Sustainability Steps – Previous and Planned Actions in the Republican Basin to Preserve Water

Upper, Middle and Lower Republican and Tri-Basin NRDs

Highlights

- Allocations in the Lower, Middle and Upper Republican NRDs have dropped an average of 25%
- Rules and regulations have helped produce rising aquifer levels in some regions, stabilized levels in others and significantly slowed rates of decline in other areas.
- Regulated water use in the Basin and elsewhere help make Nebraska the only state above a significant portion of the Ogallala Aquifer where USGS estimates there is about the same amount of groundwater as there was in the 1950's.

Regional Comparison: The approximately 1.1 million irrigated acres in Nebraska's portion of the Republican Basin represent what is believed to be the largest area of regulated groundwater use not only in Nebraska, but the eight-state region that overlies the Ogallala Aquifer. The first control area, the first and second special protection areas, and the first three integrated management plans have all been in the Republican Basin. The first allocations, the first temporary suspension of drilling, and the first moratorium on drilling occurred in the Republican Basin. The Republican Basin has also been a national leader utilizing federal programs and partnerships to conserve water: The Basin was the first in the nation to utilize the federal Conservation Reserve Enhancement Program (CREP) to temporarily retire irrigated acres, and approximately 33,000 acres are enrolled in the program for that purpose in the Basin.

The regulations that have been imposed in all or parts of the Basin since 1979 are also more stringent than those regulations enacted in other states. Groundwater levels and estimated volumes of groundwater underlying states above the Ogallala reflect management efforts in Nebraska, including the Republican Basin. The volume of water in the Ogallala underlying Nebraska is essentially the same as it was before groundwater irrigation began in the 1950's, compared to significant declines in all other states that overlie a significant portion of the aquifer.

Average, annualized allocations in Nebraska's Republican Basin currently range between 9" and 13", and water use is verified by NRD technicians annually. The history of groundwater regulations in Nebraska's Republican Basin has produced substantially lower rates of aquifer declines and, in some cases, rising groundwater levels. In Kansas and Texas, aquifer declines of 150-170 feet have occurred under their respective management schemes. The most significant declines in Nebraska's Republican Basin are less than half of what has occurred in those states. Nebraska's water management scheme that empowers NRDs to regulate water use is considered a model to some of whom have studied water-management frameworks. In 2011, the Environmental Defense Fund's former senior attorney for rivers and deltas concluded in a study that Nebraska's system was preferable to other states'. "Local interests may be more aggressive than state policy makers in protecting their resources," Mary Kelly, the attorney, concluded.

Republican Basin Actions and Plans

Upper Republican NRD: The Upper Republican NRD established a system of groundwater allocations in 1979, making it the first NRD in the state, and possibly the first entity in the country, to impose water-use restrictions on agricultural groundwater use. Allocations have been reduced by approximately 41% since that time in an effort to preserve groundwater resources. The effects of the allocation system are quantifiable: The average change in groundwater levels has been approximately 60% less than what was predicted would occur since the 1970's without restrictions. The most significant groundwater declines are approximately half of the 1970's estimates. Most notably, approximately half of the average groundwater decline in the District occurred in the 10 years before allocations were established. Additionally, the URNRD was the first district in

the state to impose a well-drilling moratorium, doing so in 1997. Well-spacing rules imposed in the 1980's substantially reduced well drilling from that period to the time the moratorium was established.

Allocations and the utilization of water-saving technological advances that allocations have incentivized irrigators to use have resulted in progressively less pumping during some weather conditions. From Spring 2009 to Spring 2012, for example, groundwater levels rose an average of 1.3 feet in the District, the largest increase in groundwater levels during a period with consecutive increases. Precipitation levels from 1980-1983 were similar to 2009-Spring 2012, yet the average amount of water applied per acre was approximately 10% less than the early 1980's. Despite reduced water applications, irrigated corn yields during the recent period were approximately 25% higher, on average, than the early 1980's. More recently, the average depth-to-water in the District rose nearly three-quarters of a foot between 2018 and 2019; from 2015-2020, the average depth-to-water in the District dropped less than 6 inches.

The District in 2013 put a limit of 7.5 inches on how much unused allocation from previous allocation periods can be used for the subsequent allocation period without incurring a penalty. Also, the rules change essentially prohibits borrowing allocation from an upcoming allocation period. It is estimated that the rules could reduce water use by approximately 90,000-acre feet over the allocation period.

Besides regulatory actions, the District has spent a significant amount of money in recent years retiring acres from irrigated production to help preserve groundwater. The focus has been on retiring acres close to streams to reduce stream flow depletions caused by groundwater pumping. In cooperation with the Natural Resources Conservation Service's Agricultural Water Enhancement Program (AWEP), the District spent more than $2 million to purchase easements on nearly 1,600 acres from willing sellers in 2011-2012; the easements permanently retire the land from irrigation. The land in the program has a history of substantial irrigation applications and an average 50-year stream flow depletion factor of more than 85%. A stream flow depletion factor is the percentage of water pumped for irrigation that otherwise would have resulted in stream flow over a period. Beginning in 2020, the District in cooperation with the State of Nebraska began executing contracts to permanently retire irrigation on approximately 3,300 acres that have high impacts on stream flow. Most of the land is in CREP and will be permanently retired once CREP contracts expire.

The District has also implemented programs using District funds and grants, including from the Nebraska Environmental Trust, that provide farmers with cost-share for using soil moisture probes that can reduce water use. Under the programs, nearly 785 probes have been installed on about 100,000 acres. The probes have been demonstrated to reduce water usage by approximately 1"-2" per acre annually.

Middle Republican NRD: The MRNRD Board of Directors has proactively approved groundwater management rules designed to aid Republican River Compact compliance and preserve groundwater.

The MRNRD purchased the Riverside Irrigation Company when? and retired those acres from irrigation. It also entered into a long-term arrangement with the Frenchman Valley Irrigation District that, in Compact call years, allows the natural flow from the Frenchman system to stay in the stream. Both projects help provide close to 3,000-acre feet of reduced consumptive use.

This balances well with the NCORPE Project that provides augmentation water to help balance whatever the MRNRD might need to meet Compact requirements.

These Compact-specific projects are also critical projects to help the MRNRD meet its goal of reaching groundwater irrigation sustainability. Other projects that strive for sustainable water use as well as help with compact efforts include: Telemetry irrigation meters on all wells in the MRNRD, permanent retirement of irrigation, soil moisture probes and groundwater modeling. The MRNRD has been successful attaining grants from USDA, Nebraska's Water Sustainability Fund and Water Resources Cash Fund, the Bureau of Reclamation's WaterSMART program, the Nebraska Environmental Trust, and others.

Lower Republican NRD: Lower Republican Natural Resources District (LRNRD): Like the other NRDs in the Republican Basin, the LRNRD has made significant progress reducing groundwater pumping.

On December 9th, 2002, the LRNRD established a moratorium on new well drilling. Soon after, in late 2004, the LRNRD established a moratorium on adding new irrigated acres. All groundwater irrigated acres were certified in 2004 and all wells were metered by April 1st of 2005.

The LRNRD has had sustained groundwater levels since 2005 and groundwater pumping has been reduced by approximately 27%. Between 2005 and 2007, the allocation in the District east of Highway 183 was 11 inches, and 12 inches west of Highway 183. Since 2008, the allocation across the whole District has been 9 inches per year, which continues to be the lowest allocation in the state.

With participation in federal and state conservation programs designed to reduce water use, more than 13,000 irrigated acres have been permanently or temporarily retired. This represents over 4% of the total irrigated acres in the LRNRD. The District has also promoted a cost-share program to encourage the use of water-saving soil-moisture probes. These probes have been installed on approximately 60,000 acres.

Tri-Basin NRD: Tri-Basin NRD operates a district-wide Groundwater Management Area to protect groundwater quality and quantity. We monitor and map groundwater and surface water quality and quantity.

The NRD has regulated fertilizer application to protect groundwater quality since 1989. These efforts have resulted in stable or declining nitrate-nitrogen levels in groundwater supplies throughout the district. District staff works cooperatively with farmers and agronomists to help improve the timeliness, efficiency and effectiveness of fertilizer application.

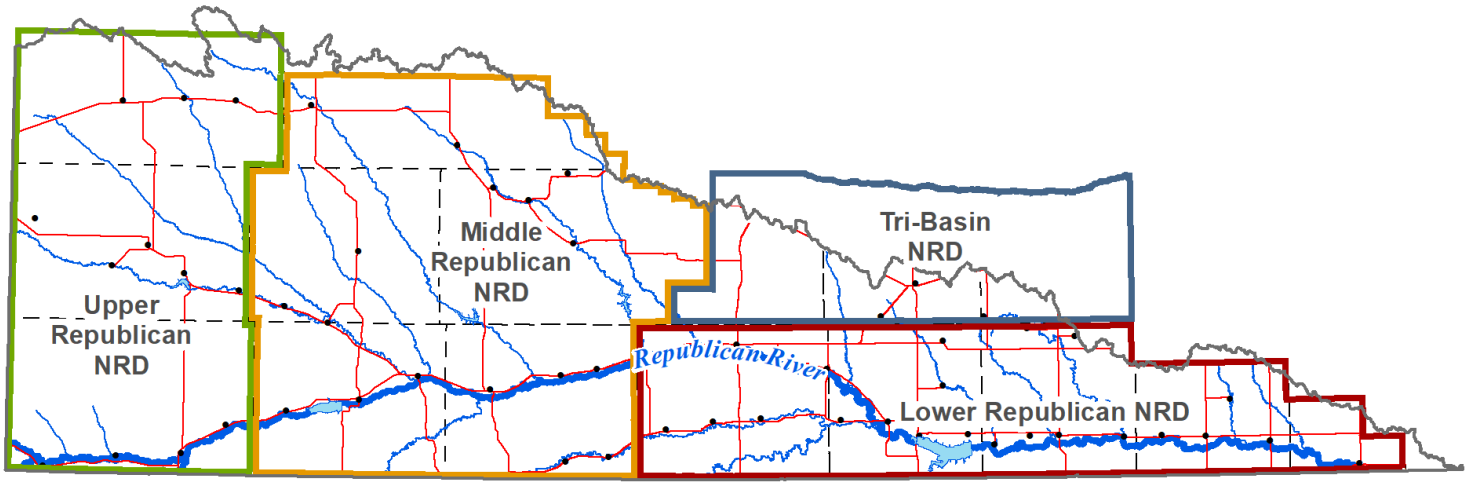
Tri-Basin NRD is also committed to sustaining groundwater supplies at levels equal to or greater than average groundwater levels in the period 1981-85. This commitment is also the objective of the Joint Action Plan for the Republican Basin portion of the district agreed to by the NRD and the Nebraska Department of Natural Resources in July 2004. This commitment to protect existing groundwater supplies also protects Nebraska's credit for "imported water" in the Republican River Basin.

Partnerships for Compliance and Conservation

The Upper, Middle and Lower Republican NRDs have recently partnered together on projects designed to ensure compliance with the Republican River Compact and conserve water throughout the Basin. Along with the Twin Platte NRD, they developed the NCORPE stream flow augmentation project in Lincoln County. Approximately 16,000 acres of sandhills were retired from irrigation under the project and all the land has been reseeded to native grass. Water that would otherwise be used to irrigate the land is instead piped into a tributary of the Republican River, when needed, to ensure compliance with the Republican River Compact. The project is considered the largest grass restoration project in Nebraska history and NRD-imposed rules ensure water piped into the stream will not exceed, and will most likely be less than, the amount of water that would have been used had the land remained in irrigated crop production.

The Districts also partnered on a multimillion-dollar grant with the Natural Resources Conservation Service's Regional Conservation Partnership Program to retire acres from irrigation, implement soil moisture probes, convert irrigation to subsurface drip systems, and enhance soil health.

Republican River Basin
Natural Resources Districts



Rivers
Tributaries
Cities
Roads

Lower Republican
Middle Republican
Tri-Basin
Upper Republican
Republican River Basin in Nebraska

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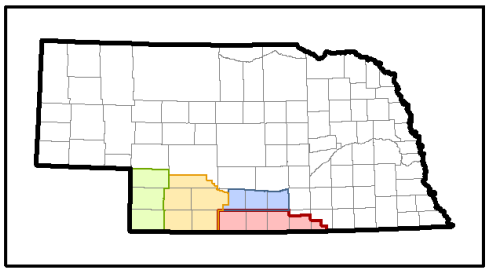

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