



Republican River Accounting: How It's Done

Nebraska's preliminary forecast of available water supplies

This is part three of a four-part series exploring how Nebraska, Kansas, and Colorado work together to administer the Republican River Compact (Compact) and how Nebraska uses Compact accounting data to help manage water and forecast future water availability in the Republican River Basin.

By Kari Burgert

Each fall, NeDNR forecasts the available water supplies for the upcoming year for the Nebraska portion of the Republican River Basin. A preliminary annual dry-year forecast for the upcoming year is provided to the Republican Basin Natural Resources Districts (NRDs) before November 15 of each year, following procedures outlined in the integrated management plans between NeDNR and each NRD. In addition, representatives from Nebraska, Kansas, and Colorado met in September to discuss preliminary 2017 water supply and use balances and an early forecast for 2018, in accordance with a long-term resolution signed by the Republican River Compact Administration (RRCA). Both the September meeting with Kansas and Colorado and the November preliminary annual dry-year forecast help predict the potential need for management actions and controls that may be used in meeting Nebraska's Compact obligations for the remainder of the current year and the upcoming year, as described in this article.



Outlet at Harlan County Dam

Discussion with Kansas and Colorado of 2017 water balance and 2018 early forecast

In August 2016, the RRCA signed a long-term resolution regarding the operation of Harlan County Lake which includes a provision that provides Kansas the opportunity to request, prior to October 1 of Compact Call Years, that all or a portion of the volume of water held in Nebraska from previous years' compliance

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Fall Planning Highlights from Across the State of Nebraska

By Brian Harmon

Niobrara River and White Hat Basin

Nebraska Department of Natural Resources (NeDNR) met with both the Upper Niobrara White and Lower Niobrara Natural Resource Districts (NRDs) for their annual IMP meetings.

The Lower Niobrara NRD hosted the annual IMP review meeting on August 3rd in Butte. NeDNR and NRD staff reviewed data as outlined in the IMP and discussed activities in the next year. Copies of the NRD's and NeDNR's annual reports are available on the NeDNR website.

The Upper Niobrara White NRD hosted the annual meeting on October 6th in Chadron. Following the IMP meeting, discussion included how the NRD, Mirage Flats Irrigation District, and NeDNR could utilize Water Resources Cash Fund dollars to improve groundwater recharge, reduce consumptive use, or increase streamflows in the fully appropriated area of the NRD. Additionally, the Upper Niobrara White NRD and the Department are currently working to prepare a refined hydrogeologic and hydrostratigraphic framework along the Niobrara River between Agate, Nebraska, and the Dunlap diversion for the Mirage Flats irrigation project.

The Department has contracted with the University of Nebraska-Lincoln's Conservation and Survey Division to conduct this study, the purpose of which is to gain additional information regarding groundwater resources in areas presumed, according to geologic maps, to be without aquifers – yet, well registration records indicate that water wells have been drilled and are producing in these areas. The study is nearly complete, and the resulting information will be used in considering the extent of groundwater resources and hydrologic connection with surface water in these areas.

Furthermore, the NeDNR began revising the CENE model in areas where the model overlaps with the Upper Niobrara Model. Once completed, the NeDNR plans to release an updated delineation of

the hydrologically connected areas in the Niobrara River Basin. Also happening in this basin, the Nebraska Game and Parks Commission along with the Niobrara Basin Natural Resources Districts have applied for instream flow rights below Spencer Dam, and are in discussions about applying for a transfer of the Spencer Dam hydropower water right to a basin-management appropriation. NeDNR has been working with all parties through these discussions.

Upper Platte River Basin

The NeDNR, North Platte, South Platte, Central Platte, Twin Platte, and Tri-basin NRDs held the annual meeting for the Upper Platte Basin-Wide Plan in July. The agencies shared information on permits issued during 2016 and gave updates on projects and studies in the basin. There are three ongoing technical studies as part of the basin-wide plan.

First, the conservation measures study examines the effect of no-till farming practices and irrigation efficiency on streamflows.

Second, the analysis of the balance between water supplies and demands in the basin illustrates when there may be shortages or excesses of available water.

And third, the robust review study will assess the impacts of management actions on streamflows and measure progress toward meeting the goals and objectives of the basin-wide plan and IMPs.

In addition to the current studies, the Upper Platte Basin-Wide Plan is undergoing a stakeholder review process to develop a second increment of the basin-wide plan that will take the place of the current plan, which ends in September 2019. The stakeholder group has been meeting for one year, discussing background information on the basin, progress made in the first increment, and potential revisions to the current goals and objectives of the plan.

Also in this basin, the first increment of the Platte River Recovery Implementation Program

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interstate water agreement will end in 2019. There are ongoing discussions among the states and parties involved to extend the first increment to fulfill the Program's obligations to improve streamflows. NeDNR and NRDs continue to address PRRIP through the integrated management plan process.

Lower Platte River Basin

The NeDNR has continued to be an active participant in the Lower Platte River Coalition, which is a partnership between seven Lower Platte River Basin NRDs and NeDNR. The Coalition is working to develop a voluntary basin-wide water management plan to support water management across the basin. As a part of Coalition activities, NeDNR attended all meetings, aided in data development and analysis, and reviewed materials pertaining to the basin-wide plan.

NeDNR also continued to be an active participant in the Lower Platte Basin Consortium, which was initiated via an interlocal agreement between the Lower Platte South NRD, Lower Platte North NRD, Papio-Missouri (Papio-MR) NRD, Metropolitan Utilities District, Lincoln Water System, and NeDNR. The purpose of the Consortium is to develop forecasting tools and evaluate responsive actions to protect public water systems, agricultural uses, and instream flows in times of drought.

The Papio-MR NRD and the NeDNR held their second voluntary IMP annual review on July 13 in Omaha. This IMP covers the Platte Basin portion of the Papio-MR NRD. The Lower Platte South NRD and NeDNR held their third voluntary IMP annual review on August 16 in Lincoln. The Upper Loup and the Lower Loup NRDs and NeDNR held their first voluntary IMP annual reviews on August 9 and August 24, respectively.

NeDNR has been consulting with other water agencies (Department of Environmental Quality, Department of Health and Human Services, Conservation Survey Division, Game and Parks Division) as a part of NeDNR's comprehensive review of the re-written Papio-MR groundwater management plan.

Republican River Basin

The Republican River Basin-wide Plan, which includes the Upper Republican, Middle Republican, Lower Republican, and Tri-basin NRDs, is three years into developing a basin-wide plan. Recent stakeholder meetings

produced progress on finalizing goals and objectives. The Republican River Basin-wide Plan requires measurable hydrological statistics to track progress, and discussions are underway on what methods are best for tracking progress. Discussions have begun with the NRDs for updates to the IMP's for Upper Republican, Middle Republican, and Lower Republican NRDs so that they are up-to-date with the Republican River Compact Administration accounting changes and the basin-wide plan.

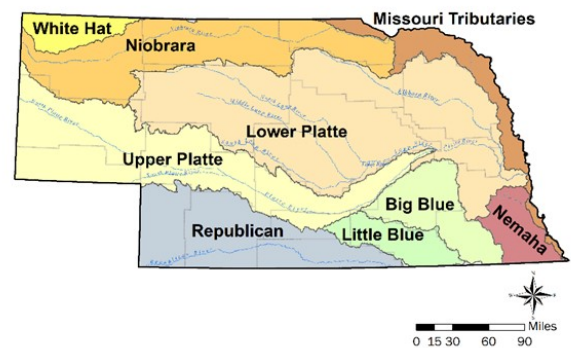
The NeDNR and Tri-Basin NRD met on October 11 to discuss and review implementation of the integrated management plan for the Republican Basin portion of the Tri-Basin NRD.

Blue River Basin

NeDNR continued to work with the Little Blue NRD and Tri-Basin NRD, to develop voluntary IMPs (two) for the Little Blue River Basin. Two more voluntary IMPs, one for the Upper Big Blue NRD and one for the Lower Big Blue NRDs have been initiated as joint planning efforts with NeDNR. In addition, NeDNR has been working with all Blue River Basin NRDs to develop a work plan for data development that could be used as a part of IMP development and/or implementation.

Missouri Tributaries and Nemaha

As a part of the jointly developed Lewis and Clark NRD and NeDNR voluntary IMP, NeDNR has been working to develop educational materials for new surface water applications. In addition, NeDNR has been working with consultants to develop a regional model for the Lower Platte and Missouri River Tributaries Basin. The model is being developed in two parts that cover the northern and southern portions of the basin. The northern model is expected to be completed by the end of 2017, while the southern model development will conclude in 2018. Upon completion, the model will be available for use by the NRDs and analyses can be incorporated into IMP implementation.



Tom Hayden Celebrates 55 Years with State of Nebraska

By Jeremy Gehle

Tom began his career with the State of Nebraska Department of Roads right out of high school in 1962, and only a couple of years later accepted a position with the Department of Natural Resources (Department of Water Resources at the time) in Bridgeport. At the Department, Tom was responsible for measuring stream flows across Western Nebraska in the Platte and Niobrara Rivers. In addition to measuring streamflow, Tom was also responsible for administering the waters of the state and settling complaints between irrigators. On more than one occasion this also meant stopping fist-fights between irrigators.

In 1990 Tom took over the leadership of the Bridgeport Field Office. Over the years, Tom has cultivated lasting relationships across irrigation districts managers and staff, representatives from Colorado and Wyoming, individual irrigators, and our federal counterparts tasked with water management. It is the relationships and Tom's steady hand that have helped keep peace in the valley, outside of the few aforementioned fist-fights over water. Tom has been a steadying influence in floods and droughts, has seen expansion in state government, and budgets that were so tight that old nails were straightened to be used again. He's been a part of the team that ensures that Nebraska received her fair share of water from our upstream neighbors by compact and decree.

When asked how he's managed to do the same job for 55 years, Tom said that he loves the challenges, respects all of the people involved in water resources management, and has always felt that the work is important. Everyone at the Department of Natural Resources feels the same way. We congratulate Tom on his 55 years of service to the State of Nebraska, and wish him the best as he continues his career with the Department of Natural Resources.



NeDNR Director Jeff Fassett, Tom Hayden, and Governor Pete Ricketts at the Governor's office at the State Capitol.

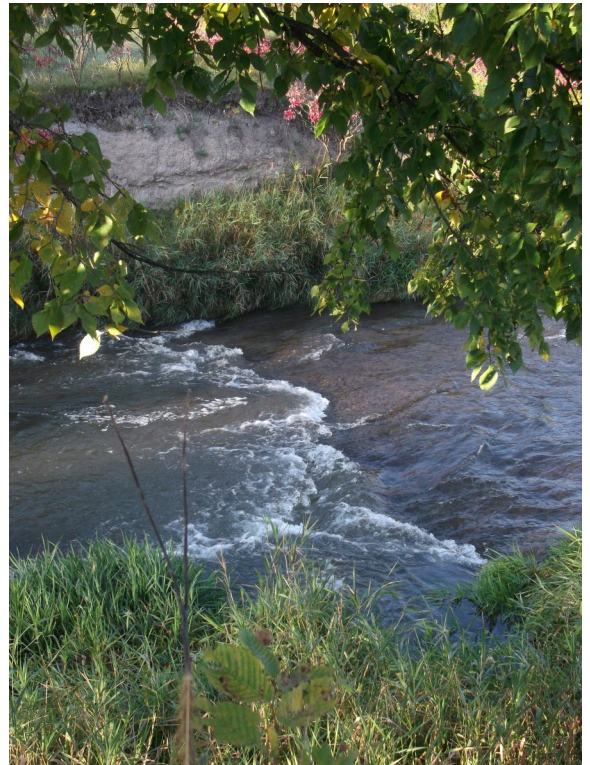
Director Approves Instream Flow Permit on Niobrara

By John Miller and Lori Arthur

On October 19, 2017, Jeff Fassett, Director of the Nebraska Department of Natural Resources, signed an Order granting application A-19406, a permit to appropriate water for the purpose of instream flows on the Niobrara River to maintain habitat for the fish community. Appropriation A-19406 was approved for seasonally adjusted flow amounts to coincide with the different life cycle stage needs of the fishery including overwintering, spawning, rearing, and growth.

Instream flow permit A-19406 was granted to a unique coalition of state and local governments consisting of the Nebraska Game and Parks Commission and five (5) Natural Resources Districts within the Niobrara River Basin. The instream flow reach includes nearly 40 miles of the Niobrara River extending from Spencer Dam to its confluence with the Missouri River. This stretch of river includes a 20-mile reach that has been designated as a unit of the of the wild and scenic river system for recreational purposes managed by the National Parks Service.

Nebraska passed instream flow legislation in 1984. River reaches previously granted Instream flow permits include the following: 1) an eight-mile reach of Long Pine Creek in 1989; 2) a stretch of the Central Platte River from near Lexington to Columbus in 1992, and; 3) the Lower Platte River from Columbus to the Missouri River in 1998. Instream flow permits are granted only for unappropriated water and are subject to same "first in time, first in right" requirements that are binding on all other water appropriations.



Niobrara River

Years of Service Awards

Years of Service Awards were handed out to employees. Those receiving awards were: 10 years: Brett Schluterbusch, Tim Gokie, Jesse Bradley, Curt Inbody, Lucas Hadenfeldt, and Chris Wiebke; 25 years: Mark Noble; 30 years: Mike Thompson; 40 years: Keith Paulsen, Steve Rathje, Susan France, and Jim Marburger; 55 years: Tom Hayden.

Director Jeff Fassett noted that a number of our employees who have been with the State have spent most of their careers with NeDNR. Susan France, who received her 40-year award this year, has been with NeDNR for 39 of those 40. Tom Hayden, (see article on Page 4) has been with the State for 55 years, more than 50 of those with NeDNR.

Continuity of staff is one of the many reasons NeDNR has such a great team.

Congratulations to all who were honored this year.

New Interactive Hydrology Applications Available on Website

By Brian Harmon

The Water Planning Division recently debuted the first of a series of new interactive educational apps, which can be found on the Nebraska Department of Natural Resources (NeDNR) website (<https://dnr.nebraska.gov/water-planning/education>). Currently, users can explore the following questions:

How do the relative positions of the water table and stream levels affect the direction of flow and rate of interaction between the stream and the aquifer?

How do precipitation and the resulting runoff affect streamflow?

How does soil texture (that is, whether soil particles are coarse like sand or fine like clay) affect recharge and streamflow?

The app features a tutorial, as well as a description and hydrograph of the user's effect on streamflow. Users can also seamlessly transition between different simulations and conditions using a drop-down menu and slider bar.

A second app, in which users can change streamflow through groundwater pumping, will be out soon, and will also be found at the same education webpage.

In addition to making these apps available to users online, NeDNR will also bring them to some outreach events. For example, the first app was featured at NeDNR's booth at this year's Nebraska State Fair.



Mosier and Werner Receive Excellence in Leadership Awards

Melissa Mosier

Working in the Water Planning Division, Melissa has played a significant leadership role. She has served as the engine that has kept numerous projects and responsibilities across the state running smoothly and on time. Melissa has the ability to handle large projects with many moving parts and is a great team member and collaborator. One of Melissa's best traits is her continuously positive attitude, which enhances our work culture. Melissa communicates clearly, professionally, and effectively with NeDNR staff, numerous partner agencies within and outside of Nebraska, and the public at outreach events. At a highly controversial meeting, Melissa was called upon to answer questions from angry stakeholders. She calmly and confidently answered the questions after listening to their views. Melissa maintains a high standard for the division's work output, ensuring that what the public sees and experiences is customer-focused and represents the department professionally and accurately.

Ryan Werner

Ryan is an innovative team member who consistently works to improve processes within the Floodplain Management Section. He recently improved our Base Flood Elevation Determination (BFE) process. Floodplain receives approximately 450 requests a year that are handled by our staff of seven. Ryan created a new BFE request interactive map and webpage interface. He collaborated with multiple NeDNR teams and staff members to get the application working. This application not only benefitted Floodplain, but provided a portal for local floodplain administrators to manage BFEs in their jurisdictions. It provides an interactive map where anyone can obtain valid BFEs and contact information to submit a BFE request. Ryan continues to improve the interactive floodplain maps. New improvements include faster loading of layers and efficient updates by using FEMA information, the ability to snap to and along streamlines to measure accurate distances along flood profiles, click identification of flood zones, and the ability for the public to view flood insurance rate maps. The interactive maps allow the public to efficiently look up specific information related to their property through use of these online applications.



Melissa Mosier, Water Planning Division, and Ryan Werner, Floodplain Management Section, receive their awards at the Nebraska State Capitol on November 1.

Republican River Cont.

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requirements be made available in Harlan County Lake for Kansas prior to June 1 of the following year. The maximum volume of carry-over water that Kansas could request in 2017 is 9,300 acre-feet. On September 28, we met with representatives from Kansas and Colorado to discuss preliminary 2017 water supply and use balances and an early forecast of 2018 water supplies for Nebraska in the Republican River Basin. Representatives from Kansas attending the meeting indicated that they would not be requesting delivery of the 9,300 acre-feet at that time due to sufficient supplies forecasted to be available in Harlan County Lake. Harlan County Lake ended the 2017 irrigation season with over 20,000 acre-feet greater storage content than at the end of the 2016 irrigation season.

Preliminary annual dry-year forecast

In consultation with the Republican River Basin NRDs, NeDNR provides an annual dry-year forecast of the minimum allocation (water supply) and likely water uses that will occur in the basin for the upcoming year. The state's forecasted balance of water supply and uses for the coming year is used as a basis for determining the potential for management actions and controls. Early forecasts are discussed with the RRCA and the NRDs beginning in September. We typically issue a final forecast in December, which includes updates to the current year accounting and closer estimates of the start of forecast year conditions than are included in the earlier preliminary forecasts.



Diversion Dam on the Republican River

The procedures for our calculations of available streamflow in the Republican River Basin are detailed in the NeDNR, Lower Republican, Middle Republican, and Upper Republican NRDs' integrated management plans. The previous five years of approved or preliminary accounting values and estimations for the Nebraska federal reservoir volumes at the start of the forecast year are used as inputs to the forecast. The forecast provides projections of Nebraska's dry-year supplies and uses, imported water supply credits, and the resulting balances at the Hardy and Guide Rock accounting points for the coming year. The forecast also breaks down the projections for Compact Call Years by each Lower Republican, Middle Republican, and Upper Republican NRDs' allowable groundwater depletions.

At the September 28 meeting with Kansas and Colorado, Nebraska was able to share that, using the best available data to date and early water supply projections from the United States Bureau of Reclamation that 2018 is preliminarily forecast to require management actions for compliance and is therefore expected to be a Compact Call Year. However, as described above, under the terms of the August 2016 RRCA resolution, management actions are expected to be deferred until Fall 2018, at which point the states will reevaluate the water supply conditions and determine if those management actions will be necessary at that time. We will be meeting with the Republican Basin NRDs and surface-water irrigation districts over the next several months to discuss managing the expected water supplies and discuss updates until the final forecast of 2018 allowable depletions to streamflow is issued in December 2017.