

2025 Forecast of Allowable Depletions in the Republican River Basin

*Nebraska Department of Natural Resources
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Background

The State of Nebraska is party to an interstate compact for the management of the Republican River Basin with the states of Colorado and Kansas, administered by the Republican River Compact Administration (RRCA). Pursuant to the current integrated management plans (IMPs) and Neb. Rev. Stat. § 46-715(6), the Nebraska Department of Natural Resources (NeDNR) in consultation with the Lower Republican Natural Resources District, Middle Republican Natural Resources District, and Upper Republican Natural Resources District (Districts) is required to provide an annual short-term and long-term forecast of maximum allowable depletions to streamflow that will ensure compliance with interstate compacts. The NeDNR has determined that the short-term forecast applies to the upcoming year (2025) and that the long-term forecast estimates what conditions may be ten years into the future. Therefore, this document includes the dry-year forecast of allowable depletions to streamflow in 2025 and 2035.

The States of Nebraska, Colorado, and Kansas, acting through the RRCA, adopted a “*Resolution Approving Long-Term Agreements Related to the Operation of Harlan County Lake for Compact Call Years*” (Resolution). The August 24, 2016, Resolution outlines certain actions that Nebraska will take toward Republican River Compact (Compact) compliance during years forecast as Compact Call Years as outlined in the Monitoring and Studies Technical Memorandum sections of the District IMPs. Compliance with the terms of the Resolution constitutes compliance with the Final Settlement Stipulation and Compact.

Short-Term Forecast

The outcome of Nebraska’s short-term forecast is largely dependent on three key elements, much of which are from data secured through the RRCA Compact accounting procedures. These three elements are detailed in the following sections.

1. Applicable compliance tests for 2025

The first key element of the short-term forecast is the identification of the averaging period that will be utilized for assessing compliance for the upcoming year. The compliance tests use five-year averaging upstream of Hardy in every year and may also include an additional test based on two-year averaging upstream of Guide Rock. The averaging period and applicable accounting points are determined based on projections of the total irrigation water supplies available to the Nebraska Bostwick Irrigation District and Kansas Bostwick Irrigation District. The current projection is that 2025 will require the use of five-year averaging to measure Nebraska’s Compact compliance upstream of Hardy and the additional test of two-year averaging upstream of Guide Rock.

2. Previous year balances

The second key element in the short-term forecast is an evaluation of the recent Compact accounting balances for the State of Nebraska as determined using the current RRCA accounting procedures. These procedures allow for the determination of Nebraska’s Compact balance for years through the current year (2024). Nebraska’s Compact balances through 2023 have been approved and finalized by the RRCA. The 2024 balances are provisional. The information used to estimate the 2024 Compact balances are presented in Table 1. Nebraska’s 2020-2023 RRCA-approved balances and 2024 provisional balances upstream of Guide Rock and Hardy are presented in Table 2.

Table 1. Information Used (acre-feet) for 2024 provisional Accounting.

Item	Information Source
Groundwater Use	Prior years’ pumping records
Surface Water Use	Estimated from preliminary data and prior years’ values
Streamflow	Provisional records, end-of-year estimates
Evaporation	Prior years’ records, provisional, end-of-year estimates

Table 2. Nebraska’s 2020-2023 RRCA-approved balances and 2024 provisional balances upstream of Guide Rock and Hardy.

Year	RRCA Status	Upstream of Guide Rock Balance*	Upstream of Hardy Balance
2020	Approved	-	69,700
2021	Approved	-	27,000
2022	Approved	-	-11,900
2023	Approved	-16,800	-17,900
2024	Nebraska Provisional	-15,600	-16,100
2023-2024 Balance		-32,400	-
2020-2024 Balance		-	50,800

* Balances for upstream of Guide Rock are included but not applicable for 2024 compliance.

Note: Values are rounded to the nearest one hundred acre-feet. 2024 values are preliminary and have not been approved by the RRCA.

3. Forecast of available water supplies and consumption for 2025

The third key element is the forecast of available water supplies and consumption within Nebraska for the upcoming year. To carry out this forecast, NeDNR uses a simplified method of estimating the streamflow-related available water supply of the Republican River Basin for Nebraska’s use. The water supply forecast is based on eight key variables:

- Surface water consumptive use in Colorado,
- Surface water consumptive use in Kansas,
- Surface water consumptive use in Nebraska,
- Groundwater consumptive use in Colorado,
- Groundwater consumptive use in Kansas,
- Groundwater consumptive use in Nebraska,
- Nebraska’s Imported Water Supply Credit, and
- Surface water flow at the Kansas – Nebraska state line.

These eight variables may be estimated for the next year:

- Surface water consumption in Colorado is estimated using a two-year average;
- Surface water consumption in Kansas is related to the water available for irrigation in Harlan County Lake at the end of each year;
- Surface water consumption in Nebraska is related to water available for irrigation in the five Bureau of Reclamation project reservoirs in Nebraska at the start of each year;
- Groundwater consumption and the Imported Water Supply Credit are estimated in all three states using a two-year average; and
- Streamflow is estimated assuming that the upcoming year is a dry year and is based on the volume of water in Harlan County Lake and the most recent five years of streamflow.

Historically, Nebraska’s share of the available water supply has been approximately half of the total water supply calculated using these methods. The information used to estimate the forecast of the available water supply and allowable depletions for 2025 are summarized in Table 3.

Table 3. Information Used (acre-feet) for 2025 Forecast of Allowable Depletions.

Year	Item	Information Source
2025 Forecast	Groundwater Consumptive Use and Imported Water Supply Credit	Average of 2023 and 2024
	Surface Water Consumptive Use	Colorado: Previous two-year average of T – 1 and T – 2 SwCBCU _{co}
		Kansas: + (.1858 x HCL content) + 9,575
		Nebraska: - (0.0000004) x (NE lake volume) ² + (0.52) x (NE lake volume) – 42,000
Streamflow	0.41 + (5-year average of previous years’ Stateline Streamflow) + 0.23 x HCL content - 27,450	

Utilizing the data sources outlined in Table 3, the required components of the forecast can be calculated (Table 4).

Table 4. 2025 Forecast values in acre-feet, where GWCBCU is defined as groundwater computed beneficial consumptive use and SWCBCU is defined as surface water computed beneficial consumptive use.

Forecast Component	Forecast Value Upstream of Guide Rock	Forecast Value Upstream of Hardy
Colorado GWCBCU	36,100	36,100
Kansas GWCBCU	14,500	14,500
Nebraska GWCBCU	197,100	199,900
Nebraska Imported Water Supply Credit	17,600	17,600
Colorado SWCBCU	200	200
Kansas SWCBCU	50,500	50,500
Nebraska SWCBCU	84,400	85,300
Streamflow	75,800	91,300

Note: Values are rounded to the nearest one hundred acre-feet.

The 2025 Compact balances – of allocations (available water supply), computed beneficial consumptive use (CBCU, groundwater and surface water consumption), and Imported Water Supply Credit – are calculated from the forecast procedures contained in the Monitoring and Studies Technical Memorandum Section of the IMPs (Table 5).

Table 5. Forecast 2025 Allocations (available water supply), Computed Beneficial Consumptive Use (CBCU, groundwater and surface water consumption), Imported Water Supply Credit, and Compact Balances for Guide Rock and Hardy in acre-feet.

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - CBCU + IWS Credit (Balance)
2025 Forecast upstream of Guide Rock	229,300	281,500	17,600	-34,700
2025 Forecast upstream of Hardy	238,900	285,200	17,600	-28,800

Note: Values are rounded to the nearest one hundred acre-feet.

Combining the results from the three key elements (applicable compliance test for 2025, previous years' balances, and forecast of available water supplies and consumption for 2025), Nebraska's 2021-2025 five-year total balance upstream of Hardy is forecast to be -47,700 acre-feet; the additional two-year test upstream of Guide Rock will be applicable and is projected to be a 2024-2025 total balance of -50,300 acre-feet (Table 6).

Table 6. 2021-2023 approved Compact balance total upstream of Hardy, 2024 provisional balances upstream of Guide Rock and Hardy, and 2025 forecast balances upstream of Guide Rock and Hardy in acre-feet.

Year	Upstream of Guide Rock Balance*	Upstream of Hardy Balance
2021-2023 total, approved	-	-2,800
2024, provisional	-15,600	-16,100
2025, forecast	-34,700	-28,800
Two-year (2024-2025) Total	-50,300	-
Five-year (2021-2025) Total	-	-47,700

* Balances for upstream of Guide Rock are included but not applicable for 2024 compliance.

Note: Values are rounded to the nearest one hundred acre-feet. 2024 values are preliminary and have not been approved by the RRCA.

Compact Call Year Evaluation

The Monitoring and Studies Technical Memorandum of the District IMPs specifies the process that will be completed by NeDNR to determine a Compact Call Year. The process of determining if the following year will be a Compact Call Year is completed in two evaluations: one evaluation for the 5-year Hardy balances and one for the 2-year Guide Rock balances. Both evaluations must be completed each year, as shown in Figure 1.

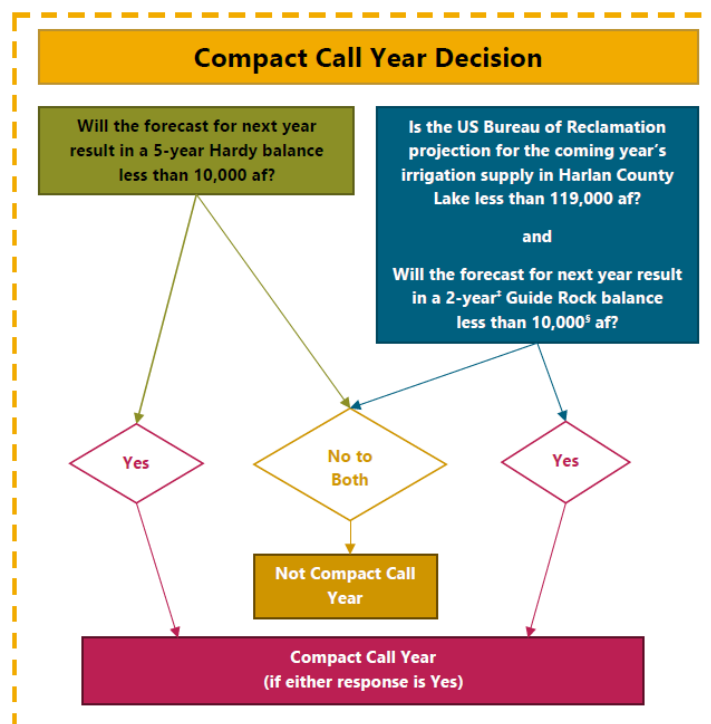


Figure 1. The Compact Call Year decision framework for the Republican River Basin consists of two evaluations: one evaluation for the 5-year Hardy balances and one for the 2-year Guide Rock balances.

§Note: Due to 2025 being the third consecutive compact call year, the Guide Rock balance threshold has been reduced from 10,000 acre-feet to 0 acre-feet.

The forecast for 2025 resulted in a 5-year Hardy balance -47,700 acre-feet. The US Bureau of Reclamation projection, dated December 11, 2024, for 2025 irrigation supply in Harlan County Lake is 101,600 acre-feet, and the 2-year Guide Rock balance is -50,300 acre-feet. Based on review of the IMP evaluations with the information presented in this document, a Compact Call Year designation is required for 2025.

Review of Resolution Provisions

Nebraska will evaluate the actual hydrologic conditions on a regular basis to estimate the Compact Compliance Volume (CCV) for 2025. The first update to this estimate will be provided no later than May 10th and will be updated each month thereafter. Nebraska will finalize the CCV no later than December 31, 2025.

Subject to the Compact Call Year designation and the terms of the Resolution, Kansas may request CCV for 2025 be made available in the Kansas Account prior to June 1, 2026. Kansas must finalize their request prior to October 1, 2025.

Review of Integrated Management Plan Provisions

Due to the Compact Call Year designation for 2025, NeDNR will provide the Districts with an estimate of how much yield from potential management actions may be needed within the year. A summary of the Districts’ provisional 2024-2025 Guide Rock balances and 2021-2025 Hardy balances are provided in Tables 7 and 8, respectively. The potential exists for an increase in irrigation water supplies and the Compact Call Year averaging period provisions of the Resolution to result in the Guide Rock balance not being applicable in 2025 or for the Hardy balance to become less than the Guide Rock balance. Therefore, the potential 2025 Compact obligation for each District is to offset the lesser of their Guide Rock and Hardy balances.

In Compact Call Years, NeDNR will implement additional surface water controls. NeDNR will issue an order designating 2025 as a Compact Call Year and carry out the necessary administration of natural flow and storage surface water appropriations within the basin consistent with NRD management actions and Compact requirements. The Department will coordinate with the Districts to provide updated water supply projections throughout 2025 and inform the Districts if Kansas requests Compact Compliance Volume in the fall of 2025.

Table 7. Summary of Guide Rock Balances for each District within the Basin in acre-feet.

Year	LRNRD	MRNRD	URNRD
2024 Provisional	-7,700	-3,600	-4,300
2025 Forecast	-11,500	-11,200	-12,000
Two-Year Total	-19,200	-14,800	-16,300

Note: Values are rounded to the nearest one hundred. The 2024 values are based on current RRCA accounting procedures at the Guide Rock location. 2024 values are not finalized by the RRCA. 2025 Forecast values are computed at the Guide Rock location. The provisional 2024 balances for each District reflect the management actions taken in 2024.

Table 8. Summary of Hardy Balances for each District within the Basin in acre-feet.

Year	LRNRD	MRNRD	URNRD
2021-2023 Final	-14,100	11,400	-200
2024 Provisional	-8,700	-3,400	-4,000
2025 Forecast	-11,000	-8,900	-8,900
Five-Year Total	-33,800	-900	-13,100

Note: Values are rounded to the nearest one hundred. The 2024 values are based on current RRCA accounting procedures at the Hardy location. 2024 values are not finalized by the RRCA. 2025 Forecast values are computed at the Hardy location. The provisional 2024 balances for each District reflect the management actions taken in 2024.

Summary of the Short-Term Forecast for 2025

Nebraska’s 2025 compliance will be measured by the five-year average upstream of Hardy which is projected to be less than 10,000 acre-feet positive, and the additional two-year test upstream of Guide Rock will be applicable and is projected to be less than 0 acre-feet. Therefore, the Districts are projected to have Compact Call Year obligations for 2025 up to the volumes outlined in Table 9. By January 31, 2025, each District will inform NeDNR of the management actions they intend to take to ensure compliance, and then NeDNR will evaluate whether the planned management actions are sufficient to ensure compliance, as described in the IMPs.

Table 9. Forecast of potential management actions for each District to comply with IMP requirements.

Year	LRNRD	MRNRD	URNRD
Potential Management Actions required for IMP compliance	33,800	14,800	16,300

Long-Term Forecast

Due to the absence of a long-term trend in water supply, the periods of low water supplies in the future are likely to be similar to periods of low water supplies from the past. Historically, the minimum water supplies that have been available to Nebraska were approximately 200,000 acre-feet. Therefore, the amount of water that may be available from streamflow for beneficial use ten years in the future (2035), assuming several consecutive dry years, is estimated to be approximately 200,000 acre-feet. In an effort to continue to ensure long-term Compact compliance through future dry years, the Compliance Standards in the IMPs outline objectives to maintain groundwater depletions at a relatively constant level over the long-term. The NeDNR and Districts will continue to evaluate the trends in long-term groundwater depletions over typical wet and dry cycles and jointly assess whether additional management actions are necessary to accomplish this objective.