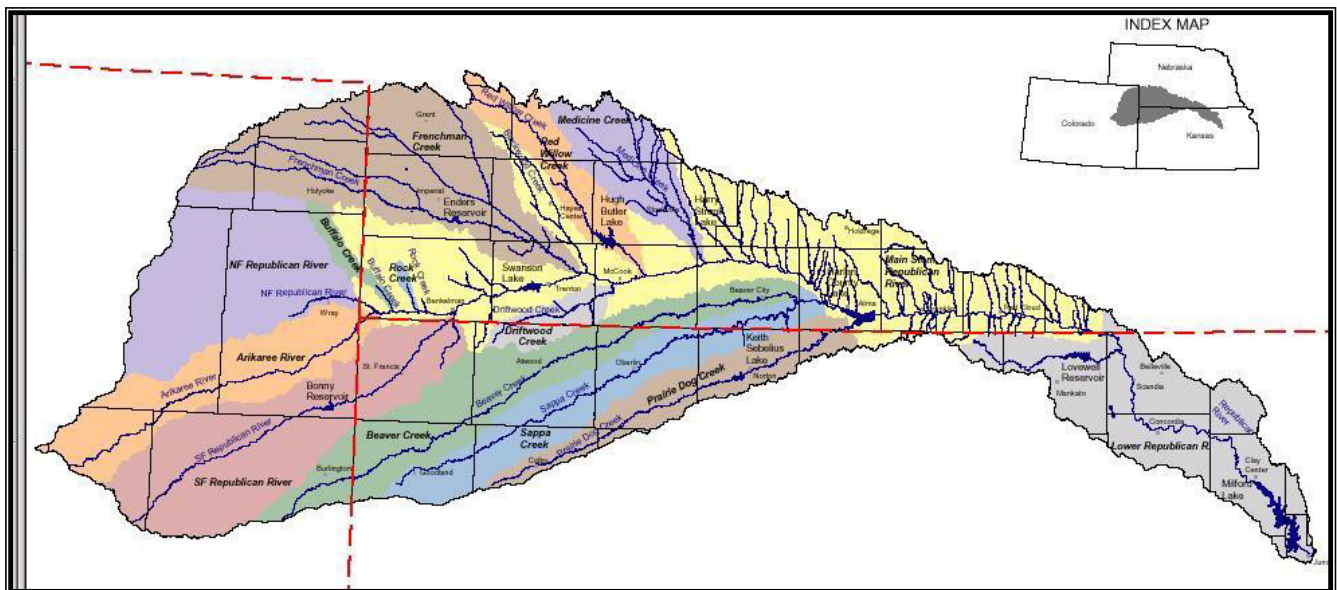


REPUBLICAN RIVER COMPACT ADMINISTRATION 60TH ANNUAL REPORT

FOR THE YEAR 2020



**McCOOK, NEBRASKA
AND VIRTUAL VIA ZOOM
AUGUST 25, 2021**

Table of Contents –

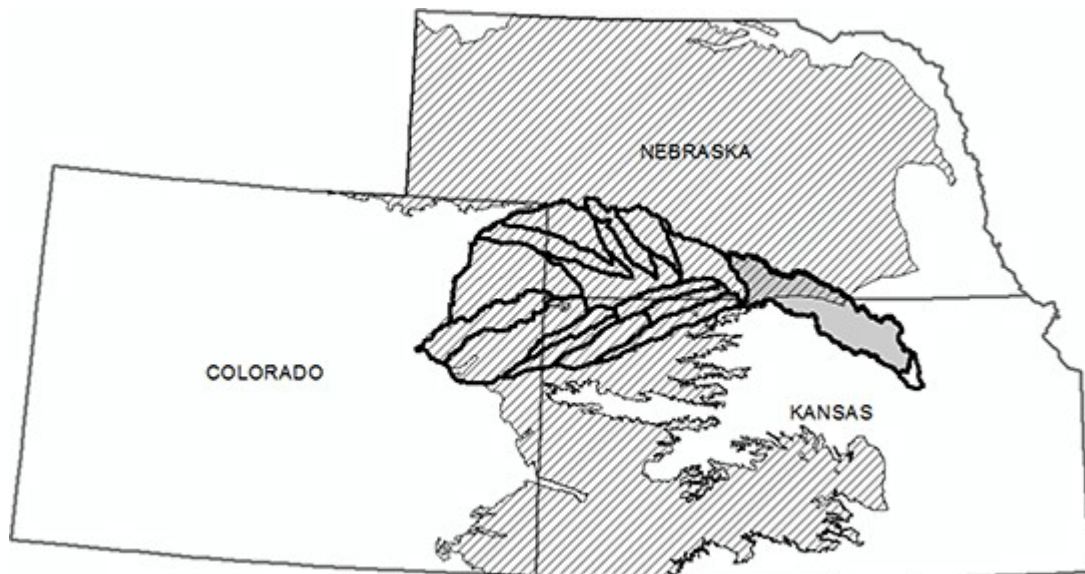
Annual Meeting of the RRCA – August 25, 2021	3
Summary and Minutes of the Annual Meeting	4
Exhibit A: Transcript	17
Exhibit B: Attendance	90
Exhibit C: Agenda	97
Exhibit D: U.S. Bureau of Reclamation Report	99
Exhibit E: U.S. Geological Survey Report	108
Exhibit F: Engineering Committee Report	110
RRCA Approval of the 60 th Annual Report	256

REPUBLICAN RIVER COMPACT ADMINISTRATION

Annual Meeting

August 25, 2021

**McCook, Nebraska
and virtual via Zoom**



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

AUGUST 25, 2021
McCOOK, NEBRASKA, AND VIRTUAL VIA ZOOM

Summary & Minutes

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

Agenda Item 1: Introductions

The annual meeting of the Republican River Compact Administration (RRCA) was called to order by Nebraska Commissioner and Chairman Thomas Riley at 10:32 a.m., August 25, 2021. Commissioner Riley 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 (for those attending in-person). Highlighted attendees include:

<u>Name</u>	<u>Representing</u>
Chris Beightel	Kansas Engineering Committee (EC) Member
Kari Burgert	Nebraska Engineering Committee Member and EC Chair
Ivan Franco	Colorado Engineering Committee Member
Justin Lavene	Nebraska Attorney General's Office
Earl Lewis	Kansas Commissioner
Kevin Rein	Colorado Commissioner
Thomas Riley	Nebraska Commissioner and Chair
Dan Steuer	Colorado Attorney General's Office
Mike Sullivan	Colorado Deputy State Engineer
Kurtis Wiard	Kansas Attorney General's Office

Agenda Item 2: Adoption of the Agenda

Commissioner Riley introduced the proposed draft agenda and asked if there were any changes to the draft agenda. Hearing no requests for changes, Commissioner Lewis moved that the agenda be adopted. Commissioner Rein seconded the motion. 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 2020 Annual Meeting

Commissioner Riley called for action on the completed RRCA 2020 annual report. Commissioner Rein moved that the RRCA 2020 Annual Report be accepted. Commissioner Lewis seconded the motion. The commissioners unanimously approved the report.

Agenda Item 4: Commissioners' Reports

a. Kansas:

- i. Commissioner Lewis noted that Kansas started the year in drought, but an unseasonably wet May and early June led to fairly good conditions for most of the state. Following recent dry and warmer weather, the middle of the state is in abnormally dry or moderate drought, with the worst drought in the Upper Republican in northwest Kansas. Overall, the year was better than expected.
- ii. Commissioner Lewis reported on water conservation activities and irrigation technology installation in the South Fork Republican funded by the Colorado settlement. There were 70 different applications and \$209,000 in funding, primarily for center-pivot or pivot control packages, nozzle packages, or soil moisture probes.
- iii. Commissioner Lewis noted that the legislature transferred \$500,000 of the \$2,000,000 settlement funds to the Cheyenne County Conservation District in northwest Kansas. The money will be used as part of the funding for a Regional Conservation Partnership Program (RCP).
- iv. Commissioner Lewis gave an update on work by Kansas Bostwick Irrigation District (KBID) to convert laterals to buried pipe and to automate operation of the Courtland Canal.
- v. Commissioner Lewis reported that in 2020 the state legislature passed one substantive water bill related to the state's multi-year flex accounts (MYFAs). The bill was a technical correction of the period used to calculate water use when beginning a MYFA. The new House water committee spent most of the session learning about the state's water entities. Since the Kansas legislature works on a two-year cycle, the same legislators will be on the water committee in 2021.
- vi. Commissioner Lewis noted that Division of Water Resources approved a Local Enhancement Management Area (LEMA) in Wichita County in west central Kansas. The LEMA was approved for a five-year period in February 2021 and will go through 2025. It is estimated that the LEMA will achieve approximately a 15 percent reduction in water use. The new LEMA joins Sheridan County and northwest Kansas Groundwater Management District (GMD) LEMAs. GMD 1, which includes Wichita County and four additional counties, is exploring a district-wide LEMA that could start in 2023.
- vii. Commissioner Lewis reported that there are a few water conservation areas in place, encompassing about 86,000 acres. Annual water reduction is about 12,000 acre-feet compared to historic use. Typically, the water conservation areas are in locations where the local groundwater management district hasn't yet created a LEMA. Some of the water conservation areas are within existing LEMAs and provide additional flexibilities.
- viii. Commissioner Lewis noted that in January 2021, Audubon of Kansas sued the Division

of Water Resources, Kansas Department of Agriculture; U.S. Fish and Wildlife Service; and U.S. Department of the Interior over the Quivira National Wildlife Refuge water right impairment. Commissioner Lewis indicated that this will probably be a lengthy litigation. The issue is that there are approximately 1,500 junior water rights above the wildlife refuge that are decreasing the stream flow going into the surface water wetland. The Division has asked to be dismissed from the lawsuit since the lawsuit was filed in federal court.

- ix. Commissioner Lewis reported on ongoing water quality issues in the state. The Division is working to quantify the extent of sulfates and uranium in the Upper Arkansas River. Kansas Department of Health and Environment is investigating a similar potential water quality issue in the Upper Republican near Oberlin by sampling domestic wells.
- x. Commissioner Lewis noted that flooding continues to be a concern in certain areas of Kansas. There is ongoing planning work related to the Missouri River.
- xi. Commissioner Lewis noted two other water issues outside the Republican Basin, including the Wichita Storage and Recovery project and a proposed water transfer to the cities of Russell and Hays.
- xii. Commissioner Lewis concluded his report and asked if anyone had questions, or if other members of the Kansas team had any additions to his report. There were no questions and no additions to Commissioner Lewis's report.

b. Colorado:

- i. Commissioner Rein noted that he was giving his report via Zoom from Steamboat Springs, Colorado, because he was there to attend legislative committee hearings and testify before the Water Resources Review Committee. Commissioner Rein expressed his appreciation that accommodations were made so he could report remotely. Commissioner Rein thanked Mike Sullivan and Ivan Franco for their work on Compact issues during the year.
- ii. Commissioner Rein reported that drought in Colorado is very temporal and location specific. The northwest corner of the state is experiencing the worst drought conditions. There have been forest fires and wild land fires in the state this year, but so far the fire situation hasn't been as bad as it was last year.
- iii. Commissioner Rein gave an update on the work environment during COVID considerations for the Division of Water Resources. More people have been allowed to come back to work than had previously been allowed to return.
- iv. Commissioner Rein reported that Lake Powell on the Colorado River has dropped to a dangerously low level that impedes power production. The drought response operations agreement has been invoked, and the U.S. Bureau of Reclamation (Bureau) has directed releases from three upper basin reservoirs: Flaming Gorge, the Aspinall Unit, and Navajo Reservoir. Those releases are alleviating concerns about power production at Lake Powell. There will be a 36,000 acre-feet release from the Aspinall Unit affecting lake levels at Blue Mesa Reservoir.
- v. Commissioner Rein noted that the Bureau is renegotiating the seven guidelines on the Colorado River Compact administration and management. The talks are being conducted by the Colorado Water Conservation Board. Colorado and the other three upper basin states are in compliance with the Colorado River Compact, and Colorado stands to stay in compliance for at least the next five years. However, there is great

- concern about the drought and conditions at the lakes. Conversations about those issues are ongoing.
- vi. Commissioner Rein reported that he and Mike Sullivan announced last week that they will start measurement rules and stakeholder meetings on the west slope soon. They recognize the need for good data on measuring ground water diversions looking ahead to Compact issues.
 - vii. Commissioner Rein gave an update on ground water rules in the Rio Grande. Most of the sub-districts have their annual replacement plans in effect. One sub-district's plan was denied, but that is under appeal. All of the wells can pump at this time, and Commissioner Rein and Mr. Sullivan want that sub-district to be in better compliance with the plan each year. The sub-districts are also continuing sustainability efforts.
 - viii. Commissioner Rein reported on the Colorado legislature's Senate Bill 48, which was 2020 legislation focused on exploring whether the state's anti-speculation law needs to be strengthened. Commissioner Rein and Assistant Deputy Attorney General Scott Steinbrecher co-chaired that work group; the committee delivered a lengthy report to the Water Resources Review Committee. The report is available on the Colorado Department of Natural Resources website.
 - ix. Commissioner Rein made a few comments on the Republican River. The Republican River Water Conservation District (RRWCD) continues its conservation and retirement efforts; Commissioner Rein mentioned that more information would be provided during the public comment period. The RRWCD and board continue to work on incentives toward conservation and retirement of acres in the South Fork to meet the requirements in the 2016 resolution between the three states for the retirement of 10,000 acres by 2024 and another 15,000 acres by 2029. Commissioner Rein stated that he appreciates and admires the work being done by the RRWCD. The Division of Water Resources has been a resource for the RRWCD and board in those efforts.
 - x. Commissioner Rein provided an update on Colorado's Compact Administration Rules, which were submitted to the Water Court on January 11, 2019. The rules were written to ensure equitable treatment for all water users, including surface water in the Republican River related to Compact compliance. At this point, the state has settled with all objectors except one. There is a motion before the court, and depending on the finding of the court, the Division may be going to trial in January. They hope to bring the issue to a conclusion in the coming months.
 - xi. Commissioner Rein asked if anyone had questions for him. Commissioner Lewis asked how close Colorado is to meeting the 10,000-acre goal and whether they will be able to meet the deadline in the resolution. Commissioner Rein responded that Colorado is at about 3,000 acres of retirements. Commissioner Rein noted the work the RRWCD is doing to develop incentives to retire more acres through the U.S. Department of Agriculture's Conservation Reserve Enhancement Program (CREP) and Environmental Quality Incentives Program (EQIP), and the letter he sent to the RRWCD Board describing the details of the resolution and identifying the goal to be met and the circumstances of not meeting the goal. He added that there is a provision in the resolution for Colorado to use other means to reduce consumptive use if the retirement goals are not met; however, that would require the development of new methodologies and more discussion with Kansas and Nebraska. Commissioner Lewis thanked Commissioner Rein for his answer and thanked the RRWCD for the work it is

doing to retire acres. He said he hopes the states will be able to continue with the current resolution, he is happy to work with Colorado, and he encourages Colorado to stay the course and meet the retirement goal to avoid more discussions and more conflict. Commissioner Lewis thanked Commissioner Rein and the RRWCD for their efforts.

- xii. Commissioner Riley asked Commissioner Rein how Colorado's Compact Administration Rules impact transbasin deliveries from the west slope to the east slope, and whether that is being affected by drought and other issues with the Colorado compact. Commissioner Rein referred to his earlier comments about the urgent situation with the Colorado River and current lake levels and said that they are very aware of many variables related to Compact administration from Colorado on the Colorado River. Transbasin diversions will be one of the questions. Their guiding principle is that there has to be priority of appropriation, which is often the starting point. Formal rulemaking would need to allow for other considerations within the west slope basins, including deliveries to the front range. Commissioner Riley thanked Commissioner Rein and mentioned that he had recently traveled through the front range and was stunned by the uptick in development in the past decade. Commissioner Riley asked Commissioner Rein if he was seeing the monthly influx of population to the front range that Commissioner Rein had mentioned in recent years, and how that matched up with the water supply. Commissioner Rein agreed that the influx of growth along the front range continues, with three storage projects on the horizon. The projects include the Chimney Hollow Firming Project for Windy Gap on the west slope that will allow better storage of water. This is a transbasin diversion that has already been decreed. The Glade Reservoir, which is a large storage project northwest of Fort Collins off the Poudre River, has been pursued for many years by the Northern Colorado Water Conservancy District and is progress. The third project is the Gross Reservoir expansion by Denver Water. Commissioner Rein stated that they are not seeing initiatives for new transbasin diversions to address the growth in the front range. In the South Platte, growth is being addressed by converting agricultural water to municipal water through changes of water rights. Commissioner Riley agreed that addressing future municipal water needs will be challenging, and thanked Commissioner Rein for his report.

c. Nebraska:

- i. Commissioner Riley began his report by describing Nebraska Department of Natural Resources's (NeDNR) office and work situation. The agency is in temporary space in the basement of the State Office Building and most staff continue to work remotely. While the work efforts, quality of work, and efficiency have been good, Commissioner Riley expressed concern about the impact of working remotely on innovation and the ability to meet in person to have conversations and solve problems. He stated that he is concerned also for the national and global science and engineering community about missed opportunities to get together and work to solve problems. The plan is for the agency to be in new space sometime early next year that will be co-located with Department of Agriculture, Department of Environment and Energy, Department of Economic Development, and the commodity boards.
- ii. Commissioner Riley reported that the state is still recovering from flooding in 2019, and working with Kansas, Iowa, and Missouri on the Missouri River to find solutions

- and develop resiliency from future flooding. The most recent news on the Missouri River is that it will have some of the lowest releases on record starting this fall that may impact power plants and other water users on the Missouri.
- iii. Commissioner Riley noted that drought in Nebraska isn't as bad as it is farther west. However, it's a lot drier from Cambridge west. In some zones of the state drought is setting in and stressing the system. The Platte River System is in an allocation year, which was unexpected. Changes are happening more quickly which makes it more difficult to provide forecasts to producers. The Department is working on drought planning with producers, natural resources districts (NRDs), and irrigation districts across the state, including in the Republican Basin.
 - iv. Commissioner Riley reported that basin conditions last year started out drier than other places across the state. The upper basin in Nebraska might have some of the driest conditions and lowest precipitation rates in recent record. There was a great water supply in 2020 and good carryover from 2019. 2021 has been reasonably good, until the higher temperatures of the last three or four weeks; hopefully conditions will improve in the next week or so.
 - v. Commissioner Riley noted that there was no need for water administration in the basin last year because of the carryover from 2019. Shane Stanton, NeDNR Cambridge field office, has been installing new equipment which provides the data used to make decisions. With the availability of new technologies that make data-collection less expensive, the department is investing in more gaging stations and stage recorders to provide more information to help with decision-making about water supply, flooding, and other issues.
 - vi. Commissioner Riley gave an update on the department's collaboration with natural resources districts on integrated management plans (IMPs). Fifth generation Republican Basin IMPs are in the final stages and will go into effect on September 27, 2021. The continued participation and work between the department and NRDs benefit other planning efforts such as drought planning and water management.
 - vii. Commissioner Riley reported on technology and water management projects undertaken by basin irrigation districts and NRDs. Frenchman-Cambridge Irrigation District is working on a canal automation project funded with Colorado settlement dollars and WaterSMART funds. Commissioner Riley noted that other districts and NRDs have been able to use WaterSMART funds with additional sources of funding to do innovative projects that might not have been possible without those resources.
 - viii. Commissioner Riley stated that Nebraska Bostwick Irrigation District (NBID) is working on headgates automation with KBID. The department is also working on a project with Frenchman Valley Irrigation District and an additional project focused on other efficiency improvements with NBID.
 - ix. Commissioner Riley reported that basin NRDs continue working on irrigation buyout projects, utilizing Water Cash Fund dollars and WaterSMART grants. More federal dollars may be available in the future for similar projects. Upper and Middle Republican NRDs have irrigation buyout programs. Middle Republican NRD has a meter installation project focused on areas where declines have been observed and the NRD's quick response area.
 - x. Commissioner Riley provided an update on the status of the Platte Republican Diversion Project, which involves Lower Republican NRD and Tri-Basin NRD in the

Republican Basin and partners in the Platte Basin. The project would move water from the Platte River to the Republican River. The department is in the process of going through administrative hearings; a hearing took place a few months ago to deal with the objectors and their standing. The permit is under review; Commissioner Riley stated that there was nothing else to report on that project.

- xi. Commissioner Riley reported that a useful funding mechanism in Nebraska is the Water Sustainability Fund, which was created by the state legislature and is managed by the Natural Resources Commission. Applications are due each year in July; 17 applications were received this year. There is \$13 million available and \$36 million in requests, so the dollars available don't match the need. Hopefully other investments on an infrastructure bill will help fund some of that work. Since its inception, the Water Sustainability Fund has brought almost \$7 million in funding into the Republican Basin; hopefully there will be opportunities to fund more projects in the future.
- xii. Commissioner Riley concluded his report and asked if anyone had questions for him. Commissioner Lewis confirmed that Kansas is interested in the Platte Republican Diversion Project, especially as it might impact Milford Lake. Commissioner Lewis said that he looks forward to future updates on the process. He also agreed that WaterSMART grant dollars working with in-state dollars to fund conservation projects have been good tools for Kansas, too. He acknowledged the cross-state cooperation between the Bostwick districts to get projects done instead of competing for funding. Otherwise, there were no questions or comments for Commissioner Riley.

Agenda Item 5: Federal Reports

a. Bureau of Reclamation:

- i. Craig Scott, Kansas-Nebraska Area Office, introduced himself and his colleagues Aaron Thompson, area manager; Miles Morgan, Water Operations Group; and Brent Esplin, regional director. Mr. Scott discussed the Bureau's summary report of its operations in the Republican River Basin for 2020 (Exhibit D). The report was shared on the computer screen.
- ii. Mr. Scott reported that all project areas in the Republican basin received below normal precipitation in 2020, ranging from 56 percent of the average at Swanson Lake in the upper basin to 95 percent of the average at Harry Strunk Lake. Total precipitation at Swanson Lake in 2020 was 11.38 inches, which is the lowest total since the 2002 drought.
- iii. Mr. Scott reported that inflows in the basin varied, with some below average and some above average. There were all-time low flows of approximately 3,700 acre feet at Enders Reservoir, which was the lowest annual inflow since the reservoir was completed.
- iv. Mr. Scott reiterated that there was significant carryover supply in Harlan County Lake from 2019. Storage in the reservoir was in the flood pool at the beginning of the year and remained in the flood pool until early July when irrigation demand lowered the reservoir elevation into the conservation pool.
- v. Mr. Scott noted that irrigation supplies in 2020 were almost 140,000 acre feet at the beginning of the irrigation season, so it was not a water-short year. His report includes data through July 2021 in Table 2.

- vi. Mr. Scott reported that there has been significant drought within the basin, and that varies from the upper to the lower part of the basin. One exception is the drainage basin around Harlan County Lake, which has received above-average precipitation.
 - vii. Mr. Scott reported that irrigation supplies for 2021 exceeded the trigger level of 119,000 acre feet, so there will be no water-short year administration required for the third consecutive year. Mr. Scott thought conditions looked favorable to not be water short in 2022.
 - viii. Mr. Scott made several comments regarding the Bostwick Memorandum of Agreement (MOA). The MOA is the document that identifies the procedures for sharing water supplies from Harlan County Lake. It is a three-year agreement developed and signed in 2018, making 2021 the last year of the agreement. He expects to initiate discussions with both irrigation districts this fall to either extend the current agreement or develop a more permanent agreement. Mr. Scott indicated that he thought the current agreement has been successful in the last two years and the districts and the Bureau are comfortable with the accounting changes. He looks forward to working with the districts on another agreement.
 - ix. Mr. Scott concluded his report; there were no questions. Commissioner Riley noted that 2020 was the first year Nebraska didn't have a Compact call year since the determination procedure was put in place.
- b. U.S. Army Corps of Engineers: no report was presented
- c. U.S. Geological Survey:
- i. John Miller discussed the U.S. Geological Survey (USGS) report for 2020 (Exhibit E). He thanked the commissioners for the opportunity to present the work done by USGS this past year in the Republican basin. The report was shared on the computer screen.
 - ii. Mr. Miller reported that 2020 was an exciting year for flows in the western Republican basin in Nebraska, specifically during an event at the end of July. The Arikaree River gage had the highest discharge measurement in 60 years, and the highest peak in 40 years. However, the annual mean trend is downward.
 - iii. Mr. Miller noted that the North Fork state line gage had the highest discharge measurement in 60 years, and the highest peak in almost 40 years. Most of the sites Mr. Miller reported on have 70 or 80 years of record, making the July 2020 rain event very significant. Overall mean flows at the North Fork gage have increased recently and are within six cubic feet per second (cfs) of the running mean for the period of record.
 - iv. Mr. Miller reported that the Buffalo Creek gage near Haigler had an event that broke all records for discharge and peak flow. The rain event generated 440 cfs at the gage.
 - v. Mr. Miller noted that the Rock Creek gage at Parks had the second and third highest discharge measurements in 80 years of record for the site, and the second highest peak flow. Discharge at that site has settled in at about 6 cfs which is about half of the long-term average.
 - vi. Mr. Miller reported that the South Fork gage had the 17th highest peak and the fifth highest discharge measurement at that site.
 - vii. Mr. Miller reported that the Benkelman site had the 14th highest peak and the 13th highest discharge measurement for the site.

- viii. Mr. Miller noted that the sites at Frenchman at Culbertson and Driftwood near McCook were down slightly from the previous-year mean. Beaver and Red Willow sites were almost the same as the previous year's flow. The annual mean at Sappa Creek near Stamford has been increasing for the last six years, and he anticipates it will continue to increase. Because of significant rainfall in the lower Republican, Guide Rock has been more than two times the long-term average mean the last two years.
- ix. Mr. Miller concluded his report by commenting that the July 2020 event in western Nebraska generated nearly 9,000 cubic feet between the South Fork gage and the North Fork Gage at Benkelman, of which only 1,500 cubic feet got to the Swanson Reservoir, with the rest being absorbed. He stated that he was fascinated by the loss of water during that localized flood event. There were no questions or comments for Mr. Miller.

Agenda Item 6: Committee Reports

- a. Engineering Committee: Chair Kari Burgert reviewed the Engineering Committee (EC) report (Exhibit F). She noted that full details of the committee's progress are summarized in the report and Attachment 1 includes quarterly meeting minutes. Attachment 3 includes summaries and correspondence from the two additional meetings which focused on flood-flows. The report was shared on the computer screen.
 - i. Assignments from 2020 Annual Meeting
 - The EC met six times since the last annual meeting and completed the following assignments: (1) hold quarterly meetings, (2) exchange information listed in the Accounting Procedures and Reporting Requirements, (3) finalize the 2020 accounting, (4) continue to work on developing a recommendation for the flood-flow provisions of the RRCA Accounting Procedures to bring them into conformance with the intent of the Final Settlement Stipulation (FSS), (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 our informational page for the public, (8) continue work and provide updates on improving accounting tools, (9) prepare the 2020 RRCA Annual Meeting Report, and (10) make a recommendation on a course of action for dealing with the 2019 PRISM data correction.
 - ii. Committee Recommendations to the RRCA
 - The EC recommends the proposed 2020 accounting presented in Attachment 2 of the EC report and a spreadsheet titled "RRCA Accounting, 2020 Final," for approval by the RRCA. Upon approval of the accounting, the spreadsheet will be placed on the RRCA public website. The 2020 accounting incorporates the proposed course of action for the 2019 PRISM data correction.
 - Ms. Burgert thanked Principia Mathematica and Dr. Willem Schreüder for his work for the EC and the RRCA. The EC requests guidance from the commissioners on contract or retention of Principia Mathematica. The current five-year contract expires at the end of this year.
 - The EC requests guidance from the commissioners on modeling and data tasks to be assigned to Principia Mathematica for the next year. The EC recommends that Principia Mathematica continue to maintain the web-based accounting tool and

- perform periodic model and accounting updates at the same level of service as this past year.
 - The EC recommends discussion on the status of the document summarizing historical changes to the RRCA Accounting Procedures that the committee prepared, which is included as Attachment 4 to the EC report.
 - The EC has continued to maintain the RRCA website. Ms. Burgert thanked Chelsea Erickson for maintaining the website and thanked the rest of the website sub-committee. The EC requests any additional comment that the commissioners have on the website.
 - The EC requests discussion on the recommended assignments, and agreement on the final EC assignments for next year.
- iii. Recommended assignments for Engineering Committee: Ms. Burgert paraphrased the recommended assignments and referred commissioners to the EC report for details of the assignments.
- Meet quarterly to review tasks assigned to the committee;
 - Exchange the information listed in the Accounting Procedures and Reporting requirements by the deadlines listed;
 - Finalize the 2021 accounting and recommend it for approval by the RRCA;
 - Maintain and publish updates to the Accounting Procedures tracking document;
 - Provide updates on the progress of new and ongoing management strategies for maintaining Compact compliance;
 - Continue development and maintenance of the website;
 - Continue work and provide future updates on improving accounting tools;
 - Prepare the 2021 Annual Meeting Report for approval by the 2022 Annual Meeting; and
 - Retain Principia Mathematica for the period and scope outlined by the commissioners.
- iv. Discussion of Engineering Committee Report and assignments
- Commissioner Riley thanked the EC for its hard work. He proposed that the commissioners approve the whole report and those items in one motion, aside from the Principia Mathematica contract, which needed to be discussed separately.
 - Commissioners Lewis and Rein supported the proposal to approve the whole report after discussion about the Principia Mathematica contract.

Agenda Item 7: New Business and Assignments to Compact Committees

- a. Action on Engineering Committee Report and assignments
- i. Commissioner Lewis moved that the RRCA direct the EC to contract with Principia Mathematica under similar terms and conditions and tasks, as was approved during the previous period. Commissioner Rein seconded the motion.
 - ii. The commissioners voted, and the motion passed unanimously.
 - iii. Commissioner Rein moved that the EC Report and associated assignments be accepted, and Commissioner Lewis seconded the motion.
 - iv. The commissioners voted, and the motion passed unanimously.

- b. Action on 2020 Accounting
 - i. Commissioner Lewis moved that the 2020 accounting results be approved and adopted, and Commissioner Rein seconded the motion.
 - ii. The commissioners voted, and the motion passed unanimously.

Agenda Item 8: Other Business

- a. There was no other business introduced by the commissioners.

Agenda Item 9: Remarks from the Public

- a. Mr. Kenny Helling, Yuma County, Colorado representative on the Republican River Water Conservation District, gave an update on the district's work toward achieving the required retirement of acres in the South Fork focus zone. Mr. Helling stated that the district had a quarterly meeting last week. A resolution has been initiated to increase opportunity for people to retire acres. Use fee within the basin has been increased to help achieve the obligations in the 2016 resolution. He noted that the district has been working hard to encourage irrigators to participate, but they are private landowners and they have a choice. The district has made a good faith effort to try to achieve that goal. Mr. Helling also commented about efforts related to Bonny Reservoir in the South Fork Republican. The district has put together a coalition including local entities, the Bureau of Reclamation, and Colorado Parks and Wildlife. The coalition has secured grant money to work on a plan to establish a new channel through Bonny Reservoir. He asked Kansas to be a partner in this project. Commissioner Lewis thanked Mr. Helling for his comments and the district's efforts to achieve the retirement obligation in the 2016 resolution and acknowledged the challenges of using a voluntary program to achieve a goal. There were no other questions or comments for Mr. Helling.

- b. Ms. Deb Daniel, general manager of the Republican River Water Conservation District in Colorado, made additional comments about Colorado's obligations under the 2016 resolution. Ms. Daniel stated that the district is working very hard with producers in the South Fork focus zone. Higher commodity prices this year slowed interest in the conservation programs. At the recent board meeting mentioned by Mr. Helling, a couple of ideas on retiring acres were discussed. Ms. Daniel stated that she has seen increased interest in the conservation programs in recent weeks. There will be public hearings throughout the basin this fall and early next year to provide information about the need to retire irrigated acres in the South Fork focus zone. Ms. Daniel noted that the board has been purchasing surface water rights. The Republican River District owns all the Hale Ditch water rights downstream of Bonny Reservoir, so those waters will remain in the stream. Ms. Daniel concluded her remarks by mentioning that the South Fork Republican Restoration Coalition was awarded a \$310,000 grant from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and has applied for a WaterSMART grant for the work on Bonny Reservoir. She invited Kansas to partner with them in this effort. Commissioner Lewis stated that he appreciated the work the district was doing and would be happy to talk offline about how that fits within the broader Colorado efforts and responsibilities.

Agenda Item 10: Future Meeting Arrangements

Commissioner Riley noted that Colorado will host the next RRCA meeting. The commissioners agreed that there was no need for additional discussion of meeting arrangements at that time. Mr. Sullivan added that Colorado plans to hold next year's annual meeting in the basin; in the past the meeting has been in Burlington, Colorado. Commissioner Rein noted the conflict that prevented him from attending this meeting in person and asked if the meeting date could be moved earlier or later to avoid the conflict. The commissioners thanked Nebraska staff for setting up the hybrid meeting.

Agenda Item 11: Adjournment

The meeting was adjourned at 12:15 p.m. on August 25, 2021.

The August 25, 2021 Annual Meeting report is hereby approved by unanimous vote of the RRCA on this 31st day of August, 2022.

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



Thomas Riley, Nebraska Commissioner

DATE SIGNED: 31 Aug 2022



Earl Lewis, Kansas Commissioner

DATE SIGNED: 8/31/2022



Kevin Rein, Chair and Colorado Commissioner

DATE SIGNED: 8-31-2022

Exhibits

- Exhibit A: Transcript of the 2021 Annual Meeting
- Exhibit B: Annual Meeting Attendance with Signature Pages
- Exhibit C: Agenda for the 2021 Annual Meeting
- Exhibit D: Bureau of Reclamation Report 2020
- Exhibit E: U.S. Geological Survey Report 2020
- Exhibit F: Engineering Committee Report 2020

Exhibit A: Transcript

2021 ANNUAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION

August 25, 2021
10:32 a.m., Central Time
McCook Community College
1205 E. 3rd Street
McCook, Nebraska

ATTENDEES:

NEBRASKA

PRESENT:

Commissioner Tom Riley, Chairperson

Don Blankenau, Blankenau Wilmoth Jareke, LLP
Alex Boyce, Middle Republican NRD
Jesse Bradley, NeDNR Assistant Director
Kari Burgert, NeDNR
Sam Capps, NeDNR
Dale Cramer, Frenchman-Cambridge Irr. Dist.
Brad Edgerton, Frenchman-Cambridge Irr. Dist.
Don Felker, Frenchman Valley Irr. Dist.
Steve Fries, Frenchman Valley Irr. Dist.
Jasper Fanning, Upper Republican NRD
Nate Jenkins, Upper Republican NRD
Justin Lavene, NE Attorney General's Office
Jack Russell, Middle Republican NRD
Craig Scott, Bureau of Reclamation, McCook, NE
Todd Siel, Lower Republican NRD
Nick Simonson, Lower Republican NRD
Shane Stanton, Cambridge, NE, Field Office
Chance Thayer, Flatwater Group
John Thorburn, Tri-Basin NRD
Tom Wilmoth, Blankenau Wilmoth Jareke, LLP

ONLINE:

Justin Ahern, NeDNR
Jill Burmester, Ne Emergency Management Agency
Margeaux Carter, NeDNR
Alexa Davis, NeDNR
Beth Eckles, NeDNR
Jean Eichhorst, NeDNR
Elizabeth Esseks, NeDNR
Carol Flaute, NeDNR
Hua Gao, NeDNR
Madeline Hoffer, NeDNR
Ryan Kelly, NeDNR
Michelle Koch, NE Game and Parks Commission
Hannah Mendez, NeDNR

John Miller, USGS
Miles Morgan, Bureau of Reclamation
Joe Murray, Office of Sen. Mike Groene, Dist. #42
William Padmore, Nebraska Public Media
Philip Paitz, NeDNR
Andy Pedley, NeDNR
Aaron Thompson, Bureau of Reclamation

COLORADO

PRESENT:

Ivan Franco, CO Div. of Water Resources
Kenny Helling, Republican River Water Conserv. Dist.
Willem Schreüder, Principia Mathematica, Inc.
Dan Steuer, CO Attorney General's Office
Mike Sullivan, CO Div. of Water Resources

ONLINE:

Commissioner Kevin Rein

Deb Daniel, Republican River Water Conserv. Dist.

KANSAS

PRESENT:

Commissioner Earl Lewis

Chris Beightel, KS Div. of Water Resources
Chelsea Erickson, KS Div. of Water Resources
Terry Nelson, Solomon-Republican Reg. Advisory Comm.

ONLINE:

Steve Adams, KS Department of Wildlife and Parks
Suzanna Baker, Republican River Water Conserv. Dist.
Hongsheng Cao, KS Div. of Water Resources
Pete Gile, KS Bostwick Irrigation District
Katie Goff, KS Water Office
Jennifer Latzke, KS Journalist
Lane Letourneau, KS Div. of Water Resources
Lori Marintzer, USGS
Connie Owen, KS Water Office
Sam Perkins, KS Div. of Water Resources
Kurtis Wiard, KS Attorney General's Office

OTHER

ONLINE:

Brent Esplin, Bureau of Reclamation, Regional
Morgan Farquhar, Pioneer Irrigation Dist., Nebraska
Phone No. 785-632-0940
Phone No. 719-343-3129

- - -

1 PROCEEDINGS:

2 CHAIRPERSON RILEY: Good morning, everyone. And
3 welcome to what we believe is the 61st Annual Meeting of the
4 Republican River Compact Administration.

5 AUTOMATED VOICE: Recording in progress.

6 CHAIRPERSON RILEY: And just a note, if you didn't
7 hear that, we are recording the meeting for posterity's sake
8 for later. So all the comments and so forth will be
9 available on our website? That's a question. I think so.
10 That'll be good.

11 So, thanks for coming here to McCook. This is
12 Nebraska's last year. As you -- many of you know, we rotate
13 every two years and I think we toss the ball to Colorado at
14 the end of our meeting. So, we appreciate everyone being
15 here and the ability to get together, at least some of us.
16 And those that can join us online, you're here with us, too.

17 We have Kevin online. For a moment, he was just
18 making a move. It made me think of Max Headroom for a
19 moment.

20 (Laughter.)

21 But he's a little smoother there now. So, Kevin's
22 joining us remotely from Colorado.

23 So, we'll start with some -- just housekeeping
24 items. If anybody needs to use any restrooms, they're
25 around the corner. Here at the McCook Community College,

1 was gracious enough to allow us to use their space, although
2 I think for a fee. So, thanks to them for having us here
3 today.

4 And we'll start with some introductions. And I'll
5 ask Earl Lewis from Kansas to begin with his crew. And
6 we'll do the best we can. As you know, with people online,
7 if we do forget somebody, we'll leave a little bit of gap
8 after Earl's done and holler in if we miss somebody.

9 Earl?

10 COMMISSIONER LEWIS: Thank you, Mr. Chairman.

11 Thank you, again, Nebraska, for hosting the
12 meeting and setting everything up. I appreciate everybody
13 being here. I am Earl Lewis. I'm the chief engineer and
14 director of the Kansas Department of Agriculture's Division
15 of Water Resources and serve as a Compact commissioner.
16 With me today is Chris Beightel, who's our Water Management
17 Services Program manager, and Chelsea Erickson, who works on
18 this -- with us on the Republican River Compact.

19 Online is Lane Letourneau, who's our Water
20 Appropriations Program manager; Sam Perkins and Hongsheng
21 Cao, who are both with the Department of Agriculture,
22 Division of Water Resources; Connie Owen, who's the director
23 of the Kansas Water Office; and Katie Goff, who also works
24 at that same office. Kurtis Wiard is online. He is with
25 the Kansas Attorney General's Office. And Steve Adams, with

1 Department of Wildlife and Parks.

2 If I've missed anybody, maybe they don't get to
3 say anything now.

4 MS. CAPPS: I'm getting it back on.

5 COMMISSIONER LEWIS: So, that's who I saw was
6 online and, I guess, we'll see if there's anybody else that
7 shows up. Thank you.

8 COMMISSIONER RILEY: All right. Well, thank you,
9 Earl, and welcome.

10 Kevin?

11 Is Kevin going to do this remotely?

12 MR. SULLIVAN: Yes.

13 COMMISSIONER RILEY: Kevin, if you don't mind
14 letting us know who is here.

15 COMMISSIONER REIN: Yes. Yeah, can you hear me
16 okay, Tom?

17 COMMISSIONER RILEY: We can hear you fine. Thank
18 you.

19 COMMISSIONER REIN: Okay. Well, thank you all
20 very much. Thank you for letting me do this remotely, and
21 I'll say more about that in a few minutes during my report.
22 But I'm Kevin Rein, the state engineer and director of the
23 Division of Water Resources for Colorado. And in the room
24 today, you have Mike Sullivan, deputy director of the
25 Division of Water Resources and deputy state engineer. Ivan

1 Franco, member of the Engineering Committee, also. And I
2 believe we have, from the attorney general's office, in the
3 room, Dan Steuer, our attorney.

4 I believe we have other participants from
5 Colorado, perhaps in the audience or online that maybe
6 introducing themselves at some point, but I believe that's
7 it from the state, Mike, unless you see anyone else in the
8 audience that I'm missing.

9 MR. SULLIVAN: There's -- there's -- I'm not
10 seeing anyone we're missing.

11 COMMISSIONER REIN: Okay. Thank you for that.
12 Mr. Chair.

13 COMMISSIONER RILEY: All right, thank you. Thank
14 you, Kevin. I'm glad that you could attend remotely. As
15 we've all lived this last year, we've found that it's worked
16 out pretty well for most instances, but I would say these
17 hybrid meetings are a little bit harder to run when you have
18 people here and people there. I'll recall our meeting last
19 year was just across the street. Many of you wouldn't know
20 that, because we did it fully remote. And, while we had
21 accessibility for the public, it was just Justin Lavene from
22 the AG's office; myself; and, at that time, Interim Director
23 Bradley. So we were very lonely in a big space. So, glad
24 to have folks here with us today. And happy that we can --
25 we can still conduct these meetings in this kind of hybrid

1 format.

2 With that, let me just introduce myself and my
3 team. I'm Tom Riley, the director of the Nebraska
4 Department of Natural Resources. I've been around the
5 Compact for about 20 years working as a supporting
6 consultant before joining this role back in November of last
7 year. So, happy to be here and happy to have a more
8 comfortable chair than the ones I used to have.

9 With me at the front table today is Jesse Bradley,
10 assistant director of the department; Kari Burgert, she's
11 our member of the EC Committee; and Assistant Attorney
12 General Justin Lavene. And our master behind the curtain in
13 back of me is Sam Capps. And we have a whole -- a whole
14 crew supporting this -- this meeting back in Lincoln and in
15 other areas, including another state. And I'll try and
16 mention their names and, hopefully, don't miss anybody. I
17 want to thank them for their efforts to put this together.
18 It is a complex effort to try and juggle all these things.
19 And then, we all love technology until technology fails us.
20 And let's cross our fingers that broadband access issues in
21 McCook aren't going to be an issue today.

22 So, the department also has some additional folks
23 working online as I said: Carol Flaute, Elizabeth Esseks,
24 Beth Eckles, Hannah Mendez, Alexa Davis, Madeline Hoffer,
25 Philip Paitz, Ryan Kelly, Margeaux Carter, Justin Ahern, and

1 Hua Gao. So, thanks to my team for helping put that
2 together.

3 If I -- people will allow me, I'll just also
4 introduce the Nebraskans here that we have in our audience.
5 And, if I miss somebody, my apologies. Let me start with,
6 maybe, a notation for this. And if somebody can break this
7 record, please let me know. But with us today is outside
8 counsel for the State of Nebraska, Mr. Don Blankenau, who
9 claims that this is his 31st consecutive year in attendance.
10 So, that's nearly half of the RRCA meetings. So,
11 congratulations to you, Don, for that standing record.

12 MR. BLANKENAU: Thank you (indiscernible).

13 (Laughter.)

14 COMMISSIONER RILEY: And if somebody else can take
15 him on that, please let me know. I don't want to have him
16 get a big head for this current streak.

17 Also outside counsel here today is Tom Wilmoth.
18 Brad Edgerton with the Frenchman-Cambridge Irrigation
19 District.

20 And, Brad, do you have any other folks here with
21 you you'd like to introduce?

22 MR. EDGERTON: I have a director, Dale Cramer.

23 COMMISSIONER RILEY: Dale, good to see you.

24 And let me just back up a moment, because I see a
25 glaring oversight I've made on DNR staff. Sitting right in

1 front of me, Shane Stanton manages our Cambridge Office, and
2 Shane's here with us today.

3 So, good to see you, Shane. It's been a while to
4 see you in person.

5 Other folks, we have a number of NRDs representing
6 us. And I'll just start with them and ask them to identify
7 anybody else they might have. Todd Siel with the Lower
8 Republican Natural Resource District.

9 MR. SIEL: And Nick Simonson, assistant manager of
10 the Lower Republican, too.

11 COMMISSIONER RILEY: Jasper Fanning with the Upper
12 Republican.

13 MR. FANNING: And we also have Nate Jenkins, my
14 assistant manager, here as well.

15 COMMISSIONER RILEY: Jack Russell. I know I saw
16 Jack. Jack Russell, right there, Middle Republican.

17 MR. RUSSELL: And Alex Boyce, our engineer.

18 COMMISSIONER RILEY: Good to see you.

19 And, also, John Thorburn, not to be forgotten, is
20 part of this meeting as well, from the Tri-Basin.

21 John, do you have anybody else here with you?

22 MR. THORBURN: No, I can handle all this
23 (indiscernible).

24 COMMISSIONER RILEY: All right. Well, thank you
25 for that.

1 Also today with us, we are recording this. Linda
2 Rohman's our court reporter. So, thanks for making the trip
3 out to McCook for that as well.

4 And I see, also out in the audience, Chance Thayer
5 from the Flatwater Group.

6 I'm not going to be able to cover all the names in
7 back of me for Nebraska beyond that. So --

8 Oh, Don Felker is with --

9 MR. FELKER: Yeah, we do. We have Steve Fries,
10 the director of the Frenchman Valley with me today.

11 COMMISSIONER RILEY: Very well.

12 So, anybody else I missed from Nebraska here in
13 the audience?

14 (No response.)

15 COMMISSIONER LEWIS: Mr. Chairman, I had
16 oversight, Terry Nelson with the Almena Irrigation District
17 from Norton is also with us in the audience today. And I
18 know Pete Gile with Kansas Bostwick is online.

19 MR. SULLIVAN: And if I may, Kenny Helling from
20 the Republican River Water Conservation District, Yuma
21 County, is also in the audience today.

22 COMMISSIONER RILEY: Very well. Well, thanks,
23 everybody, for being here and apologies to -- if we missed
24 anybody, certainly online.

25 With that, with introductions in check, we'll move

1 to our next item on the agenda, which is the adoption of our
2 agenda that we have in front of us. So, I would entertain a
3 motion, unless there's a change you'd like to have.

4 COMMISSIONER LEWIS: Mr. Chairman, I'd move
5 adoption of the agenda as presented.

6 COMMISSIONER REIN: Mr. Chair, I'd like to second
7 that.

8 COMMISSIONER RILEY: So, we have a first and then
9 a second to adopt the agenda. So, with that, I'd ask all in
10 favor to say aye.

11 COMMISSIONER LEWIS: Aye.

12 COMMISSIONER RILEY: Aye.

13 COMMISSIONER REIN: Aye.

14 COMMISSIONER RILEY: So, the agenda, as presented,
15 is adopted for our meeting. Thank you for that.

16 Our third item today is the status of the 2020
17 Annual Report and actions by the RRCA, ultimately, with a
18 motion that we would adopt the report. We had this
19 discussion this morning with some of the EC Committee about
20 some of these components and then the report itself. So,
21 any discussion that we want to cover on that annual report?

22 And just to clarify, the report that we're
23 entertaining right now is for 2020. This is a confusing
24 part that we discussed at our meeting this morning, that,
25 you know, we're here in 2021, but this is all the data and

1 accounting reporting that would have been for the year 2020.

2 So, I'd entertain a motion to accept that report
3 as presented.

4 COMMISSIONER LEWIS: Mr. Chairman, I'd --

5 COMMISSIONER REIN: Mr. Chair, I'll make -- go
6 ahead, Commissioner.

7 COMMISSIONER LEWIS: Go ahead, Kevin.

8 COMMISSIONER REIN: I'll go ahead and make a motion
9 that we accept the report.

10 COMMISSIONER LEWIS: I will second that motion.

11 COMMISSIONER RILEY: So, we've had a first and a
12 second to accept the 2020 Annual Report. So, I'd ask for a
13 vote. All those in favor say aye.

14 COMMISSIONER LEWIS: Aye.

15 COMMISSIONER RILEY: Aye.

16 COMMISSIONER REIN: Aye.

17 COMMISSIONER RILEY: So, that motion passes and
18 the 2020 report is completed. And we'll, at the end of this
19 meeting, sign that. Earl and I will do it here and the pony
20 express of Colorado will be transporting it back, with Ivan
21 riding shotgun, I take it.

22 (Laughter.)

23 Get it to Kevin to circulate a final copy to
24 everybody. So, thank you for that.

25 So, that takes us to Item No. 4, which are

1 traditional commissioners' reports about each state. And to
2 lead off this year is Earl Lewis with Kansas.

3 COMMISSIONER LEWIS: Thank you, Mr. Chairman.
4 I'll cover a few topics and, obviously, be happy to answer
5 any questions that folks may have.

6 I think, as we traditionally start off, you know,
7 we look at the climate and, certainly, as the year started,
8 we were in drought and the forecast was for expanded
9 drought. I think we had an unseasonably wet May and early
10 June leading to fairly good conditions for most of the
11 state. That has changed over the last month or so as things
12 have dried out and we've had a lot warmer temperatures. The
13 middle portion of the state now is in abnormally dry or
14 moderate drought conditions with, actually, the worst
15 drought showing up on the drought monitor in the Upper
16 Republican in northwest Kansas. So, I think, like many
17 folks in this part of the world right now, we're hoping to
18 get a few final rains before the harvest kicks in and then
19 maybe some recovery rains this fall. But, overall, I think
20 a pretty good year compared to what we thought it was going
21 to be at the beginning of the year.

22 In the Upper Republican, we continue to have water
23 conservation activities and irrigation technology being put
24 in place using the funds that were acquired under the
25 settlement with Colorado. All those funds are being used in

1 the South Fork Republican, which is, of course, the area
2 that was, we believe, impacted by the -- the past overuse of
3 Colorado. This year, there was -- \$209,000 of that money
4 was dedicated to irrigation technology, primarily for things
5 like center-pivot or pivot control packages, nozzle
6 packages, or soil moisture probes. We had 70 different
7 applications. So, basically, think about that: 70
8 different center-pivots or fields that have had some level
9 of technology put on them this year as part of that program.

10 In addition, we had, by legislative action, a half
11 a million dollars of that two million was transferred to the
12 local conservation district, the Cheyenne County
13 Conservation District, in northwest Kansas. They're using
14 that money to -- along with other funds to -- they applied
15 for and were approved for an RCPP, primarily to remove a lot
16 of vegetation, phreatophytes, along the creek, as well as
17 work on some of the watering and range land. They're going
18 to use that \$500,000 to, again, with some other funds, and
19 implement an RCPP of about \$2.7 million, total. They
20 haven't started implementing that. They're still getting
21 all the rules set in place, but hopefully will be
22 implementing here in the near future.

23 In the Lower Republican with -- again, Pete Gile
24 is on and his -- I think we've reported in the past, has
25 been very diligent about trying to convert a lot of laterals

1 to buried canal -- or buried pipe and, this year, focused on
2 trying to get a control structure in place for the Courtland
3 Canal, and then will be working over the next year or,
4 certainly, over the winter to try and implement a number of
5 control structures on the Courtland Canal to more of the
6 automated system that a number of the districts in Nebraska
7 have been using. And, I think, with anything there are some
8 bugs to work out, but I think we're pleased overall, but,
9 again, still some work to do on getting that system
10 completely in place.

11 Legislature this year was reasonably quiet for
12 water issues. We had one water bill that passed related to
13 our multi-year flex accounts, or our MYFAs. Primarily, a
14 technical correction. The period that you could use to
15 calculate your water use when going into a MYFA was set in
16 statute, and there were some additional water rights,
17 particularly in the central portion of the state, that were
18 approved or had -- at least part of their water-use history
19 was after the -- after that statutory period. And so, we
20 needed to change that period so those folks could get access
21 to that tool as well. Mostly, a technical correction, but
22 certainly gives an option for a number of additional users
23 in the central part of our state to use that tool.

24 That was the only substantive bill. I think we --
25 we've talked in some of our coordination meetings about the

1 legislature having, this year, a water committee on the
2 House side, looking at a number of things. But they spent
3 the majority of the session looking at all the different
4 water entities at the state level, whether that's for
5 agencies or divisions within agencies, and trying to
6 understand what those different functions were in the state,
7 how they were funded, who they reported to, and those kind
8 of things. Last week, they had a meeting in Garden City,
9 and so, learned a lot about what's going on in that part of
10 the world, in Ogallala, in -- and, I think, now, we're going
11 to go back and try to take all that knowledge and we'll see
12 what they come up with in this next session.

13 Our legislature works on a two-year cycle. And
14 so, there will be the same committees and the same folks on
15 those committees from last year to this year. And so,
16 hopefully, they've been educated enough to make wise
17 decisions, which I know we all are concerned about whenever
18 the legislature gets together.

19 We have talked in the past about water
20 conservation areas and LEMAs. We were able to approve an
21 additional Local Enhancement Management Area in Wichita
22 County in west central Kansas this year. That was finally
23 approved in February and is active for a five-year period
24 starting with this growing season, and so go through 2025.
25 Roughly about a 15 percent cut on the water use in Wichita

1 County. Again, that joins the Sheridan County in northwest
2 Kansas and northwest Kansas GMD LEMAs. So, we have three of
3 those in place now. The rest of the west central Kansas are
4 Groundwater Management District 1, where Wichita County's
5 at, is talking about having more of a district-wide LEMA,
6 maybe starting in 2023. That would be, essentially, another
7 four counties. They have got some outreach meetings going
8 on this fall and have started those discussions as well.

9 We continue to have a few water conservation areas
10 put in place. We've got about 86,000 acres under a water
11 conservation area. Right now, it's about 12,000 acre feet
12 of reduction, on average, each year versus what their
13 historic use was. Typically, those are in areas where the
14 local groundwater management district hasn't gotten to the
15 point of creating a LEMA yet, but there are some places
16 where, even within a LEMA, folks want to have some different
17 flexibilities than what were created with a LEMA.

18 Litigation. In January of this year, the Audubon
19 of Kansas sued the Division of Water Resources; Department
20 of Ag; and then, also, U.S. Fish and Wildlife and the
21 Department of the Interior over the Quivera National
22 Wildlife Refuge water right impairment. That is going to be
23 an ongoing and, probably, a long-term litigation. And,
24 again, I think, maybe, we've talked about that in the past.
25 But a 22,000 acre, primarily, wetland refuge at the bottom

1 end of a sub-basin in south central Kansas in which we have,
2 roughly 1,500 mostly junior water rights, mostly irrigation
3 water rights above that, that are in some fashion lowering
4 the stream flow coming into that surface water wetland. We
5 are still in the very early stages. Have asked to be
6 dismissed from the lawsuit because it's been filed in
7 federal court, with our primary argument being that our role
8 is under state law and state water rights and, therefore, if
9 you have issues with federal government, then you can take
10 up with the federal government; we should be out of that.
11 We're waiting for the court to act on that. We hope that
12 that's going to happen soon, but we'll see. I'll have more
13 to report on that later, I'm sure. The issue still remains
14 whether it remains with the litigation or some other
15 solution.

16 Water quality is a growing concern in Kansas. I
17 think we may have talked about, on the Upper Ark over the
18 years, we've had, certainly, sulfates and uranium come in,
19 and that's been an issue that has been growing as we
20 continue to concentrate that in southwest Kansas as we use
21 the water and keep what's left over on our fields and our
22 aquifer. And so, that got some legislative attention here
23 over the last couple of years. We've been doing some work
24 on quantifying that issue and making sure we understand it.
25 Department of Health and Environment is also looking at

1 other areas we might have the same type of geologic
2 situation in Kansas, and one of those is in the Upper
3 Republican, up around the Oberlin area. And so, they're
4 just now starting to collect data, primarily from domestic
5 wells. They have an opportunity for domestic well users to
6 get their wells sampled for free. And then, of course, the
7 KDHE gets the data for that, as does, of course, the well
8 owner. They're just now starting that process, so, again,
9 hopefully we'll have some more information and data to share
10 on what the means for our folks in the Upper Republican or
11 the water crossing the line down the -- down the line.

12 Flooding continues to be a concern. Obviously, it
13 wasn't so much this year, but I think the 2019 flood and I
14 know, for Nebraska, we work on that on the Missouri. That's
15 driven some interest in other parts of our state. Again, I
16 know that's been -- driven some interest in other parts of
17 your states as well. There's -- continue to be planning
18 work going on and, again, I think there will be more action
19 here in the future.

20 Two other things that are of interest but not
21 necessarily in the basin, maybe, are the Wichita Storage and
22 Recovery project and some changes the City of Wichita wants
23 to make that's creating some concern among the local ground
24 water management district and the agricultural interests
25 there locally that surround the well field. This has been

1 going on for a number of years, this particular request for
2 change for about the last three years. It's in an extended
3 hearing process that we hope to -- Connie Owen is -- she had
4 been the hearing officer before she took over the role of
5 the Director of the Water Office, so continues in that role.
6 She has promised me a Christmas gift of a recommendation on
7 what to do with that. So, I'm not sure if that's a good
8 Christmas present or not; I guess we'll wait and see.

9 And then, finally, the City of Hays and Russell
10 looking to transfer water from Edwards County, about 70
11 miles south of Hays, up to that area. Again, this is a
12 long-term process that has been in district court for awhile
13 now, and we're waiting for a judge's decision on whether or
14 not the first step of that process was done correctly by DWR
15 and, if so, then we move on to the second and more public
16 phase of gathering input on whether or not moving that water
17 from where it is to where they want to use it is in the
18 public interest. Again, that could be -- that's another one
19 that we could have a decision by the district court at any
20 point and then that would kick us off onto another eight- to
21 20-month process of public input and discussion.

22 I think that's all I have to report today. I
23 appreciate the opportunity to kind of give you an update of
24 what's going on in Kansas and would be happy to answer any
25 questions or, if anybody on the team here has anything that

1 we missed, I'd certainly welcome that as well.

2 COMMISSIONER RILEY: All right. Thank you, Earl.

3 Kevin, anybody from your team have some questions
4 for Mr. Lewis?

5 COMMISSIONER REIN: I don't have any questions for
6 Commissioner Lewis.

7 COMMISSIONER RILEY: Neither do I. So, thank you.
8 Thank you, Earl, for that report.

9 And Colorado, Kevin, if you wouldn't mind giving
10 your update.

11 COMMISSIONER REIN: Thank you, Mr. Chair. And let
12 me just ask you, can somebody give me the sign if I'm not
13 coming through clearly. Often, we'll have problems and
14 people are too polite, but flag me down and stop me if
15 there's a bad connection.

16 COMMISSIONER RILEY: We hear you loud and strong.

17 COMMISSIONER REIN: I'd like to thank --

18 We're good? Okay.

19 I want to thank you all, again, for allowing me to
20 participate --

21 THE REPORTER: I'm having problems now for some
22 reason.

23 COMMISSIONER REIN: -- in a remote way. I'm
24 actually in Steamboat Springs, Colorado, right now, which
25 may sound nice, but I don't really have a chance to do any

1 recreation in this beautiful part of our state. Instead,
2 I'm here for some legislative committee hearings.

3 And I see -- is there a question? Am I okay?

4 COMMISSIONER RILEY: Just one moment, Kevin.
5 We're having a little bit of trouble on our --

6 THE REPORTER: I had a connection problem with my
7 earpiece. Everything appears to have been recorded, but all
8 of a sudden, I wasn't hearing my playback, so I was
9 concerned. But it's fine.

10 COMMISSIONER RILEY: Very well.

11 Kevin, I think we're good. Our effort to record
12 was not working there for a moment, but we're all good. So,
13 we got everything that you said. So, please continue.

14 COMMISSIONER REIN: Okay. Thank you. And I'll
15 continue, my time here in Steamboat was very necessary.
16 Commissioner Lewis, you mentioned the special water
17 committee in your legislature, and we have a standing Water
18 Resources Review Committee that meets every year. And I
19 needed to be here to testify and provide information on some
20 other items around the state that I'll mention. So, we were
21 in a little bit of a bind that people who could stand in for
22 me were not available. And I really appreciate, especially
23 Nebraska, you all accommodating me and allowing me to do
24 this. It's not lost on me that it creates extra work and
25 it's also not lost on me that I would have really liked to

1 have been in Nebraska to see all of you present.

2 Having said that, I want to also thank Mike
3 Sullivan and Ivan Franco for their work on all the Compact
4 issues during the year, especially Ivan. It's a lot of
5 work.

6 I'll touch quickly on drought conditions. Around
7 the state, I had a chance to talk to folks in a workshop
8 about a week ago about drought conditions in Colorado and,
9 most notably, I think, this year more than a lot of other
10 years, it's very temporal and it's very location specific.
11 We have areas that experienced good conditions earlier in
12 the spring, late spring, early summer, and those conditions
13 have gotten worse and we have other areas that are now
14 starting to see some precipitation that they did not have
15 before.

16 And I'll pause. It looks like maybe there's still
17 a little bit of a problem, Mr. Chair.

18 THE REPORTER: Yeah. For some reason, and I don't
19 know what's going on. This has never happened before. But
20 I'm -- I want to take this down and restart it, if I might.
21 It'll take a second or two.

22 COMMISSIONER RILEY: That's fine. So, Kevin, we
23 need to pause just for a moment so our reporter can reset
24 her equipment.

25 (Off the record.)

1 COMMISSIONER RILEY: Sounds like we are fully
2 operational again, so I'm sorry for the delay there, Kevin.
3 If you'd like to, pick up where you were.

4 COMMISSIONER REIN: No, no. I appreciate it. It
5 allows me to be a little more emphatic about my point that I
6 really appreciate Nebraska and the work you all are going
7 through to allow me to do this remotely. And, again, it's
8 not lost on me that that's one more variable for people to
9 deal with with one of these meetings, so thank you very
10 much.

11 I was talking about drought. And my real point is
12 that, yes, we have significant drought. I think I'd be
13 standing in probably the worst area of the state right now,
14 which we're not used to in the northwest corner of the
15 state. But the other part of that, the other side of that
16 coin, is forest fires and wild land fires. And we've had a
17 few fires in Colorado this year, but they haven't really
18 gotten out of control the way they did last year. And we've
19 got a lot of the season to go; but, so far, the fire
20 situation has not been like it was last year. That's always
21 good news.

22 Touching on our work environment during continued
23 COVID considerations. At the Division of Water Resources,
24 we have allowed people to come back to work in more numbers
25 than they have. We were previously under a situation where,

1 if you could work from home, that was the direction given.
2 And we've been doing our job well. We've been very
3 effective and very efficient. But we do have people moving
4 back into the office, and we hope that they would continue
5 that as the months progress.

6 I want to give you an update on a few items of
7 general importance in the state. First of all, the Colorado
8 River. That's the other side of the hill from the
9 Republican, of course, but it's -- it's of general interest
10 to everyone in the western United States and, certainly, the
11 seven Colorado River Compact states. And, right now, there
12 are a lot of talks going on related to lake levels in Lake
13 Powell and Lake Meade, especially Lake Powell from our
14 interest. We've dropped down to a dangerously low level
15 that impedes power production, which has many different
16 implications. As a result of that -- as a result of the
17 drought, the drought response operations agreement has been
18 invoked and the Bureau of Reclamation has directed releases
19 from three upper basin reservoirs: Flaming Gorge, the
20 Aspinall Unit, and Navajo Reservoir. And those releases are
21 using water that the Bureau has available and being used to
22 prop up, so to speak, lake levels in Powell to help stave
23 off any concerns about power production. That will be a
24 36,000 acre foot release from Blue Mesa -- or from the
25 Aspinall Unit affecting lake levels at Blue Mesa Reservoir.

1 Also wanted to mention the renegotiation of the
2 Bureau's seven guidelines on the Colorado River Compact
3 administration and management. Those talks were on; they
4 were being conducted by our sister agency, the Colorado
5 Water Conservation Board.

6 Having said all that, Colorado, along with the
7 other three upper basin states, Wyoming, Utah, and New
8 Mexico, is in good compliance with the Compact. And, as
9 I've presented it in the past, we stand to stay in
10 compliance, at least for the next five years, just based
11 upon the action plan. But that doesn't take away the
12 urgency of what's going on with the drought and condition at
13 the lakes. And we always are having that conversation and
14 I'll be having that conversation with our committee this
15 afternoon.

16 I also wanted to mention that Mike Sullivan and I,
17 last week, announced we would do -- start measurement rules
18 and start stakeholder meetings on the west slope. Those
19 folks in the Republican River Basin are very familiar with
20 measurement rules and the importance of measuring ground
21 water diversions, and we need to bring that to the west
22 slope, the importance of having good data going forward on
23 Compact issues. So, that's something that Mike and I will
24 be starting very soon. An important effort.

25 The Rio Grande. I update you often about the

1 status of our ground water rules in the Rio Grande. We have
2 seven sub-districts. They're generally in -- there -- sorry
3 -- their annual replacement plan in effect. I think we had
4 one sub-district whose plan was denied, but that's under
5 appeal. So, we have all of the wells able to pump right
6 now, and we want that other sub-district to be able to be in
7 better compliance with the plan each year. They also worked
8 on continued efforts on sustainability in the Rio Grade
9 Basin.

10 And the other item of general interest, Senate
11 Bill 48 that was 2020 legislation in Colorado. It called
12 for a work group to explore our anti-speculation law and to
13 explore the possibility that that law needs to be
14 strengthened. I was part of that work group and I co-
15 chaired that with someone from the attorney general's
16 office, Scott Steinbrecher, that many of you know. We
17 delivered that report to our Water Resources Review
18 Committee. A very lengthy report, if you want to go to
19 Colorado's Department of Natural Resources website, you can
20 download it and take a look at it. It's 66 pages of great
21 information.

22 On the Republican River, just a couple of
23 comments. The conservation and retirement efforts continue
24 with the Republican River Water Conservation District. I
25 believe you'll be getting more detailed information, perhaps

1 in public comment. I don't want to take a lot of your time
2 right now, but the board -- the district and the board
3 continue to work on incentives toward conservation,
4 particularly in the South Fork, and a lot of that also goes
5 toward the retirement of acres pursuant to the 2016
6 resolution the three states have. And I think you all know
7 I'm talking about the 10,000 acres that need to be retired
8 by 2024 and another 15,000 acres by 2029. All I can say is
9 that I really appreciate and admire the work that the
10 district is doing to meet those. When they work on one,
11 conservation or retirement of acres, that really impacts the
12 other. And so, they're working on both right now. And the
13 Division of Water Resources has been available to them to
14 help them understand what different actions, what different
15 incentives, how that's affected by and is helped by
16 administration and our approval efforts. So, we've been
17 trying to be a resource for them in that.

18 The last item I'll mention related to the
19 Republican River is our rulemaking, our Compact
20 Administration Rules. I've updated you before those were
21 submitted to the Water Court on January 11th, 2019. And
22 those rules are really there to help for the equitable
23 treatment for all the water users, including surface water
24 in the Republican River related to Compact compliance. At
25 this point, we've settled with all the objectors. We have

1 -- except one. We have one objector left, and we're -- we
2 have a motion before the court that we need a finding from
3 the court on. And, depending on the outcome of that, we may
4 be going to trial in January, but we feel the rules are in
5 the good place and we're just hopeful we can bring that to
6 some conclusion here in the coming months.

7 Mr. Chairman, those -- and if there are any
8 questions, I'd be happy to --

9 COMMISSIONER RILEY: All right. Thank you,
10 Commissioner Rein.

11 Any questions of -- Commissioner Lewis.

12 COMMISSIONER LEWIS: Yeah, Mr. Chairman, thank
13 you.

14 And, Commissioner Rein, just going back to the
15 retirement of acres in the Republican, can you be a little
16 more specific about where you're at in meeting the 10,000-
17 acre goal and what your prognosis is on whether or not
18 you're going to be able to meet that -- that deadline?

19 COMMISSIONER REIN: Thank you, Commissioner Lewis.
20 Just a couple of comments on that. And I may need to be
21 corrected, but I think approx- --

22 (Commissioner Rein's connection was lost.)

23 COMMISSIONER RILEY: Kevin, I don't know if you --
24 if you can hear us, but --

25 COMMISSIONER REIN: -- about the 3,000-acre mark

1 right now, Colorado is, and I have -- I need to emphasize --

2 And I -- I think my screen froze up for a minute.

3 Are you all still hearing me?

4 COMMISSIONER RILEY: We are now. You did freeze
5 up for about 30 seconds.

6 COMMISSIONER REIN: Okay. It allows me, once
7 again, to emphasize the work that the district is doing, and
8 let me be a little more specific. I know that they're
9 developing incentives to retire more acres through CREP and
10 EQIP. And the importance of that is not lost on the
11 district, nor is it on Mike Sullivan or I, because of the
12 importance of the resolution. When you look at the
13 resolution, we see that that is pretty straightforward,
14 pretty black-and-white, that Colorado needs to retire that
15 10,000 acres. That was extended, of course, a couple of
16 years to 2024. And then, you know, 15,000 by 2029.

17 I'll just point out a specific item: That, in
18 April, I sent a letter to the Republican River Water
19 Conservation District Board that I believe they distributed
20 to their water users. But it really went through the
21 sequence of, first of all, the details of that in the
22 resolution and identifying the 10,000 acres as the goals
23 that need to be met and that the circumstances are not good
24 if we're not meeting those. So, I think that's why the
25 district has put so much importance on that.

1 And I need to just add a footnote, we recognize in
2 Colorado that there is a provision that says, if Colorado
3 cannot, will not, meet those retirement goals, that we're
4 able to use other means to reduce consumptive use. However,
5 I think we all fully understand -- well, I know we all fully
6 understand that that is not a clear objective like the
7 10,000 or the 25,000 acres. That -- that would require new
8 processes, new initiatives, quantifications, more
9 discussions with Kansas and Nebraska. So, while we realize
10 that's there and it's not something that we're going to stop
11 talking about, we know it's not as straightforward as the
12 reduction of acres target.

13 Does that answer your question, Commissioner
14 Lewis?

15 COMMISSIONER LEWIS: It did. And I -- thank you
16 for that answer. Also want to thank the district for the
17 work that they're doing to retire those acres. You know the
18 last thing I'd say on this and then I'll let it go, I think
19 we all recognize the difficulty that we all went through to
20 get to the point of having that resolution. And I think all
21 of us would rather not get back into that situation. And
22 so, you know, certainly, we would be happy to try and work
23 with you however we can, but we encourage -- encourage you
24 to stay the course and meet that goal so that we don't end
25 up back in a situation of -- of more discussion or more

1 conflict. We certainly don't want that any more than
2 anybody else does.

3 But thank you for your work and thanks to the
4 district for what they're doing.

5 COMMISSIONER RILEY: Okay. Thank you, Kevin.

6 COMMISSIONER REIN: Thank you. I appreciate the
7 conversation.

8 COMMISSIONER RILEY: I had a question,
9 Commissioner Rein, on this discussion of the management
10 rules you noted in the Colorado basin. How does that all
11 work with some of the transbasin deliveries that you make
12 from the west to the east slope, and is that -- is that
13 being affected by drought and some of the other issues with
14 the Colorado compact itself?

15 COMMISSIONER REIN: Well, Mr. Chair, I wish I had
16 about 30 minutes to answer that question. It's such an
17 important question. But aside from -- obviously, I think
18 your point is, aside from Republican rules, what are the
19 status of rules or administration related to transbasin
20 diversions from our west slope to the east slope. And I can
21 say that, as I mentioned the heightened urgency on the
22 Colorado River, less related to Compact compliance but more
23 related to lake levels right now, we are very much aware of
24 many variables related to Compact administration from
25 Colorado -- on the Colorado River. And, you know,

1 transbasin diversions will be one of the questions. But we
2 do have a guiding principle, as you know, I'm stating the
3 obvious, there has to be priority of appropriation. And,
4 you know, that's often a starting point. We look at
5 priority.

6 But if we were to do rulemaking, we would need to
7 consider -- or we would need to allow for other
8 considerations that have to do with things within the west
9 slope basins. Because we have transbasin diversions within
10 those west slope basins themselves and, certainly, more to
11 the point, to the front range. And so, I think I just took
12 a long-winded route of saying that we don't have an answer
13 to that yet, what would happen to the transbasin diversions
14 other than, right now, we have priority of appropriation
15 (indiscernible) administration.

16 COMMISSIONER RILEY: Well, thanks. Thanks for
17 that, Commissioner. I know it's a complicated topic and
18 maybe just a follow up. On the front range, I had the
19 occasion to drive from Cheyenne south earlier in the summer,
20 and I hadn't made that trip in about a decade. And the
21 front range, I know, you've noted before, the amount of
22 folks that are coming in on a monthly basis, and I was
23 stunned, really. The development. You know, you used to
24 drive down I-25, and not much going on the east side of I-
25 25. And there were homes and developments everywhere. So,

1 I'm curious, are you still seeing the influx of population
2 coming into the front range on a monthly basis that you'd
3 mentioned in the last couple of years, at least? And how do
4 you square that up with water supply?

5 COMMISSIONER REIN: Thank you, Mr. Chair. And,
6 yes, of course, you've noted it and we've noted it and
7 Colorado had influx of growth along the front range. I
8 noted -- I will note that, we just recently have seen three
9 storage projects on the horizon. One is our Chimney Hollow
10 Firming Project for Windy Gap on the west slope that will
11 allow better storage of water. It is a transbasin
12 diversion, but it's an already approved, already decreed
13 transbasin diversion. We have Glade Reservoir that Northern
14 Colorado Water Conservancy District has been pursuing for
15 many years, and that's in progress and it's large storage
16 just northwest of Fort Collins on the -- off of the Poudre
17 River. And then, our Gross Reservoir expansion by Denver
18 Water. I should not say "our" like it's the Division of
19 Water Resources'. Colorado's -- Denver Water's expansion of
20 Gross Reservoir.

21 So, that -- that's firming up some storage and --
22 to address that. But I will say that we're not seeing
23 initiatives toward new transbasin diversions to address the
24 growth. And, to a large degree, along the South Platte, we
25 see -- what we see a lot is converting ag water to municipal

1 water through changes of water rights, and that -- that
2 helps supply a lot of this growth, too.

3 COMMISSIONER RILEY: Yeah. Thanks for that. I
4 know when you see the drought maps and think about how you
5 serve all these populations on a municipal basis, it's --
6 it's not a good place to have your thoughts go. It's going
7 to be hard for all of us, I think, looking forward.

8 Anything more for Colorado?

9 COMMISSIONER LEWIS: Nothing for me. No, thank
10 you.

11 COMMISSIONER RILEY: All right. Well, thank you,
12 Commissioner Rein, for that report.

13 COMMISSIONER REIN: Thank you.

14 COMMISSIONER RILEY: And that'll take us to
15 Nebraska's report. And I might just start out with Nebraska
16 DNR and our location. Some of you may know that we don't
17 have a home right now. Beyond COVID, working remotely,
18 we're working with the -- some of the other agencies and
19 trying to accommodate some movement and consolidation of
20 departments across the state. And, with that, we have
21 relocated ourselves, on a temporary basis, into the basement
22 of the State Office Building and remain, largely, a remote
23 staff for our Lincoln group. And that's been a real tough
24 row to hoe with some of our staff.

25 They've done a great job, as, I think, Kevin, you

1 might have mentioned, our work efforts and quality of work,
2 efficiency, has been -- been really good and it's great to
3 know that we can do these things in a remote sense, but I do
4 and am concerned about or worry about the innovation and the
5 ability for people to get together, like we are here today.
6 I'm sure that Earl and I already had a conversation that we
7 wouldn't have had otherwise, and it allows you to think and
8 innovate to solve problems that you otherwise don't get to
9 do when you're on a remote basis and working apart. So,
10 this is a concern that I have for the -- our department and,
11 really, for science- and engineering-wide, across the
12 country and the world, for that matter, that we're missing
13 out on these opportunities to get together and work in these
14 spaces in between to solve problems. So, certainly, in the
15 water area, we always need to continue to push the limit on
16 efficiencies and these type of things. So, hopefully, those
17 innovations aren't lost on us moving forward, but it is a
18 concern.

19 So, we hope to move into a new space sometime
20 early next year in 2021 [sic]. We'll be co-located with a
21 couple of our sister agencies: Department of Ag and
22 Department of Energy and Environment and the Department of
23 Economic Development. So, it'll be a good mix, along with
24 our Commodity Board group. So, it'll be a nice -- a nice
25 space to go to and it'll be good, hopefully at that time, to

1 have everybody back together and the ability to work
2 together.

3 In Nebraska, certainly -- Commissioner Lewis
4 mentioned this -- it's less than 24 months that we weren't
5 worried about these drought maps. We were worried about how
6 to get rid of all the water we had in this state and had
7 some wide-ranging damage and impacts from flooding in 2019.
8 We still continue to work to recover from that. Earl
9 mentioned that Kansas and Nebraska, Iowa and Missouri, are
10 working collaboratively on the Missouri River to find
11 solutions, moving forward, to any kind of future flooding
12 and having resiliency from that.

13 So, much further removed from two years ago, we
14 now have the news that the Missouri River -- which, if
15 you've seen the drought maps, very, very dry upstream -- is
16 going to go into some of their lowest release phases on the
17 books. So, we're going to have a release on the Missouri
18 River starting this fall that may impact water supply users
19 for intakes, power plants and the like. So, it's really
20 been a rapid change from worrying about flooding to going to
21 drought.

22 And, overall, Nebraska, we're not nearly in as bad
23 a shape as when you look to the west. And, you know, it's
24 frightening to look at the drought maps every week and the
25 large amount of deep red zones that you see in most of the

1 western states. So, we have been more fortunate; although,
2 certainly, in the last few months and in areas in the basin,
3 for example, we know from kind of Cambridge west, it's a lot
4 drier. And, kind of, the two faces of this basin that we
5 often see in Nebraska that we can have better precip and
6 rains on the eastern side and, certainly, drier on the
7 western side. So, we continue to -- to deal with that.

8 Statewide, we do have some zones where drought is
9 setting in and stressing the system. We're in an allocation
10 year, now, on the Platte River System, so that was
11 unexpected. In the spring, we wouldn't have thought we were
12 going to be there, then it wasn't a couple of months later
13 when we flipped over to that. So, it -- I sense these
14 changes are happening more rapidly, and that's concerning
15 for our ability to forecast for producers to know what
16 they're going to do the next year, when the next year
17 changes so quickly. So, these are things that we need to
18 continue to work on, and our department and our staff is
19 working diligently for drought planning. And we're starting
20 that process here in the basin and other parts of the states
21 where we're working with producers, NRDs, irrigation
22 districts, to try and facilitate a better way to manage our
23 way through drought.

24 In general, on the basin conditions for last year,
25 at least, we started, at least in the Republican basin, a

1 little bit drier than other places across the state, so
2 that's never a good place to be. So, it was, especially in
3 the upper basin -- and I see Nate Jenkins in the audience.
4 I think he's looked at some data recently that shows that
5 this year might be some of the driest and lowest
6 precipitation rates that might have been on record for some
7 time in the upper portion of the basin. So, we must hope
8 for a break from those conditions to go into next year.

9 The good thing is we had a great water supply in
10 2020 and really had some -- some good carryover from that
11 coming from 2019 on water supply. So that was good in 2020.
12 And we've been able to move forward in 2021 reasonably well,
13 although these last three or four weeks, the temperatures
14 and such. And if anybody drove in yesterday when it was 103
15 degrees and you felt like you were in a -- one of these new
16 fancy air cookers, that -- it's not very comfortable. But
17 it looks like we might get a break from that going forward
18 here in the next week or so.

19 Just a note on water administration in the basin
20 last year. We didn't have a lot of necessary need for that.
21 Again, this relates to the carryover from 2019 that we had.
22 Fortunate for that and going into 2020. I'd note Shane
23 Stanton, our field office leader in Cambridge, has been
24 working to install and put in some new equipment across the
25 basin, and we're doing that really across the state to have

1 better -- and replace some of the existing gaging equipment
2 and so forth that we have. So, that's a process the
3 department's continuing to invest in. It's very important
4 to collect information. We need the data to make decisions.
5 And, as we all know, Commissioners Lewis and Rein, I think
6 there's been less data that we've had availability to have
7 over the last 20, 30 years and it makes it harder to make
8 decisions. So, with some of the new technologies coming on
9 board and the ability to collect information on a much less
10 expensive basis, I know I'm looking forward to having more
11 information and being able to deploy more gaging stations
12 and stage recorders, these type of things, to help make
13 decisions, just not for water supply, but in flooding and
14 those kind of things.

15 The department continues to work with the natural
16 resources districts in developing some of our integrated
17 management plans. We're in a fifth generation that we're
18 just finishing up right now. Those go into effect in late
19 September, September 27th. So that's been a good experience
20 and this continued participation and work with the NRDs and
21 the department really helps set the stage for things, like
22 drought planning and water management.

23 Just a few other notes in terms of some of the
24 water investments that are going on inside the Republican
25 River Basin. We appreciate all the efforts that our

1 irrigation districts and NRDs and producers go to continue
2 to push the edge on technology and water management. Just a
3 couple of projects I might note that direct -- direct [sic]
4 related to the Colorado settlement dollars on some of the
5 active projects. Frenchman-Cambridge has some canal
6 automation and WaterSMART money.

7 And I might note, just in general in the basin,
8 and this, I think, is true of Kansas as well, really
9 appreciate the Bureau's WaterSMART dollars. We've been able
10 to leverage a lot of those dollars and put them against
11 other funding mechanisms and has allowed the districts and
12 NRDs to do some really innovative work that otherwise would
13 have been a big lift to make without those kind of
14 resources. So, that's been good to have.

15 Nebraska Bostwick is working on some headgate
16 automation and working with the Kansas Bostwick on some of
17 those things. So, it's really good to see that level of
18 management going on. We have some additional projects that
19 are being developed and that we're working on with Frenchman
20 Valley Irrigation District and some additional work with
21 Nebraska Bostwick Irrigation District on doing these
22 efficiency improvements projects that we have. So, our
23 thanks to those irrigation districts and those efforts.

24 Also, the NRDs continue some of their investment
25 and we thank them for that. Our Water Cash Fund dollars

1 have been available for retirements, and those kind of
2 dollars have also been leveraged against some of the
3 WaterSMART grants, too. As I read it, it seems like there's
4 going to be more availability of that kind of federal
5 dollars to leverage against going forward. So, hopefully,
6 we all have a chance to do that. Upper Republican's doing
7 these retirements, along with the Lower Republican. Middle
8 has some great projects going on. So, again, we thank them
9 for those -- those efforts. Middle Republican, in
10 particular, is developing some meter installations and using
11 those in some of the areas where they've seen declines and,
12 particularly, these quick response areas where we know that
13 we need to act and can act more timely for those kind of
14 things.

15 A quick note, because I'm sure Commissioner Lewis
16 will ask this question, so I'll try and head him off at the
17 pass. The Platte Republican Diversion Project, that's a
18 project that is an investment by Lower Republican and Tri-
19 Basin, along with some partners in the Platte River, to move
20 water from the Platte River to the Republican. We're in the
21 process of going through some administrative hearings. We
22 just had one a few months ago that deals with the objectors
23 and their standing. So, in the process of reviewing that
24 right now and don't have a lot more to say about it other
25 than that, but be happy to answer any questions, when I

1 finish, if there might be. Again, I think I might see some
2 coming from Commissioner Lewis.

3 Some other funding mechanisms we have in Nebraska
4 that's been very useful to this basin come from the Water
5 Sustainability Fund. That's a fund that the legislature
6 created and the Natural Resource Commission manages.
7 Applications for those dollars needed to be in just this
8 past month, and we received 17 applications for that. We
9 have about \$13 million available and \$36 million in
10 requests. So, we continue to see some really innovative and
11 interesting requests for all this funding, but as I'm sure
12 happens in your own states, the dollars available aren't
13 necessarily matching the need. So, hopefully, some of the
14 other investments that we might see on an infrastructure
15 bill and those kind of things can help -- help move us along
16 on those items themselves.

17 One quick note about that sustainability fund and
18 its impact to the basin. Since its inception, there's been
19 close to \$7 million that we've been able to bring into the
20 basin and, hopefully, there will be more opportunities to do
21 that going forward.

22 With that, I didn't have any additional
23 information to report from Nebraska and would entertain any
24 questions that Commissioners Rein or Lewis might have.

25 COMMISSIONER LEWIS: Well, Mr. Chairman, I

1 appreciate you thinking of me and trying to anticipate my
2 thoughts and interests. You're right, exactly, that we
3 remain concerned about what that project will look like and
4 want to make sure that we're protecting our resources,
5 especially in Milford Lake. And so, we're continuing to be
6 interested in that and we'll look forward to future updates
7 on what the process is.

8 I do want to take the opportunity to agree with
9 you on the -- on the Bureau of Reclamation WaterSMART grant
10 dollars and the availability of those to work with in-state
11 dollars to fund water conservation projects. I think that's
12 been a really good tool for Kansas as well. So, also
13 acknowledge the cross-state cooperation of the Bostwick
14 districts to bring those projects to bear together, rather
15 than trying to compete. So, I think -- I'll stop there. I
16 appreciate the update and the opportunity to join in.

17 COMMISSIONER RILEY: Thank you, Commissioner
18 Lewis.

19 Kevin, did you have any comments or questions?

20 COMMISSIONER REIN: Thank you, Mr. Chair. I don't
21 have any comments or questions for you today.

22 COMMISSIONER RILEY: Okay. Well, thanks for that.
23 And just echoing on that, I think there's going to be a lot
24 more opportunities in -- for all these folks, NRDs and
25 irrigation districts, you know, think outside the box on

1 some of the funding. And, I don't know, Craig Scott with
2 the Bureau's here with us. Some of the latest funding
3 discussions I've heard from the Bureau, you know, it seems
4 like the door's opening for maybe some other connectivity,
5 whether it's just not water efficiency, but kind of
6 combining that with other environmental needs and those kind
7 of things. So, I think, you know, you don't -- we don't
8 want to leave the opportunities of connecting some of those
9 components together to leverage those dollars anywhere on
10 the table.

11 All right. Well, thank you. That concludes our
12 Item No. 4, the reports from the states by the
13 Commissioners. That takes us to our next item on the
14 agenda, which are federal reports. And my apologies, Craig
15 Scott, I left you hanging there. I didn't introduce you,
16 but Craig Scott is here with the Bureau of Reclamation.
17 We're glad that he came down the two blocks or so to visit
18 us in person and be with us today. I would ask -- and this
19 would be true if we make public comments later -- if you
20 could do so from the lectern. There's a little mic up there
21 and it'll be better to hear. So, with that, Craig and the
22 Bureau of Reclamation report.

23 MR. SCOTT: Well, good morning and thank you,
24 Commissioners, for inviting us over to provide our report.
25 And just real quick before I dive into my report, again, I'm

1 Craig Scott for the recorder there. I work with
2 Reclamation's Nebraska-Kansas Area Office here in McCook.
3 We also have joining us today a few folks from our office as
4 well. Aaron Thompson, our area manager, is joining us
5 online this morning, as well as Miles Morgan, one of our
6 operators -- engineering operators there in the Water
7 Operations Group. And then, in addition, we also, I
8 believe, we have our regional director, Mr. Brent Esplin, on
9 as well joining us. And I know you guys may remember him
10 when he worked with the Nebraska-Kansas Area Office in Grand
11 Island many years ago, but we do welcome him back to
12 Reclamation in our region.

13 So, with that, I will just dive into our report.
14 We did provide a report like we have in the last several
15 years, just a written report for the record. But I would
16 just like to highlight a few items in that report. And I
17 won't go into a lot of details. I think we've already heard
18 the drought topics and water-short and limited range and
19 those sort of things. But I will highlight a few highlights
20 to there, just in more relation to our reservoirs itself.

21 But, as far as 2020, you know, all of our projects
22 areas in the Republican basin received below normal precip
23 for the year, and that precip averaged 56 percent at Swanson
24 Lake in the upper part of the basin to 95 percent of average
25 at Harry Strunk Lake. The total precip at Swanson for 2020

1 was 11.38 inches, which is the lowest we've experienced
2 since 2002 drought period.

3 As far as inflows, they varied. Some were below
4 average; some were above average. But we did experience
5 all-time low inflows above or into Enders Reservoir. The
6 annual inflow for Enders in 2020 was 3,000- -- approximately
7 3,700 acre feet, which was the lowest annual inflow since
8 the reservoir was completed.

9 Moving on down to Harlan County then, as Chairman
10 Riley had mentioned, we did have significant carryover
11 supplies in Harlan County from 2019. Storage in the
12 reservoir was in the flood pool at the beginning of the year
13 and remained in the flood pool until the early part of July
14 when irrigation demands picked up and lowered that reservoir
15 elevation into the conservation pool.

16 Irrigation supplies in 2020 started at nearly
17 140,000 acre feet at the beginning of the irrigation season.
18 So, as a result of that, a water-short administration was
19 not in effect for 2020. Also included in the report is data
20 for 2021, and that data can be found on Table 2, and that
21 runs through July of this year.

22 Again, we've experienced some pretty significant
23 drought areas within the basin. That does vary from the
24 upper part of the basin to the lower part of the basin, with
25 the exception of the drainage basin around and near Harlan

1 County Lake, where they've received -- and just recently
2 received some significant rainfalls. But throughout the
3 year, they've caught some timely rains down there. They're
4 the one exception where we have seen some above-average
5 precipitation occur.

6 Irrigation supplies for 2021, in -- from Harlan
7 County, again, was -- exceeded the trigger level, the
8 119,000 acre feet, so this was the third consecutive year in
9 which water-short year administration was not required.

10 And then, just looking ahead, it's always an
11 interest of what does the next year going to look like as
12 far as water short. I think things look favorable,
13 especially after the recent storm events that occurred over
14 the weekend, that we look -- things look pretty favorable to
15 not be water short in '22. But we will start providing
16 those monthly updates again in October, so --

17 And then, lastly, I'd just like mention and make a
18 couple of comments regarding the Bostwick Memorandum of
19 Agreement. And, as you recall, I've reported on this the
20 last several years that this MOA is the document that
21 identifies the procedures for sharing those water supplies
22 from Harlan County. And it was a three-year agreement that
23 was developed and signed in 2018. So, 2021 is the last year
24 of that agreement. But I just wanted to let everybody know
25 that we expect and -- to initiate discussions with both

1 irrigation districts here later this fall to either extend
2 the current agreement or develop a more permanent agreement.
3 So, I think that agreement has been successful, at least
4 over the last two years. I think we -- you know, not only
5 the irrigation districts and Reclamation, I think we're
6 comfortable with all those accounting changes, and so we'll
7 look forward to working with the districts and developing
8 another agreement as we move forward in the future here.

9 So, with that, I think that concludes my report.
10 Have any questions, feel free to ask.

11 COMMISSIONER RILEY: Any questions for Craig?

12 (No response.)

13 MR. SCOTT: All right. Thank you.

14 COMMISSIONER RILEY: All right. Thank you, Craig,
15 for that report.

16 And it made me think of something I did fail to
17 mention, when you talked about water-short year, that 2020
18 was the first year that Nebraska didn't have a Compact call
19 year since we originated that whole process. So, that was
20 good, in addition to being in compliance for that year.
21 We'll see where we get this -- and, obviously, we're not in
22 a Compact call year this year either. So, we'll see how
23 that happens next year.

24 So, thanks for that, Craig.

25 Next on our list is the Army Corps of Engineers'

1 report. And I'm anticipating that they're not here. Are
2 they here?

3 MS. CAPPS: Nope.

4 COMMISSIONER RILEY: They're not here. Anybody
5 remember the last time? I think in Burlington. One of our
6 meetings in Burlington, about a decade ago, maybe. I don't
7 know. So, maybe we can take them off the list next time.
8 No.

9 (Laughter.)

10 So, nothing from the Corps. That leaves us with
11 the Survey's report, and I think we have somebody that's
12 going to do that on a virtual basis.

13 MS. CAPPS: And I'm going to mute our room, so
14 we'll unmute again, 'cause it keeps jumping to noise in the
15 room as they're talking, so --

16 COMMISSIONER RILEY: Okay. So, we're going to
17 mute ours so nobody will hear my mumbling during this
18 report. Good.

19 MR. MILLER: Hey, how is everybody? Am I coming
20 through okay?

21 COMMISSIONER RILEY: We can no longer tell you,
22 but, yes.

23 MR. MILLER: I'm good. Can you hear me now.

24 COMMISSIONER REIN: I can hear you.

25 MS. FLAUTE: Yes.

1 MR. MILLER: Okay. For the record, I'm John
2 Miller with the U.S. Geological Survey out of our North
3 Platte Office. Like to thank the Commissioners for this
4 opportunity to present the work the USGS has done this past
5 year in the Republican basin. I got quite a few notes, so
6 I'll go relatively quickly.

7 But, last year, as you all know, was a really
8 exciting year as far as flows go in the western Republican
9 basin in Nebraska, specifically, the event there at the end
10 of July. So, I'm going to throw out some pretty -- really
11 interesting statistics on some of the work that we did do
12 over that flood event. I'll just -- I'm just going to start
13 with the highest upstream sites and just kind of work my way
14 to Benkelman.

15 The Arikaree River, that was the highest discharge
16 measurement in 60 years. It was the highest peak in nearly
17 40 years. The annual mean trend, however, there was little
18 blip, of course, because of that event, but continues to
19 slightly -- slightly decline.

20 I guess I should pause real quick. I would like
21 to thank Elizabeth Esseks from Nebraska Department of
22 Natural Resources in the help of distributing our water
23 summary, the data report, that hopefully is provided to
24 everybody there.

25 Moving to the state line gage, the North Fork

1 state line gage, it was the highest discharge -- physical
2 discharge measurement that has been made there in 60 years.
3 That was the highest peak in nearly 40 years. And all of
4 these sites -- I'm not going to get into them specifically,
5 but most of these sites are 70 and 80 years of record. So,
6 that rain event was tremendously significant. The overall
7 mean flows at the North Fork gage definitely have come up in
8 the last half dozen years or so, and they're approaching
9 within six cfs of the running mean for the period of record.

10 Moving to the Buffalo Creek gage near Haigler,
11 that broke all records, that event that went through there.
12 That was the highest discharge measurement ever made and it
13 was our peak of record, both gage height and the discharge.
14 That was -- that little basin, some of you are probably
15 familiar with that gage or that little basin, but it -- that
16 event was 400 -- generated 440 cfs there at that gage.

17 Moving to Rock Creek at Parks, we made the second
18 and third highest discharge measurements ever made in 80
19 years of record at that site. And that was the second
20 highest peak recorded. And that site had settled in at
21 about, actually, six -- about half of the long-term average,
22 is where it is at.

23 And then, that -- that event at our South Fork
24 gage was the 17th highest peak, and that was the fifth
25 highest physical discharge measurement that has even been

1 made at that site.

2 And then, the Republican River at the Benkelman
3 site, that was the 14th highest peak ever recorded and the
4 13th highest discharge measurement ever made.

5 I'm going to go quick here through the rest of the
6 sites. The sites at Frenchman at Culbertson and Driftwood
7 near McCook, both down just a little bit from previous-year
8 mean. Beaver and Red Willow are very similar to the
9 previous year's flows. In fact, they were -- they come in
10 within one cfs of 2019 annual means.

11 The interesting trend at Sappa Creek near
12 Stamford, the last six years that annual mean has gradually
13 been creeping up every year, and I suspect 2020 is going to
14 continue in that trend.

15 And then, at the -- at Guide Rock, really, as has
16 been mentioned, there's just been some tremendous rainfalls
17 in the lower Republican within Nebraska that has generated
18 some pretty significant flows, both into Harlan County and
19 below. Guide Rock, these last two years, has been over
20 double the long-term average mean. Pretty significant
21 there.

22 And then, just one last note. On that -- it was
23 kind of fascinating to people that are really into water,
24 like myself, is that -- that event out there in western
25 Nebraska generated nearly 9,000 cubic feet between the South

1 Fork gage and the North Fork gage there at Benkelman. And
2 there was this tremendous attenuation that had happened with
3 that event with only 1,500 of it, roughly, making it to the
4 Swanson Reservoir. So, a lot of water got absorbed in that
5 event. And it's just one of those things that kind of
6 fascinates me. And that type of -- of loss is significant
7 when the flood event is relatively localized as it goes
8 downstream.

9 Anyway, I will wrap up my comments there and
10 entertain any questions if there is any.

11 COMMISSIONER RILEY: Okay. Thank you. Thank you,
12 John, for that report. And, yeah, I remember looking at
13 some of the statistics after those events myself, and pretty
14 stunning where they hit. And I think this was said earlier,
15 we continue to see the more localized events and, as long as
16 they're not damaging, it's good to see. But it's also hard
17 to plan for.

18 Any questions for the Survey and John?

19 (No response.)

20 All right. Seeing none, thank you very much for
21 that.

22 That completes our federal reports and now we're
23 to the committee reports and the Engineering Committee.

24 So, Kari, would you lead us through there, please?

25 MS. BURGERT: Sure. Thank you, Chairman.

1 I think I have a lot of thank yous to start off
2 with. Thank you to the two other Engineering Committee
3 representatives, Ivan Franco and Chris Beightel, with
4 Colorado and Kansas and their teams. And Commissioner Riley
5 mentioned a lot of people from DNR, Nebraska DNR, and thank
6 you for all their work on Compact issues. Thank you to our
7 NRD partners and all their data collection and work on
8 Compact compliance. And the irrigation districts, our field
9 office staff, all the data provided by the Bureau and the
10 USGS goes into all of these reports as well. I'm sure,
11 basically everybody has probably provided some input on this
12 report. So, thank you.

13 Okay. So, the Engineering Committee met six times
14 since the last annual meeting and, over that past year, we
15 have completed the following assignments: We held quarterly
16 meetings, exchanged information listed in the Accounting
17 Procedures and Reporting Requirements, finalized the 2020
18 accounting, continued to work on developing a recommendation
19 for the flood-flow provisions of the RRCA Accounting
20 Procedures to bring them into conformance with the intent of
21 the FSS, continue work on documenting historical changes to
22 the RRCA Accounting Procedures, provide updates on the
23 progress of new and ongoing management strategies for
24 maintaining Compact compliance, continued development and
25 maintenance of the RRCA administrative website that serves

1 as our informational page for the public, continue work and
2 provide updates on improving accounting tools, prepare the
3 2020 RRCA Annual Meeting Report, and make a recommendation
4 on a course of action for dealing with the 2019 PRISM data
5 correction.

6 So, the full details of our progress for the year
7 are summarized in our report and we have included an
8 Attachment 1, which has our full quarterly meeting minutes.
9 And we also have an Attachment 3. We had two additional
10 meetings, and the summaries of those and correspondence
11 related to flood-flows are included as Attachment 3 to our
12 report.

13 So, I'll move on to our items for discussion --
14 for the Commissioners' discussion and action. The first is
15 that we recommend that our proposed 2020 accounting
16 presented in Attachment 2 of our report and a spreadsheet,
17 titled "RRCA Accounting, 2020 Final," for approval by the
18 RRCA. Upon approval of the accounting, the spreadsheet will
19 be placed on our public website. And that 2020 accounting
20 incorporates our proposed course of action for dealing with
21 the 2019 PRISM data correction.

22 Second -- and I skipped it, but a huge thank you
23 to Principia Mathematica and Dr. Willem Schreüder for his
24 work for the Engineering Committee and the RRCA. And we
25 would like guidance on contract or retention of Principia

1 Mathematica. Our five-year contracts expire at the end of
2 this year.

3 And we're looking for guidance from the
4 Commissioners on modeling and data tasks to be assigned to
5 Principia Mathematica for the next year. We're recommending
6 that Principia Mathematica continue to maintain the web-
7 based accounting tool and perform periodic model and
8 accounting updates at the same level of service as this past
9 year.

10 We're recommending discussion on the status of the
11 document summarizing historical changes to the RRCA
12 Accounting Procedures that we have prepared, and that's
13 Attachment 4 to our report.

14 Fifth, we have continued to maintain the RRCA
15 website. Thank you to Chelsea Erickson for that, and the
16 rest of the sub-committee -- the website sub-committee, and
17 we request any additional comment that the Commissioners
18 have on that website.

19 And, lastly, discussion on the recommended
20 assignments that I'll read off and agreement on our final
21 set of assignments for the next year. That is the end of
22 the discussion list.

23 COMMISSIONER RILEY: Okay.

24 MS. BURGERT: So, is the agenda for me to go
25 through our assignments or do you wait on that? Yeah, I'll

1 go through the assignments, if that's okay?

2 COMMISSIONER RILEY: Yep, and then we can take
3 action on everything.

4 MS. BURGERT: Okay. So, our recommended
5 Engineering Committee assignments for the next year are, and
6 I'll paraphrase them. They're in their entirety in our
7 report. One, meet quarterly to review tasks assigned to the
8 committee; two, exchange the information listed in the
9 Accounting Procedures and Reporting requirements by the
10 dates -- deadlines listed; three, finalize the 2021
11 accounting and recommend it for approval by the RRCA; four,
12 maintain and publish updates to the Accounting Procedures
13 tracking document; five, provide updates on the progress of
14 new and ongoing management strategies for maintaining
15 Compact compliance; six, continue development and
16 maintenance of the website; seven, continue work and provide
17 future updates on improving accounting tools; eight, prepare
18 the 2021 Annual Meeting Report for approval by the 2022
19 Annual Meeting; and, nine, retain a contract with Principia
20 Mathematica for the period and scope outlined by the
21 Commissioners.

22 Thank you, Mr. Chairman. That concludes the
23 Engineering Committee Report.

24 COMMISSIONER RILEY: All right. Well, thank you
25 for that. And I think I can probably speak for the other

1 Commissioners, really thank the Engineering Committee. This
2 is where the hard work gets done to put all these things
3 together and all your efforts and, especially, in our remote
4 setting last year, to be able to find ways to continue to
5 put those together and meet all of our timely needs. So,
6 that's -- the yeoman's work is done right there, so really
7 appreciate that.

8 We have a few items, then, to take up with this
9 report. And it outlines -- and we had this discussion this
10 morning, Commissioners -- most of the processes. So, I
11 would entertain that, perhaps, we could take up and approve
12 the whole report and all those items in one motion or we
13 could take them up individually. I think the one we have to
14 do individually is the -- probably to talk about the
15 Principia Mathematica contract. But everything else, I'll
16 leave that up to you and see how you might want to set a
17 motion up to do that. But my recommendation is we could
18 just sweep it into one. Thoughts?

19 COMMISSIONER LEWIS: I would be supportive of
20 that, Mr. Chairman, if Commissioner Rein would be.

21 COMMISSIONER REIN: Yes, I would support that, Mr.
22 Chair.

23 COMMISSIONER LEWIS: So, Mr. Chair, if I might,
24 since, if I'm understanding this correctly, the contract
25 with Principia Mathematica -- easier to write than say -- is

1 part of the recommendations, perhaps we should take action
2 on that first and then a broader motion second. And so, if
3 you agree with that or would entertain that, I would make a
4 motion that we direct the Engineering Committee to contract
5 with Principia Mathematica under similar terms and
6 conditions and task, as was approved during the previous
7 period.

8 COMMISSIONER RILEY: Very well.

9 COMMISSIONER REIN: I'll second the motion.

10 COMMISSIONER RILEY: All right. So, what we have
11 is a motion before us that would direct the EC to
12 essentially continue status quo with what tasks were done
13 with Principia Mathematica in the past. It's been first and
14 seconded. And the idea then that, once we do that, then we
15 can, en masse, approve the entire report. So, let's take
16 this first one up, and I ask everyone in favor?

17 COMMISSIONER LEWIS: Aye.

18 COMMISSIONER RILEY: Aye.

19 COMMISSIONER REIN: Aye.

20 COMMISSIONER RILEY: So, that motion carries to
21 direct the committee to contract with Dr. Schreüder. Thank
22 you.

23 So, that leaves us with accepting the rest of the
24 report. And thank you, Commissioner, that was a good idea
25 to flip those around and do those in that order. So, I'd

1 entertain a motion to do so.

2 COMMISSIONER REIN: Mr. Chair, based on our
3 conversation this morning and the delivery of the report,
4 I'd make a motion that we accept the report.

5 COMMISSIONER LEWIS: I would second that motion.

6 COMMISSIONER RILEY: Any discussion?

7 (No response.)

8 Right. Seeing none, a vote?

9 COMMISSIONER LEWIS: Aye.

10 COMMISSIONER REIN: Aye.

11 COMMISSIONER RILEY: Aye.

12 So, motion carries to accept the EC report.

13 And that takes us to our next item. Thank you for
14 that. And that's our new business assignments that we would
15 ask the -- the committees to take up.

16 Did I miss something?

17 COMMISSIONER LEWIS: Did we approve the
18 accounting --

19 COMMISSIONER RILEY: That's coming up.

20 COMMISSIONER LEWIS: Okay.

21 COMMISSIONER RILEY: In Item 7. Is that right,
22 Kari?

23 MS. BURGERT: Well, I think you just did 7(a).

24 COMMISSIONER RILEY: I did 7(a). Sorry. Sorry,
25 sorry.

1 So, yes, we still have to approve the Accounting
2 Procedures and, as Ms. Burgert laid out, that'll be the
3 spreadsheet and so forth. So, I'd entertain a motion for
4 that.

5 COMMISSIONER LEWIS: Mr. Chairman, I'd move that
6 we approve the 2020 accounting as presented.

7 COMMISSIONER REIN: I'll second the motion.

8 COMMISSIONER RILEY: All right, a motion to accept
9 the 2020 accounting. There's been a first and a second.
10 So, let's take the vote.

11 COMMISSIONER LEWIS: Aye.

12 COMMISSIONER RILEY: Aye.

13 COMMISSIONER REIN: Aye.

14 COMMISSIONER RILEY: All right. Thank you.
15 Should have probably had some discussion, but I don't think
16 we needed it.

17 All right. I'm trying to lever the hunger piece
18 right here. It's noon, so -- to move through.

19 So, thanks for that, again. Thank you,
20 Engineering Committee, for everything you did and it sounds
21 like we have a great plan to move into this year and
22 forward.

23 So, we move on to Item No. 8, other business.
24 Commissioners, anything that you'd like to introduce on that
25 topic?

1 COMMISSIONER LEWIS: I don't have anything at this
2 time, Mr. Chairman.

3 COMMISSIONER RILEY: Thank you, Commissioner
4 Lewis.

5 COMMISSIONER REIN: Nothing from Colorado, Mr.
6 Chair.

7 COMMISSIONER RILEY: Nothing from Nebraska either.
8 So, thank you for that. Item 8. And then, at this time,
9 traditionally, we've always taken remarks from the public.
10 If there -- if anybody's interested, you're willing to come
11 up to the lectern and make any comments.

12 And, Sam, I guess we can -- if anybody has anybody
13 online, we'll do that following up after anyone here in the
14 audience.

15 So, would anybody like to make a comment? And if
16 you don't mind, you know, stating your name and who you
17 represent. Thank you.

18 MR. HELLING: Yes. Good morning, and thank you,
19 Mr. Chair, for this opportunity. My name's Kenny Helling.
20 I'm the Yuma County, Colorado, rep that sits on the
21 Republican River Water Conservation District.

22 And so, I would like to touch on a couple items
23 this morning. And the one is -- that kind of addresses Mr.
24 Lewis's concern and question about the retirement of the
25 25,000 acres in the South Fork focus zone. And so, the

1 district had their quarterly meeting last week. And we've
2 initiated a resolution to increase the opportunity for
3 people to retire acres in that zone. And, with that, we've
4 increased our use fee within the basin to try to help
5 achieve those obligations that we are held to in the 2016
6 resolution.

7 So, Mr. Lewis, we've been working very hard and
8 diligently to try to get irrigators to participate; but, at
9 the end of the day, you know, they're private landowners and
10 it's their choice. So, I feel the district's made a very
11 good faith effort to try to achieve that goal.

12 The other thing I'd like to touch on is the South
13 Fork Republican as well. And we've put together a coalition
14 over there that involves local entities, as well as Bureau
15 of Reclamation, Colorado Parks and Wildlife. We've been
16 able to capture some grant money to work on a plan to try to
17 establish a new channel through Bonny Reservoir. And I
18 would like to ask Kansas to be a partner, you know, in this
19 project. We feel that we see real value in trying to
20 establish stream flow through Bonny Reservoir. So, I would
21 like to hope that the state of Kansas would also see real
22 value in trying to clean that mess up and establish a good
23 channel through Bonny Reservoir.

24 And so, with that, if anyone has any questions,
25 I'll do my best to answer them.

1 COMMISSIONER LEWIS: If I could, Mr. Chair?

2 First, I want to thank you for your comments and
3 your remarks. And, certainly, understand the difficult
4 situation you're at. And, certainly, we face that in a
5 number of cases in Kansas as well, when you're essentially
6 dealing with a voluntary program and trying to achieve a
7 goal. I encourage people to see the benefits of those
8 activities. And the fact that you are raising fees and
9 taxing yourself to make that happen, I think, is important.
10 I want to thank you for your leadership in doing that.
11 That's no easy task for you all to do as well.

12 And so, certainly, I don't want you to take any of
13 my comments earlier that -- as disparaging to the efforts
14 you all have been taking. It's certainly not what I
15 intended, but I'm just trying to make sure we understand
16 that we encourage you to continue the work you're doing and
17 try and move that mark. So, I appreciate what you're doing.
18 Thank you.

19 MR. HELLING: Well, thank you.

20 COMMISSIONER RILEY: No questions?

21 Kevin, do you have any questions or comments?

22 COMMISSIONER REIN: No, I don't.

23 COMMISSIONER RILEY: Very well.

24 Thank you.

25 MR. HELLING: Thank you.

1 COMMISSIONER RILEY: Anyone else here in our live
2 audience?

3 (No response.)

4 All right, seeing none, Sam, if folks maybe could
5 let you know via a chat if they're interested in commenting
6 online. Please do that. And we'd be happy to hear from
7 you.

8 MS. ESSEKS: Deb, if you want to go ahead, you're
9 unmuted.

10 MS. DANIEL: Great. Thank you so much.

11 My name is Deb Daniel. I am the general manager
12 of the Republican River Water Conservation District in
13 Colorado. I appreciate the ability to be able to
14 participate virtually with you today. I wasn't able to make
15 the trip with my board member, Kenny Helling, but I
16 appreciate the ability to be able to virtually participate.
17 So, thank you very much, Nebraska, for allowing that.

18 Just want to echo a few of the things that Mr.
19 Helling spoke about. We are working very hard in the South
20 Fork focus zone, working with producers in that area. One
21 of the things that we're coming up against is, especially
22 this year, the higher commodity prices. You know, we're
23 grateful that our producers are able to benefit from the
24 higher rates for corn and wheat this year, especially in the
25 early part of the year, but that did slow down any interest

1 in the conservation programs.

2 We are, as Kenny talked about, the board did have
3 a very important meeting last week and approved increasing
4 the payments significantly in that area, coming up with a
5 couple of different ideas on how to get acres retired.
6 Everyone recognizes the fact that we have got to do
7 everything we can. And I am very happy to report that the
8 last two to three weeks I have had a significant increase in
9 the interest of these programs. So, we're working very
10 hard. We're going to be having public meetings throughout
11 the basin this fall and early next year talking to producers
12 and explaining the situation that we're in and the need to
13 retire permanent irrigated acres in the South Fork focus
14 zone. So, just wanted to mention that to you.

15 And I also wanted to let you know that the board
16 has also been very busy purchasing surface water rights.
17 Currently, the Republican River District owns all of the
18 Hale Ditch water rights that is downstream of Bonny
19 Reservoir. Those waters will remain in the stream, now that
20 the Republican River District has possession of all of the
21 Hale Ditch water rights.

22 So, we continue to try as many things as we can to
23 slow down the depletions in Colorado. And, as Mr. Helling
24 pointed out, the South Fork Republican Restoration Coalition
25 was awarded \$310,000 grants from NRCS. We have applied for

1 the BOR WaterSMART grant, and we will be reapplying this
2 next spring. So, we're hopeful that we'll be approved for a
3 grant to assist us with the funding, because it's a major
4 undertaking. And if Kansas would like to partner in with
5 us, we could certainly appreciate all of the support we
6 could receive.

7 So, I don't want to take up too much of your time.
8 Just wanted to kind of echo some of the things that Mr.
9 Helling had said. Does anyone have any questions for me at
10 this time?

11 (No response.)

12 If not, thank you so much for this opportunity.

13 COMMISSIONER RILEY: Any questions for Deb?

14 COMMISSIONER LEWIS: No questions. Just, again,
15 appreciation for the work that you're doing. And,
16 certainly, we'd be happy to talk offline about what's going
17 on in your region and how that fits within the broader
18 Colorado efforts and responsibilities.

19 MS. DANIEL: Thank you. Thank you.

20 COMMISSIONER RILEY: All right. Thank you, Deb.

21 Any others that you saw, Sam?

22 MS. CAPPS: I don't think so, but Elizabeth and
23 Carol are managing that at this point.

24 COMMISSIONER RILEY: Anyone else online that would
25 like to make a comment?

1 MS. CAPPS: Carol and Elizabeth, do you guys see
2 anybody else?

3 MS. FLAUTE: No.

4 COMMISSIONER RILEY: Very well. Well, thank you.
5 Thank you for that.

6 Our next item on the agenda are future meeting
7 arrangements. And, as I noted earlier, the ball -- the
8 torch is being handed to our friends to the west and
9 Colorado now will take over on some of those -- those
10 arrangements for the next RRCA meeting. I guess, there's
11 question of do we want to do anything between there. We've
12 been meeting on some partially regular basis. I don't have
13 anything in particular on mind, but --

14 COMMISSIONER LEWIS: Yeah, I don't think as a
15 Compact administra- --

16 COMMISSIONER REIN: Mr. Chair, I didn't hear your
17 last question, Mr. Chair. What was that?

18 COMMISSIONER RILEY: Well, I -- I'm wondering,
19 beyond the administration here for our annual meeting, if
20 there's a -- do we have any other meetings that were
21 upcoming in between?

22 MR. SULLIVAN: I don't think so. I don't think
23 so.

24 COMMISSIONER RILEY: Okay. So, may -- I'm trying
25 to remember, in the past, if we even looked at specific

1 dates for the next annual meeting or tried to do that later
2 on in the year.

3 COMMISSIONER LEWIS: It's usually later.

4 COMMISSIONER RILEY: Yeah, I think it's a little
5 too soon to do that, but we'll -- unless you had a
6 particular date in mind?

7 MR. SULLIVAN: No. Generally, the third week of
8 August seems to work well with everybody expected. And, to
9 the extent we're allowed to, we -- our plan is to hold the
10 meeting in the basin. So, we'll finali- -- we'll figure out
11 where we're going to hold it, what town. Traditionally,
12 held it in Burlington, but we'll look and see what venues
13 are available at -- as we get a little closer to it.

14 COMMISSIONER RILEY: Very well.

15 COMMISSIONER REIN: And, Chair, if I could add to
16 that? One consideration we have in Colorado is that we
17 typically have this conflict with our -- this conference
18 that I'm at right now. And the conference, in and of
19 itself, is not important enough for us to make changes. But
20 we often have legislative activities that people are
21 obligated to. So, as Colorado looks at it and we may
22 consider whether we slide that date one week or the other.
23 But we would certainly be as far ahead of it as we can in
24 talking to Kansas and Nebraska.

25 COMMISSIONER RILEY: Okay. Well, we look forward

1 to setting that for next year.

2 That takes us to our last item then, which is
3 adjournment. But, prior to doing that, I would want to,
4 again, thank all of the Nebraska DNR team for helping to set
5 up this meeting and having it in a fashion that we could
6 meet together, if possible, and still be virtual and allow
7 Kevin to participate as well. So, thanks to my team for
8 that. Appreciate that.

9 Any other comments, Commissioner Lewis?

10 COMMISSIONER LEWIS: Again, just thanks to your
11 team for getting us together and appreciate everybody's
12 work. I would make a motion we adjourn.

13 COMMISSIONER REIN: I second.

14 COMMISSIONER RILEY: All right. Any further
15 discussion?

16 (No response.)

17 Seeing none, the vote.

18 COMMISSIONER LEWIS: Aye.

19 COMMISSIONER RILEY: Aye.

20 COMMISSIONER REIN: Aye.

21 COMMISSIONER RILEY: All right. Very well. That
22 concludes our meeting of the Republican River
23 Administration, which we believe, for the 61st time, at
24 12:15.

25 Thanks, everybody for coming today.

1

(On August 21, 2021, the meeting was concluded.)

Exhibit B: Attendance

ANNUAL MEETING OF
THE REPUBLICAN RIVER COMPACT ADMINISTRATION

August 25, 2021 Attendance:

In-person – McCook, Nebraska – McCook Community College

- Chris Beightel, Kansas Division of Water Resources
- Don Blankenau, Blankenau Wilmoth Jarecke, LLP
- Alex Boyce, Middle Republican Natural Resources District
- Jesse Bradley, Nebraska Department of Natural Resources Assistant Director
- Kari Burgert, Nebraska Department of Natural Resources
- Sam Capps, Nebraska Department of Natural Resources
- Dale Cramer, Frenchman-Cambridge Irrigation District
- Brad Edgerton, Frenchman-Cambridge Irrigation District
- Chelsea Erickson, Kansas Division of Water Resources
- Jasper Fanning, Upper Republican Natural Resources District
- Don Felker, Frenchman Valley Irrigation District
- Ivan Franco, Colorado Division of Water Resources
- Steve Fries, Frenchman Valley Irrigation District
- Kenny Helling, Republican River Water Conservation District
- Nate Jenkins, Upper Republican Natural Resources District
- Justin Lavene, Nebraska Attorney General’s Office
- Commissioner Earl Lewis, Kansas Division of Water Resources
- Terry Nelson, Solomon-Republican Regional Advisory Committee
- Commissioner Tom Riley, Chairperson, Nebraska Department of Natural Resources
- Jack Russell, Middle Republican Natural Resources District
- Willem Schreuder, Principia Mathematica, Inc.
- Craig Scott, United States Bureau of Reclamation, McCook, NE
- Todd Siel, Lower Republican Natural Resources District
- Nick Simonson, Lower Republican Natural Resources District
- Shane Stanton, Nebraska Department of Natural Resources
- Dan Steuer, Colorado Attorney General’s Office
- Mike Sullivan, Colorado Division of Water Resources
- Chance Thayer, The Flatwater Group
- John Thorburn, Tri-Basin Natural Resources District
- Tom Wilmoth, Blankenau Wilmoth Jarecke, LLP

Online via Zoom

- Steve Adams, Kansas Department of Wildlife and Parks
- Justin Ahern, Nebraska Department of Natural Resources

- Suzanna Baker, Republican River Water Conservation District
- Jill Burmester, Nebraska Emergency Management Agency
- Margeaux Carter, Nebraska Department of Natural Resources
- Hongsheng Cao, Kansas Division of Water Resources
- Deb Daniel, Republican River Water Conservation District
- Alexa Davis, Nebraska Department of Natural Resources
- Beth Eckles, Nebraska Department of Natural Resources
- Jean Eichhorst, Nebraska Department of Natural Resources
- Brent Esplin, United States Bureau of Reclamation, Billings, Montana
- Elizabeth Esseks, Nebraska Department of Natural Resources
- Morgan Farquhar, Pioneer Irrigation District, Nebraska
- Carol Flaute, Nebraska Department of Natural Resources
- Hua Gao, Nebraska Department of Natural Resources
- Pete Gile, Kansas Bostwick Irrigation District
- Katie Goff, Kansas Water Office
- Madeline Hoffer, Nebraska Department of Natural Resources
- Ryan Kelly, Nebraska Department of Natural Resources
- Michelle Koch, Nebraska Game and Parks Commission
- Jennifer Latzke, Kansas Journalist
- Lane Letourneau, Kansas Division of Water Resources
- Lori Marintzer, United States Geological Survey
- Hannah Mendez, Nebraska Department of Natural Resources
- John Miller, United States Geological Survey
- Miles Morgan, United States Bureau of Reclamation
- Joe Murray, Office of Nebraska state Senator Mike Groene, Dist. #42
- Connie Owen, Kansas Water Office
- William Padmore, Nebraska Public Media
- Philip Paitz, Nebraska Department of Natural Resources
- Andy Pedley, Nebraska Department of Natural Resources
- Sam Perkins, Kansas Division of Water Resources
- Commissioner Kevin Rein, Colorado Division of Water Resources
- Aaron Thompson, United States Bureau of Reclamation
- Kurtis Wiard, Kansas Attorney General's Office

2021 Republican River Compact Administration Annual Meeting

August 25, 2021, 10:30 a.m.

McCook Community College, McCook, NE

SIGN-IN

Name: PLEASE PRINT	Representing (Self or Organization):
1. Kenny Helling	RRWCD
2. Jayer Fanning	WRWRD
3. Jesse Bradley	NeDNR
4. Tom Luther	BWJLP
5. Chelsea Erickson	KS-DWR Stockton Field Office
6. Mike Sullivan	CDWR
7. DAN STEUER	CO ATTY GEN'L
8. Chris Beightel	KDA-DWR Marketing
9. Earl Lewis	KDA-DWR
10. Ivan Franco	DWR-colorado

Name: PLEASE PRINT	Representing (Self or Organization):
24. Nick Simonsen	LENRD
25. Todd Siel	LRNRD
26. Kari Burgert	NeDNR
27. Willem Schreuder	Principia
28. Chance Thayer	The Flatwater Group
29. Jack Russell	MRNRD
30. Alex Boyu	MRNRD
31. Brad Edgerton	FCID
32. Nate Jenkins	WRNRD
33. Terry Nelson	Republican RAC
34. Craig Scott	USBR
35. John Horburn	Tri-Basin NRD
36. Dale Cramer	FCID

2021 RRCA Annual Meeting sign-in

Name: PLEASE PRINT	Representing (Self or Organization):
50. Shana Stanton	NDNR
51. <i>Steve Fin</i>	FVTD
52.	
53.	
54.	
55.	
56.	
57.	
58.	
59.	
60.	
61.	
62.	



Please Sign In for the Mid-Plains Business and Community Education

Class:

Date: 8/21/2020

Instructor:

Time:

	<u>Print</u> Last Name	<u>Print</u> First Name	M/F	Date of Birth	Mailing Address-City	<u>Zip</u>	Phone	E-mail
1	Riley	Tom				68347		
2	Lavene	Justin				68516		
3	Bradley	Jesse			Lincoln Nebraska	68508		
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Thank you for providing the above information. Your personal information will be kept confidential.

Exhibit C: Agenda

FINAL AGENDA FOR
**2021 ANNUAL MEETING OF THE
REPUBLICAN RIVER COMPACT ADMINISTRATION**

August 25, 2021

10:30 a.m. Central Time/9:30 a.m. Mountain Time
Mid-Plains Community College, McMillen Hall, Room 213, McCook, NE
and virtual meeting via Zoom

*Zoom link: <https://us02web.zoom.us/j/82868473622>
Meeting ID: 828 6847 3622*

1. Introductions
2. Adoption of the Agenda
3. Status of 2020 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 2020 Annual Meeting
 - ii. Committee recommendations to the RRCA
 - iii. Recommended assignments for Engineering Committee
 - iv. Discussion of Engineering Committee Report and assignments
7. New Business and Assignments to Compact Committees
 - a. Action on Engineering Committee Report and assignments
 - b. Action on 2020 Accounting
8. Other Business
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

McCook, Nebraska



— BUREAU OF —
RECLAMATION

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

August 25, 2021

REPUBLICAN RIVER COMPACT MEETING

August 25, 2021
McCook, Nebraska

2020 Operations

As shown on the attached Table 1, precipitation in the Republican River Basin varied from 95 percent of normal at Medicine Creek Dam to 56 percent of normal at Trenton Dam. Total precipitation at Reclamation project dams ranged from 11.38 inches at Trenton Dam to 21.40 inches at Lovewell Dam.

Inflows varied from 56 percent of the most probable forecast at Bonny Reservoir to 143 percent of the most probable forecast at Lovewell Reservoir. Inflows into Bonny Reservoir totaled 3,772 AF while inflows at Lovewell Reservoir totaled 55,465 AF.

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

<u>District</u>	<u>Farm Delivery</u>
Frenchman Valley	0.3 inches
H&RW	0.0 inches
Frenchman-Cambridge	5.9 inches
Almena	2.3 inches
Bostwick in NE	4.6 inches
Kansas-Bostwick	5.5 inches

2020 Operation Notes

Bonny Reservoir – Remained empty at elevation 3638.00 feet, 34.0 feet below the top of conservation. The annual computed inflow totaled 3,772 AF. Reservoir inflows were bypassed the entire year as ordered by the State of Colorado. No water was bypassed into Hale Ditch in 2020.

Enders Reservoir – . The reservoir level began the year at a level of 28.6 feet (3,083.70 feet) below the top of conservation. This was the fourth lowest level ever recorded on the first of January since initial filling. The reservoir level increased gradually during the spring to a peak elevation of 3,084.74 feet on May 17th. Evaporation decreased the reservoir level from June through mid-November reaching elevation 3,081.62 feet on November 16th. Due to the extremely low water supply available, no water was released from Enders Reservoir during the irrigation season. The end of the year reservoir level was 30.4 feet (3,081.93 feet) below the top of conservation. This was the second lowest end of year level recorded since initial filling. This was the nineteenth consecutive year that H&RW Irrigation District did not divert water. It was also the seventeenth consecutive year that storage releases were not made for Frenchman Valley Irrigation District. Frenchman Valley Irrigation District diverted 6,722 AF

of natural flow between April 16th and October 15th into Culbertson Canal.

Swanson Lake – The lake level began the year at elevation 2,740.00 feet (12.0 feet below the top of conservation) and gradually increased throughout the late winter and spring. The peak elevation on May 5th was 2,743.86 feet (8.1 feet below the top of conservation).

A slow-moving high intensity storm occurred on July 23rd causing flash flood conditions around the intersection of the Nebraska, Colorado, Kansas borders. The area received between 5-12 inches of rain overnight. The USGS measured a peak of 2,960 cfs on the North Fork of the Republican River at Benkelman. This was the largest flow observed since 1982. The peak on the North Fork at the Colorado-Nebraska state line was 391 cfs, the highest since 1992. The Arikaree River gage near Haigler peaked at 648 cfs, the highest since 1986. Buffalo Creek near Haigler peaked at 440 cfs the highest flow for the period of record (1940 – on). Rock Creek at Parks peaked at 190 cfs, the highest since 1965. The South Fork of the Republican River near Benkelman peaked at 5,300 cfs, the highest since 1975. Approximately 9,000 AF of inflow into Swanson Lake is estimated to have been generated by this flood event.

The reservoir level decreased throughout the irrigation season and reached an elevation of 2,738.24 feet on November 16th. The district diverted 19,398 AF into Meeker-Driftwood Canal from June 22nd through September 7th. At the end of the year, the reservoir level was 13.4 feet below the top of conservation at 2,738.60 feet.

Hugh Butler Lake –. The reservoir level at the first of the year was 2,572.31 feet, 9.5 feet below the top of conservation. Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2,574.28 feet on May 26th. This was the highest elevation observed since 2009. The district diverted 5,226 AF into Red Willow Canal. Late summer evaporation exceeded inflows, decreasing the lake level to 2,568.05 feet on October 20th. The end of year elevation was 2,568.67 feet, 13.1 feet below the top of conservation.

Harry Strunk Lake – The reservoir level at the beginning of 2020 was 0.2 feet below the top of conservation at 2,365.87 feet. The reservoir level was maintained near 0.5 foot below top of conservation from late-January through late-April with inflows passed through the outlet works. The reservoir level peaked at elevation 2366.80 feet on May 28th. Irrigation releases started May 1st. The reservoir filled to top of conservation on May 7th. Releases through the outlet works continued through September 4th reducing the reservoir level to 2,353.18 feet. The district diverted 26,714 AF into Cambridge Canal. The end of year elevation was 2,359.72 feet at the end of the year (6.4 feet below the top of conservation).

Keith Sebelius Lake – The reservoir was 4.4 feet below the top of conservation pool at the first of the year (2,299.94 feet). Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2,301.35 feet on May 28th. This was the highest elevation observed since 2000. Irrigation releases began July 4th and finished for the season on August 18th. Approximately 3,951 AF was released from Norton Dam for irrigation of which 3,076 AF was diverted into the Almena Canal. Inflows in December exceeded evaporation gradually increasing the elevation to the end of year elevation of 2,297.19 feet, 7.1 feet below the top of

conservation.

Harlan County Lake – Harlan County Lake began 2020 approximately 1.2 feet above the top of conservation pool, at 1946.89 feet. This was the highest beginning year elevation since dam completion (1952). The Corps of Engineers made varying flood releases all spring and early summer to keep the pool elevation near top of conservation which totaled approximately 85,500 AF. The conservation pool as well as accumulated flood pool were split June 15th as irrigation releases began. The projected irrigation supply at the end of June was 143,392 AF. It was determined that Water Short Year Administration would not be in effect in 2020. Both NBID and KBID were able to utilize some of the flood release for irrigation. Bostwick in Nebraska Irrigation District diverted 35,402 AF in 2020. A ten year summary of Harlan County Lake operations is shown on Table 3.

Lovewell Reservoir – The reservoir elevation at the beginning of 2020 was 1,582.68 feet (0.08 feet above the top of conservation). Various releases were made throughout the spring to keep the reservoir about a foot below top of conservation. Releases ceased April 7th. Irrigation releases for canal seasoning/flushing began June 1st with releases in earnest beginning starting mid-June and continued until September 15th. A series of hard rains at the end of July caused the reservoir elevation to raise 4.8 feet in 10 days to the yearly peak elevation of 1586.07 feet (3.5 feet) on July 29th. Flood releases were staged up to 745 cfs at the beginning of August. Flood releases were staged down and by August 11th top of conservation was reached. Republican River flow was diverted via the Courtland Canal into Lovewell Reservoir after the irrigation season. The pool level at the end of the year was 1,581.03 feet (1.6 foot below top of conservation). KBID diverted a total of 42,667 AF in 2020.

Current Operations (As of 7/31/21)

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 2021. Bonny Dam has recorded 14.16 inches of precipitation during the first seven months of the year (120% of average).

Enders Reservoir - The reservoir level is currently 30.00 feet below full and 1.15 feet below last year at this time. Enders Dam recorded 12.05 inches of precipitation during the first seven months of the year (91% of normal). Due to the water supply shortage, H&RW Irrigation District is not irrigating for the twentieth year in a row. This is also the eighteenth consecutive year that Frenchman Valley Irrigation District has not received storage water for irrigation.

Swanson Lake – The lake level is currently 12.2 feet from full and is 1.5 feet below last year at this time. Precipitation for the year is at 82% of normal (11.15 inches). Irrigation releases began on June 21st.

Hugh Butler Lake – The lake level is currently 13.2 feet below full and is 2.47 feet below last year at this time. Irrigation releases began on June 21st. The precipitation total so far this

year is 13.36 inches (103% of normal).

Harry Strunk Lake – The lake level is currently 3.6 feet below the top of conservation. Precipitation at the dam during the first seven months of the year was 15.21 inches (108% of normal). Irrigation releases began on May 10th. The lake level is currently 1.86 feet above last year at this time.

Keith Sebelius Lake – The lake is currently 8.0 feet below full. Lake level is 3.45 feet below last year at this time. Irrigation releases began July 13th. Precipitation at the dam during the first seven months of the year was 15.57 inches (97% of normal).

Harlan County Lake – The current water surface level is approximately 1.54 feet below full. The lake level is 1.23 feet below last year at this time. Harlan County Dam has recorded 20.75 inches of precipitation so far this year (137% of normal). Flood releases started in 2020 and continued through June 14th of this year when the pool was split and irrigation releases commenced. The available irrigation supply from Harlan County Lake on June 30th was 141,404 AF.

Lovewell Reservoir – The reservoir level is currently 4.3 feet below the top of conservation and approximately 7.96 feet below last year's elevation at this time. Lovewell Dam recorded 16.47 inches of precipitation during the first seven months of the year (94% of average). Canal releases began on May 25th.

A summary of data for the first seven months of 2021 is shown on Table 2.

TABLE 1
NEBRASKA-KANSAS PROJECTS
Summary of Precipitation, Reservoir Storage and Inflows
CALENDAR YEAR 2020

Reservoir	Total Precip.	Percent Of Average	Storage 12-31-19	Storage 12-31-20	Gain or Loss	Maximum Content	Storage Date	Minimum Content	Storage Date	Total Inflow	Percent Of Most Probable
	Inches	%	AF	AF	AF	AF		AF		AF	%
Box Butte	12.64	73	21,979	14,856	-7,123	27,974	5/28	11,022	8/29	16,289	106
Merritt	21.99	103	60,298	61,100	802	66,204	6/10	45,060	9/7	229,555	123
Calamus	19.42	77	81,765	96,864	15,099	122,537	5/28	69,205	9/16	367,867	139
Davis Creek	20.23	78	12,606	12,637	31	26,087	6/23	11,762	4/25	57,433	118
Bonny	11.90	67	0	0	0	0	#N/A	0	#N/A	3,772	56
Enders	11.95	62	9,786	8,638	-1,148	10,491	5/17	8,467	11/2	3,733	63
Swanson	11.38	56	60,264	55,478	-4,786	74,563	6/5	54,280	11/16	28,996	113
Hugh Butler	15.60	78	22,620	18,430	-4,190	25,124	5/25	17,767	10/20	7,321	67
Harry Strunk	20.04	95	34,226	24,696	-9,530	35,953	5/28	16,794	9/7	36,134	88
Keith Sebelius	19.05	76	25,829	21,197	-4,632	28,441	5/28	20,960	11/17	7,566	115
Harlan County	17.38	74	329,729	279,631	-50,098	328,511	1/1	274,168	10/27	125,674	119
Lovewell	21.40	77	35,905	31,163	-4,742	46,837	7/30	25,349	9/8	55,465	143
Kirwin	21.47	90	98,255	90,582	-7,673	100,710	5/28	87,099	10/25	45,763	172
Webster	17.42	73	78,208	69,098	-9,110	79,476	6/1	65,780	10/25	48,914	275
Waconda	26.70	105	212,798	208,367	-4,431	276,785	8/4	203,525	2/20	273,882	219
Cedar Bluff	20.01	94	110,720	106,503	-4,217	116,533	4/28	106,455	12/23	18,585	148

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

JANUARY - JULY 2021

Reservoir	Precip. Inches	Percent Of Average %	Storage 7/31/2020 AF	Storage 7/31/2021 AF	Gain or Loss AF	Inflow AF	Percent Of Most Probable %
Bonny	14.16	120	0	0	0	1,688	35
Enders	12.05	91	9,622	8,885	(737)	2,960	82
Swanson	11.15	82	64,905	59,602	(5,303)	21,881	105
Hugh Butler	13.36	103	21,146	18,701	(2,445)	6,340	86
Harry Strunk	15.21	108	25,997	28,676	2,679	20,188	76
Keith Sebelius	15.57	97	25,474	19,799	(5,675)	5,543	115
Harlan County	20.75	137	310,009	294,015	(15,994)	96,954	129
Lovewell	16.47	94	46,557	23,500	(23,057)	33,198	126

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)		
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
2020	125,674	130,068	45,704	17.38	75%	74%	279,631	143,392

NOTE: On June 30, 2021 Projected Irrigation Water Supply was 141,404 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) 2020

[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 2020 as	WY 2020 as	WYs used	Remarks
		WY 2020	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	2.2	15.2	14.3%	71/88	1933 - 2020	
06823000	North Fork Republican River at Colo-Nebr State Line	35.7	41.1	86.9%	62/85	1936 - 2020	
06823500	Buffalo Creek near Haigler, Nebr	2.9	5.7	50.6%	66/80	1937 - 2020	
06824000	Rock Creek at Parks, Nebr	6.2	12.0	51.4%	75/80	1938 - 2020	
06824500	Republican River at Benkelman, Nebr	49.0	78.6	62.3%	49/59	1939 - 2020	
06827500	South Fork Republican River near Benkelman, Nebr	10.0	32.1	31.0%	66/83	1940 - 2020	
06835500	Frenchman Creek at Culbertson, Nebr	30.5	61.8	49.4%	63/70	1941 - 2020	Since Enders Reservoir
06836500	Driftwood Creek near McCook, Nebr	3.8	7.9	48.7%	57/74	1942 - 2020	
06838000	Red Willow Creek near Red Willow, Nebr	6.2	12.6	48.9%	52/59	1943 - 2020	Since Hugh Butler Lake
06847000	Beaver Creek near Beaver City, Nebr	1.2	14.2	8.7%	59/83	1944 - 2020	
06847500	Sappa Creek near Stamford, Nebr (USACE funds DCP)	26.3	36.5	72.1%	28/74	1945 - 2020	
06852500	Courtland Canal at Nebr-Kans State Line (USBR DCP)	75.8	74.5	101.7%	31/66	1946 - 2020	
06853020	Republican River at Guide Rock, Nebr	475.0	255.6	185.8%	12th/70	1947 - 2020	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	43.8	88.8	49.3%	52/70	1951 - 2020	Funded by USACE and GWSIP
06837000	Republican River at McCook, Nebr	42.3	115.5	36.6%	56/66	1955 - 2020	Funded by USBR, NDNR, and GWSIP
06844500	Republican River near Orleans, Nebr	144.7	219.8	65.8%	48/73	1948 - 2020	Funded by USACE and GWSIP

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

06834000	Frenchman Creek at Palisade, Nebr	16.3	61.8	26.4%	69/70	1951 - 2020	
06843500	Republican River at Cambridge, Nebr	116.8	200.0	58.4%	57/71	1952 - 2020	Since Harry Strunk Lake

Online Annual Water Data Reports available at or through:

<http://wdr.water.usgs.gov>

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

USGS North Platte Field Office

John Miller (jdmiller@usgs.gov)

308-532-5323

USGS Lincoln Field Office

Tim Boyle (tboyle@usgs.gov)

402-328-4125

Exhibit F: Engineering Committee Report

**Engineering Committee Report Republican
River Compact Administration
August 25, 2021**

EXECUTIVE SUMMARY

The Engineering Committee (EC) met six times since the August 21, 2020, 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 2020 accounting; 4) continue to work on developing a recommendation for the Flood Flows provisions of the RRCA Accounting Procedures to bring them into conformance with the intent of the Final Settlement Stipulation (FSS); 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; 9) prepare the 2020 RRCA annual meeting report; and 10) make a recommendation on a course of action for dealing with the 2019 PRISM data correction.

Ongoing assignments include: 1) hold quarterly meetings; 2) continue work on documenting historical changes to the RRCA Accounting Procedures; 3) provide updates on the progress of new and ongoing management strategies for maintaining compact compliance; 4) work on maintaining and enhancing the RRCA public website; 5) 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 2020 incorporating the EC's proposed course of action for dealing with the 2019 PRISM data correction; retention of Principia Mathematica; modeling and data tasks to be assigned to Principia Mathematica for 2021; the status of the document summarizing historical changes to the RRCA Accounting Procedures; the ongoing maintenance and updating of the RRCA website; and recommended EC assignments and other potential assignments for the next 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 2020 recommended by the EC for approval by the RRCA (Task 3)
- Attachment 3: Compilation of documents exchanged and meeting summaries regarding the Flood Flows provision of the RRCA Accounting Procedures (Task 4)
- Attachment 4: *Summary of Historical Changes to the RRCA's Accounting Procedures and Reporting Requirements* (Task 5)

COMMITTEE ASSIGNMENTS AND RELATED WORK ACTIVITIES

1. Meet quarterly to review the tasks assigned to the committee.
 - a. The EC met October 7, 2020; January 7, 2021; April 20, 2021; and July 21, 2021. See Attachment 1 for the approved notes of these meetings.
 - b. The EC recommends that this task continue.
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.
 - a. Nebraska posted its data on April 15, 2021, and provided an update on May 18, 2021.
 - b. Kansas posted its data on April 14, 2021, and provided an update to the data on July 8, 2021.
 - c. Colorado posted its data on April 8, 2021, and added Crop Irrigation Requirement (CIR) data on June 7, 2021.
3. Finalize the 2020 accounting and recommend it for approval by the RRCA.
 - a. Colorado, Kansas, and Nebraska accounting data for 2020 are final and the EC hereby recommends approval of the accounting by the RRCA.
 - b. The applicable summary accounting tables are presented in Attachment 2.
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.
 - a. Nebraska proposed revised Accounting Procedures to correct the Attachment 6 calculation of Virgin Water Supply Guide Rock to Hardy to Computed Water Supply Guide Rock to Hardy with a placeholder for the reach's Flood Flow adjustment. Willem Schreuder provided comment on the draft which was incorporated by Nebraska. Kansas recommended that the draft not be brought to the Commissioners without full resolution of the issue. The draft edit to the Accounting Procedures is included in Attachment 3.
 - b. Kansas provided a revised proposal to the Engineering Committee to cap Nebraska's Allocation Guide Rock to Hardy in Table 5C at 33,485 acre-feet when the Flood Flows adjustment is being applied. The EC reviewed and discussed this proposal. The documents associated with Kansas' revised proposal are provided in Attachment 3.
 - c. In addition to discussions at the quarterly committee meetings, the EC met on May 18, 2021, and June 22, 2021, to continue work on developing a recommendation. Summaries of these meetings are provided in Attachment 3.
 - d. The EC, with Nebraska and Kansas proposals having maintained enough discrepancy through this year's work and given the apparent infrequency in which flood flow adjustments may impact compliance tests, does not recommend continuation of this assignment next year.

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. The EC has completed a working version of the “AP tracking” document for review by the RRCA, titled *Summary of Historical Changes to the RRCA’s Accounting Procedures and Reporting Requirements*. The document is provided as Attachment 4.
 - b. The EC requests that the RRCA consider a standing assignment to the EC to maintain the AP tracking document and publish it on the RRCA public website.
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 (NBID) and Kansas Bostwick Irrigation District (KBID) (automation of Superior/Courtland headgates); NBID (work on the Superior Canal); and updates to Integrated Management Plans for the Upper, Middle, and Lower Republican Natural Resources Districts (NRD). In addition, Nebraska described NBID and Lower Republican Natural Resource NRD’s submittal for a WaterSMART grant to fund alternate locations and sources of water for the Superior Canal. Nebraska provided updates on contracts in development with Frenchman Valley Irrigation District (FVID) and Middle Republican NRD (a remote metering contract).
 - b. Kansas provided updates on KBID’s project to automate the Courtland Canal and Kansas’s second round of cost-share grant awards in the south fork of the Upper Republican River Basin for irrigation efficiency projects.
 - c. Kansas provided updates on their climate-based analyses for evaluating water savings programs. The EC heard presentations by Kansas staff on methods to use climate data to estimate groundwater pumping. The EC discussed possible use of these methods to predict groundwater pumping to improve prospective compact accounting estimates for planning purposes. The EC recommends the RRCA discuss these analyses and their potential uses.
 - d. Colorado provided updates on deliveries by the Colorado Compliance Pipeline.
 - e. 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, and reported back to the EC.
 - b. The EC recommends this task as a recurring assignment.

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 discussed the overlap in the Courtland above Lovewell and Attachment 7 inputs and calculations that when combined with varying data sources were causing inconsistencies in the accounting spreadsheet. The EC will continue to pursue this issue to improve the accounting spreadsheet.
 - c. The EC recommends this task as a recurring assignment.
9. Prepare the 2020 RRCA annual meeting report for approval by the RRCA at the 2021 annual meeting.
 - a. The report has been finalized and approved by the EC and is hereby recommended for approval by the RRCA.
10. Make a recommendation on a course of action for dealing with the 2019 PRISM data correction.
 - a. After the 2019 accounting was approved at the 2020 annual meeting, PRISM precipitation data for 2019 were revised for nine stations used in generating ground water model inputs. The EC discussed how this would impact the 2019 accounting and how to calculate the accounting for 2020.
 - b. The EC recommends that the accounting for 2019 be left as it is since the states' compliance for 2019 is not impacted by the updated PRISM precipitation data which result in small differences in ground water model results.
 - c. The EC recommends that the 2020 accounting use ground water model runs with starting heads for 2020 that incorporate the correction for 2019, and documentation explaining the difference is included with the 2020 accounting.

ITEMS FOR RRCA DISCUSSION & ACTION

1. Data exchange and modeling results for 2020 incorporating the EC's proposed course of action for dealing with the 2019 PRISM data correction. The EC recommends the proposed 2020 accounting presented in Attachment 2 and in the spreadsheet titled "RRCA Accounting 2020 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. Retention of Principia Mathematica.
3. Modeling and data tasks to be assigned to Principia Mathematica for 2021. The EC recommends that Principia Mathematica continue to maintain the web-based accounting tool and perform periodic model and accounting updates at the same level of service as in 2020.

4. The status of the document summarizing historical changes to the RRCA Accounting Procedures (Attachment 4).
5. 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.
6. Discussion of the recommended EC assignments and other potential assignments for the next year and agreement on a final set of assignments. The EC presents the 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, 2022, 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, 2022, the states will exchange any updates to these data.
3. Finalize the 2021 accounting and recommend it for approval by the RRCA.
4. Maintain and publish updates to *Summary of Historical Changes to the RRCA's Accounting Procedures and Reporting Requirements* as necessary.
5. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
6. 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.
7. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
8. Prepare the 2021 RRCA annual meeting report for approval by the RRCA at the 2022 annual meeting.
9. Retain a contract with Principia Mathematica for the period and scope outlined by the Commissioners.

The Engineering Committee Report and the exchanged data will be posted on the web at <http://republicanriver.org/>

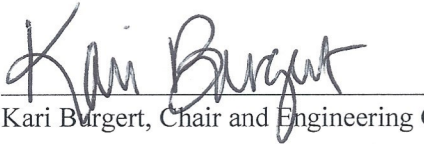
SUBMITTED TO THE RRCA BY



Ivan Franco, Engineering Committee Member for Colorado



Christopher Beightel, Engineering Committee Member for Kansas



Kari Burgert, Chair and Engineering Committee Member for Nebraska

Meeting minutes for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
October 07, 2020 1:30 PM Central Time

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS

Kari Burgert, NE

Hongsheng Cao, KS

Margeaux Carter, NE

Alexa Davis, NE

Chelsea Erickson, KS

Elizabeth Esseks, NE

Carol Myers Flaute, NE

Ivan Franco, CO

Hua Guo, NE

Lizzie Hickman, KS

Philip Paitz, NE

Sam Perkins, KS

Willem Schreüder, CO

Shea Winkler, NE

1. Introductions

1.1. The meeting started at approximately 1:35 PM.

2. Review/Modify Agenda

2.1. The EC representatives agreed to move Sam Perkins' presentation to first on the agenda.

3. Kansas' Precipitation and Irrigation Analysis

- Sam Perkins shared an analysis that he has been working on using climate-based regression estimators to evaluate water savings programs.

- Summary:

To assess the effectiveness of Local Enhanced Management Areas (LEMAs), initiated by Groundwater Management Districts (GMDs) in Kansas, and Water Conservation Areas (WCAs), initiated by individual or groups of water right holders in Kansas, on preserving groundwater resources requires distinguishing climatic impacts from change in water use behavior. A climate-based regression estimator of water use can help do this. For years when a water-savings program is in effect, the difference between reported use and estimated use represents the climate-adjusted water use savings, accounting for the uncertainty of the regression estimate. Estimators are based on monthly PRISM data for precipitation and temperature, with ET given by the Hargreaves-Samani approximation.

Two LEMAs operate in GMD4 within the RRCA GW model domain in KS. Sheridan-6 (SD-6), a 99-sq mi area mostly in Sheridan County, was established in 2012, and has shown significant reductions in water use and water level declines. In 2017, a district-wide LEMA was established, excluding minor areas without water level declines. In the analysis, simple regressions of water use versus precipitation are used to distinguish climatic variability from water use reductions for these, accounting for uncertainty of the estimates. For the GMD4 LEMA, a two-variable regression model is also shown, based on both precipitation and ET.

GMD4 accounts for about 91 percent of pumping and irrigated area reported by Kansas for RRCA GW model domain 2000-2019. For each state, reported pumping was plotted against annual precipitation for 2000-2017 for CO, KS, and NE. Data were summarized using rppKS, a version of the Republican River preprocessor. The period 2000-2017 was selected to look for the effect of the GMD4 LEMA on KS water use for 2018-2019, and any such effects in CO and NE. Average pumping reductions in 2018-2019 compared with 2000-2017 are adjusted for climatic differences.

- **Action item: Sam will share his presentation with the group.**

4. Review and Update Progress on Engineering Committee Task List - Addition of assignment 10 on the PRISM data correction

- 4.1. Meet quarterly to review the tasks assigned to the committee.
 - No comments
- 4.2. 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.
 - No comments
- 4.3. Finalize the 2020 accounting and recommend it for approval by the RRCA.
 - No comments
- 4.4. 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 Final Settlement Stipulation (FSS).
 - Chris said that he believes that the last proposal was from Kansas. He suggested that everyone look at that proposal and either discuss it at the next quarterly meeting or hold an extra meeting to discuss the Kansas proposal before the January quarterly meeting.
 - Kari suggested an additional incremental approach in which the EC would get the wording in the Accounting Procedures fixed with regard to above and below Guide Rock Virgin Water Supply (VWS) versus Computed Water Supply (CWS). If a Flood Flows term is added to change to Computed Water Supply from Guide Rock to Hardy, then the EC can work on how to calculate the flood flow at a later time. Kari suggested all would agree that the flood flow from Guide Rock to Hardy is zero if there is no flood flow.
 - Chris agreed to Kari’s proposal.
 - Ivan asked to be copied on correspondence related to this assignment.
 - **Action item: Nebraska will send out draft language for the Accounting Procedures that corrects the formulation for CWS from Guide Rock to Hardy.**
 - **Action item: Everyone will review Kansas’ most recent proposal for flood flow adjustment change.**
 - **Action item: Everyone will copy Colorado on correspondence related to flood flows assignment.**
- 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.
 - Chelsea sent a draft document before the annual meeting.
 - Kari volunteered to incorporate the most recent changes to Accounting Procedures into the tracking document.
 - Chris reminded the group that the original intent of the tracking document was to leave “breadcrumbs” about what people were thinking when the APs were changed (describe where we’d been and then how we got here).
 - **Action item: Nebraska (Kari) will add Accounting Procedures revisions from the 2020 RRCA annual meeting to the draft tracking document and distribute the draft to Kansas and Colorado for review (the goal is to distribute the draft document before the next quarterly meeting).**
- 4.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
 - Chris reported that there were no updates from Kansas.
 - Kari reported on ongoing Nebraska projects.
 - Nebraska Bostwick Irrigation District (NBID) and Lower Republican NRD submitted a WaterSMART application for alternate locations and sources of water for the Superior Canal.

- NBID and Kansas Bostwick Irrigation District (KBID) are working on automation of Superior/Courtland head gates automation project.
 - Willem gave an update on the Colorado Compliance Pipeline (CCP). The last information he heard was that Colorado was in good enough shape with compact compliance that it wouldn't be necessary to run the pipeline the rest of the year. However, the district is planning to start the CCP in December and then ramp it up. This would serve two purposes: Colorado would be over-delivering this year to dampen out positive and negative swings (there are predictions for drop-off the next two years); and the action could help mitigate winter flooding caused by ice jams. The plan is to run about 6,000 acre-feet early in 2021.
 - Willem said that another strategy is to get people to sign up for CREP to retire land; progress has been slow.
 - Chris asked about CREP re-enrollments in Nebraska. Carol said that she understood that most producers re-enrolled at the last minute.
 - **Action item: Kansas (Chris) will follow up about the KBID WaterSMART application for gate automation and report back at the next meeting.**
- 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.
- Chelsea reported that all documents from the annual meeting were loaded onto the website; she also updated the website with staffing changes and fixed broken links. Please contact Chelsea if you need help or want changes made. The 58th Annual Report is on the website.
 - Carol mentioned that the documents that were signed electronically for this year's meeting include the electronic tracking page for each document. She said that if anyone feels strongly that we should have copies of electronically signed documents without the electronic tracking page, let her know and she can generate a copy without the tracking page to be uploaded onto the website.
 - Chris said he has no preference on including the electronic tracking page.
 - Carol suggested adding the annual meeting date to the name of the report on the RRCA website because the report date is confusing. Chris suggested adding the meeting date and location that the report is about to the website.
 - Willem reminded the group that the early reports were labeled differently, so the process changed at some point (perhaps around 2002). Chris mentioned that reviewing the meeting transcript slows down the approval of the report. Willem suggested looking at the same description on his website.
 - **Action item: Nebraska (Carol) will send out the Nebraska spreadsheet for tracking meeting year/report numbers.**
 - **Action item: Kansas (Chelsea) will work on language to clarify how reports are described.**
 - **Action item: Anyone who has an opinion about the electronic tracking page being included or excluded from electronically signed documents from the 2020 Annual Meeting will share that at the next meeting.**
- 4.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee
- There was nothing to add other than fixing the flood flows issue.
- 4.9. Prepare the 2020 RRCA annual meeting report for approval by the RRCA at the 2021 annual meeting
- There was an update on the status of the transcript and meeting summary for the August 21, 2020, Annual Meeting.
 - **Action item: Ivan will return the annual meeting transcript to Elizabeth when he is finished reviewing it.**

- **Action item: Elizabeth will send the meeting summary and draft report out for external review when she has completed it.**

4.10. Make a recommendation on a course of action for dealing with the 2019 PRISM data correction.

- Willem described the issue. Nine stations have changes in total precipitation of about an inch. It's hard to tell that there are any differences even though there are. The differences in model results are about 55 acre-feet for Colorado; 10 acre-feet for Kansas; and 466.50 acre-feet for Nebraska. If you carry it forward with accounting for 2020 and 2021 and compare original and corrected, the difference for 2019 for Colorado is 40 acre-feet; Kansas is 5 acre-feet, and Nebraska is 197 acre-feet.
- Willem said that the differences in 2019 don't impact compact compliance, but it would be best to fix the problem. Willem posted all the runs in the write-up he provided. Willem suggested three possible ways to deal with the changes.
 - One option is to treat the data as if the changes never happened and carry the mistake forward through 2020 and 2021.
 - The second option is to correct the 2019 run, which the EC hasn't done before (the practice has not been to correct after the accounting has been approved) and use PRISM data moving forward.
 - The third option is to recognize that there is an error in 2019: don't change 2019 data but take a run of the 2019 correction and have that be the starting condition for 2020. There would be a discontinuity between 2019 and 2020 the same way there was a discontinuity between 2006 and 2007 when the five-run procedure was adopted. This option is Willem's recommendation (fix the problem with the initial heads but leave the 2019 modeling and accounting as it is).
- Chris said that the third option sounds reasonable and sensible. He wants to have internal discussion with Kansas staff.
- Kari indicated that Nebraska is leaning toward option 3, with the distinction of preferring to archive the 2019 run and have the continuous run have the revised 2019 data but that might be something that Nebraska will just need to do for internal modeling.
 - Willem said that making the correction as described in option 3 would only affect the groundwater model. The 2020 starting heads would be different than the 2019 ending heads. The 2019 special run would be provided as a separate zip file, with an explanation of what was done.
- Chris asked how the EC should document the correction. Willem referenced the situation in 2007. On the main page of the description (for modeling and accounting) there is a reference indicating that the starting heads are special (they are different than the ending heads for 2006). The runs are included in the data folder.
- Sam asked how the multi-year simulation using current precipitation data will be affected by this. Willem indicated that is always a problem, but there is already the issue of the difference between 2006 and 2007. For future projections this may not make those runs more or less reliable because the changes are so small. However, if we were trying to do a continuous run from 1980 to 2020, that can't be done anymore. Continuous runs also can't be done because of multiple changes in models.
- **Action item – Kansas and Nebraska will report back at the next meeting on review made internally about the PRISM data correction.**

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

6. Future Meetings

Q2 – January 6, 2021, 2:00 pm Central

Q3 – April 20, 2021, 1:30 pm Central

Q4 – July 21, 2021, 1:30 pm Central

7. Adjourn

The meeting adjourned at approximately 3:10 PM.

Meeting minutes for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
January 7, 2021; 10 – 11 AM CT

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS

Carol Myers Flaute, NE

Kari Burgert, NE

Ivan Franco, CO

Alexa Davis, NE

Sam Perkins, KS

Chelsea Erickson, KS

Willem Schreüder, CO

Elizabeth Esseks, NE

1. Introductions
 - 1.1. The meeting started at approximately 10:05 AM.
2. Review/Modify Agenda
 - 2.1. Meeting times for April and July were corrected to 2 PM CT.
3. Review and Update Progress on Engineering Committee Task List
 - 3.1. Meet quarterly to review the tasks assigned to the committee.
 - No comments
 - 3.2. 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.
 - No comments
 - 3.3. Finalize the 2020 accounting and recommend it for approval by the RRCA.
 - Willem sent out an updated accounting draft which still includes estimates earlier this week. Let him know if there are issues.
 - 3.4. 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 Final Settlement Stipulation (FSS).
 - Kari sent out a draft revision to the Accounting Procedures that has a placeholder for what the Flood Flows adjustment would be in the calculation of the computed water supply from Guide Rock to Hardy. The group reviewed the proposed edits in section H and Attachment 6. The proposed edits indicate that the computed water supply should include subtraction of the Flood Flow adjustment, calculation of which has not yet been determined.
 - Willem made a comment about the proposed language for the Flood-Flows term being vague in lines 558 and 559 of Kari's draft. Willem said the draft language is not clear if the term is subtracted from both gages, one gage, or the total. He proposed to revise the language and typed his suggestion into the chat: "A Flood Flow adjustment term will also be subtracted in the Computed Water Supply calculation between Guide Rock and Hardy." Kari will re-word Willem's suggestion and send the revised language to the group for review.
 - Kari reviewed the edits to Attachment 6. Some proposed changes were to fix existing mistakes, and some were specific to the Flood Flows edit.
 - Chris asked if Kari had reviewed the last interactions between Kansas and Nebraska on modifying the

Flood Flows provision. Kari responded that the Nebraska team reviewed the emails and were reminded of the different approaches the states were taking in calculating the Flood Flow adjustment applicable to the Table 5C test. She said that it would be helpful to know what criteria Kansas was using to evaluate the proposed Flood Flow adjustments and that working together to identify what would make a good Flood Flow adjustment conceptually might be an alternative path forward. Chris suggested that Kansas and Nebraska have a focused meeting to discuss just the Flood Flows adjustment.

- **Action item: NE (Kari) will re-word Willem’s suggestion for revised language describing the Flood Flow adjustment term and send it back to the group for input**
- **Action item: NE will propose times to meet to discuss the Flood Flows issue**

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.

- Nebraska sent out a revision. Chris said that the Kansas team discussed the revisions and they look good. The level of detail in the notes made Chris wonder if the group is taking this document in the right direction. Chelsea said the original intent of the document was to explain why the Accounting Procedures were changed and refer to the specific annual meeting documents for additional information. A simple document could be used as a tool by public and federal partners (e.g. a list of what happened and where more information can be found).
- Kansas will finish the review and return comments to the group. Chris suggested that the document memorializing Accounting Procedures changes be patterned after the website, which would be very neutral and point to a specific resource for more information.
- Ivan said that the draft document seems more complete, and he looks forward to hearing the Kansas comments. Ivan reported that he had no substantive comments yet on the revision.
- **Action item: KS will provide revisions to NE and CO for review.**

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

- Chris gave an update on Kansas Bostwick Irrigation District’s (KBID) WaterSmart project. The manager, Pete Gile, is waiting to hear if the district’s grant application for automation of the Courtland Canal was approved. KBID is busy right now burying a couple of half mile lengths of pipe; that project is funded with Nebraska settlement money.
- Willem reported that the Colorado Compliance Pipeline (CCP) is up and running. It started on December 14, 2020, and ramped up gradually, delivering 400 acre-ft in December for an annual total of 6166 acre-feet. That total puts Colorado in the black for approximately 1000 acre-feet for 2020, subject to revision. The expectation is to pump 9000 acre-feet during 2021 (approximately 5000 - 6000 acre-feet in the spring, and the rest later in the year). The exact break-even number would be 9000 acre-feet.
- Kari reported that Nebraska Bostwick Irrigation District (NBID) is waiting to hear about their WaterSmart application. Regular updates on the Platte-Republican Diversion project are being posted on the NeDNR surface water permitting webpage.

3.7. 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.

- Chelsea reported that she updated the annual report page. Language that had been reviewed by Ivan, Andy Pedley, and Chelsea was inserted at the beginning of that page. There is a log of water reports from Nebraska that Chelsea turned into a PDF and added a title. She sent the draft document to Ivan and Andy for review. Chelsea will post the log of water reports after she gets feedback from Ivan and Andy. Otherwise Chelsea reported that there were no other changes. She has been doing regular maintenance and updates. Chelsea copied all text from the website into a Word file in case the website failed (she can also call GoDaddy and ask them to re-set to a previous version of the website).
- Willem mentioned that the complete 1985 annual report has been uploaded to his website (after being re-scanned). Chelsea will copy the document from Willem’s website to the RRCA website.

- 3.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee
- No update
- 3.9. Prepare the 2020 RRCA annual meeting report for approval by the RRCA at the 2021 annual meeting
- Kari said that Nebraska had received edits back from the transcriptionist, and the revised transcript will be included in the meeting summary when it is sent out for review. Kari proposed that everyone think about how much editing we should do of the transcript since it is an independent record of the meeting; there is also a meeting summary. Elizabeth reported that she is still working on the meeting summary.
 - Chelsea made a comment about using court reporters or generating a record of the annual meeting in-house. The transcript is the official record of the meeting, so it should be the best record it can be. Maybe with technology available now we can start doing some of that work ourselves.
 - Willem mentioned that for his class, the university gets a transcript as part of the lecture recording. The transcript is very accurate, but it doesn't capture who said what (since it just uses the Zoom recording). A transcript like that could be a good starting place for a complete meeting transcript.
 - Kari said she believes that the Rules and Regs require that there be a recording of the meeting and the host state must make the recording available upon request. Previously it had been more difficult to make a recording available compared to making a transcript available. Chris said that in the past the transcript was needed because of the litigious nature of the meetings.
 - Chris recommended asking the commissioners to give the EC an assignment to re-evaluate how the annual meetings should be documented and recorded. For example, Zoom meetings can be recorded and people can see who said what.
 - Carol asked if the transcript needs to be part of the annual report. Chris reminded the group that in the future the people involved with the RRCA may not get along, and there could be potential issues that would require documentation with a transcript.
 - Willem typed a link in the chat about Zoom audio transcription: <https://support.zoom.us/hc/en-us/articles/115004794983-Using-audio-transcription-for-cloud-recordings->
 - **Action item: the EC will ask commissioners to assign the EC a task to determine how annual meetings should be documented or recorded moving forward (e.g. transcript versus recording).**
- 3.10. Make a recommendation on a course of action for dealing with the 2019 PRISM data correction.
- Willem reminded the group that the present data was refreshed after 2019 had been finalized. He ran the 2019 groundwater model simulations with the new data. The difference is approximately 100 acre-feet. Willem's recommendation is to update the starting heads for 2020 to new data but leave 2019 alone.
 - Chris said that at the last meeting he indicated that Kansas agreed with Willem's suggestion about using the 2019 PRISM data.
 - Chris wanted to know how the correction would be documented. Willem said that the EC could do the same thing that was done in 2017. On the main page of the posted runs for 2020, there would be a short description of what it is, included the revised 2019 runs documenting how data for the new 2020 starting heads was generated. Chris asked if there is an official RRCA document for this. Willem responded that there is a write-up on the website, which could be the basis of an appendix for the EC report. Chris proposed to include the documentation in the EC report, to explain that this is what happened, and this is what the EC did. Ivan and Kari agreed. Willem proposed that someone revise what he wrote into an appendix for the EC report.
 - Kari said that Nebraska is still looking at a few more details and will decide about the 2019 PRISM data before the next EC meeting. Nebraska will bring a recommendation about how to document the correction to the next EC meeting.
 - **Action item: NE will decide about PRISM data correction and will bring a proposal for**

documenting the correction to the next EC meeting.

4. Summary of Meeting Actions/Assignments (in bold)

5. Future Meetings

Q3 – April 20, 2021, 2:00 pm Central

Q4 – July 21, 2021, 2:00 pm Central

6. Adjourn

The meeting adjourned at approximately 10:51 am.

MINUTES for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
April 20, 2021 2:00 PM Central Time

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS

Jesse Bradley, NE

Kari Burgert, NE

Hongsheng Cao, KS

Alexa Davis, NE

David Engelhaupt, KS

Chelsea Erickson, KS

Elizabeth Esseks, NE

Carol Myers Flaute, NE

Ivan Franco, CO

Lizzie Hickman, KS

Sam Perkins, KS

Willem Schreüder, CO

1. Introductions

1.1. The meeting started at 2:05 pm.

2. Review/Modify Agenda

2.1. No changes were made.

3. Review and Update Progress on Engineering Committee Task List (Below agenda items)

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

- Today is the third quarterly meeting, and the EC is scheduled to meet again July 21, 2021.

3.2. 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.

- Nebraska submitted data on April 15. Nebraska expects to make an update to groundwater pumping and acres due to missing data in Dundy County. Nebraska agrees that Willem's total for Haigler/Pioneer diversions in Nebraska is the correct value and should be updated. Nebraska was using US Bureau of Reclamation (Bureau) data for the Courtland Canal flow at the state line, which differed from the flow recorded by the USGS. Kari contacted the Bureau, and they recommended using US Geological Service (USGS) data at that location. Willem suggested changing the source for the surface water input tab for the Courtland Canal at the state line to the USGS gage and Kari agreed as long as that is what the Bureau recommends.
- Colorado submitted data on April 8. Willem said that the Annual Crop Irrigation Requirement (CIR) update is still outstanding, but they will get it before July.
- Kansas submitted data on April 14. Willem asked about the 12-mile discrepancies between pumping and recharge. David explained that producers overlap in the same place of use but it's unlikely that they irrigate the places where they overlap in all cases. Chris added that overlaps are reported by water right and by seniority for administration purposes. Willem asked how we can detect when it's a mistake and when it's legitimate. David suggested checking the overlaps individually when there are very large distances. Willem suggested automating the process since there are more than 1,000 overlaps. David recommended checking the largest overlaps to be sure they're right. Chris said that Kansas would check into this and report back if they come up with a plan to resolve this issue. Kari asked if pumping and recharge would change based on resolution of overlap issue. Sam said he would expect to see small to negligible change in recharge associated with location changes of irrigation tracts. Kansas will provide a data update in June.
- **Action item: Kansas will work on a solution to resolve the overlap issue.**

- Willem said that 2020 pumping, mostly for the west side of the basin, was very high. He based the 2021 pumping projection on 2019 instead of 2020. Sometime, he would like to discuss whether the group thinks that was the right thing to do. For example, Colorado pumping last year was up 30% from 2019. Other than 2002 and 2012, 2020 was the highest year in the last 20 years. Willem is hopeful that 2021 will be closer to average. The change in Colorado depletions for 2021 based on 2021 projections for pumping is small; Willem isn't sure about the change in depletions for Kansas and Nebraska. Kari said that Nebraska will get the rest of the pumping data into 2020 files and then will let Willem know what Nebraska proposes for the prospective run for 2021.
 - **Action item: the states will provide data exchange updates to each other by July 15, 2021.**
- 3.3. Finalize the 2020 accounting and recommend it for approval by the RRCA.
- The outstanding data exchange items were noted above. Willem and Nebraska had a few differences which are being resolved (Courtland Canal at state line and Haigler gaged flows).
 - Willem commented that USGS has finalized surface water inputs gage data.
- 3.4. 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.
- Nebraska sent out an email March 1 with the recommended language edit to the Accounting Procedures suggested by Willem at the January meeting. Willem approved of the language. There were no other comments from Kansas and Colorado.
 - Kari asked if the group wants to discuss this topic more at the July meeting or if the group is ready to take a draft to the commissioners at the annual meeting. Chris suggested more discussion, including the reason for adopting the proposed interim language when no procedure for calculating the Flood Flows adjustment for the basin above or below Guide Rock has been defined. He said that the existing language is fine, but it seems appropriate to take a draft to the commissioners when we reach an agreement about the procedure for calculating the Flood Flows adjustment for the basin above or below Guide Rock. There is a conceptual framework, but he's not sure what the path forward is.
 - **Action item: Nebraska (Kari) will send a doodle poll proposing dates to have a focused meeting on calculation of the Flood Flows provisions.**
- 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.
- Chelsea provided an update. Kansas has been reviewing the last draft from Nebraska that included comments and suggestions. We are probably at a point where we need to decide what to do with this document. It is an open-ended work assignment and there will probably be future updates to the APs. Chris said we need to discuss this topic when we meet to see if we can continue or finish the document. The original intent was for this to be a common reference point for all states. Chris asked if this is something we want to continue doing. Kari said that since this is an assignment from the commissioners, she would want to check with the Nebraska commissioner for his preference on that. Kari asked if Kansas is working on revisions. Chelsea said that they are trying to determine how much detail to include in the document. Ivan said that he is waiting to see what the edits are from Kansas. Ivan agrees that the EC is doing what was assigned by commissioners; there is value in this document for future EC members; and there are concerns about what if any implications the document might have.
 - **Action item: Kansas will continue to work on the draft and will send it for review soon.**
- 3.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
- Willem reported that the Colorado Compliance Pipeline (CCP) was shut off last Friday (April 16); it has pumped 6,393 acre-feet so far this year. The estimate is that the pipeline will pump an additional 3,000 acre-feet at the end of the year, depending on the summer. There is no flow yet at the Arikaree and Benkelman gages. The South Fork state line gage started slowly at 3 cubic feet per second (cfs) and now is at 8 cfs.
 - Carol reported that Nebraska Bostwick Irrigation District (NBID) was awarded a WaterSMART grant to fund work on the Superior Canal. NeDNR and Kansas Bostwick Irrigation District (KBID) have committed funds to that project, also. Nebraska is working on updates for Upper Republican, Middle Republican, and Lower Republican Natural Resources District (NRD) Integrated Management Plans (IMP). Stakeholder meetings took place in March; NeDNR expects the NRD boards to vote next

month to advance the proposed plans to public hearings in June, with the plans taking effect at the end of September. There are editorial and formatting changes to the plans, but there are no significant changes to the plan goals, objectives, and controls.

- Chris reported that in the same round of WaterSMART grants that Carol mentioned, KBID was funded just less than \$800,000 for a \$1,600,000 project to automate the Courtland Canal. The project will automate the canal from the Guide Rock diversion dam to Lovewell Reservoir. Kansas has almost finished the second round of cost-share grant awards in the south fork in the Upper Republican River Basin for irrigation efficiency projects. The funding is from recent settlement money.

3.7. 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.

- Chelsea reported that nothing has happened since the last meeting. The only outstanding task is putting together a PDF document with annual report descriptions, including the year, meeting year, and report year.
- Chelsea confirmed that the new commissioners are listed on the website.

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

- There were no updates.

3.9. Prepare the 2020 RRCA annual meeting report for approval by the RRCA at the 2021 annual meeting

- The draft meeting summary and attendee list were sent out for review on April 15, 2021, and comments were requested by May 15. Kansas is reviewing the draft and will send comments soon. Colorado hasn't started to review the draft yet.
- **Action item: Colorado and Kansas will review the draft 2020 annual meeting summary and attendee list and return comments to Nebraska by May 15, if possible.**

3.10. Make a recommendation on a course of action for dealing with the 2019 PRISM data correction.

- Willem reminded the group that at the last meeting the recommendation was to start the 2021 run off corrected starting heads. That is what he used for the last update that he sent on April 15. Nebraska agreed to recommend to the commissioners to use the updated 2019 run for starting 2020 heads. Kari wrote a paragraph describing the update. She proposed that the group discuss where to include the summary at the next EC meeting. Willem added a short explanation of the problem in the zip file that includes the data for 2020, but he will replace what he wrote with the summary Kari wrote. Willem asked if the detailed write-up should be included on the publicly accessible page.
- **Action item: Kari will send out the draft language describing the update for review.**

4. Summary of Meeting Actions/Assignments (in bold)

5. Future Meetings

5.1. Q4 – July 21, 2021, 2:00 pm Central

- The goal is to have a draft of the EC report ready for distribution at the July meeting.
- Possible topic for discussion at the next meeting: Is Willem's contract up after 2021 and what needs to be included in EC report to extend?

6. Adjourn

6.1. The meeting adjourned at approximately 2:48 pm.

MINUTES for the
**QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION**
July 21, 2021 2:00 PM Central Time

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS

Kari Burgert, NE

Hongsheng Cao, KS

Sam Capps, NE

Alexa Davis, NE

David Engelhaupt, KS

Chelsea Erickson, KS

Elizabeth Esseks, NE

Ivan Franco, CO

Lizzie Hickman, KS

Sam Perkins, KS

Willem Schreüder, CO

1. Introductions
 - 1.1. The meeting started at approximately 2:04 p.m.
2. Review/Modify Agenda
 - 2.1. Sam Perkins has updated the climate-based pumping estimator; if there's time he will give an update today.
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 Engineering Committee's (EC) last scheduled meeting before the annual meeting.
 - The EC members agreed that the April 2021 meeting minutes are final.
 - The Republican River Compact Administration (RRCA) Annual Meeting will be held at McCook Community College on August 25, 2021. Proposed times are 8:30 a.m. for the working session and 10:30 a.m. for the annual meeting. The meeting will be a hybrid in-person and virtual meeting (via Zoom).
 - **Action item: Nebraska will send draft agendas for the working session and annual meeting to Colorado and Kansas for review.**
 - **Action item: Nebraska will notify U.S. Bureau of Reclamation, U.S. Geological Survey, and U.S. Army Corp of Engineers about the annual meeting.**
 - 3.2. 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.
 - Nebraska sent updated data on May 18, 2021.
 - Kansas sent final data on July 8, 2021.
 - Colorado sent final Crop Irrigation Requirement (CIR) data on June 7, 2021.
 - There were no comments or questions on the data exchanged.
 - 3.3. Finalize the 2020 accounting and recommend it for approval by the RRCA.
 - Willem, Sam Perkins, and Kari have been sending updates to accounting spreadsheets and the accounting website. Kari asked if there are remaining questions on the accounting updates.
 - Willem talked about inconsistencies in the Courtland worksheet and monthly water distribution reports, which include the same data. Willem asked how the EC can prevent the U.S. Bureau of Reclamation (Bureau) from sending two different reports for the same data that are different.
 - Kari talked about this issue recently with Miles Morgan of the Bureau. The Courtland worksheet and monthly water distribution reports contain data reported from the irrigation

districts. The Courtland worksheet is updated monthly, and the monthly water distribution reports are completed at the end of the year. Miles called Nebraska Bostwick Irrigation District (NBID) and found out that NBID had been pulling different summaries for each of the spreadsheets, and they discussed the appropriate data for each. The EC now has updated, corrected Courtland worksheets and monthly water distribution worksheets.

- Kari said that the EC doesn't need to include the same data in two different parts of the spreadsheet, so the EC could simplify the spreadsheet. She suggested that simplifying the spreadsheet and eliminating repetition of data could be an assignment under #8 of the EC task list ("Continue work and provide future updates on improving accounting tools developed by the Engineering Committee"). Chris and Ivan agreed with the suggestion.
 - Willem mentioned that part of the problem is there are two different, independent entries that are not tied together; KBID above Lovewell diversions are different in part because of rounding in different places.
 - Willem confirmed that the two spreadsheets are now consistent for 2020 data.
 - Kari reported that data for the Haigler canal at the state line from the new Colorado Division of Water Resources (DWR) streamgaging website are different depending on which query is used. Willem recommended using daily average discharge values; he believes the summary report has an odd conversion from cubic feet per second (cfs) to acre-feet (AF). Ivan agreed with the recommendation. Willem said that additional discrepancies may have to do with one record being provisional and one being final based on water year.
 - Kari indicated that the EC still has a couple of weeks if anyone wants to make a final review before the annual draft EC report is sent out.
 - **Action Item: Willem will check the input data sites (including PRISM and USGS gaging sites) to see if any of the inputs have changed one last time before the annual meeting.**
- 3.4. 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 Final Settlement Stipulation (FSS).
- Since the last quarterly meeting, the EC met twice on this assignment, and Kansas submitted an email proposal on June 21, 2021, with an additional email from Kansas with a spreadsheet on July 2, 2021.
 - Kari indicated that Nebraska is not ready to move forward with Kansas' current proposal. She recommended that, given the differences between Nebraska's proposal and Kansas's proposal and given the infrequency of the events associated with this accounting issue, the EC consider wrapping up the assignment for the year, documenting the discussions and progress, and to not recommend this as an assignment for next year.
 - Chris and Ivan agreed to bring Kari's recommendation to the Commissioners in the EC report.
 - It was noted that the Accounting Procedures already describes that the issue needs to be addressed prior to impacting Nebraska's Table 5C compliance.
 - Willem wondered if there could be a year that is water-short and then change to flood flow conditions and concluded that it could happen. Chris commented that going from flood flow conditions to a water-short year is where we get into trouble.
- 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.
- Chelsea reported that there is a new draft document ready for distribution, so she will send the draft to EC members today or tomorrow. She took out the extra documentation and replaced it with references to the relevant annual report and/or the RRCA website. She suggested that when bringing the document to the Commissioners, they could also provide guidance for where the document should live. Chris added that the document is more streamlined. He hopes the disclaimer language can be softened. Chelsea said that the document will be added to in the future since it is an evolving document.

- Kari asked if this document will go to the commissioners for approval, or if it will be an internal EC document. Chris indicated that he thought it was impractical to get approval from the commissioners for future changes to the document. He proposed that decisions about the document can be made by the EC the same way the EC decides about website changes.
- 3.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
- Colorado had nothing new to report.
 - Nebraska reported that updates on NBID and other projects were given at the 3-States meeting. NBID signed a contract with The Flatwater Group. The Department is working on contracts with Frenchman Valley Irrigation District and the Middle Republican Natural Resources District (a remote meter contract).
 - Kansas – Sam Perkins provided an update on the climate-based pumping estimates. Chris commented that people had been behaving the same way for years in western Kansas and Colorado, until 2018, when there was a change in behavior. The same relationship was not observed with Nebraska data.
 - Willem said that when you look at the graph of pumping over time, the data suggest that 2019 pumping was down a lot. However, the county summaries didn't look like low outliers (2020 is a high outlier). Willem wondered if carrying pumping forward from 2019 to 2021 might not be appropriate. Willem asked if it would make sense to come up with an average year and use that as a surrogate during the year before the end-of-year data is available. If there is an estimate by August of what the current year's annual pumping might be, that would be helpful for planning (e.g., Colorado Compliance Pipeline). Sam said that current-year pumping could be estimated using precipitation data from a portion of the year instead of having to wait until the year is over to use the annual precipitation data.
 - Willem said that at the beginning of August, he will start setting up predictive runs for 2022. For the predictive runs, it may be useful to take an average of last five years instead of repeating the last year. Willem commented that when the EC starts estimating 2021, if we can use precipitation as an estimator of what the pumping is, it will help us come up with better estimates for 2021 six months earlier than we would otherwise have it. Sam explained that to measure precipitation, he is using PRISM data from the PRISM grid for each state, averaged over grid cells in each state's active model. Willem asked if Sam could share the estimate for 2021 pumping.
 - The EC discussed recommending work on improving pumping estimates for the prospective accounting runs when there is a need for these.
 - **Action item: Kansas (Sam Perkins) will share the estimate for 2021 pumping with the EC.**
- 3.7. 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.
- Chelsea reported that there have been no significant changes to the website. She posted the annual report description document, and she posted a notice for the annual meeting and will update it and add documents once she gets more information.
- 3.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
- Kari referred to working on eliminating the Courtland/Attachment 7 data overlaps next year.
- 3.9. Prepare the 2020 RRCA annual meeting report for approval by the RRCA at the 2021 annual meeting
- Status of transcript and meeting summary for August 21, 2020, Annual Meeting (NE) – The draft report is being revised and will be sent out soon for review.
 - **Action item: Nebraska will send out the draft annual report to Colorado and Kansas for review soon.**
- 3.10. Make a recommendation on a course of action for dealing with the 2019 PRISM data correction.

- Kari confirmed that everyone agreed to using the correction. She sent out a draft description and will include the language again in the draft EC report for people to review and edit.
 - Kari proposed to include the description of the correction, the revised 2019 groundwater model run, and 2020 starting heads in the following places: the EC report (under the section describing completion of this task), the recommended approved accounting appendix, the accounting spreadsheet on the website, and the groundwater model files. Willem added that it will be on the website.
4. Review of EC report Recommended Discussion and Recommended Assignments sections
- The EC reviewed a draft list of completed and ongoing assignments for the year and reviewed a draft list of assignments for the next year to be included in the EC annual report.
 - Chris asked if the EC wanted to include more details in the task descriptions. Ivan commented that the specifics are incorporated into the tasks, and the same group of people will be discussing the assignments next year. Chris asked if additional documentation would be helpful beyond meeting minutes and suggested adding sub-bullets. Kari suggested that we start with the basic tasks for recommending as assignment then updating the task list with subtasks at the first EC meeting in October.
 - Recommended Discussion items
 - Kari noted that the PRISM data correction is part of the discussion of the recommended motion to approve the 2020 accounting.
 - Kari added an item for the commissioners to discuss the retention of Principia Mathematica (PM) and how long the contract with PM should be. The states' current 5-year contracts end in 2021. Chris and Ivan agreed.
 - Willem and Chris suggested adding the climate-based pumping estimator to the recommended discussion items. Willem reiterated that using the projected precipitation would be useful for estimating preliminary pumping and would have no official standing.
 - Recommended Assignments
 - In the recommended assignments list, Kari suggested modifying the wording of the assignment to create the document memorializing changes to the Accounting Procedures to remove “and incorporate it into the Accounting Procedures.” Chris and Ivan agreed that the language should be changed as Kari proposed.
 - Chelsea suggested keeping the document with the Accounting Procedures on the website or the annual EC report.
 - If a draft of the document is available, that can be presented to the commissioners and reviewed as a discussion item.
5. Summary of Meeting Actions/Assignments (in bold)
6. Future Meetings
- 6.1. Action item: Kari will email Colorado and Kansas about scheduling an EC meeting before the RRCA annual meeting, in case the group needs to meet.**
7. Adjourn
- 7.1. The meeting adjourned at approximately 3:13 p.m.

Table of Contents

Accounting Inputs	1
Groundwater Data	2
Import Water Data	2
Surface Water Pumping Data.....	3
Non-Federal Surface Water Consumptive Use.....	4
Non-Federal Reservoir Evaporation Data.....	5
Stream Gage Data	5
Hardy Gage Data.....	5
Reservoir Data	6
Canal Data.....	6
Accounting Tables	7
Table 1	8
Table 2	9
Table 3A, Table3B, and Table 3C	10
Table 4A and Table 4B	11
Table 5A and Table 5F	12
Table 5B and Table 5E	13
Table 5C and Table 5D.....	14
Attachments	15
Attachment 1	16
Attachment 6.....	17
Attachment 7.....	18
Attachment 8 and Augmentation Pumping Volume and Resolution Water Supply Credits.....	19
Flood Flow Calculations	20

Accounting Inputs

Calendar Year		2020
Groundwater Data*		
North Fork Subbasin	GW CBCU Colorado	17,390
	GW CBCU Kansas	0
	GW CBCU Nebraska	1,246
Arikaree Subbasin	GW CBCU Colorado	1,646
	GW CBCU Kansas	81
	GW CBCU Nebraska	73
Buffalo Subbasin	GW CBCU Colorado	482
	GW CBCU Kansas	0
	GW CBCU Nebraska	3,603
Rock Subbasin	GW CBCU Colorado	94
	GW CBCU Kansas	0
	GW CBCU Nebraska	5,190
South Fork Subbasin	GW CBCU Colorado	11,037
	GW CBCU Kansas	3,490
	GW CBCU Nebraska	717
Frenchman Subbasin	GW CBCU Colorado	1,137
	GW CBCU Kansas	0
	GW CBCU Nebraska	78,767
Driftwood Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	811
Red Willow Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	8,756
Medicine Creek Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	19,867
Beaver Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	6,025
	GW CBCU Nebraska	3,875
Sappa Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	2,075
	GW CBCU Nebraska	1,654
Prairie Dog Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	3,668
	GW CBCU Nebraska	0
Mainstem Subbasin	GW CBCU Colorado	(5,115)
	GW CBCU Kansas Above Guide Rock	(769)
	GW CBCU Kansas Below Guide Rock	51
	GW CBCU Nebraska Above Guide Rock	52,721
	GW CBCU Nebraska Below Guide Rock	1,769

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	0
Driftwood Subbasin	Imported Water Nebraska	0
Red Willow Subbasin	Imported Water Nebraska	49
Medicine Creek Subbasin	Imported Water Nebraska	10,592
Beaver Subbasin	Imported Water Nebraska	0
Sappa Subbasin	Imported Water Nebraska	27
Prairie Dog Subbasin	Imported Water Nebraska	0
Mainstem Subbasin	Imported Water Nebraska Above Guide Rock	8,314
	Imported Water Nebraska Below Guide Rock	(20)
Total		18,962

* The initial heads for the RRCA Groundwater Model 2020 Update are the ending heads from a groundwater model generated using corrected precipitation data rather than the RRCA Groundwater Model 2019 Update used for approved 2019 accounting. After the 2019 Update was approved, PRISM corrections for precipitation values for May-September 2019 were obtained. PRISM corrected their daily and monthly grids on August 3, 2020, after finding that some stations, including those affecting the RRCA model domain, were mis-located. The precipitation corrected 2019 groundwater model run used to generate the 2020 initial heads included 71,452 acre-feet or 2.3% additional recharge from precipitation. The updated 2020 initial heads will serve as the basis for future RRCA Groundwater Model updates.

Calendar Year		2020
SW Pumping Data		
North Fork Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	301
	SW Diversions - Irrigation - Small Pumps - Colorado	24
	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	92
	SW Diversions - Irrigation - Small Pumps - Nebraska	4
	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	0
	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	0
	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	57
	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	229
	SW Diversions - M&I - Nebraska - Below Gage	0

Calendar Year		2020
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	23
	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	1,392
	SW Diversions - M&I - Kansas	361
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	172
	SW Diversions - M&I - Nebraska - Below Gage	0
Mainstem Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	753
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	1,752
	SW Diversions - Irrigation - Small Pumps - Nebraska	1,453
	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	552
	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		2020
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	19
	Non-Federal Reservoir Evaporation - Nebraska	0
Buffalo Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Nebraska	13
Rock Subbasin	Non-Federal Reservoir Evaporation - Nebraska	152
South Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	165
	Non-Federal Reservoir Evaporation - Nebraska	0
Frenchman Subbasin	Non-Federal Reservoir Evaporation - Nebraska	124
Driftwood Subbasin	Non-Federal Reservoir Evaporation - Kansas	17
	Non-Federal Reservoir Evaporation - Nebraska	0
Red Willow Subbasin	Non-Federal Reservoir Evaporation - Nebraska	258
Medicine Creek Subbasin	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	304
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	3
Beaver Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	391
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	169
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	0
Sappa Subbasin	Non-Federal Reservoir Evaporation - Kansas	420
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	79
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	5
Prairie Dog Subbasin	Non-Federal Reservoir Evaporation - Kansas	333
	Non-Federal Reservoir Evaporation - Nebraska	26
Mainstem Subbasin	Non-Federal Reservoir Evaporation - Kansas	119
	Non-Federal Reservoir Evaporation - Nebraska - Above Guide Rock Gage - Whole Basin Value:	1,478
	Non-Federal Reservoir Evaporation - Nebraska - Below Guide Rock Gage - Whole Basin Value:	84

Stream Gage Data		
North Fork Subbasin	North Fork Republican River At Colorado-Nebraska State Line	22,984
Arikaree Subbasin	Arikaree River At Haigler	1,657
Buffalo Subbasin	Buffalo Creek Near Haigler	2,143
Rock Subbasin	Rock Creek At Parks	4,049
South Fork Subbasin	South Fork Republican River Near Benkelman	7,229
Frenchman Subbasin	Frenchman Creek At Culbertson	19,122
Driftwood Subbasin	Driftwood Creek Near McCook	2,492
Red Willow Subbasin	Red Willow Creek Near Red Willow	4,284
Medicine Creek Subbasin	Medicine Creek Below Harry Strunk	39,930
Beaver Subbasin	Beaver Creek Near Beaver City	788
Sappa Subbasin	Sappa Creek Near Stamford	16,223
Prairie Dog Subbasin	Prairie Dog Creek Near Woodruff	8,282
Mainstem Subbasin	Republican River At Guide Rock	202,416
	Republican River Near Hardy	251,239

Hardy Gage Data		
	USGS Gage 06853500 Republican River Near Hardy, NE	
Mainstem Subbasin	January	55,339
	February	33,332
	March	33,775
	April	23,421
	May	31,732
	June	10,810
	July	30,811
	August	8,337
	September	3,488
	October	4,298
	November	7,632
	December	8,265
		ANNUAL

Calendar Year		2020
Reservoir Data		
South Fork Subbasin	Bonny Reservoir Evaporation	0
	Bonny Reservoir Change In Storage	0
Frenchman Subbasin	Enders Reservoir Evaporation	2,037
	Enders Reservoir Change In Storage	(1,148)
Red Willow Subbasin	Hugh Butler Lake Evaporation	3,032
	Hugh Butler Lake Change In Storage	(4,190)
Medicine Creek Subbasin	Harry Strunk Lake Evaporation	2,924
	Harry Strunk Lake Change In Storage	(9,530)
Prairie Dog Subbasin	Keith Sebelius Lake Evaporation	4,594
	Keith Sebelius Lake Change In Storage	(4,632)
Mainstem Subbasin	Swanson Lake Evaporation	10,172
	Swanson Lake Change In Storage	(4,786)
	Harlan County Evaporation Subject to Nebraska/Kansas Split	26,419
	Harlan County Evaporation Charged to Kansas	0
	Harlan County Change In Storage	(50,098)
	Lovewell Reservoir Ev charged to the Republican River	1,385

Canal Data			
North Fork Subbasin	Haigler Canal Diversions - Colorado	0	
	Haigler Canal Diversions - Nebraska	5,288	
	Haigler Canal Diversions	5,288	
South Fork Subbasin	Hale Ditch Diversions	0	
Frenchman Subbasin	Champion Canal Diversions	0	
	Riverside Canal Diversions	0	
	Culbertson Canal Diversions	6,722	
	Culbertson Canal Extension Diversions	0	
	Culbertson Canal % Return Flow	82%	
	Culbertson Canal Extension % Return Flow	100%	
Driftwood Subbasin	Meeker-Driftwood Canal Diversions	19,398	
	Meeker-Driftwood Canal % Return Flow	61.6%	
Red Willow Subbasin	Red Willow Canal Diversions	5,226	
	Red Willow Canal % Return Flow	66%	
Prairie Dog Subbasin	Almena Canal Diversions	3,076	
	Almena Canal % Return Flow	61.3%	
Mainstem Subbasin	Bartley Canal Diversion	7,388	
	Bartley Canal % Return Flow	66%	
	Cambridge Canal Diversion	26,714	
	Cambridge Canal % Return Flow	59.0%	
	Naponee Canal Diversion	1,593	
	Naponee Canal % Return Flow	74%	
	Franklin Canal Diversion	22,053	
	Franklin Canal % Return Flow	71%	
	Franklin Pump Canal Diversions	1,190	
	Franklin Pump Canal % Return Flow	63%	
	Superior Canal Diversions	10,070	
	Superior Canal % Return Flow	80%	
	Courtland Canal Diversions At Headgate	44,380	
	Diversions to Nebraska Courtland	499	
	Nebraska Courtland % Return Flow	31%	
	Courtland Canal, Loss in NE assigned to upper Courtland KS	3,847	
	Courtland Canal, Loss in NE assigned to delivery to Lovewell	4,278	
	Courtland Canal At Kansas-Nebraska State Line	35,756	
	Courtland Canal Diversions to the Upper Courtland District	18,180	
	Courtland Canal Above Lovewell % Return Flow	60.7%	
	Courtland Canal, Loss assigned to deliveries of water to Lovewell, Stateline to Lovewell	3,950	
	Courtland Canal Deliveries To Lovewell Reservoir	17,473	
	Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	14,183	
	Courtland Canal Below Lovewell % Return Flow	51.2%	
	To allocate Harlan County evaporation:		
	Kansas Bostwick Diversions During Irrigation Season (actual, or 3-year average)	32,828	
	Nebraska Bostwick Diversions During Irrigation Season (actual or 3-year average)	32,809	

Accounting Tables

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

2020 Basin	Virgin Water Supply	Computed Water Supply	Allocations				Computed Beneficial Consumptive Use		
			Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	40,930	40,930	9,170	0	10,070	21,690	17,630	0	4,420
Arikaree	3,480	3,480	2,730	180	580	(10)	1,650	100	70
Buffalo	6,290	6,290	0	0	2,080	4,210	480	0	3,670
Rock	9,480	9,480	0	0	3,790	5,690	90	0	5,340
South Fork	22,640	22,640	10,050	9,100	320	3,170	11,040	3,650	720
Frenchman	102,180	103,330	0	0	55,380	47,950	1,140	0	82,130
Driftwood	450	450	0	30	70	350	0	20	810
Red Willow	16,970	21,160	0	0	4,060	17,100	0	0	9,490
Medicine	42,950	52,480	0	0	4,780	47,700	0	0	20,390
Beaver	11,260	11,260	2,250	4,370	4,570	70	0	6,430	4,040
Sappa	19,630	19,630	0	8,070	8,070	3,490	0	2,490	1,740
Prairie Dog	14,660	19,290	0	8,820	1,470	9,000	0	11,010	160
Main Stem	213,600	264,600	0	135,210	129,390	0	(5,120)	30,110	119,420
Total All Basins	504,520	575,020	24,200	165,780	224,630	160,410	26,910	53,810	252,400
Main Stem Including Unallocated		425,010	0	217,180	207,830				
Total	504,520	575,020	24,200	247,750	303,070	0	26,910	53,810	252,400

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

	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)
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)
2020	24,200	26,910	6,218	3,508
Avg 2016-2020	24,140	32,100	10,030	2,070

Table 3B: Table to Be Used to Calculate Kansas's Five-Year Running Average Allocation and Computed Beneficial

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Col 1 – (Col 2- Col 3)
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
2020	247,750	53,810	NA	193,940
Avg 2016-2020	218,960	53,310	NA	165,660

Table 3C: Table to Be Used to Calculate Nebraska's Five-Year Running Average Allocation and Computed Beneficial

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and NERWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and NERWS Credit Col 1 – (Col 2- Col 3)
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
2020	303,070	252,400	18,995	69,665
Avg 2016-2020	278,090	255,920	34,550	56,720

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.

2020

	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**2020**

	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	172	(10)	446	N/A	608	156	452
South Fork	9,130	3,180	0	N/A	12,310	4,886	7,424
Driftwood	90	1,002	0	N/A	1,092	12	1,080
Beaver	4,682	70	2,414	N/A	7,166	6,658	508
Sappa	7,164	3,094	0	N/A	10,258	2,598	7,660
Prairie Dog	7,960	8,130	0	N/A	16,090	10,772	5,318

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

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Year	Is the year Water Short Pursuant to III.J?* (Yes or No)	Statewide Allocation	Beaver Creek Reduction Pursuant to Table 5F	Allocation - Beaver Creek Reduction (Col. 2 - Col.3)	Computed Beneficial Consumptive (excluding the Beaver Creek Sub-basin)	Imported Water Supply Credit - IWS Beaver Creek + CORWS Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit (Col. 4 - Col. 5 + Col. 6)
2016	Yes	25,190	1,650	23,540	33,930	10,130	(260)
2017	Yes	22,960	0	22,960	31,810	11,330	2,480
2018	No	25,630	1,852	23,778	35,130	13,578	2,226
2019	Yes	22,710	0	22,710	32,740	8,905	(1,125)
2020	No	24,200	0	24,200	26,910	6,218	3,508
Avg 2016-2020	Yes	24,140	700	23,440	32,100	10,030	1,370

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

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

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

Year	Allocation				Computed Beneficial Consumptive Use	Imported Water Supply Credit	Difference Between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit
Column	1	2	3	4	5	6	7
	Sum Sub-basins	Kansas' Share of Unallocated Supply	Kansas' Share of the Unused Colorado Allocation	Total Col 1 + Col 2 + Col 3			Col 4 - (Col 5 - Col 6)
2019	38,550	11,615	1,579	51,744	26,350	N/A	25,394
2020	30,570	8,212	1,702	40,483	23,700	N/A	16,783
Avg 2019-2020	34,560	9,913	1,640	46,114	25,025	N/A	21,089

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

Year	Allocation			Computed Beneficial Consumptive Use	Imported Water Supply Credit and AWS	Allocation - (CBCU - IWS-AWS)
	Sub-Basin Total	Share of Unallocated Supply	Total			
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
2020	95,240	78,440	173,680	132,980	10,716	51,416
Avg 2019-2020	101,235	82,563	183,798	135,400	11,079	59,476

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)
2019	389,300	56,294	333,006	1,511	262,870	1,780	261,090	26,541	99,968
2020	303,070	17,777	285,293	1,628	252,400	2,266	250,134	18,995	55,783
Avg 2019-2020	346,190	37,040	309,150	1,570	257,640	2,020	255,610	22,770	77,880

Table 5D: Nebraska's Compliance Under a Alternative Water-Short Year Administration Plan

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water	Difference Between
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)
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
2020	303,070	17,777	285,293	1,628	252,400	2,266	250,134	18,995	55,783
Avg 2018-2020	311,350	31,290	280,060	1,490	260,450	2,450	258,000	23,830	47,390

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 Flows 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 towards its resolution. As it stands, Attachment 6 calculates Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce 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
2020	264,600	251,239	202,416	55,120	10,070	7,327	8,024	15,352	2,266	616	2,882	33,471	36,353	228,247	111,613	116,634	17,777	18,577

COURTLAND CANAL	
	2020
Return Flow From Courtland Canal To Republican River Above Lovewell From Kansas	536
Return Flow From Courtland Canal To Republican River Above Hardy From Nebraska	6,791
Courtland Canal Diversions At Headgate	44,380
Courtland Canal At Kansas-Nebraska State Line	35,756
NE Courtland Canal CBCU (includes transportation loss)	342
Superior Canal CBCU	2,046

NEBRASKA	
	2020
SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	552
SW Diversions - M&I - Nebraska - Below Guide Rock	0
SW Non-Federal Reservoir Evaporation - Below Guide Rock	84
SW Return - Irrigation	138
SW Return - M&I	0
GW CBCU Nebraska Below Guide Rock	1,769

KANSAS	
	2020
SW CBCU - Irrigation - Small Pumps	565
SW CBCU - M&I	0
GW CBCU Kansas Below Guide Rock	51

2020

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	5,380 1,342	89 0	5,291 1,342	257 0	5,034 1,342	30% 30%	77 0	5,111 1,342	82% 92%	4,280 1,235	80% 92.0%
Culbertson Extension	0 0	0 0	0 0	0 0	0 0	30% 30%	0 0	0 0	82% 92%	0 0	100% 100.0%
Meeker - Driftwood	19,398 0	1,817 0	17,581 0	7,463 0	10,118 0	30% 30%	2,239 0	12,357 0	82% 92%	11,950 0	61.6% 100.0%
Red Willow	5,226 0	0 0	5,226 0	1,423 0	3,803 0	30% 30%	427 0	4,230 0	82% 92%	3,469 0	66.4% 100.0%
Bartley	7,388 0	1,397 0	5,991 0	2,487 0	3,504 0	30% 30%	746 0	4,250 0	82% 92%	4,882 0	66.1% 100.0%
Cambridge	26,599 115	1,175 18	25,424 97	11,107 0	14,317 97	30% 30%	3,332 0	17,649 97	82% 92%	15,647 107	58.8% 93.3%
Naponee	1,593 0	342 0	1,251 0	356 0	895 0	35% 35%	125 0	1,020 0	82% 92%	1,178 0	74.0% 100.0%
Franklin	22,053 0	3,211 0	18,842 0	5,770 0	13,072 0	35% 35%	2,020 0	15,092 0	82% 92%	15,586 0	70.7% 100.0%
Franklin Pump	1,190 0	111 0	1,079 0	452 0	627 0	35% 35%	158 0	785 0	82% 92%	755 0	63.4% 100.0%
Almena	3,076	0	3,076	1,109	1,967	30%	333	2,300	82%	1,886	61.3%
Superior	10,070 0	3,691 0	6,379 0	1,586 0	4,793 0	31% 31%	492 0	5,285 0	82% 92%	8,024 0	79.7% 100.0%
Nebraska Courtland	499	0	499	400	99	23%	92	191	82%	157	31.4%
Courtland Canal Above Lovewell (KS)	18,181	1,532	16,649	6,568	10,081	23%	1,511	11,592	82%	11,037	60.7%
Courtland Canal Below Lovewell	24,486	2,899	21,587	12,764	8,823	23%	2,936	11,759	82%	12,541	51.2%

* 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

CCV and RCCV Tracking ^a												
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
Year	Start of Year RCCV	RCCV Adjustment	CCV	CCV Inflow Into HCL	RCCV Inflow Into HCL	Total CCV and RCCV Inflow Into HCL	Total CCV and RCCV Available for Release	CCV Released from HCL as Flow	CCV Released from HCL as Evaporation	CCV Retained in HCL (at End of Year)	CWSA	End of Year RCCV
	=Col 12 of previous year	b	c			= Col. 4 + Col. 5	=Col. 6 + Col. 10 of previous year			= Col. 7 – (Col. 8 + Col. 9)	=Col. 10 – Col. 10 of previous year	= Col. 1 – Col. 2 + Col. 3 - Col. 6 ^d
2007	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	8,332	0	8,332	8,332	0	0	8,332	8,332	0
2016	0	0	41,935	24,752	0	24,752	33,084	5,084	4,321	23,679	15,347	9,300
2017	9,300	0	20,000	20,000	0	20,000	43,679	20,000	2,241	21,438	-2,241	9,300
2018	9,300	0	0	0	0	0	21,438	0	1,339	20,099	-1,339	9,300
2019	9,300	0	0	0	0	0	20,099	0	2,340	17,759	-2,340	9,300
2020	9,300	1,860	0	0	0	0	17,759	0	3,889	13,870	-3,889	7,440

APV and RWS					RCCV Calc
Colorado		Nebraska			
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)
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	15,766	0	15,766	0
7,448	7,448	19,397	42,758	62,155	0
10,760	10,760	1,098	25,932	18,698	8332
10,130	10,130	499	22,803	41,935	449
11,330	11,330	4,563	11,106	20,000	0
13,578	13,578	0	0	0	0
8,905	8,905	0	0	0	0
6,218	6,218	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)					
	2016	2017	2018	2019	2020
January	5,429	11,315	4,619	13,289	55,339
February	6,532	6,369	5,521	6,875	33,332
March	6,415	6,420	7,386	61,131	33,775
April	6,625	6,933	3,658	21,669	23,421
May	13,501	33,286	2,309	66,000	31,732
June	5,901	11,956	7,601	69,761	10,810
July	4,844	24,712	3,805	118,015	30,811
August	6,153	5,874	5,065	82,834	8,337
September	9,868	3,532	23,848	30,188	3,488
October	5,278	8,752	17,603	21,527	4,298
November	5,286	2,399	9,231	59,330	7,632
December	4,685	5,575	20,216	75,757	8,265
ANNUAL	80,515	127,122	110,862	626,376	251,239
Over 400K	0	0	0	226,376	0

Sub-basin Flows Above Attachment 1 Flood Flow Thresholds					
	2016	2017	2018	2019	2020
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	15,988	0
Prairie Dog	0	0	0	25,260	0
Sub-basin Sum	0	0	0	41,248	0

5-month Consecutive Period Flows (acre-feet)					
	2016	2017	2018	2019	2020
Jan-May	38,501	64,322	23,494	168,964	177,598
Feb-Jun	38,973	64,964	26,475	225,436	133,069
Mar-Jul	37,285	83,307	24,760	336,576	130,548
Apr-Aug	37,023	82,760	22,438	358,279	105,110
May-Sep	40,266	79,359	42,628	366,798	85,177
Jun-Oct	32,043	54,825	57,922	322,325	57,743
Jul-Nov	31,428	45,268	59,552	311,894	54,566
Aug-Dec	31,269	26,132	75,962	269,636	32,020

5-month Consecutive Period Test					
	2016	2017	2018	2019	2020
Jan-May	0	0	0	0	0
Feb-Jun	0	0	0	0	0
Mar-Jul	0	0	0	1	0
Apr-Aug	0	0	0	1	0
May-Sep	0	0	0	1	0
Jun-Oct	0	0	0	0	0
Jul-Nov	0	0	0	0	0
Aug-Dec	0	0	0	0	0
TOTAL	0	0	0	3	0

2-month Consecutive Period Flows (acre-feet)					
	2016	2017	2018	2019	2020
Jan-Feb	11,960	17,683	10,140	20,164	88,671
Feb-Mar	12,946	12,789	12,907	68,006	67,107
Mar-Apr	13,039	13,353	11,045	82,800	57,195
Apr-May	20,126	40,219	5,967	87,669	55,152
May-Jun	19,402	45,242	9,910	135,761	42,541
Jun-Jul	10,744	36,668	11,406	187,776	41,621
Jul-Aug	10,996	30,586	8,870	200,849	39,148
Aug-Sep	16,020	9,406	28,912	113,022	11,825
Sep-Oct	15,146	12,283	41,451	51,715	7,786
Oct-Nov	10,564	11,151	26,834	80,857	11,930
Nov-Dec	9,971	7,974	29,447	135,087	15,898

2-month Consecutive Period Test					
	2016	2017	2018	2019	2020
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	1	0
Aug-Sep	0	0	0	0	0
Sep-Oct	0	0	0	0	0
Oct-Nov	0	0	0	0	0
Nov-Dec	0	0	0	0	0
TOTAL	0	0	0	1	0

Final Sub-basin Flood Flows					
	2016	2017	2018	2019	2020
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	15,988	0
Prairie Dog Flood Flow	0	0	0	25,260	0
Mainstem Flood Flow	0	0	0	185,128	0

Combined Test					
	2016	2017	2018	2019	2020
FINAL TOTAL	0	0	0	4	0

Draft Edit to Accounting Procedures
Proposed by Nebraska on 03/01/2021

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

Republican River Compact
Administration

ACCOUNTING PROCEDURES AND
REPORTING REQUIREMENTS

Revised August 21, 2020

Table of Contents

23
24
25 I. Introduction..... 5
26
27 II. Definitions 5
28
29 III. Basic Formulas..... 11
30 A. Calculation of Annual Virgin Water Supply 12
31 1. Sub-basin calculation 12
32 2. Main Stem Calculation..... 12
33 3. Imported Water Supply Credit Calculation 13
34 4. Augmentation Pumping Volume..... 13
35 B. Calculation of Computed Water Supply..... 13
36 1. Flood Flows..... 14
37 2. Computed Water Supply Adjustment 14
38 C. Calculation of Annual Allocations 15
39 D. Calculation of Annual Computed Beneficial Consumptive Use 15
40 1. Groundwater..... 15
41 2. Surface Water..... 16
42 E. Calculation to Determine Compact Compliance Using Five-Year Running Averages 16
43 F. Calculations To Determine Colorado’s and Kansas’s Compliance with the Sub- basin Non-
44 Impairment Requirement 17
45 G. Calculations To Determine Projected Water Supply..... 17
46 1. Procedures to Determine Water Short Years 17
47 2. Procedures to Determine 130,000 Acre Feet Projected Water Supply 18
48 H. Calculation of Computed Water Supply, Allocations and Computed Beneficial Consumptive
49 Use Above and Below Guide Rock During Water-Short Administration Years..... 18
50 I. Calculation of Imported Water Supply Credits During Water-Short Year Administration Years.
51 19
52 1. Monthly Imported Water Supply Credits..... [2019](#)
53 2. Imported Water Supply Credits Above Harlan County Dam 20
54 3. Imported Water Supply Credits Between Harlan County Dam and Guide Rock During the
55 Irrigation Season 20
56 4. Imported Water Supply Credits Between Harlan County Dam and Guide Rock During the
57 Non-Irrigation Season 21
58 5. Other Credits 22
59 J. Calculations of Compact Compliance in Water-Short Year Administration Years 22
60
61 IV. Specific Formulas 23
62 A. Computed Beneficial Consumptive Use..... 23
63 1. Computed Beneficial Consumptive Use of Groundwater..... 23
64 2. Computed Beneficial Consumptive Use of Surface Water..... 23
65 a) Non-Federal Canals..... 23
66 b) Individual Surface Water Pumps 23

67	c) Federal Canals.....	23
68	d) Non-irrigation Uses.....	24
69	e) Evaporation from Federal Reservoirs	24
70	(1) Harlan County Lake, Evaporation Calculation.....	24
71	(2) Evaporation Computations for Bureau of Reclamation Reservoirs	26
72	f) Non-Federal Reservoir Evaporation	27
73	B. Specific Formulas for Each Sub-basin and the Main Stem	28
74	1. North Fork of Republican River in Colorado	2928
75	2. Arikaree River ³	29
76	3. Buffalo Creek	30
77	4. Rock Creek.....	30
78	5. South Fork Republican River.....	3130
79	6. Frenchman Creek in Nebraska.....	31
80	7. Driftwood Creek	32
81	8. Red Willow Creek in Nebraska	32
82	9. Medicine Creek.....	33
83	10. Beaver Creek.....	34
84	11. Sappa Creek	34
85	12. Prairie Dog Creek.....	35
86	13. The North Fork of the Republican River in Nebraska and the Main Stem of the Republican	
87	River between the junction of the North Fork and the Arikaree River and the Republican River	
88	near Hardy.....	36
89		
90	V. Annual Data/ Information Requirements, Reporting, and Verification	40
91	A. Annual Reporting.....	40
92	1. Surface water diversions and irrigated acreage.....	40
93	2. Groundwater pumping and irrigated acreage.....	40
94	3. Climate information	41
95	4. Crop Irrigation Requirements	42
96	5. Streamflow Records from State-Maintained Gaging Records.....	42
97	6. Platte River Reservoirs.....	4342
98	7. Water Administration Notification	43
99	8. Moratorium	43
100	9. Non-Federal Reservoirs	44
101	10. Augmentation Projects.....	44
102	B. RRCA Groundwater Model Data Input Files	44
103	C. Inputs to RRCA Accounting.....	45
104	1. Surface Water Information.....	45
105	2. Groundwater Information	46
106	3. Summary	4746
107	D. Verification.....	47
108	1. Documentation to be Available for Inspection Upon Request	47
109	2. Site Inspection.....	47

110

111 TABLES..... 48

112 Table 1: Annual Virgin and Computed Water Supply, Allocations and Computed Beneficial

113 Consumptive Uses by State, Main Stem and Sub-basin..... 48

114 Table 2: Original Compact Virgin Water Supply and Allocations 49

115 Table 3A: Table to Be Used to Calculate Colorado's Five-Year Running Average Allocation and

116 Computed Beneficial Consumptive Use for Determining Compact Compliance for Averaging

117 Periods with No Water Short Year Designations Pursuant to Section III.J. 50

118 Table 3B. Table to Be Used to Calculate Kansas's Five-Year Running Average Allocation and

119 Computed Beneficial Consumptive Use for Determining Compact Compliance..... 50

120 Table 3C. Table to Be Used to Calculate Nebraska's Five-Year Running Average Allocation and

121 Computed Beneficial Consumptive Use for Determining Compact Compliance..... 51

122 Table 4A: Colorado Compliance with the Sub-basin Non-impairment Requirement..... 52

123 Table 4B: Kansas Compliance with the Sub-basin Non-impairment Requirement 52

124 Table 5A: Table to Be Used to Calculate Colorado's Compact Compliance for Averaging Periods

125 with Water Short Year Designations Pursuant to Section III.J. 53

126 Table 5B: Kansas Compliance During Water-Short Year Administration 54

127 Table 5C: Nebraska Compliance During Water-Short Year Administration..... 55

128 Table 5D: Nebraska Compliance Under an Alternative Water-Short Year Administration Plan... 56

129 Table 5E: Nebraska Tributary Compliance During Water-Short Year Administration..... 57

130 Table 5F: Colorado's Beaver Creek Reduction During Water-Short Years..... 58

131

132 FIGURES 59

133 Basin Map Attached to Compact that Shows the Streams and the Basin Boundaries 59

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

135 Stations 60

136 Map Showing Sub-basins, Streams, and the Basin Boundaries 61

137

138 ATTACHMENTS 62

139 Attachment 1: Sub-basin Flood Flow Thresholds 62

140 Attachment 2: Description of the Consensus Plan for Harlan County Lake 63

141 Attachment 3: Inflows to Harlan County Lake 1993 Level of Development 69

142 Attachment 4: Evaporation Loss Harlan County Lake 1993 Level of Development..... 71

143 Attachment 5: Projected Water Supply Spread Sheet Calculations 73

144 Attachment 6: Computing Water Supplies and Consumptive Use Above Guide Rock..... 75

145 Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals..... 76

146 Attachment 8: Calculation of the Computed Water Supply Adjustment and Remaining Compact

147 Compliance Volume for Implementation of 2016 RRCA Resolution 77

148 Attachment 9: “Resolution Approving Long-Term Agreements Related to the Operation of Harlan

149 County Lake for Compact Call Years”, adopted August 24, 2016 84

150 Attachment 10: “Resolution by the Republican River Compact Administration Approving

151 Operation and Accounting for the Colorado Compact Compliance Pipeline and Colorado’s

152 Compliance Efforts in the South Fork Republican River Basin”, adopted August 24, 2016..... 88

153 Attachment 11: RRCA “Resolution Approving Accounting Changes”, adopted May 25, 2017.... 94

154 **I. Introduction**

155
156 This document describes the definitions, procedures, basic formulas, specific formulas, and data
157 requirements and reporting formats to be used by the RRCA to compute the Virgin Water Supply,
158 Computed Water Supply, Allocations, Imported Water Supply Credit, Resolution Water Supply
159 Credits, and Computed Beneficial Consumptive Use. These computations shall be used to
160 determine supply, allocations, use and compliance with the Compact according to the Stipulation
161 and the attached RRCA Resolutions. These definitions, procedures, basic and specific formulas,
162 data requirements and attachments may be changed by consent of the RRCA consistent with
163 Subsection I.F of the Stipulation. This document will be referred to as the RRCA Accounting
164 Procedures. Attached to these RRCA Accounting Procedures as Figure 1 is the map attached to
165 the Compact that shows the Basin, its streams and the Basin boundaries.
166

167
168 **II. Definitions**

169
170 The following words and phrases as used in these RRCA Accounting Procedures are defined as
171 follows:
172

173 **2016 Colorado CCP/SF Resolution:** “Resolution Approving Operation and Accounting for the
174 Colorado Compact Compliance Pipeline and Colorado’s Compliance Efforts in the South Fork
175 Republican River Basin”, adopted by the RRCA on August 24, 2016;
176

177 **2016 CCY HCL Operations Resolution:** “Resolution Approving Long-Term Agreements
178 Related to the Operation of Harlan County Lake for Compact Call Years”, adopted by the RRCA
179 on August 24, 2016;
180

181 **Additional Water Administration Year:** a year when the projected or actual irrigation water
182 supply is less than 130,000 Acre-feet of storage available for use from Harlan County Lake as
183 determined by the Bureau of Reclamation using the methodology described in the Harlan County
184 Lake Operation Consensus Plan attached as Appendix K to the Stipulation;
185

186 **Allocation(s):** the water supply allocated to each State from the Computed Water Supply;
187

188 **Annual:** yearly from January 1 through December 31;
189

190 **Augmentation Pumping Volume:** The measured outflow from an augmentation project;
191

192 **Basin:** the Republican River Basin as defined in Article II of the Compact;
193

194 **Beaver Creek Reduction:** the Water Short Year reduction to Colorado’s statewide allocation. The
195 procedure to determine the Beaver Creek Reduction is set forth in III.E;
196
197

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

201
202 **Change in Federal Reservoir Storage:** the difference between the amount of water in storage in
203 the reservoir on December 31 of each year and the amount of water in storage on December 31 of
204 the previous year. The current area capacity table supplied by the appropriate federal operating
205 agency shall be used to determine the contents of the reservoir on each date;

206
207 **Colorado Resolution Water Supply Credit (CORWS Credit):** The credit provided for
208 Colorado's Compact compliance activities through augmentation pumping in conformance with the
209 2016 Colorado CCP/SF Resolution;

210
211 **Compact:** the Republican River Compact, Act of February 22, 1943, 1943 Kan. Sess. Laws 612,
212 codified at Kan. Stat. Ann. § 82a-518 (1997); Act of February 24, 1943, 1943 Neb. Laws 377,
213 codified at 2A Neb. Rev. Stat. App. § 1-106 (1995), Act of March 15, 1943, 1943 Colo. Sess.
214 Laws 362, codified at Colo. Rev. Stat. §§ 37-67-101 and 37-67-102 (2001); Republican River
215 Compact, Act of May 26, 1943, ch. 104, 57 Stat. 86;

216
217 **Compact Compliance Volume (CCV):** a volume of water, as defined under the 2016 CCY HCL
218 Operations Resolution;

219
220 **Computed Beneficial Consumptive Use:** for purposes of Compact accounting, the stream flow
221 depletion resulting from the following activities of man:

222
223 Irrigation of lands in excess of two acres;
224 Any non-irrigation diversion of more than 50 Acre-feet per year;
225 Multiple diversions of 50 Acre-feet or less that are connected or otherwise combined to
226 serve a single project will be considered as a single diversion for accounting purposes if
227 they total more than 50 Acre-feet;
228 Net evaporation from Federal Reservoirs;
229 Net evaporation from Non-federal Reservoirs within the surface boundaries of the Basin;
230 Any other activities that may be included by amendment of these formulas by the RRCA;

231
232 **Computed Water Supply:** the Virgin Water Supply less the Change in Federal Reservoir Storage
233 in any Designated Drainage Basin, plus the Computed Water Supply Adjustment (for the
234 Main Stem only), and less the Flood Flows;

235
236 **Computed Water Supply Adjustment:** an adjustment made to the Computed Water Supply of
237 the Main Stem reflecting water contributed to the Kansas Account that is not beneficially
238 consumed in the year it is provided, consistent with the terms of the 2016 CCY HCL Operations
239 Resolution;

240
241

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

245
 246 **Dewatering Well:** a Well constructed solely for the purpose of lowering the groundwater
 247 elevation;

248

249 **Federal Reservoirs:**

250

251 Bonny Reservoir

252 Swanson Lake

253 Enders Reservoir

254 Hugh Butler Lake

255 Harry Strunk Lake

256 Keith Sebelius Lake

257 Harlan County Lake

258 Lovewell Reservoir

259

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

263

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

265

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

270

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

274

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

277

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

284

285

286 **Kansas Account:** an account that shall store all Project Water made available for exclusive use
287 by Kansas Bostwick Irrigation District (KBID), and water supplies previously available to KBID
288 under Warren Act Contract(s) existing as of the date of the 2016 Colorado CCP/SF Resolution
289 and the 2016 CCY HCL Operations Resolution;
290

291 **Kansas Supplemental Account:** an account that shall store water supplies not in the Kansas
292 Account and which shall be for use outside of KBID within the state of Kansas in conformance
293 with the 2016 Colorado CCP/SF Resolution and the 2016 CCY HCL Operations Resolution;
294

295 **Main Stem:** the Designated Drainage Basin identified in Article III of the Compact as the North
296 Fork of the Republican River in Nebraska and the main stem of the Republican River between
297 the junction of the North Fork and the Arikaree River and the lowest crossing of the river at the
298 Nebraska-Kansas state line and the small tributaries thereof, and also including the drainage
299 basin Blackwood Creek;
300

301 **Main Stem Allocation:** the portion of the Computed Water Supply derived from the Main Stem
302 and the Unallocated Supply derived from the Sub-basins as shared by Kansas and Nebraska;
303

304 **Meeting(s):** a meeting of the RRCA, including any regularly scheduled annual meeting or any
305 special meeting;
306

307 **Modeling Committee:** the modeling committee established in Subsection IV.C. of the
308 Stipulation;
309

310 **Moratorium:** the prohibition and limitations on construction of new Wells in the geographic area
311 described in Section III. of the Stipulation;
312

313 **Nebraska Resolution Water Supply Credit (NERWS Credit):** The credit provided for
314 Nebraska's Compact compliance activities through augmentation pumping and other water
315 management activities in conformance with the 2016 CCY HCL Operations Resolution;
316

317 **Non-federal Reservoirs:** reservoirs other than Federal Reservoirs that have a storage capacity of
318 15 Acre-feet or greater at the principal spillway elevation;
319

320 **Northwest Kansas:** those portions of the Sub-basins within Kansas;
321

322 **Remaining Compact Compliance Volume (RCCV):** is a volume of water, as defined under the
323 2016 CCY HCL Operations Resolution;
324

325 **Replacement Well:** a Well that replaces an existing Well that a) will not be used after
326 construction of the new Well and b) will be abandoned within one year after such construction or
327 is used in a manner that is excepted from the Moratorium pursuant to Subsections III.B.1.c.-f. of
328 the Stipulation;
329

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

332
333 **RRCA Accounting Procedures:** this document and all attachments hereto;

334
335 **RRCA Groundwater Model:** the groundwater model developed under the provisions of
336 Subsection IV.C. of the Stipulation and as subsequently adopted and revised through action of the
337 RRCA;

338
339 **State:** any of the States of Colorado, Kansas, and Nebraska;

340
341 **States:** the States of Colorado, Kansas and Nebraska;

342
343 **Stipulation:** the Final Settlement Stipulation to be filed in *Kansas v. Nebraska and Colorado*, No.
344 126, Original, including all Appendices attached thereto;

345
346 **Sub-basin:** the Designated Drainage Basins, except for the Main Stem, identified in Article III of
347 the Compact. For purposes of Compact accounting the following Sub-basins will be defined as
348 described below:

349
350 North Fork of the Republican River in Colorado drainage basin is that drainage area above
351 USGS gaging station number 06823000, North Fork Republican River at the Colorado-
352 Nebraska State Line,

353
354 Arikaree River drainage basin is that drainage area above USGS gaging station number
355 06821500, Arikaree River at Haigler, Nebraska,

356
357 Buffalo Creek drainage basin is that drainage area above USGS gaging station number
358 06823500, Buffalo Creek near Haigler, Nebraska,

359
360 Rock Creek drainage basin is that drainage area above USGS gaging station number
361 06824000, Rock Creek at Parks, Nebraska,

362
363 South Fork of the Republican River drainage basin is that drainage area above USGS
364 gaging station number 06827500, South Fork Republican River near Benkelman,
365 Nebraska,

366
367 Frenchman Creek (River) drainage basin in Nebraska is that drainage area above USGS
368 gaging station number 06835500, Frenchman Creek in Culbertson, Nebraska,

369
370 Driftwood Creek drainage basin is that drainage area above USGS gaging station number
371 06836500, Driftwood Creek near McCook, Nebraska,

372
373

374 Red Willow Creek drainage basin is that drainage area above USGS gaging station number
375 06838000, Red Willow Creek near Red Willow, Nebraska,

376
377 Medicine Creek drainage basin is that drainage area above the Medicine Creek below
378 Harry Strunk Lake, State of Nebraska gaging station number 06842500; and the drainage
379 area between the gage and the confluence with the Main Stem,

380
381 Sappa Creek drainage basin is that drainage area above USGS gaging station number
382 06847500, Sappa Creek near Stamford, Nebraska and the drainage area between the gage
383 and the confluence with the Main Stem; and excluding the Beaver Creek drainage basin
384 area downstream from the State of Nebraska gaging station number 06847000 Beaver
385 Creek near Beaver City, Nebraska to the confluence with Sappa Creek,

386
387 Beaver Creek drainage basin is that drainage area above State of Nebraska gaging station
388 number 06847000, Beaver Creek near Beaver City, Nebraska, and the drainage area
389 between the gage and the confluence with Sappa Creek,

390
391 Prairie Dog Creek drainage basin is that drainage area above USGS gaging station number
392 06848500, Prairie Dog Creek near Woodruff, Kansas, and the drainage area between the
393 gage and the confluence with the Main Stem;

394
395 Attached hereto as Figure 2 is a line diagram depicting the streams, Federal Reservoirs and gaging
396 stations;

397
398 **Test hole:** a hole designed solely for the purpose of obtaining information on hydrologic and/or
399 geologic conditions;

400
401 **Trenton Dam:** a dam located at 40 degrees, 10 minutes, 10 seconds latitude and 101 degrees, 3
402 minutes, 35 seconds longitude, approximately two and one-half miles west of the town of Trenton,
403 Nebraska;

404
405 **Unallocated Supply:** the “water supplies of upstream basins otherwise unallocated” as set forth in
406 Article IV of the Compact;

407
408 **Upstream of Guide Rock, Nebraska:** those areas within the Basin lying west of a line
409 proceeding north from the Nebraska-Kansas state line and following the western edge of Webster
410 County, Township 1, Range 9, Sections 34, 27, 22, 15, 10 and 3 through Webster County,
411 Township 2, Range 9, Sections 34, 27 and 22; then proceeding west along the southern edge of
412 Webster County, Township 2, Range 9, Sections 16, 17 and 18; then proceeding north following
413 the western edge of Webster County, Township 2, Range 9, Sections 18, 7 and 6, through
414 Webster County, Township 3, Range 9, Sections 31, 30, 19, 18, 7 and 6 to its intersection with
415 the northern boundary of Webster County. Upstream of Guide Rock, Nebraska shall not include
416 that area in Kansas east of the 99° meridian and south of the Kansas-Nebraska state line;

417

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

419
420 **Water Short Year Administration:** administration in a year when the projected or actual
421 irrigation water supply is less than 119,000 acre feet of storage available for use from Harlan
422 County Lake as determined by the Bureau of Reclamation using the methodology described in the
423 Harlan County Lake Operation Consensus Plan attached as Appendix K to the Stipulation.
424

425 **Water Supply of the Basin or Water Supply within the Basin:** the stream flows within the
426 Basin, excluding Imported Water Supply;
427

428 **Well:** any structure, device or excavation for the purpose or with the effect of obtaining
429 groundwater for beneficial use from an aquifer, including wells, water wells, or groundwater
430 wells as further defined and used in each State’s laws, rules, and regulations.
431

432
433 **III. Basic Formulas**

434
435 The basic formulas for calculating Virgin Water Supply, Computed Water Supply,
436 Imported Water Supply, Allocations and Computed Beneficial Consumptive Use are set
437 forth below. The results of these calculations shall be shown in a table format as shown
438 in Table 1.
439

Basic Formulas for Calculating Virgin Water Supply, Computed Water Supply, Allocations and Computed Beneficial Consumptive Use	
Sub-basin VWS	= Gage + All CBCU + ΔS – IWS – APV*
Main Stem VWS	= Hardy Gage – Σ Sub-basin gages + All CBCU in the Main Stem + ΔS – IWS
CWS	= VWS - Δ S – FF + CWSA 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

440
441
442
443
444

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.

- 445 Abbreviations:
 446
 447 APV = Augmentation Pumping Volume
 448 CBCU = Computed Beneficial Consumptive Use
 449 FF = Flood Flows
 450 Gage = Gaged Flow
 451 IWS = Imported Water Supply Credit
 452 CWS = Computed Water Supply
 453 CWSA = Computed Water Supply Adjustment
 454 VWS = Virgin Water Supply
 455 % = the ratio used to allocate the Computed Water Supply between the States. This
 456 ratio is based on the allocations in the Compact
 457 ΔS = Change in Federal Reservoir Storage
 458

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

461
 462 **A. Calculation of Annual Virgin Water Supply**
 463

464 **1. Sub-basin calculation:**

465 The annual Virgin Water Supply for each Sub-basin will be calculated by adding:
 466 a) the annual stream flow in that Sub-basin at the Sub-basin stream gage designated
 467 in Section II., b) the annual Computed Beneficial Consumptive Use above that
 468 gaging station, and c) the Change in Federal Reservoir Storage in that Sub-basin;
 469 and from that total subtract any Imported Water Supply Credit and Augmentation
 470 Pumping Volume. The Computed Beneficial Consumptive Use will be calculated
 471 as described in Subsection III. D. Adjustments for flows diverted around stream
 472 gages and for Computed Beneficial Consumptive Uses in the Sub-basin between
 473 the Sub-basin stream gage and the confluence of the Sub-basin tributary and the
 474 Main Stem shall be made as described in Subsections III. D. 1 and 2 and IV. B.
 475

476
 477 **2. Main Stem Calculation:**

478 The annual Virgin Water Supply for the Main Stem will be calculated by adding:
 479 a) the flow at the Hardy gage minus the flows from the Sub-basin gages listed in
 480 Section II, b) the annual Computed Beneficial Consumptive Use in the Main Stem,
 481 and c) the Change in Federal Reservoir Storage from Swanson Lake and Harlan
 482 County Lake; and from that total subtract any Imported Water Supply Credit for
 483 the Main Stem. Adjustments for flows diverted around Sub-basin stream gages and
 484 for Computed Beneficial Consumptive Uses in a Sub-basin between the Sub-basin
 485 stream gage and the confluence of the Sub-basin tributary and the Mains Stem shall
 486 be made as described in Subsections III. D. 1 and 2 and IV.B.,
 487
 488

489
 490
 491
 492
 493
 494
 495
 496
 497
 498
 499
 500
 501
 502
 503
 504
 505
 506
 507
 508
 509
 510
 511
 512
 513
 514
 515
 516
 517
 518
 519
 520
 521
 522
 523
 524
 525
 526
 527
 528
 529
 530
 531
 532

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.

533
 534
 535
 536
 537
 538
 539
 540
 541
 542
 543
 544
 545
 546
 547
 548
 549
 550
 551
 552
 553
 554
 555
 556
 557
 558
 559
 560
 561
 562
 563
 564
 565

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. [A Flood Flows adjustment term will also be subtracted in the Computed Water Supply calculation between Guide Rock and Hardy.](#)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

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

³ [A method for calculating a Flood Flows adjustment term to be subtracted in the Computed Water Supply between Guide Rock and Hardy calculation in the event of Flood Flows has not yet been agreed upon for inclusion in this document.](#) 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.

566 HCL Operations Resolution. The methods used to calculate the Computed Water
567 Supply Adjustment and RCCV are contained in Attachment 8 and will be applied
568 for compliance activities initiated after October 1, 2015.

569 **C. Calculation of Annual Allocations**

570
571 Article IV of the Compact allocates 54,100 Acre-feet for Beneficial Consumptive
572 Use in Colorado, 190,300 Acre-feet for Beneficial Consumptive Use in Kansas
573 and 234,500 Acre-feet for Beneficial Consumptive Use in Nebraska. The
574 Compact provides that the Compact totals are to be derived from the sources and
575 in the amounts specified in Table 2.

576
577 The Allocations derived from each Sub-basin to each State shall be the Computed
578 Water Supply multiplied by the percentages set forth in Table 2. In addition,
579 Kansas shall receive 51.1% of the Main Stem Allocation and the Unallocated
580 Supply and Nebraska shall receive 48.9% of the Main Stem Allocation and the
581 Unallocated Supply.

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

583
584
585

586 **1. Groundwater**

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

591

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

596

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

600

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

610 Guide Rock.

611

612

613 **2. Surface Water**

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

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

630

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

633

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

641

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

648

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

653

654 If any one of the previous four accounting years or the current accounting year is a Water
655 Short Year (as defined in Section III.J.a and b), then Colorado's compliance will be
656 calculated using Table 5A. For each accounting year that is designated as a Water Short
657 Year pursuant to Section III.J, Colorado's statewide allocation will be reduced by the
658 Beaver Creek Reduction which is the average of the unused Colorado Beaver Creek Sub-
659 basin allocation for the five most-recent Water Short Year designations prior to that
660 accounting year as shown in Table 5F example. The Beaver Creek Reduction will be
661 reported in Table 5F. If the accounting year was not designated as a Water Short Year
662 then the Beaver Creek Reduction will not be applied in that year.
663

664 The amount of NERWS Credit shall be determined based on the Compact compliance
665 activities through augmentation pumping and other water management activities in
666 conformance with the 2016 CCY HCL Operations Resolution. NERWS Credit for the
667 year shall be equal to the greater of the Compact Compliance Volume and the
668 contribution from Nebraska's water management activities consistent with the 2016
669 CCY HCL Operations Resolution. NERWS Credit shall be counted as a credit/offset
670 against the Computed Beneficial Consumptive Use of water by Nebraska. NERWS
671 Credit for Nebraska augmentation activities initiated prior to October 1, 2015, will be
672 equal to the measured outflow from the augmentation projects.
673

674 **F. Calculations To Determine Colorado's and Kansas's Compliance with the** 675 **Sub-basin Non-Impairment Requirement**

676
677 The data needed to determine Colorado's and Kansas's compliance with the Sub-basin non-
678 impairment requirement in Subsection IV.B.2. of the Stipulation are shown in Tables 4.A.
679 and B.
680

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

682 683 684 **1. Procedures to Determine Water Short Years**

685 The Bureau of Reclamation will provide each of the States with a monthly or, if
686 requested by any one of the States, a more frequent update of the projected or actual
687 irrigation supply from Harlan County Lake for that irrigation season using the
688 methodology described in the Harlan County Lake Operation Consensus Plan,
689 attached as Appendix K to the Stipulation. The steps for the calculation are as
690 follows:
691

692 Step 1. At the beginning of the calculation month (1) the total projected inflow
693 for the calculation month and each succeeding month through the end of May
694 shall be added to the previous end of month Harlan County Lake content and (2)
695 the total projected 1993 level evaporation loss for the calculation month and each
696 succeeding month through the end of May shall then be subtracted. The total
697 projected inflow shall be the 1993 level average monthly inflow or the running

698 average monthly inflow for the previous five years, whichever is less.

699
 700 Step 2. Determine the maximum irrigation water available by subtracting the
 701 sediment pool storage (currently 164,111 Acre-feet) and adding the summer
 702 sediment pool evaporation (20,000 Acre-feet) to the result from Step 1.

703
 704 Step 3. For October through January calculations, take the result from Step 2 and
 705 using the Shared Shortage Adjustment Table in Attachment 2 hereto, determine the
 706 preliminary irrigation water available for release. The calculation using the end of
 707 December content (January calculation month) indicates the minimum amount of
 708 irrigation water available for release at the end of May. For February through June
 709 calculations, subtract the maximum irrigation water available for the January
 710 calculation month from the maximum irrigation water available for the calculation
 711 month. If the result is negative, the irrigation water available for release (January
 712 calculation month) stays the same. If the result is positive the preliminary irrigation
 713 water available for release (January calculation month) is increased by the positive
 714 amount.

715
 716 Step 4. Compare the result from Step 3 to 119,000 Acre-feet. If the result from
 717 Step 3 is less than 119,000 Acre-feet Water Short Year Administration is in
 718 effect.

719
 720 Step 5. The final annual Water-Short Year Administration calculation determines
 721 the total estimated irrigation supply at the end of June (calculated in July). Use
 722 the result from Step 3 for the end of May irrigation release estimate, add the June
 723 computed inflow to Harlan County Lake and subtract the June computed gross
 724 evaporation loss from Harlan County Lake.

725
 726
 727 **2. Procedures to Determine 130,000 Acre Feet Projected Water Supply**
 728 To determine the preliminary irrigation supply for the October through June
 729 calculation months, follow the procedure described in steps 1 through 4 of the
 730 “Procedures to determine Water Short Years” Subsection III. G. 1. The result from
 731 step 4 provides the forecasted water supply, which is compared to 130,000 Acre-
 732 feet. For the July through September calculation months, use the previous end of
 733 calculation month preliminary irrigation supply, add the previous month’s Harlan
 734 County Lake computed inflow and subtract the previous month’s computed gross
 735 evaporation loss from Harlan County Lake to determine the current preliminary
 736 irrigation supply. The result is compared to 130,000 Acre-feet.

737
 738
 739 **H. Calculation of Computed Water Supply, Allocations and Computed Beneficial**
 740 **Consumptive Use Above and Below Guide Rock During Water-Short**
 741 **Administration Years.**

742
743 For Water-Short-Administration Years, in addition to the normal calculations, the
744 Computed Water Supply, Allocations, Computed Beneficial Consumptive Use, NERWS
745 Credit, and Imported Water Supply Credits shall also be calculated above Guide Rock as
746 shown in Table 5C. These calculations shall be done in the same manner as in non-
747 Water-Short Administration years except that water supplies originating below Guide
748 Rock shall not be included in the calculations of water supplies originating above Guide
749 Rock. The calculations of Computed Beneficial Consumptive Uses shall be also done in
750 the same manner as in non-Water-Short Administration years except that Computed
751 Beneficial Consumptive Uses from diversions below Guide Rock shall not be included.
752 The depletions from the water diverted by the Superior and Courtland Canals at the
753 Superior- Courtland Diversion Dam shall be included in the calculations of Computed
754 Beneficial Consumptive Use above Guide Rock. Imported Water Supply Credits above
755 Guide Rock, as described in Sub-section III.I., may be used as offsets against the
756 Computed Beneficial Consumptive Use above Guide Rock by the State providing the
757 Imported Water Supply Credits.
758

759 The Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy
760 gage shall be determined by taking the difference in stream flow at Hardy and Guide Rock,
761 adding Computed Beneficial Consumptive Uses in the reach (this does not include the
762 Computed Beneficial Consumptive Use from the Superior and Courtland Canal diversions),
763 ~~and~~ subtracting return flows from the Superior and Courtland Canals in the reach, and
764 subtracting the Flood Flow adjustment for the Main Stem between Guide Rock and Hardy.⁴
765 The Computed Water Supply above Guide Rock shall be determined by subtracting the
766 Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage
767 from the total Computed Water Supply.⁵ Nebraska's Allocation above Guide Rock shall be
768 determined by subtracting 48.9% of the Computed Water Supply of the Main Stem reach
769 between Guide Rock and the Hardy gage from Nebraska's total Allocation. Nebraska's
770 Computed Beneficial Consumptive Uses above Guide Rock shall be determined by
771 subtracting Nebraska's Computed Beneficial Consumptive Uses below Guide Rock from
772 Nebraska's total Computed Beneficial Consumptive Use.
773

774 **I. Calculation of Imported Water Supply Credits During Water-Short** 775 **Year Administration Years.** 776

777 Imported Water Supply Credit during Water-Short Year Administration years shall be
778 calculated consistent with Subsection V.B.2.b. of the Stipulation.
779

⁴ A method for calculating a Flood Flows adjustment term to be subtracted in the Computed Water Supply between Guide Rock and Hardy calculation in the event of Flood Flows has not yet been agreed upon for inclusion in this document.

⁵ 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.

780 The following methodology shall be used to determine the extent to which Imported Water
781 Supply Credit, as calculated by the RRCA Groundwater Model, can be credited to the State
782 importing the water during Water-Short Year Administration years.
783

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

785 The RRCA Groundwater Model will be used to determine monthly Imported
786 Water Supply Credits by State in each Sub-basin and for the Main Stem. The
787 values for each Sub-basin will include all depletions and accretions upstream of
788 the confluence with the Main Stem. The values for the Main Stem will include all
789 depletions and accretions in stream reaches not otherwise accounted for in a Sub-
790 basin. The values for the Main Stem will be computed separately for the reach 1)
791 above Harlan County Dam, 2) between Harlan County Dam and Guide Rock, and
792 3) between Guide Rock and the Hardy gage. The Imported Water Supply Credit
793 shall be the difference in stream flow for two runs of the model: a) the “base” run
794 and b) the “no State import” run.
795

796
797 During Water-Short Year Administration years, Nebraska’s credits in the Sub-
798 basins shall be determined as described in Section III. A. 3.
799

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

801 Nebraska's Imported Water Supply Credits above Harlan County Dam shall be the
802 sum of all the credits in the Sub-basins and the Main Stem above Harlan County
803 Dam.
804

805 **3. Imported Water Supply Credits Between Harlan County Dam and** 806 **Guide Rock During the Irrigation Season**

807
808
809
810 a. During Water-Short Year Administration years, monthly credits in the
811 reach between Harlan County Dam and Guide Rock shall be determined
812 as the differences in the stream flows between the two runs at Guide
813 Rock.
814

815 b. The irrigation season shall be defined as starting on the first day of
816 release of water from Harlan County Lake for irrigation use and ending on
817 the last day of release of water from Harlan County Lake for irrigation
818 use.
819

820 c. Credit as an offset for a State's Computed Beneficial Consumptive Use
821 above Guide Rock will be given to all the Imported Water Supply accruing
822 in the reach between Harlan County Dam and Guide Rock during the
823 irrigation season. If the period of the irrigation season does not coincide

824 with the period of modeled flows, the amount of the Imported Water
 825 Supply credited during the irrigation season for that month shall be the total
 826 monthly modeled Imported Water Supply Credit times the number of days
 827 in the month occurring during the irrigation season divided by the total
 828 number of days in the month.

829
 830
 831 **4. Imported Water Supply Credits Between Harlan County Dam and**
 832 **Guide Rock During the Non-Irrigation Season**

833
 834 a. Imported Water Supply Credit shall be given between Harlan County
 835 Dam and Guide Rock during the period that flows are diverted to fill
 836 Lovewell Reservoir to the extent that imported water was needed to
 837 meet Lovewell Reservoir target elevations.

838
 839 b. Fall and spring fill periods shall be established during which credit shall
 840 be given for the Imported Water Supply Credit accruing in the reach. The
 841 fall period shall extend from the end of the irrigation season to December 1.
 842 The spring period shall extend from March 1 to May 31. The Lovewell
 843 target elevations for these fill periods are the projected end of November
 844 reservoir level and the projected end of May reservoir level for most
 845 probable inflow conditions as indicated in Table 4 in the current Annual
 846 Operating Plan prepared by the Bureau of Reclamation.

847
 848 c. The amount of water needed to fill Lovewell Reservoir for each period
 849 shall be calculated as the storage content of the reservoir at its target
 850 elevation at the end of the fill period minus the reservoir content at the
 851 start of the fill period plus the amount of net evaporation during this
 852 period minus White Rock Creek inflows for the same period.

853
 854 d. If the fill period as defined above does not coincide with the period of
 855 modeled flows, the amount of the Imported Water Supply Credit during the
 856 fill period for that month shall be the total monthly modeled Imported
 857 Water Supply Credit times the number of days in the month occurring
 858 during the fill season divided by the total number of days in the month.

859
 860 e. The amount of non-imported water available to fill Lovewell Reservoir to
 861 the target elevation shall be the amount of water available at Guide Rock
 862 during the fill period minus the amount of the Imported Water Supply
 863 Credit accruing in the reach during the same period.

864
 865 f. The amount of the Imported Water Supply Credit that shall be credited
 866 against a State's Consumptive Use shall be the amount of water imported by
 867 that State that is available in the reach during the fill period or the amount

868 of water needed to reach Lovewell Reservoir target elevations minus the
 869 amount of non-imported water available during the fill period, whichever is
 870 less.

871
 872
 873
 874
 875
 876
 877
 878
 879

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

880
 881
 882 During Water-Short Year Administration, using the procedures described in Subsections
 883 III.A-D, the RRCA will calculate the Annual Allocations for each State, the Computed
 884 Beneficial Consumptive Use by each State, and Imported Water Supply Credit and RWS
 885 Credits that a State may use to offset Computed Beneficial Consumptive Use in that year.
 886 The resulting annual and average values will be calculated as displayed in Tables 5 A-C
 887 and E.

888 The compliance tests outlined in Tables 5B – 5E shall not apply when on or before June
 889 30:

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

897
 898 For the State of Colorado, if the current accounting year or any one of the previous four
 899 years is designated as a Water Short Year based on the criteria in Section III.J.a or b
 900 above, then Colorado’s compliance will be calculated using Table 5A. The methods used
 901 to implement the Table 5A calculations will be in conformance with Section III.E.

902
 903 If Nebraska is implementing an Alternative Water-Short-Year Administration Plan, data
 904 to determine Compact compliance will be shown in Table 5D. Nebraska’s compliance
 905 with the Compact will be determined in the same manner as Nebraska’s Above Guide
 906 Rock compliance except that compliance will be based on a three-year running average
 907 of the current year and previous two year calculations. In addition, Table 5 D. will
 908 display the sum of the previous two-year difference in Allocations above Guide Rock and
 909 Computed Beneficial Consumptive Uses above Guide Rock minus any Imported Water
 910 Credits and compare the result with the Alternative Water-Short-Year Administration
 911 Plan’s expected decrease in Computed Beneficial Consumptive Use above Guide Rock.

912 Nebraska will be within compliance with the Compact as long as the three-year running
913 average difference in Column 8 is positive and the sum of the previous year and current
914 year deficits above Guide Rock are not greater than the expected decrease in Computed
915 Beneficial Consumptive Use under the plan.
916
917
918

919 **IV. Specific Formulas**

920
921 **A. Computed Beneficial Consumptive Use**

922
923
924 **1. Computed Beneficial Consumptive Use of Groundwater:**

925 The Computed Beneficial Consumptive Use caused by groundwater diversion
926 shall be determined by the RRCA Groundwater Model as described in Subsection
927 III.D.1.
928
929

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

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

933 a) Non-Federal Canals

934 Computed Beneficial Consumptive Use from diversions by non- federal
935 canals shall be 60 percent of the diversion; the return flow shall be 40
936 percent of the diversion
937
938

939 b) Individual Surface Water Pumps

940 Computed Beneficial Consumptive Use from small individual surface
941 water pumps shall be 75 percent of the diversion; return flows will be 25
942 percent of the diversion unless a state provides data on the amount of
943 different system types in a Sub-basin, in which case the following
944 percentages will be used for each system type:
945

946	Gravity Flow	30%
947	Center Pivot	17%
948	LEPA	10%

949
950
951 c) Federal Canals

952 Computed Beneficial Consumptive Use of diversions by Federal canals
953 will be calculated as shown in Attachment 7. For each Bureau of
954 Reclamation Canal the field deliveries shall be subtracted from the
955 diversion from the river to determine the canal losses. The field delivery

956 shall be multiplied by one minus an average system efficiency for the
 957 district to determine the loss of water from the field. Eighty-two percent
 958 of the sum of the field loss plus the canal loss shall be considered to be
 959 the return flow from the canal diversion for diversions occurring during
 960 the irrigation season (May-September). For recharge diversions
 961 occurring during the non-irrigation season (October-April), 92 percent
 962 of the sum of the field loss plus the canal loss shall be considered to be
 963 the return flow from the canal diversion. The assumed field efficiencies
 964 and the amount of the field and canal loss that reaches the stream may be
 965 reviewed by the RRCA and adjusted as appropriate to insure their
 966 accuracy.

967
 968
 969 d) Non-irrigation Uses

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

976
 977
 978 e) Evaporation from Federal Reservoirs

979 Net Evaporation from Federal Reservoirs will be calculated as follows:
 980

981
 982 (1) Harlan County Lake, Evaporation Calculation

983
 984 April 1 through October 31:

985
 986 Evaporation from Harlan County Lake is calculated by the Corps of
 987 Engineers on a daily basis from April 1 through October 31. Daily
 988 readings are taken from a Class A evaporation pan maintained near
 989 the project office. Any precipitation recorded at the project office is
 990 added to the pan reading to obtain the actual evaporation amount.

991 The pan value is multiplied by a pan coefficient that varies by
 992 month. These values are:

993

March	.56
April	.52
May	.53
June	.60
July	.68
August	.78

September .91
October 1.01

994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015

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

1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026

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

1027 is subtracted from the monthly gross evaporation. The monthly
 1028 precipitation is calculated by multiplying the sum of the month's
 1029 daily precipitation in inches by the average of the end of the month
 1030 lake surface area for the previous month and the end of the month
 1031 lake surface area for the current month in acres and dividing the
 1032 result by 12 to obtain the precipitation for the month in acre feet.

1033
 1034 Kansas supplemental accounts established within Harlan County
 1035 Lake, as defined in the 2016 CCY HCL Operations Resolution, will
 1036 be charged annual net evaporation in an amount proportional to the
 1037 relative contents of the supplemental account compared to the total
 1038 irrigation supply.

1039
 1040 The remaining annual net evaporation (Acre-feet) will be charged to
 1041 Kansas and Nebraska in proportion to the annual diversions made
 1042 by the Kansas Bostwick Irrigation District and the Nebraska
 1043 Bostwick Irrigation District during the time period each year when
 1044 irrigation releases are being made from Harlan County Lake. For
 1045 any year in which no irrigation releases were made from Harlan
 1046 County Lake, the annual net evaporation charged to Kansas and
 1047 Nebraska will be based on the average of the above calculation for
 1048 the most recent three years in which irrigation releases from Harlan
 1049 County Lake were made. In the event Nebraska chooses to
 1050 substitute supply for the Superior Canal from Nebraska's allocation
 1051 below Guide Rock in Water-Short Year Administration years, the
 1052 amount of the substitute supply will be included in the calculation of
 1053 the split as if it had been diverted to the Superior Canal at Guide
 1054 Rock.

- 1055
 1056
 1057 (2) Evaporation Computations for Bureau of Reclamation Reservoirs
 1058 The Bureau of Reclamation computes the amount of evaporation
 1059 loss on a monthly basis at Reclamation reservoirs. The following
 1060 procedure is utilized in calculating the loss in Acre-feet.

1061
 1062 An evaporation pan reading is taken each day at the dam site. This
 1063 measurement is the amount of water lost from the pan over a 24-hour
 1064 period in inches. The evaporation pan reading is adjusted for any
 1065 precipitation recorded during the 24-hour period. Instructions for
 1066 determining the daily pan evaporation are found in the "National
 1067 Weather Service Observing Handbook No. 2 – Substation
 1068 Observations." All dams located in the Kansas River Basin with the
 1069 exception of Bonny Dam are National Weather Service Cooperative
 1070 Observers. The daily evaporation pan readings are totaled at the end

1071 of each month and converted to a “free water surface” (FWS)
1072 evaporation, also referred to as “lake” evaporation. The FWS
1073 evaporation is determined by multiplying the observed pan
1074 evaporation by a coefficient of .70 at each of the reservoirs. This
1075 coefficient can be affected by several factors including water and air
1076 temperatures. The National Oceanic and Atmospheric
1077 Administration (NOAA) has published technical reports describing
1078 the determination of pan coefficients. The coefficient used is taken
1079 from the “NOAA Technical Report NWS 33, Map of coefficients to
1080 convert class A pan evaporation to free water surface evaporation”.
1081 This coefficient is used for the months of April through October
1082 when evaporation pan readings are recorded at the dams. The
1083 monthly FWS evaporation is then multiplied by the average surface
1084 area of the reservoir during the month in acres. Dividing this value
1085 by twelve will result in the amount of water lost to evaporation in
1086 Acre-feet during the month.

1087
1088 During the winter months when the evaporation pan readings are
1089 not taken, monthly evaporation tables based on the percent of ice
1090 cover are used. The tables used were developed by the Corps of
1091 Engineers and were based on historical average evaporation rates. A
1092 separate table was developed for each of the reservoirs. The
1093 monthly evaporation rates are multiplied by the .70 coefficient for
1094 pan to free water surface adjustment, divided by twelve to convert
1095 inches to feet and multiplied by the average reservoir surface area
1096 during the month in acres to obtain the total monthly evaporation
1097 loss in Acre- feet.

1098
1099 To obtain the net evaporation, the monthly precipitation on the lake
1100 is subtracted from the monthly gross evaporation. The monthly
1101 precipitation is calculated by multiplying the sum of the month's
1102 daily precipitation in inches by the average of the end of the month
1103 lake surface area for the previous month and the end of the month
1104 lake surface area for the current month in acres and dividing the
1105 result by 12 to obtain the precipitation for the month in acre feet.

1106
1107

1108 f) Non-Federal Reservoir Evaporation:

1109

1110 For Non-Federal Reservoirs with a storage capacity less than 200 Acre-feet,
1111 the presumptive average annual surface area is 25% of the area at the
1112 principal spillway elevation. Net evaporation for each such Non-Federal
1113 Reservoir will be calculated by multiplying the presumptive average annual
1114 surface area by the net evaporation from the nearest climate and evaporation

1115 station to the Non-Federal Reservoir. A State may provide actual data in lieu
 1116 of the presumptive criteria.

1117
 1118 Net evaporation from Non-Federal Reservoirs with 200 Acre-feet of
 1119 storage or greater will be calculated by multiplying the average annual
 1120 surface area (obtained from the area-capacity survey) and the net
 1121 evaporation from the nearest evaporation and climate station to the
 1122 reservoir. If the average annual surface area is not available, the Non-
 1123 Federal Reservoirs with 200 Acre-feet of storage or greater will be
 1124 presumed to be full at the principal spillway elevation.
 1125
 1126

1127 **B. Specific Formulas for Each Sub-basin and the Main Stem**

1128
 1129 All calculations shall be based on the calendar year and shall be rounded to the nearest 10
 1130 Acre-feet using the conventional rounding formula of rounding up for all numbers equal
 1131 to five or higher and otherwise rounding down.
 1132

1133 Abbreviations:

- 1134 APV = Augmentation Pumping Volume
- 1135 CBCU = Computed Beneficial Consumptive
- 1136 Use CWS = Computed Water Supply
- 1137 CWSA = Computed Water Supply Adjustment
- 1138 D = Non-Federal Canal Diversions for Irrigation
- 1139 Ev = Evaporation from Federal Reservoirs
- 1140 EvNFR = Evaporation from Non-Federal Reservoirs
- 1141 FF = Flood Flow
- 1142 GW = Groundwater Computed Beneficial Consumptive Use (includes
 1143 irrigation and non-irrigation uses)
- 1144 IWS = Imported Water Supply Credit from Nebraska
- 1145 M&I = Non-Irrigation Surface Water Diversions (Municipal and Industrial)
- 1146 P = Small Individual Surface Water Pump Diversions for Irrigation
- 1147 RF = Return Flow
- 1148 VWS = Virgin Water Supply
- 1149 c = Colorado
- 1150 k = Kansas
- 1151 n = Nebraska
- 1152 ΔS = Change in Federal Reservoir Storage
- 1153 % = Average system efficiency for individual pumps in the Sub-basin
- 1154 % BRF = Percent of Diversion from Bureau Canals that returns to the stream
- 1155 ### = Value expected to be zero

1156
 1157

1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198

1. North Fork of Republican River in Colorado⁶

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

CBCU Kansas = GW_k

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

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

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

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

CWS = $VWS - FF$

Allocation Colorado = $0.224 \times CWS$

Allocation Nebraska = $0.246 \times CWS$

Unallocated = $0.53 \times CWS$

2. Arikaree River^{6S}

CBCU Colorado = $0.6 \times D_c + \% \times P_c + 0.5 \times M\&I_c + EvNFR_c + GW_c$

CBCU Kansas = $0.6 \times D_k + \% \times P_k + 0.5 \times M\&I_k + EvNFR_k + GW_k$

CBCU Nebraska = $0.6 \times D_n + \% \times P_n + 0.5 \times M\&I_n + EvNFR_n + GW_n$

VWS = $\text{Arikaree Gage at Haigler Stn. No. 06821500} + CBCU_c + CBCU_k + CBCU_n - IWS$

CWS = $VWS - FF$

Allocation Colorado = $0.785 \times CWS$

⁶ 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.

1199		
1200	Allocation Kansas	= 0.051 x CWS
1201		
1202	Allocation Nebraska	= 0.168 x CWS
1203		
1204	Unallocated	= -0.004 x CWS
1205		
1206		
1207	3. Buffalo Creek	
1208		
1209	CBCU Colorado	= 0.6 x Dc + % x Pc + 0.5 x M&In + EvNFRc
1210		+ GWc
1211		
1212	CBCU Kansas	= GWk
1213		
1214	CBCU Nebraska	= 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn
1215		
1216	VWS	= Buffalo Creek near Haigler Gage Stn. No. 06823500
1217		+ CBCUc + CBCUk + CBCUn – IWS
1218		
1219	CWS	= VWS - FF
1220	Allocation Nebraska	= 0.330 x CWS
1221		
1222	Unallocated	= 0.670 x CWS
1223		
1224		
1225	4. Rock Creek	
1226		
1227	CBCU Colorado	= GWc
1228		
1229	CBCU Kansas	= GWk
1230		
1231	CBCU Nebraska	= 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn
1232		
1233	VWS	= Rock Creek at Parks Gage Stn. No. 06824000 + CBCUc
1234		+ CBCUk + CBCUn – IWS – APV
1235		
1236	CWS	= VWS – FF
1237		
1238	Allocation Nebraska	= 0.400 x CWS
1239		
1240	Unallocated	= 0.600 x CWS
1241		
1242		

1243	5. South Fork Republican River	
1244		
1245	CBCU Colorado	= 0.6 x Hale Ditch Diversion + 0.6 x Dc + % x Pc
1246		+ 0.5 x M&Ic + EvNFRc + Bonny Reservoir Ev + GWc
1247		
1248	CBCU Kansas	= 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + GWk
1249		
1250	CBCU Nebraska	= 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn
1251		
1252	VWS	= South Fork Republican River near Benkelman Gage
1253		Stn. No. 06827500 + CBCUc + CBCUk + CBCUn
1254		+ ΔS Bonny Reservoir – IWS
1255		
1256	CWS	= VWS - ΔS Bonny Reservoir - FF
1257		
1258	Allocation Colorado	= 0.444 x CWS
1259		
1260	Allocation Kansas	= 0.402 x CWS
1261		
1262	Allocation Nebraska	= 0.014 x CWS
1263		
1264	Unallocated	= 0.140 x CWS
1265		
1266		
1267	6. Frenchman Creek in Nebraska	
1268		
1269	CBCU Colorado	= GWc
1270		
1271	CBCU Kansas	= GWk
1272		
1273	CBCU Nebraska	= Culbertson Canal Diversions (IRR Season) x (1-%BRF)
1274		+ Culbertson Canal Diversions (Non-IRR Season) x (1-
1275		92%) + Culbertson Extension (IRR Season) x (1-%BRF)
1276		+ Culbertson Extension (Non-IRR Season) x (1-92%)
1277		+ 0.6 x Champion Canal Diversion + 0.6 x Riverside Canal
1278		Diversion + 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn
1279		+ Enders Reservoir Ev + GWn
1280		
1281	VWS	= Frenchman Creek in Culbertson, Nebraska Gage Stn. No.
1282		06835500 + CBCUc + CBCUk + CBCUn
1283		+ 0.17 x Culbertson Diversion RF + Culbertson Extension RF
1284		+ 0.78 x Riverside Diversion RF + ΔS Enders Reservoir –
1285		IWS
1286		

1287 Note: 17% of the Culbertson Diversion RF and 100% of the
1288 Culbertson Extension RF return to the Main Stem

1289
1290 CWS = VWS - ΔS Enders Reservoir – FF

1291
1292 Allocation Nebraska = 0.536 x CWS

1293
1294 Unallocated = 0.464 x CWS

1295 **7. Driftwood Creek**

1296
1297 CBCU Colorado = GWc

1298
1299 CBCU Kansas = 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + GWk

1300
1301 CBCU Nebraska = 0.6 x Dn + % x Pn + 0.5 x M&In + EvNFRn + GWn

1302
1303 VWS = Driftwood Creek near McCook Gage Stn. No. 06836500
1304 + CBCUc + CBCUk + CBCUn
1305 – 0.24 x Meeker Driftwood Canal RF - IWS

1306
1307 Note: 24 % of the Meeker Driftwood Canal RF returns to
1308 Driftwood Creek

1309
1310 CWS = VWS – FF

1311
1312 Allocation Kansas = 0.069 x CWS

1313
1314 Allocation Nebraska = 0.164 x CWS

1315
1316 Unallocated = 0.767 x CWS

1317
1318
1319 **8. Red Willow Creek in Nebraska**

1320
1321 CBCU Colorado = GWc

1322
1323 CBCU Kansas = GWk

1324
1325 CBCU Nebraska = 0.1 x Red Willow Canal CBCU + 0.6 x Dn + % x Pn
1326 + 0.5 x M&In + EvNFRn + 0.1 x Hugh Butler Lake Ev
1327 + GWn

1328
1329 Note:
1330 Red Willow Canal CBCU = Red Willow Canal Diversion

1331		(IRR Season) x (1- % BRF) + Red Willow Canal Diversion
1332		(Non-IRR Season) x (1-92%)
1333		
1334		90% of the Red Willow Canal CBCU and 90% of Hugh
1335		Butler Lake Ev charged to Nebraska’s CBCU in the Main
1336		Stem
1337		
1338	VWS	= Red Willow Creek near Red Willow Gage Stn. No.
1339		06838000 + CBCUc + CBCUk + CBCUn + 0.9 x Red
1340		Willow Canal CBCU + 0.9 x Hugh Butler Lake Ev + 0.9 x
1341		Red Willow Canal RF+ ΔS Hugh Butler Lake – IWS
1342		
1343		Note: 90% of the Red Willow Canal RF returns to the
1344		Main Stem
1345		
1346	CWS	= VWS - ΔS Hugh Butler Lake - FF
1347		
1348	Allocation Nebraska	= 0.192 x CWS
1349		
1350	Unallocated	= 0.808 x CWS
1351		
1352		
1353		9. Medicine Creek
1354		
1355	CBCU Colorado	= GWc
1356		
1357	CBCU Kansas	= GWk
1358		
1359	CBCU Nebraska	= 0.6 x Dn above and below gage + % x Pn above and below
1360		gage + 0.5 x M&In above and below gage + EvNFRn above
1361		and below gage + GWn
1362		
1363		Notes: Harry Strunk Lake Ev charged to Nebraska’s
1364		CBCU in the Main Stem.
1365		
1366		CU from Harry Strunk releases in the Cambridge Canal is
1367		charged to the Main stem (no adjustment to the VWS
1368		formula is needed as this water shows up in the Medicine
1369		Creek gage).
1370		
1371	VWS	= Medicine Creek below Harry Strunk Lake Gage Stn. No.
1372		06842500 + CBCUc + CBCUk + CBCUn – 0.6 x Dn below
1373		gage - % x Pn below gage – 0.5 * M&In below gage
1374		- EvNFRn below gage + Harry Strunk Lake Ev + ΔS Harry

1375		Strunk Lake – IWS – APV
1376		
1377		Note: The CBCU surface water terms for Nebraska which
1378		occur below the gage are added in the VWS for the Main
1379		Stem
1380		
1381	CWS	= VWS - ΔS Harry Strunk Lake - FF
1382		
1383	Allocation Nebraska	= 0.091 x CWS
1384		
1385	Unallocated	= 0.909 x CWS
1386		
1387		
1388		10. Beaver Creek
1389		
1390	CBCU Colorado	= 0.6 x Dc + % x Pc + 0.5 x M&Ic + EvNFRc + GWc
1391		
1392	CBCU Kansas	= 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + GWk
1393		
1394	CBCU Nebraska	= 0.6 x Dn above and below gage + % x Pn above and
1395		below gage + 0.5 x M&In above and below gage
1396		+ EvNFRn above and below gage + GWn
1397		
1398	VWS	= Beaver Creek near Beaver City gage Stn. No. 06847000 +
1399		BCUc + CBCUk + CBCUn – 0.6 x Dn below gage - % x Pn
1400		below gage – 0.5 * M&In below gage - EvNFRn below
1401		gage – IWS
1402		
1403		Note: The CBCU surface water terms for Nebraska which
1404		occur below the gage are added in the VWS for the Main
1405		Stem
1406		
1407	CWS	= VWS – FF
1408		
1409	Allocation Colorado	= 0.200 x CWS
1410		
1411	Allocation Kansas	= 0.388 x CWS
1412		
1413	Allocation Nebraska	= 0.406 x CWS
1414		
1415	Unallocated	= 0.006 x CWS
1416		
1417		
1418		11. Sappa Creek

1419		
1420	CBCU Colorado	= GWc
1421		
1422	CBCU Kansas	= 0.6 x Dk + % x Pk + 0.5 x M&Ik + EvNFRk + GWk
1423		
1424	CBCU Nebraska	= 0.6 x Dn above and below gage + % x Pn above and
1425		below gage + 0.5 x M&In above and below gage
1426		+ EvNFRn above and below gage + GWn
1427		
1428	VWS	= Sappa Creek near Stamford gage Stn. No. 06847500
1429		- Beaver Creek near Beaver City gage Stn. No. 06847000
1430		+ CBCUc + CBCUk + CBCUn - 0.6 x Dn below gage
1431		- % x Pn below gage - 0.5 * M&In below gage - EvNFRn
1432		below gage - IWS
1433		
1434		Note: The CBCU surface water terms for Nebraska which
1435		occur below the gage are added in the VWS for the Main Stem.
1436	CWS	= VWS - FF
1437		
1438	Allocation Kansas	= 0.411 x CWS
1439		
1440	Allocation Nebraska	= 0.411 x CWS
1441		
1442	Unallocated	= 0.178 x CWS
1443		
1444		
1445	12. Prairie Dog Creek	
1446		
1447	CBCU Colorado	= GWc
1448		
1449	CBCU Kansas	= Almena Canal Diversion x (1-%BRF) + 0.6 x Dk + % x Pk
1450		+ 0.5 x M&Ik + EvNFRk + Keith Sebelius Lake Ev + GWk
1451		
1452	CBCU Nebraska	= 0.6 x Dn below gage + % x Pn below gage + 0.5 x
1453		M&In below gage + EvNFRn + GWn below gage
1454		
1455	VWS	= Prairie Dog Creek near Woodruff, Kansas USGS Stn. No.
1456		06848500 + CBCUc + CBCUk + CBCUn - 0.6 x Dn below
1457		gage - % x Pn below gage - 0.5 x M&In below gage -
1458		EvNFRn below gage + ΔS Keith Sebelius Lake - IWS
1459		
1460		Note: The CBCU surface water terms for Nebraska which
1461		occur below the gage are added in the VWS for the Main
1462		Stem

1463		
1464	CWS	= VWS - ΔS Keith Sebelius Lake - FF
1465		
1466	Allocation Kansas	= 0.457 x CSW
1467		
1468	Allocation Nebraska	= 0.076 x CWS
1469		
1470	Unallocated	= 0.467 x CWS
1471	13. The North Fork of the Republican River in Nebraska and the Main	
1472	Stem of the Republican River between the junction of the North Fork and	
1473	the Arikaree River and the Republican River near Hardy	
1474		
1475	CBCU Colorado	= GWc
1476		
1477		
1478	CBCU Kansas	=
1479		(Deliveries from the Courtland Canal to Kansas above
1480		Lovewell) x (1-%BRF)
1481		+ Amount of transportation loss of Courtland Canal
1482		deliveries to Lovewell that does not return to the river,
1483		charged to Kansas
1484		+ (Diversion of Republican River water from Lovewell
1485		Reservoir by the Courtland Canal below Lovewell)
1486		x (1-%BRF)
1487		+ 0.6 x Dk
1488		+ % x Pk
1489		+ 0.5 x M&Ik
1490		+ EvNFRk
1491		+ Harlan County Lake Ev charged to Kansas
1492		+ Lovewell Reservoir Ev charged to the Republican River
1493		+ GWk
1494		
1495	CBCU Nebraska	=
1496		Deliveries from Courtland Canal to Nebraska lands x (1-
1497		%BRF)
1498		+ Superior Canal (IRR Season) x (1- %BRF) + Superior Canal
1499		(Non-IRR Season) x (1 - 92%)
1500		+ Franklin Pump Canal (IRR Season) x (1- %BRF) +
1501		Franklin Pump Canal (Non-IRR Season) x (1 - 92 %)
1502		+ Franklin Canal (IRR Season) x (1- %BRF) + Franklin Canal
1503		(Non-IRR Season) x (1 - 92%)
1504		+ Naponee Canal (IRR Season) x (1- %BRF) + Naponee
1505		Canal (Non-IRR Season) x (1 - 92%)
1506		+ Cambridge Canal (IRR Season) x (1- %BRF) + Cambridge

1507 Canal (Non-IRR Season) x (1 - 92%)
 1508 + Bartley Canal (IRR Season) x (1- %BRF) + Bartley Canal
 1509 (Non-IRR Season) x (1 - 92%)
 1510 + Meeker-Driftwood Canal (IRR Season) x (1- %BRF) +
 1511 Meeker-Driftwood Canal (Non-IRR Season) x (1- 92%)
 1512 + 0.9 x Red Willow Canal CBCU
 1513 + 0.6 x Dn
 1514 + % x Pn
 1515 + 0.5 x M&In
 1516 + EvNFRn
 1517 + 0.9 x Hugh Butler Lake Ev
 1518 + Harry Strunk Lake Ev
 1519 + Swanson Lake Ev
 1520 + Harlan County Lake Ev charged to Nebraska
 1521 + GWn

1522
1523 Notes:

1524 The allocation of transportation losses in the Courtland
 1525 Canal above Lovewell between Kansas and Nebraska shall
 1526 be done by the Bureau of Reclamation and reported in their
 1527 "Courtland Canal Above Lovewell" spreadsheet. Deliveries
 1528 and losses associated with deliveries to both Nebraska and
 1529 Kansas above Lovewell shall be reflected in the Bureau's
 1530 Monthly Water District reports. Losses associated with
 1531 delivering water to Lovewell shall be separately computed.

1532
 1533 Amount of transportation loss of the Courtland Canal
 1534 deliveries to Lovewell that does not return to the river,
 1535 charged to Kansas shall be 18% of the Bureau's estimate
 1536 of losses associated with these deliveries.

1537
 1538 Red Willow Canal CBCU = Red Willow Canal Diversion x
 1539 (IRR Season) x (1- % BRF) + Red Willow Canal Diversion
 1540 (Non-IRR Season) x (1 - 92%)

1541
 1542 10% of the Red Willow Canal CBCU is charged to
 1543 Nebraska's CBCU in Red Willow Creek sub-basin

1544
 1545 10% of Hugh Butler Lake Ev is charged to Nebraska's
 1546 CBCU in the Red Willow Creek sub-basin

1547
 1548 None of the Harry Strunk Lake EV is charged to Nebraska's
 1549 CBCU in the Medicine Creek sub-basin

1550

1551	VWS	=
1552		Republican River near Hardy Gage Stn. No. 06853500
1553		- North Fork of the Republican River at the State Line,
1554		Stn. No. 06823000
1555		- Arikaree Gage at Haigler Stn. No. 06821500
1556		- Buffalo Creek near Haigler Gage Stn. No. 06823500
1557		- Rock Creek at Parks Gage Stn. No. 06824000
1558		- South Fork Republican River near Benkelman Gage Stn.
1559		No. 06827500
1560		- Frenchman Creek in Culbertson Stn. No. 06835500
1561		- Driftwood Creek near McCook Gage Stn. No. 06836500
1562		- Red Willow Creek near Red Willow Gage Stn.
1563		No. 06838000
1564		- Medicine Creek below Harry Strunk Lake Gage Stn.
1565		No. 06842500
1566		- Sappa Creek near Stamford Gage Stn. No. 06847500
1567		- Prairie Dog Creek near Woodruff, Kansas Stn. No.
1568		068485000
1569		
1570		+ CBCU _c
1571		+ CBCU _n
1572		
1573		+ 0.6 x Dk
1574		+ % x Pk
1575		+ 0.5 x M&Ik
1576		+ EvNFR _k
1577		+ Harlan County Lake Ev charged to Kansas
1578		+ Amount of transportation loss of the Courtland Canal
1579		above the Stateline that does not return to the river, charged
1580		to Kansas
1581		+ GWk
1582		
1583		- 0.9 x Red Willow Canal CBCU
1584		- 0.9 x Hugh Butler Ev
1585		- Harry Strunk Ev
1586		
1587		+ 0.6 x Dn below Medicine Creek gage
1588		+ % x Pn below Medicine Creek gage
1589		+ 0.5 * M&In below Medicine Creek gage
1590		+ EvNFR _n below Medicine Creek gage
1591		
1592		+ 0.6 x Dn below Beaver Creek gage
1593		+ % x Pn below Beaver Creek gage
1594		+ 0.5 * M&In below Beaver Creek gage

1595	+ EvNFRn below Beaver Creek gage
1596	
1597	+ 0.6 x Dn below Sappa Creek gage
1598	+ % x Pn below Sappa Creek gage
1599	+ 0.5 * M&In below Sappa Creek gage
1600	+ EvNFRn below Sappa Creek gage
1601	
1602	+ 0.6 x Dn below Prairie Dog Creek gage
1603	+ % x Pn below Prairie Dog Creek gage
1604	+ 0.5 * M&In below Prairie Dog Creek gage
1605	+ EvNFRn below Prairie Dog Creek gage
1606	
1607	+ Change in Storage Harlan County Lake
1608	+ Change in Storage Swanson Lake
1609	
1610	- Nebraska Haigler Canal RF
1611	- 0.78 x Riverside Canal RF
1612	- 0.17 x Culbertson Canal RF
1613	- Culbertson Canal Extension RF to Main Stem
1614	+ 0.24 x Meeker Driftwood Canal RF which returns to
1615	Driftwood Creek
1616	- 0.9 x Red Willow Canal RF
1617	
1618	+ Courtland Canal at Kansas-Nebraska State Line Gage Stn
1619	No. 06852500
1620	- Courtland Canal RF in Kansas above Lovewell Reservoir
1621	
1622	- IWS
1623	
1624	Notes:
1625	None of the Nebraska Haigler Canal RF returns to the North
1626	Fork of the Republican River
1627	
1628	83% of the Culbertson Diversion RF and none of the
1629	Culbertson Extension RF return to Frenchman Creek
1630	
1631	24 % of the Meeker Driftwood Canal RF returns to
1632	Driftwood Creek.
1633	
1634	10% of the Red Willow Canal RF returns to Red Willow
1635	Creek
1636	
1637	Courtland Canal RF in Kansas above Lovewell Reservoir =
1638	0.015 x (Courtland Canal at Kansas-Nebraska State Line

1639 Gage Stn No. 06852500)
 1640
 1641 CWS = VWS - Change in Storage Harlan County Lake - Change
 1642 in Storage Swanson Lake – FF + CWSA
 1643
 1644 Allocation Kansas = 0.511 x CWS
 1645
 1646 Allocation Nebraska = 0.489 x CWS

1647 **V. Annual Data/ Information Requirements, Reporting, and Verification**

1648
 1649 The following information for the previous calendar year shall be provided to the members of the
 1650 RRCA Engineering Committee by April 15th of each year, unless otherwise specified.

1651
 1652 All information shall be provided in electronic format, if available.

1653
 1654 Each State agrees to provide all information from their respective State that is needed for the
 1655 RRCA Groundwater Model and RRCA Accounting Procedures and Reporting Requirements,
 1656 including but not limited to the following:

1657
 1658 **A. Annual Reporting**

1659
 1660
 1661 **1. Surface water diversions and irrigated acreage:**

1662 Each State will tabulate the canal, ditch, and other surface water diversions that are
 1663 required by RRCA annual compact accounting and the RRCA Groundwater Model
 1664 on a monthly format (or a procedure to distribute annual data to a monthly basis)
 1665 and will forward the surface water diversions to the other States. This will include
 1666 available diversion, wasteway, and farm delivery data for canals diverting from the
 1667 Platte River that contribute to Imported Water Supply into the Basin. Each State
 1668 will provide the water right number, type of use, system type, location, diversion
 1669 amount, and acres irrigated.

1670
 1671
 1672 **2. Groundwater pumping and irrigated acreage:**

1673 Each State will tabulate and provide all groundwater well pumping estimates
 1674 that are required for the RRCA Groundwater Model to the other States.

1675
 1676 **Colorado** – will provide an estimate of pumping based on a county format
 1677 that is based upon system type, Crop Irrigation Requirement (CIR),
 1678 irrigated acreage, crop distribution, and irrigation efficiencies. Colorado
 1679 will require installation of a totalizing flow meter, installation of an hours
 1680 meter with a measurement of the pumping rate, or determination of a power
 1681 conversion coefficient for 10% of the active wells in the Basin by
 1682 December 31, 2005. Colorado will also provide an annual tabulation for

1683 each groundwater well that measures groundwater pumping by a totalizing
 1684 flow meter, hours meter or power conversion coefficient that includes: the
 1685 groundwater well permit number, location, reported hours, use, and
 1686 irrigated acreage.

1687
 1688 **Kansas** - will provide an annual tabulation by each groundwater well that
 1689 includes: water right number, groundwater pumping determined by a
 1690 meter on each well (or group of wells in a manifold system) or by reported
 1691 hours of use and rate; location; system type (gravity, sprinkler, LEPA,
 1692 drip, etc.); and irrigated acreage. Crop distribution will be provided on a
 1693 county basis.

1694
 1695 **Nebraska** – will provide an annual tabulation through the representative
 1696 Natural Resource District (NRD) in Nebraska that includes: the well
 1697 registration number or other ID number; groundwater pumping determined
 1698 by a meter on each well (or group of wells in a manifold system) or by
 1699 reported hours of use and rate; wells will be identified by; location; system
 1700 type (gravity, sprinkler, LEPA, drip, etc.); and irrigated acreage. Crop
 1701 distribution will be provided on a county basis.

1702
 1703
 1704 **3. Climate information:**

1705 Each State will tabulate and provide precipitation, temperature, relative humidity or
 1706 dew point, and solar radiation for the following climate stations:
 1707

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

1708

1709

1710

4. Crop Irrigation Requirements:

1711 Each State will tabulate and provide estimates of crop irrigation requirement
1712 information on a county format. Each State will provide the percentage of the
1713 crop irrigation requirement met by pumping; the percentage of groundwater
1714 irrigated lands served by sprinkler or flood irrigation systems, the crop irrigation
1715 requirement; crop distribution; crop coefficients; gain in soil moisture from winter
1716 and spring precipitation, net crop irrigation requirement; and/or other information
1717 necessary to compute a soil/water balance.

1718

1719

1720

5. Streamflow Records from State-Maintained Gaging Records:

1721 Streamflow gaging records from the following State maintained gages will be
1722 provided:

1723

1724

<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

1725

1726

1727

1728

1729

1730

1731

1732

1733

1734

1735

1736

1737

1738

1739

Diversion Dam

1740
 1741
 1742
 1743
 1744
 1745
 1746
 1747
 1748
 1749
 1750
 1751
 1752
 1753
 1754
 1755
 1756
 1757
 1758
 1759
 1760
 1761
 1762
 1763
 1764
 1765
 1766
 1767
 1768
 1769
 1770
 1771
 1772
 1773
 1774
 1775
 1776
 1777
 1778
 1779
 1780
 1781
 1782
 1783

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;

1784
 1785
 1786
 1787
 1788
 1789
 1790
 1791
 1792
 1793
 1794
 1795
 1796
 1797
 1798
 1799
 1800
 1801
 1802
 1803
 1804
 1805
 1806
 1807
 1808
 1809
 1810
 1811
 1812
 1813
 1814
 1815
 1816
 1817
 1818
 1819
 1820
 1821
 1822
 1823
 1824
 1825
 1826
 1827

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

1828 spatially using kriging.

1829
 1830
 1831
 1832
 1833
 1834
 1835
 1836
 1837
 1838
 1839
 1840
 1841
 1842
 1843
 1844
 1845
 1846
 1847
 1848
 1849
 1850
 1851
 1852
 1853
 1854
 1855
 1856
 1857
 1858
 1859
 1860
 1861
 1862
 1863
 1864
 1865
 1866
 1867
 1868
 1869
 1870
 1871

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

- 1872 Hugh Butler Lake
- 1873 Enders Reservoir
- 1874 Keith Sebelius Lake
- 1875 Harlan County
- 1876 Lake Lovewell
- 1877 Reservoir
- 1878
- 1879 c. Non-federal reservoirs obtained by each state: an updated
- 1880 inventory of reservoirs that includes the location, surface area
- 1881 (acres), and capacity (in Acre-feet), of each non-federal reservoir
- 1882 with storage capacity of fifteen (15) Acre-feet or greater at the
- 1883 principal spillway elevation. Supporting data to substantiate the
- 1884 average surface water areas that are different than the presumptive
- 1885 average annual surface area may be tendered by the offering State.
- 1886
- 1887 d. Diversions and related data from USBR
- 1888
- 1889 Irrigation diversions by canal, ditch, and pumping station
- 1890 that irrigate more than two (2) acres
- 1891 Diversions for non-irrigation uses greater than 50 Acre-feet
- 1892 Farm Deliveries
- 1893 Wasteway measurements
- 1894 Irrigated acres
- 1895
- 1896 e. Diversions and related data – from each respective State
- 1897
- 1898 Irrigation diversions by canal, ditch, and pumping station
- 1899 that irrigate more than two (2) acres
- 1900 Diversions for non-irrigation uses greater than 50 Acre-feet
- 1901 Wasteway measurements, if available
- 1902
- 1903

2. Groundwater Information

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

- 1904
- 1905
- 1906
- 1907
- 1908 a. Imported water - mound credits in amount and time that occur in
- 1909 defined streamflow points/reaches of measurement or compliance
- 1910 – ex: gaging stations near confluence or state lines
- b. Groundwater depletions to streamflow (above points of
- measurement or compliance – ex: gaging stations near confluence
- or state lines)

3. Summary

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

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

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

2. Site Inspection

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

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

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

Table 2: Original Compact Virgin Water Supply and Allocations

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

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

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

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

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

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

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

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

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

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

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

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

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

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

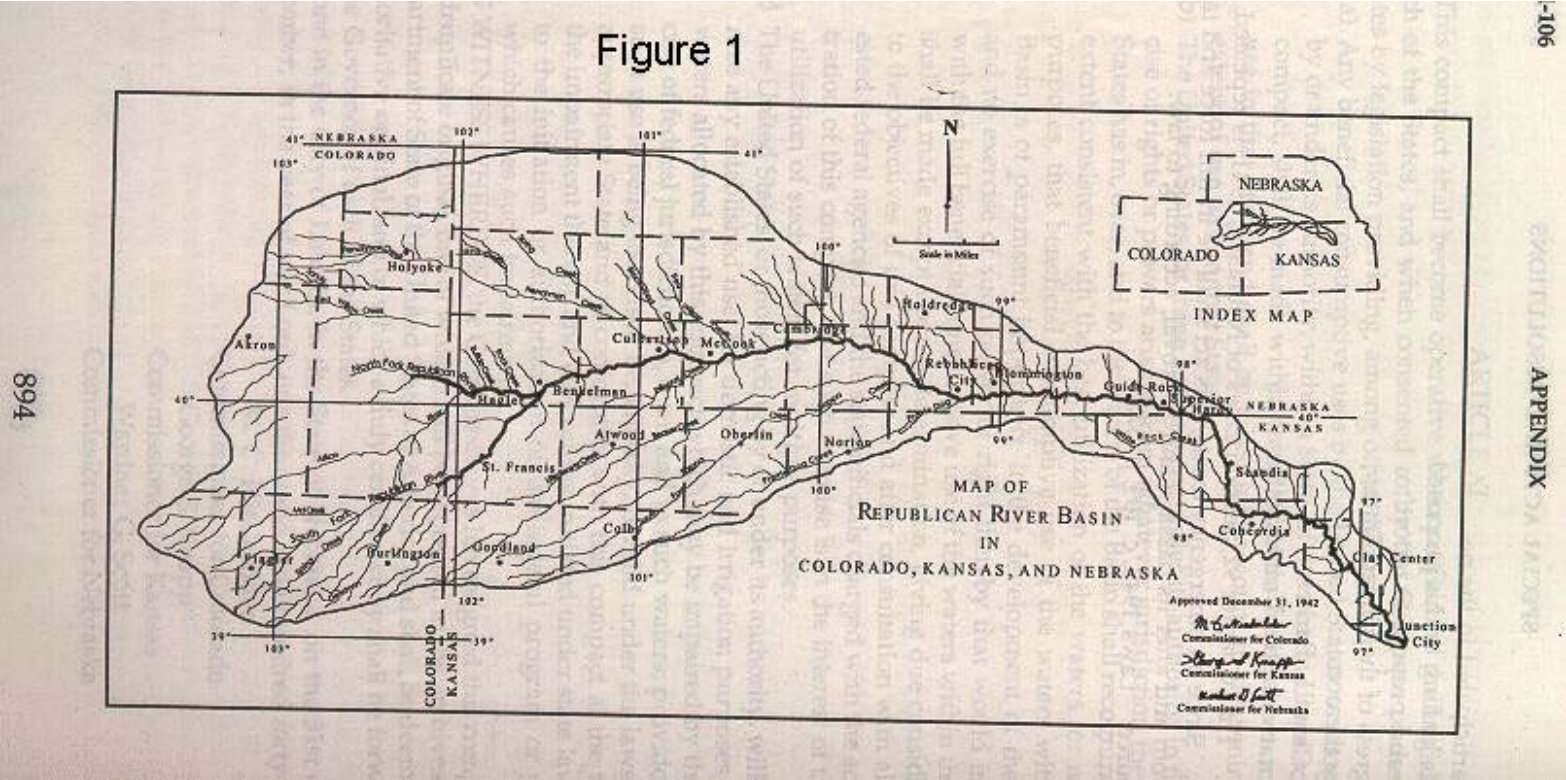
Table 5F: Colorado's Beaver Creek Reduction During Water-Short Years

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

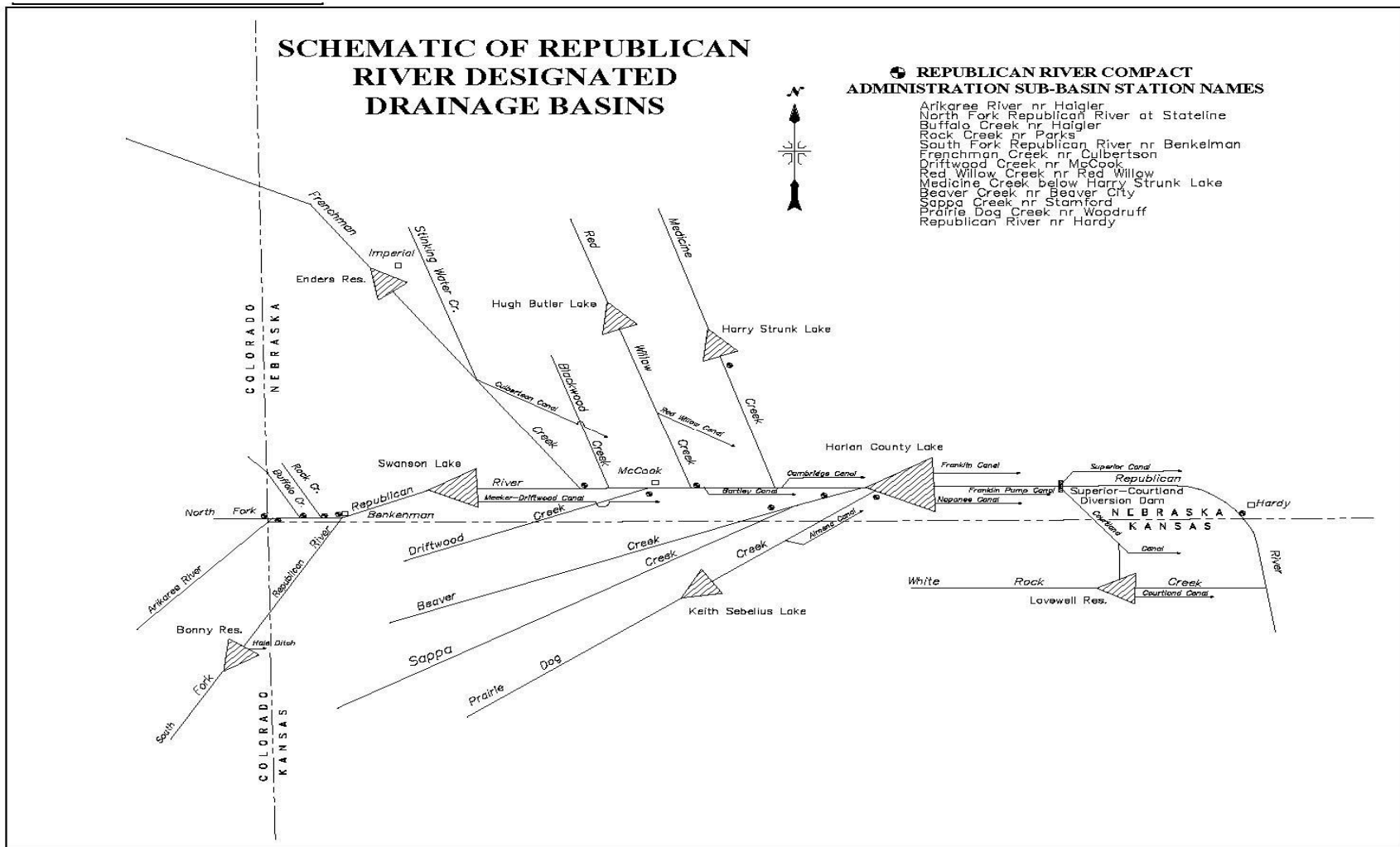


Basin Map Attached to Compact that Shows the Streams and the Basin Boundaries

894

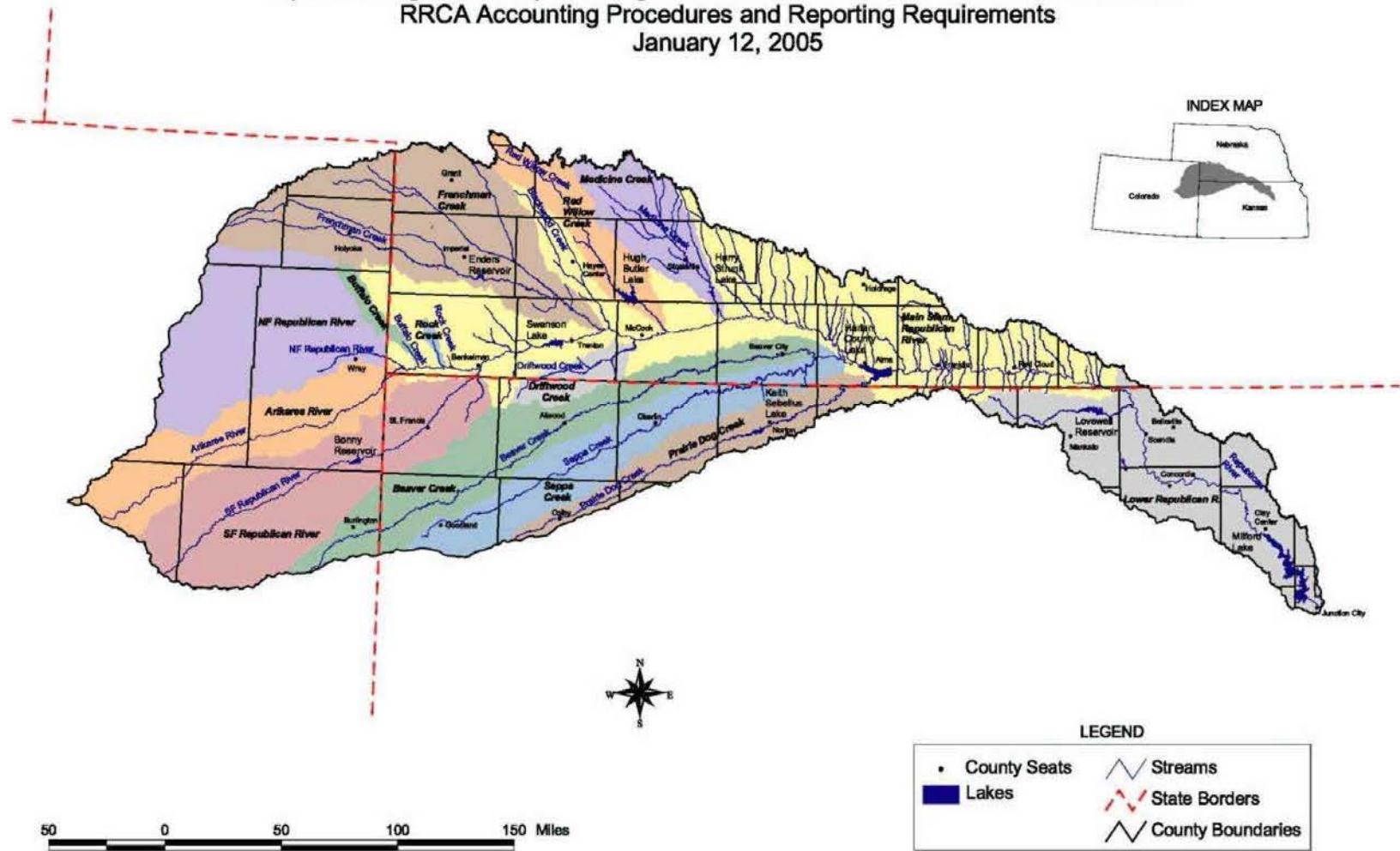
-106

APPENDIX



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

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



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

Attachment 1: Sub-basin Flood Flow Thresholds

Sub-basin	Sub-basin Flood Flow Threshold Acre-feet per Year ⁷
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

⁷ 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.

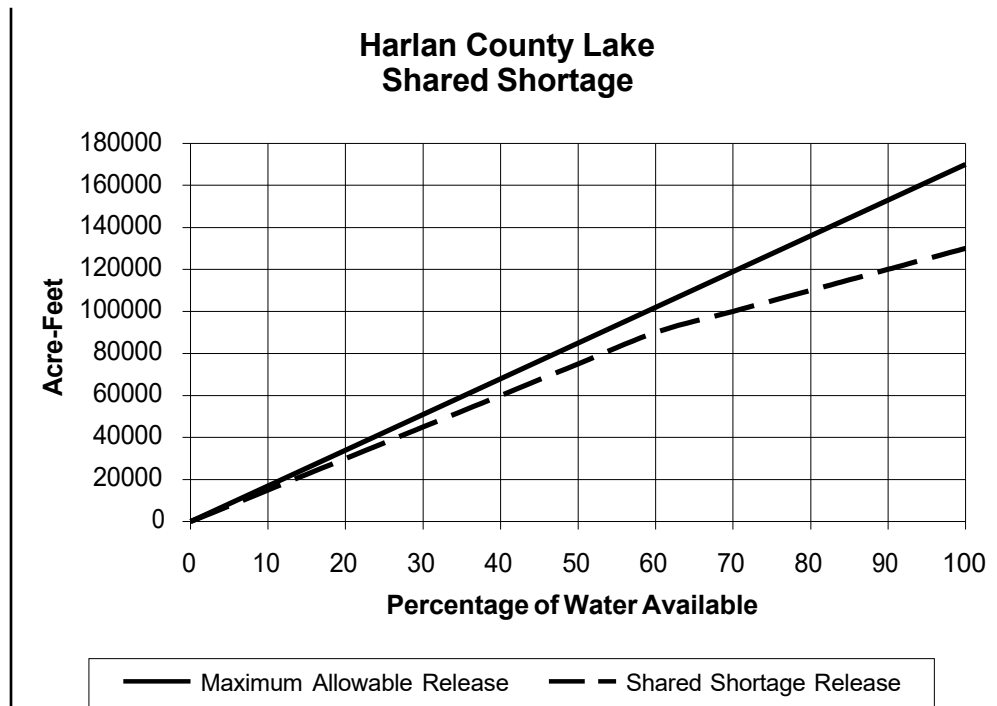
Since the construction of Harlan County Lake, inflows to the lake have been depleted by upstream irrigation wells and farming practices. Reclamation has recently completed an in-depth study of these depleted flows as a part of their contract renewal process. The study concluded that if the current conditions 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 (1931-93)	2.2	1.3	0.5	0.6	0.8	1.5	2.7	3.2	3.9	5.3	4.3	2.8	29.1
Avg. Inflow Last 5 Years	10.8	13.0	12.3	12.9	16.6	22.4	19.4	18.1	14.8	16.5	11.0	4.7	172.6

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	MN	NO	OP	PQ	QR	RS
Total Main Stem VWS CWS	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	<u>Flood Flow adjustment for the Mainstem Between Guide Rock and Hardy</u>	VWSCW <u>S</u> Guide Rock to Hardy	Main Stem Virgin <u>Computed</u> Water Supply Above Guide Rock	Nebraska Main Stem Allocation Above <u>HardyGuide Rock</u>	Kansas Main Stem Allocation Above <u>HardyGuide Rock</u>	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 - <u>Col M</u>	Col A - Col MN	.489 x Col NO	.511 x Col NO	.489 x Col MN	.511 x Col MN

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
∑ Irrigation Season											
∑ Non-Irrigation Season											
Example	100	5	95	60	35	30%	18	53	82%	48.46	48.5%
	100	5	95	0	95	30%	0	95	92%	87.4	87.4%
Culbertson						30%			82%		
						30%			92%		
Culbertson Extension						30%			82%		
						30%			92%		
Meeker - Driftwood						30%			82%		
						30%			92%		
Red Willow						30%			82%		
						30%			92%		
Bartley						30%			82%		
						30%			92%		
Cambridge						30%			82%		
						30%			92%		
Naponee						35%			82%		
						35%			92%		
Franklin						35%			82%		
						35%			92%		
Franklin Pump						35%			82%		
						35%			92%		
Almena						30%			82%		
Superior						31%			82%		
						31%			92%		
Nebraska Courtland						23%			82%		
Courtland Canal Above Lovewell (KS)						23%			82%		
Courtland Canal Below Lovewell						23%			82%		

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

Attachment 8: Calculation of the Computed Water Supply Adjustment and Remaining Compact Compliance Volume for Implementation of 2016 RRCA Resolution

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

⁸ 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.

⁹ 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.

¹⁰ In years when the contributions from Nebraska’s water management activities, consistent with the 2016 CCY HCL Operations Resolution, are greater than CCV and the NERWS is equal to the greater contribution volume, CCV in Column 3 should also be set equal to the contribution.

Definitions

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

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

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

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

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

CWSA and RCCV Example Calculations

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

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

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

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

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

Assumptions

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

Computed Water Supply Adjustment (CWSA)

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

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

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

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

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

Assumptions

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

Computed Water Supply Adjustments (CWSA)

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

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

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

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

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

Assumptions

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

Computed Water Supply Adjustment (CWSA)

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

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

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

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

Year 1**Assumptions**

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

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

Computed Water Supply Adjustment (CWSA)

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

Remaining Compact Compliance Volume (RCCV) for Following Year

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

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

Year 2

Assumptions

- RCCV = 35,000
- CCV = 10,000 Acre-feet
- APV = 45,000 Acre-feet
- CCV Inflow Into HCL = 10,000 Acre-feet
- RCCV Inflow Into HCL = 35,000 Acre-feet
- CCV Released from HCL = 50,000 Acre-feet
- CCV Retained in HCL = 0
- NERWS Credit = 10,000 Acre-feet¹¹

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

¹¹ With respect to the NERWS Credit in Year 2, the value is only 10,000 Acre-feet, despite the fact that 45,000 Acre-feet of the CCV and RCCV water from Years 1 and 2 were made available in HCL during Year 2. This is because the credit is applied in the years in which it is needed for compliance purposes, and not necessarily in the same year as when releases are made from HCL or augmentation water is pumped.

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

Year 2

Assumptions

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

Remaining Compact Compliance Volume (RCCV) for Following Year

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

Table 1. Example of HCL Accounting for CWSA

Table 1: Example HCL Accounting for CWSA

	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 Evaporation	CCV Retained in HCL (at End of Year)	CWSA	End of Year RCCV
	=Col. 12 of previous year					= Col. 4 + Col. 5	=Col. 6 + Col. 10 of previous year			= Col. 7 – (Col. 8 + Col. 9)	=Col. 10 – Col. 10 of previous year	= Col. 1 – Col. 2 + Col. 3 – Col. 6
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

Kansas Proposal on Flood
Flows Accounting Issue
emailed on 06/21/2021

Burgert, Kari

From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Monday, June 21, 2021 10:14 AM
To: Burgert, Kari; Franco - DNR, Ivan
Subject: Flood Flows issue - Kansas proposal to cap GRtoHdy allocation

Follow Up Flag: Follow up
Flag Status: Completed

Kari and Ivan,

After considering our EC discussion on May 20, it appears to Kansas that in lieu of developing a new Flood Flows adjustment for the Computed Water Supply of the Guide Rock to Hardy reach, the issue of increasing allocation in that reach could be solved by simply agreeing to cap the allocation.

In 2015, Nebraska's allocation below Guide Rock was 33,485 acre-feet, the highest non-Flood Flows-year allocation reported since 1995. Kansas proposes that in a Flood Flows year, Nebraska's allocation below Guide Rock be calculated as it currently is but capped at 33,485 acre-feet. I think this is a reasonable compromise that addresses both Nebraska's and Kansas' concerns.

Regards,
Chris

Chris Beightel, PE
Program Manager - Water Management Services
Kansas Department of Agriculture
Division of Water Resources
785.564.6659

Follow-up on Kansas
Proposal on Flood Flows
Accounting Issue emailed
on 07/02/2021

Burgert, Kari

From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Friday, July 2, 2021 2:59 PM
To: Burgert, Kari; Franco - DNR, Ivan; Erickson, Chelsea [KDA]; Willem Schreuder; Davis, Alexa; Bradley, Jesse; Engelhaupt, David [KDA]; Hickman, Elizabeth [KDA]
Cc: Lewis, Earl [KDA]
Subject: Re: RRCA EC - Flood Flows discussion 2
Attachments: 20210628.GR-HdyCapProposal-KS.xlsx

Follow Up Flag: Follow up
Flag Status: Completed

Kari and Ivan,

Attached is the spreadsheet showing the impact of Kansas' proposal with varying Guide Rock and Hardy flows as the group has seen in the past. The implementation of Kansas' proposed cap is shown in tab "CapProposal...". There is a note at the lower right-hand area of the worksheet that explains how it was implemented. Let me know if you have any questions about it.

And Kari, thanks for the summary notes from the 21 June meeting. They look fine to Kansas.

Chris Beightel, PE
Program Manager - Water Management Services
Kansas Department of Agriculture
Division of Water Resources
785.564.6659

From: Burgert, Kari <kari.burgert@nebraska.gov>
Sent: Tuesday, June 22, 2021 4:10 PM
To: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; Franco - DNR, Ivan <ivan.franco@state.co.us>; Erickson, Chelsea [KDA] <Chelsea.Erickson@ks.gov>; Willem Schreuder <willem@prinmath.com>; Davis, Alexa <Alexa.Davis@nebraska.gov>; Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Engelhaupt, David [KDA] <David.Engelhaupt@ks.gov>; Hickman, Elizabeth [KDA] <Elizabeth.Hickman@ks.gov>
Cc: Lewis, Earl [KDA] <Earl.Lewis@ks.gov>
Subject: RE: RRCA EC - Flood Flows discussion 2

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 –

Please see the attached summary of this morning's meeting. Please let me know if you have any edits.
Thanks!
Kari

-----Original Appointment-----

From:

Sent: Thursday, May 27, 2021 9:20 AM

To: Burgert, Kari; Beightel, Chris [KDA]; Franco - DNR, Ivan; Erickson, Chelsea [KDA]; Willem Schreuder; Davis, Alexa; Bradley, Jesse; david.engelhaupt@ks.gov; elizabeth.hickman@ks.gov

Cc: Lewis, Earl [KDA]

Subject: RRCA EC - Flood Flows discussion 2

When: Tuesday, June 22, 2021 11:00 AM-12:00 PM America/Chicago.

Where: <https://us02web.zoom.us/j/83870713940?pwd=NTZMZEM2ZktDaGlla3Zna1RkUFdCdz09>

Agenda

1. Welcome/Introductions
2. Draft Notes from 5/18/21 meeting
3. Kansas' 6/21/21 proposal
4. Annual meeting
 - a. Bring to Commissioners?
 - b. Assignment for next year?
5. Next Steps

DNR Water Planning is inviting you to a scheduled Zoom meeting.

Join Zoom Meeting

<https://us02web.zoom.us/j/83870713940?pwd=NTZMZEM2ZktDaGlla3Zna1RkUFdCdz09>

Meeting ID: 838 7071 3940

Passcode: 080498

One tap mobile

+13462487799,,83870713940# US (Houston)

+16699009128,,83870713940# US (San Jose)

Dial by your location

+1 346 248 7799 US (Houston)

+1 669 900 9128 US (San Jose)

+1 253 215 8782 US (Tacoma)

+1 312 626 6799 US (Chicago)

+1 646 558 8656 US (New York)

+1 301 715 8592 US (Washington DC) Meeting ID: 838 7071 3940 Find your local number:

<https://us02web.zoom.us/j/83870713940?pwd=NTZMZEM2ZktDaGlla3Zna1RkUFdCdz09>

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

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		358,455	370,678	396,241	419,578	444,028	468,478	492,928	517,378	541,828	
550000		358,455	358,455	371,791	395,128	419,578	444,028	468,478	492,928	517,378	
625,783		358,455	358,455	358,455	358,455	382,520	406,970	431,420	455,870	480,320	
650000		358,455	358,455	358,455	358,455	370,678	395,128	419,578	444,028	468,478	
700000		358,455	358,455	358,455	358,455	358,455	370,678	395,128	419,578	444,028	
750000		358,455	358,455	358,455	358,455	358,455	358,455	370,678	395,128	419,578	
800000		358,455	358,455	358,455	358,455	358,455	358,455	358,455	370,678	395,128	
850000		358,455	358,455	358,455	358,455	358,455	358,455	358,455	358,455	370,678	
900000		358,455	358,455	358,455	358,455	358,455	358,455	358,455	358,455	358,455	

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		33,485	21,262	-4,301	-27,638	-52,088	-76,538	-100,988	-125,438	-149,888
550000		33,485	33,485	20,149	-3,188	-27,638	-52,088	-76,538	-100,988	-125,438
625,783		33,485	33,485	33,485	33,485	9,420	-15,030	-39,480	-63,930	-88,380
650000		33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088	-76,538
700000		33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088
750000		33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088
800000		33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088
850000		33,485	33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-52,088
900000		33,485	33,485	33,485	33,485	33,485	33,485	33,485	33,485	33,485

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		33,485	21,262	-4,301	-27,638	-52,088	-76,538	-100,988	-125,438	-149,888	
550000		33,485	33,485	20,149	-3,188	-27,638	-52,088	-76,538	-100,988	-125,438	
625,783		33,485	33,485	33,485	33,485	9,420	-15,030	-39,480	-63,930	-88,380	
650000		33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088	-76,538	
700000		33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088	
750000		33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088	
800000		33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-27,638	-52,088	
850000		33,485	33,485	33,485	33,485	33,485	33,485	21,262	-3,188	-52,088	
900000		33,485	33,485	33,485	33,485	33,485	33,485	33,485	33,485	33,485	

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

At the 22 June 2021 meeting of the RRCA EC, Kansas proposed to cap the allocation between Guide Rock and Hardy at **33,485** acre-feet in a Flood Flows year.

2021-06-28: This Kansas-proposed method allows the Guide Rock to Hardy allocation to increase according to the original accounting procedures, but caps the allocation at 33,485 acre-feet. 33,485 is the greatest allocation for the Guide Rock to Hardy reach in a non-Flood Flows year on record (2015) since 1995.

To apply the cap, the only difference between this worksheet and the "Current method" worksheet is that a formula was added to table 4 on this sheet (O21:W31) which uses the MIN function to implement the cap.

Flood Flows Focused
05/18/2021 Meeting Summary

Focused Flood Flows accounting assignment meeting
RRCA Engineering Committee
May 18, 2021
10:00 am Central
Virtual

Attendees: Chris Beightel, Ivan Franco, Hongsheng Cao, Willem Schreuder, Kari Burgert, Jesse Bradley, Alexa Davis, Elizabeth Hickman, Sam Perkins

Summary:

Members of the Engineering Committee and additional state representatives met to focus on the Flood Flows accounting assignment.

Nebraska reviewed the issue described at the 2019 RRCA Working Session. In short, the issue described by Nebraska is that application of the Flood Flow adjustment did not appear to be contemplated in calculation of Above Guide Rock allocations, which manifested in Above Guide Rock allocations decreasing with increasing flow below Guide Rock.

Nebraska also reviewed their most recent proposal to calculate allocation between Guide Rock and Hardy from Computed Water Supply including a Flood Flow adjustment rather than from Virgin Water Supply. Nebraska proposed the Guide Rock and Hardy Flood Flow adjustment, when applicable, be calculated as the minimum of the Main Stem Flood Flow adjustment and the Guide Rock to Hardy Virgin Water Supply. Nebraska reiterated that this proposal appears maintain consistency with the FSS, addresses Nebraska's issue of decreasing Above Guide Rock allocations with increasing flow below Guide Rock in the current Accounting Procedures, and addresses Kansas's issue with Nebraska's original proposal by not allowing the Guide Rock to Hardy Computed Water Supply be negative when there are Flood Flows. Kansas maintains that their issue with this proposal is they do not see the justification for an allocation of 0 acre-feet between Guide Rock and Hardy in a Flood Flow year. Schreuder reviewed conceptualization of how an allocation, particularly for that of a portion of a subbasin, could be negative.

Kansas reviewed their latest proposal and noted some inconsistencies in the description provided. Kansas committed to sending out an updated proposal.

All parties discussed that the spreadsheets provided by Kansas showing the sensitivity of the proposed allocation calculations to Guide Rock and Hardy streamflows were useful and recommended continued display of the proposals in this manner.

Nebraska stated that their first two criteria for evaluating a proposed solution would be to determine if the FSS is being followed and to determine if the original issue observed of the allocation above Guide Rock decreasing with increasing flows below Guide Rock is resolved. Nebraska asked if any others would like to provide their criteria for evaluating a proposed solution. No additional criteria were provided at that time.

Kari asked that the Engineering Committee members think about what the Engineering Committee would be bringing to the Commissioners at this year's annual meeting and what assignment the Engineering Committee would want to recommend having for the next year to be included in the annual report.

Flood Flows Focused
06/22/2021 Meeting Summary

Focused Flood Flows accounting assignment meeting
RRCA Engineering Committee
June 22, 2021
11:00 am Central
Virtual

Attendees: Chris Beightel, Ivan Franco, Willem Schreuder, Kari Burgert, Jesse Bradley, Alexa Davis, Elizabeth Hickman, Chelsea Erickson, Earl Lewis, David Engelhaupt

Summary:

Members of the Engineering Committee and additional state representatives met for a second time to focus on the Flood Flows accounting assignment.

The EC members agreed that the draft summary of the 5/18/21 meeting emailed out by Kari on 5/24/21 is final.

Chris summarized Kansas' 6/21/21 proposal (Attachment). Kansas' proposal is to set a cap of 33,485 acre-feet Nebraska's Below Guide Rock Allocation when there is a Flood Flows adjustment. Kansas' proposal does not require any additional changes to the calculations described in the Accounting Procedures.

Chris agreed to send out a spreadsheet showing the impact of Kansas' proposal with varying Guide Rock and Hardy flows as the group has seen in the past.

Nebraska committed to evaluating Kansas' proposal. Kari will let the group know if it seems like a meeting prior to the scheduled July 21 EC meeting is necessary based on Nebraska's evaluation.

REPUBLICAN RIVER COMPACT ADMINISTRATION (RRCA)

SUMMARY OF HISTORICAL CHANGES TO THE RRCA’S ACCOUNTING PROCEDURES AND REPORTING REQUIREMENTS

Contents

I.	Background and Purpose.....	1
II.	First Version of the Accounting Procedures	2
III.	Changes to the Accounting Procedures.....	2
	January 2005 Accounting Procedures Update	2
	August 2006 Accounting Procedures Update	3
	August 2007 Annual Meeting Discussion	4
	August 2010 Accounting Procedures Update	4
	August 2015 Accounting Procedures Update	4
	August 2016 Accounting Procedures Update	5
	May 2017 Accounting Procedures Update	6
	August 2020 Accounting Procedures Update	6
IV.	Groundwater Model Versions	7
V.	Accounting Adjustments	7

I. Background and Purpose

The Republican River Compact Administration (RRCA) Accounting Procedure and Reporting Requirements (Accounting Procedures) 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 (CBCU). These computations are used to determine supply, allocations, use and compliance with the Compact according to the Final Settlement Stipulation (FSS) and RRCA Resolutions. The Accounting Procedures may be changed by consent of the RRCA and formally adopted with an update to the RRCA Rules and Regulations. Since the FSS, the computations described in the Accounting Procedures have been implemented primarily through an accounting spreadsheet shared among the states.

The Accounting Procedures have been the subject of numerous assignments to the RRCA Engineering Committee (EC) with subsequent actions by the RRCA including the formal adoption of amended versions with update of the RRCA Rules and Regulations. In addition, the

RRCA has instructed the EC to make certain accounting adjustments in particular years, which allowed the accounting to be changed without changing the Accounting Procedures.

At the August 27, 2015, RRCA annual meeting, the RRCA assigned the EC the task of summarizing historical changes that have been made to the Accounting Procedures. This document serves to fulfill this assignment. . This document is only intended to summarize changes to the Accounting Procedures for educational purposes to aid in understanding the changes. Any omissions or characterizations contained in this document shall not supersede or alter the official actions taken by the RRCA to amend the Accounting Procedures or be used as evidence by any RRCA member state in future disputes.

This tracking document will continue to be updated with future changes to the Accounting Procedures or Groundwater Model Versions as a means to provide a general summary of relevant changes through time. Future updates to this document are the responsibility of the RRCA Engineering Committee Chair and will be reviewed and agreed upon by all three states.

This document includes the following sections: First Version of the Accounting Procedures, Changes to the Accounting Procedures, RRCA Groundwater Model Versions, and Accounting Adjustments. Many of the referenced documents are located on the RRCA official website, specifically on the Documents webpage (<http://republicanriver.org/rrca-documents-2/>) as well as on the Annual Reports webpage (<http://republicanriver.org/rrca-documents-2/rrca-documents/rrca-annual-reports-1960-to-present/>).

II. First Version of the Accounting Procedures

The first version of the Accounting Procedures was agreed upon by the States on December 15, 2002, as Appendix C to the Final Settlement Stipulation (FSS), replacing previous methods of the RRCA to determine virgin water supplies and consumptive use by the States.

As provided in the FSS, the States agreed on June 30, 2003, to accept the RRCA groundwater model developed by the Groundwater Model committee formed for this purpose.

At the 2003 annual meeting, the RRCA formally adopted the Accounting Procedures and the RRCA groundwater model as the official procedures for calculating water supplies and water consumption, including approving changes to its rules and regulations that specifically cited them. *Republican River Compact Administration Forty-Second Annual Report for the Year 2002. Alma, Nebraska. August 22, 2003. Pages 7-9, New Business section.*

III. Changes to the Accounting Procedures

January 2005 Accounting Procedures Update

At the 2003 Annual Meeting, the RRCA, in addition to adopting the initial Accounting Procedures, assigned its Engineering Committee to review the Accounting Procedures and make

recommendations for needed corrections and improvements. The recommended assignments were then approved by the administration. *Republican River Compact Administration Forty-Second Annual Report for the Year 2002. Alma, Nebraska. August 22, 2003. Pages 7-9, Engineering Committee Report section.*

At the 2004 annual meeting, the Engineering Committee reported progress on the Accounting Procedure assignment. The Engineering Committee and technical representatives from the States of Colorado, Kansas, and Nebraska participated in numerous collaborative work activities and phone conferences and met May 3-4, 2004. Based upon a review of the Accounting Procedures and Formulas, the EC recommended the adoption of eleven editorial changes. *Republican River Compact Administration. Forty-Third Annual Report for the Year 2004. Burlington, Colorado. June 9, 2004. Pages 32 & 33, Engineering Committee Report.*

The Commissioners approved the EC's report at the 2004 annual meeting, specifically noting that the RRCA was approving the changes to the Accounting Procedures as recommended in the report. However, no revised Accounting Procedures document was provided or adopted until January 2005.

At the January 12, 2005, Special Meeting of the RRCA the Engineering Committee produced a revised version of the Accounting Procedures with all recommended changes to date. *Republican River Compact Administration. Forty-Fourth Annual Report for the Year 2004. Special Meeting Denver, Colorado. January 12, 2005. Annual Meeting Burlington, Colorado June 9, 2005. Page 2.*

The revised version of the Accounting Procedures dated January 12, 2005, was approved and attached to the Minutes of the Special Meeting of the RRCA. Also, at the 2005 Special Meeting, the RRCA Administration approved a change in the RRCA Rules and Regulations that specifically adopted the 2005 version of the Accounting Procedures and Groundwater Model version 12s (discussed below).

August 2006 Accounting Procedures Update

At the RRCA's regular annual meeting on July 27, 2005, the RRCA Engineering Committee developed a recommendation for proportioning annual net evaporation from Harlan County Lake to Kansas and Nebraska CBCU in years when no irrigation releases are made from Harlan County Lake, a situation that was not previously addressed in the Accounting Procedures. The specific language is detailed in the Engineering Committee's July 27, 2005, report, which is attached to the RRCA 44th Annual Report. The 2005 Engineering Committee report was approved by the RRCA. However, there was no official change to the Accounting Procedures, with revision date January 12, 2005.

The Accounting Procedures, containing this language, with revision date August 10, 2006, was officially adopted by the Commissioners at the next annual meeting in Phillipsburg, Kansas. *Annual Report August 10, 2006 pages 8 & 9 – Engineering Committee report to the Commissioners.*

August 2007 Annual Meeting Discussion

At the August 15, 2007, annual meeting in Junction City, Kansas, the Engineering Committee report stated that during the committee's work, it was discovered that Table 5B, *Kansas Compliance During Water-Short Year Administration*, in the Accounting Procedures did not allow Kansas to use 51.1% of any unused portion of Colorado's allocations as per Settlement Stipulation in the water-short year test. The Engineering Committee recommended that this change be made in the accounting spreadsheet. The Table 5B issue was remedied in the new business section of the annual meeting when the RRCA assigned the Engineering Committee to make the necessary change in the accounting spreadsheet. *Republican River Compact Administration. Forty-Sixth Annual Report for the Year 2006. Junction City, Kansas. August 15th, 2007. Pages 10 and 12 of the report.*

August 2010 Accounting Procedures Update

Two changes to the Accounting Procedures occurred in 2010 via RRCA resolution titled "Changes to the RRCA's Accounting Procedures and Reporting Requirements," signed by the Compact commissioners on August 12, 2010. The Engineering Committee recommended in its August 12, 2010, report to amend the Accounting Procedures to correct the formulas used to compute the Virgin Water Supply for both Frenchman Creek and the Main Stem to properly account for return flows from the Riverside Canal. The Engineering Committee also recommended in the same report to amend the Accounting Procedures to include the groundwater impact attributed to Kansas well pumping (GWk), as calculated by the RRCA Groundwater Model, in the formula to compute the Main Stem Virgin Water Supply. The proposal by the Engineering Committee was included as Attachment A to the August 12, 2010, Engineering Committee report and formally adopted by the RRCA Administration on August 12, 2010. The Accounting Procedures were updated with these changes and approved by the RRCA as the August 12, 2010 version, which replaced the January 12, 2005 version.

August 2015 Accounting Procedures Update

The August 2015 Accounting Procedures changes were implemented due to the United States Supreme Court decision of February 24, 2015, that accepted the recommendations contained in the November 15, 2013, Report of the Special Master, including modification of the Accounting Procedures. The EC provided a memorandum dated May 14, 2015, where the State of Nebraska proposed a revised version of the Accounting Procedures to include the changes stipulated in Appendix F, Exhibit A of the Report of the Special Master dated November 15, 2013, as well as proposed changes to Attachment 7 regarding spill to waste-way data.

The changes to the Accounting Procedures were enacted via resolution adopted by the RRCA at the RRCA annual meeting on August 27, 2015, and are attached to the 2015 RRCA annual report. The resolution is titled "Resolution of the Republican River Compact Administration Regarding Required Changes to the RRCA Accounting Procedures and Reporting Requirements

Document Proposed in the Report of the Special Master and Proposed Edits to Attachment 7 Regarding Spill to Waste-Way Data.”

The changes contained in the Report of the Special Master were enacted for accounting years 2007 and forward, while the changes to Attachment 7 were enacted for accounting years 2015 and forward.

August 2016 Accounting Procedures Update

At the August 24, 2016, annual meeting of the RRCA, the Administration approved three resolutions that resulted in changes to the Accounting Procedures.

The first resolution, “Resolution of the Republican River Compact Administration Regarding Required Changes to the RRCA Accounting Procedures and Reporting Requirements Regarding Non-Irrigation Season Canal Diversions for Groundwater Recharge Purposes”, approved August 24, 2016) required changes to the Accounting Procedures for non-irrigation season canal diversions for groundwater recharge purposes. The State of Nebraska provided documentation, reformed Accounting Procedures, and edits to the implementation of Attachment 7 in the accounting spreadsheet in a memorandum dated July 7, 2016, attached to the resolution. The proposed changes documented in the memorandum were approved with an additional provision. That provision was that non-irrigation season canal recharge diversions shall be limited to 10,000 acre-feet. If canal recharge diversions exceed 10,000 acre-feet, then the method established for irrigation season canal diversion shall apply. Amended RRCA Rules and Regulations were approved to enact the Accounting Procedures proposed in the non-irrigation season canal diversions for groundwater recharge purposes resolution.

The second resolution approved a long-term agreement related to the operation of Harlan County Lake for Compact Call Years. The RRCA previously enacted temporary resolutions to modify the operations of Harlan County Lake and the Accounting Procedures for the years 2014, 2015, and 2016. The long-term resolution includes 15 provisions, including specifications for the timing and location of Nebraska’s compliance activities, creation of additional terms for the accounting, and modification to the application of Nebraska’s compliance tests.

The third resolution approved a long-term agreement related to operation and accounting for the Colorado Compact Compliance Pipeline (CCP) and Colorado compliance efforts in the South Fork Republican River Basin. The RRCA approved terms and conditions for CCP operations and the related accounting procedures changes, provided as an appendix to the resolution. For Bonny Reservoir, the agreement was to develop options to maximize the use of the reservoir. Colorado agreed to work with state and federal partners to maintain the flow of water through Bonny Reservoir. The resolution described how Colorado plans to utilize the USDA (Conservation Reserve Enhancement Program (CREP) or other programs to retire up to 25,000 acres in the South Fork Republican River basin by 2027. The resolution also included plans for the States to meet to resolve the Beaver Creek issue for all Water Short Years with unapproved accounting. The resolution concluded with details about how to resolve any disputes between

the states that may arise, procedure for termination of the agreement and reviewing the resolution and progress in 2024.

May 2017 Accounting Procedures Update

At a special meeting of the RRCA on May 25, 2017, the RRCA approved and adopted the revised Accounting Procedures and a resolution specifying that the changes should be used for accounting for 2007 and subsequent years until amended by the RRCA.

The same resolution also clarified that if a state provides a notice of intent to terminate for the August 24, 2016, resolution related to Harlan County Lake for Compact Call Years or the resolution related to operation of Colorado Compact Compliance Pipeline and Colorado's Compliance efforts in the South Fork Republican River Basin, then Nebraska or Colorado, respectively, shall not receive Resolution Water Supply Credit after December 31 of the second full year following the RRCA's receipt of a Notice of Intent to Terminate.

August 2020 Accounting Procedures Update

An update to the Accounting Procedures was made at the August 21, 2020, annual meeting in recognition that the Accounting Procedures do not properly implement the Flood Flow provisions at the Hardy gage with respect to the calculations of the Computed Water Supply above and below Guide Rock, a solution for which had not been obtained prior to the annual meeting. The Engineering Committee's annual report included an attachment documenting the exchanges between the states that had occurred to date towards resolution of the issue. (Reference 2020 annual report when available).

The update to the Accounting Procedures included footnotes to Section III.B.1. – the section describing Flood Flows in the calculation of Computed Water Supply, Section III.H. – the section describing calculations above and below Guide Rock during Water-Short Years, and Attachment 6 – a table outlining the calculations for computing water supplies and consumptive use above Guide Rock. The footnotes reflect the Engineering Committee's findings as described in their annual report.

IV. Groundwater Model Versions

Three versions of the RRCA Groundwater Model, officially designated as 12p, 12s and 12s2, have been used by RRCA to compute each state's CBCU and imported water supply credit. The three versions differ in how streams and reservoirs and associated accounting points are represented. The model versions are listed below, starting with the first version designated 12p. That version was replaced by version 12s in 2005 and then by the current version 12s2 in 2010. Follow the provided links for full details on each version of the model.

1. Original model version 12p was adopted as the final version for the accounting years 1918-2000; click the link for full details on this original model version. <http://www.republicanrivercompact.org/v12p/index.html>.
2. The next model version 12s, approved January 12, 2005 and used for accounting years 2001-2006, corrected stream routing errors discovered in the 12p version along Medicine Creek above Harry Strunk Reservoir; click the link for full details on this model update for 2005. <http://www.republicanrivercompact.org/2003/index.html>.
3. Currently used (2010) model version 12s2, approved August 12, 2010 and used for accounting years 2007 to present day, involved only changes to accounting point locations for Guide Rock and the North Fork Republican River, and did not involve model changes to how streams and reservoirs are represented; click the link for full details on this current model version. <http://www.republicanrivercompact.org/2007/index.html>.
 - a. Parameter-elevation Regressions on Independent Slopes Model (PRISM) (August 30, 2011) - Missing Precipitation Data for RRCA Groundwater Model 2008-Onward. Beginning in 2008, monthly precipitation data became unavailable for several of the 34 National Weather Service weather stations used in the RRCA groundwater model. For years 2009 and 2019, the RRCA agreed to use monthly PRISM data as a substitute for missing months used to calculate the annual sums. The RRCA approved using this method for missing precipitation data at the RRCA annual meeting on October 16, 2012. The entire PRISM discussion is found as Exhibit A to the Engineering Committee report to RRCA on pages 801-822 in the 52nd annual report.

V. Accounting Adjustments

This section provides an overview of accounting provisions impacted by a series of agreements implemented by the states starting in December 2013 and continuing through until the adoption of long-term agreements approved at the 2016 annual meeting, which were incorporated into the August 24, 2016, version of the Accounting Procedures. While the official accounting of the RRCA did not ultimately reflect the accounting provisions contained in the interim agreements, this section outlines those accounting provisions that were impacted through each successive

agreement to provide context to the preliminary accountings that were being developed and reviewed by the states during this timeframe.

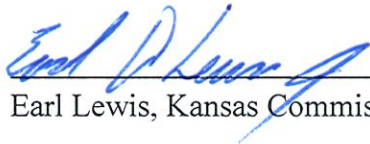
- December 2013 – At a special telephonic meeting on December 19, 2013, the States approved a resolution for a Temporary Augmentation Plan and Related Accounting Procedures for the Colorado Compact Compliance Pipeline for 2014.
- October 2014 – At a special telephonic meeting on October 22, 2014, the States approved a resolution that included adding water to the “Imported Water Supply Credit” and the “Imported Water Supply Credit Above Guide Rock” and reducing the “Virgin Water Supply” of Rock Creek and Medicine Creek for 2014 only. An account was established in Harlan County Lake for use by Kansas during the irrigation season.
- October 2014 – At a special telephonic meeting on October 22, 2014, the States approved a resolution for a Temporary Augmentation Plan and Related Accounting Procedures for the Colorado Compact Compliance Pipeline. The plan description and related changes to the accounting procedures and groundwater model were attached as exhibits. There were twenty-three terms and conditions outlined in the resolution.
- November 2014 – The next Harlan County Lake agreement was signed at a special telephonic RRCA meeting on November 19, 2014. The States approved a resolution detailing how Nebraska’s 2015 compliance operations shall be recorded in the “Imported Water Supply Credit” and the “Imported Water Supply Credit Above Guide Rock” while at the same time reducing the “Virgin Water Supply” of Rock Creek and Medicine Creek by the amount of 2015 augmentation discharges to those creeks. Water delivered to Harlan County Lake and deposited into a Kansas account would be assessed a portion of the monthly evaporation charges based on the amount of water in the account.
- March 2015 – On March 6, 2015, at a special telephonic RRCA meeting the States approved an addendum to the November 19, 2014, resolution that provided Nebraska additional flexibility to achieve compact compliance if there is a shortfall as well as detailing adjustments to the compact accounting as a result of compliance actions.
- August 2015 – A resolution was approved on August 27, 2015, regarding accounting adjustments and agreements related to the operation of Harlan County Lake for Compact Year 2016. Specifically, the accounting offset for Nebraska’s 2016 compliance operations shall be recorded in the “Imported Water Supply Credit” and “Imported Water Supply Credit Above Guide Rock” columns of Nebraska’s Take 3 and Table 5c respectively, which, for the 2016 Compact Accounting for Nebraska, will be increased by the amount of augmentation water delivered into the Kansas Account pursuant to Provisions 3 and 5 of the resolution. In 2016 and, as necessary, the 2015 and 2017 Virgin Water Supply of Rock Creek and Medicine Creek will be reduced by the amount of augmentation water supplied between October 1, 2015, and April 1, 2017, in the year pumped.

The 2021 annual report of the Republican River Compact Administration is hereby approved by unanimous vote on this 31st day of August, 2022.



Thomas Riley, Nebraska Commissioner

DATE SIGNED: 31 Aug 2022



Earl Lewis, Kansas Commissioner

DATE SIGNED: 8/31/2022



Kevin Rein, Chair and Colorado Commissioner

DATE SIGNED: 8-31-2022