Minutes

Second Annual Meeting
Republican River Basin-Wide Plan

Virtual via Zoom
November 9, 2020
2:00 p.m. Central Time

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Attendance

28 people were in attendance. Those that signed in are listed below.

Meeting Participants

Representing the Nebraska Department of Natural Resources (NeDNR):
Justin Ahern
Jesse Bradley
Kari Burgert
Alexa Davis
Elizabeth Esseks
Carol Flaute
Andrew Mwape
Andy Pedley

Representing the Republican Basin Natural Resources Districts (NRDs):
Scott Dicke, Lower Republican NRD
Nate Jenkins, Upper Republican NRD
Jack Russell, Middle Republican NRD
Todd Siel, Lower Republican NRD
John Thorburn, Tri-Basin NRD

Other presenters:
Brad Edgerton, Frenchman-Cambridge Irrigation District

Guests

Wayne Anderson
Deborah Colbert
Karl Dietrich, JEO Consulting Group, Inc.
Chelsea Erickson, Kansas Division of Water Resources
Keith Koupal, Nebraska Game and Parks Commission (NGPC)
David Kracman, The Flatwater Group
Miles Morgan, United States Bureau of Reclamation
Sarah Nevison, NGPC
Richard M Nicolas
Roric Paulman
Yangbo Peng, University of Wisconsin
Jay Rempe, Nebraska Farm Bureau
Chance Thayer, The Flatwater Group
Marcia Trompke

Summary of Meeting

1. Welcome and introductions by Carol Flaute, NeDNR
    a. Nebraska Open Meetings Act requirements – Carol Flaute. An internet link to the agenda, a copy of the Nebraska Open Meetings Act, and the meeting handouts was posted in the Zoom chat box.
    b. Review agenda and meeting objectives – Carol shared the agenda on the computer screen and reviewed the meeting objectives and agenda items ("Second Annual Meeting Republican River Basin-Wide Plan Agenda," Attachment A).
    c. Introductions –Carol noted that there were almost 30 people in the Zoom chat. Carol introduced herself and other staff from NeDNR. The NRD managers introduced themselves and their staff. Carol noted that the meeting was advertised as a virtual Zoom meeting, with the option of participating in person at the NRD offices. Carol asked other people participating in the Zoom call to type their name and affiliation into the Zoom chat box, and any members of the public attending the meeting at an NRD office to sign the attendance sheet.
2. Plan implementation progress - The annual report (*DRAFT Second Annual Report for the Republican River Basin-Wide Plan,* Attachment B*)* was shared on the screen. Carol reminded the group that at the first annual meeting in February 2020, a lot of time was spent going over the details in the annual report as background on how reporting was going to be done. She said that this year we will not be reviewing every detail in the report; instead, we will be doing an overview of where to find the information in the report and what's new from last year's report. Carol noted that the second annual report is a final draft. The Basin-Wide Plan requires that we exchange reports before the annual meeting. Like last year, we went a step further and combined the separate reports into one report. The final draft is under final review. The final report will be uploaded to the website (rrbwp.nebraska.gov), and we will send out a GovDelivery email to people on the GovDelivery list when the report is available for download. Carol reminded the group that the annual report is a report of plan progress for 2019, including management activities and measurable hydrologic objectives, and information about water supplies and uses in the basin.
    a. Annual Report: Plan Implementation Progress 2019 - Carol
        i. Progress toward Goals, Objectives, and Action Items

1. Management activities (page 4 of Annual Report) – Carol told the group that there is a lot of new information in this section since the first Basin-Wide Plan annual report.
    a. Progress snapshot (page 6 of Annual Report) – Carol described the progress snapshot. This is a visual summary of progress for each action item for the plan goals and objectives. Carol referred to the key with symbols indicating information about the action items, including the timeframe when the action is to take place, whether action was taken, and progress on the action. The snapshot also includes clickable links to more detailed explanations of how the symbols were picked (i.e., more detailed information about progress for the action items).
2. Measurable Hydrologic Objectives (MHOs) (page 40 of Annual Report)
    a. Carol explained that the objectives were set into the plan by stakeholders, the NRDs and NeDNR to assess measurable progress on the plan. There are five MHOs total. Three will be discussed today because those three are evaluated annually (MHOs A, D, and E). MHOs B and C will be evaluated every five years beginning in 2023, so there is nothing to report on MHOs B and C for 2019.
    b. For each MHO assessment, the report contains a description of the assessment and a table of results.
        i. MHO A (page 40 of Annual Report) – This MHO is to maintain each NRD's net groundwater depletion to streamflow within its portion of Nebraska's allowable groundwater depletions to streamflow. The MHO is being achieved if each NRD's actual depletions were within its allowable depletions to streamflow. For 2019 this MHO is being met, so no further discussion is needed. The annual report includes a table with details about how the assessments were done for MHO A. For Tri-Basin NRD, MHO A success is defined in the TBNRD IMP, which is the hydrologically balanced assessment. The symbols and definitions are different from the

other NRDs because the TBNRD test works differently and the timing of when the NRD takes action to make up for differences is different.

ii. MHO B and C (page 45 of Annual Report) – No assessment is required for 2019.

iii. MHO D (page 45 of Annual Report) – This MHO is to continue existing and new actions to reduce the need for special regulations in the rapid response area for compact compliance. MHO D is being achieved if the NRD did not need to curtail pumping within the Rapid Response Area for Republican River Complact (Compact) compliance as specified in the NRD's IMP. In 2019 there was no need to curtail groundwater pumping within the rapid response area for compact compliance, so no further discussion was needed. TBNRD is not listed because there is no portion of the rapid response area that is part of the TBNRD.

iv. MHO E (page 46 of Annual Report) – This MHO is similar to MHO D but looks at whether surface water was administered as a management action to get enough water for Compact compliance. Surface water was not administered to ensure compact compliance in 2019, so no further discussion was needed.

ii. Water supplies and uses in the basin (data and information about the basin for 2019; page 48 of the Annual Report)

1. Carol explained that each district reports information about groundwater supplies and uses, and NeDNR reports surface water information about the basin as a whole.
2. All the NRDs' sections are arranged the same way, including current allocations; annual groundwater use for irrigation; and a summary of conservation and retirement programs and how many acres are involved. Also, there is a basin-wide map of groundwater level and observation well locations, and information about the curtailment of groundwater pumping

for compact compliance. There was no curtailment of groundwater pumping for compact compliance in 2019.

3. The NeDNR section includes annual precipitation; annual streamflow; irrigated acres; allocation and Computed Beneficial Consumptive Use (CBCU); reservoir storage and evaporation; surface water municipal and industrial CBCU; surface water administration for compact compliance; and a qualitative evaluation of the net effect of management actions for compact compliance. No surface water management actions were required for compact compliance in 2019.

iii. Augmentation Pumping and Net Impacts Analysis (page 73 of Annual Report)

1. This is part of the IMPs for Upper, Middle, and Lower Republican NRDs. The analysis summarizes how much augmentation pumping occurred and then looks at the depletions from augmentation versus expected depletions if the land had been irrigated. That analysis provides information about whether management actions (offsets) are necessary to make sure that those projects are not affecting other water users who are senior.

b. Drought planning exercise – Andy Pedley and Andrew Mwape, NeDNR. One of the largest ongoing projects is planning for a basin-wide drought planning exercise.

i. Andy introduced himself and described the action item focused on a drought planning exercise. This is objective 2.8, action item 2.8.1, which is to organize and participate in a basin-wide drought planning exercise. The purpose of the drought planning exercise is to increase understanding of the needs for and logistics of storing water in case of a drought; to evaluate existing and potential new management actions; and to develop metrics that can be used to evaluate future management actions that might be taken in case of drought. Andy explained that NeDNR partnered with the National Drought Mitigation Center and the Republican Basin NRDs to bring on a graduate research assistant to start a two-year graduate research assistant project. The project will involve doing a lot of the research and organizing for the drought planning exercise project.

ii. Andrew, the project's graduate assistant, gave a PowerPoint presentation about the work he accomplished this semester, including where the group is in the drought planning exercise

process and next steps moving forward ("Republican River Basin Drought Scenario Exercise," Attachment C).

1. Andrew clarified that in this context drought refers to water shortage or deficit in the Republican River Basin as the result of extreme temperatures or below normal precipitation.
2. Andrew presented data about temperature and precipitation trends from 1900 to present. Recent drought years included 2003 and 2012. Andrew stated that drought is inevitable in the Republican River Basin, and it has occurred in recent years.
3. The purpose of planning for drought is to minimize the effects of drought. Drought not only affects water levels but has other direct and indirect effects. Examples of impacts from previous droughts include loss of production (which affects food security and finances of farmers and ranchers); low water levels affected recreational activities; drought caused additional stress on farmers and ranchers; wildfires in Hitchcock county posed threats to biodiversity and public health (because of poor air and water quality); livestock activity in the Basin was reduced because of reduced grazing lands; and there was an increase in the growth of invasive species which had an impact on grazing land. Planning for drought can minimize the impacts of these effects.
4. Since water is a common resource, a collaborative and diverse water plan is extremely important to ensure readiness for drought-induced water shortages. Drought eventually affects everybody.
5. Scenario-based drought planning exercises are innovative and creative ways to bring together community leaders, decision-makers, government staff and stakeholders in collaborative discussions about planning and policy issues related to drought. The scenario-based planning exercise brings these people together and exposes them to a hypothetical drought to stimulate creative thinking about response and adaptive strategies. The exercise can help identify gaps and vulnerabilities; improve communication and relationships among stakeholders; clarify roles in drought response; test and improve organization and coordination involved in drought response; and practice decision-making about drought management and using operational tools.

6. Scenario-based exercises have three components, including the narrative, events, and technical details. The narrative is a general story about what is happening. The events include what happened and when it happened. Technical details include data.
7. The two types of scenario-based planning exercises are discussion-based exercises and operational-based scenario exercises. Discussion-based exercises focus on participant engagement, and include workshops, games, and table-top exercises. Operational-based exercises are more realistic and are functional exercises.
    a. The workshop option is useful to develop a specific component of a drought plan.
    b. The game option helps promote team building and is a holistic approach to drought planning.
    c. A table-top exercise is ideal to test the effectiveness of an existing drought plan.
    d. A functional exercise is intended for the staff who will execute the drought plan, and is realistic, complex, and costly.
8. Andrew reviewed the tables in his presentation that describe the exercise options and different considerations (such as desired outcomes, cost of resources, and participating audience), and concluded his presentation.

iii. Andy indicated that this is the first phase of a two-year project, and the next step will be a meeting with the NRD managers in December to look at different options for the scenario exercise. Discussion during that meeting will determine work to be done next semester. Andrew's presentation is a summary of the current state of the project.

c. Feasibility and potential impacts of planned projects – introduction by Carol – The purpose of this part of the meeting is to give updates on projects that are being planned; to discuss what has been done for background research and preparation to evaluate the feasibility; and to prepare to do the projects. Carol introduced Todd Siel to provide updates on a potential new water storage project and the Platte-Republican Diversion Project.

    i. Update on LRNRD potential new storage project – The potential new water storage project is part of three different grant applications

LRNRD submitted to the United States Department of Agriculture Natural Resources Conservation Service Watershed and Flood Prevention Operations Program (USDA NRCS WFPO Program). The NRD has applied for three watershed grants for watersheds in their district. Todd said that they expect to hear back about whether the grants have been awarded to LRNRD sometime in 2021. The project will include an environmental assessment and assessing the feasibility of alternatives, and then determining what those goals and objectives would be to help with the district's IMP. A water storage facility is one option.

ii. Platte to Republican Basin High Flow Diversion Project (PRD) – Todd reported that on October 29, 2020, they received a notice and order from the NeDNR acknowledging receipt of their amended application and amended water service agreement with CNPPID. The two main items in the amended application were the result of a "show cause" hearing that occurred in June 2019. There was an order put forth by NeDNR in February 2020 that CNPPID was dismissed as an applicant, and also there was a name change that was amended into the application (Platte to Republican Basin High Flow Diversion Project) so the name would be consistent with their interlocal agreement. The order received from the Department in October 2020 confirmed that the amended application and amended water service agreement are in compliance with the order from February 2020. PRD is the sole applicant and the sole owner of the appropriation. That is the update on the state of the PRD application.

3. Collaboration – introduction by Carol
   a. Existing and potential new water conservation programs
      i. District new/ongoing telemetry projects –
         1. Nate Jenkins, URNRD – Three to four years ago, the URNRD started looking at telemetry to streamline the district's administration of water usage, to make sure that people were staying within the district's allocation, and to allow farmers to track their water usage. Many of the irrigation tools available now are better utilized if the producer has real-time water usage data. The district looked at a few telemetry options, including digital flowmeter heads that transmitted water usage data using cellular and satellite communication. The pilot testing with satellite had good communication capability and data transmission, but it was very expensive ($6.50 per

meter per month, for 3300 meters in the district). With cellular, they encountered problems because of poor coverage in the district. The cost for cellular communication was lower ($4 – $4.50 per meter per month), but the technology wasn't reliable. While they were looking at these options, Highline Electric Association (HEA) in Holyoke (CO) was completing a radio network to collect their electric readings remotely. HEA provides electricity to approximately half of URNRD. HEA agreed to help with the district's project and allowed URNRD to piggy-back on their radio network with the district's flow meters. The radio network was tested for a year, and it worked very well. Data transmission and communication were very reliable, and the technology is much cheaper at $1.50 per meter per month; that price is expected to decline over time. Grant funds helped a lot with this project, including a $300K WaterSMART grant and $375K from the Water Sustainability Fund (WSF). The district plans to pursue more grants in the future. For a timeline, 860 units have been installed of 3300 total, and the district plans to install 450 more during the winter and spring. Three full-time technicians and one part-time technician are doing all installation. To conclude, the district isn't doing anything cutting edge technologically, but they've learned that it's a matter of finding what works for you. They took their time and landed on something that works, and the district hopes to wrap up this project in the next three years or so.

2. Jack Russell, MRNRD – The district started three or four years ago with a WSF grant installing high-tech management systems, including telemetry on meters and telemetry with soil moisture probes. The district has installed approximately 100 systems. The preliminary project led them to work with (American) McCrometer Company (using McCrometer FlowConnect, which is telemetry-equipped meters). The district was approved for a WaterSMART grant to put 1000 meters in the high depletion area. Approximately 40 percent of those meters have been installed. The district has applied for a WaterSMART grant to put an additional 1000 meters in the high depletion area where there are mostly likely to be declines. The district will benefit from the information and plans to make the information available to producers also. The

district was notified last week that it has been awarded an Environmental Quality Incentives Program (EQIP) grant that targets WaterSMART projects, and that grant will fund soil moisture probes. The district has a total of 2600 to 2700 meters. They have the same concerns about the reliability of cell service that were voiced by URNRD, but so far, they have been able to get reliable readings.

3. Todd Siel, LRNRD – The district is in a pilot project now with a WaterSMART grant, and they are looking at different possibilities for telemetry for the district's 3200 mechanical water meters.

ii. District new/ongoing Water Resources Cash Fund (WRCF) retirement programs – Nate, Jack, Todd

1. Nate, URNRD – Nate explained that retiring irrigated acres that have a high impact on streamflow is another way to stay in compliance with the compact. The district has a WRCF grant ($6M) and $4M of their own money to retire irrigated acres to help maintain compact compliance and reduce groundwater declines. The district decided to use that money to retire as many acres as possible near the Republican River and its tributaries to minimize impacts on streamflow. The district is focusing on the CREP area, or the old quick response area, which is approximately 2.5 miles from the river and its tributaries. They took bids from landowners in the CREP area to gage interest in the program, and to decide whom to fund and which parcels to retire. The district was surprised at how much interest there was (they received $17M in bids to retire 6,000 acres). The bids were scored based on the cost per acre-foot; the lower the cost per acre-foot, the higher the bid ranked. After the ranking process, fifteen landowners were funded to retire approximately 3400 acres. The average water use on the ground for acres being retired is almost 12 inches, which is the district-wide average. The average stream depletion factor (SDF) is 57 percent. The average cost per acre is $2730, which is in line with a private market cost to transfer certified acres. The district is happy with the interest in the retirement program, and they are making progress on the agreements to retire the acres. Over time, the retired acres will result in a reduction of 3300 acre-feet annually.

2. Jack, MRNRD – The district also retired acres with WRCF money. They received four offers to retire 267 acres permanently, with most of those acres in high depletion zones. The district is going through another round of bids, and they are taking sign-ups. They anticipate looking at several more offers to retire acres.
3. Todd, LRNRD – The district has a WRCF contract with NeDNR that would include retirements, but they haven't retired any acres or announced plans to retire acres. The district's total amount of money is a $3.3M match from NeDNR plus the district's match. Carol clarified that WRCF money can be used for a variety of projects that meet the criteria in statute for the WRCF.

iii. CREP – Carol

1. All Republican River districts have acres enrolled in the CREP program. In 2019 and 2020 a lot of acres came out of the CREP program, and people have asked about how re-enrollments have been progressing. Carol gave an update with information from the permitting division at NeDNR. ("CREP Acres" PowerPoint slides, Attachment D)
    a. For 2019, there were few changes to the total number of CREP acres in the basin, because the numbers of expiring, re-enrolled, and new acres were low relative to the total number of CREP acres. There were more new enrollments than expirations in the three districts with 2019 changes in CREP acres (there were no changes for TBNRD in 2019).
    b. For 2020, the preliminary data for all four districts indicate that the number of acres with contracts expiring was very large compared to the total number of acres in the CREP program. The majority of acres scheduled to expire in 2020 have been re-enrolled.

iv. Water Conservation Incentive Program (WCIP) - John Thorburn, TBNRD

1. This voluntary allocation program started off focused on groundwater users. The landowner agrees to a five-year allocation of their water use on their land. The landowner can only use the total amount allocated, which is based on certified acres, but can use it on any part of their land (not just

acres that are certified for groundwater irrigation). So far, the district has enrolled 1449 acres in the Republican Basin and an additional 125 acres in the Platte Basin.

2. TBNRD has another option for landowners outside the Republican River Basin who have commingled parcels (groundwater wells and CNPPID service). If those landowners limit their groundwater use to 1 acre-inch per acre per year, the district will pay for the cost of delivery of CNPPID water (which is approximately $35 per acre per year). If the landowner uses more than 1 acre-inch of groundwater, TBNRD will deduct $5 per acre-inch from the payment for every inch over the 1-acre-inch voluntary allocation. The incentive is to use surface water instead of groundwater; groundwater should be supplemental to surface water. The district hopes that the incentive will have the double benefit of reducing groundwater pumping and increasing groundwater recharge from surface water use. The district has enrolled 3500 acres and expects more applications.
3. The district has funds to enroll 12,000 acres for the two options. The district isn't required to have allocations, but these programs encourage landowners to become more efficient.

v. Collaboration with irrigation districts

1. Examples from report – Carol
    a. Several examples are summarized in the annual report. Either NeDNR is funding a portion of a project with WRCF money, or one of the NRDs has pledged to contribute money, or NeDNR has collaborated during the planning phase of a project. In the Frenchman-Cambridge Irrigation District (FCID), NeDNR and MRNRD have supported projects. In the Nebraska Bostwick Irrigation District (NBID), the irrigation district, NeDNR and LRNRD have collaborated on projects, and Kansas Bostwick Irrigation District (KBID) has offered support on one project. One NBID project is the automation of the headgates of the Courtland-Superior canals. Also, NBID recently submitted a project for a WaterSMART grant.
2. FCID water conservation projects update - Brad Edgerton

a. FCID completed a canal automation project on the Cambridge canal during the summer of 2020. The district has Rubicon's total channel control implemented to the bottom of the canal, and it worked well in July and August. This year was really telling because it was very dry during the irrigation season, and the district delivered a lot of water.
b. The district is also looking at water-ordering software for the district's producers under the same system. The district will explore options on how to implement that on the Cambridge canal.
c. The district was awarded a WaterSMART grant from the United States Bureau of Reclamation (USBR) and some Colorado settlement money from NeDNR to do canal automation on the Meeker-Driftwood canal. They are installing equipment for that project. Brad expects that 80 percent of the new gates will be installed by the 2021 irrigation season. The district installed 14 miles of new gates before the 2020 irrigation season.
d. Roric Paulman asked a question about the water-ordering software project. He asked Brad if producers will have access to real-time water delivery data or canal operation data. Brad confirmed that producers are getting canal operation data but said that if they can get the water-ordering software online, producers will have access to ordering water online and their account balances. Rubicon has provided the same service in Australia, and this is the next step in doing the canal automation. Brad said that they are trying to do a pilot project of the water-ordering software for the next irrigation season.

3. Carol added that NeDNR is in discussion with Frenchman-Valley Irrigation District (FVID) about ideas for collaboration on potential projects. MRNRD and FVID have collaborated on projects in the past.

b. Information sharing about water user management practice improvements - Carol
   i. Future opportunities to encourage and support water users to share information about management practice improvements-Carol

explained that the idea behind this item in the Basin-Wide Plan is to look for opportunities to encourage and support water users who are doing great things to share information with others about management practice improvements. We want to find out who is doing great things and might be willing to present, write an article or in some way share their knowledge or success story with other people in the basin. Also, we will think about who we might want to bring in to give updates at this meeting in future years.

ii. In February 2020 we discussed upcoming outreach events and opportunities, but the pandemic curtailed most outreach opportunities. We don't have an update and we didn't invite anyone to speak at this meeting because of the uncertainties associated with the pandemic.

iii. Carol asked attendees to contact her or one of the NRD managers if they have ideas for events that they would like to be connected to or if they would like to give an update to the group about their success stories at next year's meeting.

iv. Carol invited attendees to share information about virtual outreach opportunities, events that they know are happening, their own experiences, or opportunities to learn from others about water management.

1. Nate Jenkins mentioned that URNRD is working with the Water for Food Institute on developing a phone application that will allow producers to get reliable, location-specific evapotranspiration (ET) forecasts. The app will use remote sensing and ground-truthing through Eddy Covariance (EC) towers (research-grade ET instruments). The producer will be able to see what the ET has been and get a forecast. URNRD and UNL will be convening a group of farmers to provide input on what they would like to see in the app and parallel website. Carol asked how farmers will be contacted to participate. Nate explained that he's not sure how they will recruit farmers, but he will follow up with Carol once the outreach plan has been finalized.

4. Conflicts Resulting from Implementation of the Plan, if any – Carol (procedures found on page 99 of *Republican River Basin-Wide Plan*)

a. The Basin-Wide Plan includes conflict resolution procedures for any conflicts resulting from implementation of the Plan.

b. No conflicts were submitted for consideration prior to this meeting.

5. Public comment
    a. Marsha Trompke (CNPPID) asked if the 2014 – 2018 report will be the first report submitted to the legislature. Carol explained that the report to the legislature is every five years, following the five-year technical review. The first technical review to evaluate progress on the plan as defined in statute will be in 2023. From that review there will be recommendations about whether the plan needs to be updated or any actions need to be taken. The results of the five-year technical review will be presented at the annual meeting at the end of 2023. In early 2024, the report will be made to the legislature summarizing that analysis.
    b. Roric Paulman described the coordination effort between himself, Paige Wireless and UNL called Smart Farm. The Paige Wireless LoRaWAN® network was installed over Roric's farm. They are working with the UNL Institute of Agriculture and Natural Resources through Dr. Ron Yoder and Dr. Chittaranjan Ray, and Water for Food to make a test bed for technologies. They have interesting technologies for soil moisture monitoring, imagery, and other new equipment that they will put to ground and test. Other parameters to be monitored include carbon and nitrous oxide exchange.
    c. Roric Paulman also made a public comment. It was a tough year as a producer on the pumping side for his business, with only 1.2 inches of rain in late July. It was very challenging to get through the season and try to preserve the water resource and his financial integrity. That was a real balancing act. He said that he appreciates what everyone is doing in terms of communication and efforts to get better data to producers.
    d. Carol made a follow-up comment addressing Mr. Paulman's comment about sharing data. In the water supplies and uses section of the 2019 annual report, only data for 2019 were reported. The intent is for data from 2014 through 2018 to be available on the Republican River Basin-Wide Plan website (rrbwp.nebraska.gov). For some of the data-reporting elements in the annual report, additional data are available on the website under the plan implementation tab.
6. Annual Reports for the Integrated Management Plan for Republican Basin Portions of Tri-Basin NRD - John Thorburn and Carol
    a. TBNRD report – John ("2019 Annual Report of Integrated Water Management Activities in the Republican Basin Within Tri-Basin NRD," Attachment E)
        i. John indicated that the report had been sent to the NRDs prior to the meeting. The cover picture is of the Platte-Republican Diversion

prescribed burn that took place in the spring of 2020. That site is being used as a demonstration of good range management.

ii. John reviewed the geographic area covered by TBNRD. He explained that the district writes similar annual reports for the portions of the NRD that are in the Platte and Little Blue basins.

iii. John reviewed the data summarized in the report, including certified irrigated acres and groundwater transfers. He explained that it is challenging to be granted a correction of certified irrigated acres in TBNRD. Landowners also report actual irrigated acres to the district. Transfers of irrigated acres were one-to-one transfers. If someone is transferring from a low to a higher depletion area, the district requires a proration of those acres to reduce impact to the stream.

iv. TBNRD requires groundwater transfers when a person wants to pump water from their property onto someone else's land. Generally, these situations involve adjacent parcels owned by different people that have a center pivot running over both parcels with the irrigation well located on one parcel.

v. John reviewed well construction permits and variances. The district only had three replacement wells permitted in 2019.

vi. Municipal and industrial accounting is summarized in the report. John noted that the City of Arapahoe's wellfield is located in Gosper county, which is in the Republican Basin portion of TBNRD.

vii. TBNRD requires landowners to report annual water use from all irrigation, commercial, and industrial wells; flowmeters are mandatory on these wells. The district spot-checks approximately 20 percent of water use reports. In Union township, which has a mandatory allocation, the district does read all flowmeters.

viii. John referred to the district's Water Conservation Incentive Program, which was discussed earlier under the Basin-Wide Report section titled "Collaboration: Existing and potential new water conservation programs (section iv)."

ix. John referred to the discussion of acres retired under the CREP program in the Basin-Wide Report section titled "Collaboration: Existing and potential new water conservation programs (section iii)."

x. John mentioned that the district has an active program with CNPPID to capture excess flows from the Platte River, divert those flows through the CNPPID canal system, and discharge the excess flows into Elwood reservoir, the E-65 canal, and five federally-owned wetlands. The wetlands are in the Platte basin, but several are close

to the Republican basin. The high flow diversions declined because of problems with water seeping around the impoundment at Elwood reservoir, which is an important storage resource for excess flows in the Republican basin. Because of those problems, the level at Elwood reservoir has been kept lower recently.

xi. John noted a few corrections to appendix labels.

xii. John mentioned that TBNRD has an extensive network of dedicated observation wells.

b. NeDNR report for the Republican Basin Portions of Tri-Basin NRD – Carol ("2020 Report of 2019 Data by the Nebraska Department of Natural Resources To Meet the Requirements of the Integrated Management Plan for those Portions of the Tri-Basin Natural Resources District within the Republican River Basin," Attachment F)

   i. Carol indicated that the NeDNR report for the Republican Basin Portions of Tri-Basin NRD is available on the ShareFile site and will be posted to the NeDNR website. TBNRD and NeDNR write separate IMP reports for the district's Republican Basin IMP.

   ii. Carol reviewed the contents of the report and reiterated that the report is for 2019, except for the stream gage data which has a different date range.

   iii. Carol reported that there were no new surface water permits, dam permits, or new groundwater transfer permits that NeDNR is required to report.

   iv. No surface water was reported as being diverted from natural flow for irrigation purposes.

   v. NeDNR estimated annual evaporation from reservoirs. TBNRD does not have any reservoirs larger than 200 acre-feet in the Republican Basin portions of the NRD. Evaporation from small reservoirs (15 – 200 acre-feet) was estimated to be 91 acre-feet.

   vi. There were no offsets necessary for depletions in 2019, and there were no estimated depletions from permitted new or expanded uses.

   vii. Stream gage data are found in Figure 1 in Section 3. There are four stream gages that measure flow in the district. There is a chart and a link to where data can be downloaded from the NeDNR stream gaging website. Dark blue data is final and light blue is preliminary data. There were several big precipitation events in 2019 during the spring and summer. In the slides everything above 50 cubic feet per second was truncated for display purposes.

The meeting ended prematurely due to teleconferencing technical issues. The only thing remaining to cover, at the time when the meeting ended, would have been section IV of NeDNR's report about progress on the IMP for the Republican Basin portion of TBNRD. Everything that would have been covered on this topic is available in the report. In total, the meeting lasted 2 hours and 2 minutes. NeDNR in agreement with the NRDs sent out an GovDelivery email covering the remaining agenda items and explaining the technical problems (Attachment G).

Attachment A, Agenda

Second Annual Meeting
Republican River Basin-Wide Plan

Monday, November 9, 2020
2:00 pm Central Time (1:00 pm Mountain Time)

https://us02web.zoom.us/j/81661780182
Meeting ID: 816 6178 0182
(Phone 1-312-626-6799)

Agenda

1. Welcome and introductions
    a. Nebraska Open Meetings Act requirements
    b. Review agenda and meeting objectives
    c. Introductions
2. Plan implementation progress
    a. Annual Report: Plan Implementation Progress 2019
        i. Progress toward goals and objectives of the plan
            1. Management activities
            2. Measurable Hydrologic Objectives (MHOs)
        ii. Water supplies and uses in the basin
    b. Drought planning exercise
    c. Feasibility and potential impacts of planned projects
3. Collaboration
    a. Existing and potential new water conservation programs
    b. Information sharing about water user management practice improvements
        i. Future opportunities to encourage and support water users to share information about management practice improvements
4. Conflicts Resulting from Implementation of the Plan, if any
    a. None submitted for consideration
5. Public comment
6. Annual Reports for Integrated Management Plan for Republican Basin Portions of Tri-Basin NRD

Attachment B, Annual Report

DRAFT Second Annual Report for the Republican River Basin-Wide Plan

Data and Progress Updates, 2019

Submitted at the Second Annual Meeting

November 9, 2020

Jointly prepared by

Upper Republican Natural Resources District

Middle Republican Natural Resources District

Lower Republican Natural Resources District

Tri-Basin Natural Resources District

&

Nebraska Department of Natural Resources

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Introduction

The *Republican River Basin-Wide Plan* (basin-wide plan) was developed by the Nebraska Department of Natural Resources (NeDNR) and the Upper Republican, Middle Republican, Lower Republican, and Tri-Basin Natural Resources Districts (NRDs), in consultation and collaboration with a Stakeholder Advisory Committee. The time frame to implement the basin-wide plan is approximately 25 years, spanning from the effective date of the basin-wide plan (March 1, 2019) to April 17, 2044, which is 30 years after the operative date of LB 1098 (2014), as specified in *Neb. Rev. Stat.* § 46-755.

Action Item 3.2.2 of the basin-wide plan specifies that NeDNR and the NRDs will annually exchange reports containing data and information about water supplies and uses in the Republican River Basin, management activities, and progress toward the goals and objectives of the basin-wide plan. This report contains the data and information about plan implementation progress for the 2019 calendar year, to be exchanged by NeDNR and the NRDs at the following year's annual meeting.

Progress toward Goals, Objectives, and Action Items

Progress toward the basin-wide plan's goals, objectives, and action items is described below, in two subsections. The "Management Activities" subsection summarizes progress toward the plan's goals, objectives, and action items. The "Assessment of Measurable Hydrologic Objectives (MHOs)" subsection contains the results of the MHO assessments used to evaluate overall plan progress. Specific progress report details can be found on the following pages:

Management Activities 4
- Progress Snapshot 6
- Progress Summaries 15

Assessment of Measurable Hydrologic Objectives (MHOs) 40
- MHO A Evaluation 40
  - MHO A Assessment Criteria 40
  - MHO A Evaluation Results for 2019 41
  - Tri-Basin NRD Hydrologically Balanced Assessment Results for 2019 43
- MHO B Evaluation 45
- MHO C Evaluation 45
- MHO D Evaluation 45
  - MHO D Assessment Criteria 45
  - MHO D Evaluation Results for 2019 46
- MHO E Evaluation 46
  - MHO E Assessment Criteria 46
  - MHO E Evaluation Results for 2019 47

Management Activities

Under *Neb. Rev. Stat.* § 46-755 (4), the basin-wide plan was required to include a timeline of up to 30 years after April 17, 2014, to meet the plan's goals and objectives. The basin-wide plan took effect on March 1, 2019. This section summarizes progress toward the basin-wide plan's goals, objectives, and action items during the 2019 calendar year, first as a visual snapshot of overall plan progress (beginning on page 6) followed by summaries describing progress on individual action items (beginning on page 15).

Two icons are displayed beside each action item in both the visual progress snapshot and the progress summaries. One symbol indicates when the action item is to be completed, according to the implementation schedule in the basin-wide plan. The other symbol indicates progress

made on that action item during 2019. Figure 1 is a key describing the meanings of the symbols used throughout the "Management Activities" section.

Republican River Basin-Wide Plan Progress Summary Key

Symbols indicating when action item is to be completed, per plan schedule

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years
To be completed when beneficial, feasible, and economically viable; at NeDNR and NRDs' discretion	To be completed every year	To be completed in every year that the triggering circumstances described in the plan occur	To be completed by a certain year; likely can be "completed indefinitely"	To be completed every five years, either corresponding with the five-year analysis or in the following year, as specified in the basin-wide plan

Symbols indicating progress during report year

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
Fully complete and no longer able to be worked on in the future	Recurring task completed during report year	Work on this action item is ongoing, generally progressing	Not completed as planned during report year	Not started as planned during report year	N/A Did not need to be completed during report year

Figure 1. Key to symbols used throughout the "Management Activities" section. The report year for this report is 2019.

Progress Snapshot

This section contains a snapshot of overall progress on the basin-wide plan's goals and objectives. Visual summaries of progress on each goal can be found in the following locations:

- Goal 1 visual summary: Table 1, beginning on page 6;
- Goal 2 visual summary: Table 2, beginning on page 9;
- Goal 3 visual summary: Table 3, beginning on page 13; and
- Goal 4 visual summary: Table 4, beginning on page 14.

Each of these four tables spans multiple pages.

Table 1. Visual summary of progress on Goal 1 during 2019. The "Time-Frame" column indicates the expected timeframe for each action item, as indicated in the basin-wide plan. The "Action Taken" column refers to whether the action item was worked on in 2019, and the "Progress" column contains more information about progress during 2019. For details about the progress on each action item, see the page number indicated in the rightmost column.

Action Item	Description	Time Frame	Action Taken	Progress	Page
Goal 1	**Maintain Nebraska's compliance with the Republican River Compact and applicable laws**				
Obj. 1.1	**Coordinate basin-wide management actions with Compact compliance efforts and adherence to state laws**				
1.1.1	*Review each basin-wide plan management action prior to implementation to ensure it does not negatively impact efforts to achieve Compact compliance in the most efficient and cost-effective way practicable while adhering to state laws.*		Yes		15
1.1.2	*Implement appropriate offsets for any basin-wide plan action that would exceed Nebraska's allocation under the Compact*		No	**N/A**	15

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate | Annually | Annually When Appropriate | By This Year | Every Five Years

Progress during report year:

Completed Indefinitely | Completed | Ongoing Progress | Not Completed | Not Started | Not Applicable This Year

N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Action Item	Description	Time Frame	Action Taken	Progress	Page
Obj. 1.2	**Understand effects of management actions for compact compliance on water supplies for State's water users**				
1.2.1	*Qualitatively evaluate the net effect on water supplies of any management actions that are taken for Compact compliance*		Yes		16
Obj. 1.3	**Assess progress toward meeting the goals and objectives of the Plan, and share the results of this assessment with the Public and the Nebraska Legislature**				
1.3.1	*Within five years after the adoption of this Plan, and every five years thereafter, conduct a technical analysis of the actions taken to determine the progress toward meeting the goals and objectives of the Plan*		No	**N/A**	17
1.3.2	*Evaluate progress toward each of the Plan's measurable hydrologic objectives at the intermediate dates specified in the Plan for each one.*				
MHO A:	*Maintain each NRD's net groundwater depletions to streamflow within its portion of Nebraska's allowable groundwater depletions to streamflow.*		No	**N/A**	17
MHO B:	*Limit groundwater depletions to streamflow to a relatively constant level over the long-term both across the basin as a whole and within each NRD*		Yes		17
MHO C:	*Ensure there is always enough groundwater for all groundwater uses within the timeframe of this plan, either by stabilizing groundwater levels or managing declining groundwater levels*		Yes		18
MHO D:	*Continue existing and initiate new actions that reduce the need for special regulations in the Rapid Response Area for Compact compliance*		No	**N/A**	19

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Action Item	Description	Time Frame	Action Taken	Progress	Page
MHO E:	*Continue existing and initiate new actions that reduce the need for administration of surface water use for Compact compliance*	ANNUAL	No	**N/A**	19
1.3.3	*Following each five-year technical analysis (Action Item 1.3.1), share the results of the analysis and any recommended Plan modifications with the public*	5	No	**N/A**	20
1.3.4	*Following each five-year technical analysis (Action Item 1.3.1) and any resulting modifications to the Plan, submit a report to the Legislature of the results of the analysis and progress made under the Plan*	5	No	**N/A**	20

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Table 2. Visual summary of progress on Goal 2 during 2019. The "Time-Frame" column indicates the expected timeframe for each action item, as indicated in the basin-wide plan. The "Action Taken" column refers to whether the action item was worked on in 2019, and the "Progress" column contains more information about progress during 2019. For details about the progress on each action item, see the page number indicated in the rightmost column.

Action Item	Description	Time Frame	Action Taken	Progress	Page
Goal 2	**Maximize Nebraska's efficient and beneficial consumptive use of its water, increase certainty for long-range planning of water supplies to reduce the need for regulatory actions, and increase collaborative efforts among water management entities and stakeholders across the Basin**				
Obj. 2.1	**Understand potential impacts of actions and establish standard procedure for projects**				
2.1.1	*For each planned new water management project in the Plan, evaluate hydrologic and regulatory feasibility and potential economic and environmental impacts*		Yes		21
2.1.2	*For each project evaluated in accordance with Action Item 2.1.1 in a given year, include a summary of the evaluation in the annual report of that year's activities*		Yes		21
2.1.3	*For projects that are feasible and beneficial, apply for necessary permits, establish new or utilize existing infrastructure, then begin operations*		Yes		22
Obj. 2.2	**Improve the efficiency of use, availability, and reliability of water supplies for current irrigators**				
2.2.1	*Work with irrigation districts and individual groundwater and surface water irrigators to improve the efficiency of the Basin's surface water delivery systems and irrigation water use, when it is both feasible and beneficial to Nebraska's Compact accounting balance*		Yes		22

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Action Item	Description	Time Frame	Action Taken	Progress	Page
2.2.2	*Participate in projects to improve the reliability, availability, and sustainability of water supplies in the Basin, which may include but are not limited to* • *Voluntary reduction of irrigated acres (temporary or permanent)* • *Interbasin transfers* • *Conjunctive management projects such as aquifer recharge or streamflow augmentation*		Yes		24
Obj. 2.3	**Provide opportunities for collaboration among Basin's water users**				
2.3.1	*Hold an annual public meeting to discuss Plan implementation and exchange information about the Basin*	ANNUAL	Yes		25
2.3.2	*Work cooperatively to investigate and address conflicts between water users resulting from implementation of this Plan by following the procedures for addressing conflicts that are outlined in this Plan*		No	**N/A**	26
Obj. 2.4	**Promote conservation programs available to the water users in the Basin**				
2.4.1	*Work together to identify, investigate, and discuss existing and potential new water conservation programs*	ANNUAL	Yes		26
2.4.2	*Collaborate to promote conservation program opportunities to the Basin's water users*		No	**N/A**	27
Obj. 2.5	**Understand how management activities of independent decision-makers affect water supplies**				
2.5.1	*Study the effects of conservation practices on streamflow, if feasible*	'28	No	**N/A**	27

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Action Item	Description	Time Frame	Action Taken	Progress	Page
2.5.2	*As part of each five-year technical analysis, analyze the future impacts to streamflow of past pumping to determine the lag time of these residual impacts*	5	No	**N/A**	28
2.5.3	*Examine and attempt to estimate the quantity of all inputs and outputs affecting the water supply balance in a small watershed, and consider using the results of this pilot study to create water use and land use guidelines for producers and other land managers, incentivize participation in recommended practices, and determine the value of completing similar studies across the Basin*	'28	Yes		28
Obj. 2.6	**Evaluate the feasibility and potential outcomes of establishing water markets in the Basin**				
2.6.1	*Cooperate in determining the feasibility of water markets in the Basin*	'23	No	**N/A**	29
2.6.2	*Following the water markets feasibility analysis (Action Item 2.6.1), test conclusions through implementation of a water market program in a pilot area, if feasible*	'28	No	**N/A**	29
Obj. 2.7	**Support the NRDs in management of allocations for irrigation purposes and surface water irrigation districts in management of the allotment of their water supply**				
2.7.1	*Periodically evaluate, as part of each five-year technical analysis, the impact of the groundwater allocation and surface water allotment systems as a whole*	5	No	**N/A**	29
2.7.2	*As needed, based on the evaluation described in Action Item 2.7.1, recommend changes or improvements to the groundwater allocation and/or surface water allotment systems*	5	No	**N/A**	30

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Action Item	Description	Time Frame	Action Taken	Progress	Page
Obj. 2.8	**Conserve water for future use during a drought**				
2.8.1	*Organize and participate in a Basin-wide drought planning exercise*	'23	Yes		30
2.8.2	*Following the drought planning exercise (Action Item 2.8.1) evaluate whether to recommend any changes to the IMPs or this Plan related to conservation of water for future use during a drought*	'24	No	**N/A**	31

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Table 3. Visual summary of progress on Goal 3 during 2019. The "Time-Frame" column indicates the expected timeframe for each action item, as indicated in the basin-wide plan. The "Action Taken" column refers to whether the action item was worked on in 2019, and the "Progress" column contains more information about progress during 2019. For details about the progress on each action item, see the page number indicated in the rightmost column.

Action Item	Description	Time Frame	Action Taken	Progress	Page
Goal 3	**Positive public relations, including information sharing, within and outside the Basin**				
Obj. 3.1	**Improve information sharing with decision-makers and public about solutions within the Basin**				
3.1.1	*Use existing resources to share information about Basin progress and activities with outside entities*		Yes		32
3.1.2	*Educate civic leaders and the public on implementation efforts within the Basin*		Yes		32
3.1.3	*Educate civic leaders and the public about the policies and institutional infrastructure that contribute to the development and implementation of solutions*		Yes		33
3.1.4	*Propose and support changes to laws, policies, and rules that would incentivize reduced water consumption*		No	**N/A**	35
Obj. 3.2	**Improve information sharing with water users who are reliant on the Basin's water supplies**				
3.2.1	*Share data and information related to the Republican River Compact with the public in an easily accessible, user-friendly format*	ANNUAL	Yes		35
3.2.2	*Annually prepare and exchange reports containing data and information about water supplies and uses in the Basin, and make these reports publicly known*	ANNUAL	Yes		36
3.2.3	*Regularly communicate with the Plan's former Stakeholder Advisory Committee about implementation progress and potential Plan revisions*	ANNUAL	Yes		36

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Table 4. Visual summary of progress on Goal 4 during 2019. The "Time-Frame" column indicates the expected timeframe for each action item, as indicated in the basin-wide plan. The "Action Taken" column refers to whether the action item was worked on in 2019, and the "Progress" column contains more information about progress during 2019. For details about the progress on each action item, see the page number indicated in the rightmost column.

Action Item	Description	Time Frame	Action Taken	Progress	Page
Goal 4	**When possible, pursue projects that not only benefit water supplies and uses, but also create benefits for fish, wildlife, recreation and conveyance within the Republican River Basin**				
Obj. 4.1	**Protect and enhance fish and wildlife habitat and recreational opportunities**				
4.1.1	*Partner with wildlife-focused organizations on projects that benefit the organizations' habitat and wildlife interests while also helping to fulfill other goals of the Plan*		Yes		38
4.1.2	*Promote public recreation on the river, when doing so can also help to fulfill other goals of the Plan*		Yes		38
4.1.3	*Cooperate in projects to assess and restore riparian wetlands while also helping to fulfill other goals of the Plan*		Yes		39
Obj. 4.2	**Where feasible and beneficial, reduce the effects of undesirable vegetation on water conveyance**				
4.2.1	*Cooperate in removing undesirable vegetation impacting water conveyance and managing reinfestation*		Yes		39

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Progress Summaries

This section contains descriptions summarizing 2019 progress on each action item. For actions marked as not applicable ("N/A") the summaries include explanations of why progress did not need to be taken on those action items in 2019. For a copy of any reference materials mentioned in these summaries, please contact NeDNR or one of the Republican Basin NRDs.

Goal 1	**Maintain Nebraska's compliance with the Republican River Compact and applicable laws**
Obj. 1.1	**Coordinate basin-wide plan management actions with Nebraska's Compact compliance efforts and adherence to applicable state laws**

1.1.1 *Review each basin-wide plan management action prior to implementation to ensure it does not negatively impact efforts to achieve Compact compliance in the most efficient and cost-effective way practicable while adhering to state laws.*

In 2019, all basin-wide plan management actions were reviewed in accordance with Action Item 1.1.1. The Republican Basin NRDs and NeDNR do not expect any 2019 basin-wide plan management actions to negatively impact efforts to achieve Compact compliance in the most efficient and cost-effective way under state law.

Based on our review of the potential future basin-wide plan management actions outlined in the basin-wide plan, we do not expect any will negatively impact Compact compliance efforts or adherence to state laws. As new management actions are proposed, we will thoroughly analyze them at that time.

1.1.2 *Implement appropriate offsets for any basin-wide plan action that would exceed Nebraska's allocation under the Compact* **N/A**

For this action item, the basin-wide plan defines offsets as actions that either reduce water use or increase water supply for the purpose of staying within Nebraska's Compact allocation. Nebraska complied with the Compact in 2019 without the need for any offsets

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

by NeDNR or the Republican Basin NRDs. Because no offsets were necessary, this action item is not applicable for 2019.

In years when offsets are required, the volume of water that each NRD needs to make up through management actions is determined through procedures described in the IMPs. The IMPs for Upper Republican, Middle Republican, and Lower Republican NRDs require each district's computed beneficial consumptive water use to remain within its share of Nebraska's Compact allocation. The IMP for the Republican Basin portions of Tri-Basin NRD states that the district will incrementally achieve and sustain a hydrologically balanced condition so that, in combination with imported water contributions from the Platte Basin, streamflow augmentation, and other management actions, Tri-Basin NRD water users will not cause a net depletion to streamflow. Through implementation of the IMPs, NeDNR and the Republican Basin NRDs will take any necessary offsetting actions to ensure that Nebraska remains in compliance with the Compact.

Obj. 1.2 Understand the effects of management actions for Compact compliance on water supplies for Nebraska's water users

1.2.1 *Qualitatively evaluate the net effect on water supplies of any management actions that are taken for Compact compliance*

This action item was completed during the first year of plan implementation. A qualitative evaluation of the net effect on water supplies of any management actions that were taken for Compact compliance during 2014–2018 was presented at the first annual meeting to review progress on the basin-wide plan, which took place in February 2020. It can be found in the PowerPoint presentation from the annual meeting, which is entitled *Republican River Basin-Wide Plan First Annual Meeting* (February 20, 2020) and can be downloaded from the basin-wide plan website, http://rrbwp.nebraska.gov.

The current year's qualitative evaluation of the net effect of 2019 management actions for Compact compliance on water supplies can be found under "Qualitative Evaluation of Net Effect of Management Actions for Compact Compliance" on page 72 of this report.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Obj. 1.3	**Assess progress toward meeting the goals and objectives of the Plan, and share the results of this assessment with the Public and the Nebraska Legislature**
1.3.1	*Within five years after the adoption of this Plan, and every five years thereafter, conduct a technical analysis of the actions taken to determine the progress toward meeting the goals and objectives of the Plan* **N/A**

A five-year technical analysis of actions taken is not necessary at this time. Following the schedule in the basin-wide plan, NeDNR and the Republican Basin NRDs will carry out the first five-year technical analysis in 2023 and repeat it every five years thereafter for the duration of the plan implementation time frame.

1.3.2	*Evaluate progress toward each of the Plan's measurable hydrologic objectives at the intermediate dates specified in the Plan for each one.*
MHO A:	*Maintain each NRD's net groundwater depletions to streamflow within its portion of Nebraska's allowable groundwater depletions to streamflow.* **N/A**

Because 2019 was the first year of plan implementation, there was no plan implementation progress to assess for the prior year; therefore, MHO A was not evaluated in 2019. This MHO will be evaluated annually for the remainder of the basin-wide plan implementation period.

The current year's evaluation of MHO A can be found under "MHO A Evaluation" on page 40 of this report.

MHO B:	*Limit groundwater depletions to streamflow to a relatively constant level over the long-term both across the basin as a whole and within each NRD*

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

An assessment of MHO B is not necessary at this time. Following the schedule laid out in the basin-wide plan, MHO B will be assessed in 2023, and every five years thereafter for the duration of the plan implementation time frame, as part of the five-year technical analysis.

In addition to requiring analysis of MHO B every five years, the basin-wide plan included a requirement to develop methodology for MHO B within the first year of plan implementation. In 2019, NeDNR and the Republican Basin NRDs worked together to develop methodology for this test. This methodology was presented at the first annual meeting in February 2020, and a final draft of the methods was included as an appendix to *First Annual Report for the Republican River Basin-Wide Plan: Data and Progress Updates, 2014–2018* (February 2020). The final methods are also available as a standalone document, *Supplement to the Republican River Basin-Wide Plan: Methodology for MHO B* (February 20, 2020). This task was completed within the first year of plan implementation, as specified in the basin-wide plan.

MHO C: *Ensure there is always enough groundwater for all groundwater uses within the timeframe of this plan, either by stabilizing groundwater levels or managing declining groundwater levels*

An assessment of MHO C is not necessary at this time. Following the schedule laid out in the basin-wide plan, MHO C will be assessed in 2023, and every five years thereafter for the duration of the plan implementation time frame, as part of the five-year technical analysis.

In addition to requiring analysis of MHO C every five years, the basin-wide plan included a requirement to develop methodology for MHO C within the first year of plan implementation. In 2019, NeDNR and the Republican Basin NRDs worked together to develop methodology for this test. This methodology was presented at the first annual meeting in February 2020, and a final draft of the methods was included as an appendix to *First Annual Report for the Republican River Basin-Wide Plan: Data and Progress Updates, 2014–2018* (February 2020). The final methods are also available as a standalone document, *Supplement to the Republican River Basin-Wide Plan: Methodology for MHO C*

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

(February 20, 2020). This task was completed within the first year of plan implementation, as specified in the basin-wide plan.

MHO D: *Continue existing and initiate new actions that reduce the need for special regulations in the Rapid Response Area for Compact compliance* **N/A**

MHO D assesses whether groundwater pumping within the Rapid Response Area of Upper Republican, Middle Republican, or Lower Republican NRD was curtailed to ensure Compact compliance during the previous year. There is no Rapid Response Area designated within Tri-Basin NRD.

Because 2019 was the first year of plan implementation, there was no plan implementation progress to assess for the prior year; therefore, MHO D was not evaluated in 2019. This MHO will be evaluated annually for the remainder of the basin-wide plan implementation period.

The current year's evaluation of MHO D can be found under "MHO D Evaluation" on page 45 of this report.

The Republican Basin NRDs and NeDNR have undertaken many projects that reduce the potential future need for special regulations in the Rapid Response Area for Compact compliance. Examples of new and existing projects can be found in this report, within the summaries of progress on other plan action items.

MHO E: *Continue existing and initiate new actions that reduce the need for administration of surface water use for Compact compliance* **N/A**

MHO E assesses whether surface water administration was needed during the previous year to ensure Compact compliance. Note that any administration that is automatically trigged under terms of the Final Settlement Stipulation is not evaluated as part of MHO E.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Because 2019 was the first year of plan implementation, there was no plan implementation progress to assess for the prior year; therefore, MHO E was not evaluated in 2019. This MHO will be evaluated annually for the remainder of the basin-wide plan implementation period.

The current year's evaluation of MHO E can be found under "MHO E Evaluation" on page 46 of this report.

NeDNR and the Republican Basin NRDs have undertaken many projects that reduce the potential future need for surface water administration for Compact compliance. Some examples are included in this report, within the summaries of progress on other plan action items.

1.3.3 *Following each five-year technical analysis (Action Item 1.3.1), share the results of the analysis and any recommended Plan modifications with the public* **N/A**

As explained under action item 1.3.1 above, the five-year technical analysis was not necessary in 2019; therefore, there were also no results to share with the public in 2019. As laid out in the basin-wide plan, NeDNR and the Republican Basin NRDs will carry out the five-year technical analysis and share the results with the public every five years throughout the plan implementation period, beginning in 2023.

1.3.4 *Following each five-year technical analysis (Action Item 1.3.1) and any resulting modifications to the Plan, submit a report to the Legislature of the results of the analysis and progress made under the Plan* **N/A**

A report to the legislature summarizing the results of the analysis of a five-year technical analysis is not necessary at this time. As laid out in the basin-wide plan, NeDNR and the Republican Basin NRDs will carry out the five-year technical analysis every five years throughout the plan implementation period, beginning in 2023. A report to the Legislature will be submitted following each five-year technical analysis, beginning in 2024.

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Goal 2	**Maximize Nebraska's efficient and beneficial consumptive use of its water, increase certainty for long-range planning of water supplies to reduce the need for regulatory actions, and increase collaborative efforts among water management entities and stakeholders across the Basin**
Obj. 2.1	**Understand the feasibility and potential impacts of Plan actions and establish a standard procedure for projects**

2.1.1 *For each planned new water management project in the Plan, evaluate hydrologic and regulatory feasibility and potential economic and environmental impacts*

In 2019, Lower Republican NRD began evaluating three proposed locations for potential water storage. These efforts will initiate the National Environmental Policy Act (NEPA), which will require analyzing all components addressed in Action Item 2.1.1.

The Republican River Basin NRDs and NeDNR will continue to support the development and maintenance of digital water management models, databases, streamgages, observation wells, and other tools and facilities needed to accurately measure and clearly depict the current state of groundwater and surface water resources and potential future resource trends and conditions. These tools are essential for decision makers as they consider whether and how to regulate and manage water resources. As new water management actions are proposed, NeDNR and the NRDs will thoroughly review them in accordance with Action Item 2.1.1.

2.1.2 *For each project evaluated in accordance with Action Item 2.1.1 in a given year, include a summary of the evaluation in the annual report of that year's activities*

The Lower Republican NRD NEPA analysis described under Action Item 2.1.1, above, may take up to 18 months. A hyperlink to the report can be provided in a future annual report, after conclusion of the analysis.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

2.1.3 *For projects that are feasible and beneficial, apply for necessary permits, establish new or utilize existing infrastructure, then begin operations*

The Lower Republican and Tri-Basin NRDs (as partners in an Interlocal Cooperative Agreement), together with the Central Nebraska Public Power and Irrigation District, filed an application with NeDNR for a surface water appropriation for the proposed Platte to Republican Basin High Flow Diversion (PRD) project (application A-19594) in 2018. In June 2019, a hearing was held on procedural aspects of the application, and briefs were filed by the applicants and objectors after the hearing. Also in 2019, the PRD interlocal agreement requested that objectors be dismissed, arguing that the objectors will not have injury since the PRD interbasin transfer permit application requested to always be junior to existing and future Platte appropriations. As of the end of 2019, the applicants were still awaiting a decision from the Director of NeDNR on the matters raised at the hearing. This project is also mentioned under action item 2.2.2.

All ongoing and future projects will be developed in compliance with local, state, and federal permitting requirements.

Obj. 2.2 Improve the efficiency of use, availability, and reliability of water supplies for current irrigators

2.2.1 *Work with irrigation districts and individual groundwater and surface water irrigators to improve the efficiency of the Basin's surface water delivery systems and irrigation water use, when it is both feasible and beneficial to Nebraska's Compact accounting balance*

The Upper Republican NRD, Middle Republican NRD, Lower Republican NRD, Tri-Basin NRD and NeDNR each made progress on this action item in 2019.

The Upper Republican NRD is facilitating the installation of telemetry units on flow meters throughout the district. These units will make farmers aware of their water usage in near real time. The data will help farmers align their water applications more closely with crop-water demands that are indicated by tools including soil-moisture probes and

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

evapotranspiration estimates. Upper Republican NRD also continues to work with the University of Nebraska and Nebraska Water Balance Alliance to acquire grant funding to pursue developing a mobile app that provides location-specific evapotranspiration data and forecasts based on satellite imagery, research-grade evaporation calculation tools, and weather forecasts. In addition, the NRD and the Water Sustainability Fund provided cost share for 110 soil moisture probes on approximately 14,000 acres in 2019.

The Middle Republican NRD has a telemetry meter project targeting the high depletion areas of the NRD. NeDNR supports this effort in the Rapid Response Area by reimbursing a portion of project costs via the Water Resources Cash Fund. The NRD is also continuing its High Tech Irrigation program that uses telemetry that includes soil moisture probes. The Middle Republican NRD also works with the Frenchman-Cambridge Irrigation District (FCID) on potential surface water management projects. Middle Republican NRD has also provided support for an FCID telemetry gate project.

The Lower Republican NRD has an agreement with Bostwick Irrigation District in Nebraska (NBID) that establishes water savings through the placement of automated gates in the Franklin Canal. This project is funded by NBID, the Lower Republican NRD, and the Water Sustainability Fund. The NRD has also provided a letter of support to the NeDNR to support an NBID project to increase the efficiency of water delivery to the Superior Canal.

Tri-Basin NRD's Water Conservation Incentive Program (WCIP) incentivizes landowners to reduce irrigation water use through enrollment in a voluntary five-year allocation program. Additional details, including an overview of the program and the number of acres enrolled in 2019, can be found in Table 23 under "Conservation/Retirement Programs" on page 62. This project is also described included under action item 2.2.2.

In 2019, NeDNR provided financial support for several of the NRDs' projects, as noted in the preceding paragraphs. Also noted above, NeDNR worked with Lower Republican NRD and NBID in 2019 to develop ideas for a project to increase the efficiency of water delivery in the Superior Canal. NeDNR also provided a letter of support for the project. In addition, in 2019 NeDNR and the basin's irrigation districts discussed potential projects that might be eligible to utilize funds from a 2018 settlement with Colorado. Negotiations were ongoing in 2019 on a contract with FCID that includes financial support for a gate

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

automation project in the Meeker-Driftwood canal system as well as conjunctive management aspects; the contract was finalized in early 2020.

2.2.2 *Participate in projects to improve the reliability, availability, and sustainability of water supplies in the Basin, which may include but are not limited to:*

- *Voluntary reduction of irrigated acres (temporary or permanent)*
- *Interbasin transfers*
- *Conjunctive management projects such as aquifer recharge or streamflow augmentation*

All four Republican River Basin NRDs participate in the Conservation Reserve Enhancement Program (CREP), which provides federal funding for the temporary removal of environmentally sensitive land from production. Three of the districts also have acres enrolled in the Agricultural Water Enhancement Program (AWEP). Summaries of acres enrolled in CREP and AWEP within each NRD can be found on pages 52, (Upper Republican NRD), page 56 (Middle Republican NRD), page 59 (Lower Republican NRD), and page 61 (Tri-Basin NRD).

The Upper Republican NRD has initiated a program to permanently retire irrigation on cropland where pumping has high impacts on streamflow. This program is expected to result in the retirement of approximately 3500 acres, with an average 50-year streamflow depletion factor of approximately 60%, and an average annual irrigation usage of 12" per acre. This program is funded by the Upper Republican NRD and the Water Resources Cash Fund, which is administered by NeDNR. Specific details about the number of contracts entered into with landowners and the number of acres retired in 2019 are reported under "Conservation/Retirement Programs" on page 55.

The Middle Republican NRD has a program to permanently retire irrigation on cropland. This program is funded by the Middle Republican NRD and the Water Resources Cash Fund, which is administered by NeDNR. Specific details about the number of contracts

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

entered into with landowners and the number of acres retired in 2019 are reported under "Conservation/Retirement Programs" on page 51.

The Lower Republican NRD established a retirement program through the Regional Conservation Partnership Program (RCPP) and the Water Resources Cash Fund, which is administered by NeDNR.

The Lower Republican NRD and Tri-Basin NRD have submitted an application to NeDNR for an interbasin transfer permit to divert excess flows from the Platte Basin to the Republican Basin as the Platte to Republican Basin High Flow Diversion (PRD) project. As filed it was proposed to always be junior in priority to existing and future Platte River water uses. The permitting process for this project is ongoing. Permitting aspects of this project are described under action item 2.1.3.

The Lower Republican NRD has agreements with NBID to use water stored in Harlan County Lake for Compact compliance. The stored water is a result of water savings derived from automated gates, which received a million dollars from the Lower Republican NRD. Additionally, the NRD provided a letter of support for the Superior Canal WaterSMART grant.

Some additional potential conjunctive management projects NeDNR and the NRDs were involved in with the basin's irrigation districts are described under action item 2.2.1.

Obj. 2.3 Provide opportunities for collaboration among Basin's water users

2.3.1 *Hold an annual public meeting to discuss Plan implementation and exchange information about the Basin*

Coordination efforts to prepare for the first basin-wide plan annual meeting were underway in 2019. That meeting was held in February 2020, which was within the first year of plan implementation.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Another opportunity to exchange information about the Basin occurred during a basin-wide meeting that was held in November 2019, in fulfillment of the IMPs for the Upper Republican, Middle Republican, and Lower Republican NRDs.

2.3.2 *Work cooperatively to investigate and address conflicts between water users resulting from implementation of this Plan by following the procedures for addressing conflicts that are outlined in this Plan* **N/A**

The Republican River NRDs and NeDNR intend to work cooperatively to investigate and address conflicts between water users resulting from implementation of the Basin-Wide Plan by following the procedures for addressing conflicts that are outlined in the Plan. In 2019, no conflicts resulting from implementation of the basin-wide plan were brought to the attention of NeDNR or the NRDs to address.

Obj. 2.4 Promote conservation programs available to the water users in the Basin

2.4.1 *Work together to identify, investigate, and discuss existing and potential new water conservation programs*

Throughout 2019, the Republican Basin NRDs and NeDNR discussed and shared information with each other about existing and potential new water conservation programs as new information became available or new questions were raised by one of the parties. For example, they discussed changes to the Conservation Reserve Enhancement Program (CREP) that resulted from the 2018 Farm Bill.

The Tri-Basin NRD launched its Water Conservation Incentive Program in 2018. The program has options for groundwater users (voluntary allocation) and commingled users (incentive to use canal water). Nearly 5000 acres were enrolled in the program and additional sign-up opportunities are planned. For additional information about this program, see "Conservation/Retirement Programs", page 61. In 2019, Tri-Basin NRD shared information about this program with the other NRDs and NeDNR.

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

2.4.2 *Collaborate to promote conservation program opportunities to the Basin's water users* **N/A**

The Republican River Basin NRDs and NeDNR are open to opportunities to collaborate with neighboring NRDs, state and federal government agencies and constituents on programs and projects that promote and incentivize water conservation. The NRDs and NeDNR did not collaborate with each other to jointly promote conservation program opportunities in 2019.

Obj. 2.5 Understand how various water management activities of independent decision-makers affect water supplies

2.5.1 *Study the effects of conservation practices on streamflow, if feasible* **N/A**

This action item is to be completed by 2028, when and if funding and staff resources allow. NeDNR and the NRDs have some analytical tools available to them to assist with studies of the effects of conservation practices on streamflow, as described below.

The Lower Republican NRD will study the effects of conservation practices on streamflow through the Lower Republican NRD Management Action Opportunity (MAO) model. The RRCA model is run to determine the quantitative effect of a proposed land use change through the MAO model.

The Tri-Basin NRD has the most extensive groundwater level monitoring network in Nebraska. Groundwater level data is critical to accurately determining impacts of groundwater pumping on streamflows. Data are shared with state and federal agencies and made available to the public.

NeDNR uses the Republican River Compact Administration model to estimate stream depletions resulting from groundwater pumping, stream accretions resulting from recharge projects, and other parameters.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

2.5.2 *As part of each five-year technical analysis, analyze the future impacts to streamflow of past pumping to determine the lag time of these residual impacts*

N/A

Following the schedule in the basin-wide plan, NeDNR and the Republican Basin NRDs will carry out the first five-year technical analysis in 2023 and repeat it every five years thereafter for the duration of the plan implementation time frame.

2.5.3 *Examine and attempt to estimate the quantity of all inputs and outputs affecting the water supply balance in a small watershed, and consider using the results of this pilot study to create water use and land use guidelines for producers and other land managers, incentivize participation in recommended practices, and determine the value of completing similar studies across the Basin*

This action item is to be completed by 2028.

In 2019, the Upper Republican NRD partnered with the University of Nebraska Water for Food Institute and Nebraska Water Balance Alliance on a grant application to the USDA's Natural Resources Conservation Service to conduct a water balance study within the HUC-12 watershed of Perkins County. The 2019 grant was not approved; however, the partner groups plan to pursue other grant funding in the future. NeDNR also participated in informational discussions with the research team for this project.

The Middle Republican NRD has a Water Sustainability Grant looking at using airborne electromagnetic (AEM) technology to model water supply balance in the western portion of the Middle Republican NRD.

The Lower Republican NRD will examine the effort required to complete action item 2.5.3 in the coming years. Tri-Basin NRD is willing to consider opportunities to examine water use within sub-watersheds that originate within or flow through the district.

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Obj. 2.6 Evaluate the feasibility and potential outcomes of establishing water markets in the Basin

2.6.1 *Cooperate in determining the feasibility of water markets in the Basin* ‘23 **N/A**

This action item is to be completed by 2023. Two large action items from the plan are scheduled to be completed by 2023: this feasibility study and the drought planning exercise described in Action Item 2.8.1, and it was not feasible in 2019 to begin both projects. At this time, NeDNR and the NRDs have been focusing efforts on the drought planning exercise.

2.6.2 *Following the water markets feasibility analysis (Action Item 2.6.1), test conclusions through implementation of a water market program in a pilot area, if feasible* ‘28 **N/A**

As stated in the basin-wide plan, this action item is contingent upon the findings from the feasibility study in Action Item 2.6.1. If the evaluation in Action Item 2.6.1 indicates that water markets in the Basin would be feasible, and if sufficient funding and staff resources are available to do so, then NeDNR and the NRDs will work cooperatively with the US Bureau of Reclamation, the Basin’s irrigation districts, and water users in the Basin to conduct a water market pilot program within a portion of the Basin by 2028.

Obj. 2.7 Support the NRDs in management of allocations for irrigation purposes and surface water irrigation districts in management of the allotment of their water supply

2.7.1 *Periodically evaluate, as part of each five-year technical analysis, the impact of the groundwater allocation and surface water allotment systems as a whole* 5 **N/A**

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Following the schedule in the basin-wide plan, NeDNR and the Republican Basin NRDs will carry out the first five-year technical analysis in 2023 and repeat it every five years thereafter for the duration of the plan implementation time frame.

The NRDs individually review pumping and allocations on a regular basis to comply with the IMPs and groundwater management plans while balancing the allocations so as not to restrict the economic vitality of the NRD or the region, as is consistent with the mission of the *Republican River Basin-Wide Plan*.

Tri-Basin NRD has only one township in the Republican Basin that is subject to allocation. This allocation was imposed to protect groundwater levels in the local area from diminishment. The allocation requirement is tied to local groundwater levels. If a three-year average of groundwater levels rises above the 1981–1985 average springtime levels for that township, the allocation will be suspended. The other three NRDs have allocations district-wide.

2.7.2 *As needed, based on the evaluation described in Action Item 2.7.1, recommend changes or improvements to the groundwater allocation and/or surface water allotment systems* **N/A**

Following the schedule in the basin-wide plan, NeDNR and the Republican Basin NRDs will carry out this action item by the year following each iteration of Action Item 2.7.1. Therefore, this action will be completed for the first time by 2024 and then repeated every five years thereafter for the duration of the plan implementation timeframe.

Obj. 2.8 Conserve water for future use during a drought

2.8.1 *Organize and participate in a Basin-wide drought planning exercise*

This action item is to be completed by 2023.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

In 2019 the four NRDs and NeDNR agreed to partner with the University of Nebraska-Lincoln to hire a Graduate Research Assistant to conduct a basin-wide drought planning exercise. The NRDs and NeDNR have agreed to share the cost of hiring the graduate student, with NeDNR responsible for 50% and the NRDs collectively responsible for the other 50%. The assistantship is expected to continue through May 2022.

In addition to participating in the basin-wide drought planning exercise, the Lower Republican NRD is interested in pursuing a plan to reserve flood water for irrigation use within existing structures, which would be beneficial for water supplies during drought periods. Many reservoirs in the US Army Corps of Engineers Kansas City District have Lake management plans that allow additional water to be held back above conservation pools. Additionally, regulatory changes that allow for the modification or change in a reservoir operating plan allowing flood water retention above current levels would conserve water for future use.

Tri-Basin NRD and Central Nebraska Public Power and Irrigation District are also in the early stages of developing a drought management and mitigation plan for the entire NRD.

2.8.2 *Following the drought planning exercise (Action Item 2.8.1) evaluate whether to recommend any changes to the IMPs or this Plan related to conservation of water for future use during a drought* '24 **N/A**

This action item will be completed by the year following completion of the drought planning exercise, and no later than 2024.

In addition to participating in the basin-wide drought plan, the Tri-Basin NRD and Central Nebraska Public Power and Irrigation District are in the early stages of developing a drought management and mitigation plan for the entire NRD. Once these efforts are complete an evaluation of recommended changes to Tri-Basin NRD's IMP or the basin-wide plan will be considered.

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate		By This Year	Every Five Years
				'22?	5
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Goal 3	**Positive public relations, including information sharing, within and outside the Basin**
Obj. 3.1	**Improve information sharing with decision-makers and public about solutions within the Basin**

3.1.1 *Use existing resources to share information about Basin progress and activities with outside entities*

The Republican River Basin NRDs and NeDNR use existing information dissemination resources such as newsletters, radio programs, public meetings, websites, social media, and education/outreach events. Some of these resources were used in 2019 to share information about Basin progress and activities with outside entities. Examples are described under Action Item 3.1.2 and 3.1.3.

3.1.2 *Educate civic leaders and the public on implementation efforts within the Basin*

NeDNR and the Republican Basin NRDs participated in education and outreach about plan implementation efforts in 2019. The basin-wide plan identifies some examples of potential outreach topics related to this objective as efficiency improvements, the NRDs' allocation systems and resulting successes, other management activities and successes, factors that have contributed to streamflow reduction in the Basin, variations in groundwater management that reflect natural wet/dry cycles, realistic expectations for outcomes of projects and policy changes. The following paragraphs provide specific examples of 2019 education and outreach activities related to implementation efforts within the basin.

NeDNR hosts a website about the Republican River Basin-Wide Plan that was originally used to convey information about plan development (*http://rrbwp.nebraska.gov*). In 2019, NeDNR and the Republican Basin NRDs redesigned and redeveloped the website as a tool for conveying information about basin-wide plan implementation. The redesigned website includes background information about the plan and plan implementation resources such as data, annual meeting materials, and annual reports. Plan development meeting materials are still available on the website, too.

Legend

Per basin-wide plan, this action item is to be completed:				
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years
Progress during report year:				
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

The Upper Republican NRD shared information about water management and progress within the Republican Basin with outside entities including the University of Washington, an association of irrigation-related organizations and individuals in New Zealand, and the University of Nebraska Water for Food Institute, among others.

Lower Republican NRD and Tri-Basin NRD co-hosted the South-Central Nebraska Water Conference with the Central Nebraska Public Power and Irrigation District (CNPPID) to inform the public on the happenings of the water world within South Central Nebraska. Middle Republican NRD participated in the McCook Farm and Ranch Show in November.

All four NRDs produce newsletters for the public containing information about their activities, including water management activities in the Republican Basin. NeDNR also produces a newsletter, but NeDNR's newsletter did not include any Republican Basin-specific articles in 2019. The Lower Republican NRD also provides articles and radio publications on a regular basis to keep constituents informed.

3.1.3 Educate civic leaders and the public about the policies and institutional infrastructure that contribute to the development and implementation of solutions

NeDNR and the Republican Basin NRDs participated in education and outreach about policies and institutional infrastructure in 2019. The basin-wide plan identifies some examples of potential outreach topics related to this objective as correlative groundwater rights; integrated management plans; the Republican River Basin-Wide Plan; the Republican River Compact; other aspects of Nebraska's surface water and groundwater statutes; and other NRD rules, regulations, and plans. The following paragraphs provide specific examples of 2019 education and outreach activities related to the policies and institutional infrastructure that contribute to the development and implementation of solutions.

The NRDs and NeDNR communicate regularly with their legislative representatives and other state senators, as needed. They work to educate civic leaders and the public about the policies and institutional infrastructure that contribute to the development and implementation of solutions, through public outreach such as articles, conferences, and radio news briefs. All four NRDs and NeDNR produce newsletters for the public containing

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

information about their activities, some of which included articles about policies and institutional infrastructure in 2019.

NeDNR hosted an American Water Resources Association specialty conference in Omaha in 2019 entitled *Setting Conditions for Success in Integrated Water Resources Management*. One of the presentations given by NeDNR staff at the conference was "From Litigation to Cooperation: The Changing World of the Republican River Basin." This presentation highlighted examples of projects resulting from efforts in recent years by the basin's interstate and intrastate partners to work collaboratively toward shared water management objectives, including the Republican River Compact and basin-wide plan development and implementation.

At the same conference, NeDNR staff gave multiple presentations about various aspects of the integrated management planning processes and legislation. Following the conference, NeDNR staff were invited to publish an article entitled "Legislation Supporting IWRM in Nebraska" in the American Water Resource Association's magazine, *Impact*. NeDNR also shared information about the integrated management planning process at several other events in the state throughout the year, including at the Nebraska Women in Agriculture Conference, the South-Central Nebraska Water Conference, a seminar at the University of Nebraska-Lincoln, and multiple water conferences hosted by the Nebraska Association of Resources Districts.

NeDNR and colleagues from Kansas and Colorado maintain a website with information about the Republican River Compact (*http://republicanriver.org/*), which includes background information about the Republican River Compact Administration (RRCA), annual reports, and other RRCA meeting materials. The Upper Republican NRD website is updated with Compact developments and provides a layman's explanation of the Compact and compliance efforts. Both Upper Republican NRD and NeDNR's websites include links to the Compact, the Final Settlement Stipulation, and other important Compact-related documents.

NeDNR and the NRDs also addressed these topics in 2019 at some of the other outreach events described under action item 3.1.2.

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

3.1.4 *Propose and support changes to laws, policies, and rules that would incentivize reduced water consumption* **N/A**

In 2019 there were no proposed changes to laws, policies, and rules that would incentivize reduced water consumption within the Basin. NeDNR and the Republican River Basin NRDs are committed to evaluating all proposals that offer incentives to reduce groundwater use, with the intention of supporting any changes that do not reduce the economic vitality of the region in accordance with the mission of the Basin-Wide Plan.

Obj. 3.2 Improve information sharing with water users who are reliant on the Basin's water supplies

3.2.1 *Share data and information related to the Republican River Compact with the public in an easily accessible, user-friendly format*

All four NRDs and NeDNR exchange water use and groundwater level data annually for Republican River Compact Administration (RRCA) accounting purposes. RRCA annual reports and final RRCA accounting data are available at *http://republicanriver.org/*, and RRCA groundwater model information is available at the RRCA's data site, *https://www.republicanrivercompact.org/*. Information about the Republican River Compact is also available on NeDNR's website and the Upper Republican NRD's website.

In the first year of basin-wide plan implementation, NeDNR and the NRDs worked to make some data from the RRCA annual accounting and groundwater model more easily accessible and user-friendly by including some data from these sources in *First Annual Report for the Republican River Basin-Wide Plan: Data and Progress Updates, 2014–2018,* which was developed beginning in 2019 and published in February 2020. In this current report, RRCA data can be found in several of the tables and charts throughout the "Water Supplies and Uses in the Basin" section, which begins on page 48.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

3.2.2 Annually prepare and exchange reports containing data and information about water supplies and uses in the Basin, and make these reports publicly accessible

All four NRDs and NeDNR share data and information about water supplies and uses in the basin as part of the annual report for the basin-wide plan. This information is shared with the public at the basin-wide plan's annual meeting and through the *Republican River Basin-Wide Plan* website (http://rrbwp.nebraska.gov). In 2019, NeDNR and the NRDs worked to develop the first annual report, which was published in February 2020.

Tri-Basin NRD and NeDNR also exchange information about water supplies in uses annually in fulfillment of the IMP for the Republican Basin portions of Tri-Basin NRD. These reports can be downloaded from the NeDNR website (https://dnr.nebraska.gov).

3.2.3 Regularly communicate with the Plan's former Stakeholder Advisory Committee about implementation progress and potential Plan revisions

All four NRDs and NeDNR work to keep former Stakeholder Advisory Committee members informed about implementation progress and potential plan revisions. This information is primarily shared at the annual meeting for the basin-wide plan.

Information about plan implementation is also shared via email through a GovDelivery contact list for people interested in receiving updates about the basin-wide plan. NeDNR created this contact list in 2019. All stakeholders from the plan development process were added to the list in 2019. One former stakeholder does not have an email account, so printed copies of updates posted to the GovDelivery list are mailed to that individual.

3.2.4 Encourage and support water users to share information about their management practice improvements with other water users and the public

All four NRDs and NeDNR encourage and support water users to share information about their management practice improvements with other water users and the public. In 2019, Tri-Basin NRD worked with researchers from the University of Nebraska-Lincoln (UNL) to

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

help irrigators improve water use efficiency. Middle Republican NRD held meetings with water users to introduce high tech irrigation programs. NeDNR and the NRDs also supported and participated in UNL's TAPS program, which is an annual competition that provides teams from all over the state with an opportunity to learn from each other about irrigation water management practices and other aspects of crop production. A substantial portion of past TAPS award winners has been from the Republican River Basin.

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Goal 4	**When possible, pursue projects that not only benefit water supplies and uses, but also create benefits for fish, wildlife, recreation and conveyance within the Republican River Basin**
Obj. 4.1	**Where feasible and beneficial, protect and enhance fish and wildlife habitat and public outdoor recreational opportunities**

4.1.1 *Partner with wildlife-focused organizations on projects that benefit the organizations' habitat and wildlife interests while also helping to fulfill other goals of this Plan*

The Republican Basin NRDs continued to partner with wildlife-focused organizations on projects to benefit habitat and wildlife interests in the Basin in 2019. Middle Republican NRD partnered with Pheasants Forever to promote habitat restoration through wildlife plantings, Lower Republican NRD continues to support the Nebraska Game and Parks Commission (NGPC) through the lease of office space, and Tri-Basin NRD worked with the Central Nebraska Public Power and Irrigation District (CNPPID) to deliver excess Platte River flows to USFWS wetlands to enhance habitat for migratory waterfowl and other wildlife and provide groundwater recharge that benefits both the Platte and Republican basins. The NRDs also provide support to the Twin Valley Weed Management and Southwest Weed Management Districts for the removal of invasive vegetation throughout the Basin, as described under Action Items 4.1.3 and 4.2.1.

4.1.2 *Promote public recreation on the river, when doing so can also help to fulfill other goals of the Plan*

Lower Republican NRD supports NGPC through lease of office space. Through the Lower Republican NRD office, the NGPC provides public information regarding public recreation on the River and open lands within the Basin.

Legend

Per basin-wide plan, this action item is to be completed:

When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years

Progress during report year:

Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

4.1.3 *Cooperate in projects to assess and restore riparian wetlands while also helping to fulfill other goals of the Plan*

The NRDs provide financial support to weed management districts for the removal of invasive vegetation and noxious weeds throughout the Basin, including for restoration of riparian wetlands. Upper Republican NRD and Middle Republican NRD financially support the Southwest Weed Management District. Lower Republican NRD and Tri-Basin NRD financially support the Twin Valley Weed Management District. The NRDs have also worked with the weed management districts on projects across the basin to restore riparian areas.

In 2019, Upper Republican NRD and Middle Republican NRD helped in the reorganization of Southwest Weed Management District to improve oversight of the group and assure that it was achieving its mission. The district is on solid financial footing, has good board oversight, and has worked on projects across the basin to restore riparian areas.

Obj. 4.2 Where feasible and beneficial, reduce the effects of undesirable vegetation on water conveyance

4.2.1 *Cooperate in removing undesirable vegetation impacting water conveyance and managing reinfestation*

As described under Action Item 4.1.3, the NRDs provide financial support to the Southwest and Twin Valley Weed management districts for the removal of invasive vegetation and noxious weeds throughout the Basin. Upper Republican NRD also made landowners in the district aware of vegetation removal services the weed management districts provide and helped established plans for future vegetation removal.

Legend

Per basin-wide plan, this action item is to be completed:					
When Appropriate	Annually	Annually When Appropriate	By This Year	Every Five Years	
Progress during report year:					
Completed Indefinitely	Completed	Ongoing Progress	Not Completed	Not Started	Not Applicable This Year
					N/A

(see Figure 1 on page 5 for more detailed descriptions of each symbol)

Assessment of Measurable Hydrologic Objectives (MHOs)

Under *Neb. Rev. Stat.* § 46-755 (4)(b), this basin-wide plan is required to include measurable hydrologic objectives (MHOs) to ensure that reasonable progress is being made toward achieving the goals and objectives of the plan. The basin-wide plan includes five MHOs, which will each be evaluated either annually or every five years, as specified in the basin-wide plan. The MHOs and their assessment schedules are summarized in Table 5. Results of the MHO evaluations are described beginning on page 40.

In the table summarizing the results of each MHO, possible results of the assessment are described, including whether the results indicate that further discussion is required or not. If a result indicates that discussion of next steps is required, this means that NeDNR and the NRDs will discuss the test results and determine what actions will be taken to achieve the MHO in the future, as described in the basin-wide plan.

Table 5. Measurable Hydrologic Objectives (MHOs) agreed to during plan development and adoption. During plan implementation, each MHO is to be evaluated either annually or every 5 years, as specified in the basin-wide plan.

Measurable Hydrologic Objective (MHO)	Evaluation Frequency
MHO A: Maintain each NRD's net groundwater depletions to streamflow within its portion of Nebraska's allowable groundwater depletions to streamflow	Annually
MHO B: Limit groundwater depletions to streamflow to a relatively constant level over the long-term both across the basin as a whole and within each NRD	Every 5 years, beginning in 2023
MHO C: Ensure there is always enough groundwater for all groundwater uses within the timeframe of this plan, either by stabilizing groundwater levels or managing declining groundwater levels	Every 5 years, beginning in 2023
MHO D: Continue existing and initiate new actions that reduce the need for special regulations in the Rapid Response Area for Compact compliance	Annually
MHO E: Continue existing and initiate new actions that reduce the need for administration of surface water use for Compact compliance	Annually

MHO A Evaluation

MHO A Assessment Criteria

MHO A is to maintain each NRD's net groundwater depletions to streamflow within its portion of Nebraska's allowable depletions to streamflow. For the purposes of MHO A, "net groundwater depletions to streamflow" includes augmentation and other management actions.

The basin-wide plan defines the MHO A assessment as follows: for the previous Compact averaging period (2 or 5 years, as determined by Compact accounting procedures), has each NRD's net groundwater depletions to streamflow for the RRCA model area remained within its portion of Nebraska's allowable groundwater depletions to streamflow, as specified in the IMPs? This MHO is being achieved if the answer to that question is yes for each NRD. The results of this assessment are described in the next subsection.

Note the MHO A assessment as described above applies only to the Upper Republican, Middle Republican, and Lower Republican NRDs, because these are the three NRDs that receive a portion of Nebraska's allowable groundwater depletions to streamflow under the terms of their IMPs. The equivalent test from the IMP for the Republican Basin portion of Tri-Basin NRD is the hydrologically balanced assessment, which evaluates whether Tri-Basin NRD's depletions from groundwater pumping exceeded accretions from the groundwater mound caused by seepage from Platte River canals within in the district, when calculated on a three-year rolling average basis. The results from that analysis are included below, beginning on page 41.

MHO A Evaluation Results for 2019

MHO A evaluation results are summarized in Table 6. For 2019, MHO A is being achieved for Upper Republican, Middle Republican, and Lower Republican NRDs. Each NRD's groundwater net depletions to streamflow remained within its portion of Nebraska's allowable depletions to streamflow, as specified in the IMPs. The evaluation and results for each NRD are described below the summary table.

Table 6. Summary of MHO A results for 2019.

Key to Possible Test Results	🟢 MHO is being achieved. NRD's actual depletions were within its allowable depletions. No further discussion is needed. 🚫 MHO is not being achieved. NRD's actual depletions exceeded its allowable depletions. Discussion of next steps is required.		
NRD	**Upper Republican**	**Middle Republican**	**Lower Republican**
NRD's Results for 2019	🟢	🟢	🟢

According to the Compact accounting procedures, the averaging period applicable to 2019 is five-year averaging corresponding to a "Normal Year" in the integrated management plans.

Allowable groundwater depletions to streamflow for each NRD are defined in the current integrated management plans between each NRD and NeDNR, Section VII.B.2.c, as:

*(Nebraska Allocation + IWS – $SWCBCU_{NE}$ – Other NRD CBCU) * NRD's Normal-Year Baseline Depletion Percentage*

where

Nebraska Allocation = Nebraska's available water supply under the Compact

IWS = Imported Water Supply credit

$SWCBCU_{NE}$ = The surface water consumptive use by Nebraska, includes net evaporative losses

Other NRD CBCU = The groundwater consumptive use of streamflow calculated for the South Platte NRD, Twin Platte NRD, Tri-Basin NRD, Central Platte NRD, and Little Blue NRD

To include all NRD management actions in the analysis, allowable groundwater depletions were adjusted by the difference between Nebraska Resolution Water Supply (NERWS) Credit under the Compact and the NRD's management actions, which may be different in instances such as annual crediting for permanent surface water retirements and the timing of the calculations outlined in RRCA procedures.

Each NRD's groundwater depletions to streamflow is calculated using the RRCA ground water model. An NRD's net depletions are the sum of groundwater depletions and the impacts to Nebraska's Compact balance from management actions taken.

Altogether, the difference between an NRD's allowable groundwater depletions to streamflow and the NRD's groundwater net depletions to streamflow is calculated as:

*(Nebraska Allocation + IWS – $SWCBCU_{NE}$ – Other NRD CBCU – All NRD management Actions + NERWS Credit) * NRD's Normal-Year Baseline Depletion Percentage – NRD Actual Groundwater Depletions + NRD Management Actions*

The results of the five-year average evaluation for MHO A for 2019 for each NRD are shown in Table 7. Two-year averaging was not evaluated this year as part of MHO A because, under RRCA Accounting Procedures, two-year averaging does not apply for 2019.

Table 7. MHO A evaluation results for 2019, with five-year averaging. Positive values indicate that allowable groundwater depletions to streamflow exceeded actual groundwater net depletions to streamflow. The five-year averaging period for MHO A is evaluated based on the average of the evaluation year (2019) and the previous four years, in conformance with RRCA Accounting Procedures.

	Difference between allowable depletions an actual groundwater net depletions (acre-feet)		
Year	**Lower Republican NRD**	**Middle Republican NRD**	**Upper Republican NRD**
2015	-4,926	6,470	14,956
2016	8,676	9,724	5,175
2017	3,862	14,687	17,291
2018	540	-1,919	2,922
2019	40,262	46,951	65,758
5-year average (2015–2019)	**9,683**	**15,183**	**21,220**
5-year average positive?	**Yes**	**Yes**	**Yes**

Tri-Basin NRD Hydrologically Balanced Assessment Results for 2019

The hydrologically balanced assessment from the IMP for the Republican Basin portion of Tri-Basin NRD evaluates whether Tri-Basin NRD's depletions from groundwater pumping and accretions from the mound are hydrologically balanced when calculated on a three-year rolling average basis. This assessment is performed by NeDNR each fall, following finalization of RRCA data for the prior calendar year.

Hydrologically balanced assessment results for 2019 are summarized in Table 8. The analysis and results are explained below the summary table.

Table 8. Summary of results of hydrologically balanced assessment for Tri-Basin NRD for 2019.

Key to Possible Test Results	In compliance with IMP. On a three-year rolling average basis, depletions from groundwater pumping did not exceed accretions from the mound. Also, sufficient management actions were taken in 2019 to offset net depletions from previous year's test, if any. No further discussion is needed. Caution. On a three-year rolling average basis, depletions from groundwater pumping exceeded accretions from the mound. Under the terms of the IMP, management actions are required to maintain a hydrologically balanced condition. Discussion of next steps is required. Insufficient management actions were taken in 2019 to offset net depletions from previous year's assessment. Discussion of next steps is required.
Tri-Basin NRD's Results for 2019	

Full details of the hydrologically balanced assessment for 2019 are included in NeDNR's report for the IMP for the Republican Basin portion of Tri-Basin NRD, entitled *2020 Annual Report of 2019 Data by the Nebraska Department of Natural Resources to Meet the Requirements of the Integrated Management Plan for Those Portions of the Tri-Basin Natural Resources District within the Republican River Basin* (November 9, 2020). The three-year average net effect is positive for 2019 (Figure 2), meaning that mound accretions exceeded groundwater depletions from pumping on a three-year average basis; therefore, no offsets are required in the future as a result of the 2019 test. In addition, no management actions were required to be taken by Tri-Basin NRD in 2019 to offset the results of a previous year's test.

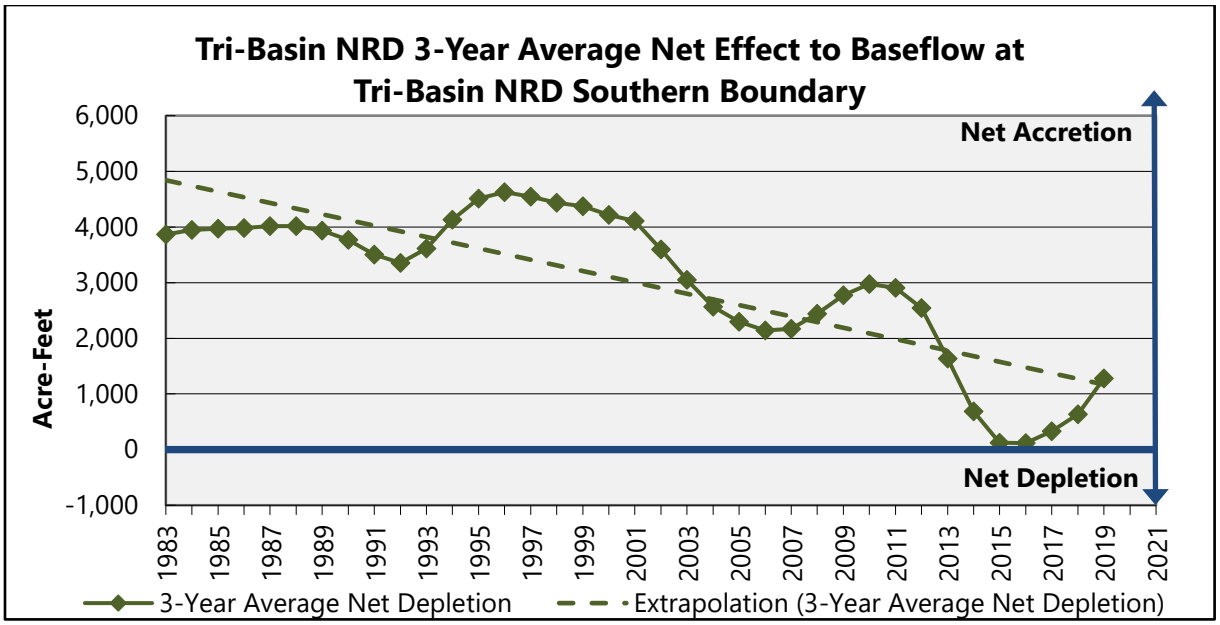

Figure 2. Rolling three-year average net effect to baseflow as the total of modeled values of streamflow depletion and mound accretions, using the August 2020 RRCA Accounting Procedures and the RRCA groundwater model.

MHO B Evaluation

MHO B is evaluated every five years as part of the basin-wide plan's five-year technical review. No MHO B evaluation is required this year.

MHO C Evaluation

MHO C is evaluated every five years as part of the basin-wide plan's five-year technical review. No MHO C evaluation is required this year.

MHO D Evaluation

MHO D Assessment Criteria

MHO D is to continue existing and initiate new actions that reduce the need for special regulations in the Rapid Response Area for Compact compliance.

The basin-wide plan defines the MHO D assessment as follows: during the previous year, has groundwater pumping within the Rapid Response Area of any NRD been curtailed to ensure Compact compliance? This MHO is being achieved if the answer to that question is no for each NRD. The results of this assessment are described in the next subsection.

Note that this assessment only applies to the Upper Republican, Middle Republican, and Lower Republican NRDs. The IMPs for those NRDs state that in Compact Call Years, if management actions taken by the NRD are insufficient to ensure compliance, the NRD will implement additional ground water controls and regulations to make up for any expected shortfall, which

will include curtailment of groundwater pumping within the Rapid Response Area (10 Percent/5-Year Area) of the NRD. The purpose of this MHO is to ascertain whether such curtailment occurred.

MHO D Evaluation Results for 2019

MHO D evaluation results are summarized in Table 9. For 2019, MHO D is being achieved for Upper Republican, Middle Republican, and Lower Republican NRDs, as none of the NRDs curtailed pumping within the Rapid Response Area in 2019 to ensure Compact Compliance.

Table 9. Summary of MHO D results for 2019.

Key to Possible Test Results	🟢 MHO is being achieved. NRD did not curtail groundwater pumping within the Rapid Response Area to ensure Compact compliance. No further discussion needed. 🚫 MHO is not being achieved. NRD curtailed groundwater pumping within the Rapid Response Area to ensure Compact Compliance. Discussion of next steps is required.		
NRD	**Upper Republican**	**Middle Republican**	**Lower Republican**
NRD's Results for 2019	🟢	🟢	🟢

MHO E Evaluation

MHO E Assessment Criteria

MHO E is to continue existing and initiate new actions that reduce the need for administration of surface water use for Compact compliance.

The basin-wide plan defines the MHO E assessment as follows: During the previous year, has surface water use within the basin been administered to reduce surface water use to ensure Compact compliance? This MHO is being achieved if the answer to that question is no. The results of this assessment are described in the next subsection.

Note that for the purposes of MHO E, only surface water administration that occurs to fulfill Nebraska's Compact obligations as described in the IMPs for the Upper Republican, Middle Republican, and Lower Republican NRDs. Surface water administration that is required by the terms of the Final Settlement Stipulation (FSS) is excluded from MHO E. For more information, see "Surface Water Municipal and Industrial CBCU

During the reporting year, there were no permitted municipal nor industrial uses of surface water in the Republican River Basin. For more information on surface water permitting, visit NeDNR's Surface Water Permitting and Data website at: *https://dnr.nebraska.gov/surface-water*.

Surface Water Administration for Compact Compliance," page 71.

MHO E Evaluation Results for 2019

MHO E evaluation results are summarized in Table 10. For 2019, MHO E is being achieved, as surface water use within the basin has not been administered for Compact Compliance. For further details, see "Surface Water Municipal and Industrial CBCU

During the reporting year, there were no permitted municipal nor industrial uses of surface water in the Republican River Basin. For more information on surface water permitting, visit NeDNR's Surface Water Permitting and Data website at: *https://dnr.nebraska.gov/surface-water*.

Surface Water Administration for Compact Compliance," page 71.

Table 10. Summary of MHO E results for 2019.

Key to Possible Test Results	MHO is being achieved. NeDNR did not administer surface water to ensure Compact compliance, except as required under the Final Settlement Stipulation (FSS). No further discussion needed. MHO is not being achieved. NeDNR administered surface water to ensure Compact Compliance. Discussion of next steps is required.
Results for 2019	

Water Supplies and Uses in the Basin

In accordance with the requirements of *Neb. Rev. Stat.* §§ 46-755 (5)(a) and 46-755 (5)(b), the basin-wide plan contains a monitoring plan, which includes a process to gather and evaluate data, information, and methodologies to increase understanding of the surface water and hydrologically connected groundwater system with the basin and to test the validity of the conclusions, information, and assumptions upon which the plan is based.

One component of the monitoring plan is a list of data on water supplies and uses in the Republican River Basin that will be reported annually by NeDNR and the NRDs (Table 3.1 of the basin-wide plan). As stated in the basin-wide plan's Monitoring section, it will take time for NeDNR and the NRDs to prepare each category of data for distribution; some of the listed data are readily available within existing data sets, while others will take significantly longer for methodology development. As a result, NeDNR and the NRDs will gradually increase the number of data items that will be reported on each year as they are able. In addition, as also noted in the plan, the list of data reported is subject to change as data needs and resources change over time.

This annual report contains data for the year 2019. The following data are included in this annual report:

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Middle Republican Natural Resources District 54
Current Allocations 54
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Upper Republican Natural Resources District

Current Allocations

Upper Republican NRD's allocations and related rules for the 2018–2022 allocation period are summarized in Table 11. In this context, an allocation is a regulatory measure that stipulates the amount of water available to be used for irrigation

Table 11. Summary of current allocation for groundwater irrigation use in the Upper Republican NRD, 2018–2022 allocation period.

Total Allocation	65 Inches/Acre/5 Years
Annual or Base Allocation	Allocation is over 5 Years, not annual
Maximum Annual Use	65 Inches/Acre
Carry over amount that can be used in the following allocation period	7.5 Inches/Acre (Max)
Hard Cap	None
Pooling allowed?	Yes
How are the allocations affected by surface water use?	Allocations are not affected by surface water use. Irrigators may use their full groundwater allocation, regardless of any surface water use.
Special allocations for designated groundwater management areas? Or subbasins?	None
Rapid Response Area Allocations?	Not unless augmentation projects are insufficient to meet Republican River Compact obligations will Rapid Response Area allocations be needed. Rapid Response Area allocations would depend upon projected Compact shortfalls.
Penalty for exceeding allocation	For every inch of excess use, 2 inches of allocation lost for next allocation period.
Penalty for exceeding carry over	2 inches carry-over deducted for every inch of carry-over used above 7.5 inches

Annual Groundwater Use for Irrigation

Annual groundwater use for irrigation in Upper Republican NRD, for 2019, is summarized in Table 12. This summary includes:

- The total number of certified acres within the district. For the purposes of this report, certified acres are acres certified by the NRD to be allowed to be irrigated with groundwater.
- The total number of effective acres within the district. For the purposes of this report, effective acres are acres where groundwater irrigation was possible (i.e., certified acres minus acres enrolled in a conservation program prohibiting irrigation)
- The total volume of groundwater pumped for irrigation within the district.
- The average depth of water applied for irrigation on effective acres within the district.

Table 12. Annual groundwater use for irrigation in Upper Republican NRD, 2019. The difference between certified and effective acres is described in the body of the report.

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2019	440,990	430,491	344,393	9.6"

Conservation/Retirement Programs

Retired acres are acres enrolled in a program that prohibits the use of water for irrigation, either temporarily or permanently. Table 13 summarizes the number of acres within Upper Republican NRD that were enrolled in retirement programs in 2019. During 2019, retirement programs in effect in this NRD included the Conservation Reserve Enhancement Program (CREP) and the Agricultural Water Enhancement Program (AWEP). In 2019, the Upper Republican NRD also began entering into contracts with landowners to permanently retire irrigation in high stream flow-impact areas under a new program funded by the state's Water Resources Cash Fund and the URNRD. There was strong interest; total bids submitted by landowners in 2019 totaled more than $17 million, almost twice the amount of money available under the program. Contracts to permanently retire a total of 602 acres were signed in 2019 and contracts are pending or have been signed so far in 2020 on an additional 2,795 acres. Many, but not all, of the acres in the new program are also enrolled in CREP; those that are will be permanently barred from being irrigated after CREP contracts expire.

Table 13. Acres within the Upper Republican NRD that are retired from irrigation, either permanently or temporarily. During 2019, retirement programs in effect in this NRD included the Cooperative Reserve Enhancement Program (CREP) and the Agricultural Water Enhancement Program (AWEP).

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2019	10,499	2,148 (AWEP and new program)

Groundwater Levels and Observation Well Locations

The locations of wells used to monitor groundwater levels for all NRDs in the District are shown in Figure 3. Groundwater level data are provided to NeDNR by this NRD as part of the analysis of MHO C for the basin-wide plan. A summary of the data will be provided in the report of the next five-year technical analysis for the plan. Groundwater level data are available from the NRD upon request.

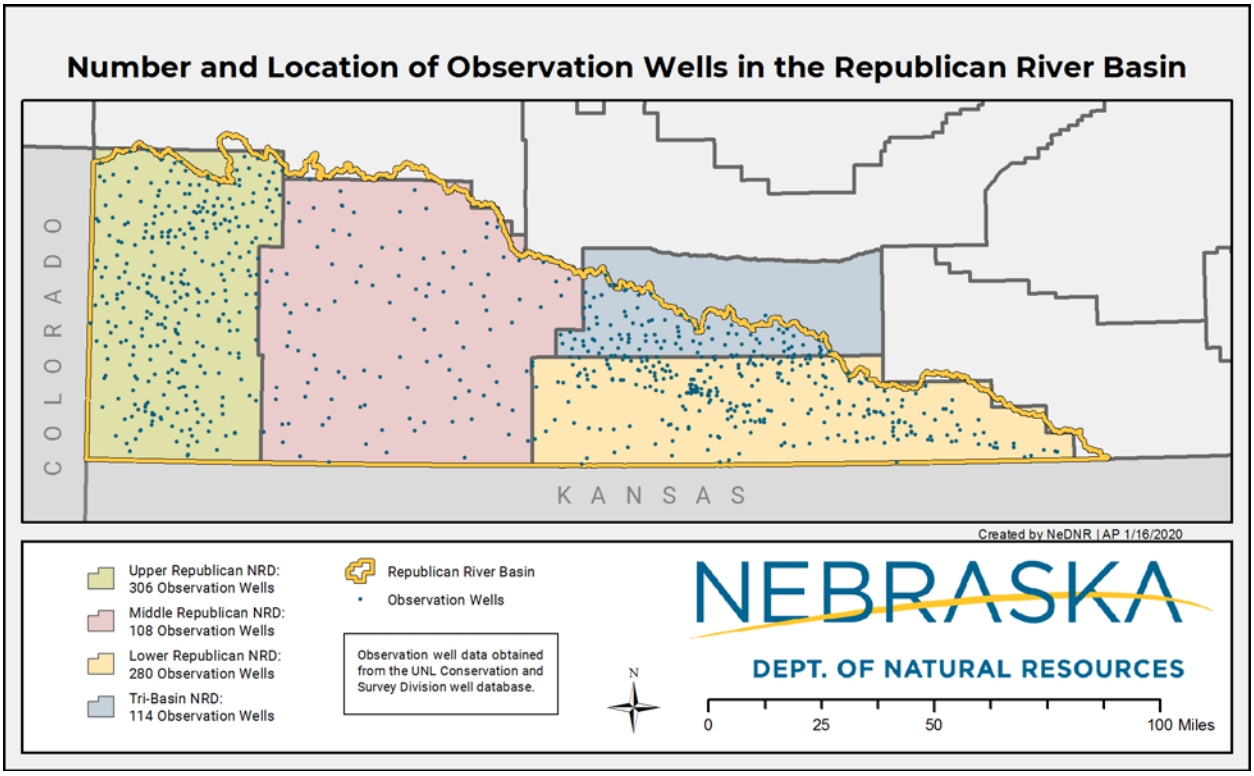


Figure 3. Location and number of groundwater observation wells within the Republican River Basin, by NRD, according to the UNL Conservation and Survey Division well database.

Curtailment of Groundwater Pumping for Compact Compliance

Under the Integrated Management Plan jointly developed by the Upper Republican NRD and NeDNR, curtailment of groundwater pumping in an area called the "Rapid Response Area" may be required by the NRD if necessary for compliance with Nebraska's obligations under the

Republican River Compact (Compact). During 2019, Upper Republican NRD did not curtail groundwater pumping in the Rapid Response Area for Compact compliance at any time.

Middle Republican Natural Resources District

Current Allocations

Middle Republican NRD's allocations and related rules for the 2018–2022 allocation period are summarized in Table 14. In this context, an allocation is a regulatory measure that stipulates the amount of water available to be used for irrigation.

Table 14. Summary of current allocations for groundwater irrigation use in the Middle Republican NRD, 2018–2022 allocation period.

Total Allocation	60 Inches/Acre/5 Years
Annual or Base Allocation	12 Inches/Acre/Year
Maximum Annual Use	60 Inches/Acre (15 Inches/Acre in a Compact Call Year)
Carry over amount that can be used in the following allocation period	12 Inches/Acre (Max)
Hard Cap	15 Inches/Acre/Year
Pooling allowed?	Yes
How are the allocations affected by surface water use?	Allocations are not affected by surface water use. Irrigators may use their full groundwater allocation, regardless of any surface water use.
Special allocations for designated groundwater management areas? Or subbasins?	None
Rapid Response Area Allocations?	None
Penalty for exceeding allocation	See explanation below*
Penalty for exceeding carry over	See explanation below*

***Middle Republican NRD Penalty for exceeding allocation:**

If an operator has exceeded his or her allocation, the allocation for the next allocation period shall be reduced by the number of acre inches, by which said allocation was exceeded in the prior

period. A penalty of 1 inch for every inch over the first 3 inches and 2 inches for every inch over 3 inches of overuse will be applied.

Overuse of the adjusted base allocation during a Compact Call Year shall result in a penalty of 2 inches for every inch over the first 3 inches and 3 inches for every inch over 3 inches of overuse will be applied. This penalty will result in a correction to the remaining allocation following the compact call year. This penalty shall be in addition to the penalties imposed by 5-4.16 if the compact call year is the last year of an allocation period.

Annual Groundwater Use for Irrigation

Annual groundwater use for irrigation in Middle Republican NRD, for 2019, is summarized in Table 15. This summary includes:

- The total number of certified acres within the district. For the purposes of this report, certified acres are acres certified by the NRD to be allowed to be irrigated with groundwater.
- The total number of effective acres within the district. For the purposes of this report, effective acres are acres where groundwater irrigation was possible (i.e., certified acres minus acres enrolled in a conservation program prohibiting irrigation)
- The total volume of groundwater pumped for irrigation within the district.
- The average depth of water applied for irrigation on effective acres within the district.

Table 15. Annual groundwater use for irrigation in Middle Republican NRD, 2019. The difference between certified and effective acres is described in the body of the report.

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2019	296,782	289,660	133,735	5.72

Conservation/Retirement Programs

Retired acres are acres enrolled in a program that prohibits the use of water for irrigation, either temporarily or permanently. Table 16 summarizes the number of acres within Middle Republican NRD that were enrolled in retirement programs in 2019. During 2019, retirement programs in effect in this NRD included the Cooperative Reserve Enhancement Program (CREP) and the Agricultural Water Enhancement Program (AWEP). In 2019, the Middle Republican NRD also entered into a contract with one landowner to permanently retire 94.5 acres from surface water irrigation and contracts with three landowners to permanently retire 267.0 acres from groundwater irrigation. These permanent retirement contracts were jointly funded by the state's Water Resources Cash Fund and the Upper Republican NRD.

Table 16. Acres within the Middle Republican NRD that are retired from irrigation, either permanently or temporarily. During 2019, retirement programs in effect in this NRD included the Cooperative Reserve Enhancement Program (CREP) and the Agricultural Water Enhancement Program (AWEP). Additionally, in 2019 MRNRD permanently retired acres from irrigation through their own program, which was partially funded by the Water Resources Cash Fund.

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2019	12,310	1861

Groundwater Levels and Observation Well Locations

The locations of wells used to monitor groundwater levels for all NRDs in the District are shown in Figure 3 (page 52). Groundwater level data are provided to NeDNR by this NRD as part of the analysis of MHO C for the basin-wide plan. A summary of the data will be provided in the report of the next five-year technical analysis for the plan. Groundwater level data are available from the NRD upon request.

Curtailment of Groundwater Pumping for Compact Compliance

Under the Integrated Management Plan jointly developed by the Middle Republican NRD and NeDNR, curtailment of groundwater pumping in an area called the "Rapid Response Area" may be required by the NRD if necessary for compliance with Nebraska's obligations under the Republican River Compact (Compact). During 2019, Middle Republican NRD did not curtail groundwater pumping in the Rapid Response Area for Compact compliance at any time.

Lower Republican Natural Resources District

Current Allocations

Lower Republican NRD's allocations and related rules for the 2018–2022 allocation period are summarized in Table 17. In this context, an allocation is a regulatory measure that stipulates the amount of water available to be used for irrigation.

Table 17. Summary of current allocations for groundwater irrigation use in the Lower Republican NRD, 2018–2022 allocation period.

Total Allocation	45 Inches/Acre/5 Years
Annual or Base Allocation	9 Inches/Acre/Year
Maximum Annual Use	45 Inches/Acre (13 Inches/Acre in a Compact Call Year)
Carry over amount that can be used in the following allocation period	9 Inches/Acre (Max)
Hard Cap	13 Inches/Acre/Year (in a Compact Call Year)
Pooling allowed?	Yes
How are the allocations affected by surface water use?	Allocations are not affected by surface water use. Irrigators may use their full groundwater allocation, regardless of any surface water use.
Special allocations for designated groundwater management areas? Or subbasins?	None
Rapid Response Area Allocations?	See explanation below**
Penalty for exceeding allocation	See penalty explanation below***
Penalty for exceeding carry over	See penalty explanation below***

***Lower Republican NRD Rapid Response Area Allocations:**

During Non-Compact Call years, the Rapid Response Area has the same Allocation as the rest of the District. During a Compact Call Year, the Allocation shall be set at the maximum allowable that would not cause the District's depletions to streamflow to exceed the District's allowable Ground Water depletions after taking into consideration other actions and controls that the District would implement. As set forth in the IMP, DNR will perform all calculations relating to the District's forecasted allowable Ground Water depletions, forecasted depletions, and potential yield from implementing actions and controls.

*****Lower Republican NRD Rule 3-2 Penalties:**

3-2.1. Unless otherwise provided, imposition of penalties shall be at the discretion of the Board and may include, but are not limited to:

(a) A reduction (in whole or in part) of a Person's Allocation of Ground Water;
(b) A reduction (in whole or in part) of a Person's Certified Irrigated Acres; and
(c) Decommissioning of Water Wells.

3-2.2. Where penalties are enumerated in the Rules and Regulations, the Board may impose additional penalties, up to and including a permanent forfeiture of Certified Irrigated Acres, and/or a permanent forfeiture of all future Allocations, under the following circumstances: (1) previous violations of any Rule or Regulation, (2) multiple violations of these Rules and Regulations, (3) engaging in willful and wanton misconduct, or (4) certification by the record owner to the District of the non-irrigation status of certain Certified Irrigated Acres in order to opt-out of an Occupation Tax levied by the District, which status is later found to be false in whole or in part.

3-2.3. Any Person who violates a cease and desist order issued by the District pursuant to *Neb. Rev. Stat.* § 46- 707(h) may be subject to a civil penalty assessed pursuant to *Neb. Rev. Stat.* § 46-745.

Annual Groundwater Use for Irrigation

Annual groundwater use for irrigation in Lower Republican NRD, for 2019, is summarized in Table 18. This summary includes:

- The total number of certified acres within the district. For the purposes of this report, certified acres are acres certified by the NRD to be allowed to be irrigated with groundwater.
- The total number of effective acres within the district. For the purposes of this report, effective acres are acres where groundwater irrigation was possible (i.e., certified acres minus acres enrolled in a conservation program prohibiting irrigation)
- The total volume of groundwater pumped for irrigation within the district.
- The average depth of water applied for irrigation on effective acres within the district.

Table 18. Annual groundwater use for irrigation in Lower Republican NRD, 2019. The difference between certified and effective acres is described in the body of the report.

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2019	323,045.29	310,528.06	96,209.82	3.72

Conservation/Retirement Programs

Retired acres are acres enrolled in a program that prohibits the use of water for irrigation, either temporarily or permanently. Table 19 summarizes the number of acres within Lower Republican NRD that were enrolled in retirement programs, 2019. During 2019, retirement programs in effect in this NRD included the Cooperative Reserve Enhancement Program (CREP) and the Agricultural Water Enhancement Program (AWEP).

Table 19. Acres within the Lower Republican NRD that are retired from irrigation, either permanently or temporarily. During 2019, retirement programs in effect in this NRD included the Cooperative Reserve Enhancement Program (CREP) and the Agricultural Water Enhancement Program (AWEP).

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2019	6,644.01	5,873.49

Groundwater Levels and Observation Well Locations

The locations of wells used to monitor groundwater levels for all NRDs in the District are shown in Figure 3 (page 52). Groundwater level data are provided to NeDNR by this NRD as part of the analysis of MHO C for the basin-wide plan. A summary of the data will be provided in the report of the next five-year technical analysis for the plan. Groundwater level data are available from the NRD upon request.

Curtailment of Groundwater Pumping for Compact Compliance

Under the Integrated Management Plan jointly developed by the Lower Republican NRD and NeDNR, curtailment of groundwater pumping in an area called the "Rapid Response Area" may be required by the NRD if necessary for compliance with Nebraska's obligations under the Republican River Compact (Compact). During 2019, Lower Republican NRD did not curtail groundwater pumping in the Rapid Response Area for Compact compliance at any time.

Tri-Basin Natural Resources District

Current Allocations

Tri-Basin NRD's allocations and related rules for the 2018–2020 allocation period are summarized in Table 20. In this context, an allocation is a regulatory measure that stipulates the amount of water available to be used for irrigation.

Table 20. Summary of current allocations for groundwater irrigation use in the Tri-Basin NRD, 2018–2020 allocation period.

Total Allocation	27 Inches/Acre/3 Years
Annual or Base Allocation	9 Inches/Acre/Year
Maximum Annual Use	27 Inches/Acre
Carry over amount that can be used in the following allocation period	9 Inches/Acre (Max)
Hard Cap	None
Pooling allowed?	Yes
How are the allocations affected by surface water use?	Allocations are not affected by surface water use. Irrigators may use their full groundwater allocation, regardless of any surface water use.
Special allocations for designated groundwater management areas? Or subbasins?	Allocation only required in Phase 3 groundwater quantity management areas. Current Phase 3 area is Township 5 North, Range 22 West (Union Twp.) in Gosper County.
Rapid Response Area Allocations?	None
Penalty for exceeding allocation	1.5 times the overuse amount
Penalty for exceeding carry over	1.5 times the overuse amount

Annual Groundwater Use for Irrigation

Annual groundwater use for irrigation in Tri-Basin NRD, for 2019, is summarized in Table 21. This summary includes:

- The total number of certified acres within the district. For the purposes of this report, certified acres are acres certified by the NRD to be allowed to be irrigated with groundwater.
- The total number of effective acres within the district. For the purposes of this report, effective acres are acres where groundwater irrigation was possible (i.e., certified acres minus acres enrolled in a conservation program prohibiting irrigation)
- The total volume of groundwater pumped for irrigation within the district.
- The average depth of water applied for irrigation on effective acres within the district.

Table 21. Annual groundwater use for irrigation in the Republican River Basin portion of Tri-Basin NRD, 2019. The difference between certified and effective acres is described in the body of the report.

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2019	190299.74	174524.91	73446.71	2.37

Conservation/Retirement Programs

Retired acres are acres enrolled in a program that prohibits the use of water for irrigation, either temporarily or permanently. Table 22 summarizes the number of acres within the Republican River Basin portion of Tri-Basin NRD that were enrolled in retirement programs in 2019. During 2019, the retirement program in effect in the Republican River Basin portion of this NRD included the Cooperative Reserve Enhancement Program (CREP).

Table 22. Acres within the Republican River Basin portion of Tri-Basin NRD that are retired from irrigation, either permanently or temporarily. During 2019, the retirement program in effect in this NRD included the Cooperative Reserve Enhancement Program (CREP).

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2019	2329.24	n/a

The Tri-Basin NRD Water Conservation Incentive Program (WCIP) is intended to address two natural resources management issues: insuring sustainability of groundwater supplies and protecting streamflows from diminishment due to groundwater pumping. The goal of this

voluntary program is to reduce groundwater pumping and increase irrigation water use efficiency in Tri-Basin NRD. Acres enrolled in the WCIP program in 2019 are listed in Table 23.

Tri-Basin will allow landowners to enroll up to 8000 NRD-certified irrigated acres in the program. Any parcel enrolled is subject to a voluntary five-year allocation of groundwater pumping for irrigation. The allocation is equivalent to the average corn irrigation requirement, as determined by the University of Nebraska. Once the enrollment limit is reached, water savings to the district should reach at least 650 acre-feet per year. Incentives in this program will likely be most attractive to landowners in phase two and phase three groundwater quantity management areas, so the water-use reductions should be greatest where the need is greatest (there are approximately 30,000 certified irrigated acres in Tri-Basin's phase two and phase three townships).

In exchange for their participation, if landowners use less than their full allocation, they will be paid for the equivalent of one acre-inch of water credit per acre per year, with the opportunity to sell additional unused credits to the NRD at a set price. In addition to NRD purchases, landowners will have the opportunity to sell water credits on the open market at any agreed-upon price (private transactions require NRD board approval). Landowners will also be granted flexibility to irrigate any acres within enrolled parcels and to share (pool) allocations between parcels. Pooling agreements will be required to enable sharing allocations between parcels under different ownership.

Table 23. Acres in the Republican River Basin enrolled in the Tri-Basin NRD's Water Conservation Incentive Program in 2019. The "New Acres Enrolled" column indicates the number of acres that were added to the program on the year indicated. The "Total Acres Enrolled" column indicates the total number of acres enrolled as of the year indicated.

Year	New Acres Enrolled	Total Acres Enrolled
2019	1449.57	1449.57

Groundwater Levels and Observation Well Locations

The locations of wells used to monitor groundwater levels for all NRDs in the District are shown in Figure 3 (page 52). Groundwater level data are provided to NeDNR by this NRD as part of the analysis of MHO C for the basin-wide plan. A summary of the data will be provided in the report of the next five-year technical analysis for the plan. Groundwater level data are available from the NRD upon request.

Nebraska Department of Natural Resources

The Republican River Basin is located at the intersection of Nebraska, Colorado, and Kansas (Table 11 and Figure 4). The Republican River Compact (Compact), administered by the Republican River Compact Administration (RRCA) is an interstate agreement that allocates consumption of the waters of the Republican River Basin among the three states. Unless otherwise indicated, the data reported in the NeDNR section of this report are either from the RRCA's approved accounting data or the data Nebraska provided to Colorado and Kansas as part of the RRCA's annual data exchange, or else they were calculated from those data using the RRCA groundwater model.

Table 24. Area of Nebraska, Kansas, and Colorado within the Republican River Basin (USGS Hydrologic Unit Code: 102500).

State	Republican River Basin Area (mi^2)
Colorado	7,816
Kansas	7,551
Nebraska	9,546

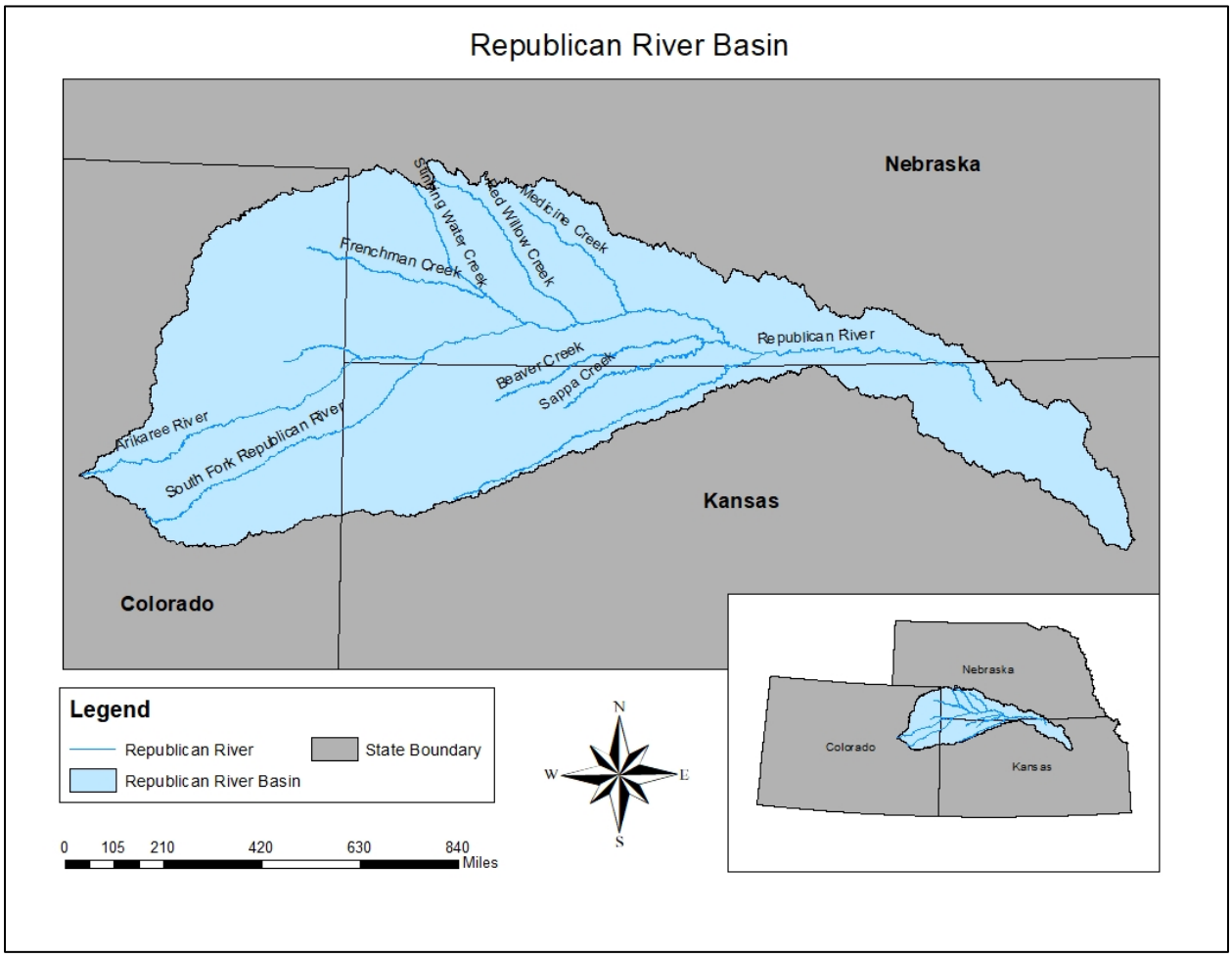


Figure 4. Extent of Republican River Basin within Nebraska, Kansas, and Colorado (USGS Hydrologic Unit Code: 102500).

Precipitation

In 2019, annual precipitation measured at National Weather Service cooperative stations across the Republican River Basin in Nebraska, as used in RRCA analyses, ranged from 18.77 inches to 42.18 inches. Figure 5 displays the 2019 precipitation at each of the cooperative stations used by the RRCA. Additional stations outside of Nebraska and the basin are used by the RRCA to fill in precipitation across the whole RRCA model area which extends beyond the basin boundary.

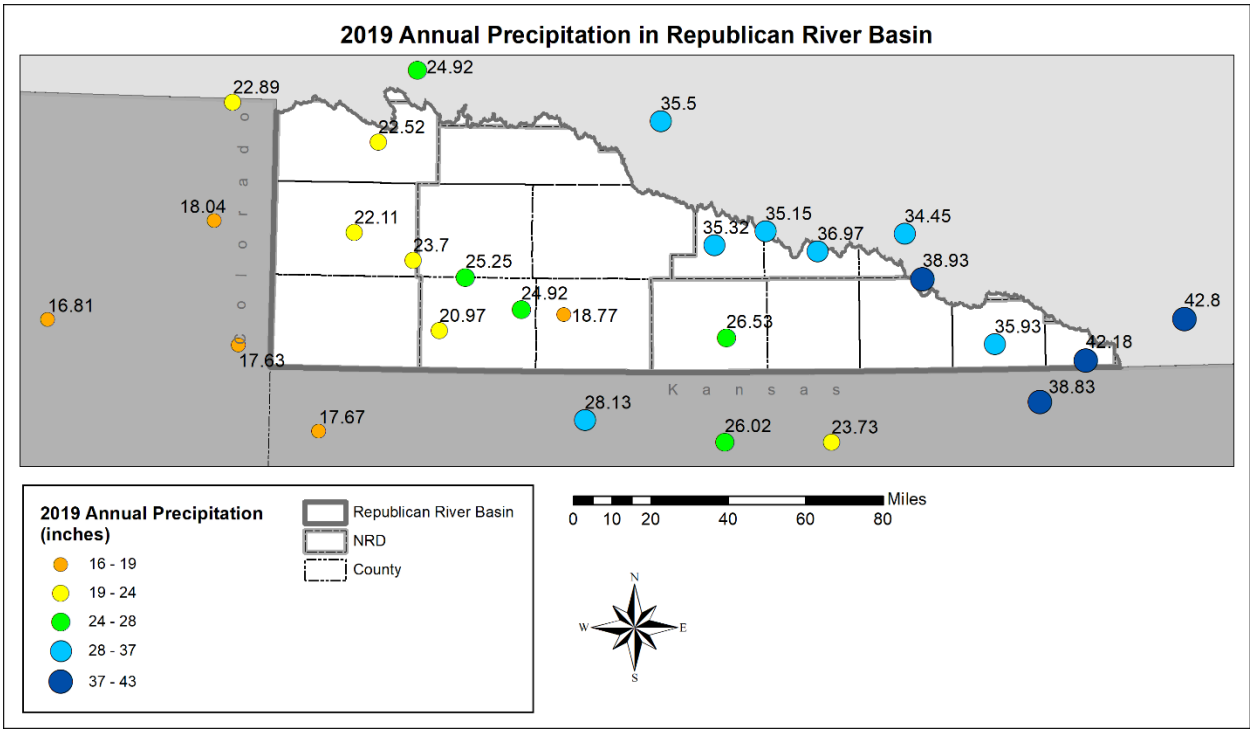


Figure 5. 2019 annual precipitation in inches from National Weather Service cooperative stations, as used in RRCA groundwater model processing.

Streamflow

Under the Republican River Compact, allocations within each Republican River subbasin include the streamflow at the downstream end of the subbasin. Subbasin streamflow is measured for the Compact by 13 USGS gages and one NeDNR gage (Figure 6 and Tables 15). The most downstream streamgages in Nebraska are on the Main Stem of the Republican River at Guide Rock and Hardy. Table 25 presents the total amount of water in acre-feet measured past each of the streamgages in 2019. For more details and to obtain continuous stream and reservoir, partial year, canal, canal return flow, and miscellaneous spot measurement data from over 250 gaging sites visit the NeDNR website: *https://nednr.nebraska.gov/RealTime/*.

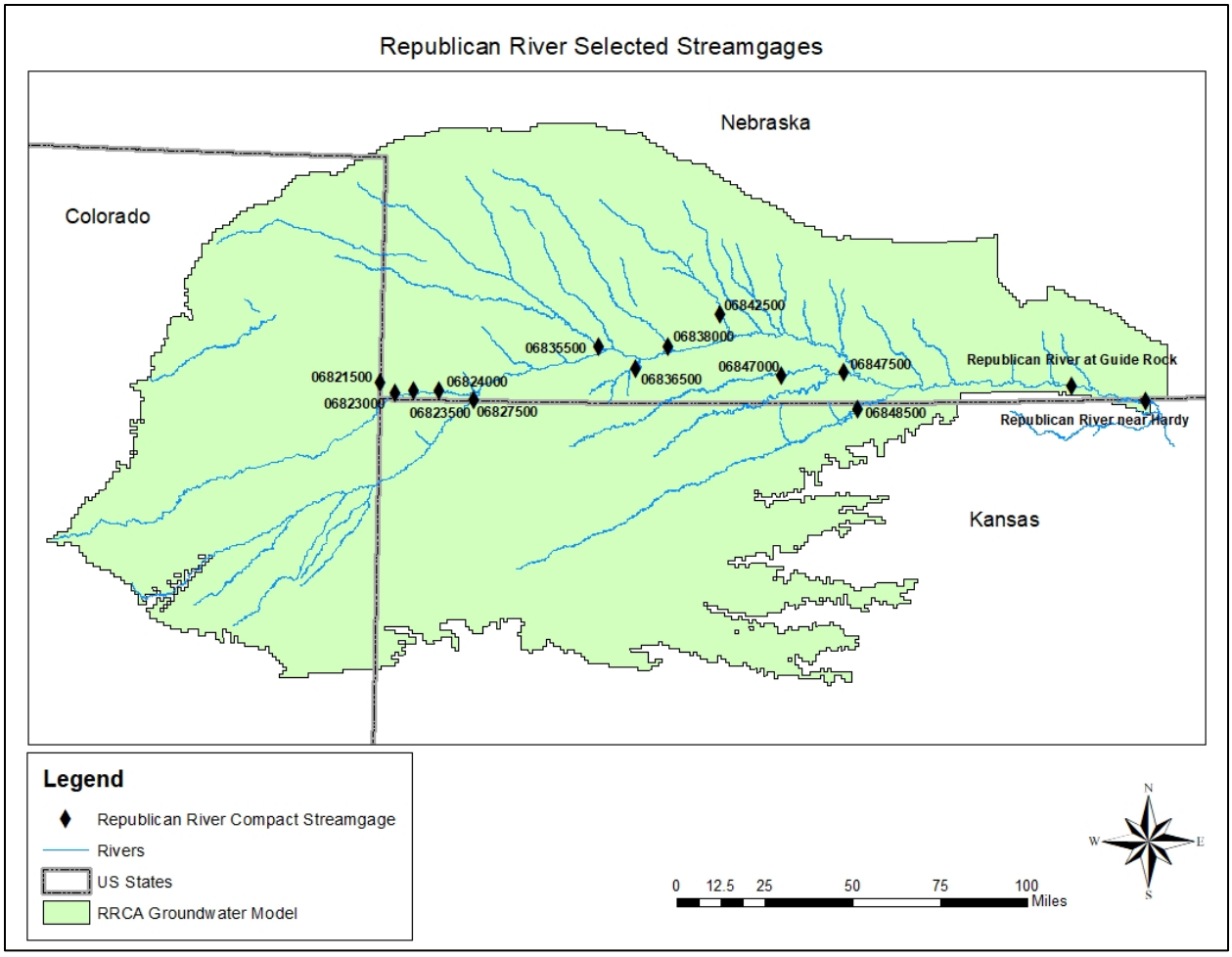


Figure 6. Location of subbasin streamgages within the Republican River Basin.

Table 25. Annual streamflow volumes in acre-feet from Republican River subbasin streamgages used in the Republican River Compact accounting.

Annual Streamflow (acre-feet)	
Streamgage	**2019**
USGS 06823000 - North Fork of the Republican River at Colorado-Nebraska State Line	25,436
USGS 06821500 - Arikaree River at Haigler	1,113
USGS 06823500 - Buffalo Creek near Haigler	1,355
USGS 06824000 - Rock Creek at Parks	3,748
USGS 06827500 - South Fork Republican River near Benkelman	2,385
USGS 06835500 - Frenchman Creek at Culbertson	27,267
USGS 06836500 - Driftwood Creek near McCook	3,284
USGS 06838000 - Red Willow Creek near Red Willow	3,457
NeDNR 06842500 - Medicine Creek below Harry Strunk Lake	48,769
USGS 06847000 - Beaver Creek near Beaver City	1,632
USGS 06847500 - Sappa Creek near Stamford	42,888
USGS 06848500 - Prairie Dog Creek near Woodruff, Kansas	40,960
USGS 06853020 - Republican River at Guide Rock	502,644
USGS 06853500 - Republican River near Hardy	626,375

Irrigated Acres

For the Republican River Compact Administration Groundwater Model, Nebraska currently reports irrigated acres as one of the following:

1. Groundwater-only irrigated acres.
2. Surface water-only irrigated acres or surface water and groundwater (commingled) irrigated acres.

Acres irrigated with groundwater are reported with metered pumping annually by the NRDs to NeDNR or are estimated for the portions of the RRCA model area that are in NRDs without metered pumping. Acres irrigated with surface water and commingled are flagged annually based on use from a master database developed from water right information. Annual irrigated acres within the RRCA model from 2019 have been divided into the two reporting methods and groundwater acres have been delineated by the NRD that the model cells primarily overlay (Figure 7). Nebraska annual total surface water and commingled and total groundwater irrigated acres are also presented in Table 26.

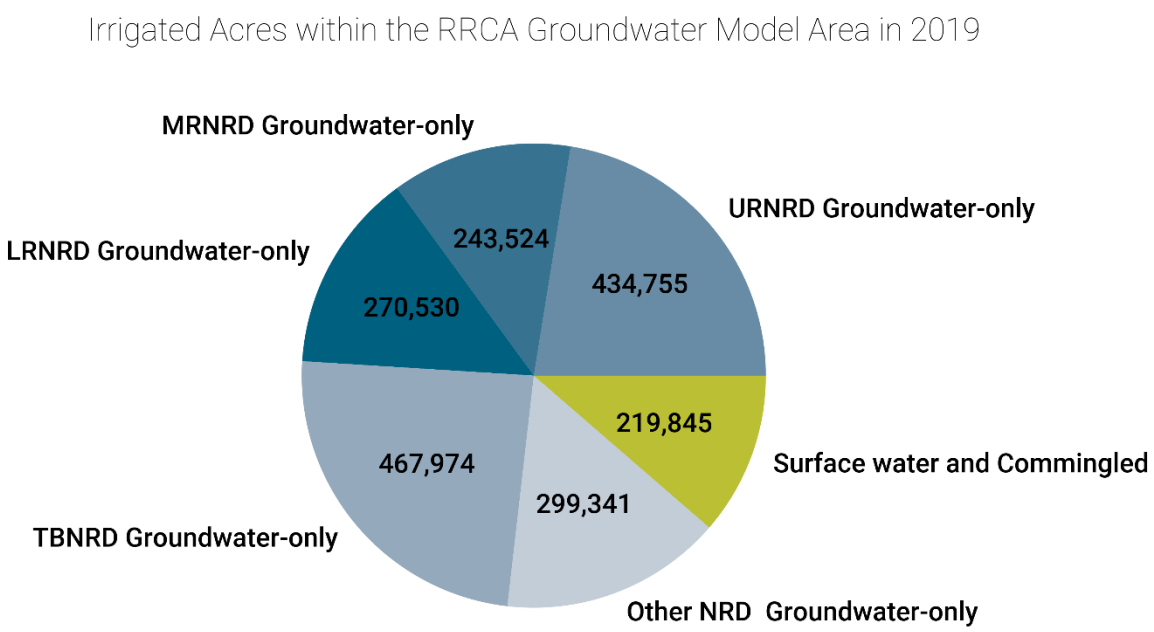


Figure 7. Annual acres irrigated by surface water and commingled (surface water and groundwater irrigated) or acres irrigated by only groundwater, delineated by the NRD that the model cells primarily overlay in the Nebraska portion of the RRCA groundwater model. Because all of Tri-Basin NRD (TBNRD) is included in the RRCA groundwater model area, the groundwater-irrigated acres shown here for Tri-Basin NRD include acres that are located in the Platte, Little Blue, and Republican River Basins.

Table 26. Annual division of acres irrigated by surface water and commingled (surface water and groundwater irrigated) or acres irrigated by only groundwater in the Nebraska portion of the RRCA groundwater model. Because all of Tri-Basin NRD is included in the RRCA groundwater model area, the groundwater-irrigated acres shown here for Tri-Basin NRD include acres that are located in the Platte, Little Blue, and Republican River Basins.

Area and Irrigation Type	2019
Nebraska Model Area – Surface Water and Commingled	219,845
Upper Republican NRD – Groundwater-only	434,755
Middle Republican NRD – Groundwater-only	243,524
Lower Republican NRD – Groundwater-only	270,530
Tri-Basin NRD – Groundwater-only	467,974
Other – Groundwater-only	299,341

Allocation and Computed Beneficial Consumptive Use (CBCU)

Under the Republican River Compact, the total water supply and how much of the total supply each state is entitled to beneficially use is referred to as "allocation." The allocations are calculated from the water supply of the basin if it had been undepleted by the activities of man. Each state is allotted a fixed percentage of the undepleted water supply in each of the Republican River subbasins to obtain the states' allocations. The calculated uses of the water supplies are referred to as "Computed Beneficial Consumptive Use" or "CBCU". The CBCU in the Republican River Basin includes direct surface water uses, such as reservoir evaporation and consumption of diverted water, and withdrawal or interception of streamflow by groundwater pumping (groundwater depletions to streamflow). Groundwater pumping can have a lagged effect on streamflow. The RRCA groundwater model considers the effects of pumping since early well development in the 1940s, therefore, the groundwater consumptive use of streamflow in each year is impacted by pumping in that year and all previous years. Table 27 presents total CBCU in Colorado, total CBCU in Kansas, and the breakdown of total CBCU as surface water or groundwater CBCU from Nebraska. Nebraska groundwater CBCU are presented for the effects of pumping from each basin NRD separately (Upper Republican, Middle Republican, Lower Republican, and Tri-Basin NRDs) and all other NRDs within the model area collectively (Other NRD) in Table 27. Each NRD's groundwater CBCU is equivalent to the net depletions to streamflow due to groundwater pumping within that NRD. .

Table 27. Annual total Computed Beneficial Consumptive Use (CBCU) by Kansas and Colorado and annual Nebraska total surface water CBCU and division of groundwater CBCU (i.e., net depletions to streamflow) by each NRD. The sum of Nebraska CBCU presented in this table may vary slightly from the statewide CBCU in Nebraska's Compact compliance tables due to rounding.

CBCU (acre-feet)	
	2019
Colorado	32,740
Kansas	47,910
Nebraska Surface Water	46,520
Lower Republican NRD Groundwater	48,401
Middle Republican NRD Groundwater	62,437
Upper Republican NRD Groundwater	88,089
Tri-Basin NRD Groundwater	14,950
Other NRD Groundwater	2,457

Reservoir Storage and Evaporation

Federal Reservoir Storage

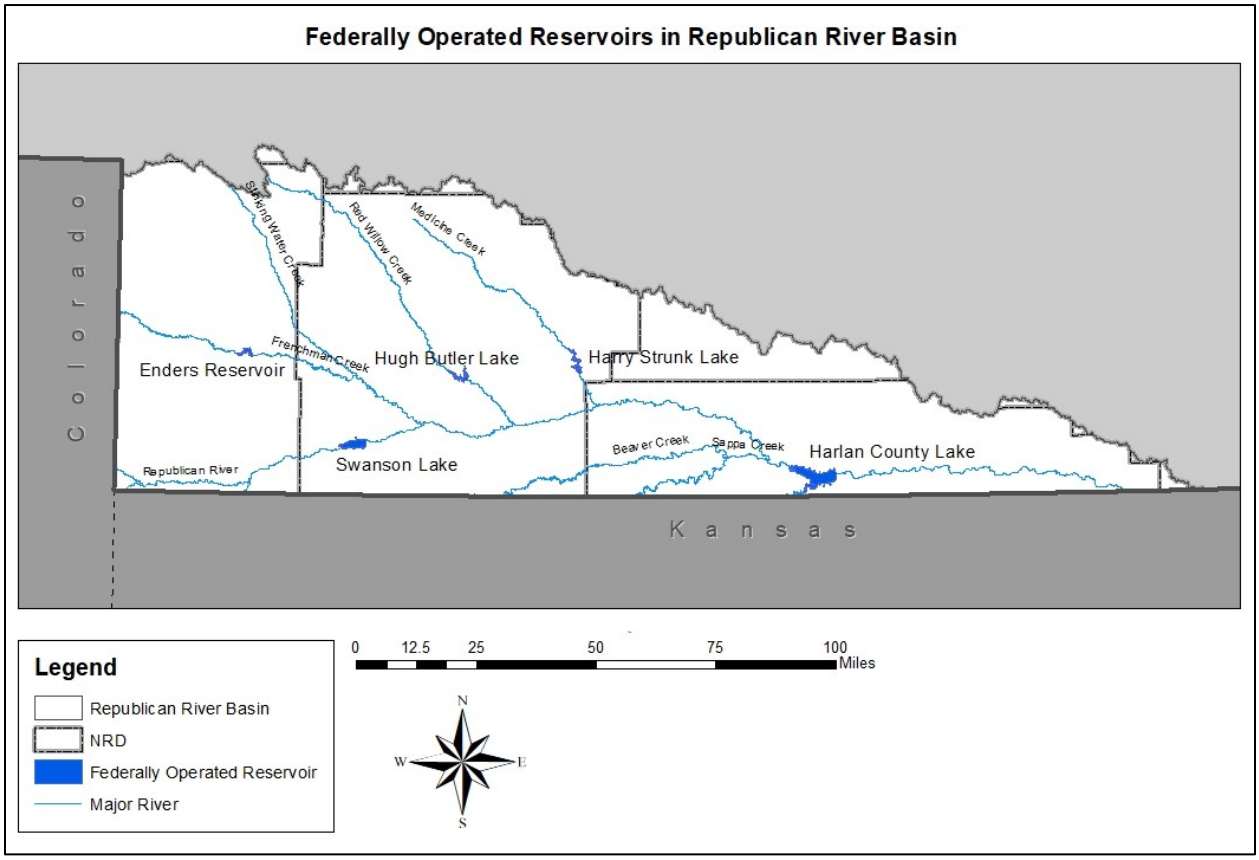


Figure 8. Location of federal reservoirs located in Nebraska portion of the Republican River Basin.

There are five federally operated reservoirs within the Republican River Basin in Nebraska: Enders Reservoir on Frenchman Creek, Hugh Butler Reservoir on Red Willow Creek, Harry Strunk Reservoir on Medicine Creek, and Swanson Lake and Harlan County Lake on the Republican River (Figure 8). Annual end of year storage volumes for 2019 relative to the reservoirs' active storage for each Republican River Basin reservoir in Nebraska are shown in Figure 9. Storage data were obtained from the United States Bureau of Reclamation (USBR), which are available on the USBR's automated data system HydroMet at *https://www.usbr.gov/gp/hydromet/*.

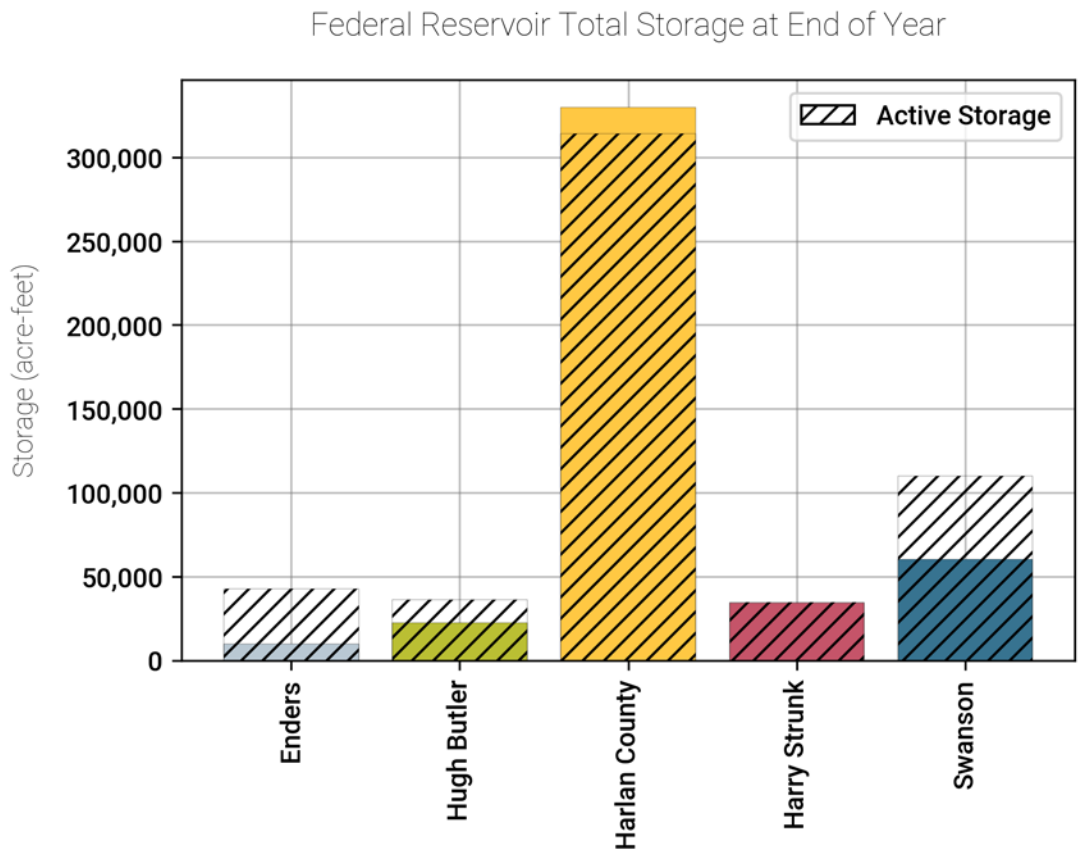


Figure 9. 2019 end-of-year reservoir contents relative to the reservoirs' active storage (i.e., capacity at the top of active conservation elevation) for the federally operated reservoirs within the Republican River Basin in Nebraska: Enders Reservoir on Frenchman Creek, Hugh Butler Reservoir on Red Willow Creek, Harry Strunk Reservoir on Medicine Creek, and Swanson Lake and Harlan County Lake on the Republican River.

Reservoir Evaporation

In 2019 in the Republican River Basin, net evaporation from the five federal reservoirs in Nebraska was 25,547 acre-feet and 1,003 acre-feet from non-federal reservoirs. Federal and non-federal reservoir evaporation are beneficial consumptive uses of surface water. For the RRCA, federal and non-federal reservoir CBCU are calculated as net evaporation, which is evaporation from the reservoir minus precipitation directly intercepted by the reservoir.

Surface Water Municipal and Industrial CBCU

During the reporting year, there were no permitted municipal nor industrial uses of surface water in the Republican River Basin. For more information on surface water permitting, visit NeDNR's Surface Water Permitting and Data website at: *https://dnr.nebraska.gov/surface-water*.

Surface Water Administration for Compact Compliance

Under the IMPs jointly developed by NeDNR and the Upper Republican, Middle Republican, and Lower Republican NRDs, NeDNR may administer and regulate surface water if necessary to ensure compliance with Nebraska's obligations under the Compact during Compact Call Years. Compact Call Years are years in which NeDNR's analysis following the forecast procedures contained in the IMPs for the Upper Republican, Middle Republican, and Lower Republican NRDs indicate the potential for noncompliance with the Compact if sufficient management actions are not taken. No water administration for Compact compliance due to a Compact Call occurred in 2019.

Note that only administration for Compact compliance due to a Compact Call is considered a management action for the purposes of evaluating the basin-wide plan's MHO E. Surface water is also administered under the Water-Short Year provisions of the Final Settlement Stipulation (FSS) for the Compact. This type of water administration is triggered automatically under the terms of the FSS: whenever the projected or actual irrigation supply available in Harlan County Lake is less than 130,000 acre-feet and water is needed for direct diversion at Guide Rock, Nebraska must close appropriations downstream of Harlan County Lake that are junior to February 26, 1948. Because this type of water administration is triggered automatically, it is not considered a management action for the purposes of evaluating the basin-wide plan's MHO E.

Qualitative Evaluation of Net Effect of Management Actions for Compact Compliance

Action Item 1.2.1 of the basin-wide plan is to qualitatively evaluate the net effect on water supplies of any management actions that are taken for Compact compliance. As described in the previous subsection, "Surface Water Administration for Compact Compliance," and in the subsection entitled "Curtailment of Groundwater Pumping for Compact Compliance" within each NRD's section for reporting water supplies and uses (pages 52, 56, 59), neither surface water administration nor curtailment of groundwater pumping occurred in 2019. In addition, as stated in the progress summary for Action Item 1.1.2 (page 15) no management actions were necessary as offsets in 2019. In summary, there were no management actions taken in 2019 for 2019 Compact compliance.

Some management actions were taken in 2019 that will help with Compact compliance in future years. NeDNR and all four NRDs worked with landowners to retire land from irrigation through enrollment or reenrollment in temporary or permanent retirement programs (pages 51, 55, 59, and 61). In addition, Tri-Basin NRD enrolled landowners in a voluntary allocation program to incentivize water conservation (page 61). Both retirement programs and allocation programs are expected to have a positive effect on water supplies by reducing consumptive use of water.

Augmentation Pumping and Net Impacts Analysis

This section contains a summary of pumping data for the augmentation projects in the basin, as well as NeDNR's analysis of the net impacts of augmentation pumping for the N-CORPE and Rock Creek Augmentation projects. NeDNR's net impacts analysis fulfills a requirement of the IMPs jointly developed by NeDNR and the Upper Republican, Middle Republican, and Lower Republican NRDs. The IMPs state that "…all new net depletions to streamflow that result from augmentation pumping (as calculated by the RRCA ground water model) will be mitigated to ensure protection of existing surface water appropriations." All 2020 data are provisional at the time of this report.

N-CORPE Augmentation Project

Pumping

The Nebraska Cooperative Republican Platte Enhancement project (N-CORPE) is operated through an interlocal cooperative agreement formed in 2012 by Upper Republican NRD, Middle Republican NRD, Lower Republican NRD, and Twin Platte, NRD. A summary of N-CORPE pumping for 2019 is provided in Table 28.

Table 28. Summary of N-CORPE augmentation project pumping. The "Days Pumped for Compact Compliance" column indicates the number of days the project was pumped to augment streamflow for Compact compliance purposes. The "Total Pumped Volume" column provides the volume of water pumped in that year for all purposes, including augmentation and maintenance pumping.

Year	Days Pumped for Compact Compliance	Total Pumped Volume (acre-feet)
2019	0	16

Net Impacts Analysis

The IMPs for the Upper Republican NRD, Middle Republican NRD, and Lower Republican NRD state that "…all new net depletions to streamflow that result from augmentation pumping (as calculated by the RRCA ground water model) will be mitigated to ensure protection of existing surface water appropriations." This evaluation provides the most recent estimate of the difference in depletions from the historical operation of N-CORPE and depletions from a simulated continuation of irrigation pumping for lands retired through the implementation of each augmentation project.

Augmentation projects affect streamflow in two ways: by increasing streamflow through direct addition of pumped groundwater, and by impacts to baseflows (groundwater discharge to the stream) from changes in groundwater pumping, with the sum of these being the net streamflow

impacts. The amount of direct groundwater addition to streamflow is metered by the NRDs and reported to NeDNR. The impacts to baseflow are determined by comparing model-estimated impacts from the historical simulation that includes all of the augmentation pumping but ceases irrigation operations once the projects were initiated with a simulation where an estimation of irrigation pumping is included for lands retired through the development of each augmentation project and augmentation pumping from the beginning of the projects through 2020 is excluded (Figure 10 and Figure 11). All 2020 data are provisional.

The N-CORPE augmentation project was operational each year from its first year through 2017 to offset depletions for Compact compliance; 2018 and 2019 operations were for maintenance purposes; and 2020 operations primarily utilized the project's north pipeline to the Platte River for part of TPNRD's integrated management plan requirements. Net depletive effects from 2014–2019 operation were offset by augmentation pumping (Figure 12), so no additional offsets were needed. Based on current projections, 2020 net depletive effects may not be fully offset by augmentation pumping (Figure 13). An analysis of potentially negatively impacted downstream surface water users and the mitigation activities NCORPE has already enacted should be initiated.

An additional analysis was completed to determine the groundwater impacts to streamflow from the 2020 N-CORPE pumping for delivery to the Upper Platte Basin separately from previous years' pumping toward Republican Basin water supply. Due primarily to the distance of the N-CORPE wells to Republican streams, there is a time lag between groundwater pumping from the N-CORPE wells and impacts to Republican streams. This resulted in no impact of 2020 N-CORPE pumping for delivery to the Upper Platte Basin on the project's net depletion to streamflow in the Republican River Basin. In other words, all net depletive impacts in 2020 were due to previous years' augmentation pumping. We will continue this additional scenario in future years as there may be lagged impacts of 2020 Upper Platte augmentation pumping.

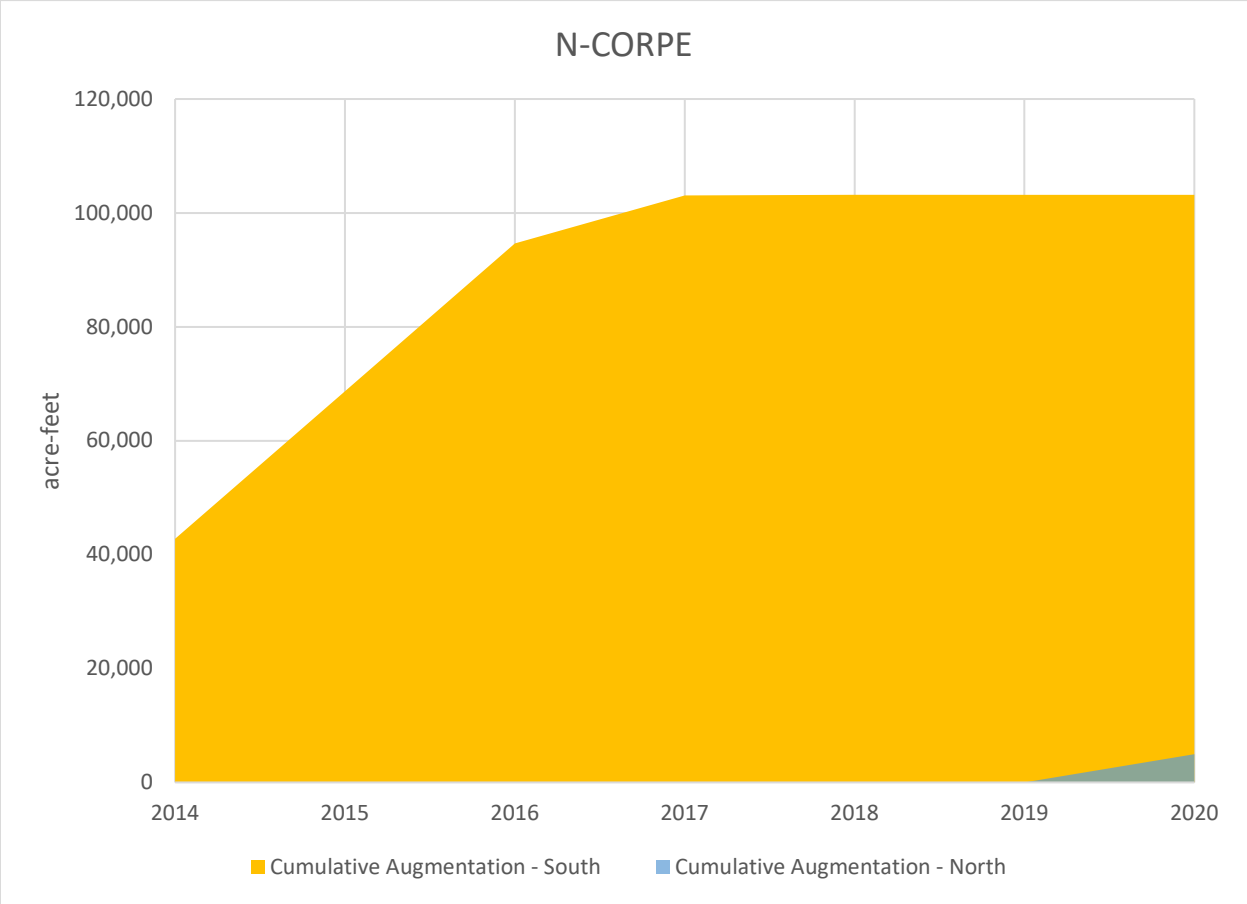


Figure 10: Cumulative water use for augmentation and estimated irrigation pumping on acres retired under the N-CORPE Augmentation Project.

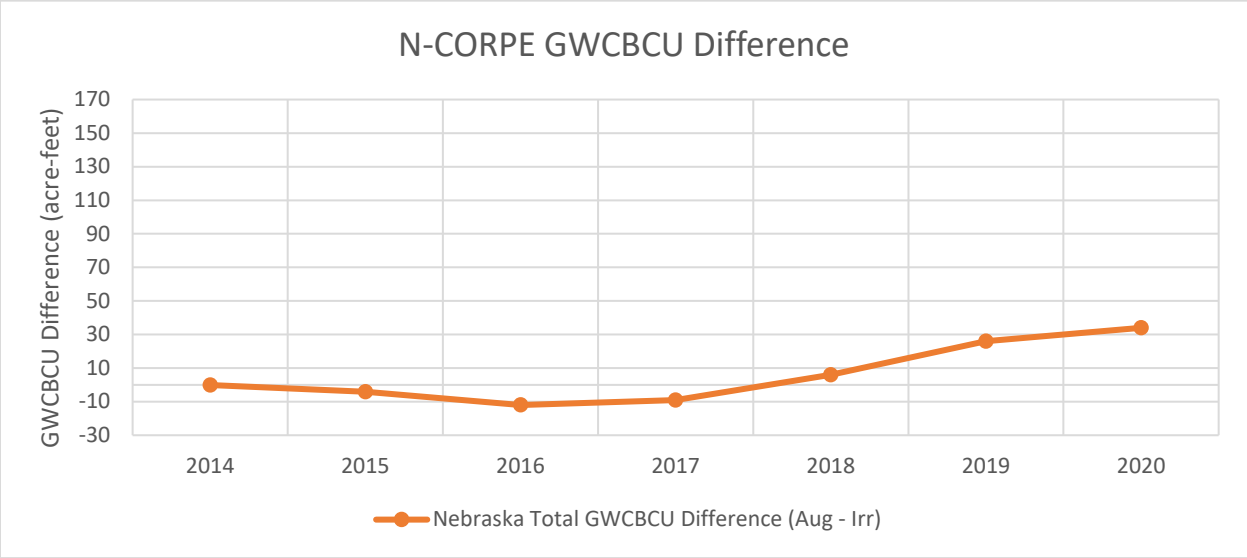


Figure 11: The difference between modeled CBCU (depletions) from N-CORPE Augmentation pumping and modeled CBCU from estimated irrigation pumping on the N-CORPE retired acres had those acres been used for irrigation. In this figure, a positive groundwater CBCU (GWCBCU) difference indicates that modeled depletions from augmentation were greater than modeled CBCU from estimated irrigation pumping.

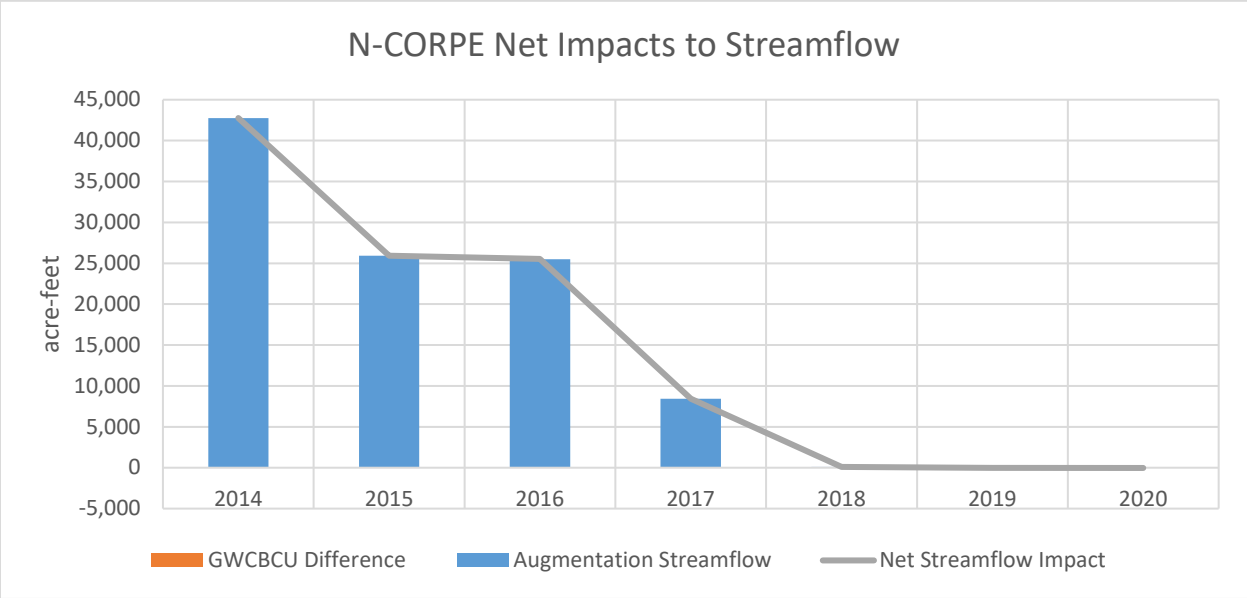


Figure 12: The net impacts to streamflow from the N-CORPE Augmentation Project. In this figure, a positive value indicates a net increase in streamflow due to N-CORPE operations, and a negative value indicates net depletions to streamflow. Because of this, the GWCBCU Difference values in this chart are represented as the inverse of the GWCBCU values in Figure 11.

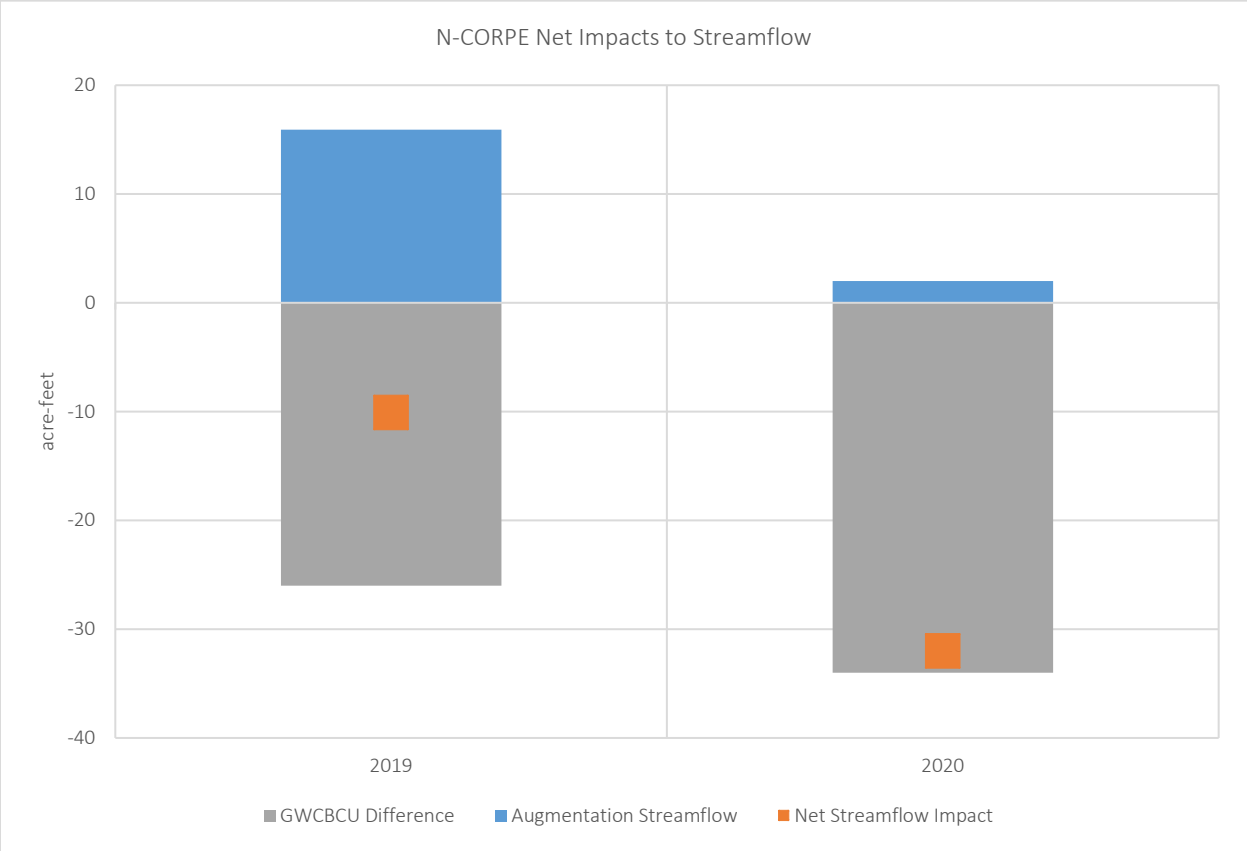


Figure 13: 2019 and 2020 net impacts to streamflow. 2020 data are provisional as of this report. In this figure, a positive value indicates a net increase in streamflow due to N-CORPE operations, and a negative value indicates net depletions to streamflow. Because of this, the GWCBCU Difference values in this chart are represented as the inverse of the GWCBCU values in Figure 11.

Rock Creek Augmentation Project

Pumping

The Rock Creek augmentation project is operated by Upper Republican NRD. A summary of Rock Creek augmentation project pumping for 2019 is provided in Table 29.

Table 29. Summary of Rock Creek augmentation project pumping. The "Days Pumped for Compact Compliance" column indicates the number of days the project was pumped to augment streamflow for Compact compliance purposes. The "Total Pumped Volume" column provides the volume of water pumped in that year for all purposes, including augmentation and maintenance pumping.

Year	Days Pumped for Compact Compliance	Pumped Volume (acre-feet)
2019	0	60

Net Impacts Analysis

The IMP for the Upper Republican NRD states that "…all new net depletions to streamflow that result from augmentation pumping (as calculated by the RRCA ground water model) will be mitigated to ensure protection of existing surface water appropriations." This evaluation provides the most recent estimate of the difference in depletions from the historical operation of the Rock Creek augmentation project and depletions from a simulated continuation of irrigation pumping for lands retired through the implementation of each augmentation project.

Augmentation projects affect streamflow in two ways: by increasing streamflow through direct addition of pumped groundwater, and by impacts to baseflows (groundwater discharge to the stream) from pumping groundwater, with the sum of these being the net streamflow impacts. The amount of direct groundwater addition to streamflow is metered by the NRDs and reported to NeDNR. The impacts to baseflow are determined by comparing model-estimated impacts from the historical simulation that includes all of the augmentation pumping but ceases irrigation operations once the projects were initiated with a simulation where an estimation of irrigation pumping is included for lands retired through the development of each augmentation project and augmentation pumping from the beginning of the projects through 2020 is excluded (Figure 14 and Figure 15). All 2020 data are provisional.

The Rock Creek augmentation project was operational each year from its first year through 2017 to offset depletions for Compact compliance and through 2020 for maintenance purposes. Any net depletive effects through 2017 were offset by augmentation pumping in those years (Figure 16). A small net depletive effect of Rock Creek in 2020 is projected to be offset by the pumping that occurred in 2020 for maintenance purposes. Augmentation pumping alone did not fully offset augmentation pumping from Rock Creek in 2018 and 2019 (Figure 17). A 2019 analysis by NeDNR concluded that maintenance pumping plus temporary retirements and permanent decertifications located either upstream of the Rock Creek confluence or in close proximity to the eastern end of the Rock Creek subbasin provides a total offset that well exceeds the new depletions from previous Rock Creek augmentation pumping, mitigating any potential effects to downstream users (see *First Annual Report for the Republican River Basin-Wide Plan: Data and Progress Updates, 2014–2018* (February 2020) for details).

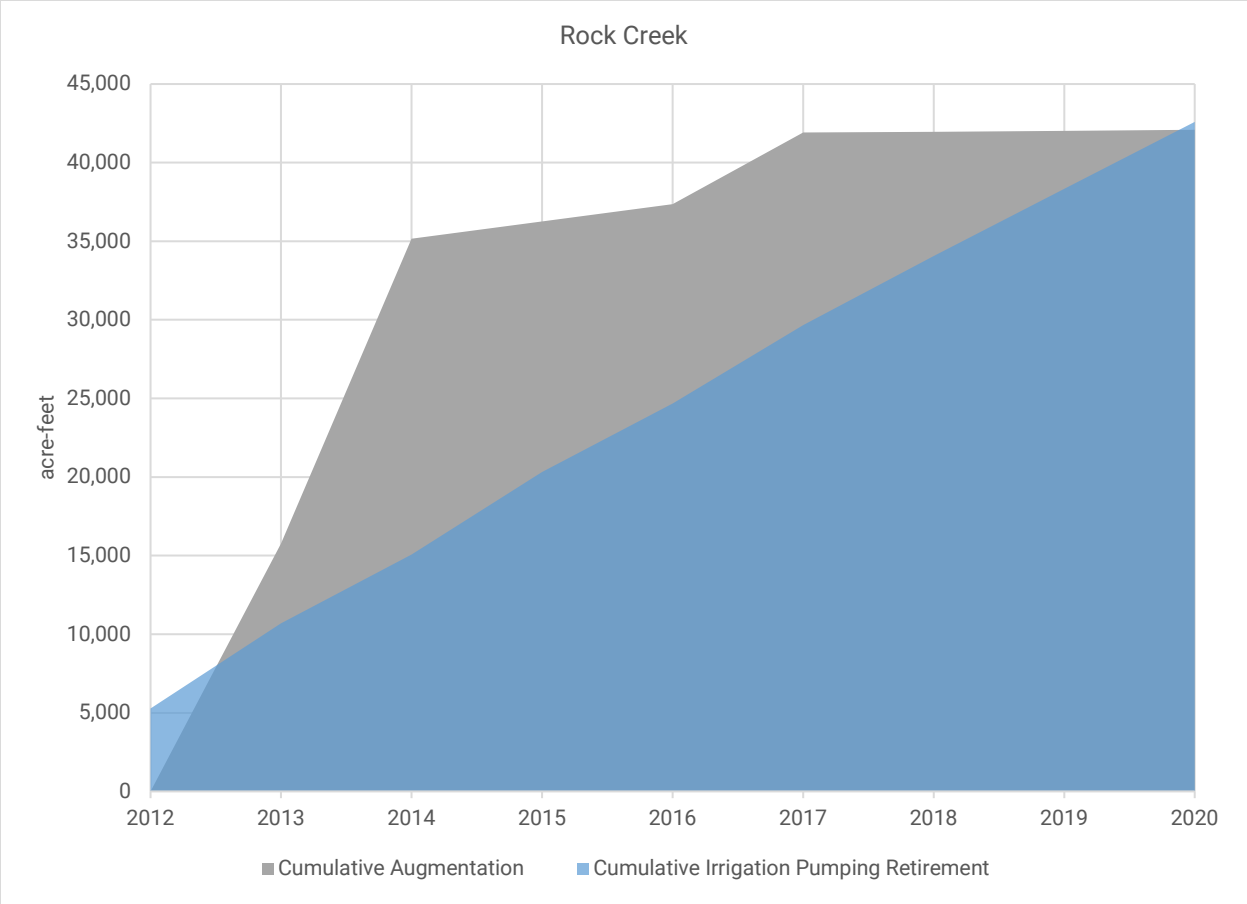


Figure 14: Cumulative water use for augmentation and estimated irrigation pumping on acres retired under the Rock Creek Augmentation Project.

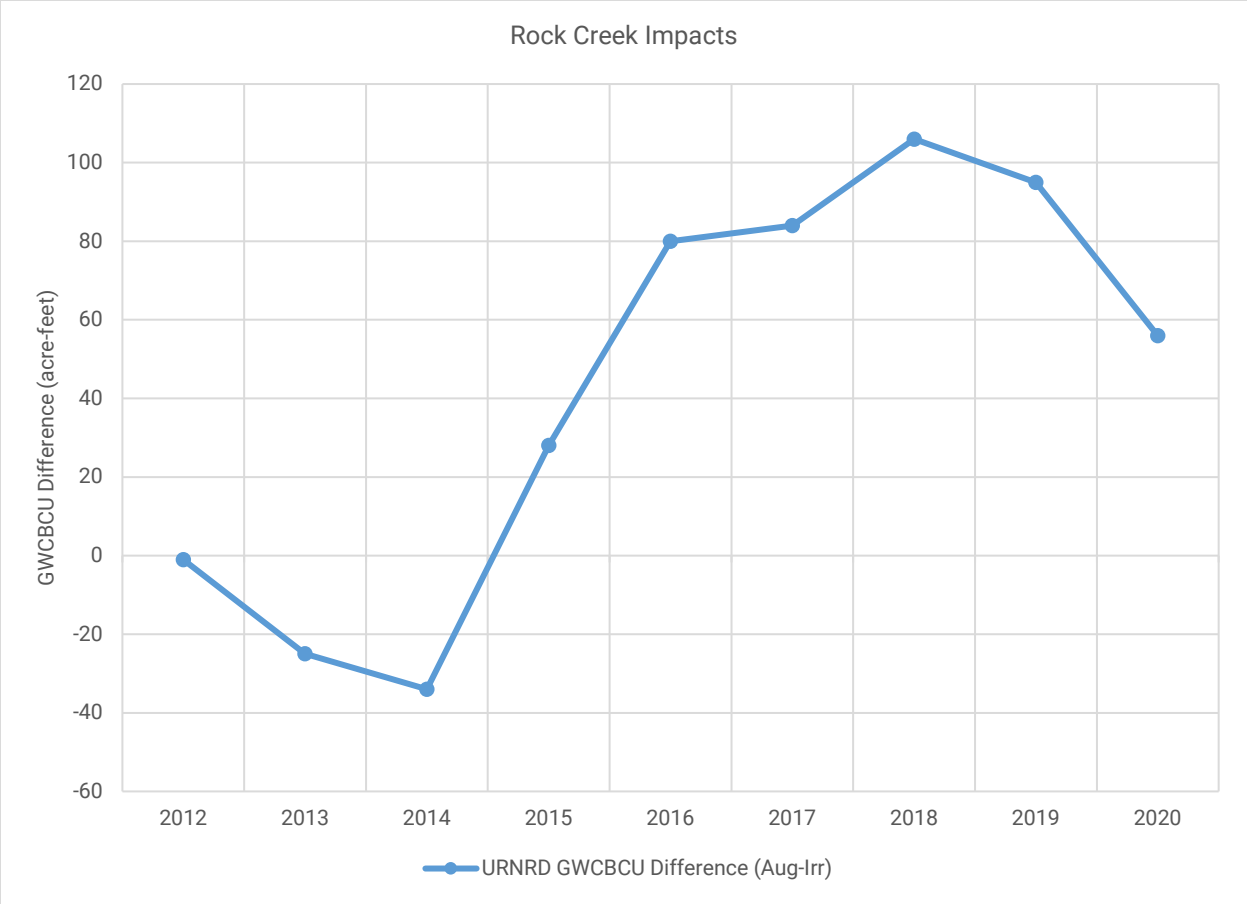


Figure 15: The difference between modeled CBCU (depletions) from Rock Creek Augmentation pumping and modeled CBCU from estimated irrigation pumping on the Rock Creek retired acres had those acres been used for irrigation. In this figure, a positive groundwater CBCU (GWCBCU) difference indicates that modeled depletions from augmentation were greater than modeled CBCU from estimated irrigation pumping.

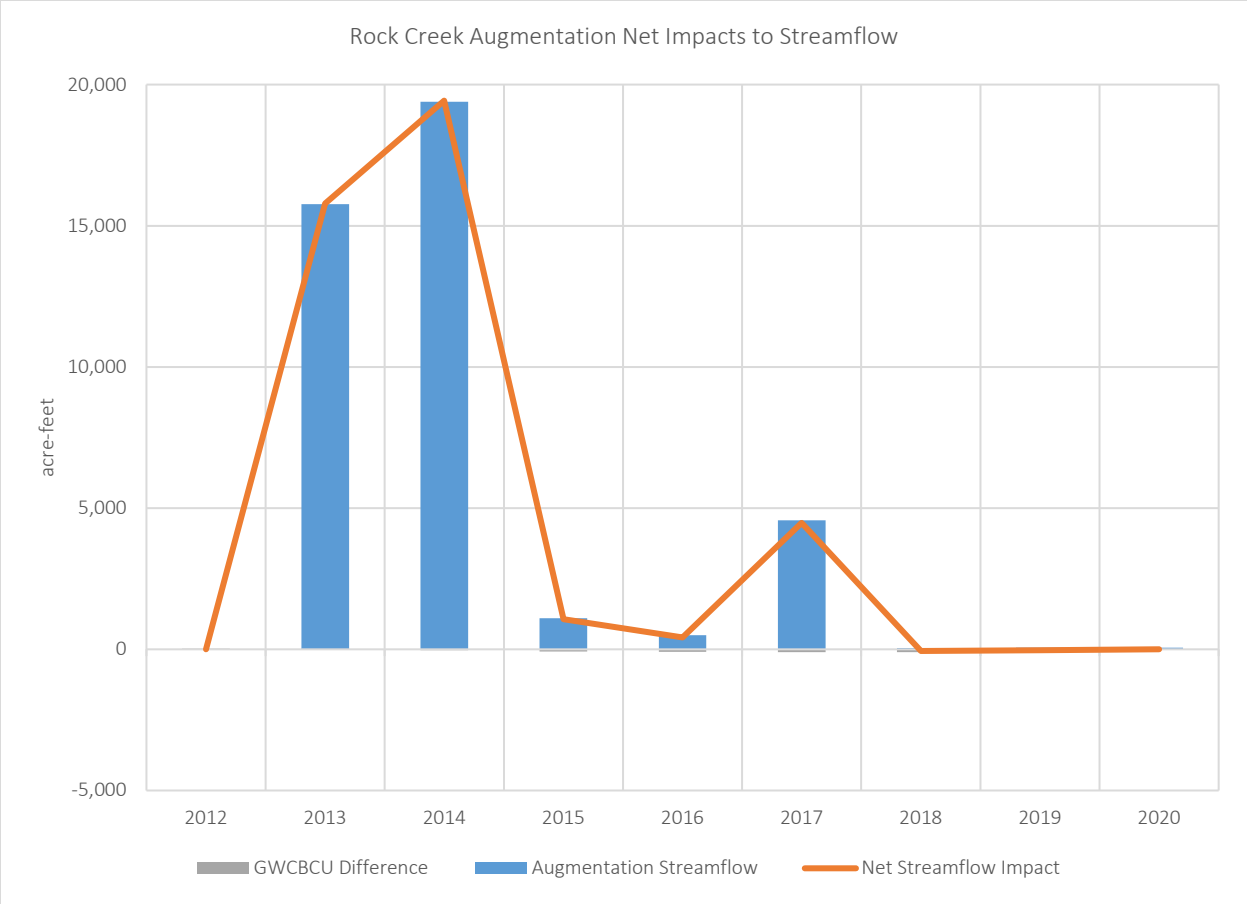


Figure 16: The net impacts to streamflow from the Rock Creek Augmentation Project. 2019 and 2020 net impacts to streamflow. 2020 data are provisional as of this report. In this figure, a positive value indicates a net increase in streamflow due to Rock Creek project operations, and a negative value indicates net depletions to streamflow. Because of this, the GWCBCU Difference values in this chart are represented as the inverse of the GWCBCU values in Figure 15.

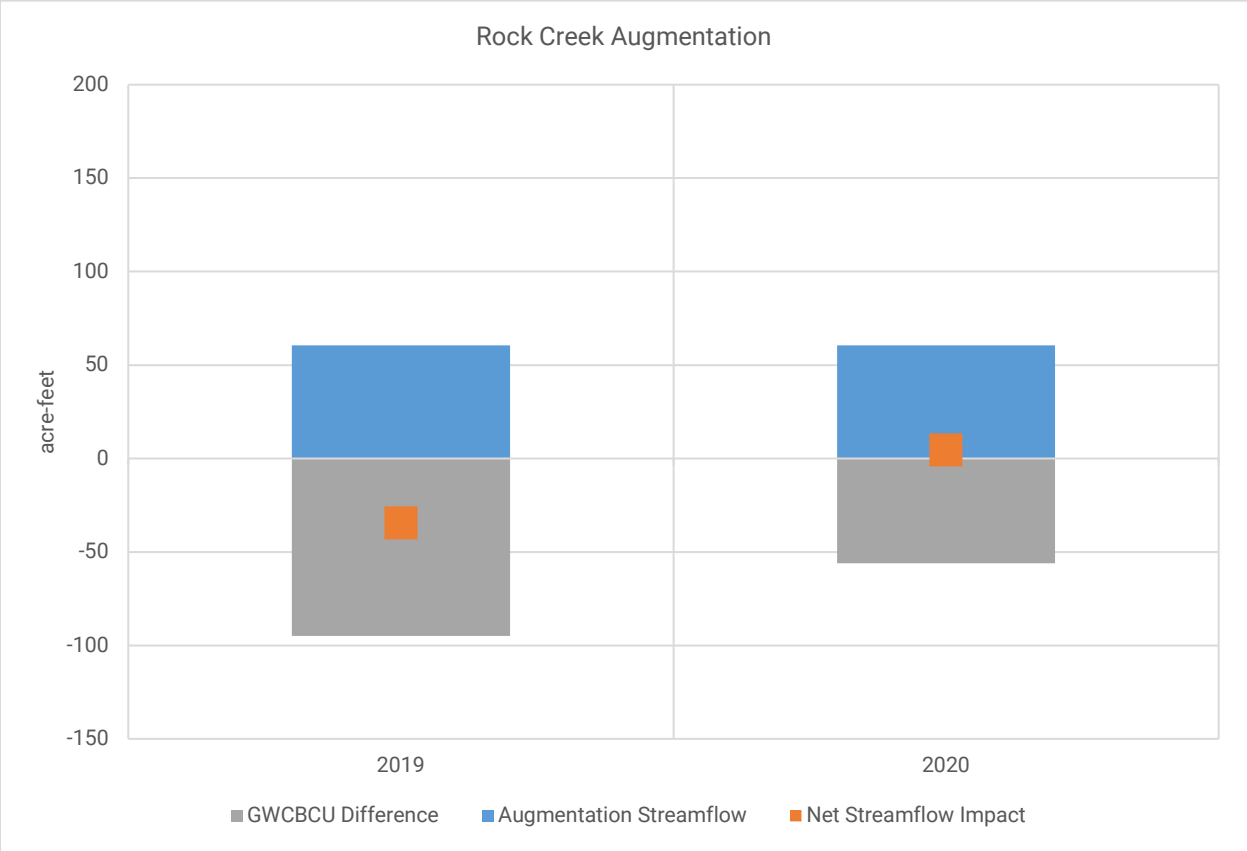


Figure 17: 2019 and 2020 net impacts to streamflow. 2020 data are provisional as of this report. In this figure, a positive value indicates a net increase in streamflow due to Rock Creek project operations, and a negative value indicates net depletions to streamflow. Because of this, the GWCBCU Difference values in this chart are represented as the inverse of the GWCBCU values in Figure 15.

Turkey Creek Augmentation Well

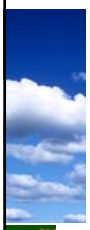
Pumping

The Turkey Creek augmentation well is operated by Tri-Basin NRD as part of the NRD's Republican Basin Streamflow Augmentation Project. Construction was completed in 2016. From 2016–2019, this well was not operated for augmentation purposes.

Attachment C, Drought Planning Presentation

Republican River Basin Drought Scenario Exercise

-9TH November, 2020-



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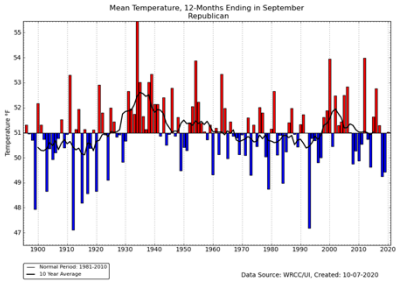
Republican River Basin- NE



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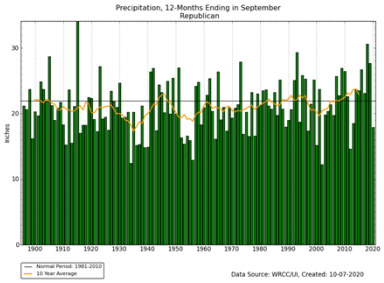
Republican River Basin- NE



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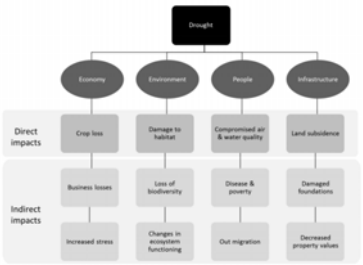
Why Plan for Drought?

"It does not do to leave a live dragon out of your calculations, if you live near him."

— J.R.R. Tolkien,

4

Why Plan for Drought?



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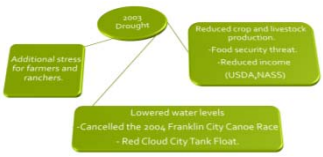
Why Plan for Drought?



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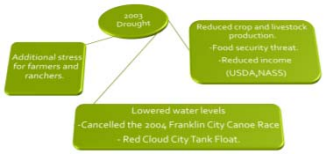
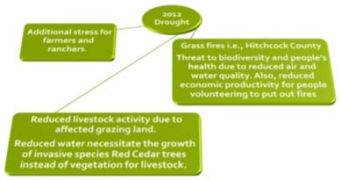
Why Plan for Drought?



7 11/10/2021

7

Why Plan for Drought?



8 11/10/2021

8

Why Plan for Drought?

A collaborative, diverse water value dialog is extremely important to ensure societal readiness for drought induced water shortages **certain to occur in the future.**

9 11/10/2021

9

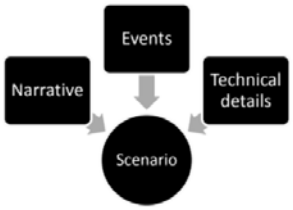
Scenario Based Drought Planning Exercise?

- Innovative way to engage community leaders, decision-makers, government staff, and stakeholders in **collaborative discussions** of planning and policy oriented issues.
- People come together to plan and manage activities for a hypothetical drought.
- Stimulate creative thinking for **mitigation, response,** and **adaptation strategies**; learn about differing views and perspectives of drought; **identify gaps and vulnerabilities; foster better communication and relationships among stakeholders; clarify agency/organizational roles and responsibilities; test and improve coordination among organizations involved in drought response; and practice making drought management decisions and using operational tools.**

10 11/10/2021

10

Scenario Based Drought Planning Exercise- Components



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Scenario Based Drought Planning Exercice

<u>Types</u>: (According to NDMC):

1. Discussion based scenario exercise- Participant engagement
   1.1. Workshop
   1.2. Games
   1.3. Table top

2.0. Operational based scenario exercise- Realistic
   2.1. Functional

12 11/10/2021

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Scenario Based Drought Planning Exercise

1. Discussion based scenario exercise-

Workshop and Game exercises maximize tapping into participants' competitive and collaborative energies by dividing them into teams with assigned roles for each player, and judging each team's response to a hypothetical drought.

1.1. Workshop:

- Develop a component of a drought plan.
- Build a specific product, such as a list of planning resources.
- Identify and prioritize uncertainties in water resources planning.
- Find solutions or create a consensus vision in response to planning challenges and opportunities.

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Scenario Based Drought Planning Exercise

1. Discussion based scenario exercise

1.2. Game:

- Promote team building.
- Increase knowledge about the complexities of water resources management.
- Improve cross-sectoral communication and collaboration.
- Learn about the values and viewpoints of stakeholders with competing interests.
- Generate innovative mitigation, adaptation, and response strategies.
- Simulate or evaluate the costs and benefits of different courses of action.

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Scenario Based Drought Planning Exercise

1. Discussion based scenario exercise- Participant engagement

1.3. Table top: Ideal for an already existing plan.

- Test a drought plan.
- Familiarize participants with the drought plan.
- Review the effectiveness of the plan.
- Discover gaps in resources.
- Improve coordination among stakeholders.

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Scenario Based Drought Planning Exercise

2. Operational based scenario exercise

2.1. Functional:

- Mostly used in emergency management activities.
- More precise and realistic.
- More complex.
- Assess the adequacy of plans, policies, and procedures.
- More costly.

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Exercise Options

	Considerations	Workshop	Game	Tabletop	Functional
Outcomes	Identification of problems and/or mitigation and response actions	x	x		
	Education or training	x	x	x	x
	Consensus building	x	x	x	
	Collaboration or coordination	x	x	x	x
	Plan evaluation and modification			x	x
Resources	Low to medium	x	x	x	
	Medium to high		x		
	High		x		x
Participation	General stakeholders	x	x	x	
	Agency or organizational staff			x	x

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Exercise Options

	Considerations	Workshop	Game	Tabletop	Functional
Planning stage	Developing	X	X		
	Existing			X	X
Interaction with experts	Significant	X		X	
	Limited		X		X
Learning format	Thinking and discussing	X	X	X	
	Doing				X
Realism and atmosphere	Less realistic and more relaxed	X	X	X	
	More realistic and tense				X

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References:

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Thank you!

Questions? Concerns?

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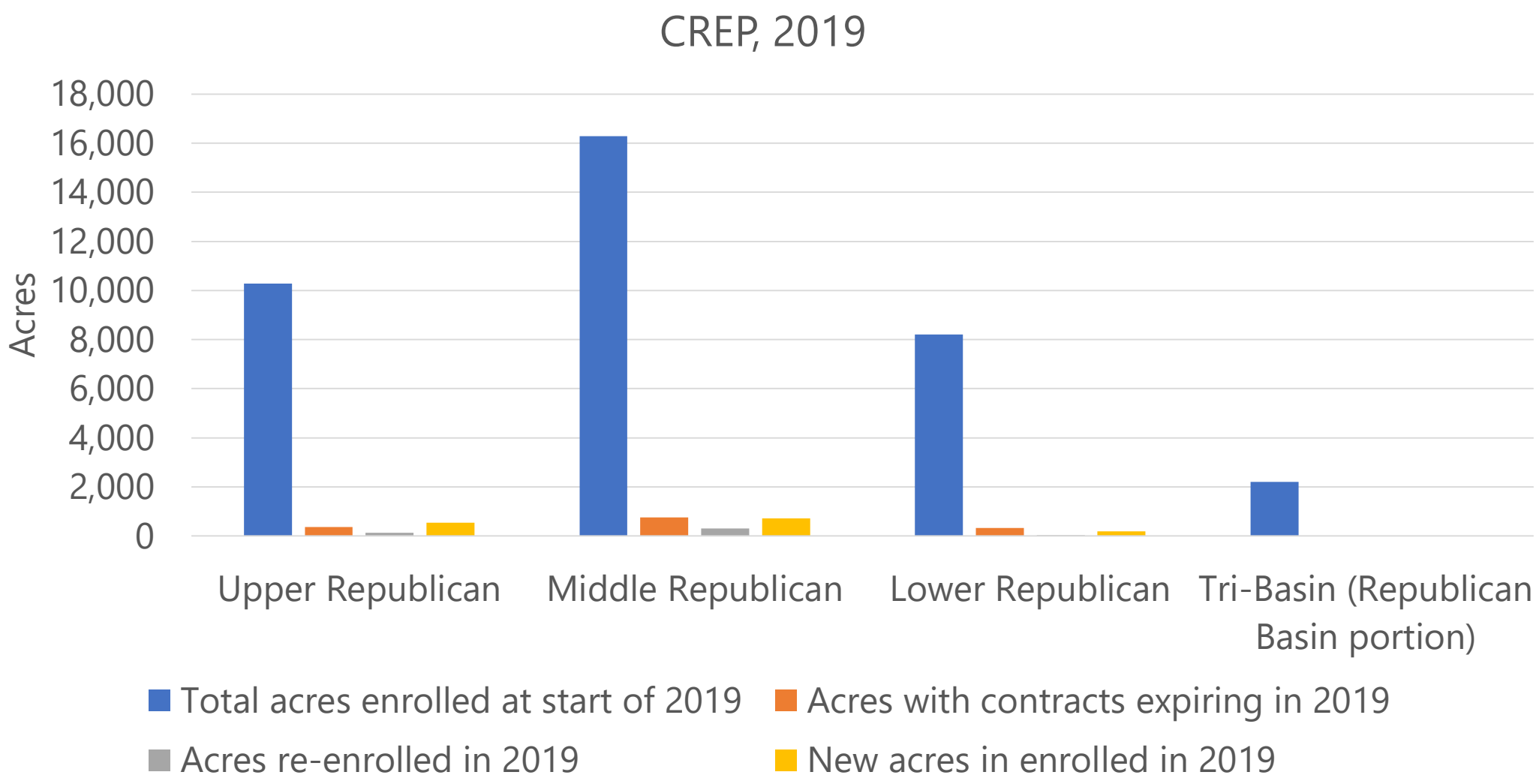
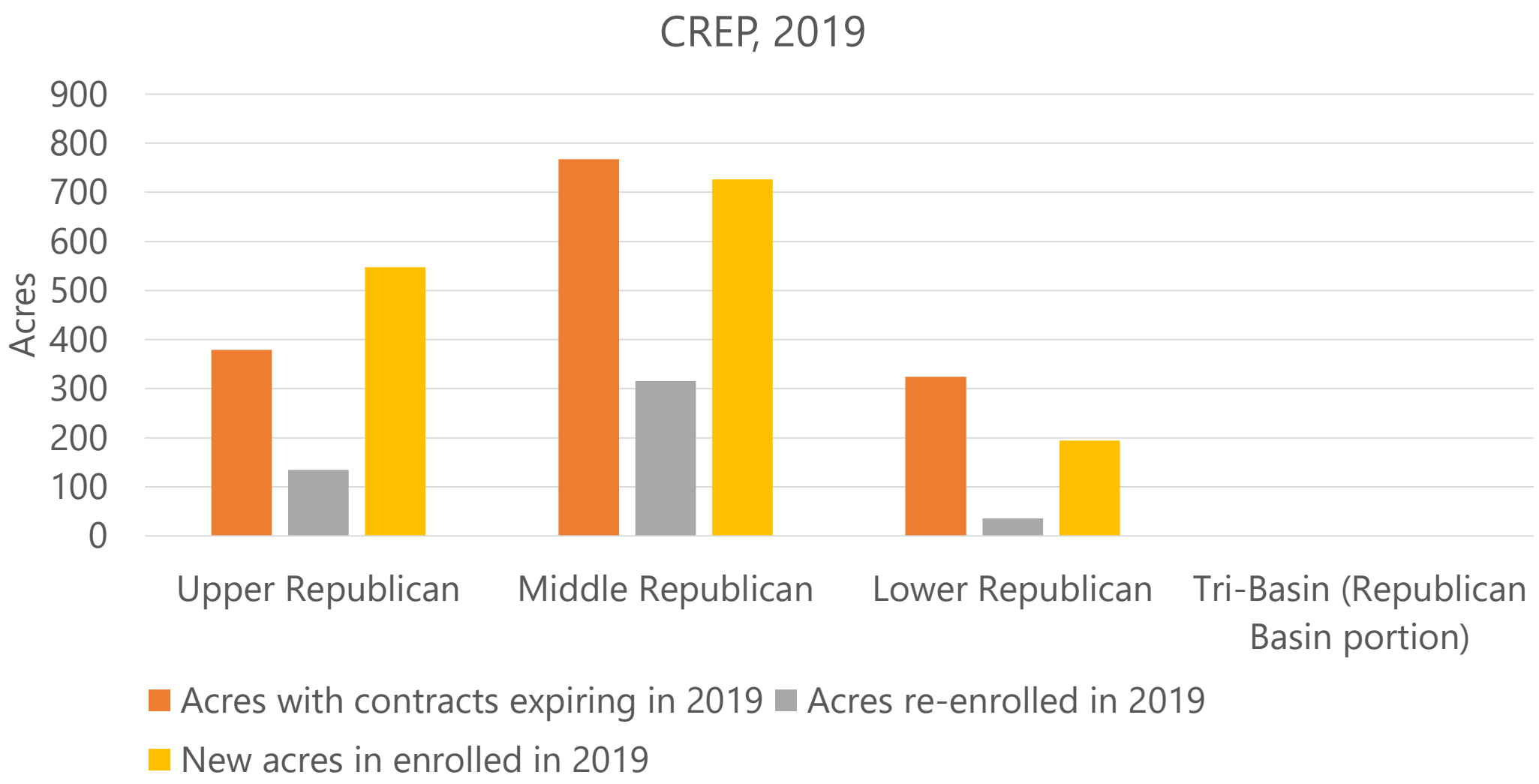
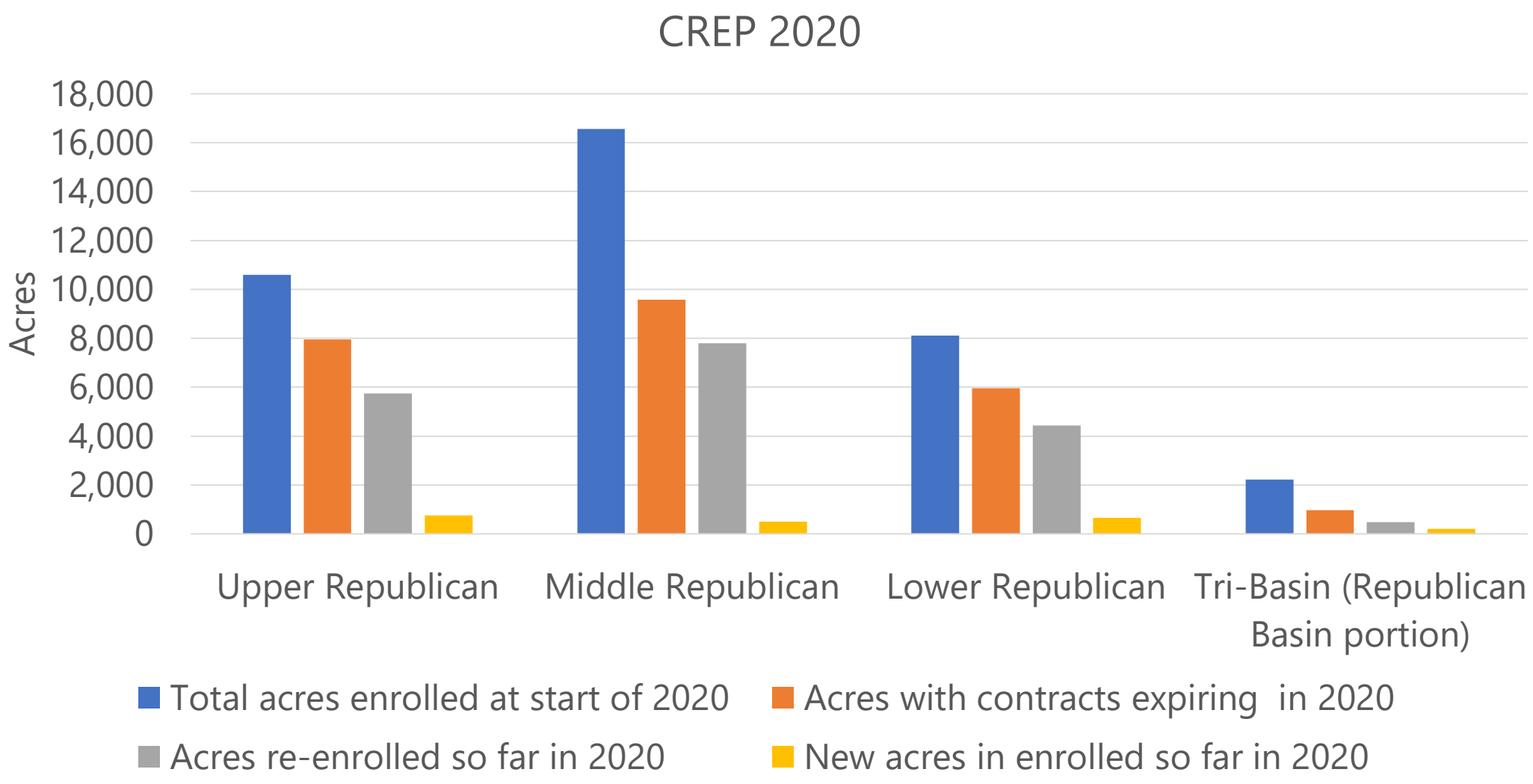
Attachment D, CREP Acres Presentation


CREP, 2019
Acres
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Upper Republican
Middle Republican
Lower Republican
Tri-Basin (Republican Basin portion)
Total acres enrolled at start of 2019
Acres with contracts expiring in 2019
Acres re-enrolled in 2019
New acres in enrolled in 2019


CREP, 2019
Acres
900
800
700
600
500
400
300
200
100
0
Upper Republican
Middle Republican
Lower Republican
Tri-Basin (Republican Basin portion)
Acres with contracts expiring in 2019
Acres re-enrolled in 2019
New acres in enrolled in 2019


CREP 2020
Acres
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Upper Republican
Middle Republican
Lower Republican
Tri-Basin (Republican Basin portion)
Total acres enrolled at start of 2020
Acres with contracts expiring in 2020
Acres re-enrolled so far in 2020
New acres in enrolled so far in 2020

Attachment E, Tri-Basin NRD Annual Report for IMP

Platte-Republican Diversion (PRD) Pasture Burn, April 20, 2020

2019 Annual Report of Integrated Water Management Activities in the Republican Basin Within Tri-Basin NRD

Tri Basin Natural Resources District

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Holdrege, Nebraska 68949
(308) 995-6688
www.tribasinnrd.org
email: tribasin@tribasinnrd.org

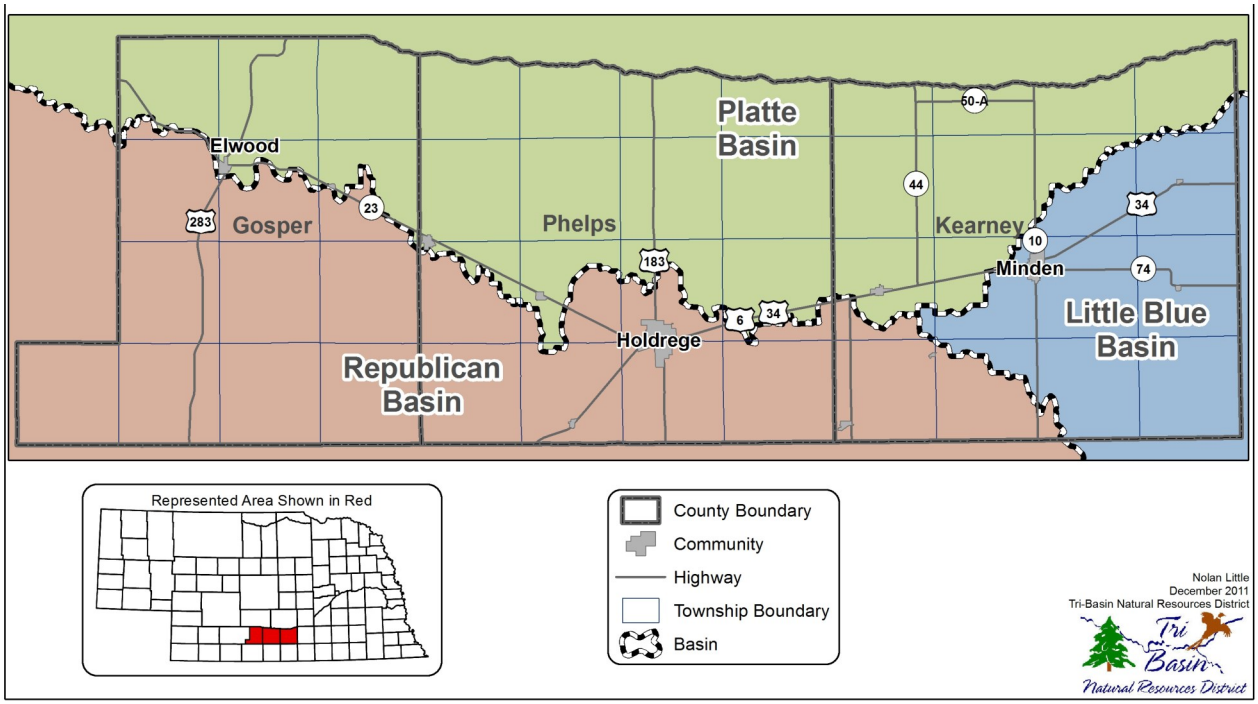
October 2020

ANNUAL REPORT OF WATER USE ACTIVITIES
IN THE REPUBLICAN BASIN WITHIN TRI-BASIN NRD
TO MEET THE REQUIREMENTS OF THE JOINT INTEGRATED MANAGEMENT PLAN
FOR THE 2019 JOINT INTEGRATED MANAGEMENT PLAN PROGRESS REVIEW MEETING

I. SUMMARY

The purpose of this report is to convey information that Tri-Basin Natural Resources District (TBNRD) agreed to supply to the State of Nebraska as part of a joint Integrated Water Re sources Management Plan for the Republican River Basin portion of the district.

Map #1: Basin Reference Map



II. INTRODUCTION

TBNRD encompasses portions of the Republican, Platte and Little Blue River Basins (see map #1, above). The district also contains an area commonly referred to as the "Groundwater Mound," a large area spanning portions of all three basins that is characterized by groundwater levels that are generally higher than historic "pre-development" groundwater elevations.

More than 100,000 acres of cropland within the Platte Basin portion of TBNRD are irrigated with water diverted from the Platte River and distributed through the canals of the Central Nebraska Public Power and Irrigation District (CNPPID). Surface irrigation water and the canals that distribute it enhance recharge of groundwater supplies within the district. In addition to helping sustain groundwater supplies, this incidental recharge has increased streamflows in Platte and Republican tributaries.

III. CERTIFIED IRRIGATED ACRES

The district began certifying irrigated acres in the Republican Basin in 2004. Development of additional certified irrigated acres in the Republican Basin was prohibited as of September 15, 2004. Since that time, corrections and revisions to the certified acre database have occurred with a net result of 189,926.13 certified irrigated acres in the Republican Basin portion of Tri-Basin NRD as of December 31, 2019. Data regarding certified irrigated acres can be found in **TABLE 1: Certified Irrigated Acres**, below. The commingled acres referred to in the table are acres that may be watered with either groundwater or surface water, or a combination of both. Detailed information about locations and distribution of certified irrigated acres is available in the Tri-Basin NRD office.

TABLE 1: Certified Irrigated Acres

	Year	Groundwater	Commingled Acres	Surface Water	Totals
Gosper County	2012	56,489.90	1,057.16	173.00	57,720.06
	2013	56,501.89	1,013.68	216.48	57,732.05
	2014	56,494.37	1,013.68	123.48	57,631.53
	2015	56,671.20	1,013.68	123.48	57,808.36
	2016	56,707.83	1,013.68	88.48	57,809.99
	2017	56,590.81	1,017.11	87.98	57,695.90
	2018	56,605.10	1,017.11	87.98	57,710.19
	2019	56,604.94	1,017.11	87.98	57,710.03
Kearney County	2012	40,955.11	427.59		41,382.70
	2013	40,938.11	427.59		41,365.70
	2014	40,937.45	427.59		41,365.04
	2015	40,918.57	427.59		41,346.16
	2016	40,922.16	427.59		41,349.75
	2017	40,938.16	427.59		41,365.75
	2018	40,941.91	427.59		41,369.50
	2019	40,975.52	427.59		41,403.11
Phelps County	2012	85,504.59	4,532.56	236.51	90,273.66
	2013	85,550.50	4,562.40	236.51	90,349.41
	2014	85,926.68	4,562.66	161.23	90,650.57
	2015	86,090.68	4,488.25	235.65	90,814.58
	2016	86,100.60	4,488.25	235.65	90,824.50
	2017	86,098.12	4,488.25	235.65	90,822.02
	2018	86,071.22	4,645.38	74.42	91,180.93
	2019	86,093.19	4,645.38	74.42	90,812.99
Basinwide Total	**2012**	**182,949.60**	**6,017.31**	**409.51**	**189,376.42**
	2013	**182,990.50**	**6,003.67**	**452.99**	**189,447.16**
	2014	**183,358.50**	**6,003.93**	**284.71**	**189,647.14**
	2015	**183,680.45**	**5,929.52**	**359.13**	***189,969.10**
	2016	**183,730.59**	**4,929.52**	**324.13**	***189,984.24**
	2017	**183,627.09**	**5,932.95**	**323.63**	***189,883.67**
	2018	**183,618.23**	**6,090.08**	**162.40**	***189,870.71**
	2019	**183,673.65**	**6,090.08**	**162.40**	***189,926.13**

*total does not include 157.8 Harlan County acres

IV. APPROVED CERTIFIED ACRE AND GROUNDWATER TRANSFERS

A. TBNRD allows certified irrigated acres to be transferred from one parcel to another within the Republican Basin portion of the district, with some limitations. Certified irrigated acres cannot be transferred from parcels with surface water or commingled water resources to parcels that have groundwater wells as their only water source. The NRD also pro-rates certified acre transfers in which acres are transferred from low to high streamflow depletion zones. Between January 1, 2019 and December 31, 2019 the district approved five certified irrigated acre transfers in the Republican Basin. A total of 42.15 certified irrigated acres were involved in these transfers. Data regarding the location, amount and conditions associated with each transfer can be found in **TABLE 2A: Republican Basin Transfers-Acres Original Locations** (below) and **TABLE 2B: Republican Basin Transfers-Destinations for Transferred Acres** (below).

TABLE 2A: Republican Basin Transfers - Acres Original Locations

NRD Permit Number	Legal Description	Acres Dried Up
TBAT-0344	Section 29-5- 16W	5.83
TBAT-0345	Section 28-5- 16W	4.1
TBAT-0346	Section 21-5- 16W	8.22
TBAT-0347	Section 31-6- 18W	17.5
TBAT-0348	Section 31-6- 18W	6.5
	Total	**42.15**

TABLE 2B: Republican Basin Transfers - Destinations for Transferred Acres

NRD Permit Number	Legal Description	New Irrigated Acres
TBAT-0344	Section 10-5- 16W	5.83
TBAT-0345	Section 10-5- 16W	4.1
TBAT-0346	Section 10-5- 16W	8.22
TBAT-0347	Section 15-6- 19W	17.5
TBAT-0348	Section 18-6- 18W	6.5
	Total	**42.15**

B. TBNRD regulates groundwater pumping off of overlying land by requiring landowners to secure groundwater transfer permits before they can pump groundwater to properties that are not under the same ownership. Groundwater transfer permits can only be used to supply groundwater for irrigation of certified irrigated acres. Landowners are required to install flowmeters on wells that are permitted for transfers and to report pumping from these wells annually to TBNRD. TBNRD issued two groundwater transfer permits involving 77 acres in the Republican Basin between January 1, 2019 and December 31, 2019 (see **TABLE 3: Groundwater Transfers**, below).

TABLE 3: Groundwater Transfers

NRD Permit Number	Legal Description	Neighboring Certified Acres to be watered with well	Well	Well ID
GWT-0341	Section 29-5- 17W	67	G-022287 G-042442	164695 49735
GWT-0342	Section 13-5- 15W	10	G-075089	83571

V. WELL CONSTRUCTION PERMITS

A. Since 1989, TBNRD has required landowners to secure well construction permits be fore they drill wells capable of pumping more than 50 gallons per minute. The district is sues three categories of well permits: new well permits, conditional replacement well permits, and replacement well permits.

TBNRD requires landowners to agree to several conditions on the operation of new wells and conditional replacement wells before permits are issued. These conditions are listed in an agreement that is signed by landowners when they apply for these types of well permits. A copy of that agreement is attached to this report as Appendix A.

TABLE 4: TBNRD Well Permits

Well Permit Type	Permits
New (variance) irrigation	0
Replacement irrigation	3
Conditional replacement irrigation - supplemental to groundwater	0
Conditional replacement irrigation—supplemental to surface water	0
Dewatering	0
New commercial/industrial [Acre transfer involved]	0
Domestic (over 50 gallons per minute)	0

B. **TABLE 4: TBNRD Well Permits** (above) is a breakdown of well permits TBNRD is- sued in the Republican Basin between January 1, 2019 and December 31, 2019. A detailed listing of well permits issued by TBNRD in 2019 is found in **TABLE 5: Well Permit Summary** (below).

TABLE 5: Well Permit Summary

Permit Number	Well Permit Type	Legal Description	NDNR Reg. Number	NDNR Well ID Number
TBRP-G044893-R1	**Replacement Well**	**Lots 3-4; 9-10 Section 6-5-17W**	G-044893	257672
TBRP-G031733-R1	**Replacement Well**	**SW 1/4 Section 13-5- 17W**	G-031733	258074
TBRP-G025628-R1	**Replacement Well**	**SW 1/4 Section 19-6- 16W**	G-025628	258225

VI. VARIANCES

TBNRD considers variances to the district rules regarding certified irrigated acre transfers. In 2019, district directors approved one variance regarding the location of irrigated acres within a parcel that was involved in a prior certified irrigated acre transfer. The variance did not change the number of certified irrigated acres associated with the parcel. Information about this variance is in **TABLE 6: Republican Basin Certified Irrigated Variances** (below).

TABLE 6: Republican Basin Certified Irrigated Variances

Date Approved	Type of Variance	Legal Description	Affected Acres	Comment
3/12/2019	Acre Correction	Section 7-5- 16	33.61	

VII. MUNICIPAL AND INDUSTRIAL ACCOUNTING

TBNRD collects water use data annually from all municipalities and industries within the district. Municipal and industrial water use data for communities and industries located in the Republican Basin reported to TBNRD in 2019 are shown in the next two tables. A summary of Municipal Water Use may be found in **TABLE 7: Republican Basin Municipal Water Use Data** (below) and **TABLE 8: Industrial and Commercial Water Use Data** (below).

TABLE 7: Republican Basin Municipal Water Use Data (in gallons)

Municipality	2012	2013	2014	2015	2016	2017	2018	2019
Atlanta	33,219,000	23,124,400	20,357,400	21,729,800	18,953,600	14,161,100	10,210,500	9,046,300
Arapahoe	138,279,000	120,573,000	97,223,000	91,449,000	103,916,000	101,311,000	90,286,000	83,598,000
Holdrege	512,347,700	473,755,500	519,360,800	470,600,100	478,038,800	441,265,200	402,611,800	373,071,300
Wilcox	27,905,000	25,414,900	22,987,500	27,343,300	25,688,000	25,049,600	26,343,100	28,349,000
			Total	**611,122,200**	**626,596,400**	**581,786,900**	**529,451,400**	**494,064,600**

TABLE 8: Republican Basin Industrial and Commercial Water Use Data

NDNR Reg. Number	Well ID	Owner	Legal Description	Gallons Used
G-030619	37512	City of Holdrege	Section 9-5- 18	0
G-025572	32122	City of Holdrege	Section 9-5- 18	0
G-096786	109719	City of Holdrege	Section 34-6- 18	903,500
G-135221	169721	Geer Utility	Section 27-6- 18	1,066,250
G-135220	171309	Geer Utility	Section 27-6- 18	0
G-069908	78071	Holdrege County Club	Section 29-6- 18	15,446,700
G-009687	14429	Holdrege County Club	Section 29-6- 18	15,156,200
G-070168	78331	Holdrege Well Service	Section 34-6- 18	231,350
G-070393	78555	NE Game & Parks, Sac-Wilcox WMA	Section 27-5- 17	7,800
G-184679	250906	Norder Supply Inc	Section 12-6- 23	868,000
G-071934	80096	Sargent Irrigation Co Inc	Section 34-6- 18	105,800
G-179201	241336	Tri-Basin NRD	Section 7-6- 21	13,001,064

VIII. FLOWMETER DATA

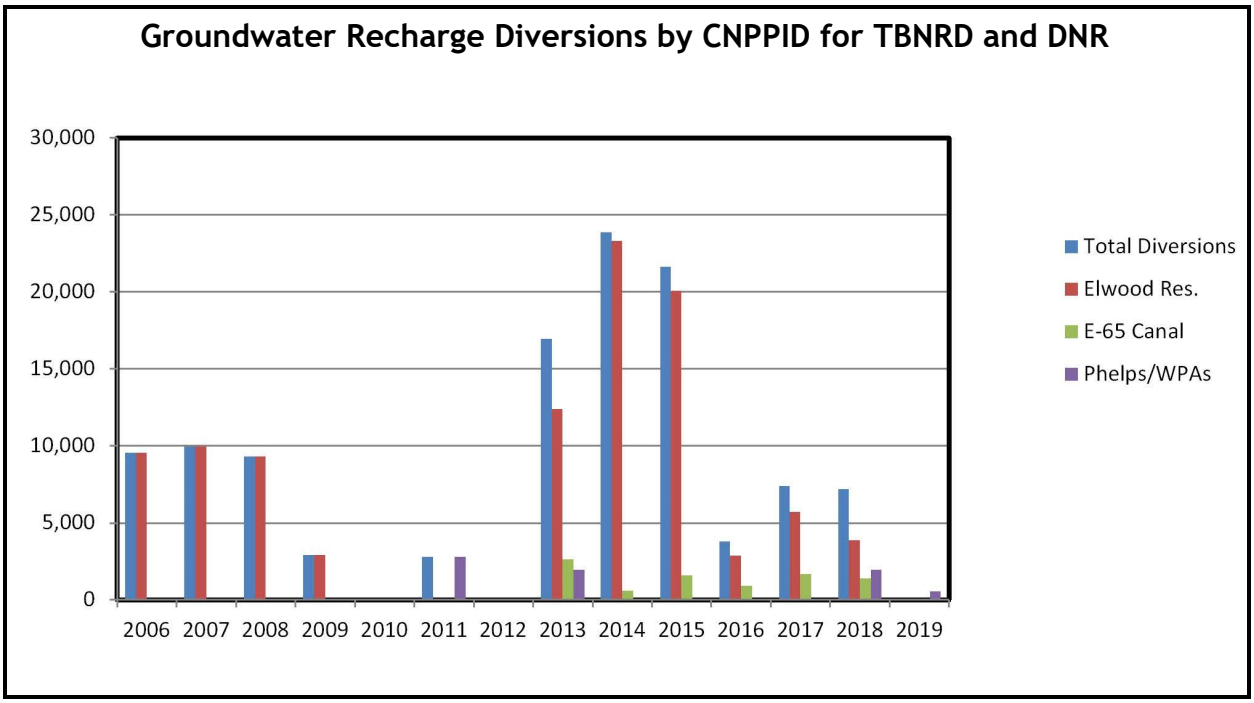
TBNRD requires flowmeters to be installed on all irrigation, commercial and industrial wells in the Republican Basin portion of the district. Annual water use is reported to TBNRD. In 2019, landowners reported data from 1,438 metered wells in the Republican Basin, which provided irrigation for 174,566.3 certified irrigated acres. There are 29 wells in the Republican Basin that are exempt from having flowmeters because they irrigate less than 15 acres water use on these wells is estimated and reported annually. All District flowmeter data is reported annually to the Nebraska Department of Natural Resources (NDNR) for Republican River Basin Compact Administration accounting. A summary of Republican Basin water use data is included in this report as Appendix B. Detailed Republican Basin flowmeter data is available from the Tri-Basin NRD office.

IX. WATER BANKING ACTIVITIES

TBNRD has initiated a new program called the Water Conservation Incentive Program (see program summary in Appendix D). Participants in this program sign contracts agreeing to limit irrigation to the UNL Average Corn Crop Irrigation requirement. In exchange, Tri-Basin NRD agrees to pay them if they use less water than their allocated amount. Participants will be provided with credit accounts that track available water use credits for participating fields. A total of 1449.57 certified irrigated acres in the Republican Basin portion of the district were approved in 2019 for this new program. The TBNRD board of directors has committed funds sufficient to pay incentives for as many as 8000 acres to be enrolled in the program.

X. RETIRED ACRES AND OTHER STREAMFLOW ACCRETION ACTIVITIES

Tri-Basin NRD started utilizing the facilities of Central Nebraska Public Power District (CNPPID) to provide groundwater recharge and to augment streamflows when the district and the NE Game and Parks Commission paid CNPPID to divert 9551 acre-feet of water from the Platte River into Elwood Reservoir in Gosper County in 2006. Additional diversions (see Appendix C and graph below) have been made regularly over the ensuing 13 years. In all these instances, diversions were made when Platte streamflows exceeded target flows, or when irrigation deliveries were suspended because of heavy rainfall in the CNPPID irrigated area. Diversions into Elwood Reservoir and E-65 Canal provide groundwater recharge and “imported water” to augment Republican Basin water supplies.



Tri-Basin and Lower Republican NRDs commissioned a feasibility study to examine directly diverting excess flows from the Platte via E-65 Canal to Turkey Creek, a Republican tributary in Gosper County. That study concluded that the diversion project is feasible both hydrologically and economically. The partners have purchased a 330 acre parcel of pasture at the upper end of Turkey Canyon. We have also applied for a water right for the project. Construction is anticipated in 2021, assuming that water right is approved this year.

Tri-Basin NRD also constructed a streamflow augmentation well on the east branch of Turkey Creek. This augmentation well is capable of pumping as much as 1000 acre-feet per year. The well has been tested and is fully functional. It hasn't been used yet for augmenttation.

Tri-Basin NRD records indicate that 2329.24 irrigated acres are enrolled in USDA Conservation Reserve Enhancement Program (CREP) in the Republican Basin portion of the district. Nine of these contracts are set to expire by 2020. We reviewed the contracts and found a correction needs to be made for 2018. An additional 305.84 irrigated acres were enrolled in 2018 bringing the total for that year to 1959.84 irrigated acres enrolled.

On district water use reports, landowners reported to TBNRD that conservation tillage practices have been adopted or continue to be utilized on 79,565.4 certified irrigated acres in the Republican Basin portion of the district during 2019 (no-till data is available from the Tri-Basin NRD office). University research (Klocke, et al, 2009) indicates that evapotranspiration (ET) is reduced by as much as 3 inches per acre on minimally-tilled irrigated cropland, as compared to conventional tillage systems. If the estimates of no-till acres are accurate, as much as 19,891.34 acre-feet of water was conserved in the Republican Basin in TBNRD in 2019 through this conservation practice.

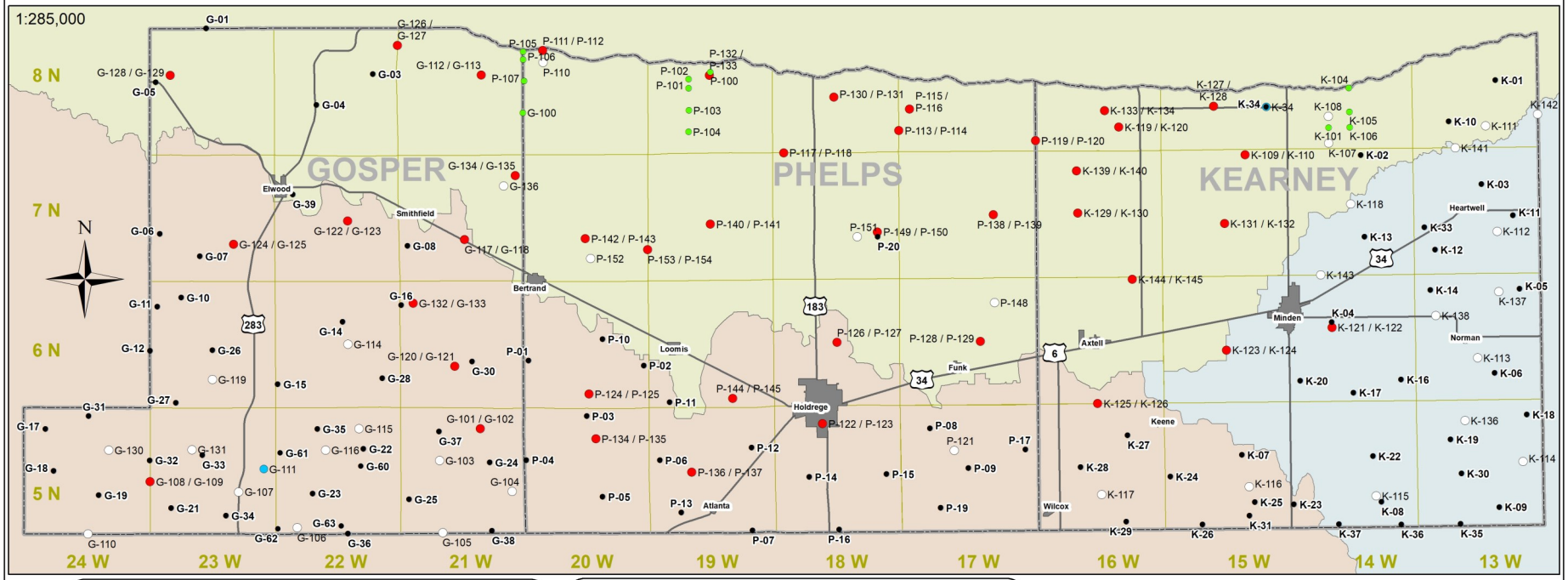
XI. GROUNDWATER LEVELS

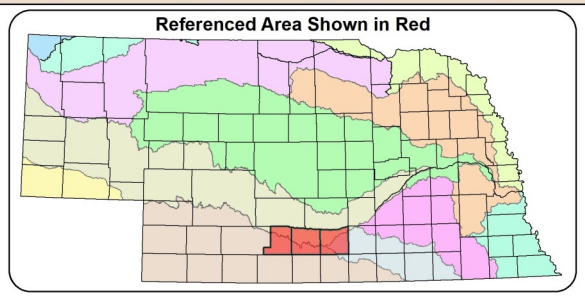
TBNRD has an extensive network of 131 dedicated groundwater observation wells (44 in the Republican Basin) and 90 irrigation wells (60 in the Republican Basin) that are used to measure groundwater levels (see Map #2, page 9). TBNRD also works cooperatively with CNPPID to gather groundwater level data. Data from 10 wells in the Republican Basin that are measured by CNPPID are included in TBNRD's groundwater observation well data base. District water level data is reported semi-annually to U.S. Geological Survey and UNL Conservation and Survey Division. Groundwater level data for the district is available from the Tri-Basin NRD office.

Map #2: Dedicated Groundwater Observation Wells

Tri-Basin Natural Resources District

Static Water Measurement Wells





- Irrigation Well
- Transect Well
- Single Well
- Nested Well
- Other Well
- Highway
- Community
- County Boundary
- Township
- Little Blue Basin
- Republican Basin
- Platte Basin

Observation Well Stats:
- 91 Sites
- 41 Nested Wells
- 134 Data Loggers
- 12 Hour Interval

Irrigation Well Stats:
- 9 Platte Basin
- 21 Little Blue Basin
- 60 Republican Basin
- 90 Measured Wells
- Spring & Fall

Nolan Little
March 2020
Tri-Basin Natural Resources District

Tri-Basin NRD – Republican Basin Annual Report
Appendix A

Tri-Basin Natural Resources District
New Well and Conditional Replacement Well Permit
Applicant Certification and Agreement

Applicant Certification and Agreement to be bound by Conditions and Limitations on operation of a Well permitted as a New Well or as a Conditional Replacement Well pursuant to Rule 1.13, Tri-Basin Natural Resources District Rules and Regulations for Management of Land and Water Resources

NRD Permit # _____ Applicant _____

Applicant is the owner of the following- described real estate:

_____ ¼ Section _____ T _____ N - R _____ W _____

******

Applicant accepts and agrees to be bound by the following conditions and limitations on the operation of a well that is constructed under the authority of a permit issued by the Tri-Basin Natural Resources District ("NRD"). The conditions and limitations are (check the box and initial those that apply):

☐ _____ 1. Applicant agrees to offset any "new depletions" to streamflows of the Platte River, Little Blue River, Republican River, or their tributaries that may be determined to be associated with use of this well. Applicant agrees to use methods to offset those depletions that are deemed acceptable by the NRD and the State of Nebraska. Applicant understands and agrees that Applicant's failure to offset said new depletions may result in closure of this well or restrictions being imposed by the NRD on the number of acres of land that can be irrigated by this well.

☐ _____ 2. Applicant agrees to abide by well spacing and pumping capacity limitations that apply to the well that is the subject of this permit, whether such limitations arise pursuant to federal or state law or by rule or regulation of the NRD. Applicant understands and agrees that Applicant's failure to comply with all rules and regulations of the NRD that pertain to this well may result in closure of this well and civil or criminal prosecution and other penalties.

☐ _____ 3. Applicant agrees to comply with all current and future rules and regulations of the NRD that pertain to this well. Applicant understands and agrees that Applicant's failure to comply with all rules of regulations of the NRD that pertain to this well may result in closure of this well and civil or criminal prosecution and other penalties.

☐ _____ 4. Applicant agrees to maintain any and all surface water rights associated with the land to be irrigated by this well for the lifespan of the permitted well. Applicant understands and agrees that Applicant's failure to comply with all rules and regulations of the NRD that pertain to this well may result in closure of this well and civil or criminal prosecution and other penalties.

☐ _____ 5. Applicant agrees to irrigate only land that has been certified for irrigation by the NRD (no new irrigated acres will be allowed). Applicant understands and agrees that Applicant's failure to prevent irrigation of land not certified for irrigation by the NRD may result in closure of this well and prosecution by the State of Nebraska.

Applicant certifies that Applicant is familiar with the information contained in this instrument and that to the best of Applicant's knowledge and belief, such information is true, complete and accurate. Applicant further acknowledges and agrees that the NRD and/or the State of Nebraska may impose additional conditions, limitations and restrictions on operation of the well that is the subject of this permit. Applicant further acknowledges and agrees that the conditions and limitations agreed to herein shall also be binding upon Applicant's successors-in-interest to the well and/or the subject real estate.

Tri-Basin NRD – Republican Basin Annual Report
Appendix A

I certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief such information is true, complete and accurate. I further acknowledge that Tri-Basin Natural Resources District or the State of Nebraska may impose additional conditions, limitations and restrictions on operation of the well that is the subject of this permit.

Date	Signature of Applicant
Date	Signature of Applicant
Date	Signature of Witness

Approval by Tri-Basin Natural Resources District

Date	Signature of Tri-Basin NRD Representative

Version 2 11/21/2013

Tri-Basin NRD Republican Basin Water Use							Kearney County
YEAR	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Certified Irrigated Acres	**41,365.70**	**41,365.04**	**41,346.16**	**41,349.75**	**41,370.75**	**41,369.50**	**41,403.11**
Pivots							
Actual Reported Acres	24,643.73	24,765.78	24,650.91	25,014.85	31,018.14	31,190.1	30,659.10
Gallons Used	7,063,988,419	3,748,611,721	6,060,475,376	7,037,163,570	5,486,469,797	4,713,924,522	3,331,595,134
Average acre Inches	10.56	5.57	9.05	10.36	6.51	5.6	4.00
Gravity							
Actual Reported Acres	4,280.08	3,817.91	3,584.80	3,458.16	2,624.22	2,169.7	1,858.60
Gallons Used	2,290,597,600	1,004,222,115	1,610,758,519	1,902,782,114	896,621,660	726,021,399	576,820,423
Average acre Inches	19.71	9.69	16.55	20.26	12.58	12.3	11.40
Combination							
Actual Reported Acres	10,100.91	9,834.82	10,367.16	10,052.32	4,977.82	4,968.2	5,075.90
Gallons Used	3,338,885,321	1,662,313,886	2,655,672,700	2,938,231,843	970,126,131	820,374,310	568,830,323
Average acre Inches	11.98	6.22	9.43	10.76	7.18	6.1	4.13
Drip Tape							
Actual Reported Acres		37.00	37.00	37.00	37.00	37.0	82.00
Gallons Used		7,942,200	18,391,400	12,882,000	9,601,700	8,759,500	13,702,512
Average acre Inches		7.91	18.31	12.82	9.56	8.7	6.15
Total Irrigation Use							
Actual Reported Acres	39,024.72	38,455.51	38,639.87	38,562.33	38,657.18	38,365.08	37,675.60
Gallons Used	12,693,471,340	6,423,089,922	10,345,297,995	11,891,059,527	7,362,819,288	6,269,079,731	4,490,948,392
Average acre Inches	11.98	6.15	9.86	11.36	7.01	6.02	4.39
Misc [gallons used]							
Wildlife Areas			104,039,000	10,227,000	58,700,000	52,748,000	8,000
Other Uses						40,459	
Total Gallons Used	**12,693,471,340**	**6,423,089,922**	**10,449,336,995**	**11,901,286,527**	**7,421,519,288**	**6,321,868,191**	**4,490,956,392**

February 18, 2020

Tri-Basin NRD Republican Basin Water Use							Phelps County
YEAR	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Certified Irrigated Acres	**90,349.41**	**90,650.57**	**90,814.58**	**90,823.25**	**90,822.02**	**91,180.93**	**91,186.60**
Pivots							
Actual Reported Acres	51,634.20	50,670.04	51,898.96	53,338.05	55,447.14	55,100.54	56,220.80
Gallons Used	18,349,493,213	8,303,306,913	11,443,663,774	15,208,478,608	10,910,834,987	6,762,281,160	7,482,177,323
Average acre Inches	13.09	6.03	8.12	10.50	7.25	4.52	4.90
Gravity							
Actual Reported Acres	8,916.10	7,431.08	7,894.43	7,652.13	6,145.48	5,529.48	5,184.00
Gallons Used	5,972,669,159	2,358,776,689	3,343,075,013	4,134,425,635	2,295,801,707	1,765,607,050	1,504,333,084
Average acre Inches	24.67	11.69	15.60	19.90	13.76	11.76	10.69
Combination							
Actual Reported Acres	22,874.36	22,523.31	23,976.76	23,270.96	22,411.53	22,387.63	21,745.80
Gallons Used	8,950,299,149	3,596,843,384	5,701,876,965	7,562,355,869	4,819,237,536	2,958,296,992	3,141,038,609
Average acre Inches	14.41	5.88	8.76	11.97	7.92	4.87	5.32
Drip Tape							
Actual Reported Acres		435.40	435.40	670.40	732.40	732.40	856.00
Gallons Used		79,980,790	133,860,021	189,132,035	155,429,742	100,822,467	135,178,288
Average acre Inches		6.76	11.32	10.39	7.82	5.07	5.82
Total Irrigation Use							
Actual Reported Acres	83,424.66	81,059.83	84,205.55	84,931.54	84,736.55	83,750.05	84,006.60
Gallons Used	33,272,461,521	14,338,907,776	20,622,475,773	27,094,392,147	18,181,303,972	11,587,007,669	12,262,727,304
Average acre Inches	14.69	6.51	9.02	11.75	7.90	5.10	5.38
Misc [gallons used]							
Wildlife Areas			14,106,000	45,054,000	58,903,200	43,286,200	21,822,300
Other Uses							5,000
Total Gallons Used	**33,272,461,521**	**14,338,907,776**	**20,636,581,773**	**27,139,446,147**	**18,240,207,172**	**11,630,293,869**	**12,284,554,604**

February 18, 2020

Tri-Basin NRD Republican Basin Water Use							Gosper County
YEAR	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Certified Irrigated Acres	**57,732.05**	**57,631.53**	**57,808.36**	**57,809.99**	**57,689.54**	**57,710.19**	**57,710.03**
Pivots							
Actual Reported Acres	34,348.63	34,731.48	34,890.31	35,728.47	36,932.09	36,354.3	35,626.34
Gallons Used	12,023,940,692	6,214,034,271	7,540,338,329	8,270,724,930	7,646,156,083	5,415,780,801	4,561,602,106
Average acre Inches	12.89	6.59	7.96	8.53	7.62	5.5	4.72
Gravity							
Actual Reported Acres	5,515.43	5,313.43	4,590.33	4,193.53	3,398.67	3,371.67	3,183.67
Gallons Used	3,343,182,638	1,735,788,826	1,936,717,927	1,618,658,819	1,485,661,126	900,908,023	712,867,325
Average acre Inches	22.32	12.03	15.54	14.21	16.10	9.84	8.25
Combination							
Actual Reported Acres	14,310.51	14,543.61	14,714.00	14,829.31	14,498.23	14,483.43	13,409.90
Gallons Used	7,034,537,746	3,063,979,197	4,145,559,266	3,830,557,883	3,437,938,742	2,228,362,381	1,809,296,480
Average acre Inches	18.10	7.76	10.38	9.51	8.73	5.67	4.97
Drip Tape							
Actual Reported Acres		360.77	360.77	510.37	538.76	538.76	622.80
Gallons Used		84,044,100	123,091,700	133,466,835	131,221,335	92,376,011	95,243,727
Average acre Inches		8.58	12.57	9.63	8.97	6.31	5.63
Total Irrigation Use							
Actual Reported Acres	54,174.57	54,949.29	54,555.41	55,261.68	55,367.75	54,748.12	52,842.71
Gallons Used	22,401,661,076	11,097,846,394	13,745,707,222	13,853,408,466	12,700,977,286	8,637,427,217	7,179,009,638
Average acre Inches	15.23	7.44	9.28	9.23	8.45	5.81	5.00
Misc [gallons used]							
Wildlife Areas			76,368,100				
Other Uses						201,000	
Total Gallons Used	**22,401,661,076**	**11,097,846,394**	**13,822,075,322**	**13,853,408,466**	**12,700,977,286**	**8,637,628,217**	**7,179,009,638**

February 18, 2020

Tri-Basin NRD Republican Basin Water Use							Republican Basin
YEAR	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Certified Irrigated Acres	**189,447.16**	**189,647.14**	**189,969.10**	**189,982.99**	**189,882.31**	**190,260.62**	**190,299.74**
Pivots							
Actual Reported Acres	110,626.56	110,167.30	111,440.18	114,081.37	123,397.37	122,644.94	122,506.24
Gallons Used	37,437,422,324	18,265,952,905	25,044,477,479	30,516,367,107	24,043,460,867	16,891,986,484	15,375,374,563
Average acre Inches	12.46	6.11	8.28	9.85	7.18	5.07	4.62
Gravity							
Actual Reported Acres	18,711.61	16,562.42	16,069.56	15,303.82	12,168.37	11,070.87	10,226.27
Gallons Used	11,606,449,397	5,098,787,630	6,890,551,459	7,655,866,568	4,678,084,493	3,392,536,472	2,794,020,832
Average acre Inches	22.84	11.34	15.79	18.42	14.16	11.29	10.06
Combination							
Actual Reported Acres	47,285.78	46,901.74	49,057.92	48,152.59	41,887.58	41,839.28	40,231.60
Gallons Used	19,323,722,216	8,323,136,467	12,503,108,931	14,331,145,595	9,227,302,409	6,007,033,683	5,519,165,412
Average acre Inches	15.05	6.535280715	9.39	10.96	8.11	5.29	5.05
Drip Tape							
Actual Reported Acres	0.00	833.17	833.17	1,217.77	1,308.16	1,308.16	1,560.80
Gallons Used	0.00	171,967,090	275,343,121	335,480,870	296,252,777	201,957,978	244,124,527
Average acre Inches		7.60	12.17	10.15	8.34	5.69	5.76
Total Volume Pumped							
Actual Reported Acres	176,623.95	174,464.63	177,400.83	178755.55	178,761.48	176,863.25	174,524.91
Gallons Used	**68,367,593,937**	**31,859,844,092**	**44,713,480,990**	**52,838,860,140**	**38,245,100,546**	**26,493,514,617**	**23,932,685,334**
Basin Inches Per Acre	14.25	6.73	9.28	10.89	7.88	5.52	5.05
Wildlife Acres	0	0	194,513,100	55,281,000	117,603,200	96,034,200	21,830,300
Other Use [Non Irrigation]	0	0	0	0	0	241,459	5,000
Basin Total Gallons Used	**68,367,593,937**	**31,859,844,092**	**44,907,994,090**	**52,894,141,140**	**38,362,703,746**	**26,589,790,276**	**23,954,520,634**
Basin Acre Feet	**209,812.442**	**97,774.271**	**137,817.573**	**162,326.159**	**117,730.815**	**81,601.070**	**73,513.724**
Harlan County Wells					19,580,400	20,133,900	17,748,400
*** Lower Republican Reports volume on these wells**							February 18, 2020

Tri-Basin NRD Republican Basin Water Use

Union Township

YEAR	2013	2014	2015	2016	2017	2018	2019
Certified Irrigated Acres	**8,259.02**	**8,184.02**	**8,163.02**	**8,164.49**	**8,167.47**	**8,169.29**	**8,169.29**
Pivots							
Actual Reported Acres	7275.42	7029.67	7176.67	7,156.70	7,224.67	7,007.70	6,941.00
Gallons Used	2,029,206,694	955,549,803	1,290,179,868	1,650,537,892	1,439,253,491	1,107,044,683	1,024,037,708
Average acre Inches	10.3	5.0	6.6	8.50	7.34	5.82	5.43
Gravity							
Actual Reported Acres					45.00	45.00	45.00
Gallons Used					10,749,400	8,066,600	6,333,100
Average acre Inches					8.80	6.60	5.18
Combination							
Actual Reported Acres	476.7	462.8	462.8	462.80	462.80	417.00	171.00
Gallons Used	90,473,600	46,298,000	71,712,700	64,802,400	59,907,800	37,224,800	24,930,100
Average acre Inches	7.0	3.7	5.7	5.20	4.77	3.29	5.37
Drip Tape							
Actual Reported Acres							
Gallons Used							
Average acre Inches							
Total Irrigation Use							
Actual Reported Acres	7,752.12	7,492.47	7,639.47	7,619.50	7,732.47	7,469.70	7,157.00
Gallons Used	2,119,680,294	1,001,847,803	1,361,892,568	1,715,340,292	1,509,910,691	1,152,336,083.00	1,055,300,908
Average acre Inches	**10.07**	**4.92**	**6.57**	**8.29**	**7.19**	**5.68**	**5.43**

February 18, 2020

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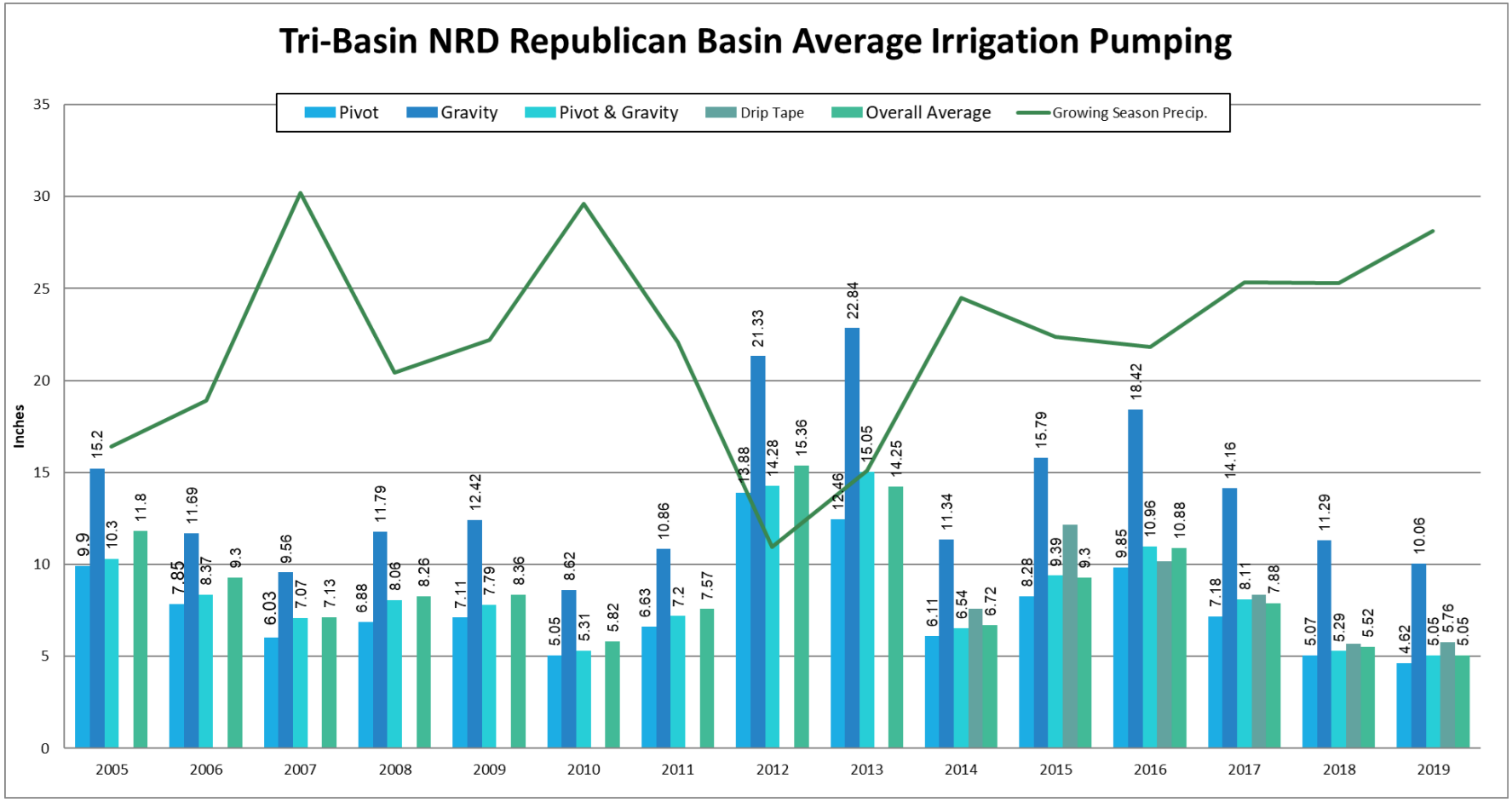
Appendix B



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2006 Dates of Recharge Diversion	1/24/06 to 2/13/06	8/8/06 to 2 /13/06	12/22/06 to 12/31/06
Elwood Reservoir Diversions			
AF, in	6131	627	
$/af			
$/other			
Notes	gravity, Appears to be no charges	gravity, Appears to be no charges	gravity, JO costs, NGPC was billed for 50% of the JO costs
Elwood Releases			
AF, in			
$/af			
$/other			
Notes			
E65 Canal			
AF, in			
$/af			
$/other			
Notes			
Phelps Canal			
AF, in			
$/af			
$/other			
Notes			
Funk Lagoon			
AF, in			
$/af			
Notes			
Funds			
Total $	N/A	N/A	$16,752.44
PRRIP			
NDNR			
TBNRD			
NGPC			$16,752.44

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2007 Dates of Recharge Diversion	5/30/07 to 6/25/07	7/9/07 to 7/11/07	7/31/07 to 8/8/07
Elwood Reservoir Diversions			
AF, in			
$/af			
$/other			
Notes	gravity, JO costs	gravity, Not billed	gravity, JO Costs
Elwood Releases			
AF, in			
$/af			
$/other			
Notes			
E65 Canal			
AF, in			
$/af			
$/other			
Notes			
Phelps Canal			
AF, in			
$/af			
$/other			
Notes			
Funk Lagoon			
AF, in			
$/af			
Notes			
Funds			
Total $	$57,819.51	N/A	$17,686.39
PRRIP			
NDNR			
TBNRD			
NGPC	$57,819.51		$17,686.39

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2008-2009 Dates of Recharge Diversion	5/23/08 to 6/11/08	7/18/08 to 7/21/08	8/10/08 to 8/19/08	6/21/09 to 8/21/09
Elwood Reservoir Diversions				
AF, in				
$/af				
$/other				
Notes	4240 af gravity, 2543 pumped, $ pump & hydro	pumped, $pump & hydro	gravity, $ for hydro offset	diversions stopped once irrigation decision was made
Elwood Releases				
AF, in				
$/af				
$/other				
Notes				
E65 Canal				
AF, in				
$/af				
$/other				
Notes				
Phelps Canal				
AF, in				
$/af				
$/other				
Notes				
Funk Lagoon				
AF, in				
$/af				
Notes				
Funds				
Total $	$66,568.32	$12,878.02	$10,498.40	$25,572.80
PRRIP				
NDNR				
TBNRD	$33,284.16	$6,439.01	$5,249.20	$12,786.40
NGPC	$33,284.16	$6,439.01	$5,249.20	$12,786.40

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2012-2013 Dates of Recharge Diversion	9/28/11 to 1/5/12	12/4/12 to 3/11/13	9/19/13 to 10/31/13					
Elwood Reservoir Diversions								
AF, in			12385					
$/af			35					
$/other								
Notes			Pumped					
Elwood Releases								
AF, in								
$/af								
$/other								
Notes								
E65 Canal								
AF, in				2615				
$/af				35				
$/other								
Notes				Canal to NP 23.7-3.2, Cottonwood WPA, and 36.2S				
Phelps Canal								
AF, in						3890	2000	3897
$/af						25	25	NA
$/other								
Notes						down to MP 13.3	Funk Lagoon	Phelps below 13.3 to 51.1 plus 19.1, 38.6. No payment for these diversions.
Funk Lagoon								
AF, in								
$/af								
Notes								
Funds								
Total $	$138,954.00	$102,200.00	$433,475.00	$91,525.00	$97,250.00	$50,000.00	NA	
PRRIP	$69,477.00	$102,200.00			$48,625.00	$50,000.00		
NDNR	$41,686.20		$260,085.00	$54,915.00	$29,175.00			
TBNRD	$27,790.80		$173,390.00	$36,610.00	$19,450.00			
NGPC								

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2014 Dates of Recharge Diversion	6/10/14 to 7/7/14	11/26/14 to 11/30/14			12/9/14 to 12/27/14		11/26/14 to 12/31/14
Elwood Reservoir Diversions							
AF, in	13237	1763	37		8309.2		
$/af	39	39	NA		41		
$/other							
Notes	Pumped, 15,000 af contract with amendment	Pumped, finished con-tract 11-26 to 11-30	Not billed but pumped into Elwood		Pumped, 5000 af contract + 5000 af am-mendment		
Elwood Releases							
AF, in							
$/af							
$/other							
Notes							
E65 Canal							
AF, in				70		567.1	
$/af				NA		38	
$/other							
Notes				Not billed, part of Elwood filling, down to MP 5.9		down to MP 20.1	
Phelps Canal							
AF, in							2346
$/af							27
$/other							
Notes							down to MP 13.3
Funk Lagoon							
AF, in							
$/af							
Notes							
Funds							
Total $	$516,243.00	$68,757.00	NA	NA	$340,677.20	$21,549.80	$63,339.30
PRRIP							$31,669.65
NDNR	$258,121.50	$34,378.50			$170,338.60	$10,774.90	$31,669.65
TBNRD	$258,121.50	$34,378.50			$170,338.60	$10,774.90	
NGPC							

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2015 (cont. on 46) Dates of Recharge Diversion	1/1/15 to 2/14/15		1/14/15 to 1/21/15		5/11/15 to 8/24/15		
Elwood Reservoir Diversions							
AF, in			1028.8		6800		9007
$/af			42.6		42.6		42.6
$/other							
Notes			Finished out 10,000 af contract, pumped		For NDNR/ TBNRD,finished out Amend-ments No 1 thru No 4 (Total 17,000 AF)		For PRRIP
Elwood Releases							
AF, in							
$/af							
$/other							
Notes							
E65 Canal							
AF, in				94.9		200	
$/af				39.5		39.5	
$/other							
Notes				in Canal to MP 5.9		Into Cotton-wood WPA, part of Amend-ment No 1	
Phelps Canal							
AF, in	1654	543.7					
$/af	28.1	28.1					
$/other							
Notes	down to MP 13.3, up to 4000 af, then PRRIP to get 100%	down to MP 13.3, PRRIP only					
Funk Lagoon							
AF, in							
$/af							
Notes							
Total $	$46,447.13	$15,267.10	$43,868.03	$3,750	$289,952.00	$7,904.00	$384,058.48
PRRIP	$23,223.56	$15,267.10					$384,058.48
NDNR	$23,223.56		$21,934.02	$1,875.22	$144,976.00	$3,950.00	
TBNRD			$21,934.02	$1,875.22	$144,976.00	$3,950.00	
NGPC							

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2015 (cont.) Dates of Recharge Diversion	11/23/15 to 12/18/15			11/16/15 to 12/31/15		12/19/15 to 2/1/16
Elwood Reservoir Diversions						
AF, in	3227		5776			
$/af	42.6		42.6			
$/other						
Notes	For NDNR/ TBNRD, 11-16-15 Agreement for 4500 af total Canal and Elwood		For PRRIP, May 2015 Agreement and Amendment No 1			
Elwood Releases						
AF, in						1119
$/af						
$/other						
Notes						Released from Elwood to E65 Canal. Subtracted from NDNR/State Elwood Acct for recharge in E65 Canal, No charge in the contract
E65 Canal						
AF, in					1273	
$/af					39.5	
$/other						
Notes					For NDNR/ TBNRD, 11-16-15 Agreement for 4500 af total Canal and Elwood, down to MP 20.1	
Phelps Canal						
AF, in				747.5	2243	
$/af				28.1	28.1	
$/other						
Notes				down to MP 13.3, 25% of diversions for NDNR, 11-18-15 Agreement	down to MP 13.3, 75% of diversions for PRRIP, 11-26-14 Agreement	
Funk Lagoon						
AF, in						
$/af						
Notes						
Funds						
Total $	$137,599.28	$50,308.96	$246,288.64	$20,989.80	$62.969.40	NA
PRRIP			$246,288.64		$62.969.40	
NDNR	$68,799.64	$25,154.48		$20,989.80		
TBNRD	$68,799.64	$25,154.48				
NGPC						

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2016 (Cont. on pg. 48) Dates of Recharge Diversion	1/1/16 to 2/14/16		3/16/16 to 4/13/16		3/16/16 to 3/20/16		9/15/16 to 12/31/16	
Elwood Reservoir Diversions								
AF, in								
$/af								
$/other								
Notes								
Elwood Releases								
AF, in								
$/af								
$/other								
Notes								
E65 Canal								
AF, in			500	28				
$/af			41.1					
$/other								
Notes			Fullfills 3-17-16 agreement (ammendment NO.1), down to MP 20.1	Not Billed, excess diversion as part of 500 af agreement				
Phelps Canal								
AF, in	489.25	1467.75	157.5	472.5			1080.5	3241.4
$/af	29.2	29.2	29.2	29.2			29.2	29.2
$/other								
Notes	down to MP 13.3, 25% of diversions for NDNR, 11-18-15 Agreement	down to MP 13.3, 75% of diversions for PRRIP, 12-11-15 Agreement	down to MP 13.3, 25% of diversions for NDNR, 11-18-15 Agreement	down to MP 13.3, 75% of diversions for PRRIP, 12-11-15 Agreement			down to MP 13.3, 25% of diversions for NDNR, 9-20-2016 Agreement	down to MP 13.3, 75% of diversions for PRRIP, 9-26-2016 Agreement
Funk Lagoon								
AF, in								
$/af								
Notes								
Funds								
Total $	$14,286.10	$42,858.30	$4,599.00	$13,797.00	$20,550.00	NA	$31,550.60	$94,648.88
PRRIP		$42,858.30		$13,797.00				$94,648.88
NDNR	$14,286.10		$4,599.00		$10,275.00		$31,550.60	
TBNRD					$10,275.00			
NGPC								

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2016 (Cont.) Dates of Recharge Diversion	12/10/16 to 12/31/16			12/9/16 to 12/31/16	
Elwood Reservoir Diversions					
AF, in	1152	2880	1728		
$/af	44.4	44.4	44.4		
$/other					
Notes	For TBNRD, 12-7-2016 Agreement with $127,036 limit for TBNRD and 60% NDNR/40% TBNRD split	For TBNRD, 12-7-2016 Agreement with $127,036 limit for TBNRD and 60% NDNR/40% TBNRD split	For NDNR, 12-7-2016 Agreement with $190,554 limit for NDNR and 60% NDNR/40% TBNRD split		
Elwood Releases					
AF, in					
$/af					
$/other					
Notes					
E65 Canal					
AF, in				335.9	503.8
$/af				41.1	41.1
$/other					
Notes				For TBNRD, 12-7-2016 Agreement with $127,036 limit for TBNRD and 60% NDNR/40% TBNRD split, Water down to MP 19.3	For NDNR, 12-7-2016 Agreement with $190,554 limit for NDNR and 60% NDNR/40% TBNRD split, Water down to MP 19.3
Phelps Canal					
AF, in					
$/af					
$/other					
Notes					
Funk Lagoon					
AF, in					
$/af					
Notes					
Funds					
Total $	$51,091.20	$127.728.00	$76,636.80	$13,805.49	$20,706.18
PRRIP		$127.728.00			
NDNR			$76,636.80		$20,706.18
TBNRD	$51,091.20			$13,805.49	
NGPC					

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2017 (Cont. on pg. 50) Dates of Recharge Diversion	1/1/17 to 1/30/17		1/1/17 to 1/31/17	1/1/17 to 2/14/17		1/1/17 to 2/14/17	1/1/17 to 2/14/17	9/15/17 to 10/12/17	
Elwood Reservoir Diversions									
AF, in	1631.6	2447.4							
$/af	45.7	45.7							
$/other									
Notes	For TBNRD, 1-23-17 Amendment for $164,800	For NDNR, 1-23-17 Amendment for $247,200 limit.							
Elwood Releases									
AF, in									
$/af									
$/other									
Notes									
E65 Canal									
AF, in				599.4	899.1				
$/af				42.3	42.3				
$/other									
Notes				For TBNRD, 1-23-17 Amendment for $164,800 limit. Water to MP 19.3	For NDNR, 1-23-17 Amendment for $247,200 limit. Water to MP 19.3				
Phelps Canal									
AF, in						338.50	1015.40	1353.50	451.20
$/af						30.1	30.1	30.1	30.1
$/other									
Notes						down to MP 13.3, 25% of diversions for NDNR, 9-20-2016 Agreement, 2,666 af limit	down to MP 13.3, 75% of diversions for PRRIP, 9-26-2016 Agreement, 8,000 af limit	down to MP 13.3, 75% of diversions for PRRIP, 10-20-17 Agreement	down to MP 13.3, 25% of diversions for NDNR, 9-20-2016 Agreement, 2,666 af limit
Funk Lagoon									
AF, in									
$/af									
Notes									
Funds									
Total $	$74,531.49	$111,797.23	$208,789.58	$25,372.60	$38,058.90	$10,182.08	$30,543.23	$40,713.28	$13,572.10
PRRIP			$208,789.58				$30,543.23	$40,713.28	
NDNR		$111,797.23			$38,058.90	$10,182.08			$13,572.10
TBNRD	$74,531.49			$25,372.60					
NGPC									

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2017 (Cont.) Dates of Recharge Diversion	11/28/17 to 12/22/17	12/15/17 to 12/22/17				12/1/17 to 12/31/17	
Elwood Reservoir Diversions							
AF, in	6953.6	657.5	986.3				
$/af	45.7	50.7	50.7				
$/other							
Notes	For PRRIP,10-20-17 Agreement, 8,000 af limit, All diversion to PRRIP until 12-15-17 when NDNR/ TBNRD signed agreement, then 50%/50% split with them	For TBNRD, 12-15-17 Agreement, 50/50 split with PRRIP and then 40% of that split to TBNRD, 13,500 af limit for State and TBNRD combined	For NDNR, 12-15-17 Agreement, 50/50 split with PRRIP and then 60% of that split to State, 13,500 af limit for State and TBNRD combined				
Elwood Releases							
AF, in							
$/af							
$/other							
Notes							
E65 Canal							
AF, in				66.6	100		
$/af				42.3	42.3		
$/other							
Notes				For TBNRD, 12-15-17 Agreement, Contract No. 1024, 40% split to TBNRD, 60% to NDNR, 13,500 af limit for State and TBNRD combined	For NDNR, 12-15-17 Agreement, Contract No. 1024, 60% of that split to NDNR, 40% split to TBNRD, 13,500 af limit for State and TBNRD combined		
Phelps Canal							
AF, in						1317.70	439.20
$/af						30.1	30.1
$/other							
Notes						down to MP 13.3, 75% of diversions for PRRIP, 10-20-17 Agreement	down to MP 13.3, 25% of diversions for NDNR, 9-20-2016 Agreement, 2,666 af limit
Funk Lagoon							
AF, in							
$/af							
Notes							
Funds							
Total $	$317,640.45	$33,322.10	$49,985.68	$2,819.18	$4,233.00	$39,636.42	$13,211.14
PRRIP	$317,640.45					$39,636.42	
NDNR			$49,985.68		$4,233.00		$13,211.14
TBNRD		$33,322.10		$2,819.18			
NGPC							

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2018 (Cont. on pg. 52) Dates of Recharge Diversion	1/3/18 to 3/22/18		1/5/18 to 2/8/18			1/1/18 to 2/12/18
Elwood Reservoir Diversions						
AF, in			3854.9	1542	2313	
$/af			47.1	52.2	52.2	
$/other						
Notes			For PRRIP,10-20-17 Agreement, 8,000 af limit,1-8-18 Ammend-ment took limit to 12,000 af, 50%/50% split with NDNR/ TBNRD	For TBNRD, 12-15-17 Agreement, 50/50 split with PRRIP and then 40% of that split to TBNRD, 13,500 af limit and/or $362,948 limit for State and TBNRD combined	For NDNR, 12-15-17 Agreement, 50/50 split with PRRIP and then 60% of that split to State, 13,500 af limit and/or $362,948 limit for State and TBNRD combined	
Elwood Releases						
AF, in						
$/af						
$/other						
Notes						
E65 Canal						
AF, in	360.5	540.8				
$/af	43.6	43.6				
$/other						
Notes	For TBNRD, 12-15-17 Agreement, Contract No. 1024, 40% split to TBNRD, 60% to NDNR, 13,500 af limit for State and TBNRD combined. Diversions down to MP 19.3	For NDNR, 12-15-17 Agreement, Contract No. 1024, 60% of that split to NDNR, 40% split to TBNRD, 13,500 af limit for State and TBNRD combined. Diversions down to MP 19.3				
Phelps Canal						
AF, in						1066.00
$/af						31
$/other						
Notes						10-20-17 Agreement. No agreement with NDNR, PRRIP got all diversions. Diversions down to MP 13.3. NOTE: Total diverions were reduced by 200 af for water left in the Phelps Canal at the start of irrigation sea-son.
Funk Lagoon						
AF, in						
$/af						
Notes						
Funds						
Total $	$15,717.80	$23,578.88	$181,373.05	$80,492.40	$120,738.60	$33,024.68
PRRIP			$181,373.05			$33,024.68
NDNR		$23,578.88			$120,738.60	
TBNRD	$15,717.80			$80,492.40		
NGPC						

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2018 (Cont.) Dates of Recharge Diversion	11/19/18 to 12/31/18	11/21/18 to 12/20/18	11/22/18 to 12/20/18	12/3/18 to 12/31/18		
Elwood Reservoir Diversions						
AF, in				11061		
$/af				47.1		
$/other						
Notes				11-26-18 SWA Ammendment No. 2, took limit to 30,000 af. All for PRRIP. NDNR and TBNRD wanted the remainder of their contract in E65 Canal		
Elwood Releases						
AF, in						
$/af						
$/other						
Notes						
E65 Canal						
AF, in					196.8	295.1
$/af					43.6	43.6
$/other						
Notes					Contract 1024, for TBNRD, down to MP 19.3	Contract 1024, for NDNR, down to MP 19.3
Phelps Canal						
AF, in	2191.80	1001.00				
$/af	31	31				
$/other						
Notes	10-27-19 WSA w/ PRRIP, Diversions down to MP 13.3	11-15-17 WPA WSA with TBNRD, from MP 13.3 to MP 34.2.				
Funk Lagoon						
AF, in			1952.4			
$/af			25.5			
Notes			11-15-17 WPA WSA with TBNRD, Delivery to Funk Lagoon			
Funds						
Total $	$67,901.96	$31,010.98	$49,786.20	$520,401.23	$8,580.48	$12,866.36
PRRIP	$67,901.96			$520,401.23		
NDNR						$12,866.36
TBNRD		$31,010.98	$49,786.20		$8,580.48	
NGPC						

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Dates of Recharge Diversion	1/1/19 to 1/24/19	1/1/19 to 1/28/19	1/1/19 to 1/31/19	
Elwood Reservoir Diversions				
AF, in				
$/af				
$/other				
Notes				
Elwood Releases				
AF, in				
$/af				
$/other				
Notes				
E65 Canal				
AF, in			297	445.5
$/af			44.9	44.9
$/other				
Notes			Contract 1024 w/ 1-7-19 Ammendment, for TBNRD, down to MP 19.3	Contract 1024 w/ 1-7-19 Ammendment, for NDNR, down to MP 19.3
Phelps Canal				
AF, in	712.1			
$/af	31.9			
$/other				
Notes	10-27-19 WSA w/ PRRIP, Diversions			
Funk Lagoon				
AF, in				
$/af				
Notes				
Funds				
Total $	$22,723.11	$347.879.80	$13,338.27	$20,007.41
PRRIP	$22,723.11	$347.879.80		
NDNR				$20,007.41
TBNRD			$13,338.27	
NGPC				

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2019 (Cont. on pg. 60 & 61) Dates of Recharge Diversion	1-1-19 to 1-24-19	1-1-19 to 1-28-19	1-1-19 to 1-31-19	
Elwood Reservoir Diversions				
AF, in		7178.7		
$/af		48.46		
$/other				
Notes		11-26-18 SWA Ammendment No. 2, took limit to 30,000 af. All for PRRIP. NDNR and TBNRD wanted the remainder of their contract in E65 Canal		
Elwood Releases				
AF, in				
$/af				
$/other				
Notes				
E65 Canal				
AF, in			297	445.5
$/af			44.91	44.91
$/other				
Notes			Contract 1024 w/ 1-7-19 Amendment, for TBNRD, down to MP 19.3	Contract 1024 w/ 1-7-19 Amendment, for NDNR, down to MP 19.3
Phelps Canal				
AF, in	712.10			
$/af	31.91			
$/other				
Notes	10-20-17 WSA w/ PRRIP, Diversions down to MP 13.3			
Funk Lagoon				
AF, in				
$/af				
Notes				
Funds				
Total $	$ 22,723.11	$ 347,879.80	$ 13,338.27	$20,007.40
PRRIP	$ 22,723.11	$ 347,879.80		
NDNR				$20,007.40
TBNRD			$ 13,338.27	
NGPC				

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2019 (Cont.) Dates of Recharge Diversion	5-10-19 to 5-16-19			5-10-19 to 5-20-19
Elwood Reservoir Diversions				
AF, in	941.3	123.2	184.9	
$/af	48.46	53.77	53.77	
$/other				
Notes	For PRRIP. 11-26-18 SWA Ammendment No. 2 , took limit to 30,000 af for PRRIP. 1-3-19 WSA Amendment to 1024 extends cost cap to $402,247 for TBNRD-NDNR. 50% split until TBNRD-NDNR full then all to PRRIP. These deliveries fullfilled both amendments.	For TBNRD. 11-26-18 SWA Amendment No. 2 , took limit to 30,000 af for PRRIP. 1-3-19 WSA Amendment to 1024 extends cost cap to $402,247 for TBNRD-NDNR. 50% split until TBNRD-NDNR full then all to PRRIP. These deliveries fullfilled both ammendments. TBNRD 40%, NDNR 60% of their 50% of total diversions	For NDNR. 11-26-18 SWA Ammendment No. 2 , took limit to 30,000 af for PRRIP. 1-3-19 WSA Amendment to 1024 extends cost cap to $402,247 for TBNRD-NDNR. 50% split until TBNRD-NDNR full then all to PRRIP. These deliveries fullfilled both ammendments. TBNRD 40%, NDNR 60% of their 50% of total diversions	
Elwood Releases				
AF, in				
$/af				
$/other				
Notes				
E65 Canal				
AF, in				
$/af				
$/other				
Notes				
Phelps Canal				
AF, in				
$/af				
$/other				
Notes				
Funk Lagoon				
AF, in				
$/af				
Notes				
Funds				
Total $	$ 45,615.40	$ 6,624.46	$ 9,942.07	$ 6,557.12
PRRIP	$ 45,615.40			
NDNR			$ 9,942.07	
TBNRD		$ 6,624.46		$ 6,557.12
NGPC				

CNPPID Groundwater Recharge Diversions Summary
2019 Republican Basin Annual Report
Appendix C

2019 (Cont.) Dates of Recharge Diversion	7-9-19 to 7-29-19	9-12-19 to 9-28-19	12-16-19 to 12-31-19	12-16-19 to 12-31-19	12-20-19 to 12-31-19
Elwood Reservoir Diversions					
AF, in	4955.2	5463.9			
$/af	48.46	48.46			
$/other					
Notes	For PRRIP. 6-24-19 WSA (30,000 af limit annualy)	For PRRIP. 6-24-19 WSA (30,000 af limit annualy)			
Elwood Releases					
AF, in					
$/af					
$/other					
Notes					
E65 Canal					
AF, in			250.4	375.6	
$/af			44.91	44.91	
$/other					
Notes			E65 Canal recharge down to MP 23.7-0.3-TBNRD under contract #1150, 60/40 split TBNRD/DNR	E65 Canal recharge down to MP 23.7-0.3 -DNR under contract #1150, 60/40 split TBNRD/DNR	
Phelps Canal					
AF, in					
$/af					
$/other					
Notes					
Funk Lagoon					
AF, in					
$/af					
Notes					
Funds					
Total $	$ 240,128.99	$ 264,780.59	$ 11,245.46	$ 16,868.20	$ 12,101.63
PRRIP	$ 240,128.99	$ 264,780.59			
NDNR				$ 16,868.20	
TBNRD			$ 11,245.46		$ 12,101.63
NGPC					

CNPPID Groundwater Recharge Diversions Summary
2019 Republican Basin Annual Report
Appendix C

2019 Dates of Recharge Diversion	1-1-20 to 2-14-20	1-1-20 to 2-14-20	1-1-20 to 2-23-20	3-19-20 to 4-14-20	3-26-20 to 4-14-20			Total
Elwood Reservoir Diversions								
AF, in								153932.8
$/af								
$/other								
Notes								
Elwood Releases								
AF, in								1118.7
$/af								
$/other								
Notes								
E65 Canal								
AF, in	465.5	698.30			253.9	380.8		12413
$/af	46.26	46.26			46.26	46.26		
$/other								
Notes	E65 Canal recharge down to MP 23.7-0.3-TBNRD under contract #1150, 60/40 split TBNRD/DNR	E65 Canal recharge down to MP 23.7-0.3 -DNR under contract #1150, 60/40 split TBNRD/DNR			E65 Canal recharge down to MP 23.7-0.3 -TBNRD under contract #1150, 60/40 split TBNRD/DNR	E65 Canal recharge down to MP 23.7-0.3 -DNR under contract #1150, 60/40 split TBNRD/DNR		
Phelps Canal								
AF, in				910.40				44672.56
$/af				32.87				
$/other								
Notes				9-25-19 WSA w/ PRRIP, Diversions down to MP 13.3				
Funk Lagoon								
AF, in								1952.4
$/af								
Notes								
Funds								
Total $	$21,534.03	$32,303.36	$30,766.20	$29,924.85	$11,745.41	$17,615.81		$7,275,028.61
PRRIP				$29,924.85				$3,703,930.27
NDNR		$32,303.36				$17,615.81		$1,774,743.16
TBNRD	$21,534.03		$30,766.20		$11,745.41			$1,646,340.21
NGPC								$150,014.98

Tri-Basin NRD Water Conservation Incentive Program
Appendix D

3/12/19

Introduction: The Tri-Basin NRD Water Conservation Incentive Program (WCIP) is intended to address two natural resources management issues: ensuring sustainability of groundwater supplies and protecting streamflows from diminishment due to groundwater pumping. The goal of this voluntary program is to reduce groundwater pumping and increase irrigation water use efficiency in Tri-Basin NRD.

The Program: Tri-Basin will allow landowners to enroll up to 8000 NRD-certified irrigated acres in the program. The enrollment period will be from March 26 through April 19, or until the program acre enrollment limit is reached. Once the enrollment limit is reached, water savings to the district could reach 650 acre-feet per year. Incentives in this program will likely be most attractive to landowners in phase two and phase three groundwater quantity management areas, so the water-use reductions should be greatest where the need is greatest (there are approximately 30,000 certified irrigated acres in Tri-Basin's phase two and phase three townships).

In exchange for their participation, landowners will be paid for the equivalent of one acre-inch of water credit per acre per year, with the opportunity to sell additional credits to the NRD at a set price. In addition to NRD purchases, landowners will have the opportunity to sell water credits on the open market at any agreed-upon price (private transactions require NRD board approval). Tri-Basin will maintain an "electronic bulletin board" to facilitate connections between buyers and sellers. Landowners will also be granted flexibility to irrigate any acres within enrolled parcels and to share (pool) allocations between parcels. Pooling agreements will be required to enable sharing allocations between parcels under different ownership.

The Contract: The NRD and the landowner will sign a five-year agreement. The agreement commits the landowner to limiting water use (allocation) on parcels that they select. The allocation will be equal to the UNL average corn crop consumptive irrigation requirement, which is nine inches per acre per year in Kearney County, ten inches per acre per year in Phelps County and eleven inches per acre per year in Gosper County (allocation will be limited to current allocation of nine inches per acre per year in Union Township in Gosper County). Landowners will be required to have flowmeters installed on all wells serving participating parcels and to report water use annually to the NRD. Tri-Basin NRD will offer cost share on flowmeters for participants. Tri-Basin NRD will spot check flowmeter readings on 20% of participating parcels annually. As a condition of their participation, landowners will agree to subject enrolled parcels to (most of) the same rules that apply to all landowners in Phase three groundwater quantity management areas. An instrument will be filed with the county clerk recording these contracts, to provide notice to potential buyers of water use limitations associated with program participation.

In exchange for their participation, the NRD agrees to buy one acre-inch per acre per year from every acre enrolled in the contract. Landowners will have two payment options: an annual payment of $5 per acre-inch credit for one acre-inch per year, or payment at the end of the contract period for up to five acre-inches of credits per acre (assuming the landowner has that much unused allocation) at a rate of $4 per acre-inch. The NRD may also choose to purchase additional credits from participants. NRD purchases of additional acre-inches will be prioritized in Groundwater Quantity Management Phase 2 and Phase 3 areas and 50%+ stream depletion zones. The NRD will have the right of first refusal to purchase unused allocations from landowners, so landowners would need NRD board approval before they make private sales.

Landowners will also have the option to irrigate any and all acres within participating parcels. They can also pool acre-inches between parcels under the same ownership (pooling water credits associated with parcels under different ownership, but the same management will

require a separate NRD-approved pooling agreement). Pools are only allowed for multiple parcels in the same basin and with the same qroundwater quantity management phase status. Water use will be deducted from landowner water credit "accounts."

If a producer overuses their allocation, they will need to purchase credits from other landowners to eliminate their deficit. Otherwise they will be prohibited from irrigating enrolled parcels until the deficit is eliminated. The only way a landowner can cancel a contract would be to pay the NRD for the full contracted amount (refund any payments that we've already made to them and pay the NRD the amount we would have paid them at the end of the contract period).

Terminology

Accounts- An account will track the number of acre-inches of water available for pumping on a parcel. Each parcel will have a separate account, unless landowners form pool accounts.
Allocations- Allocation amounts would be based on estimated safe yields from aquifers that would not result in long-term declines in groundwater levels. An initial allocation will be equal to the University of Nebraska's average annual irrigation water consumption requirement for corn (that amount is nine inches per acre in Kearney County, ten inches per acre in Phelps County and eleven inches per acre in Gosper County).
Credits (Water Use Credits)- Credits are accumulated on a per-NRD-certified irrigated acre per-parcel basis. Allocation credits are granted at the beginning of each allocation period.
Debits- Debits would be made against accounts based on actual pumping or water credits marketed and sold to the NRD or other water users.

Attachment F, NeDNR Annual Report for IMP

2020 Annual Report of 2019 Data

By the Nebraska Department of Natural Resources

To Meet the Requirements of the Integrated Management Plan
for those Portions of the Tri-Basin Natural Resources District
within the Republican River Basin

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I. INTRODUCTION

This report is intended to satisfy the Nebraska Department of Natural Resources' (NeDNR's) tracking and reporting requirements as described in the "Monitoring and Studies" section of the integrated management plan (IMP) for those portions of the Tri-Basin Natural Resources District (NRD) located within the Republican River Basin. This report has been filed annually following the adoption of the IMP in June 2012. The IMP requires that NeDNR track and report on the following items on an annual basis:

a) Any surface water permits issued;
b) Any dam safety permits issued;
c) Any groundwater transfer permits issued;
d) Reports of water diverted and, when available, water stored by surface water users; and
e) The associated offsets for any new permits issued.

This report covers activities that occurred from January 1, 2019, to December 31, 2019. Data from streamgages within Tri-Basin NRD are also provided with this report along with calculations of streamflow depletions using the Republican River Compact Administration (RRCA) model.

The information contained in this report will assist in measuring the success of the IMP in meeting its goals and objectives.

II. ACTIVITIES TO BE REPORTED ANNNUALLY

A. Summary

Items reported annually include permits that are issued by NeDNR and the amount of water diverted by surface water users. When an application for a surface water or groundwater permit is reviewed, NeDNR assesses the potential for the permitted action to increase, decrease, or not affect existing water users. Existing surface water users have the right to divert water in accordance with their permit. The NeDNR field office uses water use reports to verify that surface water users are following the conditions of their permits. During calendar year 2019, NeDNR issued no (zero) new surface water permits in the Republican River Basin portion of the Tri-Basin NRD.

B. NeDNR Permitting

In 2019, NeDNR did not issue any new surface water permits, dam safety permits, nor any new groundwater transfer permits in the Republican River Basin portion of the Tri-Basin NRD.

C. Water Diverted by Surface Water Users

In 2019, no water was reported as having been diverted from natural flow for irrigation purposes. Water administration, lack of water, not needing to irrigate due to it being a wet year, or using groundwater instead of surface water were reasons cited for not irrigating with surface water rights in 2019.

There are no Federal reservoirs or non-Federal reservoirs with capacities greater than 200 AF within the Republican River Basin region of Tri-Basin NRD. Evaporation from small reservoirs (capacity to store 15 to 200 AF) is estimated on an annual basis to comply with the RRCA. The total estimated net evaporation for small reservoirs in the Republican River Basin portion of the Tri-Basin NRD for 2019 was 91 AF. Net evaporation is calculated by multiplying the presumptive average annual surface area of each small reservoir by the net evaporation measured at the nearest United States Bureau of Reclamation reservoir climate and evaporation station. The presumptive average annual surface area of each small reservoir is 25% of the area at the principal spillway elevation, as measured in 2012. The presumptive average surface area may change from year to year based on evaluations by the Dam Safety section of NeDNR.

D. Associated Depletion Offsets

No offsets were necessary in 2019.

E. Estimated Depletions

There is no information to include on estimated depletions from permitted new or expanded water use or accretions from associated offsets for 2019.

III. STREAMGAGE DATA

Data for streamgages located on Muddy Creek at the Furnas-Gosper County line, Muddy Creek at Arapahoe, Turkey Creek at the Furnas-Gosper County line, and Turkey Creek at Edison, can be found in Figure 1. Please note that all data from October 1, 2019, to the present are provisional and may be subject to change upon further review.

2020 Annual Report of 2019 Data

By the Nebraska Department of Natural Resources
To Meet the Requirements of the Integrated Management Plan
for those Portions of the Tri-Basin Natural Resources District
within the Republican River Basin

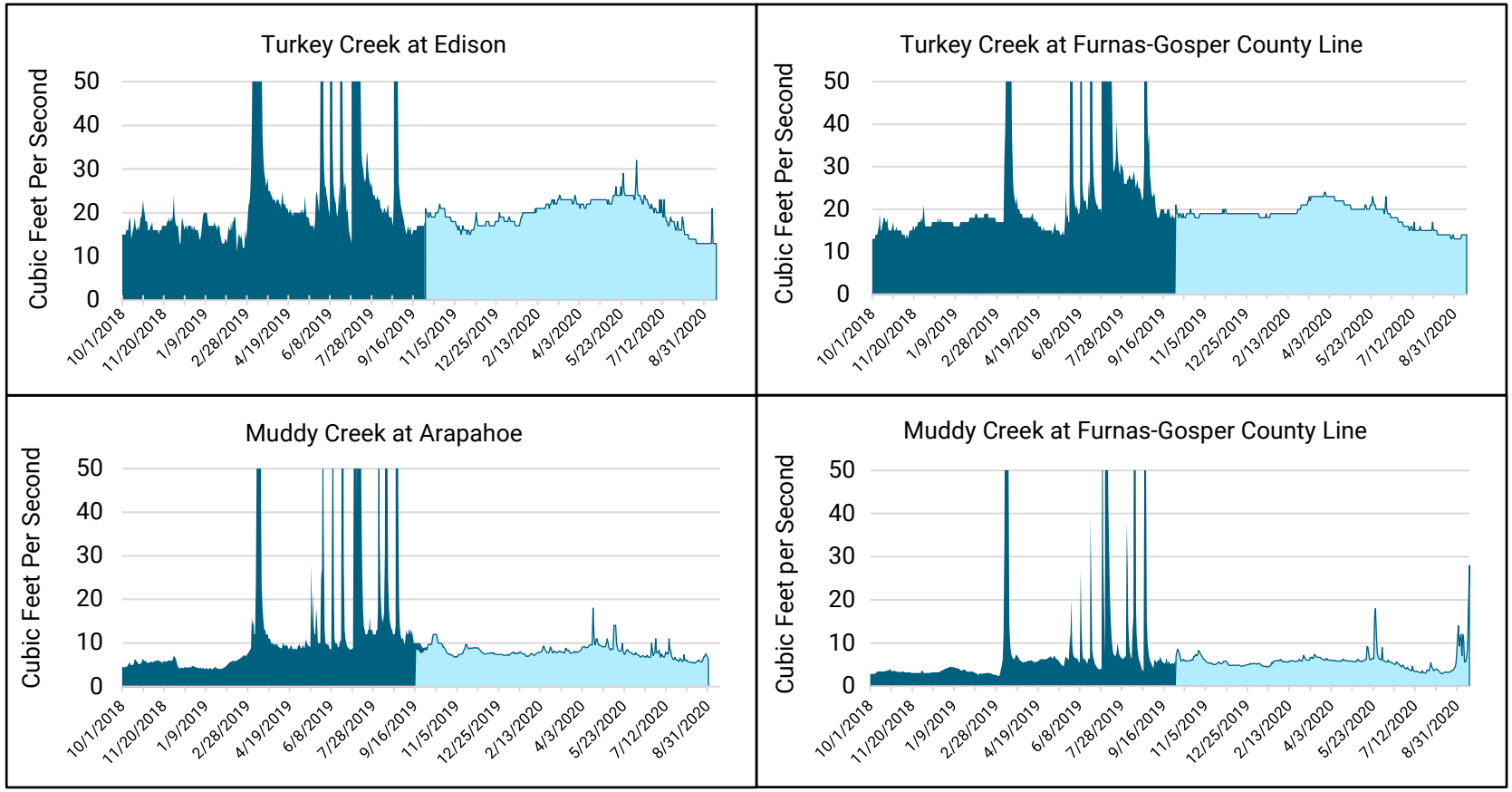

Figure 1. Measured flow at 4 streamgages in the Republican River Basin of Tri-Basin NRD. Data shown in dark blue are those that have been finalized since NeDNR's 2019 report. Data shown in light blue are preliminary. Due to high variability of flow, flows measured above 50 cfs were truncated at 50 cfs for visualization purposes. Streamgage data can be downloaded from https://nednr.nebraska.gov/RealTime/Gage/Index.

IV. STREAMFLOW DEPLETION CALCULATIONS

This section of the report includes information on the calculated depletions to streamflow due to groundwater pumping within the Tri-Basin NRD and the imported water credit (Table 1 and Figure 3). The data shown on in Table 1, Figure 2, and Figure 3 were calculated using the August 2020 RRCA accounting procedures. These calculations were completed using historical Tri-Basin NRD pumping data, groundwater mound, and recharge data as inputs to the RRCA groundwater model. Net effect to baseflow for each calendar year was calculated by totaling the imported water credit (mound accretions) and the streamflow depletion at the southern boundary of the Tri-Basin NRD. The net effects are summarized into a rolling three-year average to assess the progress towards achieving and sustaining a hydrologically balanced condition in accordance with the IMP. The three-year average net effect is positive for 2019 (Table 1 and Figure 3). In accordance with the IMP, these data will be used to assess the Tri-Basin NRD's progress to meet Goal A, Objective 1, of the IMP. In instances where the balance is negative, Tri-Basin NRD and NeDNR will set an objective for an offset up to 1000 acre-feet, and Tri-Basin NRD could begin augmentation pumping the same year. This report includes the final data approved by the RRCA through calendar year 2019.

Table 1. Calendar years 2012 to 2019 modeled streamflow depletion, mound accretion, and net effect to baseflow in acre-feet and previous three-year average net effect to baseflow for 2014 through 2019. A negative value represents depletion, and a positive value represents accretion.

Year	Streamflow Depletion (AF)	Mound Accretion (AF)	Net Effect (AF)	3-year Average Net Effect (AF)
2012	-8,783	10,674	1,891	--
2013	-9,174	9,476	302	--
2014	-9,588	9,455	-133	687
2015	-9,636	9,836	200	123
2016	-9,794	10,078	284	117
2017	-9751	10,256	505	330
2018	-10,089	11,203	1,114	634
2019	-10,717	12,931	2,214	1,278

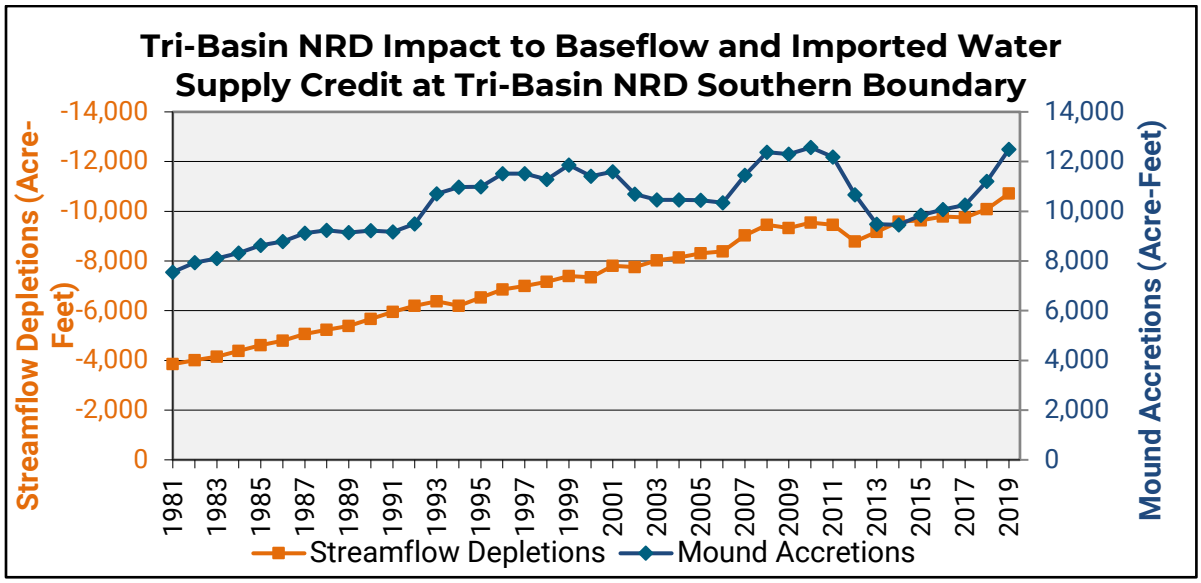

Figure 2. Modeled annual streamflow depletions and mound accretion for calendar years 1981 through 2019. These data were calculated using the August 2020 RRCA accounting procedures and the RRCA groundwater model. In order to show both streamflow depletions and mound accretions for comparison in one chart, the negative values on the left vertical axis pertain to the red line, representing stream depletion values, and positive values on the right vertical axis pertain to the blue line, representing mound accretions.

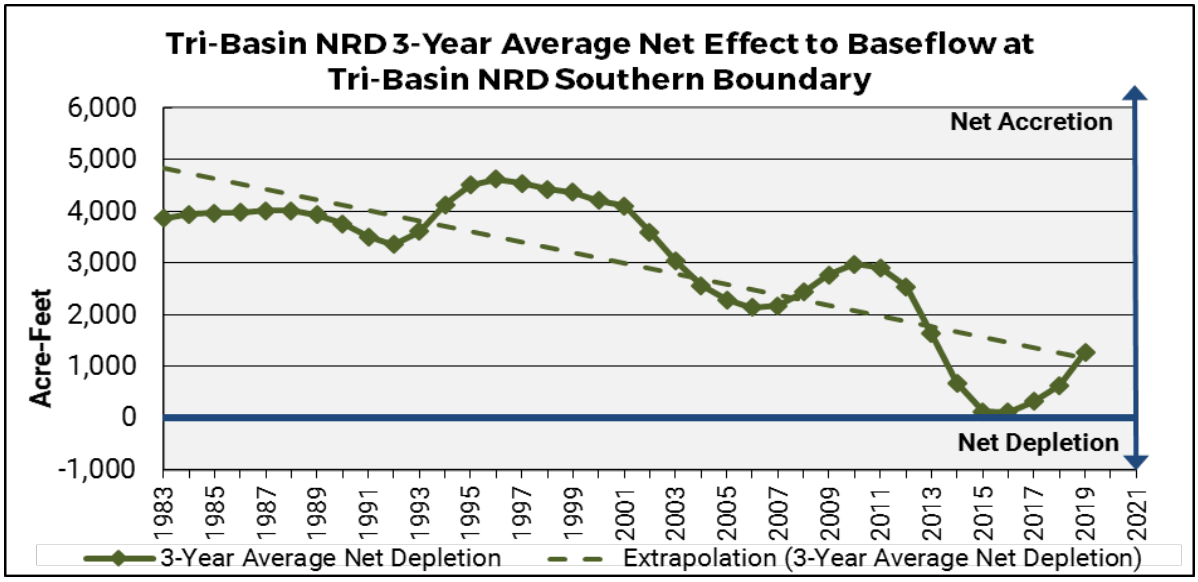

Figure 3. Rolling three-year average net effect to baseflow for calendar years 1981 through 2019, as the total of modeled values of streamflow depletion and mound accretions using the August 2020 RRCA Accounting Procedures and the RRCA groundwater model.

Attachment G, GovDelivery Message about Truncated Meeting

Flaute, Carol

From: Nebraska DNR <NEDNR@public.govdelivery.com>
Sent: Monday, November 9, 2020 6:01 PM
To: Schwartman, Kevin; Bonebright, Pam; Pedley, Andy; Flaute, Carol; Kloch, Dan; Eckles, Beth; Menke, Kim; Esseks, Elizabeth
Subject: Courtesy Copy: truncated Republican River Basin-Wide Plan annual meeting

This is a courtesy copy of an email bulletin sent by Elizabeth Esseks.

This bulletin was sent to the following groups of people:

Subscribers of Republican River Basin-Wide Plan (165 recipients)

NEBRASKA

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DEPT. OF NATURAL RESOURCES

Republican River Basin-Wide Plan Update

Due to a scheduling glitch with NeDNR's Zoom account, today's Republican River Basin-Wide Plan annual meeting ended prematurely. Fortunately, the meeting was already nearly over at that time. All that remained on the agenda was for NeDNR to finish presenting their annual report for the IMP for the Republican Basin portion of Tri-Basin NRD. The remaining portion of that report was Section IV, which includes an analysis assessing whether the NRD has maintained a hydrologically-balanced condition, in compliance with the requirements of the IMP.

For those who are interested to learn more about that analysis, you can download NeDNR's report from https://nebraska.sharefile.com/share/view/sc1973c63e754767b/foaa0945-610f-417d-85c6-c7aa48b2a26c. This is a temporary link that will remain active for approximately the next few days, until we are able to upload the meeting materials to the basin-wide plan website. If you have questions about the report or would like to schedule time for an NeDNR staff member to talk through Section IV of the report, please contact carol.flaute@nebraska.gov.

Once all meeting materials have been uploaded to the basin-wide plan website, we will send another GovDelivery message to let you know they are available.

Water Planning Website

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