

# Existing Republican River Basin Water Management Actions

Stakeholder Advisory Committee Meeting

November 1, 2016

## **Natural Resource Districts**

### **Lower Republican Natural Resources District Water Management Actions**

#### *Special Protection Area*

The Lower Republican NRD established the first Special Protection Area in the state back in 1991, the Superior-Hardy Special Protection Area. The strict rules pertaining to nitrogen applications, along with monitoring and educational workshops have kept the nitrate levels in check.

#### *Rural Water Project*

In October of 2005 work was completed on the Lower Republican Rural Water Project. This project provides potable water to 200 rural hookups and the Village of Guide Rock. Water quality and quantity issues prompted the construction of the project. High nitrate levels along with excessive potassium made the drinking water unsafe in many areas along the Republican River between Franklin and Guide Rock. The aquifer is also very shallow to the extent that even getting a stock well is impossible in places. With 140 miles of pipeline and the water coming from the City of Franklin, there is now safe, clean drinking water for domestic as well as livestock use.

#### *Moratorium on New Irrigation Wells and Acres*

The Lower Republican NRD established a moratorium on new irrigation well drilling on December 9<sup>th</sup>, 2002. No new irrigation wells have been drilled since that date. The District established a moratorium on adding new irrigated acres on December 31, 2004. No new irrigated acres have been added since that date. All ground water irrigated acres were certified in 2004 and all wells were metered by April 1<sup>st</sup> of 2005.

#### *Integrated Management Plan (IMP)*

The Lower Republican NRD, along with the Nebraska Department of Natural Resources, adopted one of the first Integrated Management Plans in state back in 2005. Our fourth generation of Integrated Management Plans was adopted in January 2016. The IMP's as they are called, are supported by strict rules and regulations. The IMP addresses every phase of ground water management from certified acres to allocations.

#### *Soil Moisture Sensors*

The Lower Republican NRD has prompted the use of soil moisture technology heavily for the past eight years and presently have moisture sensors installed on over 160,000 acres. Soil moisture sensors have been proven to lower water usage by 1 to 2 inches per acre per year. It is estimated that the sensors are lowering water usage in the Lower Republican NRD by as much as 26,000 acre feet per year.

#### *CREP, EQIP and AWEP*

Since 2005 the Lower Republican NRD has temporarily or permanently retired over 17,000 acres through programs such as CREP, DQIP, AWEP and the Dry Year Lease Program.

#### *Allocations*

The Lower Republican NRD has the lowest ground water allocation in the state. The present allocation is 9 acre inches per year. The District allocates a 5 year block for 45 acre inches and the water may be used however the irrigator chooses during that 5 years unless there is an allocation cap. The District allows up to 9 acre inches to be carried over the end of an allocation period to the next allocation period.

#### *Regional Conservation Partnership Program (RCPP)*

The Lower, Middle and Upper Republican NRD's partnered on a 2.1 million dollar RCPP application which is called the Republican Basin Conservation Partnership Initiative and was one of the only three projects approved which focus entirely on Nebraska. The projects will help to improve irrigation water management, create wildlife habitat and reduce soil erosion on cropland. More specifically the Lower Republican Project will target three main areas which include conservation from gravity to sub-surface drip, high-end soil moisture sensors and permanent retirement of end guns. The program will run for four years and will be administered by the U.S.D.A. Natural Resources Conservation Service.

### **Upper Republican Natural Resources District Water Management Actions**

#### *Penalties to Prevent Overuse of Allocation*

Since 2013, the URNRD has restricted to 7.5" the amount of carry-forward (unused allocation from previous allocation periods) that irrigators can use during an allocation period. Also, the URNRD has penalties in place that aim to prevent irrigators who are out of allocation from borrowing allocation from the next allocation period.

#### *Pooling/Transfer Restrictions*

Irrigators cannot transfer or pool certified irrigated acres, aka "move water", more than 6 miles without requesting a variance from the rules from the Board of Directors. There are also limits on how much allocation associated with the acres can be transferred. When considering variances, the Board views requests to move water to areas with significant declines or impacts on stream flow unfavorably. All transfers are offset by decertification of acres sufficient to ensure there is no additional impact on stream flow and no increase in pumping from the historical use of the certified acres being transferred.

#### *Moratorium on Irrigation Wells and Well-spacing Requirements*

The URNRD has prohibited new irrigation wells since 1998. Any replacement irrigation well, replacement livestock well, replacement industrial well or replacement public water system must be at least 600' from any domestic well or range livestock well, 2,640' from a public water supply well, and 1,000' from any irrigation well, commercial livestock well or industrial well.

#### *Connecting Wells*

No wells can be connected without prior approval from the URNRD.

#### *Industrial Well Requirements*

All industrial wells must be granted an allocation before they can be operated and to receive an allocation must provide full offset, i.e. retire water uses equal to the water use they propose for the industrial well.

#### *Incentives to Use Soil Moisture Probes*

The URNRD uses its own funds and grant funds to provide cost share on soil-moisture probes. Since 2011, the URNRD has provided cost share on approximately 350 probes installed on more than 45,000 acres which represent more than 10% of all irrigated acres in the district. There are no restrictions on what types of probes are used; irrigators pick probes on the open market of their choosing and the URNRD reimburses them for 2/3 of the cost. Almost all probes used under the cost-share programs have been probes equipped with telemetry that relay soil-moisture information to computers and smart phones.

#### *Partnership with NRCS/Republican NRDs*

The Republican Basin NRDs including the URNRD applied for and have been accepted into the NRCS Regional Conservation Partnership Program. Under the program, approximately \$2.1 million in additional NRCS funds will be used in the Republican Basin to reduce water use by incentivizing removal of end guns, converting gravity irrigation to pivots, and using sub-soil drip irrigation systems. The NRDs will match the federal funds to incentivize those practices. Within the URNRD, district matching funds will be used for soil moisture probes.

## *CREP*

The URNRD partners with the Nebraska Department of Natural Resources and the federal Farm Service Agency to enroll irrigated acres in the Conservation Reserve Enhancement Program. The intent of the program is to convert irrigated land to grassland in areas that have high impacts on stream flow, i.e. near or adjacent to the Republican River and its tributaries. Currently, about 12,000 CREP acres are within the URNRD. The contracts began expiring this year and most CREP acres in the district are scheduled to expire in 2020. The district will work with partner agencies to encourage re-enrollment of the acres and possibly enrollment of new acres.

## *URNRD Irrigation Retirement*

Since 2011, the URNRD has permanently retired from irrigation approximately 1,500 acres with high impacts on stream flow. The district has pending a grant proposal with the State of Nebraska to permanently retire approximately 7,000 acres from irrigation. The grant request is for \$10.5 million; the URNRD's match would be \$7 million. The program would target acres with high impacts on stream flow and/or cropland where there have been significant groundwater declines.

## *Real-time Water Usage and Groundwater Levels*

The URNRD plans to install telemetry units on all flowmeters within the district so the URNRD and irrigators can receive near real-time information on water usage. Hardware will also be installed in groundwater monitoring wells so the district can receive near real-time information on groundwater levels. Additionally, weather stations that calculate ET will be installed throughout the district. Correlations between water usage, groundwater levels and crop-water needs as indicated by the weather stations will help the district and irrigators critically assess irrigation usage and develop new planning tools and possibly regulations. The effort is aided by a \$300,000 grant from the federal government and may be aided by a pending, \$3 million grant proposal with the State of Nebraska.

## *Modeling/Education*

The URNRD in the near future will develop a groundwater model for the district that will allow assessment of impacts on the aquifer under current and alternative groundwater usage scenarios. The information will be used to educate irrigators about future water availability under current levels of water usage and lower levels of water usage. This educational process may be used to encourage lower water usage and could potentially be part of future efforts to adjust district water allocations and consider merits of special management areas within the district.

## **Middle Republican Natural Resources District Water Management Actions**

### *Introduction*

The Middle Republican NRD is and will continue to enforce all of the management actions that have been described in the handout such as: Moratorium on new irrigation wells and acres; Abiding our 4<sup>th</sup> generation of the Integrated Management Plan; helping producers with programs for their irrigated land; implementing allocations and penalties; and much more that we have been doing for years already within our district.

### *Innovation and Efficiency*

The Middle Republican NRD is also currently looking at new and innovative ways to make all of those things listed about easier and more productive for our producers within our District with a science based answer:

1. The District just completed its first watershed model of the "Medicine Creek Basin", this was developed for our Board of Directors to have a calibrated transient groundwater flow model that provided a more robust tool for them to use for decision making with a more science based answer; for example being able to evaluate future management strategies that support groundwater allocations that minimize declines in aquifer levels, maintain compliance, optimizing the use of surface water or ground water resources within the Basin.
2. The District also just completed the "Culbertson Canal Recharge Study", which was developed to evaluate aquifer recharge benefits along the Culbertson Canal between the Frenchman River diversion and the Blackwood Creek and the objective for developing this model was to evaluate canal and groundwater interactions and quantify the groundwater recharge benefits provided by this canal
  - Within this timeframe of completing the Culbertson Canal study the MRNRD has had contracts with the Frenchman Valley Irrigation District to try and come up with a long-term plan for the viability of the producers within the area, working together for the sake of the ground and surface water users and to build a working relationship with the BOR.
3. The District currently has developed its own High-Tech Irrigation Efficiency Program within our District as a project of aquifer sustainability that will offer real-time data that provides growers with the information needed to make quick, effective management decisions. The benefits of these systems for our producers will avoid over or under watering, set alarms for critical events, make timely decisions about power, fertilizer, chemicals and more. The project will help producers reduce their costs while improving their yields and reducing water usage. The Middle Republican NRD feels that by implementing these wireless irrigation systems we are allowing our producers to properly use the precious

natural resource of water in a more efficient manner. We also feel that our producers have been given the restrictions and implications by the board of directors and are still preserving the water resource by abiding their allocations and then ensuring that they are protecting the water from over use. This helps the District achieve our goal that efficiency is a core element of a sustainable water resource.

4. The Middle Republican NRD has also completed a "Economic Impact" study for the district after 2012 and we found the following had we not had Irrigation within the District:
  - When all rounds of economic activity are included, irrigation contributed \$363 million in 2012 in total economic output to the Middle Republican NRD economy
  - Without irrigation in 2012, an average of \$509 would be lost per acre in the Middle Republican NRD
  - Without irrigation in 2012 the Middle Republican NRD would have had 819 fewer jobs – which was greater than the population of Hayes County
  - Also, to expand on the 819 fewer jobs that outlet have happened here is the District would of not just been agricultural related jobs they could have been food service, wholesale trade business, banking activities, retail stores, nursing & care facilities, truck transportation, hospitals, real estate, and doctors & dentists.

The economic benefit is enough to buy everyone in the Middle Republican NRD, based on the 2010 census, and 3.50/per gallon with a 17 gallon tank 373 tanks of gas.

#### *Closing Statement*

There are many unintended consequences associated with limiting or preventing irrigation of the Middle Republican NRD crop land. Some of these impacts, such as those related to the production of livestock because our District is a five county area that had over 430,000 cattle and calves at the time and a reduced availability of a crucial feedstuff such as silage had large implications for the ability of these cattle producers to provide adequate nutrition for their cattle.

The Middle Republican believes that stable farm incomes benefit communities and all of the businesses supporting agriculture. The Middle Republican NRD has done lots of things the last few years such as getting selected to participate in the Ogallala Aquifer Initiative Funding, Regional Conservation Partnership Program Funding, and other programs as they become available either through the District or the NRCS or a combination of the two and to make sure that our producers and communities are able to keep going.

By doing more with high end technology efficiencies and using less water that will result in savings of the aquifer. If we can ensure that there will be a sustainable aquifer for generations to

come we will ensure our District's small towns viability. Something that has hit home to our District is that of what Governor Ricketts had said in this 2016 State of the State speech "Agriculture is our largest industry representing nearly 25% of the States economy. And that we need to grow Nebraska's economy, create more and better paying jobs, keep our kids and grandkids here, and attract people from all over the country to come and make Nebraska their home. Our three largest industries are agriculture, manufacturing, and tourism and they all require a strong transportation infrastructure to expand" and this really hits local to the Middle Republican NRD as we share the same passion for Nebraska Ag as Governor Pete Ricketts does and that we need to continue growing and sustaining it.

To reiterate the above context the Middle Republican is and will continue, as they have for years, to enforce all of the management actions that have been described in the handout such as: Moratorium on new irrigation wells and acres; Abiding our 4<sup>th</sup> generation of the Integrated Management Plan; helping producers with programs for their irrigated land; implementing allocations and penalties; and much more that we have been doing for years already within our district. **We are going to do all of the above and then some, we are taking it to the next notch to being more efficient as our goal is that "efficiency is a core element of a sustainable water source" and that we want to be more innovative with our management actions and listen to the area producers and those stakeholders that have skin in the game because they can have a lot to offer in a sense of advice and innovative ideas.**

### **Tri-Basin Natural Resources District Water Management Actions**

#### *Introduction*

Tri-Basin NRD has worked with the State of Nebraska for 20 years, since the passage of LB 108, to protect streamflows and imported water contributions originating within the district, to help insure that Nebraska will stay in compliance with the Republican River Compact. Tri-Basin and the state agreed on terms for a joint Republican Basin Integrated management plan (IMP) in 2012. Following is a brief summary of the district's management actions for these purposes.

#### *Groundwater Quantity Management*

Tri-Basin NRD has strict controls in place to protect groundwater supplies and imported water contributions from the Platte Basin portion of the district. Groundwater levels are measured in a network of dedicated observation wells and irrigation wells.

The entire district was designated as Phase 1 for groundwater quantity management in 2004. A moratorium on development of additional irrigated acres was imposed at that time and remains in place. The NRD board reviews three-year rolling averages of springtime groundwater level measurements and compares them to 1981-85 springtime averages to determine whether higher levels of regulation are needed. One township in the Republican Basin in Gosper County is designated as Phase 2 for groundwater quantity management and a neighboring township is

designated as a phase 3 groundwater quantity management area. Allocation of pumping is required in phase 3 quantity management areas.

#### *Groundwater Quality Management*

Tri-Basin NRD has been at the forefront of groundwater quality management in Nebraska. The district established a groundwater quality management area (the second in the state) in 1989. Groundwater quality management is implemented in three phases, with the entire district designated as phase one. Higher phases of regulation are tied to nitrate levels in groundwater, as sampled by district staff. Groundwater quality management regulations mandate educational programs for farmers and fertilizer applicators, regulate timing of fertilizer application and require reporting by farmers of fertilizer applied, nitrates in groundwater and soils and crop yields.

#### *Integrated Water Management*

As part of Tri-Basin's joint action plan with Nebraska under LB 108 in 2003, the district agreed to protect groundwater levels at 1981-85 average levels as a way to protect imported water contributions. In the district's joint Republican Basin IMP, approved in 2012, Tri-Basin agreed to offset consumption of imported water through either augmentation or regulation to insure net positive imported water contributions by the district. The plan requires offsets amounting to 1000 acre-feet per year starting in 2017 and 2000 acre-feet per year starting in 2020.

Rather than using additional water use regulations to achieve these offsets, the district has, since 2008, paid Central NE Public Power and Irrigation District (CNPPID) to divert over 30,000 acre-feet of excess flows from the Platte into Elwood Reservoir and E-65 Canal to provide groundwater recharge and replace imported water consumed within the Republican Basin portion of the district. The district has also drilled one streamflow augmentation well and has an easement in place for a second well, which will be drilled if needed. The district's augmentation well will operate for the first time in 2017.

Tri-Basin NRD is working in cooperation with Lower Republican NRD and CNPPID on a study to determine whether it is economically and environmentally feasible to divert excess flows from the Platte River through the CNPPID canal system into Turkey Creek, a tributary of the Republican River, to augment streamflows in the Republican basin. The feasibility study and a preliminary project design are expected to be completed by December, 2016. The Tri-Basin and Lower Republican NRD boards will review the study and decide whether to proceed to a final design phase of the project.

#### *Water Measurement*

Tri-Basin NRD required flowmeters on alluvial irrigation wells in the Republican River Basin starting in 1998. Flowmeters were required on all irrigation wells in the Republican Basin portion of the district in 2003. Irrigators are required to submit annual water use reports that indicate the amount of water they pumped, crops grown and the number of acres that they irrigated.

The district has also cooperated with the Nebraska Department of Natural Resources to establish several stream gauges on Republican River tributaries.

*Other*

Tri-Basin NRD staff assisted the Nebraska Attorney General's office as they defended the state against two lawsuits filed by the State of Kansas. The NRD has also provided the state of Nebraska with data needed for water-use modeling efforts. The district has worked cooperatively with researchers from the University of Nebraska using district data for studies that will help farmers improve their irrigation efficiency.

Tri-Basin NRD has assisted landowners for decades by providing cost-share funds for irrigation efficiency improvements. Tri-Basin has been an active participant in the USDA CREP program since 2004. The district also worked with USDA Natural Resources Conservation Service on a special initiative to set aside irrigated cropland for up to five years and convert it to grassland wildlife habitat.

Irrigated land was temporarily retired in TBNRD during 2015 through one contracts totaling 27.3 irrigated acres that were signed up for USDA-EQIP Dryland Corners.

Tri-Basin NRD records indicate that 1776.6 irrigated acres are enrolled in USDA Conservation Reserve Enhancement Program (CREP) in the Republican Basin portion of the district. Four of these contracts are set to expire by 2019."

## **Irrigation Districts**

### **Bostwick Irrigation District Water Management and Conservation Actions**

#### *Grants*

The District received a WaterSMART grant in 2015 to convert 2.7 miles of open ditch to buried pipe. In 2016 the District also received grant funding to convert an additional 2.4 miles. The District will now be more focused on the main canals and automation.

#### *Policy and Regulation Efforts*

The District had a 12 acre-inch, per acre, cap on water delivery. The District allowed pooling of acres as well as water purchasing from other users. The District had minimum thresholds for canal operation.

#### *Studies*

The District tried and evaluated the cycling of canals.

#### *Compact Compliance*

We are modifying our Memorandum of Agreement (MOA) to assist the State with compact compliance.

#### *CREP*

The District has two users enrolled in the CREP program.

## **Frenchman Cambridge Irrigation District Water Management Actions**

### *FCID Water Conservation Activities*

In the mid too late 1970s FCID realized a declining water supply within the Republican River Basin.

The Irrigation District participated in the Bureau of Reclamation's R and B Program. (Rehabilitation and Betterment Program) This program allowed projects governed by Federal Reclamation laws the ability to borrow money for canal improvements. FCID borrowed 5.2 million dollars and installed over 115 miles of PVC pipe and replaced all open ditch laterals with buried pipe. This program was not a grant and FCID water users paid for 100% of the conservation improvements.

Throughout the 1980s water users continued to look for and implement new irrigation practices and technologies. Surge valves were installed using cost share dollars from the Bureau of Reclamation during the 1980s and early 1990s. FCID also began a meter program and installed flow meters on many of the turnouts. Today over 90% of the deliveries use a Micrometer flow meter to accurately distribute the water supply.

During the late 1990s and early 2000s water users began installing center pivot systems on the canal service area. Center pivots have allowed FCID water users the ability to pre-water and irrigate immediately after planting. FCID has adjusted to this practice and has successfully amended our contract with Reclamation that allows us to begin irrigation on April 15<sup>th</sup> of each year. This practice has also reduced the canal loss during July and August when over 90% of the water supply is coming from reservoir stored water. Today over 90% of the water delivered by the canal system is delivered with a center pivot irrigation system.

After the drought in the early 2000s FCID realized more conservation practices were needed. In the late 2000s FCID applied for and was awarded three separate grant opportunities:

1. The first grant was for 1.2 million dollars from the Bureau of Reclamation's WaterSMART program and the money was used to install a new pumping station on the south end of the Cambridge Diversion Dam. This pump station will pump up to 20 cfs and up to 2,400 acre-feet of Medicine Creek water per year south to the Bartley Canal. This pump station will eliminate the need to release water into the River form Swanson Reservoir located west of Trenton. Historically 60% of the water released from Swanson reservoir for the Bartley Canal was lost in transit. This water is now saved and made available to Meeker-Driftwood Canal acres.
2. The second grant was also a WaterSMART grant for \$600,000. This money was used to automate the head gate of the Cambridge Canal and the first 7 miles of Cambridge Canal. Several times a week throughout the irrigation season the releases from Harry Strunk Reservoir are adjusted depending on the demand for the

Cambridge Canal. The head gate automation insures that 100% of the released water ends up in the Cambridge Canal. The water saved is now available to supplement the Bartley Canal.

3. The third grant was a Kansas-Nebraska Area Office grant from Reclamation for \$200,000. This money was used to automate the pump station mentioned in grant no. 1. This grant eliminates the spill from the bottom end of the Bartley Canal when the pump station is operating. The result is that over 95% of the pumped water is delivered to the field, this saves both water and electricity.

Recently FCID has applied for 1.5 million in water sustainability funds from the State of Nebraska with the hopes of adding more canal automation and more importantly the implementation of Rubicon Water's TCC (Total Channel Control). TCC is a technology developed by Rubicon Water and implemented in Australia. TCC has a proven track record for eliminating canal spills and drastically improving canal efficiencies.

FCID will continue to explore new water conservation technologies in the future with the goal of providing the most water to our customers at the lowest cost possible.

**Compiled from 2015 CREP Report: Acres Retired through CREP**

<b>Republican NRD</b>	<b>GW Only Acres</b>	<b>SW Only Acres</b>	<b>Comingled Acres</b>	<b>Total Irrigated Acres</b>	<b>Total Non-Irrigated Acres</b>	<b>Total Acres</b>
<b>Lower Republican</b>	5,521.40	1,110.5	830.6	7,462.5	291.5	7,754
<b>Middle Republican</b>	9,625.15	3,224.1	3,460.96	16,310.21	428.52	16,738.73
<b>Upper Republican</b>	10,144.90		149.8	10,294.70	550.8	10,845.50
<b>Tri-Basin*</b>	1,552.50			1,552.50	49.70	1,602.00

\*Includes acres in both Platte River and Republican River basins