning to Kansas is that subtracting this calculated negative allocation below Guide Rock as required by the Table 5C test thereby increases the allocation above Guide Rock.

In 2019, Flood Flows were triggered by flows past Hardy March-July at 337,000 AF (5 months total greater than 325,000 AF). In that same time period, flows past Guide Rock were 227,000 AF; a difference of 110,000 AF. After July, it appears that the two gages evened out, though USGS has yet to finalize the records for the last quarter of 2019. In any case, the illustration works just as well looking at the estimate that Willem Schreüder included in his preliminary accounting [here](#). That estimate has end-of-year Guide Rock flow at 502,276 AF and Hardy flow at 625,783 AF, a difference of 123,507 AF. Clearly, all of the Flood Flows did not originate below Guide Rock, but Nebraska's Proposal would subtract the entire calculated amount of Flood Flows (184,000 AF) from the Hardy gage to determine the Table 5C allocation. This does not make sense to Kansas.

Again, looking at the preliminary accounting for 2019; in normal-year accounting for Nebraska (Table 3C), Nebraska's 2019 statewide allocation (with adjustments), including accounting for Flood Flows, is 142,076 AF. If that same year is used in a WSY test, Nebraska's Proposal would set the allocation above Guide Rock at 179,898; an increase in water available to Nebraska in a WSY of 37,822 AF. This does not make sense to Kansas. Kansas believes that the Table 5C "allocation above Guide Rock" should always be less than the Table 3C "statewide allocation" because the fundamental purpose of the WSY provisions is to constrain the allowable use by the upstream state and thereby increase the available supply to the downstream state.

Kansas' proposal

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Please review this work and let me know if you have any questions about it or would like to discuss it further.

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Date: Friday, April 3, 2020 2:55:41 PM

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Guide Rock to Hardy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

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We believe this alternative proposal addresses the concerns raised by Kansas about Nebraska's original proposal and that it is consistent with your thoughts expressed during the March 3-States.

Thank you for continuing to work with us toward resolving the Flood Flows Adjustment issue.

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Nebraska Department of Natural Resources

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Subject: Re: KS work on NE's flood flows/Table 5C issue
Date: Monday, April 13, 2020 3:30:00 PM
Attachments: [2020-04-13.KS-RespToNE0403-FF.pdf](#)

Carol,

Attached please find our response to your 4/3 email and proposal.

I am available to discuss this issue this week - after 3p Tue or Wed; Thu until noon; Fri until noon. I do think it would be helpful for us to have a more in-depth technical conversation before the larger 3-States call next Monday 4/20.

Chris

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Please review this work and let me know if you have any questions about it or would like to discuss it further.

Chris

Nebraska's Latest Proposal

Nebraska's April 3, 2020 proposal (4/3 Proposal) still appears to create accounting disparities for Kansas water users by working against the fundamental purposes of both: 1) the Water Short Year provisions and specifically the test in Table 5C which requires that Nebraska forgo the use of the two-year average of its allocation below Guide Rock, and 2) the Flood Flow provisions whose purpose is to adjust the accounting for unusable water, not to potentially relax Nebraska's compliance obligations in future years. Although your intent to fix the stated problem is clear, your proposal has the potential to hurt Kansas water users directly.

As a starting point, can you please provide us with more information justifying a Flood Flow year allocation of 0 AF for the Guide Rock to Hardy reach as your 4/3 Proposal would require in 2019?

In order to provide some perspective about why this proposal causes us concern, please consider that the Table 5C test limits Nebraska's use in a dry year by removing Nebraska's access to the 2-year average of its Guide Rock to Hardy allocation. In a wetter, but non-Flood Flow year, Nebraska's Guide Rock to Hardy allocation might be 20,000-25,000 AF. See 2001, 2010, 2011, 2015 (33,482 AF), 2018. But Nebraska proposes that in 2019, its Guide Rock to Hardy allocation should be adjusted to 0 AF. If the 20,000-25,000 AF year is not included in the two-year average, the average is going to be much smaller, resulting in less allocation for Kansas despite the intent of the Water Short Year provisions.

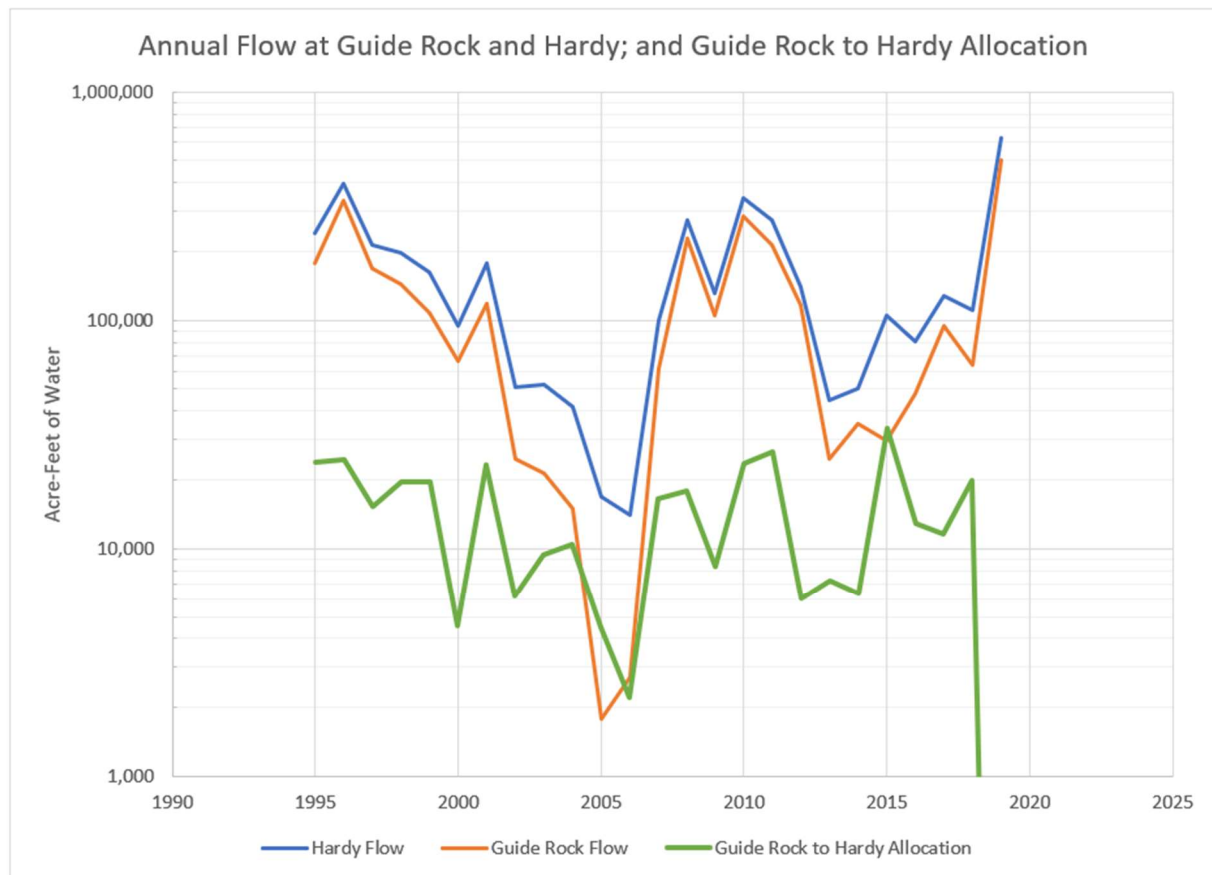


Figure 1 data from republicanrivercompact.org/restricted, except 2019 Guide Rock to Hardy allocation from Nebraska 4/3 Proposal

The table below is based on historical Guide Rock to Hardy allocations as documented on Willem's site [here](#).

Nebraska allocation below Guide Rock from wetter to drier years and illustration of the effects of Nebraska's 4/3/20 proposal assuming Year 1 of the 2-year Table 5C test is a flood flow year and the NE proposal sets the Year 1 allocation to zero as would happen in 2019					
(1)	(2)	(3)	(4)	(5)	(6)
Year	Alloc difference	current Table 5c NE would have to forgo	Alloc Year 2	NE 4/3/2020 proposal table 5c Nebraska would have to forgo if flood flow year(1) results in no GR2Hdy Alloc	increase to NE's Table 5c statewide alloc if flood flow year(1) has no alloc
2015-2016	-20602	23181	12880	6440	16741
2011-2012	-20480	16230	5990	2995	13235
2001-2002	-17247	14820	6196	3098	11722
1999-2000	-15071	12074	4538	2269	9805
2008-2009	-9418	13086	8377	4189	8898
1996-1997	-9257	19993	15364	7682	12311
2004-2005	-6015	7492	4484	2242	5250
2005-2006	-2269	3350	2215	1108	2243
2016-2017	-1335	12213	11545	5773	6441
2013-2014	-954	6785	6308	3154	3631
1998-1999	-83	19651	19609	9805	9847

The table is sorted in order of the largest decreases in Guide Rock to Hardy allocation from year to year.

Column 2 shows the difference in Guide Rock to Hardy allocation from one year to the next.

Column 3 is the historical calculation of Guide Rock to Hardy allocation that Nebraska would have to forgo if the second year in Column 1 was a Water Short Year.

Column 4 is the historical calculation of the Guide Rock to Hardy allocation for the second of the two years in Column 1.

Column 5 is the amount of allocation that Nebraska would have to forgo under its 4/3 Proposal if the first year in Column 1 was a Flood Flow year and its allocation was set to zero (as would happen in 2019).

Column 6 is the effective increase to Nebraska's statewide allocation in a Water Short Year under Nebraska's 4/3 Proposal if the first year in Column 1 was a Flood Flow year and its allocation was set to zero (as would happen in 2019).

Summary and Future Talking Points

Kansas has repeatedly acknowledged that the inclusion of a Flood Flow year in a Water Short Year Test was probably not contemplated when the Accounting Procedures were developed and that because of this omission, there should be an adjustment for Flood Flows in the Table 5C test in the RRCA APs. However, Kansas does not completely agree with Nebraska's characterization of the problem, namely

“the behavior of decreasing Guide Rock supply with increasing streamflow between Guide Rock and Hardy when the Flood Flow Adjustment is in effect.”

Kansas continues to hold that the problem is that there are no defined flood flow provisions for the Guide Rock to Hardy subbasin – a subbasin that only exists in the Accounting Procedures in the context of the Table 5C test. With no such provisions, Nebraska has proposed, first; subtracting all of the Mainstem Flood Flows out of the subbasin, and now proposes subtracting the Mainstem Flood Flows or the subbasin Virgin Water Supply, whichever is less. These proposed measures seem arbitrary and don’t address the root problem that the Accounting Procedures don’t contemplate a Flood Flow adjustment for the Guide Rock to Hardy subbasin.

Nebraska seems focused on ensuring that Flood Flows will not reduce its allocation in Water Short Years. Kansas is focused on ensuring that Flood Flows don’t reduce its allocation in Water Short Years either. Nebraska’s 4/3 Proposal passes Nebraska’s test but fails Kansas’ test.

Kansas remains open to any proposed solutions, including some modified version of our previously suggested limitations, but we’ll need some clarification as to why Nebraska thinks it is reasonable to ever adjust its Guide Rock to Hardy allocation to anything less than a wet-year level.

Regards,

Chris Beightel

Engineering Committee Report August 21, 2020 - Signature Page

Final Audit Report

2020-08-21

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Exhibit G: Accounting Procedures Revisions

Republican River Compact Administration

ACCOUNTING PROCEDURES AND REPORTING REQUIREMENTS

Revised August 21, 2020

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I. Introduction

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

II. Definitions

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

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

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

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

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

Annual: yearly from January 1 through December 31;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Federal Reservoirs:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

RRCA Accounting Procedures: this document and all attachments hereto;

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

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

States: the States of Colorado, Kansas and Nebraska;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

III. Basic Formulas

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

Basic Formulas for Calculating Virgin Water Supply, Computed Water Supply, Allocations and Computed Beneficial Consumptive Use		
Sub-basin VWS	=	Gage + All CBCU + ΔS – IWS – APV*
Main Stem VWS	=	Hardy Gage – Σ Sub-basin gages + All CBCU in the Main Stem + ΔS – IWS
CWS	=	VWS - ΔS – FF + CWSA ¹
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

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

Abbreviations:

APV	=	Augmentation Pumping Volume
CBCU	=	Computed Beneficial Consumptive Use
FF	=	Flood Flows
Gage	=	Gaged Flow
IWS	=	Imported Water Supply Credit
CWS	=	Computed Water Supply
CWSA	=	Computed Water Supply Adjustment
VWS	=	Virgin Water Supply
%	=	the ratio used to allocate the Computed Water Supply between the States. This ratio is based on the allocations in the Compact
ΔS	=	Change in Federal Reservoir Storage

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

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

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

2. Main Stem Calculation:

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

3. Imported Water Supply Credit Calculation:

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

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

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

4. Augmentation Pumping Volume

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

B. Calculation of Computed Water Supply

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

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

1. Flood Flows

If in any calendar year there are five consecutive months in which the total actual stream flow² at the Hardy gage is greater than 325,000 Acre-feet, or any two consecutive months in which the total actual stream flow is greater than 200,000 Acre-feet, the annual flow in excess of 400,000 Acre-feet at the Hardy gage will be considered to be Flood Flows that will be subtracted from the Virgin Water Supply to calculate the Computed Water Supply, and Allocations. The Flood Flow in excess of 400,000 Acre-feet at the Hardy gage will be subtracted from the Virgin Water Supply of the Main Stem to compute the Computed Water Supply unless the Annual Gaged Flows from a Sub-basin, minus the Augmentation Pumping Volume for that Sub-basin, were in excess of the flows shown for that Sub-basin in Attachment 1. These excess Sub-basin flows shall be considered to be Sub-basin Flood Flows.

If there are Sub-basin Flood Flows, the total of all Sub-basin Flood Flows shall be compared to the amount of Flood Flows at the Hardy gage. If the sum of the Sub-basin Flood Flows are in excess of the Flood Flow at the Hardy gage, the flows to be deducted from each Sub-basin shall be the product of the Flood Flows for each Sub-basin times the ratio of the Flood Flows at the Hardy gage divided by the sum of the Flood Flows of the Sub-basin gages. If the sum of the Sub-basin Flood Flows is less than the Flood Flow at the Hardy gage, the entire amount of each Sub-basin Flood Flow shall be deducted from the Virgin Water Supply to compute the Computed Water Supply of that Sub-basin for that year. The remainder of the Flood Flows will be subtracted from the flows of the Main Stem.³

2. Computed Water Supply Adjustment

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

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

³ At its Annual Meeting on August 21, 2020, the RRCA agreed that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flow provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock. The current implementation could impact Nebraska's Table 5C compliance test, specifically the Allocation above Guide Rock. Nebraska and Kansas each offered proposals to resolve the issue but could not reach agreement on a solution. Due to the infrequent occurrence of Flood Flows, the RRCA deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. The states wish to acknowledge and memorialize the issue to encourage work toward its resolution.

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

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

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

2. Surface Water

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

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

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

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

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

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

If any one of the previous four accounting years or the current accounting year is a Water Short Year (as defined in Section III.J.a and b), then Colorado's compliance will be calculated using Table 5A. For each accounting year that is designated as a Water Short

Year pursuant to Section III.J, Colorado's statewide allocation will be reduced by the Beaver Creek Reduction which is the average of the unused Colorado Beaver Creek Sub-basin allocation for the five most-recent Water Short Year designations prior to that accounting year as shown in Table 5F example. The Beaver Creek Reduction will be reported in Table 5F. If the accounting year was not designated as a Water Short Year then the Beaver Creek Reduction will not be applied in that year.

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

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

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

G. Calculations To Determine Projected Water Supply

1. Procedures to Determine Water Short Years

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

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

Step 2. Determine the maximum irrigation water available by subtracting the

sediment pool storage (currently 164,111 Acre-feet) and adding the summer sediment pool evaporation (20,000 Acre-feet) to the result from Step 1.

Step 3. For October through January calculations, take the result from Step 2 and using the Shared Shortage Adjustment Table in Attachment 2 hereto, determine the preliminary irrigation water available for release. The calculation using the end of December content (January calculation month) indicates the minimum amount of irrigation water available for release at the end of May. For February through June calculations, subtract the maximum irrigation water available for the January calculation month from the maximum irrigation water available for the calculation month. If the result is negative, the irrigation water available for release (January calculation month) stays the same. If the result is positive the preliminary irrigation water available for release (January calculation month) is increased by the positive amount.

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

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

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

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

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

For Water-Short-Administration Years, in addition to the normal calculations, the Computed Water Supply, Allocations, Computed Beneficial Consumptive Use, NERWS

Credit, and Imported Water Supply Credits shall also be calculated above Guide Rock as shown in Table 5C. These calculations shall be done in the same manner as in non-Water-Short Administration years except that water supplies originating below Guide Rock shall not be included in the calculations of water supplies originating above Guide Rock. The calculations of Computed Beneficial Consumptive Uses shall be also done in the same manner as in non-Water-Short Administration years except that Computed Beneficial Consumptive Uses from diversions below Guide Rock shall not be included. The depletions from the water diverted by the Superior and Courtland Canals at the Superior- Courtland Diversion Dam shall be included in the calculations of Computed Beneficial Consumptive Use above Guide Rock. Imported Water Supply Credits above Guide Rock, as described in Sub-section III.I., may be used as offsets against the Computed Beneficial Consumptive Use above Guide Rock by the State providing the Imported Water Supply Credits.

The Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage shall be determined by taking the difference in stream flow at Hardy and Guide Rock, adding Computed Beneficial Consumptive Uses in the reach (this does not include the Computed Beneficial Consumptive Use from the Superior and Courtland Canal diversions), and subtracting return flows from the Superior and Courtland Canals in the reach. The Computed Water Supply above Guide Rock shall be determined by subtracting the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from the total Computed Water Supply.⁴ 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

⁴ At its Annual Meeting on August 21, 2020, the RRCA agreed to revisit the calculation of the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage and the Computed Water Supply above Guide Rock per Section III.B.1.

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

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

2. Imported Water Supply Credits Above Harlan County Dam

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

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

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

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

- a. Imported Water Supply Credit shall be given between Harlan County Dam and Guide Rock during the period that flows are diverted to fill Lovewell Reservoir to the extent that imported water was needed to meet Lovewell Reservoir target elevations.
- b. Fall and spring fill periods shall be established during which credit shall be given for the Imported Water Supply Credit accruing in the reach. The fall period shall extend from the end of the irrigation season to December 1. The spring period shall extend from March 1 to May 31. The Lovewell target elevations for these fill periods are the projected end of November reservoir level and the projected end of May reservoir level for most probable inflow conditions as indicated in Table 4 in the current Annual Operating Plan prepared by the Bureau of Reclamation.
- c. The amount of water needed to fill Lovewell Reservoir for each period shall be calculated as the storage content of the reservoir at its target elevation at the end of the fill period minus the reservoir content at the start of the fill period plus the amount of net evaporation during this period minus White Rock Creek inflows for the same period.
- d. If the fill period as defined above does not coincide with the period of modeled flows, the amount of the Imported Water Supply Credit during the fill period for that month shall be the total monthly modeled Imported Water Supply Credit times the number of days in the month occurring during the fill season divided by the total number of days in the month.
- e. The amount of non-imported water available to fill Lovewell Reservoir to the target elevation shall be the amount of water available at Guide Rock during the fill period minus the amount of the Imported Water Supply Credit accruing in the reach during the same period.
- f. The amount of the Imported Water Supply Credit that shall be credited against a State's Consumptive Use shall be the amount of water imported by that State that is available in the reach during the fill period or the amount of water needed to reach Lovewell Reservoir target elevations minus the amount of non-imported water available during the fill period, whichever is less.

5. Other Credits

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

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

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

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

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

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

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

IV. Specific Formulas**A. Computed Beneficial Consumptive Use****1. Computed Beneficial Consumptive Use of Groundwater:**

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

2. Computed Beneficial Consumptive Use of Surface Water:

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

a) Non-Federal Canals

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

b) Individual Surface Water Pumps

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

Gravity Flow	30%
Center Pivot	17%
LEPA	10%

c) Federal Canals

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

the return flow from the canal diversion. The assumed field efficiencies and the amount of the field and canal loss that reaches the stream may be reviewed by the RRCA and adjusted as appropriate to insure their accuracy.

d) Non-irrigation Uses

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

e) Evaporation from Federal Reservoirs

Net Evaporation from Federal Reservoirs will be calculated as follows:

(1) Harlan County Lake, Evaporation Calculation

April 1 through October 31:

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

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

The pan coefficients were determined by studies the Corps of Engineers conducted a number of years ago. The result is the evaporation in inches. It is divided by 12 and multiplied by the daily lake surface area in acres to obtain the evaporation in Acre-feet. The

lake surface area is determined by the 8:00 a.m. elevation reading applied to the lake's area-capacity data. The area-capacity data is updated periodically through a sediment survey. The last survey was completed in December 2000.

November 1 through March 31

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

HARLAN COUNTY LAKE

Estimated Evaporation in Inches
Winter Season -- Monthly Total
PERCENTAGE OF ICE COVER

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

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

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

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

The remaining annual net evaporation (Acre-feet) will be charged to Kansas and Nebraska in proportion to the annual diversions made by the Kansas Bostwick Irrigation District and the Nebraska Bostwick Irrigation District during the time period each year when irrigation releases are being made from Harlan County Lake. For any year in which no irrigation releases were made from Harlan County Lake, the annual net evaporation charged to Kansas and Nebraska will be based on the average of the above calculation for the most recent three years in which irrigation releases from Harlan County Lake were made. In the event Nebraska chooses to substitute supply for the Superior Canal from Nebraska's allocation below Guide Rock in Water-Short Year Administration years, the amount of the substitute supply will be included in the calculation of the split as if it had been diverted to the Superior Canal at Guide Rock.

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

An evaporation pan reading is taken each day at the dam site. This measurement is the amount of water lost from the pan over a 24-hour period in inches. The evaporation pan reading is adjusted for any precipitation recorded during the 24-hour period. Instructions for determining the daily pan evaporation are found in the "National Weather Service Observing Handbook No. 2 – Substation Observations." All dams located in the Kansas River Basin with the exception of Bonny Dam are National Weather Service Cooperative Observers. The daily evaporation pan readings are totaled at the end of each month and converted to a "free water surface" (FWS) evaporation, also referred to as "lake" evaporation. The FWS evaporation is determined by multiplying the observed pan evaporation by a coefficient of .70 at each of the reservoirs. This coefficient can be affected by several factors including water and air temperatures. The National Oceanic and Atmospheric Administration (NOAA) has published technical reports describing

the determination of pan coefficients. The coefficient used is taken from the "NOAA Technical Report NWS 33, Map of coefficients to convert class A pan evaporation to free water surface evaporation". This coefficient is used for the months of April through October when evaporation pan readings are recorded at the dams. The monthly FWS evaporation is then multiplied by the average surface area of the reservoir during the month in acres. Dividing this value by twelve will result in the amount of water lost to evaporation in Acre-feet during the month.

During the winter months when the evaporation pan readings are not taken, monthly evaporation tables based on the percent of ice cover are used. The tables used were developed by the Corps of Engineers and were based on historical average evaporation rates. A separate table was developed for each of the reservoirs. The monthly evaporation rates are multiplied by the .70 coefficient for pan to free water surface adjustment, divided by twelve to convert inches to feet and multiplied by the average reservoir surface area during the month in acres to obtain the total monthly evaporation loss in Acre- feet.

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

f) Non-Federal Reservoir Evaporation:

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

Net evaporation from Non-Federal Reservoirs with 200 Acre-feet of storage or greater will be calculated by multiplying the average annual surface area (obtained from the area-capacity survey) and the net evaporation from the nearest evaporation and climate station to the

reservoir. If the average annual surface area is not available, the Non-Federal Reservoirs with 200 Acre-feet of storage or greater will be presumed to be full at the principal spillway elevation.

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

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

Abbreviations:

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

1. North Fork of Republican River in Colorado⁵

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

⁵ The RRCA will investigate whether return flows from the Haigler Canal diversion in Colorado may return to the Arikaree River, not the North Fork of the Republican River, as indicated in the formulas. If there are return flows from the Haigler Canal to the Arikaree River, these formulas will be changed to recognize those returns.

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

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

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

$$\begin{aligned} \text{VWS} &= \text{North Fork of the Republican River at the State Line,} \\ &\text{Stn. No. 06823000} + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} \\ &+ \text{Nebraska Haigler Canal RF} - \text{IWS} - \text{APV} \end{aligned}$$

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

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

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

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

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

2. Arikaree River⁵

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

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

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

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

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

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

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

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

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

3. Buffalo Creek

CBCU Colorado	$= 0.6 \times Dc + \% \times Pc + 0.5 \times M\&In + EvNFRc + GWc$
CBCU Kansas	$= GWk$
CBCU Nebraska	$= 0.6 \times Dn + \% \times Pn + 0.5 \times M\&In + EvNFRn + GWn$
VWS	$= \text{Buffalo Creek near Haigler Gage Stn. No. 06823500} + CBCUc + CBCUk + CBCUn - IWS$
CWS	$= VWS - FF$
Allocation Nebraska	$= 0.330 \times CWS$
Unallocated	$= 0.670 \times CWS$

4. Rock Creek

CBCU Colorado	$= GWc$
CBCU Kansas	$= GWk$
CBCU Nebraska	$= 0.6 \times Dn + \% \times Pn + 0.5 \times M\&In + EvNFRn + GWn$
VWS	$= \text{Rock Creek at Parks Gage Stn. No. 06824000} + CBCUc + CBCUk + CBCUn - IWS - APV$
CWS	$= VWS - FF$
Allocation Nebraska	$= 0.400 \times CWS$
Unallocated	$= 0.600 \times CWS$

5. South Fork Republican River

CBCU Colorado	$= 0.6 \times \text{Hale Ditch Diversion} + 0.6 \times Dc + \% \times Pc + 0.5 \times M\&Ic + EvNFRc + \text{Bonny Reservoir Ev} + GWc$
CBCU Kansas	$= 0.6 \times Dk + \% \times Pk + 0.5 \times M\&Ik + EvNFRk + GWk$
CBCU Nebraska	$= 0.6 \times Dn + \% \times Pn + 0.5 \times M\&In + EvNFRn + GWn$

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

6. Frenchman Creek in Nebraska

CBCU Colorado = GWc

CBCU Kansas = GWk

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

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

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

CWS = VWS - ΔS Enders Reservoir – FF

Allocation Nebraska = 0.536 x CWS

Unallocated = 0.464 x CWS

7. Driftwood Creek

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

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

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

$$\begin{aligned} \text{VWS} &= \text{Driftwood Creek near McCook Gage Stn. No. 06836500} \\ &+ \text{CBCUc} + \text{CBCUk} + \text{CBCUn} \\ &- 0.24 \times \text{Meeker Driftwood Canal RF} - \text{IWS} \end{aligned}$$

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

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

$$\text{Allocation Kansas} = 0.069 \times \text{CWS}$$

$$\text{Allocation Nebraska} = 0.164 \times \text{CWS}$$

$$\text{Unallocated} = 0.767 \times \text{CWS}$$

8. Red Willow Creek in Nebraska

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

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

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

Note:

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

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

$$\text{VWS} = \text{Red Willow Creek near Red Willow Gage Stn. No.}$$

$$06838000 + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} + 0.9 \times \text{Red Willow Canal CBCU} + 0.9 \times \text{Hugh Butler Lake Ev} + 0.9 \times \text{Red Willow Canal RF} + \Delta S \text{ Hugh Butler Lake} - \text{IWS}$$

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

$$\text{CWS} = \text{VWS} - \Delta S \text{ Hugh Butler Lake} - \text{FF}$$

$$\text{Allocation Nebraska} = 0.192 \times \text{CWS}$$

$$\text{Unallocated} = 0.808 \times \text{CWS}$$

9. Medicine Creek

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

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

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

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

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

$$\begin{aligned} \text{VWS} = & \text{Medicine Creek below Harry Strunk Lake Gage Stn. No.} \\ & 06842500 + \text{CBCUc} + \text{CBCUk} + \text{CBCUn} - 0.6 \times \text{Dn below} \\ & \text{gage} - \% \times \text{Pn below gage} - 0.5 \times \text{M\&In below gage} \\ & - \text{EvNFRn below gage} + \text{Harry Strunk Lake Ev} + \Delta S \text{ Harry} \\ & \text{Strunk Lake} - \text{IWS} - \text{APV} \end{aligned}$$

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

$$\text{CWS} = \text{VWS} - \Delta S \text{ Harry Strunk Lake} - \text{FF}$$

$$\text{Allocation Nebraska} = 0.091 \times \text{CWS}$$

$$\text{Unallocated} = 0.909 \times \text{CWS}$$

10. Beaver Creek

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

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

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

$$\begin{aligned} \text{VWS} &= \text{Beaver Creek near Beaver City gage Stn. No. 06847000} + \\ &\text{BCUc} + \text{CBCUk} + \text{CBCUn} - 0.6 \times \text{Dn below gage} - \% \times \text{Pn} \\ &\text{below gage} - 0.5 \times \text{M\&In below gage} - \text{EvNFRn below} \\ &\text{gage} - \text{IWS} \end{aligned}$$

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

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

$$\text{Allocation Colorado} = 0.200 \times \text{CWS}$$

$$\text{Allocation Kansas} = 0.388 \times \text{CWS}$$

$$\text{Allocation Nebraska} = 0.406 \times \text{CWS}$$

$$\text{Unallocated} = 0.006 \times \text{CWS}$$

11. Sappa Creek

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

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

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

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

12. 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

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

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 (IRR Season) x (1- %BRF) + Superior Canal (Non-IRR Season) x (1 - 92%)
 + Franklin Pump Canal (IRR Season) x (1- %BRF) + Franklin Pump Canal (Non-IRR Season) x (1 - 92 %)
 + Franklin Canal (IRR Season) x (1- %BRF) + Franklin Canal (Non-IRR Season) x (1 - 92%)
 + Naponee Canal (IRR Season) x (1- %BRF) + Naponee Canal (Non-IRR Season) x (1 - 92%)
 + Cambridge Canal (IRR Season) x (1- %BRF) + Cambridge Canal (Non-IRR Season) x (1 - 92%)
 + Bartley Canal (IRR Season) x (1- %BRF) + Bartley Canal (Non-IRR Season) x (1 - 92%)
 + Meeker-Driftwood Canal (IRR Season) x (1- %BRF) + Meeker-Driftwood Canal (Non-IRR Season) x (1- 92%)
 + 0.9 x Red Willow Canal CBCU
 + 0.6 x Dn
 + % x Pn

- + 0.5 x M&In
- + EvNFRn
- + 0.9 x Hugh Butler Lake Ev
- + Harry Strunk Lake Ev
- + Swanson Lake Ev
- + Harlan County Lake Ev charged to Nebraska
- + GWn

Notes:

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

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

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

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

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

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

VWS

=
Republican River near Hardy Gage Stn. No. 06853500
- North Fork of the Republican River at the State Line, Stn. No. 06823000
- Arikaree Gage at Haigler Stn. No. 06821500
- Buffalo Creek near Haigler Gage Stn. No. 06823500
- Rock Creek at Parks Gage Stn. No. 06824000
- South Fork Republican River near Benkelman Gage Stn.

No. 06827500

- Frenchman Creek in Culbertson Stn. No. 06835500
- Driftwood Creek near McCook Gage Stn. No. 06836500
- Red Willow Creek near Red Willow Gage Stn.

No. 06838000

- Medicine Creek below Harry Strunk Lake Gage Stn.

No. 06842500

- Sappa Creek near Stamford Gage Stn. No. 06847500
- Prairie Dog Creek near Woodruff, Kansas Stn. No. 068485000

+ CBCUc

+ CBCUn

+ 0.6 x Dk

+ % x Pk

+ 0.5 x M&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 + CWSA

Allocation Kansas = 0.511 x CWS

Allocation Nebraska = 0.489 x CWS

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

The following information for the previous calendar year shall be provided to the members of the RRCA Engineering Committee by April 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	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:

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

6. Platte River Reservoirs:

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

7. Water Administration Notification:

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

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

The number of notices sent.

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

8. Moratorium:

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

Designation whether the Well is a:

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

Wells in the Basin in Northwest Kansas or Colorado. Kansas and Colorado will

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

9. Non-Federal Reservoirs:

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

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

10. Augmentation Projects:

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

B. RRCA Groundwater Model Data Input Files

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

C. Inputs to RRCA Accounting

1. Surface Water Information

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

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

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

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

Federal Reservoirs:

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

- c. Non-federal reservoirs obtained by each state: an updated

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

d. Diversions and related data from USBR

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

e. Diversions and related data – from each respective State

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

2. Groundwater Information

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

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

3. Summary

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

D. Verification

1. Documentation to be Available for Inspection Upon Request

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

2. Site Inspection

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

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

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

Table 2: Original Compact Virgin Water Supply and Allocations

Designated Drainage Basin	Virgin Water Supply	Colorado Allocation	% of Total Drainage Basin Supply	Kansas Allocation	% of Total Drainage Basin Supply	Nebraska Allocation	% of Total Drainage Basin Supply	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 for Averaging Periods with No Water Short Year Designations Pursuant to Section III.J.

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

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

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

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

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

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

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

Note: In Table 4A, the CORWS Credit in Col 3 can only be applied to the North Fork Republican River Colorado.

Table 4A is left unpopulated pursuant to the 2016 Colorado CCP/SF Resolution, paragraph E.

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

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

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

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

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

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

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

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

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

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

Note:

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

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

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

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

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

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

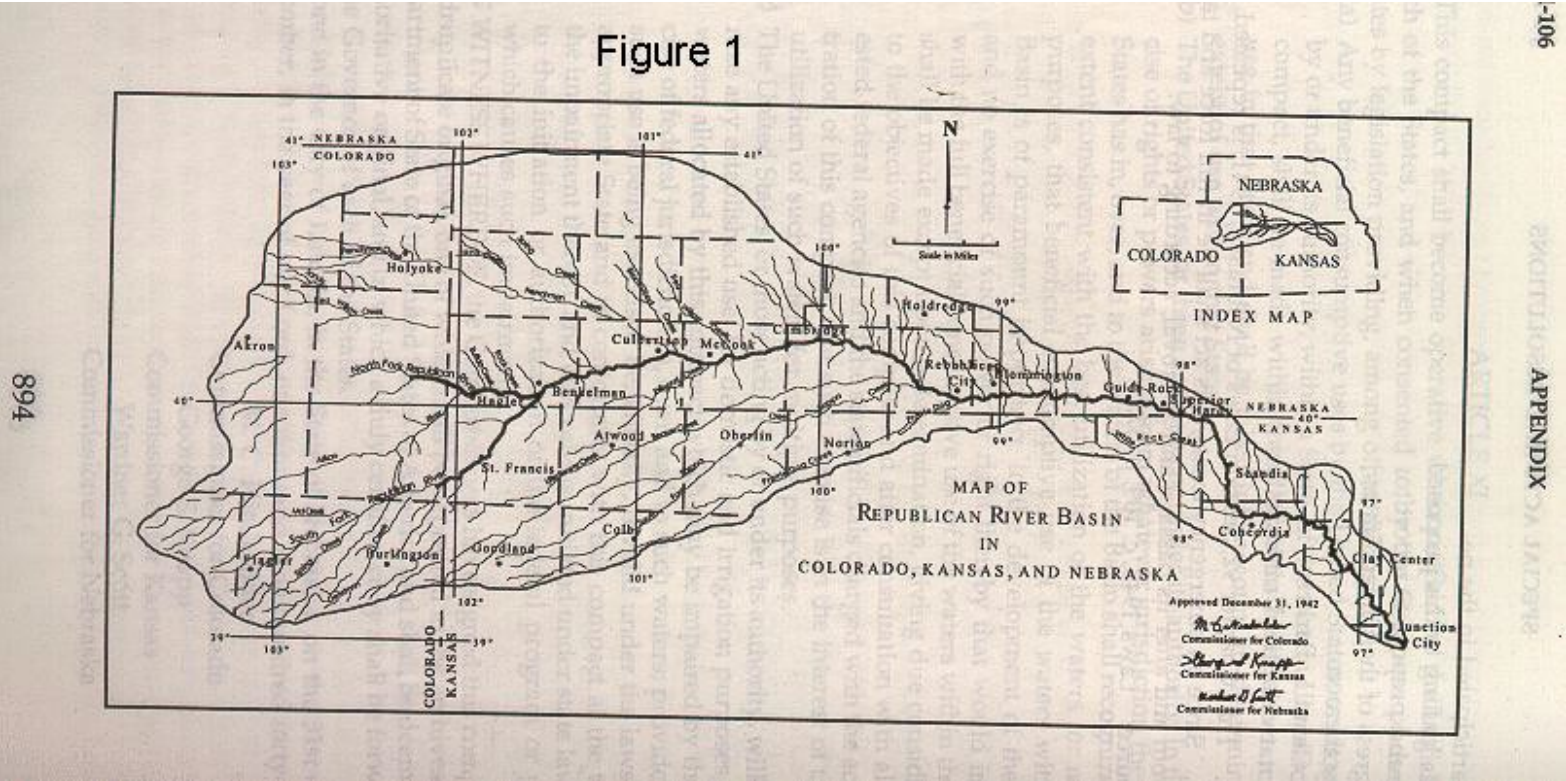
Table 5F: Colorado's Beaver Creek Reduction During Water-Short Years

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

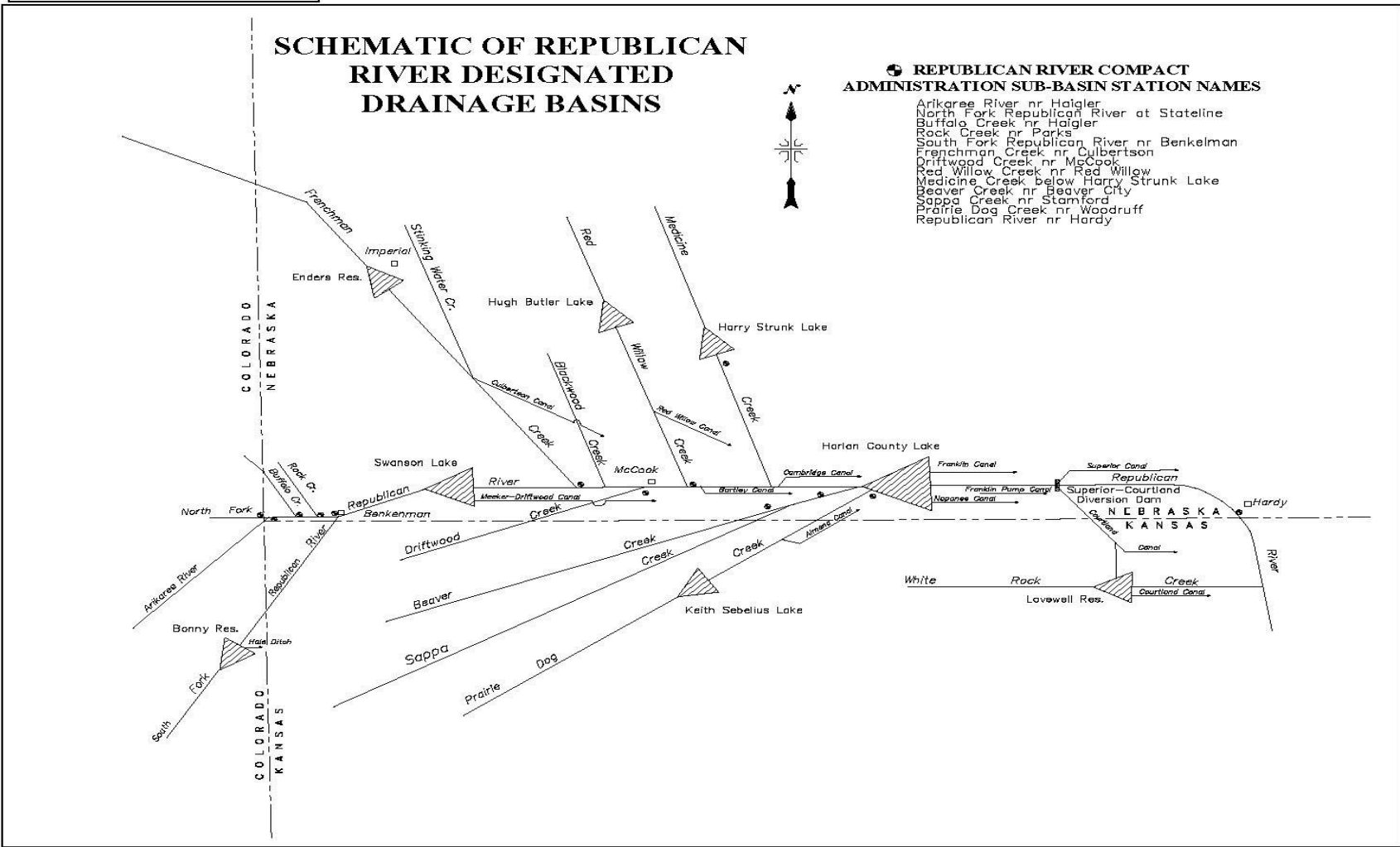
*Most Recent WSY prior to the current accounting year.

Example calculation for Table 5F

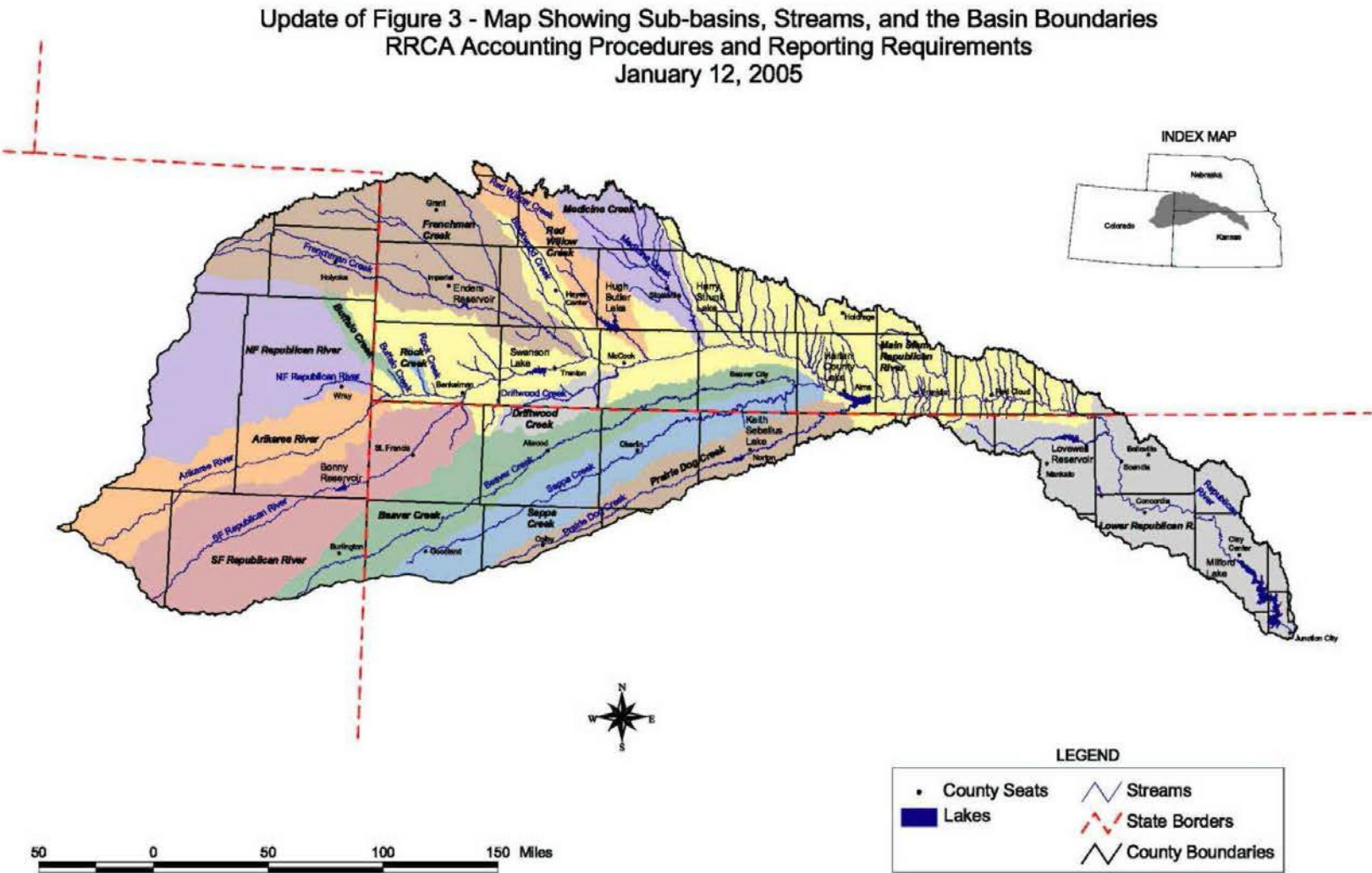
Colorado		
Water Short Year Pursuant to III.J	Beaver Creek Allocation	Reduction = Average of last 5 WSY Beaver Creek Allocations
	Col. 1	Col. 2
2002	770	
2003	260	
2004	360	
2005	910	
2006	1420	
2007	2320	744
2013	1130	1054
2014	1250	1228
2015	2130	1406
2016	2520	1650



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



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



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 ⁶
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

⁶ Flows considered to be Flood Flows are flows in excess of the 94% flow based on a flood frequency analysis for the years 1971-2000. The Gaged Flows are measured after depletions by Beneficial Consumptive Use and change in reservoir storage.

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

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

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

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

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

1. Sediment Accumulation.

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

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

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

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

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

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

Top of Irrigation Pool	1,945.70 feet, msl
------------------------	--------------------

Top of Sediment Pool	1,931.75 feet, msl
----------------------	--------------------

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

2. Summer Evaporation.

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

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

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

Due to downstream water rights for summer inflow, neither the irrigation nor the sediment pool is credited with summer inflow to the lake. The summer inflows would be

assumed passed through the lake to satisfy the water right holders. Therefore, Reclamation and we did not distribute the summer inflow between the project purposes.

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

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

3. Irrigation withdrawal from sediment storage.

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

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

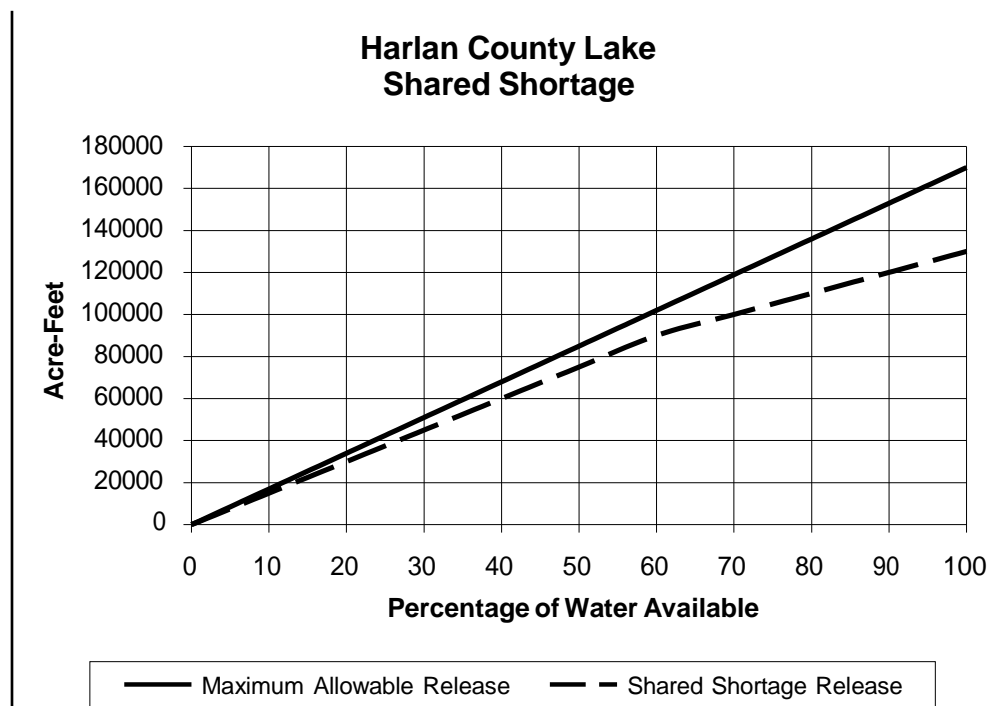
Since the construction of Harlan County Lake, inflows to the lake have been depleted by upstream irrigation wells and farming practices. Reclamation has recently completed an in-depth study of these depleted flows as a part of their contract renewal process. The study concluded that if the current conditions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

In addition, both agencies also recognized that the inflow to the project could continue to decrease with further upstream well development and water conservation farming. Due to these concerns, Reclamation and we determined that the previous 5-year inflow values would be averaged each year and compared to 57,600 Acre-feet. The inflow estimate for Harlan County Lake would be the smaller of these two values.

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

4. Water Shortage Sharing.

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



5. Calculation of Irrigation Water Available

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

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

The variables in the equation are defined as:

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

6. Shared Shortage Adjustment

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

Shared Shortage Adjustment Table

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

7. Annual Shutoff Elevation for Harlan County Lake

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

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

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

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

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

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

BASELINE RUN - 1993 LEVEL INFLOW TO HARLAN COUNTY RESERVOIR

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

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

BASELINE RUN - 1993 LEVEL INFLOW TO HARLAN COUNTY RESERVOIR

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

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

BASELINE - 1993 LEVEL FLOWS - HARLAN COUNTY EVAPORATION

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

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

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

Note: At its Annual Meeting on August 21, 2020, the RRCA agreed that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flow provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock. The current implementation could impact Nebraska's Table 5C compliance test, specifically the Allocation above Guide Rock. Nebraska and Kansas each offered proposals to resolve the issue but could not reach agreement on a solution. Due to the infrequent occurrence of Flood Flows, the RRCA deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. The states wish to acknowledge and memorialize the issue to encourage work toward its resolution. As it stands, Attachment 6 calculates the Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas.

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

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

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

Attachment 8: Calculation of the Computed Water Supply Adjustment and Remaining Compact Compliance Volume for
Implementation of 2016 RRCA Resolution

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

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

⁷ The formula for calculation of RCCV is based on calendar year operations and will vary when operations occur in a different calendar year than NERWS Credit is applied.

⁸ See Provision 10 of the RRCA Resolution signed August 24, 2016, titled “Resolution Approving Long-Term Agreement Related to the Operation of Harlan County Lake for Compact Call Years” for the terms of assigning RCCV Adjustment. The RCCV Adjustment for each year is equal to 20% of the unadjusted portion of the RCCV, if it is a non-Compact Call Year, plus any remaining volumetric reductions from the previous four years.

⁹ In years when the contributions from Nebraska’s water management activities, consistent with the 2016 CCY HCL Operations Resolution, are greater than CCV and the NERWS is equal to the greater contribution volume, CCV in Column 3 should also be set equal to the contribution.

Definitions

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

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

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

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

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

CWSA and RCCV Example Calculations

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

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

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

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

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

Assumptions

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

Computed Water Supply Adjustment (CWSA)

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

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

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

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

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

Assumptions

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

Computed Water Supply Adjustments (CWSA)

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

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

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

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

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

Assumptions

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

Computed Water Supply Adjustment (CWSA)

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

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

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

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

Year 1**Assumptions**

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

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

Computed Water Supply Adjustment (CWSA)

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

Remaining Compact Compliance Volume (RCCV) for Following Year

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

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

Year 2

Assumptions

- RCCV = 35,000
- CCV = 10,000 Acre-feet
- APV = 45,000 Acre-feet
- CCV Inflow Into HCL = 10,000 Acre-feet
- RCCV Inflow Into HCL = 35,000 Acre-feet
- CCV Released from HCL = 50,000 Acre-feet
- CCV Retained in HCL = 0
- NERWS Credit = 10,000 Acre-feet¹⁰

Computed Water Supply Adjustment (CWSA)

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

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

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

Example 5: HCL Reservoir Accounting for CWSA

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

Year 1

Assumptions

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

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

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

Year 2

Assumptions

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

Remaining Compact Compliance Volume (RCCV) for Following Year

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

Table 1. Example of HCL Accounting for CWSA

Table 1: Example HCL Accounting for CWSA

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

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

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

CWSA and RCCV Tracking Example Calculations

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

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

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

*Indicates Compact Call Year

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

August 24, 2016

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

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

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

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

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

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

NOW THEREFORE BE IT RESOLVED:

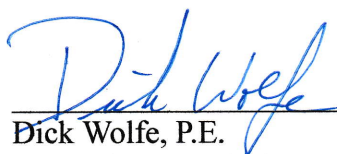
1. For this Resolution, the following definitions shall apply:
 - A. *Compact Call Year* means the calendar year that is designated by the State of Nebraska pursuant to its Republican River Basin Integrated Management Plans for Compact compliance activities, which may include augmentation, water rights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

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

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

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

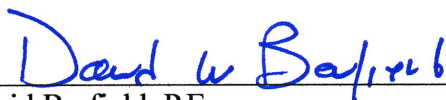
- iii. The States agree to work in good faith to resolve any disputes arising from the interpretation of this resolution.



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

8/24/16

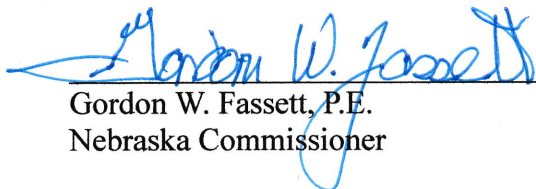
Date



David Barfield, P.E.
Kansas Commissioner

8/24/16

Date



Gordon W. Fassett, P.E.
Nebraska Commissioner

8/27/16

Date

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

RECITALS

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

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

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

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

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

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

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

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

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

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

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

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

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

A. Colorado Compact Compliance Pipeline.

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

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

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

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

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

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

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

B. Bonny Reservoir

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

C. Irrigation in South Fork Republican River basin

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

D. Water Short Year Accounting

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

E. Use of the Unallocated Supply of the South Fork

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

F. Disputes under this Agreement

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

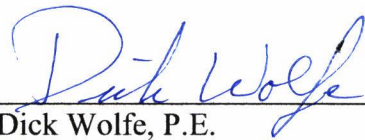
G. Term of Agreement

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

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

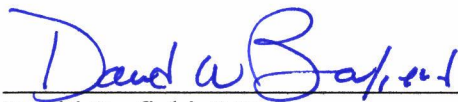
H. Compliance Measure

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



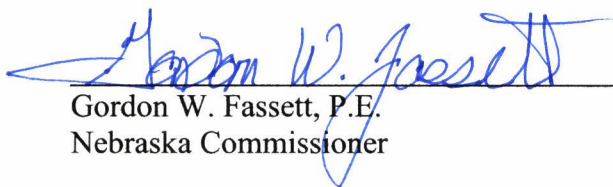
Dick Wolfe, P.E.
Colorado Commissioner
Chairman, RRCA

8/24/16
Date



David Barfield, P.E.
Kansas Commissioner

8/24/16
Date



Gordon W. Fassett, P.E.
Nebraska Commissioner

8/24/16
Date

RESOLUTION APPROVING ACCOUNTING CHANGES

May 25, 2017

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

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

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

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

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

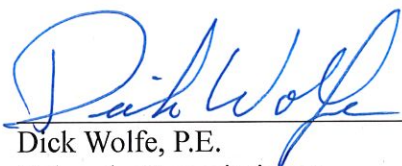
Whereas, on August 24, 2016, the RRCA approved the Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years, which requires changes to the RRCA Accounting Procedures for its proper implementation; and

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

NOW THEREFORE BE IT RESOLVED:

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

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



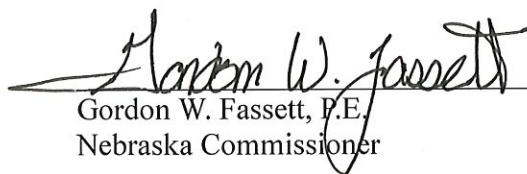
Dick Wolfe, P.E.
Colorado Commissioner
Chairman, RRCA

May 25, 2017
Date



David Barfield, P.E.
Kansas Commissioner

May 25, 2017
Date



Gordon W. Fassett, P.E.
Nebraska Commissioner

MAY 25, 2017
Date

Exhibit H: Rules and Regulations Revisions

Rules and Regulations

Republican River Compact Administration

Revised August 21, 2020

1. Pursuant to Article IX of the Republican River Compact ("Compact"), the States of Colorado, Nebraska and Kansas have the duty to administer the Compact through the officials in such States who are now or may hereafter be charged with the duty of administering the public water supplies in each of such States. Such officials shall be the members of an administrative body hereby designated as the Republican River Compact Administration ("RRCA"). The purpose of the RRCA shall be to administer the Compact. Such administration shall include but not be limited to the responsibilities as are assigned to it in the Final Settlement Stipulation dated December 15, 2002, approved by the States of Colorado, Nebraska and Kansas and filed in the case of *Kansas v. Nebraska and Colorado*, No. 126, Original, in the Supreme Court of the United States ("Final Settlement Stipulation").
2. As of the effective date of these Rules and Regulations, the officials who are charged with the duty of administering the public water supplies in each of the three States, and who therefore constitute the Members¹ are the individuals who hold the following offices: the State Engineer of the Division of Water Resources of the Colorado Department of Natural Resources; the Director of Natural Resources for the State of Nebraska; and, the Chief Engineer of the Division of Water Resources of the Kansas Department of Agriculture.
3. Each RRCA Member's term shall run concurrent with his or her term of office as the official charged with administering the public water supplies in his or her State.
4. Each State official shall be recognized as a Member of the RRCA upon furnishing to the other Members satisfactory evidence that he or she is the official in his or her State charged with the duty of administering the public water supplies in such State.

¹ Reference in the RRCA records to "Commissioner(s)" refers to the Members as described in these Rules and Regulations.

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

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

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

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

12. The RRCA shall prepare and approve an annual report that includes the official actions taken by the RRCA at the annual meeting and at any special meetings, a summary of the compact accounting for the previous year and such other matters as the RRCA may deem appropriate. The Chair shall furnish copies of the report to the President of the United States, the Governors of the States of Colorado, Nebraska and Kansas, the officials of appropriate State and federal agencies and to any other person, as the RRCA determines appropriate.
13. The RRCA may make amendments, revisions, deletions, or additions to these Rules and Regulations at any meeting of the RRCA. Unless otherwise agreed to by the RRCA, written notice and a copy of any proposed change must be sent to all Members by the Member proposing the change at least 15 days in advance of any meeting at which the RRCA shall consider such changes. Any Member may offer modifications of any such proposed changes at any time prior to the RRCA acting on those proposed changes.
14. Compact accounting and data exchanges among the States shall be done annually in accordance with the Final Settlement Stipulation, including the RRCA Accounting Procedures and Reporting Requirements, dated August 21, 2020, and the Republican River Compact Administration Groundwater Model, Version 12s2 (V12s2), dated August 6, 2010. Unless otherwise agreed to by the RRCA Members, the annual accounting shall be completed by the Engineering Committee and submitted to the RRCA no later than June 1st of the year following for which the accounting is being done. The RRCA may modify the RRCA Accounting Procedures and the RRCA Groundwater model only by contemporaneously amending these Rules and Regulations to show the date, title or version, as appropriate, of the RRCA Accounting Procedures and/or the RRCA Groundwater model that the RRCA shall use. At the time of any modification, the RRCA shall specify the time and method for implementation of each modification.

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

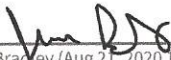
Adopted by the Republican River Compact Administration this 21st day of August, 2020.



Christopher W. Beightel
Commissioner for Kansas



Kevin Rein
Commissioner for Colorado



Jesse Bradley (Aug 21, 2020 14:12 CDT)

Jesse Bradley
Commissioner for Nebraska

RRCA Rules and Regulations (August 21, 2020)

Final Audit Report

2020-08-23

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"RRCA Rules and Regulations (August 21, 2020)" History











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Exhibit I: Resolution Honoring David Barfield

RESOLUTION OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
HONORING
DAVID W. BARFIELD

Whereas, David W. Barfield of Lawrence, Kansas, retired as Kansas Chief Engineer thereby ending his duties as the Kansas Commissioner to the Republican River Compact Administration (RRCA) after having served faithfully in the position of commissioner for 12 years; and

Whereas, Mr. Barfield's extensive knowledge of water laws and hydrology of the Republican River basin have been a key asset to the State of Kansas in the original 1998 U.S. Supreme Court case and resulting Final Settlement Stipulation for the Republican River Compact; and

Whereas, Mr. Barfield provided excellent representation of the State of Kansas, constructive insights into complex issues discussed during the several Republican River arbitrations and the continuation of the original Supreme Court case; and

Whereas, Mr. Barfield displayed a positive and collaborative attitude while forging lasting partnerships to benefit the State of Kansas during the 3-States meetings and negotiations; and

Whereas, Mr. Barfield facilitated discussions on many occasions with local stakeholders in Kansas to provide the water users with a better understanding of the Republican River Compact and efforts made to resolve issues between the States.

NOW, THEREFORE, BE IT RESOLVED: that the Republican River Compact Administration does hereby acknowledge and express its appreciation for the contributions of David W. Barfield to this Administration and extends to him the best wishes for continued good health and happiness in all his future endeavors; and that this resolution be entered into the records of the 2020 Annual Compact Administration Meeting Minutes and the Annual Report and hereby instructs the Kansas Commissioner to send copies of this resolution to Mr. Barfield and the Governor of the State of Kansas.


Adopted by the Republican River Compact Administration at the 2020 annual meeting of the RRCA.



Kevin Rein, P.E.
Colorado Commissioner

Aug 23, 2020

Date



Christopher Beightel, P.E.
Kansas Commissioner

Aug 21, 2020

Date


Jesse Bradley (Aug 21, 2020 14:11 CDT)

Jesse Bradley, P.G.
Nebraska Commissioner
Chairman, RRCA

Aug 21, 2020

Date

Resolution Honoring David Barfield

Final Audit Report

2020-08-23

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"Resolution Honoring David Barfield" History












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Exhibit J: Resolution Honoring Gordon “Jeff” Fassett

RESOLUTION OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION
HONORING
GORDON W. "JEFF" FASSETT

Whereas, Gordon W. "Jeff" Fassett of Cheyenne, Wyoming, has resigned his position as Director of the Nebraska Department of Natural Resources (NeDNR) and the Nebraska Commissioner of the Republican River Compact Administration (RRCA) after having served faithfully in that position for more than 4 years while serving the people of Nebraska through his committed public service at NeDNR; and

Whereas, as the Nebraska Commissioner to the RRCA and the Director of NeDNR, Jeff diligently represented the Compact interests of the State of Nebraska and the residents of the Republican River basin in Nebraska; and

Whereas, while representing the State of Nebraska and its constituents, Jeff exhibited professionalism and integrity and provided leadership and guidance towards addressing the complexities of water administration and compact compliance, continually reaching out and communicating straightforwardly with the States of Colorado and Kansas to reach fair and reasonable solutions to the many issues associated with the Republican River Compact; and

Whereas, Jeff led NeDNR with openness and directness and consistently guided competing Nebraska water interests and Republican River Basin stakeholders through collaborative efforts including the State of Nebraska's ongoing Republican River Compact compliance under his leadership; and

Whereas, Jeff promoted increased certainty and predictability in water supply to allow for broader investment within the Republican River basin to more efficiently and effectively manage water, our most precious natural resource, and grow the State of Nebraska.

NOW THEREFORE BE IT RESOLVED that the Republican River Compact Administration does hereby express its sincerest gratitude and appreciation to Gordon W. "Jeff" Fassett for his dedicated service to the RRCA in his position of Nebraska Commissioner and extends its best wishes to Mr. Fassett in all his future endeavors; and that the RRCA honors Mr. Fassett's service by including this resolution and appropriate dedicatory remarks in the 2020 RRCA Annual Report Meeting Minutes and hereby instructs the Nebraska Commissioner to send copies of this resolution to Mr. Fassett and the Governor of the State of Nebraska.

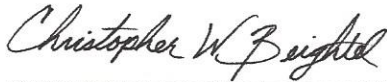
Adopted by the Republican River Compact Administration at the 2020 annual meeting of the RRCA.



Kevin Rein, P.E.
Colorado Commissioner

Aug 23, 2020

Date



Christopher Beightel, P.E.
Kansas Commissioner

Aug 21, 2020

Date


Jesse Bradley (Aug 21, 2020 14:10 CDT)

Jesse Bradley, P.G.
Nebraska Commissioner

Aug 21, 2020

Date












Resolution Honoring Jeff Fassett

Final Audit Report

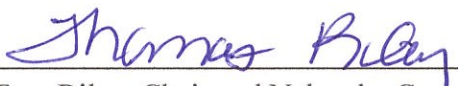
2020-08-23

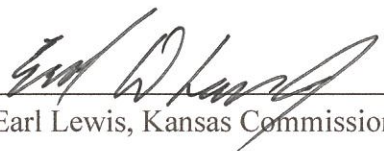
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By:	Carol Flaute (carol.flaute@nebraska.gov)
Status:	Signed
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"Resolution Honoring Jeff Fassett" History

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2020-08-23 - 2:07:03 PM GMT

The 2020 annual report of the Republican River Compact Administration is hereby approved by unanimous vote on this 25th day of August, 2021.

 DATE SIGNED: 25 Aug 2021
Tom Riley, Chair and Nebraska Commissioner

 DATE SIGNED: 8/25/2021
Earl Lewis, Kansas Commissioner

 DATE SIGNED: 9-1-2021
Kevin Rein, Colorado Commissioner