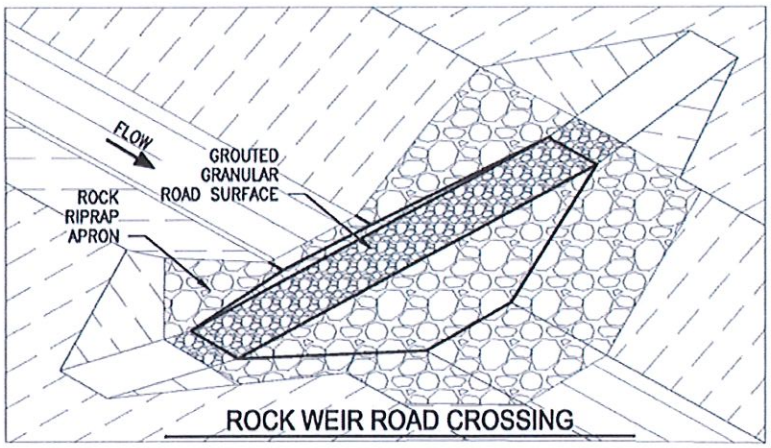
Groundwater Recharge Projects Move Forward

The Little Blue NRD applied for two grants from the Nebraska Water Sustainability Fund (WSF) and both have been approved for funding. The first project was approved in last 2016 and includes five weirs which will be constructed on Sand Creek near Holstein. The low-level weirs are designed to capture storm water in Sand Creek in an area of very sandy soil conditions series, and allow the water to seep into the creek bed. The weirs are designed in series with the pool backup of one weir, reaching to the tow of the upstream weir. The weirs are a lower cost alternative to large flood control dams and impact very little land because of their design. Thus a project is much cheaper and land impacts are negligible. The cost of this first project is $335,000 with the WSF picking up 60% or $201,000. The projects benefits for recharge, sediment retention and stream stabilization over the 50-year life of the projects is expected to exceed $860,000, plus the structures will provide several safe creek crossing for the landowners. Below is a conceptual schematic of the low-level weir.

Project final design was completed and permits obtained in 2017. Easements have now been secured so the projects are now ready to go to bid.

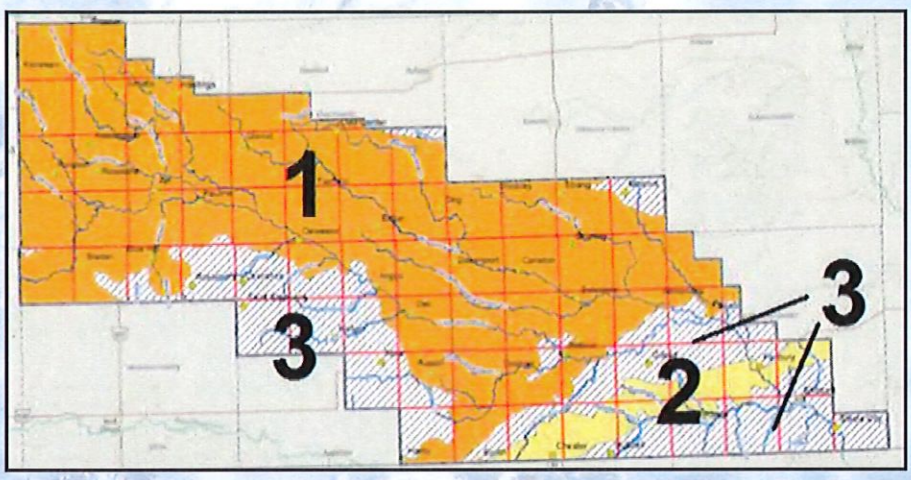


The second group of projects was approved in December, 2017 and includes several oxbow reconnections. These projects are a variant of the projects above, but will divert water into old existing oxbow in streams to expand the storage areas and increase groundwater recharge potential. A total of four sites are proposed. The total cost of this set of projects is $649,000 with contributions being provided by the WSF in the amount of $389,820 and the Nebraska Environmental Trust for $95.865. The 50-year benefits of the project are estimated at $1,343,500.

District's Groundwater Management Plan Approved

Nebraska State statutes require natural resources districts to have an approved Groundwater Management Plan (GMP) to chart a course and direction for water quantity and water quality management in each district. The Little Blue NRD's first GMP was adopted in 1986, with updates to the plan occurring in 1995, and 2005. These updates have been important components of the District's management strategy as changes in groundwater conditions, changing groundwater statutes and public demands for prudent water management have driven discussions.

The LBNRD completed a total re-write of its GMP in October 2017 and the plan was approved by the Nebraska Department of Natural Resources on December 15th. The plan was updated with recent geologic mapping data, crop water use data, groundwater monitoring information (both from a water quantity and quality perspective) and it established a new triggering mechanism for managing groundwater declines and hydrologic sub-units upon which those triggers would be applied. The trigger approved by the LBNRD Board of Directors established the 2016 spring groundwater levels as the baseline for calculating when groundwater allocations would begin. Based on that trigger and the collection of 2017 spring groundwater levels, the major aquifer of the District, Hydrologic Sub-Unit 1, is approximately 0.6 feet from the allocation trigger. Water management area Unit 2 (formerly known as "Unit 8"), is approximately 0.9 feet from the allocations trigger.



Hydrologic Sub-Units

Unit 1—Principal Aquifer
Unit 2—Formerly Unit 8
Unit 3—Aquifers Generally Absent or Less than 10' of Thickness

Irrigation Flowmeters

Flow meters are now required on all high-capacity wells (those which pump more than 50 gallons per minute). Livestock feeders have been exempted from this rule. The NRD encourages producers to check over the meter before the irrigation season to make sure everything is working properly, and check and record the numbers on the meter's register. If the meter was removed for winter storage, be sure to record the meter reading to confirm that there has been no change of numbers from your end-of-season readings last year.

So far, sub-soil moisture conditions are fairly dry; our area was short on fall and winter moisture. Summer weather projections also call for a dry season. Flow meters are a valuable tool in tracking irrigation pumpage and, in combination with soil moisture sensors, helping understand the soil's capacity to hold and transmit moisture to the crops. Knowing these things over time, will help the operator become more efficient in applying water to the crops. The irrigation pumpage chart in this issue document the average water use by irrigators and confirm the increasing hard work by those irrigators to reduce groundwater needs to grow crops. Kudos for your efforts.

2016 and 2017
IRRIGATION PUMPAGE COMPARISONS

The irrigation pumpage reports from the 2017 irrigation season have been compiled. Thanks to all producers who reported promptly and accurately. The pumpage information is a critical component of the Board's water use tracking to determine trends and future directions.

A total of 637,418 acres were reported irrigated in 2017 in the Little Blue NRD and showed an overall reduction of 1 inch per acre in total irrigation applications from the 2016 pumpage season. The average pumpage application for 2016 was 8.5" per irrigated acre; the application for 2017 was 7.5" per irrigate acre.

The report reflects the variation in weather conditions during the 2016 and 2017 irrigation seasons. The lowest application rates were in Adams and Webster County, while the highest were in Jefferson and Thayer Counties. Drought conditions persisted in the western portion of the District in 2016 and are reflected in higher pumpage needs. Conversely, very dry conditions existed in the eastern half of the District in 2017, and again are reflected those higher crop water needs.

The reports also indicated that pivots are used exclusively on 84% of all irrigation acres and they contribute to 9% of the irrigation systems where pivot and gravity are combined on cropland. Gravity irrigation accounted exclusively for only 6% of the irrigated lands in the District while sub-surface drip now accounts for about 1% of all irrigated lands. Below are the numbers by county.

Little Blue NRD Irrigated Acreage Pumpage Data

County	2016 Reported Irrigated Acres	2017 Reported Irrigated Acres	2016 Average Inches/Acre	2017 Average Inches/Acre
Adams	162,189	207,266	9.9	6.7
Clay	99,652	112,336	9.8	7.6
Fillmore	51,511	56,070	8.6	8.1
Jefferson	23,451	25,601	5.8	8.4
Nuckolls	44,226	57,768	7.3	6.7
Thayer	133,840	155,283	6.7	8.4
Webster	19,520	23,094	9.2	5.1
TOTALS	534,389	637,418	8.5	7.5

Again, thanks to those who provide this valuable information for the LBNRD Board's use.

Chemigation Renewal Deadline Nears

The LBNRD reminds producers that the deadline for renewing annual chemigation permits is June 1st. If you have existing chemigation permits and plan to use them again in 2018, please make sure to turn in those permit forms with proper information and permit fees. The cost for a renewal is $20; the cost of a new permit is $60. Any permit which is not renewed by the **June 1 deadline**, will be treated as a new permit. If a producer finds during the irrigation season that an emergency permit is required, the cost for such a permit is $250.

Chemigation is the process of applying either fertilizer or chemicals to you crops at the proper time to meet plant health and production needs. The NRD must inspect all new chemigation equipment on new permit applications to insure all safety measures are in place and functioning properly. When done correctly and with the proper functioning equipment, chemigation is a safe and valuable practice to protect our natural resources.

RECREATION AREAS GETTING FACELIFT

Vegetation management is an ongoing maintenance issue, whether you are a farmer, rancher or NRD employee. One thing is obvious, if vegetation is left unmanaged, over the years undesirable invasive species can begin to take over the landscape. We see it in pastures and grazing lands throughout the area.

Red cedar, honeylocust, elms, mulberry and the shrub autumn olive are prime examples of local invasive species. For that reason, the Little Blue NRD has begun a vegetation management plan for several public use and recreation areas across the District. The purpose of these projects is to remove trees that have gotten out-of-hand, thin other areas where competition and desirable timber quality are suffering and create some open prairie areas. "Trees left unattended over time decline in health and vigor, or if invasive in nature, tend to spread and negatively impact adjoining lands," says Mike Onnen, Manager of the NRD.

Shelterbelts and tree lines were planted through many of the areas in the late 1970s. "Many of these plantings were the first ones I made when I joined the NRD staff in 1977," says Onnen. We thought we were doing the right thing by surrounding the areas in trees. Cedars and autumn olives were a couple of our main species." However, the proliferation and spread of red cedars and removal of autumn olive from nursery lists because of their invasive nature in pasturelands is evidence that a different philosophy and management strategy is needed.

The NRD plans to leave some strategic plantings and will replant some areas with more desirable species. The Bruning and Liberty Cove areas will be managed more as prairie habitat areas. "There are some who are unhappy with the NRD's removal of so many trees," says Onnen, "but this approach is the most cost effective and practical one if we are going to keep ahead of the advance of invasive species."

SOIL HEALTH CAMPAIGN

Why are soil microbes important to agriculture and how are they effected by different agricultural systems?

Soil microbes are key to the function of agricultural systems. Microbial populations play roles in nutrient cycling, from fixing nitrogen to solubilizing phosphorus. Some microbes assist in the formation of soil aggregates that improve pore space in the soil, which allows for higher infiltration rates, better water-holding capacity, and lowers the compaction that often impedes root growth. Other microbes are involved in extensive predator and prey relationships that can reduce the prevalence of disease. Many microorganisms are involved in organic matter decomposition, which releases nutrients needed by other microbes and plants, while others break down soil minerals for nutrient cycling. Several organisms play multiple roles in the soil or have roles that may change based on the microenvironment.

Insecticides not only kill macroscopic insects, they also kill microscopic insects, or microarthropods. The normal cycle is for microarthropods to shred organic matter for bacteria and fungi. The bacteria and fungi are then eaten by protozoa and nematodes, which 'poop' out nitrogen and other elements as nutrients for plants. Without microarthropods, many bacterial and fungal populations within the soil foodweb begin to decline. This then impacts concentrations of protozoa and nematodes and reduces the amount of nitrogen available for plants. Fungicides directly kill some populations of fungi and nematicides kill all nematodes, most of which aren't plant pathogens. One thing that we do know is that one of the most widely used herbicides, glyphosate, is a strong metal chelator and metals are important components of enzymes that impact biochemical functions in micro- and macro-organisms. Therefore, they are impacting microbial populations.

When it comes to synthetic fertilizer use, there are direct and indirect impacts on microbes. The direct impacts stem from the fact that most fertilizers are salt-based, which disrupts hydrologic activities, essentially 'stealing' water away from microbes. Ammonia-based fertilizers increase the acidity of our soils and are initially toxic to living organisms that come in contact with them. The indirect impacts of fertilizers are that we are basically 'outsourcing the jobs' of the microbes that are normally involved in cycling and delivering nutrients to the plants. These microbes often receive a carbon 'payment' for this service that they can then use to grow and reproduce, but if the fertilizers are satisfying the nutrient demands from the plant without the plant having to 'pay' for them, then the microbes do not receive enough carbon to grow and reproduce.

The approach that we need to take rests in using a systems approach with the soil as the foundation even though soil is something that we don't fully understand and quite possibly never will. We need to identify the agricultural practices that will maximize the use of this soil resource and allow us to eliminate the use of offsite inputs, particularly synthetic fertilizers and pesticides. We also need to understand the best ways to integrate livestock into the system. As we start to put biologically-based, soil enhancing tools into place, we will increase soil organic matter and biological activity.

CALENDAR

April 22, 2018 - Earth Day
April 24 & 26, 2018 - Earth Festival, Camp Jefferson
April 27, 2018 - Arbor Day
May 8 - Little Blue NRD Board Meeting—Davenport
June 1 - Chemigation Application Deadline
June 12, 2018 - LBNRD Board Meeting

LBNRD
RURAL WATER PROJECTS

Project Manager: Kevin Orvis
Rural Water Superintendent: Bruce Dux
Clerk: Paula Schultz

VISIT US ON THE WEB: www.littlebluenrd.org

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Donnie Engelhardt — Assistant Manager
Kevin Orvis — Project Manager
Marie Herbek –Administrative Secretary
Dylan Long—Watershed Coordinator
Kent Thompson — Operations Supervisor
Jed Bergen— Water Resources Technician
Jim Oltmans—Water Resources Technician
Elysabeth Kierl — Database Specialist
Alicia Epps—Database Assistant
Jamie Benes—District Secretary

FIELD OFFICES

Adams County NRCS Secretary—Robin Leichty
Clay County NRCS Secretary—Rachelle Tompkin
Fillmore County NRCS Secretary—Sylvia Jividen
Jefferson County NRCS Secretary—Paula Schultz
NRD/NRCS Technician—Christine Zabokrtsky
Nuckolls County NRCS Secretary—Patsy Ord
Thayer County NRCS Secretary—Melanie McPherson
Webster County NRCS Secretary—Lynetta Snelling

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