

2021-22

Annual Report

Upper Big Blue

NATURAL RESOURCES DISTRICT

Celebrating 50 Years of Conservation
1972-2022

50 YEARS

NEBRASKA'S NATURAL RESOURCES DISTRICTS

PROTECTING LIVES. PROTECTING PROPERTY. PROTECTING THE FUTURE.

CONTENTS

The District

4 Introduction & Mission Statement
5 District Responsibilities
6 Board of Directors
7 Census Data Drives District Map Updates
9 Nebraska's NRDs Reflect on 50 Years
11 50 Years of Wise Groundwater Stewardship
15 Water Quality Tour Displays District Projects
18 NRD Recognized with Award from Ducks Unlimited
19 NRD Staff and Recognitions
21 Brisk on 40 Years with the NRD

Water Department

23 Water Levels
25 Average Irrigation Use
27 Nitrogen Levels in Groundwater Lead to Increased Management
31 Plumbing the Depths for Insights
34 'One Water' Plan Recognized
36 Innovation in Nitrate Treatment
38 Multiyear Study Looks at Nitrogen Levels in Local Soils
42 Producer-Reported Data Analysis Shows Less Fertilizer, Similar Yield
45 Save the Soil: Program Provides Funding
48 Project GROW Winter Workshop
49 Windproof: Cover Crops Hold Soils in Place
51 Testing Reveals Economic Impact of Soil Health
53 New Incentive Program Announced

Projects Department

55 Invasive Species Removed From Oxbow
56 Funding Approved for All Inclusive Playground
57 Land Treatment Projects by County
59 Land Treatment Practices by Type & Cost

Public Relations Department

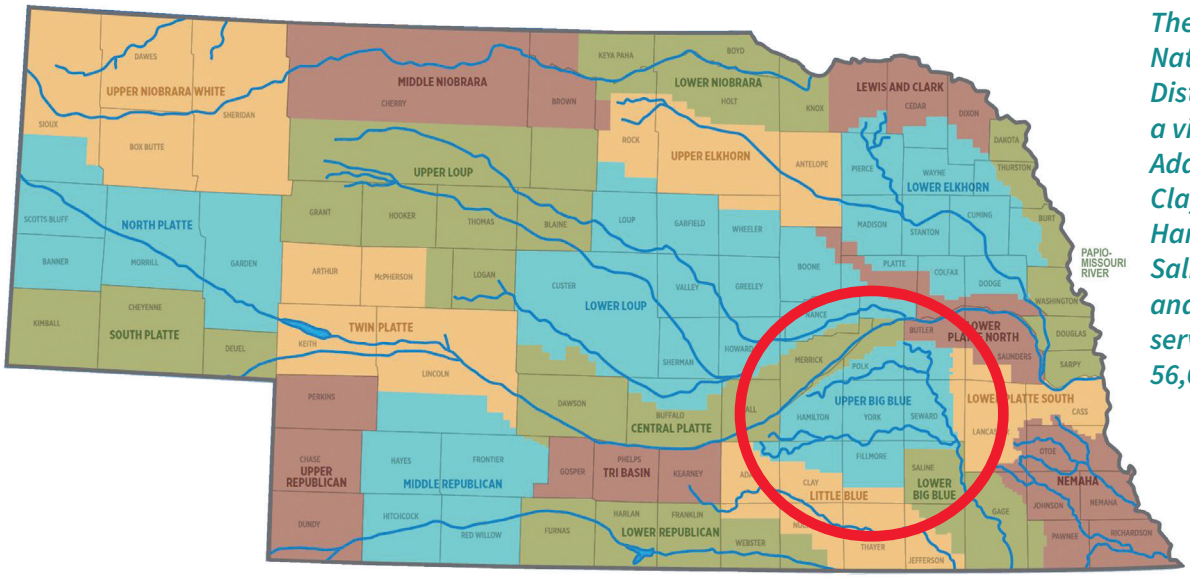
60 News Coverage
61 Website Statistics
63 Burke Scholars
64 Nebraska Water Leaders Academy
65 Birds and Bees: Pollinator Event
67 Local Control, Local Solutions, Global Mindset

Forestry & Parks Department

69 The NRD and Trees
70 Tree Planting Expenditures and Sales Report
71 Tree Sales Report and Trends
75 Nebraska Forestry Workshop Hosted by NRD
76 Trees for Conservation and Celebration
77 Birds Abound at Teal View
79 Gone Fishin': Pioneer Trails Fishery Evaluated
81 Recreation Area Usage and Upgrades

Administrative Department

83 Fiscal Year 2020-2021 Audit Highlights
84 Assets
85 Revenues
86 Expenditures
88 Balance Sheet



The Upper Big Blue Natural Resources District provides a vital service in Adams, Butler, Clay, Fillmore, Hamilton, Polk, Saline, Seward, and York Counties, serving more than 56,000 people.

THE DISTRICT

- ***More than 56,000 citizens rely on the Upper Big Blue Natural Resources District (NRD) to provide direction and assistance in the wise use, conservation and development of our soil, water and related natural resources.***

The NRD is dedicated to the conservation and careful development of natural resources to serve everyone's needs. The NRD system was created in 1972, following Nebraska legislation which consolidated 154 statewide special-purpose districts into 24 NRDs (later further consolidated into 23 NRDs). The NRDs correspond to major river basins in Nebraska. NRDs carry the names of these rivers, hence the Upper Big Blue NRD is named after the uppermost portion of the Big Blue River.

NRDs are organized as governmental sub-divisions of the state. Local control is provided by a board of directors. At the Upper Big Blue NRD, a 17 member board of directors establishes policy. These directors are placed in office through the general election process and represent the community's interests in conservation.

Across the state, NRDs offer a major source of assistance to landowners in conservation and natural resources management. Not only do the board members make decisions about conservation programs at the district level, they also bring a wealth of local judgment and experience when adapting state and national programs to local situations.

The NRD staff at York and the field clerks at the Natural Resources Conservation Service (NRCS) offices in each county are responsible for implementing NRD policy and regulations.

A major source of funding for projects, programs, and administration comes from a levy on taxable property within the district. Other sources include federal and state funding, as well as program fees. Certain projects may also be funded with a portion of other local, state, private and/or federal revenues. The NRD is empowered to coordinate land and water management programs with local, state and federal conservation organizations and other governmental units.

Mission Statement

The Upper Big Blue Natural Resources District shall be a leader in conserving, protecting, developing, and managing the natural resources of the district for the health and welfare of the people of the district.

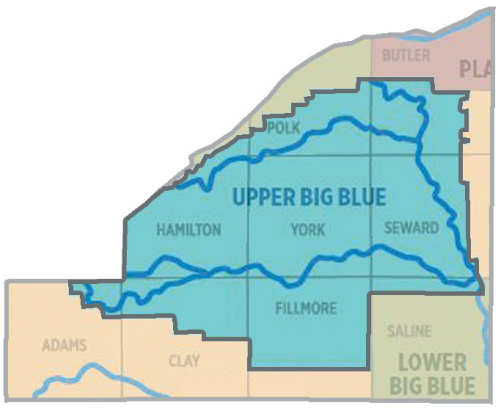
THE DISTRICT

12 District Responsibilities

The Upper Big Blue Natural Resources District is a sub-division of local county government charged with the management, development, and protection of soil and water resources within district boundaries. District responsibilities are authorized by state statutes and are listed below but are **not** ranked in order of priority.

- Development, management, use and conservation of groundwater and surface water
- Soil conservation
- Erosion prevention and control
- Flood prevention and control
- Pollution control
- Water supply for any beneficial uses
- Prevention of damages from flood water and sediment
- Development and management of recreational and park facilities
- Forestry and range management
- Development and management of fish and wildlife habitat
- Drainage improvement
- Solid waste disposal

Within this general framework, the Upper Big Blue NRD carries out a variety of projects and programs in forestry, groundwater management, land treatment, flood control, water storage, and information and education.





Board of Directors

The Upper Big Blue Natural Resources District is governed by a 17 member Board of Directors. Two directors are elected from each of the eight sub-districts, plus one at-large member from any sub-district. The board sets policy for the district and works closely with the staff through a committee system to carry out the district's goals. Board meetings are conducted on the third Thursday of each month at the district office. Committees meet throughout the month. Special meetings are called as needed to consider important concerns and issues. The district board of directors sets the direction, policies and budget for the natural resources district.

Roger Houdersheldt Shelby Sub-district 1	
Larry Moore Ulysses Sub-district 1	
Jeff Bohaty Seward Sub-district 2	
Douglas Dickinson Seward Sub-district 2	
Richard Bohaty Seward Sub-district 3	
Bill Stahly Milford Sub-district 3	
Paul Weiss McCool Jct. Sub-district 4	
Lynn Yates Geneva Sub-district 4	

Micheal Nuss Sutton Sub-district 5	
Kendall Siebert Henderson Sub-district 5	
Bill Kuehner, Jr. Aurora Sub-district 6	
John Miller Aurora Sub-district 6	
Rodney Grotz York Sub-district 7	
Ronda Rich York Sub-district 7	
Paul Bethune York Sub-district 8	
David Robotham York Sub-district 8	
Linda Luebbe Beaver Crossing At-Large	

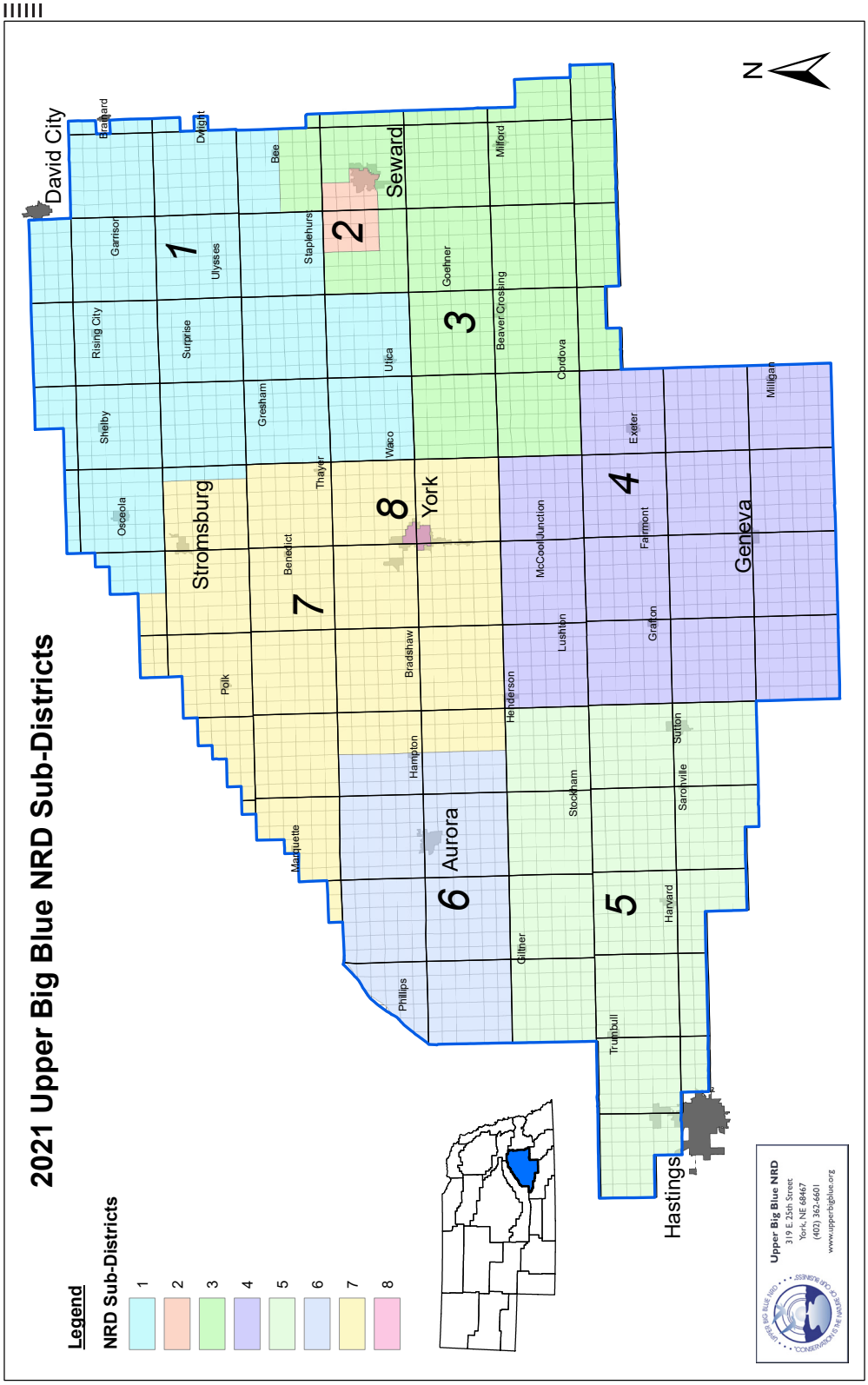
THE DISTRICT

- While the boundaries of the Upper Big Blue Natural Resources District as a whole have not changed, the subdistricts within the NRD's boundaries have shifted slightly in 2021.

The district, which represents all or part of nine counties in southeast Nebraska, is broken into eight subdistricts. The population base served by the Upper Big Blue NRD is approximately 56,000 people spread across 41 communities, including Rising City in the north, Milford to the east, Milligan in the south, and a portion of Hastings in the west. The board of directors is composed of two residents of each of these subdistricts, plus one "at-large" representative. The update of the subdistrict lines was an effort to make sure that each subdistrict had a similar population base (about 7,000 residents).

Typically, subdistrict boundaries are evaluated every ten years in response to new census data. The recent updates do not necessitate changes to the current board of directors, as the shifting of subdistrict boundaries did not change the eligibility of any directors presently serving.

The board of directors are elected from across the district to protect and conserve a wide array of natural resources within the district. Each director is elected to serve a four-year term, with no term limits. Directors in the same subdistrict are elected in alternate election years to preserve the continuity of the board. Board members set policy for the district and work closely with the staff through a committee system to carry out the district's responsibilities.


2021 Upper Big Blue NRD Sub-Districts
Legend
NRD Sub-Districts
1
2
3
4
5
6
7
8
N
David City
Seward
Stromsburg
York
Aurora
Geneva
Hastings
Upper Big Blue NRD
319 E. 25th Street
York, NE 68467
(402) 362-6601
www.upperbigblue.org

Celebrating 50 Years

Nebraska's NRDs Reflect on 50 Years

The year 2022 marks 50 years of Nebraska's 23 Natural Resources Districts protecting lives, protecting property, and protecting the future. NRDs are unique to Nebraska because they are governed by locally elected boards and Nebraska is the only state in the union to have this system.

After the devastation of the Dust Bowl, special purpose districts were developed to solve local soil and water-related problems. But the puzzle of overlapping authorities and responsibilities provided confusion at best.

Senator Maurice Kremer introduced and the Nebraska Legislature enacted Legislative Bill (LB) 1357 in 1969 to combine Nebraska's 154 special purpose entities into 24 Natural Resources Districts by July 1972. The original 24 NRDs' boundaries were organized based on Nebraska's major river basins which allows for better management practices to be applied to similar topography. In 1989, the Middle Missouri NRD and the Papio NRD were merged into one, becoming the Papio-Missouri NRD which resulted in the current 23-NRD system.

Originally the NRDs primarily performed the functions of the previous county soil and water conservation districts, however, the unicameral has significantly expanded the duties of the districts over the past 50 years, especially in groundwater management. The formation of NRDs allowed local control, but at the same time streamlined the fragmented and often conflicting authorities.

The landscape of the Upper Big Blue NRD has changed dramatically in the last 50 years. In an ongoing effort to reduce soil erosion and increase groundwater quality and quantity, the Upper Big Blue NRD has made a noticeable difference in the area. Notable projects include many large-scale dam and reservoir projects: Smith Creek (Utica), Pioneer Trails (Aurora), Bruce L. Anderson/ Recharge Lake and Overland

50 YEARS

NEBRASKA'S NATURAL RESOURCES DISTRICTS

PROTECTING LIVES. PROTECTING PROPERTY. PROTECTING THE FUTURE.

Trails (York), and Oxbow Trail (Ulysses). These projects were designed to provide groundwater recharge, flood and erosion control, and have the added benefit of providing recreational areas. Overland Trail provides rapid groundwater recharge and preserves the wildlife habitat of the area.



The cities of Seward, David City, Sutton, Giltner, and York and Henderson received NRD assistance in flood control and drainage problems affecting the residents of those communities.

In the past 50 years, over one million trees and shrubs were planted within the district by citizens or by district personnel. Nearly every town and village within the Upper Big Blue has improved the look of their parks and public areas. Windbreak plantings, riparian buffers, and the seeding of grasses at pivot corners has decreased soil erosion and provided wildlife habitat.

The district's constant monitoring of water levels, nitrates, and other contaminants in test and domestic wells provides up-to-date research and information, plus encourages area producers to use best management practices including irrigation management, split application of fertilizer, cover crops, no-till, rotational cropping systems, and livestock integration.

Local communities have the option to develop their own Wellhead Protection Area (WHPA) to identify potential contaminants to the public wells and assist in protection of the water quality. Communities that have participated in WHPA planning include Hastings, Polk, York, Stromsburg, and others.

Conservation practices are encouraged by the information and education projects of the district. From radio to web, and direct mail to social media, the NRD staff works tirelessly to keep residents informed about programs and projects that are available to benefit their farming operation, home, or community. In the past 50 years, thousands of young people have explored conservation topics through classroom activities, groundwater festivals, and contests facilitated by NRD staff. Some go on to receive scholarships to pursue natural resources at Nebraska colleges and universities, supported by the NRD.

Many area schools have expanded their natural resources education opportunities, from greenhouses to study ponds to community garden plots, through use of NRD funding and resources.

Celebrating 50 Years

Upper Big Blue NRD: 50 Years of Wise Groundwater Stewardship

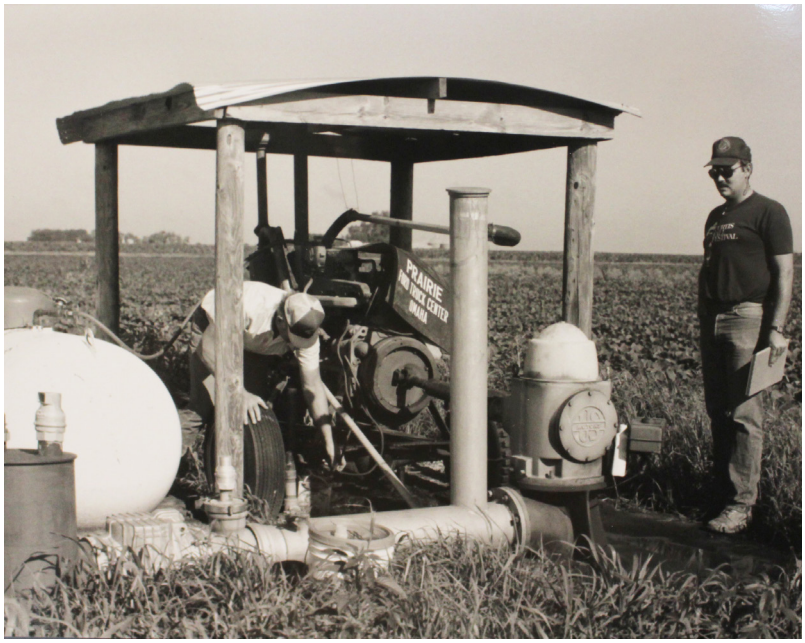
The Upper Big Blue NRD Groundwater Management Area was the second one established in Nebraska. That was in 1977, right after the Upper Republican Area. The Upper Big Blue NRD Groundwater Management Area encompasses all or parts of nine counties and has 1/8 of the total irrigated acres in Nebraska. The changes in water levels are closely related to the changes in annual rainfall. Coincidently, the Upper Big Blue NRD has more irrigated acres within its boundaries than 37 states. Over 1,000,000 acres use center pivot irrigation systems in the district. The Upper Big Blue is the district with the greatest number of groundwater irrigated acres (more than 1.2 million acres).

Time line

- **1972** – Upper Big Blue NRD created (all 23 NRDs started on the same date).
- **1974-76** - Dry period, drought coupled with increase of groundwater wells being drilled.
- **1975** – Nebraska Groundwater Management Act adopted by the Legislature.
- **1977** – Upper Big Blue Groundwater Management Area established in a cooperative effort between the Nebraska Department of Water Resources and the Upper Big Blue NRD to protect the future.
- **1978** – Upper Big Blue NRD average groundwater level hits low of 7 feet below 1961 level.
- **1979** – Ground Water Management Area regulations go into effect with the goal of keeping the declines to less than ½ foot per year. The rules included well permits, 1,000 foot well spacing, and future allocation if decline rate was exceeded.
- **1980-87; 1991-94; 1997-99; 2007-08** —Wet periods: Abundance of precipitation; groundwater levels rise; rising average groundwater levels mirror rising accumulated rainfall.
- **1990** – Rules changed to hold the average groundwater level







at or above the 1978 level (sustainability).

- **1993** – Water Quality Management Area established in Upper Big Blue NRD through cooperative effort with the Department of Environmental Quality.
- **1999** – Rules added to require large groundwater users (withdrawal of 500-acre feet from one parcel of land per year) to conduct a hydrologic study showing the impacts of the groundwater withdrawal. If the impact is not adverse, a permit is granted.
- **2000** – Upper Big Blue average groundwater level hits all-time high of 7 feet above 1961 level.
- **2001-04** – Dry periods and extreme drought conditions, groundwater levels decline.
- **2004** – Regulations amended establishing a reporting trigger (groundwater level declines to a point three feet above the 1978 level) and an allocation trigger (another 3-foot drop beyond the reporting trigger). A flowmeter must be installed on any new or replacement well.
- **2005** – Small area in Hamilton County parallel to the Platte River declared fully appropriated with a stay on well drilling and expansion of irrigated acres. The rest of the NRD does not have a well drilling moratorium but is still subject to the groundwater management regulations.
- **2006** - Reporting trigger reached, requiring the certification of all irrigated acres using county assessor records. Three ethanol plants permitted to drill wells based on minor impacts demonstrated through required large water user hydrologic studies. One other site was deemed not feasible for permit because of impact on other water users.
- **2007** – Above average annual rainfall. All water users required to report water use by Dec. 31, 2007. Total average irrigation water use reported was 4.95 inches per acre. 1,109,818 irrigated acres were certified by the Board of Directors. Rules were changed to implement more restrictive groundwater transfers. A city begins required large water user study for proposed city well field.
- **2008-09** – Additional acres certified bringing the total to nearly 1.2 million certified irrigated acres. Total average irrigation water use reported was 4.3 inches per acre. Fifth ethanol plant water study approved but for lesser amount of withdrawal than requested.
- **2010-11** – Flood Control/Drainage Projects created in Milford and David City to protect lives and property for District citizens.
- **2012** – Severe drought. Average district groundwater levels drop -4.38 feet.
- **2013** – Allocation Regulation: The Board adopted the regulation to set the first allocation period of 30 acre inches over three years, with a second allocation period of 45 acre inches over five years (a 10% reduction). When the allocation trigger is reached, the allocation process is invoked. The allocation trigger on the Upper Big Blue NRD's average groundwater level chart has been in place since 1990.
- **2014** – Mandatory Flow Meters: ALL wells with a pumping capacity greater than 50 gpm must be equipped with a mechanical flow meter by January 1, 2016.

Celebrating 50 Years



- High Risk Groundwater Area (15% of District) established, which includes the following: New high capacity wells (wells that pump more than 50 gpm) must be at least 1,250 feet from existing high capacity wells, including wells with the same ownership; new high capacity wells must be at least 1,250 feet from existing domestic wells under different ownership; new high capacity wells must be at least two miles from existing municipal wells; existing wells may be replaced; new or replacement domestic water wells shall be constructed to such a depth that they are less likely to be affected by seasonal water level declines caused by other water wells in the same area.
- **2015** – Average district groundwater levels +1.42 feet.
  Storm Damage Tree Program: Creation of a permanent cost-sharing program designed to encourage replacement plantings of trees and shrubs damaged or destroyed due to tornados, strong winds, hail, and ice. Small Dams Program: The Private Dams Program provides planning, design and financial assistance for the construction or reconstruction of dams located on private property. These dams generally have a cost exceeding $15,000 and have a drainage area of approximately 80 to 640 acres. Dams constructed under this program generally involve only one landowner. Public benefits include flood control, sediment and erosion control, water conservation, groundwater recharge, and fish and wildlife enhancement.
  New Building: Construction for the NRD office headquarters at 319 E 25th St, York, begins
  Rec Areas: RV camping added to Pioneer Trails and handicap accessible fishing pier added at Recharge Lake
- **2016** – Average district groundwater levels are up +1.20 feet.
  VRI: Board explores implementation of a VRI (Variable Rate Irrigation) Cost-Share Program for greater efficiency in water application on center pivot systems.
  Rainwater Basin: Continuing partnership with the Rainwater Basin Joint Venture in identifying landowners interested in restoring wetlands.
- **2017-21** – Average district groundwater levels continue to rise. Average water use remains below average of 6.6 inches per acre.

  Joint Water Management Plan: Embarked on the first-ever combined water quality management and voluntary integrated management planning processes in partnership with both the Nebraska Department of Environment and Energy (NDEE) and the Nebraska Department of Natural Resources (NeDNR). Water quality management plans address restoration and protection of water quality and are developed with assistance from NDEE. Voluntary integrated management plans address the sustainability and quantity of hydrologically connected groundwater and surface water and are developed with assistance from NeDNR. The Upper Big Blue NRD viewed the separate planning processes to combine two inseparable priorities for water quantity and quality into a consolidated planning process that fully engages citizens within the District to help form the goals and objectives

for both plans. The theme for this project is One District, Two Plans, One Water. The Water Quality Management Plan was adopted by EPA in December 2019. This effort sparked the creation of incentive programs aimed to protect surface and groundwater quality thru the use of cover crops and filter/buffer strips.

Project GROW (Growing Rotational crops On Wellfields) is a partnership between the City of York and the NRD. The goals are to improve soil health, increase soil carbon, erosion control, non-leaching of nitrogen into the water table, and increasing water holding capacity in the soil, culminating in the protection of York's water quality at the wellfield while maintaining agricultural profitability.

Blue Basin Regional Groundwater Model: The NRD in partnership with NeDNR, Lower Big Blue, Little Blue and Tri-Basin NRDs continue to work on a regional groundwater flow model of the Blue River Basin in Nebraska. The model will identify areas of hydrologic connection between ground and surface water, aid in the development of large water user studies, and aid in the development of policies pertaining to groundwater quantity.

Partnerships with The Nature Conservancy: The NRD partnered with The Nature Conservancy and other agencies to begin two long-range programs on soil health. One involves interseeding cover crops in corn and soybeans at the V-4 to V-6 stage of growth. The other program offers producers financial incentives for a variety of soil health practices, from cover crops, to reduced tillage, to enhanced crop rotation.

- **2022** -- The NRD is collaborating on projects concerning water quality measurement. A vadose zone study with UNL examines the amount of nitrate in district soils compared to historic data. A study with UNMC tracks nitrate and other contaminants in Nebraska's watersheds to see how the data compares with locations of pediatric cancer incidents. United States Geological Survey is reviewing the NRD's current Groundwater Management Area #2 well network to ensure the wells being sampled fit their original criteria. This study could be the first phase of a larger study on the monitoring network and the parameters and contaminant data collected.

THE DISTRICT



Water Quality Tour Displays District Projects and Challenges

How is water quality being protected and what can be done to improve it in our district? These questions were explored during the annual board of directors tour hosted by the Upper Big Blue NRD on Friday, August 27, 2021.

The tour featured six sites in Hamilton and York counties where directors met with experts and saw first-hand what NRD staff and partners are doing to safeguard water quality in the district.

The first stop on the tour was Recharge Lake at Bruce L. Anderson Recreation Area in York. Board members met with Matthew Perrion, a fisheries biologist with Nebraska Game and Parks, who presented information about the deteriorating health of the fishery at Recharge. Water quality in the lake is poor as sediment from surrounding farmland pours into the lake during rain events. A fishing survey conducted by Nebraska Game and Parks in May found poor water visibility throughout the lake, which is a detriment to fish populations, as fish hunt for prey by sight. The murky water means that sunlight can't penetrate the lake to enable aquatic vegetation to flourish, which is also tied to the decrease in fishery health. The recent report on the lake found no bass and a low number of carp and bullheads, all in poor condition.



Perrion had some suggestions for the board members on how the fishery could be improved, including digging out the sediment dam on the north end of the lake and designing a wetland area with early successional vegetation to provide better filtration for water entering the lake. Perrion was enthusiastic about a recent board decision to provide incentive payments to producers whose fields drain into Recharge Lake (and other targeted areas) for additional conservation efforts to reduce erosion. Cover crops, buffer strips, and other land treatment practices would prevent sediment from entering waterbodies by holding soil in place on the fields. Perrion suggested that improving the lands around the lake is an important first step before additional funds are spent on restoring the lake.



The next stop was Midwest Research Inc, a research farm a few miles from Recharge Lake. Owner Jess Spotanski demonstrated an agricultural drone that can be used to plant cover crops and buffer strips in places that are hard to reach by other methods. Spotanski flew the drone over a field of soybeans, spreading a cover crop mixture a few feet above the plants waving in the wind created by the drone's eight powerful propellers. The drone can be programed to drop seed with a high degree of precision in a specific pattern or location. The day before the tour, Spotanski and his drone operator used the same piece of equipment to seed a grassed waterway project on a washed-out channel in a field near Recharge Lake. If this planting is successful, the NRD may employ this technology in other locations as it is a simple way to reduce erosion and protect surface water from contamination.

The tour continued with a visit to Pioneer Trails Recreation Area near Aurora. There, board members met with Brad Eifert, another fisheries biologist with Nebraska Game and Parks, who gave a report on the health of the fishery at that site. While not an ideal fishing spot due to increased sediment, the water quality in general is better for fish habitat than Recharge Lake. Eifert reiterated the need for conservation practices in the farmland surrounding the lake to improve water quality; however, the most recent fishing report from Pioneer Trails suggests that there are a decent number of largemouth bass and bluegill thriving in the reservoir, in addition to channel catfish and crappie.

While at Pioneer Trails Recreation Area, the board members also met with Nelson Winkel, a soil health specialist with The Nature Conservancy. Winkle gave a report on the interseeder cover crop trials that the Upper Big Blue NRD, The Nature Conservancy, and Nebraska Extension have partnered to conduct. The project began in 2020 and will continue through 2022. It includes planting a cover crop mix between rows of corn at the V4 to V6 stage of development at 11 test sites across the district. The interseeder planter was on display at the recreation area so that board members could see the equipment up close and talk to Winkle about how it is employed.

The tour continued with stops in Hampton, first at a monitoring well site south of town, where NRD staff demonstrated how wells are sampled. Water from monitoring wells across the district is sampled several times throughout the year to determine the amount of nitrogen and other contaminants present and to look at trends in water quality over time. The wells vary in depth, allowing for data collection from shallow, medium, and deep well sites to capture a more accurate picture of the health of the district's

THE DISTRICT

groundwater. The Upper Big Blue NRD has been tracking this data consistently since 1997 to look at non-point source contamination in the groundwater supply.

The second Hampton stop was at the NRD's newest recreation area site, Teal View Wetland Education Area. While the location is still largely undeveloped, the board was able to see the site and get a better understanding of how it will be improved in the coming months, including with infrastructure to graze cattle. Cattle will be used as a management tool to maintain the health of the wetland in the future. The location will be a great spot for hunting and other recreation, as well as a place for students to learn more about the importance of wetlands in Nebraska's landscape.

The final destination on the tour was to the soil health demonstration fields managed by the Upper Big Blue NRD on the City of York's wellfield. The board members heard a presentation from Dan Leininger, water conservationist with the NRD, who oversees Project GROW (Growing Rotational Crops on Wellfield). Now in the fourth year of the project, Leininger and cooperating producer Scott Gonnerman, are experimenting new crops, including alfalfa and milo.

In addition to diverse crop rotations, Project GROW also enhances the soil health on these fields with livestock grazing, no-till, and cover crops. These practices increase the microbial activity of the soil as well as its water holding capacity, so that it can provide maximum fertility naturally, without a reliance on synthetic fertilizer and other inputs that would potentially contaminate the water in the wellfield. This wellfield provides drinking water for the more than 8,000 people who reside in York, so maintaining quality above this source is important for the health of York's citizens. Project GROW is intended to be a program that could be reproduced at public wellfield sites across the district.

"It's really important for directors to see the projects and programs in our district first-hand so we can make better decisions when these things come up for discussion," said Lynn Yates, board chairperson, who attended the tour. "If you can see things yourself, it's easier to understand. I wish all directors would go on these tours because there is so much to see in the district."







NRD Recognized with Award from Ducks Unlimited for Wetland Partnership Project

Nebraska Ducks Unlimited (DU) presented the 2021 and 2022 Nebraska Wetland Partnership Awards to Mark Brohman and David Eigenberg at its state convention in Lincoln. Since 2016, DU has bestowed this award to a single individual from other organizations who were crucial in helping DU achieve its wetland conservation missions in Nebraska.

David Eigenberg, General Manager of the Upper Big Blue Natural Resources District (UBBNRD), received the 2022 Partnership Award for the efforts he and his Board of Directors made to protect two very important wetland areas. The UBBNRD allowed DU to keep a property open to the public in exchange for holding a property in Hamilton County that will now be known as the Teal View Wetland Education Area. DU Conservation Program Manager John Denton said, "Keeping this wetland area open to public use while also serving as an education area is a huge win for wetland conservation and would not have happened without Dave's efforts."

Additionally, the UBBNRD protected a crop field containing two ephemeral wetlands adjacent to a large U.S. Fish and Wildlife Service wetland, the Real Waterfowl Production Area in Fillmore County, from being developed or drained via a working lands easement held by the UBBNRD. "This effort is beneficial to wildlife by limiting disturbance of the wetland and additionally benefits agricultural production by ensuring the property remains as crop," Denton said.

THE DISTRICT

Upper Big Blue NRD Staff

- As of June 2022, the district currently has 30 employee positions: 28 full-time and two occasional workers. Full-time and part-time employees are permanent employees with paid benefits. Full-time employees work 40-hour work weeks all year, whereas part-time employees work a regular schedule of at least 20 hours per week. Occasional workers are temporary employees who do not earn benefits. Their hours vary depending on available work.

- David Eigenberg, General Manager
- Marie Krausnick, Assistant General Manager
- Jack Wergin, Projects Department Manager
- Nancy Brisk, Office Manager
- Chrystal Houston, Public Relations Manager
- Jeffrey Ball, Lead Engineering Technician
- Kyle Yrkoski, District Forester
- Mick Northrop, Lead Maintenance Worker
- Jay Geiger, Maintenance Worker
- Andy Larkin, Maintenance Worker
- Sylvia Jividen, Geneva Field Office Clerk
- Tamra Jones, Osceola Field Office Clerk
- Janet Yates, Seward Field Office Clerk
- Mandy Miller, York Field Office Clerk
- Rita Hoblyn, Projects Department Secretary
- Carleen Light, Water Department Secretary
- DeeDee Novotny, Water Department Secretary
- Patty Connors, Secretary
- Angie Johnson, Secretary
- Drew ten Bensel, Water Resources Technician
- Dawson Tietmeyer, Water Resources Technician
- Jacob Maslonka, Water Resources Technician
- Erinn Wilkins, Water Resources Technician
- Miranda Coffey, Water Data Specialist
- Dan Leininger, Water Conservationist
- Jerry Gangstad, Seasonal Maintenance Worker
- Jerry Petersen, Seasonal Maintenance Worker

Open Positions

- Water Department Manager
- Water Resources Technician
- Water Data Assistant

IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII



NRD Employee Recognition

Sylvia Jividen (20 years)
Geneva Field Office Clerk

April English (10 years)
York Field Office Clerk

Miranda Coffey (5 years)
Water Data Specialist

Nancy Brisk (40 years)
Office Manager



THE DISTRICT



"Doing our best to make things better"

Brisk on 40 years with the NRD

- Nancy Brisk came to the Upper Big Blue Natural Resources District for the job, but she says it's the people and the mission of the organization that have kept her there for 40 years. "The work we are doing is very important," she said.

And after all these years, "It feels like a family here," she said of the staff and board members.

Brisk was recognized recently by the board of directors of the NRD for her four decades of service. She began working as an assistant secretary for the NRD in August of 1981. When she first applied for a job at the district office, she had no idea what an NRD was, she recalled with a chuckle. Longtime General Manager John Turnbull was happy to explain it to her during her interview. Brisk had experience with agriculture and was a nature enthusiast. That combined with her office skills made her the perfect person for the position.

Through the years, the job grew and Brisk took on new responsibilities. She started out typing minutes and recording stream gauge data, eventually took on payroll and accounts payable/receivable, then HR and benefits coordination. Today she is the department manager for administration and oversees a staff of secretaries and clerks. While she doesn't measure water levels or plant trees, her work is essential to the NRD's mission, as it undergirds the work of every employee of the district. Brisk particularly enjoys the parts of her job linked to helping communities with park improvements, tree plantings, or flood mitigation projects.

Brisk has seen lots of changes in technology over the course of her career with the NRD. In her early days at the NRD, there was a single computer terminal linked to a server at UNL. You had to save frequently as the link was temperamental, she explained. Occasionally it winked out and a half-day of data would be lost. Eventually the NRD got a computer that didn't rely on the UNL connection, but it was still the only computing device for the whole office. Staff members had to reserve time to use the much sought-after machine with its noisy dot matrix printer.

Brisk's trusty typewriter eventually gave way to a computer with word processing software. She was not sorry to say goodbye to the tedious process

of formatting documents manually and making corrections with White Out. She was similarly enthusiastic when the district got its first accounting software, which transformed her job. Previously, payroll was done by hand in one day. Employees would turn in their timecards on payday and she would compute everything manually, then print checks to distribute at the end of the workday. Paying bills and managing annual tree sales was just as labor intensive and required Brisk's trademark attention for detail.

The NRD is governed by a locally elected board of directors, which meets monthly to direct the work of the NRD staff and vote on policy measures. Of the 60 or so board members to serve the NRD since its inception, Brisk estimates she has served alongside at least 50 of them, attending somewhere in the range of 1,200 committee and board meetings through the years. Two long-serving current members of the board, Doug Dickinson and Larry Moore, have worked with Brisk since her first day. Brisk says occasionally there have been board members who were challenging to work with, but that often the ones that start out adversarial end up being beneficial members of the group.

Brisk reflected on the shifting demographics of the board, noting that when she started with the NRD the group was all male and all farmers. Eventually women joined, as well as people from other professions and industries. Each brought important perspectives and ideas to share. Brisk is pleased that today, younger people are taking an interest in serving on the board. "Don't just complain about things," she encourages people. "Get involved and work to fix what you don't like."

Relationships between the board of the NRD and the public that they serve has been tumultuous through the years, Brisk recalls. In the 80s, ensuring water quantity was a much bigger concern than protecting quality, and some producers worried that the NRD was going to limit their access to irrigation.



The NRD has done more outreach and education to get everyone on the same page about conservation since then, said Brisk. "Our relationship with the farmers is much better than it used to be. Most of them don't think we're out to get them anymore."

Through the years, the NRD has taken on larger projects and offered more programs. Keeping all the paperwork in order and moving forward on large projects with multiple partners, from local communities to state and federal agencies, is a big challenge. "There are sometimes a lot of hoops to jump through to get things done," she said. "There's always more paperwork to do and details to manage."

Taking on more hiring and management responsibilities has been a growth opportunity for Brisk as well. "The more your staff grows, the more diverse you become and sometimes it is harder to get everyone to work together and get along," she said. When she began with the NRD, there were 10 employees in the York office and five field office staff in county NRCS offices. Now there are 27 employees total, nine of whom she supervises.

When she's not working, Brisk enjoys gardening and making stained glass art at her home near Henderson, as well as visiting her children and their families. Brisk has come a long way from the assistant secretary fresh out of college who didn't even know what an NRD was. She is proud to have spent a majority of her career engaged in work that is meaningful to her. "We are doing good work. We're doing what we can to improve people's lives and leave something better for our kids and grandkids. I wish more people understood how hard we work to take care of the land and the water. We really are doing our best to make things better," she said.

WATER

NRD Reports Small Average Water Level Decline

Groundwater level declines, yet remains well above allocation trigger

During March and April 2022, staff of the Upper Big Blue Natural Resources District measured roughly 500 observation wells throughout the district to determine an average water level change, based on a weighted change from each well. For spring 2022 water level measurements, the NRD has determined that the average groundwater level change shows a decline of 0.24 feet from last spring. The spring 2022 average groundwater level is now 8.89 feet above the "Allocation Trigger." Thus, there will be no allocation restrictions for the 2023 irrigation season.

Observation wells are measured in the spring of each year, allowing the water table to rebound from the previous irrigation season. The wells that are measured are uniformly distributed throughout the district to provide an accurate profile of the average groundwater level change. Each well measured is assigned an area of the district based on distances from other wells. This method gives the average groundwater level change a weighted average.

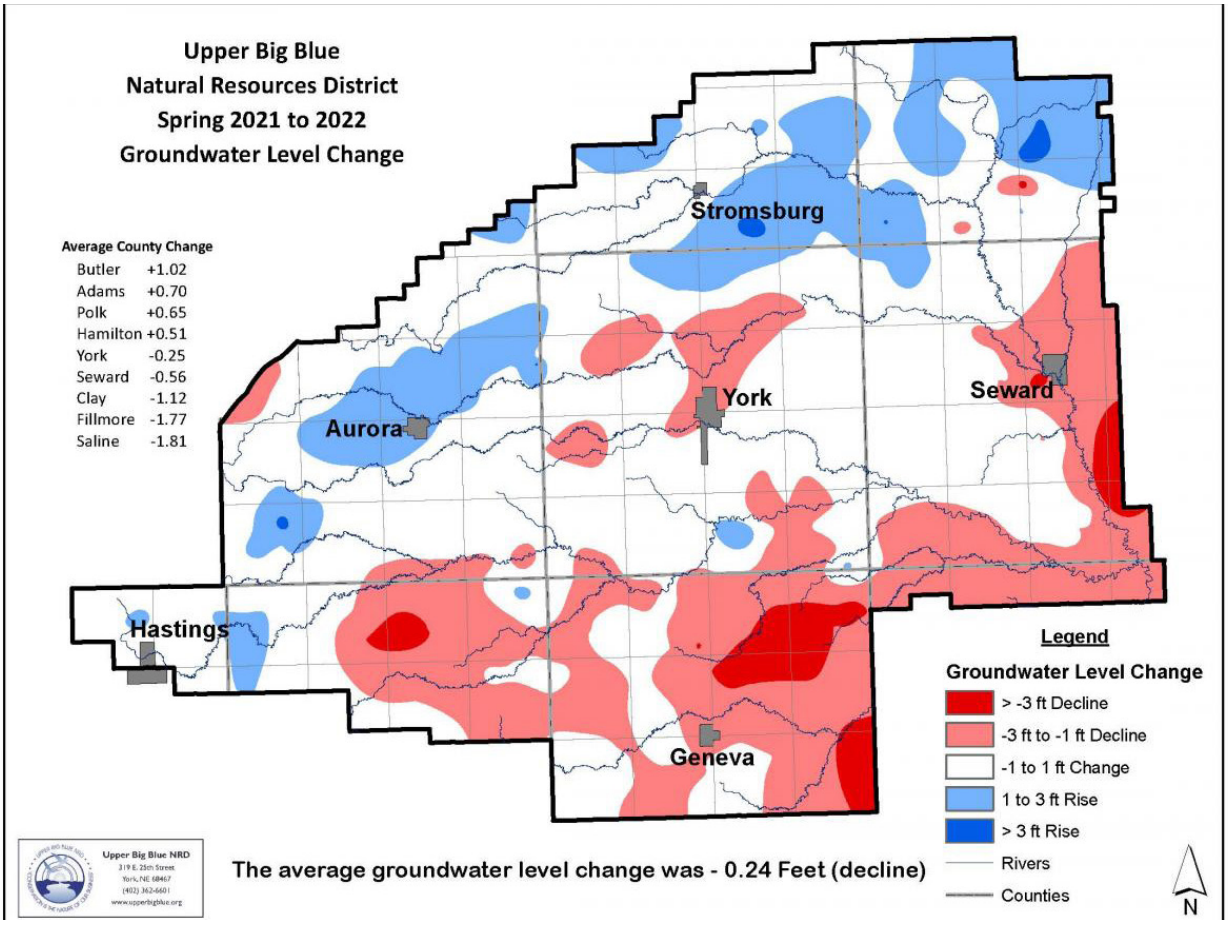
In spring 2021, the NRD reported an average increase of 0.35 feet. Spring 2020 showed an increase of 3.67 feet on average. Fluctuations from year to year are common throughout the district. The Upper Big Blue NRD sits above the High Plains Aquifer, which stretches from South Dakota to Texas. This portion of the aquifer is dynamic and different factors like rainfall and pumping affect how the aquifer reacts.

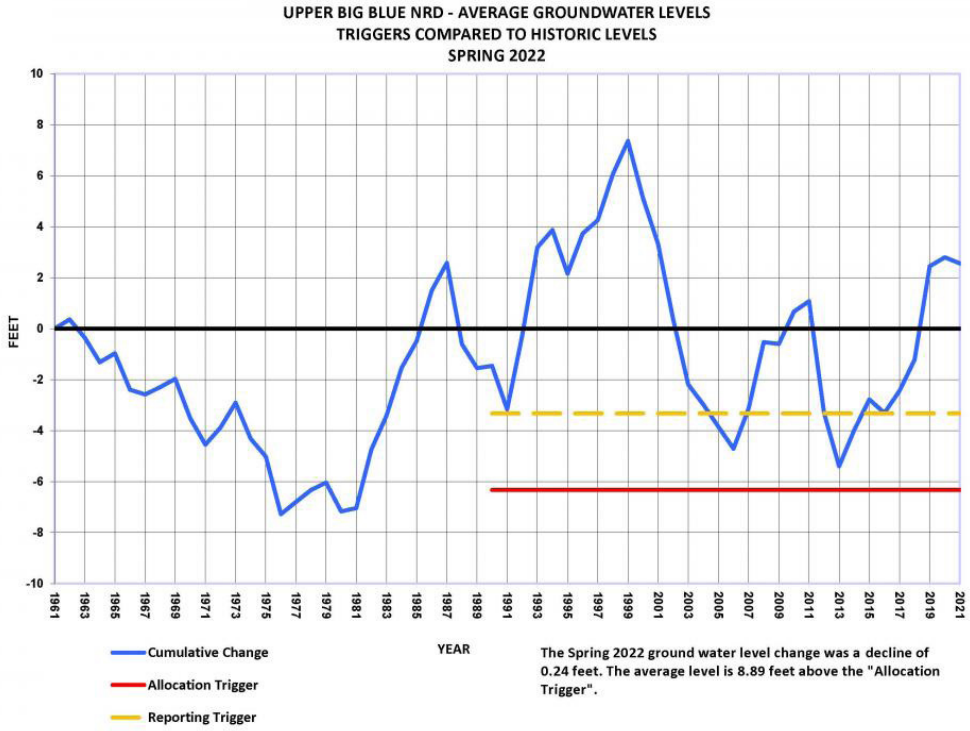
In addition to the average change across the district, the NRD has also provided a more detailed look at water levels across the district. Water levels rose slightly in the north and west parts of the district, including Butler, Adams, Polk, and Hamilton counties. Water levels decreased from 1 to 2 feet in the south and east part of the district, including York, Seward, Clay, and Fillmore Counties. Saline county saw the biggest decline, with a drop of 1.81 feet.

Water use records enable informed management decisions and practices

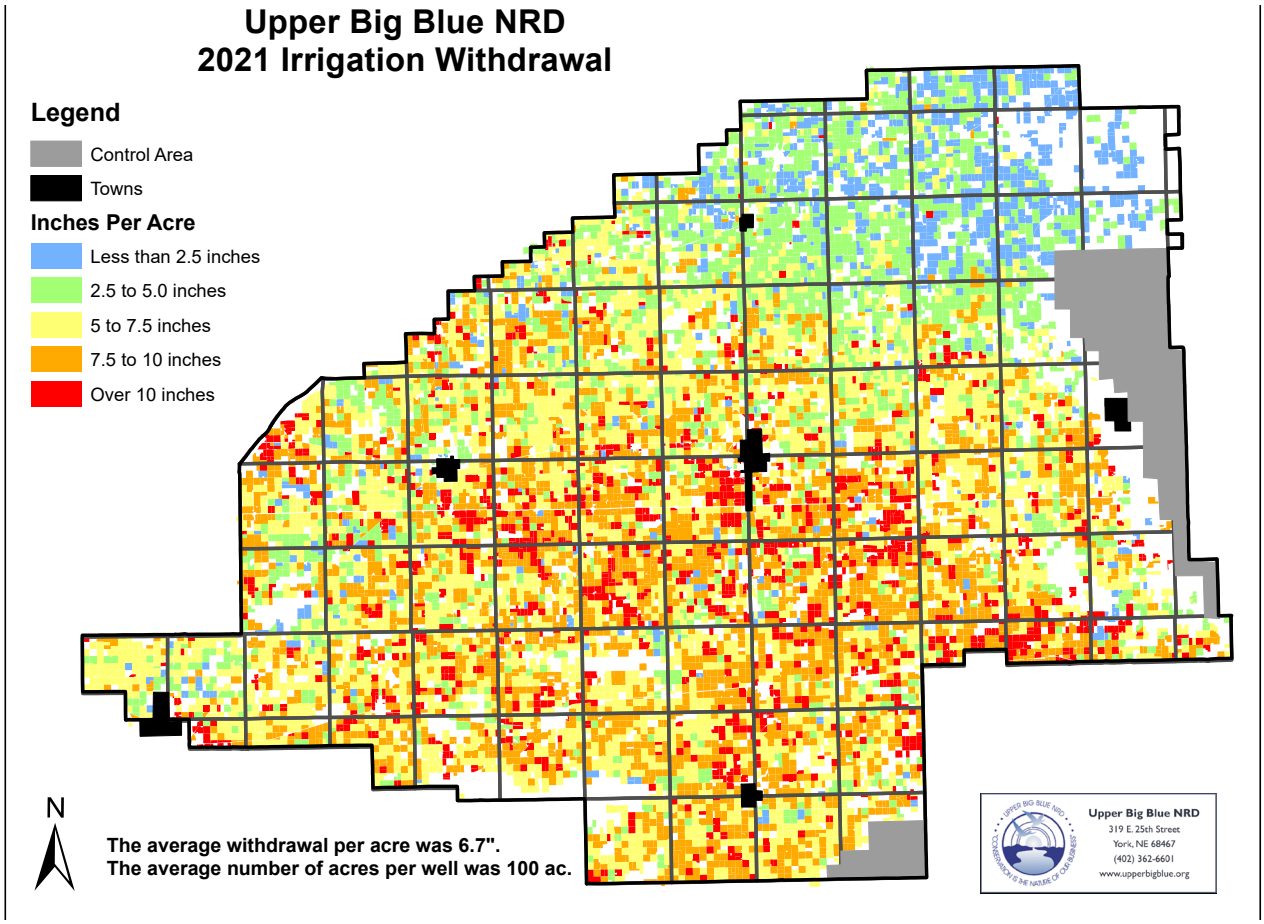
In recent years, producers have done an exceptional job of managing use of district water resources and cooperating with the NRD on conservation activities and monitoring. Along with NRD staff measuring observation wells, all groundwater users are required to annually report their water use. This is how the NRD maintains records on historic groundwater usage. Groundwater use records are very important to the district for making informed management decisions. The 2021 district average groundwater usage was 6.7 inches/acre. The district average groundwater usage is 5.9 inches/year since 2007.

The district's goal is to hold the average groundwater level at or above the 1978 level. In 2005, the district average groundwater level reached the "Reporting Trigger", initiating mandatory reporting of annual groundwater use to the district and certification of irrigated acres. If the district average water level falls below the 1978 level ("Allocation Trigger"), groundwater allocation will begin.


Upper Big Blue
Natural Resources District
Spring 2021 to 2022
Groundwater Level Change
Average County Change
Butler +1.02
Adams +0.70
Polk +0.65
Hamilton +0.51
York -0.25
Seward -0.56
Clay -1.12
Fillmore -1.77
Saline -1.81
Stromsburg
Aurora
York
Seward
Hastings
Geneva
Legend
Groundwater Level Change
> -3 ft Decline
-3 ft to -1 ft Decline
-1 to 1 ft Change
1 to 3 ft Rise
> 3 ft Rise
Rivers
Counties
N
Upper Big Blue NRD
The average groundwater level change was - 0.24 Feet (decline)

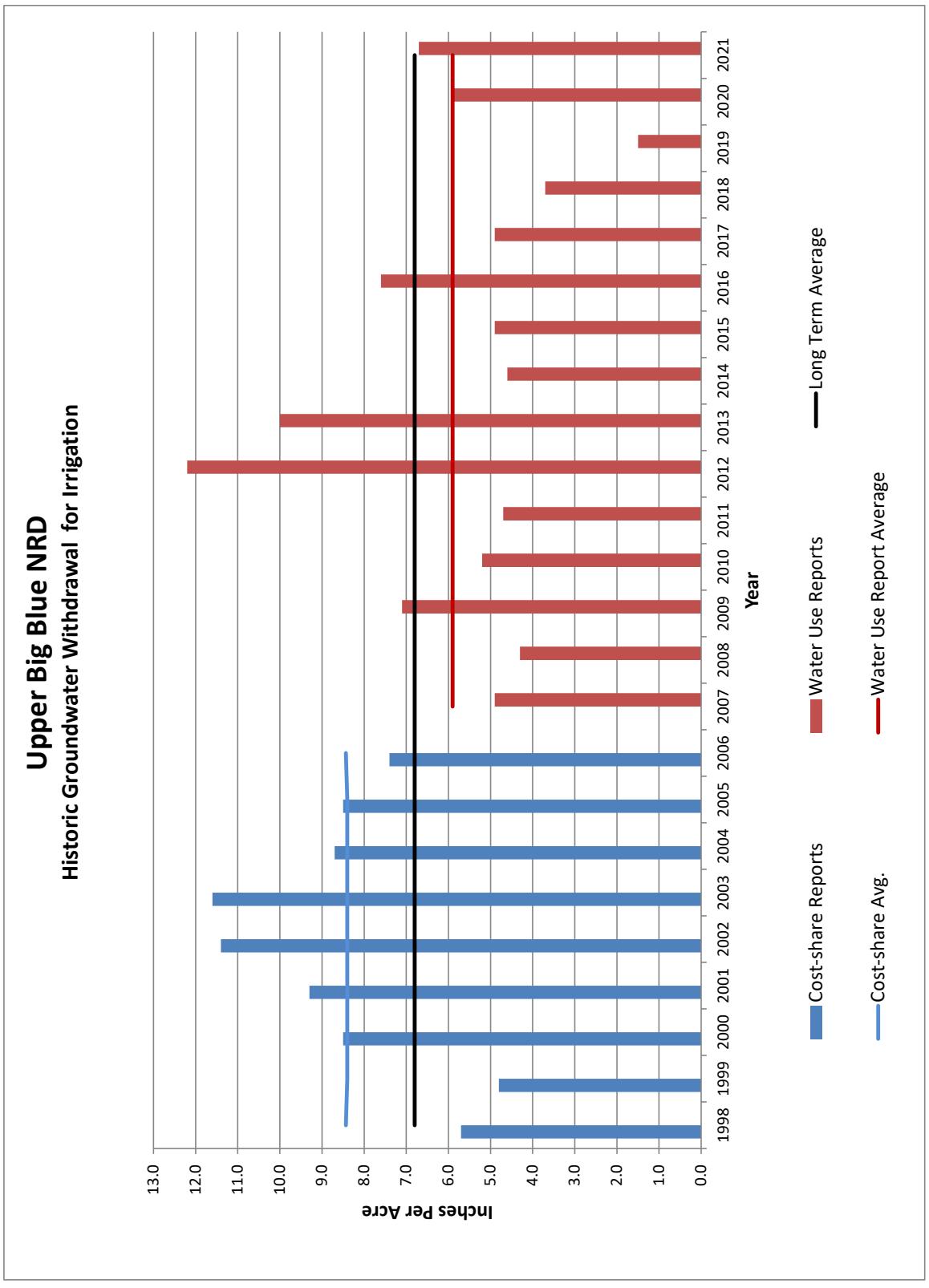

UPPER BIG BLUE NRD - AVERAGE GROUNDWATER LEVELS
TRIGGERS COMPARED TO HISTORIC LEVELS
SPRING 2022
FEET
YEAR
Cumulative Change
Allocation Trigger
Reporting Trigger
The Spring 2022 ground water level change was a decline of 0.24 feet. The average level is 8.89 feet above the "Allocation Trigger".

WATER



Average Irrigation Use Increased in 2021

- The average reported irrigation use across the district was 6.7” per acre, up from 5.7" per acre in the previous year. Much of the district had below average in-season rainfall again during the spring and summer months. Based on historic water use data, the average irrigation use is 6.8” per acre.


Upper Big Blue NRD
Historic Groundwater Withdrawal for Irrigation
Inches Per Acre
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
Cost-share Reports
Water Use Reports
Long Term Average
Cost-share Avg.
Water Use Report Average

WATER



Nitrogen Levels in Groundwater Lead to Increased Management

- Two zones of the district are moving from Phase II management to Phase III management as of January 1, 2022. This change is due to elevated median levels of nitrate in the groundwater in these areas.

The Upper Big Blue NRD is divided into 12 groundwater quality Management Zones. The median nitrate value for that zone determines the phase of management and therefore, rules and regulations. According to the NRD's Rule 5, a zone will move into Phase II management at 7 milligrams of nitrogen per liter (mg/L) in median samples and into Phase III at 10 milligrams per liter.

The board of directors of the NRD voted on the resolution to move Zones 6 and 11 to Phase III management at their September 16 meeting with a vote of 10-6 in favor of increased management of these areas. Discussion at the meeting from board members and the public focused on the need to review the data that is used to make these management area decisions, as well as future changes to Rule 5, which governs actions in management areas.

The 2021 median nitrate level for both Zone 6 and Zone 11 is 10 mg/L. The median nitrate value for a zone is the product of water samples collected from a specific network of wells selected based on construction and geology. In Phase I areas, each well in the water quality monitoring network is sampled on a rotation once every three years. In Phase II and III areas, all wells in the zone are sampled annually. Wells sampled include domestic, irrigation, and public municipal uses.

Cities and villages located in Zone 11 include Goehner, Milford, Seward, Tamora, and Utica. Cities and villages in Zone 6 include Henderson, Lushton, and a portion of McCool Junction. Zone 5, which includes the York area, is already under Phase III management due to elevated nitrates.

Zone 6 was moved into Phase II management in 2004, while Zone 11 entered Phase II management in 2012. Since that time, the median level of nitrate in these areas has continued to increase.
The last time changes to nitrogen management zones were made in the district was in 2018 when Zone 1 moved from a Phase I to a Phase II designation. Of the district's 12 Zones, eight show increasing median nitrate levels over the past ten years. (See graphs on following pages.)

Nitrate is found naturally in the environment, however excess nitrates that are causing groundwater contamination come primarily from the use of commercial fertilizers. Nitrogen fertilizer is needed to produce maximum corn yields; however the amount and timing of the fertilizer application can reduce the risks of groundwater contamination. Decreasing nitrate contamination in Nebraska's groundwater will require a multifaceted approach of changing policy and practices, as well as improving technologies, over a span of years. This process must be a collaboration between farmers, municipalities, policy makers, and industry, with everyone providing actionable solutions to ensure safe drinking water is available to all Nebraskans.

According to EPA regulations, it is unsafe to consume water that has greater than 10 mg/L, though some studies are exploring possible links to negative health outcomes at much lower levels, including pediatric cancers and birth defects (the rates of which are elevated in Nebraska), as well as reproductive cancers in adults. One of the most direct risks in consuming water high in nitrate is to infants, as it can cause "Blue Baby Syndrome" or methemoglobinemia, where there is not enough oxygen transported in the blood.

The NRD offers free analysis for nitrates and bacteria in groundwater for all district residents. Rural domestic wells are not held to public water system regulations; therefore it is the well owners' responsibility to ensure safe drinking water. These wells should be tested at least once a year for both nitrates and bacteria. If contamination is found, the NRD staff can help you determine next steps to ensure that water is healthy and safe.
The change from Phase II to Phase III management involves additional steps agricultural producers must take to safeguard the water supply. Fall/winter application of anhydrous ammonia in the Phase III Area must include a nitrification inhibitor, though spring anhydrous application would not require the use of a nitrification inhibitor. Phase II and Phase III producers are also required to use soil moisture probes or capacitance probes to schedule irrigation in one field. Scheduling irrigation using soil moisture information can reduce the risk of excess irrigation leaching nutrients from the root zone. Additional soil and water sampling and reporting is also required.

Increasing nitrates in groundwater have been a concern in the Upper Big Blue NRD for decades. Several communities in the district have found it necessary to construct new wells to comply with state and federal drinking water standards. Some communities have built or are seeking funding to build additional treatment plants to remediate for nitrates and other contaminants. Some rural residents have also replaced domestic wells or installed private water treatment systems to decrease consumption of nitrates.

Since 1996, the NRD has required that producers wait until November 1 to apply fall anhydrous, and to wait until March 1 to apply other formulations of nitrogen fertilizer, as lower soil temperatures stabilize anhydrous and should prevent nitrogen from leaching out of the crop root zone. In parts of the district where groundwater nitrate is the highest, farmers are required by existing regulations to attend training classes, take soil samples, and calculate crop nitrogen needs annually.


Zone 1 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
8.7 7.3 6.8 6.8 6.8 7.1 7.5 7.5 8.3 8.8 9


Zone 2 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
8.1 7.8 7.4 8.5 9.2 8.2 8.9 9.7 7.8 8.5 8


Zone 3 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
6.8 6.8 7.1 7.1 7 7.2 7.3 7.3 7.3 7.8 8.1


Zone 4 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
5.8 5.8 5.8 6.7 6.7 6.7 6.9 6.9 6.9 6.9 6.9


Zone 5 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12 14
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
10 12 10 11 11 12.8 11.4 11.5 11 11 12


Zone 6 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
9.1 9.2 9.5 9.6 9.6 8.5 9.6 9.6 8.8 9.1 10


Zone 7 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
4 3.4 3.4 3.4 4.4 4.1 4.1 3.4 3.4 3.4 3.5

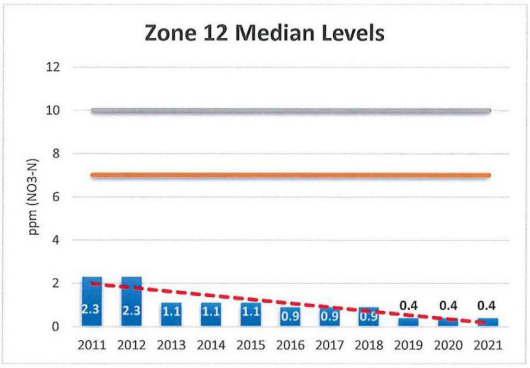

Zone 8 Median Levels
ppm (NO3-N)
0 2 4 6 8 10 12
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
5 2.5 2.5 2.5 4.2 4.2 4.2 4.2 4.2 4.2 5.6

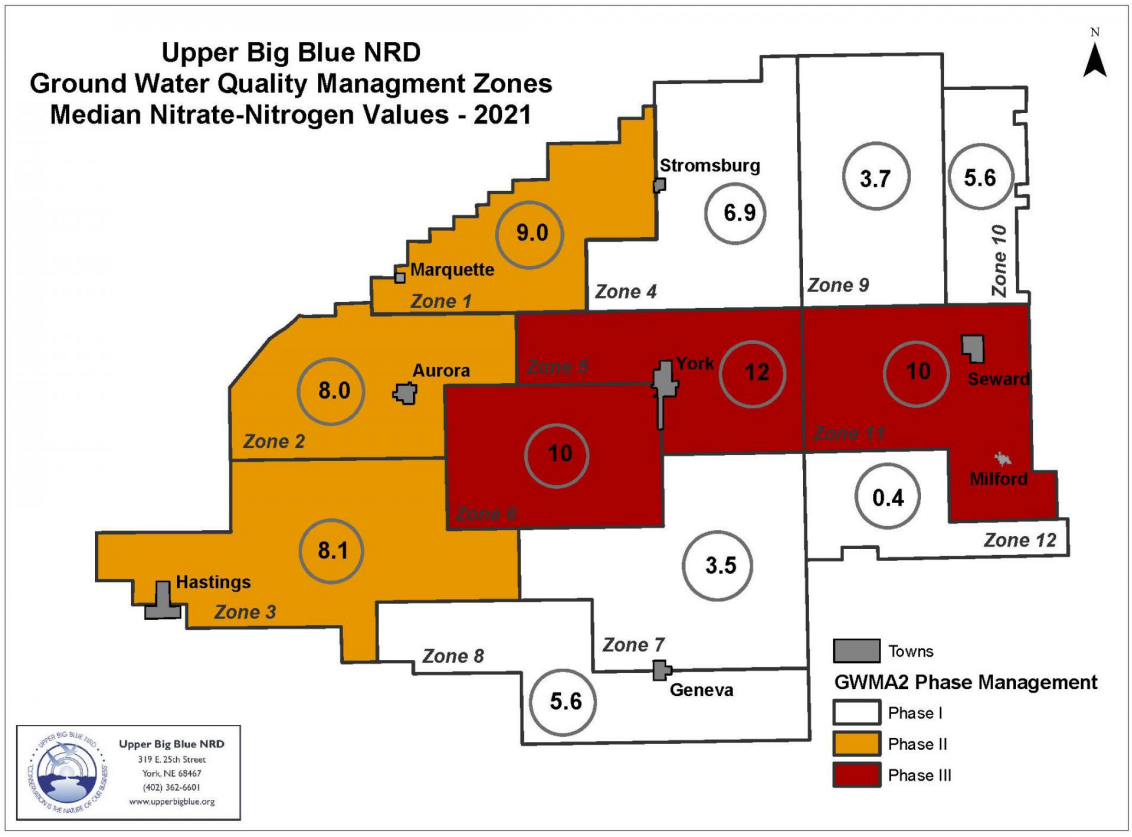
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Zone 9 Median Levels
ppm (NO3-N)
12
10
8
6
4
2
0
3
3
2.5
2.5
2.5
3.1
3.1
3.1
3.7
3.7
3.7
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021


Zone 10 Median Levels
ppm (NO3-N)
12
10
8
6
4
2
0
5.9
5.9
2.8
2.8
2.8
6.2
6.2
6.2
5.6
5.6
5.6
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021


Zone 11 Median Levels
ppm (NO3-N)
12
10
8
6
4
2
0
8.6
9.9
9
9.1
7.8
8.1
8.1
8.2
9
10
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021


Zone 12 Median Levels
ppm (NO3-N)
12
10
8
6
4
2
0
2.3
2.3
1.1
1.1
1.1
0.9
0.9
0.9
0.4
0.4
0.4
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021


Upper Big Blue NRD
Ground Water Quality Managment Zones
Median Nitrate-Nitrogen Values - 2021
N
Stromsburg
6.9
3.7
5.6
9.0
Marquette
Zone 1
Zone 4
Zone 9
Zone 10
8.0
Aurora
Zone 5
York
12
10
Seward
Zone 2
10
Zone 11
Milford
0.4
Zone 6
Zone 12
8.1
3.5
Hastings
Zone 3
Zone 8
Zone 7
Geneva
5.6
Towns
GWMA2 Phase Management
Phase I
Phase II
Phase III
Upper Big Blue NRD
319 E. 25th Street
York, NE 68467
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WATER



Plumbing the Depths for Insights

Student Research Project Looks at Surface Water Quality

Blayne Winkler might have looked like just another recreationist as he paddled a kayak across Recharge Lake throughout the summer months of 2021; however, it wasn't a fishing line he cast over the side of his boat.

Instead he lowered collection jars to the bottom of the lake on a cord then gently pulled them back up, capped and labeled them, then paddled to the bridge at the northwest side of the lake to trade research partner Emily Eggar full jars for more empty ones. Eggar traveled the perimeter of the lake to gather additional samples from designated locations.

Winkler and Eggar completed a water quality analysis looking for nutrient pollution in the lake at Bruce L. Anderson Recreation Area in York over the summer months. The pair of young researchers collaborated with the Upper Big Blue Natural Resources District staff, who manage the recreation area as well as water quality throughout the district, to design the project.

In September, they presented findings to the board of directors of the NRD. "I was very impressed with not only the initiative Emily and Blayne took but also their findings," said NRD Director John Miller, chairperson of the water and regulations committee. "The presentation they brought to the committee was very professional. My hope is that they or other York University students continue to expand this project."

"We at the NRD are happy to have research conducted by students from our schools in the district," added NRD Director Ronda Rich. "Many times they can see things in a different way than it has been looked at before. There is always room for more ideas. I hope this type of collaboration can continue."

The experiment consisted of collecting deep and shallow water samples from seven locations across the lake, testing the same spots regularly over the span of eight weeks. The project required meticulous data management, as Eggar and Winkler charted not only the readings of chemical concentrations at these locations, but other field observations, like weather conditions and water clarity.

They took their samples to the lab at York University to evaluate with probes and a colorimeter tool purchased for this experiment. The data sets collected averaged three readings for each sample to increase accuracy. Using LabQuest software for data collection and Excel for graph building, the researchers were able to see some trends in the numbers.

Their results indicated that phosphate levels in the lake were high. The EPA recommended amount for lakes and streams is 0.05 mg/L. The levels Winkler and Eggar recorded were 2-4 mg/L. According to the EPA's website on nutrient pollution, "Too much nitrogen and phosphorus in the water causes algae to grow faster than ecosystems can handle. Significant increases in algae harm water quality, food resources and habitats, and decrease the oxygen that fish and other aquatic life need to survive." A sustained quantity of phosphorus in a waterbody can lead to harmful algal blooms, which are becoming more common as the climate warms.

As the NRD has previously reported, the fishery at Recharge Lake is impaired by nutrient pollutants from the agricultural acres that surround the area. The NRD has encouraged producers in the watershed of the lake and Beaver Creek to implement best management practices to reduce the amount of nutrients that make their way into the ground and surface water. A new cost-share program was recently announced to incentivize planting cover crops on these acres, which would minimize nutrient loss from farm fields in the event of heavy rains.



Winkler and Eggar's research also looked at nitrogen and potassium in the water samples. The nitrogen in their samples from Recharge Lake was not beyond the EPA recommended amount of 10 mg/L. There is not an EPA recommendation for potassium, which they found to be in the 11-14 mg/L range. Their research did not look at bacterial contamination in the water, only chemical. If they had the opportunity to expand the research, they would like to include groundwater samples from the area to see how nutrient pollution impacts ground and surface water differently. They would also like to expand the project to include testing for additional nutrient pollutants and testing throughout the year to see how weather and crop cycles impact water quality. At the moment, they are not planning to continue this study, however they are encouraging other York University students to pursue the research further.

Dr. Stacie Turnbull, formerly a York University instructor of Agribusiness, was the academic advisor on this project. She suggested that Eggar get in touch with the NRD to create the project then encouraged Eggar to apply for a grant through EPSCoR (Established Program to Stimulate Competitive Research), which provides funding for student research at small colleges in Nebraska who don't have access to the research facilities and budgets that tend to be available at larger universities. Eggar wrote the grant application and Winkler joined her for the collection and analysis parts of the project—for which Eggar was

WATER



immensely grateful, as she does not like being on boats. The $5,000 they were awarded covered transportation, chemicals, software, and sampling equipment.

The pair says they learned a lot through the process, from applying for funding, to conducting and analyzing the research, to communicating findings to relevant audiences. They also learned more about water quality issues in Nebraska, and the unique way natural resources are managed in the state through the NRD system.

Eggar is a junior from Wolf Point, Montana, double majoring in biology with an emphasis in chemistry as well as pre-professional biology, with a minor in mathematics. She is interested in microbiology and genetics and is planning a career in scientific research and development. When she wasn't conducting water quality research over the summer, she was rounding out her science knowledge working for Corteva Agriscience in York. Next summer she hopes to work with Meridian Clinical Research at either their Lincoln or Grand Island facility to gain more experience in this area, with the goal of one day working on Alzheimer's Disease research.



Winkler is looking for competitive internship opportunities in biotechnology for summer '22 and '23. His primary interest is in pharmaceutical research and vaccine development. He is a junior pre-professional biology major from Lincoln, Nebraska.





'One Water' Plan Recognized

- What's the use of having plenty of water available if it is not drinkable?

  This is the question posed by the One District, Two Plans, One Water initiative, which seeks to protect both water quality and water quantity by managing the two objectives together in the Upper Big Blue NRD.

The NRD was recently recognized with the "Best Practice Award" from the American Planning Association's Nebraska Chapter for the community supported planning project.



The project was unique as it was the state's first-ever combined water quality management and voluntary integrated management planning process. The two planning efforts are typically conducted separately, but the NRD seized the opportunity to combine two inseparable priorities for water: quality and quantity.

The One District, Two Plans, One Water process was created in partnership with the Nebraska Department of Natural Resources (NeDNR) and the Nebraska Department of Environment and Energy (NDEE). The process involved feedback and continuous input from a stakeholder group of 18 district citizens who represented different types of water users (industry, residential, recreation, and agriculture).
The design of the combined planning processes built momentum for action and public support as its structure allowed stakeholders to develop a sense of ownership. Through the process, the stakeholder group members repeatedly commented how well the draft goals and objectives

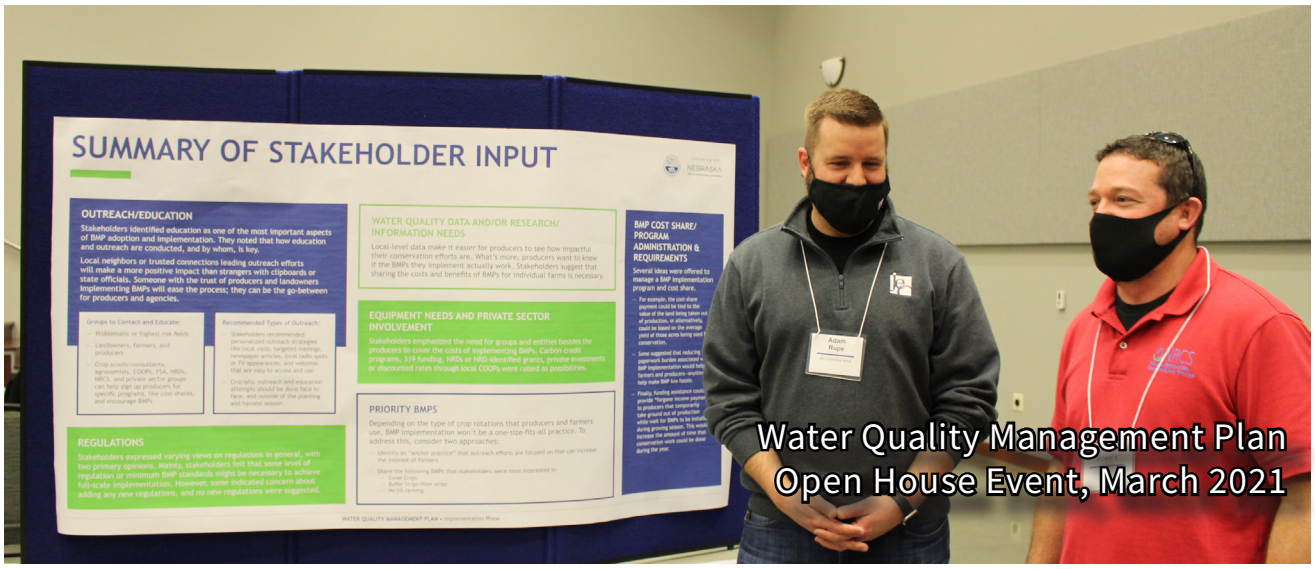
WATER

reflected their conversations and their values. This helped foster trust between citizens and the collaborating state and local agencies. With that trust, stakeholders more readily identified the types of action items that they or their neighbors would likely support and voluntarily implement. This process also helped the NRD and agency partners to identify the types of assistance most needed at the local and individual property level. Sitting at the table with NDEE and NeNDR staff, stakeholders also began to see state agencies as partners rather than regulators.

The process was started in 2018 and the plan was implemented in 2020. The planning process resulted in two interconnected plans shaped by a common interest. While the plans share the same vision statement, each possesses its own unique set of goals and objectives that complement those of the other plan.

JEO Consulting Group, Inc, was instrumental in managing the stakeholder process and it was JEO that nominated the NRD program for the award from the American Planning Association Nebraska Chapter. Their nomination materials state, “While these planning processes have historically been conducted separately, the NRD recognized the interrelatedness of the plans and worked with NDEE and NeDNR to pioneer a combined process… Everyone uses water, making the management of water quality and quantity a matter of public health and safety.” The action plan is to be annually reviewed for progress and updated every five years.

In the future, other Nebraska NRDs might replicate this process within their own district to develop similar plans.



Water Quality Management Plan Open House Event, March 2021



Innovation in Nitrate Treatment

- Marty Stange, environmental director at Hastings Utilities, presented to the Upper Big Blue NRD board of directors at a 2022 learning session about the Aquifer Storage and Restoration Project that is improving drinking water in Hastings and the surrounding area.

Stange has been with Hastings Utilities for 32 years and says he's been dealing with the issue of nitrate contamination in the municipal drinking water supply from his first day. Since he began working with the city in 1990, nitrate levels in the groundwater have increased 68 percent. As this level continued to rise, the City of Hastings recognized that they needed short-term and long-term solutions to continue to provide a safe and reliable potable water supply for residents.

Long-term solutions include working with local growers to implement best management practices to reduce the amount of leaching that would happen going forward in the Hastings Wellhead Protection Area (which is part of the Upper Big Blue and Little Blue NRDs). However, that solution does not reduce the amount of legacy nutrients already in the system applied by the previous generation of growers. The short-term solutions the city considered included drilling new wells (though it would be a challenge to find locations with lower nitrates in the area to draw from and new infrastructure would need to be built) or constructing a nitrate remediation facility (estimated to cost $75 million). Instead, in 2016 they began work on an innovative Aquifer Storage and Restoration (ASR)



WATER

project, which cost $45 million to complete and $1 million per year to operate.

The ASR project involves drawing water from the aquifer at different depths (deeper water has less nitrate contamination), treating the water with the highest levels of nitrates with a reverse osmosis system, then blending the two so that the resulting product has a level of nitrate considered to be safe by the EPA (under 10 ppm). Cleaner water is then injected back into the aquifer and stored underground. Higher nitrate water is also stored in an above ground lagoon, where it is used for irrigation in surrounding fields instead of drinking water.

Stange says that the system is working better than they had hoped and several wells that had previously been taken offline due to high nitrates can provide water to the city again. Stange sees the project as a cost-effective solution for the City of Hastings, but that's not the end of the story. He warns that consuming water contaminated with nitrates even at the EPA threshold of 10 ppm may be linked to negative health outcomes. While there are multiple barriers in place to protect the quality of the water for Nebraskans whose water comes from a municipal source, those whose water comes from a private well (about 20 percent of the population of Nebraska) are on their own when it comes to ensuring that they aren't consuming dangerous levels of contaminants. (Learn more about our walk-in water testing program.)

Studies are currently underway through the University of Nebraska Medical Center (UNMC) that examine the relationship between nitrates and pediatric cancer, birth defects, and other negative health outcomes including lifetime cancer risk. Stange noted that Nebraska has one of the highest rates of pediatric cancer in the United States and that Adams County has one of the highest rates of pediatric cancer in the state of Nebraska. An additional concern is that increased nitrate in the water leads to the mobilization of naturally occurring elements uranium and selenium in the water, which are also linked to negative health outcomes.

Stange encouraged board members to consider the unintended consequences of poorly managed nitrogen application in Nebraska, including a loss of public confidence in the water system, impacts on public health as well as the economic viability of the state. Stange asked the board, who is responsible for ensuring safe water for Nebraskans? How can we all work together to encourage social change? What will it take to convince people to act on this challenge? He suggested that planning and modeling must be a priority, as access to safe drinking water is vital to Nebraska's future.





Multiyear Study Looks at Nitrogen Load in Local Soils

Fertilizer pricing is top-of-mind for many involved in agriculture in Nebraska, so it is a great time to ask: are corn growers getting the maximum for nitrogen use efficiency? Are there management practices that could reduce nitrogen leaching, and thereby save farmers money as well as safeguard the groundwater supply? A research project from the University of Nebraska Lincoln in partnership with the Upper Big Blue NRD is looking for insights on nitrogen use in the past and present in the district and its long-lasting impact.

On a chilly spring morning in a cornfield near Bradshaw, Nebraska, a strong wind whips last season's dried husks through the air. Jacob Maslonka, water resources technician with the Upper Big Blue Natural Resources District, picks his way through the corn stubble to meet with a pair of researchers from the University of Nebraska. A motor rumbles loudly as the team drives collection tubes one after another into the soft soil of the field. The plastic tubes are encased in a metal sheath that is pressed into the ground with a drill rig mounted on the back of a pickup. When each sample tube is drawn back up, it's full of dark earth—and information. The tubes are removed from the metal casings, capped, and labeled with collection data for later analysis of chemicals present as well as soil type and other characteristics.

The cropland that Maslonka and the others are standing on is the property of a cooperating producer who has agreed to be part of a study that will examine the nitrate load in the vadose zone

WATER

across the district. The collaboration between the NRD and the university will involve collecting shallow and deep soil samples from up to 120 locations across the district over the next three years. These samples will be compared to samples from a similar study of the district in 1998. That data collected will be coupled with reporting from the participating producers about historic and current land management practices in the fields where the samples are collected. The results will give researchers insight into current nitrate levels, the movement of nitrate in the vadose zone, practices that are impacting nitrates in the vadose zone, and the future of groundwater quality in the district.

The vadose zone, also known as the unsaturated zone, is the soil between the crop root zone and the water table. Nitrogen from fertilizer can leach below the root zone beyond the usable range for crops to absorb, accumulating in the vadose zone. This is particularly true in instances of overapplication of fertilizer. When more fertilizer is applied than is needed by the crop or is applied too early to be used fully by the crop, the situation is primed for leaching. Over time, that nitrogen moves through the soil profile and ends up in the groundwater. The time it takes the nitrogen to reach the groundwater supply varies, based on soil type, precipitation/irrigation, and depth to water.

Not only does leaching represent a lost investment for the producers, but it also creates a contamination challenge for residents, as most Nebraskans' drinking water comes from groundwater (rather than surface water) sources. Consuming water with elevated levels of nitrate can lead to adverse health outcomes including birth defects, and may be associated with some kinds of cancer.

Remediating for nitrogen in groundwater is becoming an expensive problem for many rural Nebraskans. (A 2018 article from The Environmental Working Group, an advocacy organization, estimates that every $1 spent on prevention of nitrate contamination is worth $27 of remediation for the problem.) The cost for nitrogen remediation in drinking water is disproportionately high for rural residents, who typically have a lower median household income in addition to a small population base to defray the cost of municipal water improvements. In small towns, improved water systems can cost hundreds of dollars per person per year if new water treatment facilities must be constructed or additional wells drilled.

According to a 2019 study published by UNL faculty members on nitrogen use efficiency in Nebraska corn production, nitrogen leaching occurs more frequently when corn is grown continuously, rather than in rotation with other crops; where soils are sandier; where less efficient methods of irrigation are used; and when fertilizer is applied 100 percent preplant instead of 50 percent or more applied in-season.

In the Upper Big Blue Natural Resources District area, a few of these factors loom large. Many



acres are farmed continuously with corn and a significant percentage of producers in Phase II & III management areas, where nitrate levels in water are higher, apply all of their nitrogen pre-plant (though this number has decreased somewhat in the last two years). On the plus side, soils tend to be less sandy than other parts of the state and more than half of irrigators utilize center pivots (instead of less efficient methods of irrigation such as furrow).

The Upper Big Blue NRD recommends a number of practices that can improve producers' nitrogen use efficiency including chemigation and split application of fertilizer, as well as soil health practices such as no-till, crop rotations, and cover crops. Implementing the five principles of soil health can increase soil organic matter, as well as help soil retain moisture—meaning the system would need less fertilizer as well as less irrigation.

The current vadose zone study will provide valuable insight to the movement of nitrate through soils in the district and into the water supply, as well as which practices are working when it comes to best managing this problem. It's a matter of human and environmental health, as well as one of financial health. Better practices will reduce the amount of nitrate in drinking water; they will also benefit producers, who may lose part of their investment due to leaching. While high fertilizer prices and supply chain challenges are causing added stress for the ag community, it's the opportune moment to equip farmers with information to help them make wise decisions with regards to nitrogen use, as well as soil health practices that could reduce their dependence on conventional fertilizers.

A vadose zone study was recently conducted in the Hastings area by the same team from UNL that is conducting the current study in the Upper Big Blue NRD. The study drew samples from 32 locations



and tested them against samples from the same locations five years later to see the rate of change of nitrate levels in the soil. The conclusion of that study was that current management practices in the Hastings area are not slowing the rate of increase of nitrate in the vadose zone. Lead researcher Dr. Dan Snow reported that while some samples reflected declines in soil nitrogen over that five-year period, most saw an increase. The average change across all locations was a 30 percent increase in nitrate-nitrogen in the soil. The highest level of increase was beneath gravity irrigated cropland. Increases were also seen in high density livestock feeding operations.

These findings suggest that the problem is not only historic overuse of fertilizer but continued need to improve nitrogen use efficiency and nutrient management in the Hastings area.

Beyond the Hastings area, there has been a steady increase in nitrogen concentration in groundwater samples, across the district. While there have been decreases or plateaus in some areas of the district, there has been an overall increase of 54 percent across the district in the last 20 years. Half of the district is now in a Phase II or Phase III management zone, meaning additional management is required due to the increased level of nitrogen in the groundwater.

Researchers with the current study of the vadose zone will collect samples for the next three years. Results will be analyzed throughout that time

WATER

and will be first communicated to individual landowners. The aggregated information will be released to the public in 2024 and beyond. “This study is not meant to further regulations about nitrogen use,” said Maslonka. Instead, he hopes the study will examine if there are strategies for stopping or reversing the problem. “This study is an update on previous research but taking a current look at what the nitrate situation is in our district.” The study will also look at the concentrations of manganese, uranium, selenium, and arsenic in the soil, which could be indicative of a water quality problem in the future.



“It’s nice to know if your practices are working or not,” Maslonka added, noting that his hypothesis is that good management practices have slowed the rate of nitrogen contamination in the vadose zone and groundwater supply locally. “Management practices are better today than they were 50 years ago, but we need to continue to improve and be vigilant,” he said. “I hope this study will help farmers see the benefits of good management practices and it will encourage them to try new things on their land in the future…We don’t want to mess up their yield goal or balance sheet, but we want to show the value of the adoption of practices that reduce or reverse the rate of nitrogen leaching into the soil.”



Producer-Reported Data Analysis Shows Less Fertilizer, Similar Yield

According to data reported to the Upper Big Blue Natural Resources District, some district corn growers are not seeing maximum return on their fertilizer investment. This conclusion is based on information provided by corn growers in Phase II and Phase III management areas, which reveals that those who are growing continuous corn and those using a corn and bean rotation are using similar quantities of nitrogen, meaning those growing soybeans may not be taking a full legume credit on their nitrogen calculations. On average those growing beans in their rotation only applied 15 pounds less nitrogen than those growing corn. While this shows a certain level of nitrogen use efficiency, there is still room for improvement.

The graphs provided by the NRD (on following pages) that chart this data show that producers in Phase II and III areas growing corn on corn from 2017-2021 applied between less than 50 pounds and over 350 pounds of nitrogen per acre, with the bulk of producers falling in the 150 to 250 pounds per acre range. Similarly, yields for that group ranged from less than 50 bushels per acre to over 300 bushels, with the majority falling between 200 and 250 bushels. For the corn/bean rotation fields for the same period the numbers are remarkably similar. Producers applied between less than 50 and up to 400 bushels per acre, with the majority applying between 150 and 250 pounds per acre. Yields ranged from less than 50 bushels per acre to over 300 bushels.

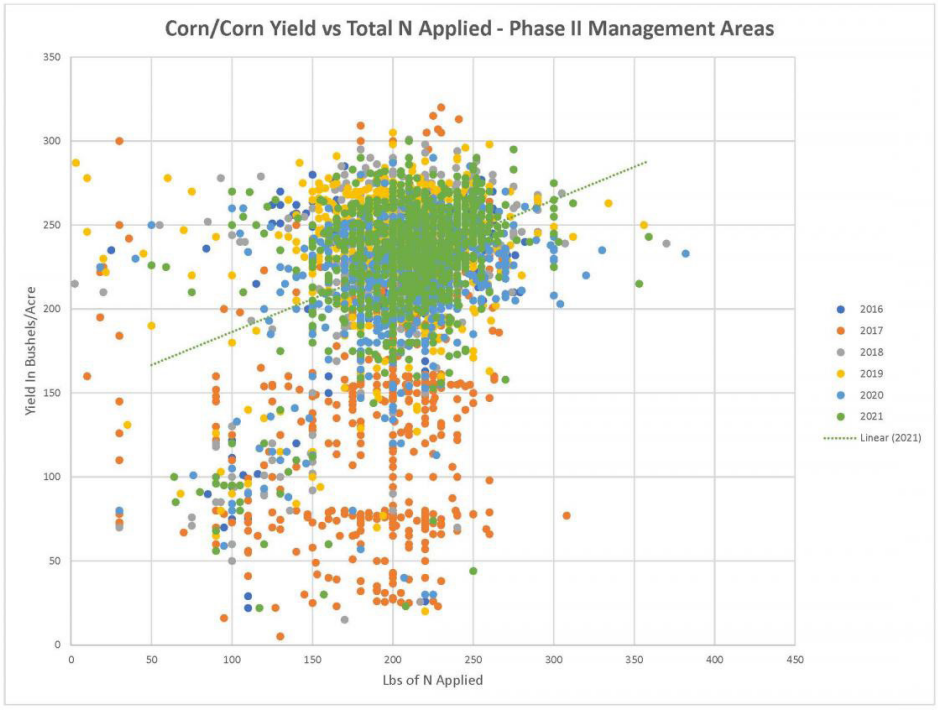
The nitrogen use efficiency numbers reported in this period ranged from 0.61 to 1.61. The majority of years in this period showed NUE of less than 1, however the trend line has continued to increase over this period.

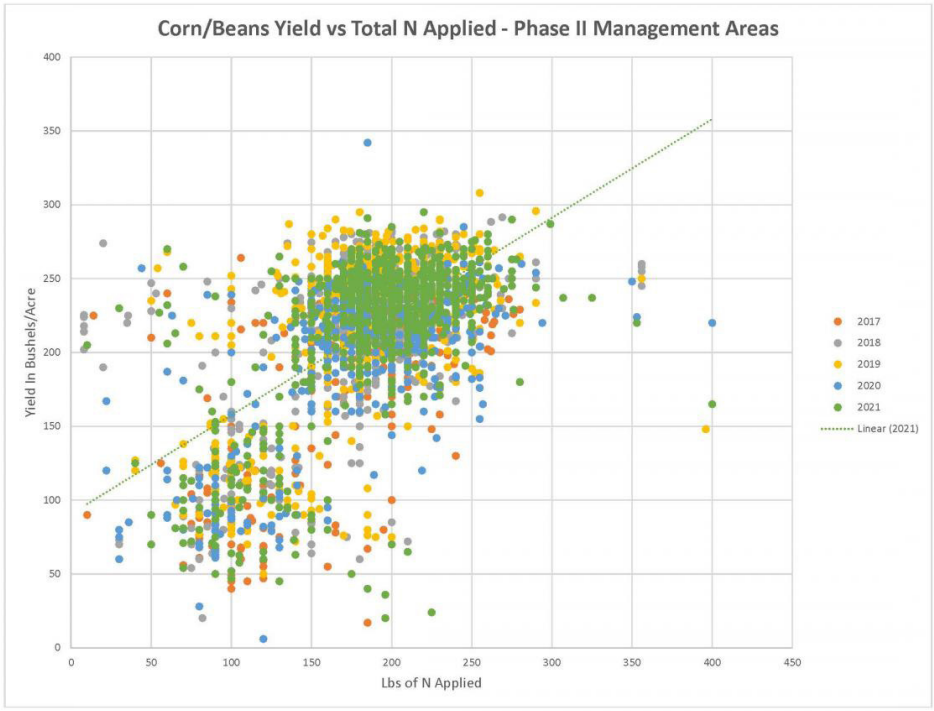
"Our concern is that they aren't taking enough credit for their residual nitrogen and legumes in their nitrogen calculations," explains Dan Leininger, NRD water conservationist. Additionally, Leininger says throughout the 2017-2021 period, the rate of nitrogen applied to all fields in Phase II and III areas increased, while yields did not. This continued increase in fertilizer use without a corresponding yield increase means there is likely nitrogen over application. This wasted fertilizer is left over in the field after the growing season—which directly impacts the quality of the water in the district.

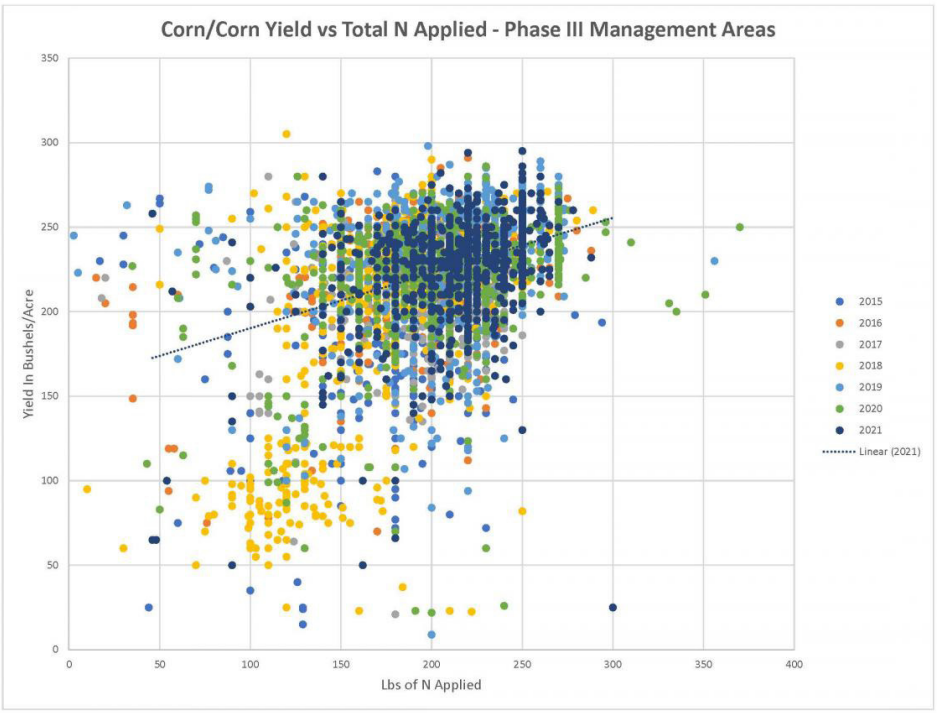
"Every year, if you over apply nitrogen by even 30 pounds, it adds up in the system," said Leininger, who recommends producers split apply fertilizer to increase efficiency. "Soil isn't a good storage place for fertilizer. As much as you can, apply fertilizer in season."

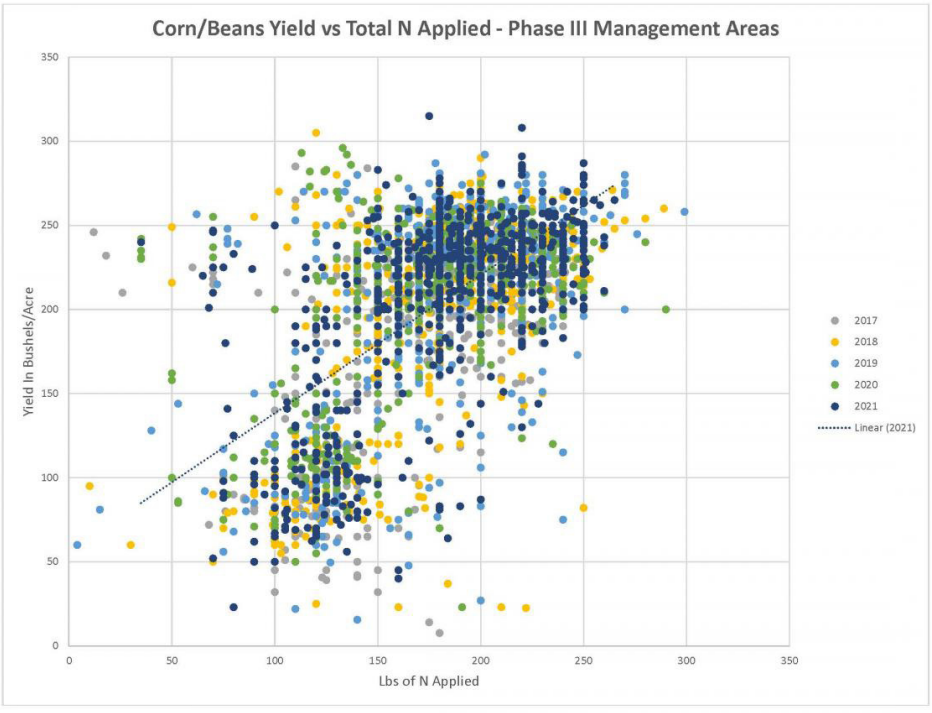


WATER


Corn/Corn Yield vs Total N Applied - Phase II Management Areas
Yield In Bushels/Acre
Lbs of N Applied
0
50
100
150
200
250
300
350
400
450
2016
2017
2018
2019
2020
2021
Linear (2021)


Corn/Beans Yield vs Total N Applied - Phase II Management Areas
Yield In Bushels/Acre
Lbs of N Applied
0
50
100
150
200
250
300
350
400
450
2017
2018
2019
2020
2021
Linear (2021)


Corn/Corn Yield vs Total N Applied - Phase III Management Areas
Yield In Bushels/Acre
Lbs of N Applied
0
50
100
150
200
250
300
350
400
2015
2016
2017
2018
2019
2020
2021
Linear (2021)


Corn/Beans Yield vs Total N Applied - Phase III Management Areas
Yield In Bushels/Acre
Lbs of N Applied
0
50
100
150
200
250
300
350
2017
2018
2019
2020
2021
Linear (2021)

SOIL HEALTH

Save The Soil

Program Provides Funding, Allows Farmers to Install Practices that Safeguard Soil Health

When Matt Grosshans started farming seven years ago in Hamilton County, he was interested in regenerative agriculture practices he'd learned about in college, including cover crops, reduced tillage, and rotational cropping systems.

However, it wasn't until extreme weather patterns started impacting his operation that he realized these practices weren't just a good idea, they were essential to maintaining his most valuable resource—his soil.

Erosion control was the biggest concern for Grosshans, who was tired of seeing his strip-tilled fields washed out with heavy spring rains. The flooding in 2019 was eye-opening, as his hillier acres saw an unprecedented amount of erosion. Damage from that event is still apparent in some areas. "Last year we got a six-inch rain in early May in like an hour. Extreme heavy rainfall really needs good soil structure or else there's erosion," he said. "I am interested in the long-term sustainability of the soil, especially for fields that I farm that are more challenging."

Grosshans partnered with the NRD and NRCS to take advantage of funding and technical assistance for installing cover crops. He planted 350 acres of rye after corn and beans in fall 2021 and terminated it prior to planting in spring 2022.

"For a few years, I've been interested in trying cover crops, at least prioritizing heaviest need acres," Grosshans explained. "This was the first year we got our ducks in a row, enrolled in the program, got the seed and the application ironed out, and made it happen."



There has been a learning curve, but Grosshans says the practice has been worthwhile and he plans to expand use of cover crops to include more acres this fall while further reducing tillage. He acknowledged that making these kinds of management changes is challenging, but he recommends that other producers consider adding practices strategically where it makes sense for them. "Pinpoint acres that you feel would really benefit and then just jump in and try it on a small scale, one field or two fields, something that's easily manageable that's not going to get away from you," he advised. Every farm operation is different and there are many variables to consider. For Grosshans, a strategic approach included identifying the acres where practices would have the biggest immediate impact. "The farms that are susceptible to eroding, those are the ones we are working to

convert to a minimum or no till, or spot tillage, and add cover crops. Reducing erosion, that's the end goal."

The funding Grosshans receives via the NRD and NRCS offsets costs for five years while the practices get established. "Without having financial assistance, it would be really hard [to implement cover crops]," he said, when you consider seed, application, and termination. With chemical and fuel costs rising, it's too expensive for most farmers to do it without help. "You need to see a major benefit on soil health and soil productivity."

Year One: Lessons, Challenges, and Surprises

This first year has been more experimental, as Grosshans evaluates what the pros and cons are to cover crops and what's feasible for his system. Some of his cover crop seed was broadcasted, while the rest was tilled in, providing mixed results. In the future he plans to use a no-till drill to apply the seed. "Getting a good consistent growth without drilling or doing tillage is challenging," he noted. Another challenge is the timing of application. This far north, cover crops are hard to get planted in the fall behind commercial corn, which may not be harvested until early November. It's easier after seed corn and soybeans, as they are harvested earlier.

"There are undeniable benefits, like suppressing weeds. It's a good weed control measure, provides a lot of ground cover once it is terminated. It may suck up a little moisture in the spring, but if it's wet, that's going to enable things to dry out quicker so you can get out there sooner," he said. "Once it is killed off and you've got a grass mat cover on the ground, that does help shield the soil from drying out from sunlight and wind." As the biomass breaks down it is providing food for the microbial activity, which Grosshans believes will eventually improve productivity. "It really needs to be coupled with the no till, which is what we're trying to do on a couple of these farms where we've had long-term erosion problems," he said.



"I like the idea of having something growing year-round. Soil stability, overall soil health is going to be better," he said, noting he's also interested in the benefits of sequestering carbon. Timing of application and termination of cover crops was tricky to figure out, as moisture plays such a crucial role in getting the cover crops established so they can provide maximum benefit. Grosshans suggests that if there isn't a timely rain in the fall, then farmers should irrigate after planting cover crops to ensure germination. In the spring, if there is a lot of moisture and warmer weather, rye can grow very quickly and then become more challenging to terminate.

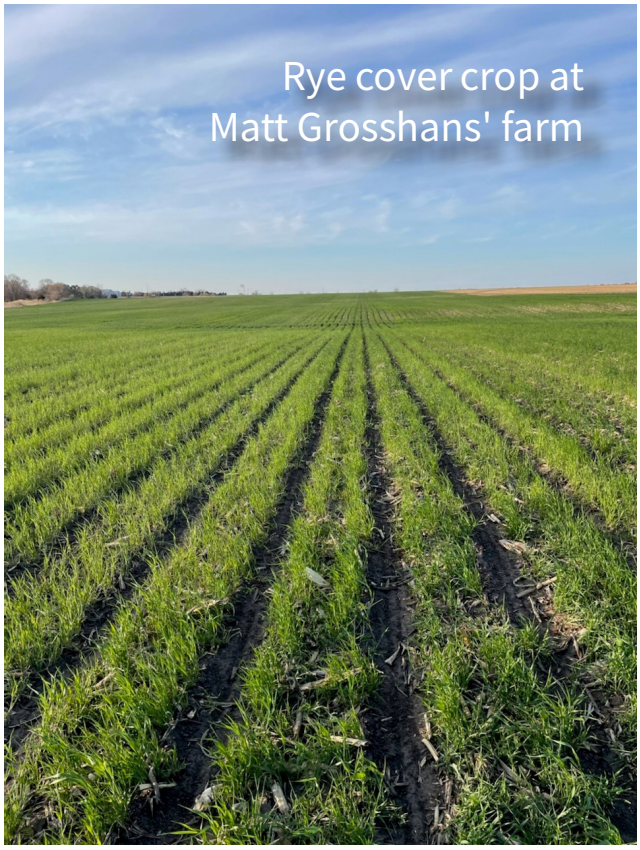
"Overall, we've had really good luck this year," he said. "Where it did get established, it really grew pretty well…We got good enough growth that I feel like the root systems are going to provide some stability to the soil if there's a heavy, fast rain." He noticed the benefit through the exceptionally windy month of April, as he could see the soil blowing off conventionally tilled fields without covers. Where he had implemented new practices, the soil stayed in place despite the winds and dry weather, followed by a week of heavier rainfall in May. "I was extremely happy to have covers on some of these fields, because they didn't blow or wash out at all," he said.

Grosshans says he really didn't know what to expect

SOIL HEALTH

when he started this process, but the biggest surprise has been the curiosity and interest from other farmers in the area. They've asked him what he's doing, why he's doing it, and how it's going. It has led to some good conversations about the benefits and challenge of making these practice changes. "It's hard to deny that it's going to be more work," he tells other farmers. "Even if you have someone else apply the cover crops, it's now more management, more to keep track of, so that is a deterrent for some. It's not the 'easy button' in any way." But in the end, Grosshans believes it will be worth the extra work to save his soil from the threat of further erosion.

"The fact that the NRD and NRCS are providing the means to get cover crops out there…it's a good step to get guys to at least consider it," he said.


Rye cover crop at Matt Grosshans' farm

Nebraska Soil Carbon Project Year 1 Stats (2020-2021)

# of Producer Applicants	7
Total $$	$411,681.94
Total Acres	1309.1

Nebraska Soil Carbon Project Year 2 Stats (2021-2022)

# of Producer Applicants	6
Total $$	$461,311.56
Total Acres	1917.2



Project GROW Winter Workshop Offers New Ideas

- From a deep dive into the nitrogen cycle, to advice from Nebraska cover crop experts, to a look at the ag forecast for next year's growing season, the 2021 Project GROW Winter Workshop presented a variety of topics to local producers. Hosted by the Upper Big Blue NRD, the event offered morning and afternoon breakout sessions for those looking for information on a range of agronomic topics, including those who needed nitrogen management operator certification or continuing education credits for crop advisors.

  Videos from the event are available at www.upperbigblue.org/projectgrow.





SOIL HEALTH



Windproof

Cover crops hold soils in place, despite high winds

The wind was gusting up to 65 miles per hour in York County during the first week of April, a week that saw multiple days of high wind warnings across the state. Dan Leininger, water conservationist for the Upper Big Blue NRD, saw more than an inconvenience in this storm: as he looked across the tilled fields of dark soil that comprise most of the district, he saw the wealth of the state blowing away in the howling gale force.

Clouds of rich topsoil, lifted from fields and blasted south and eastward, never to return. The drought conditions across much of Nebraska, combined with sustained high winds, meant that erosion was inevitable on conventionally tilled fields where best management practices such as cover crops and diverse growing rotations are not in use.

According to the Natural Resources Conservation Service, erosion happens when soil is not adequately covered to protect it from water and wind. When uncovered soil particles become detached and are washed or blown away, soil health declines, and other resources are negatively impacted such as water and air quality. The impact on air quality was evident during the recent windstorm, as Leininger noticed the swirling clouds blow off the fields and across roads, creating a possible safety hazard for drivers, as well as making breathing without eating a mouthful of soil a challenge for anyone unfortunate enough to be outside on such a day. Visions of the Dust Bowl era are hard to deny.

It is a stark contrast to visit the Project GROW (Growing Rotational crops On Wellfield) demonstration fields on the northeast side of the City of York. Amidst the brown and gold stubble of the previous year's crop, vibrant green of new rye grass is coming up. The ground cover provided

by the small grain crop and the other remnant plant matter on the field means that even in high winds, the soil doesn't move. Unlike the fields that surround the GROW site, there is no loss of fertility here due to erosion. Beyond simply protecting the soil from being blown away, the cover crops are also providing nutrients into the soil that will be used by the alfalfa crop to be planted after the rye is harvested in July. These fields are getting richer while the neighboring fields are deteriorating in the current weather conditions, notes Leininger.

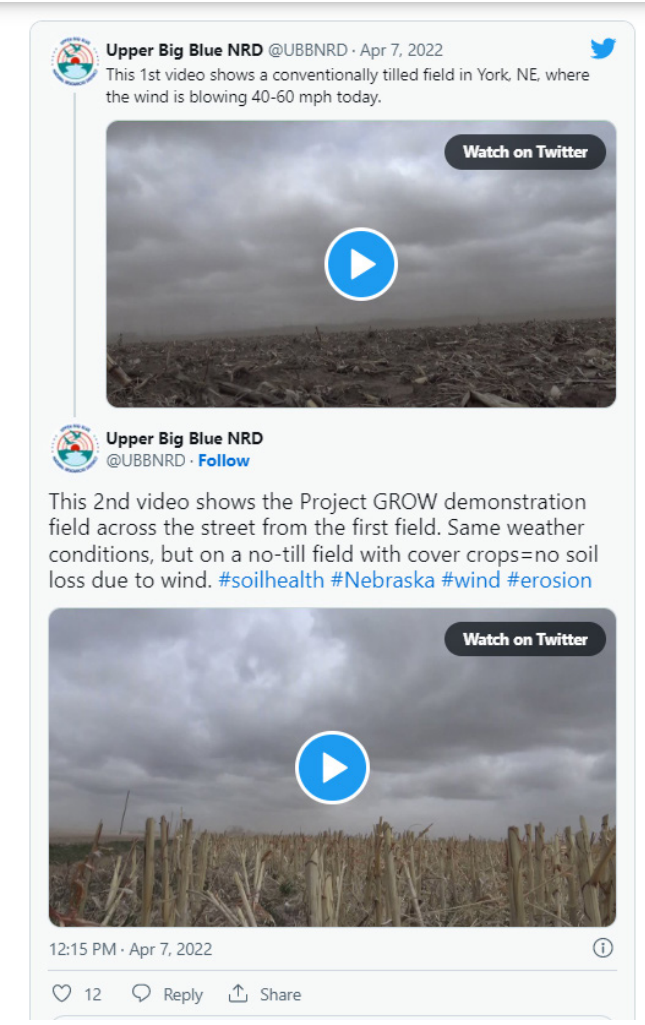
Project GROW is a collaborative effort between the Upper Big Blue NRD and the City of York to protect the soil over the city's wellfield through best management practices. The end goal is to safeguard the groundwater beneath the soil that provides drinking water to the 7,800 people who live in York. In addition to preventing erosion, these soil health practices are preventing nitrogen leaching that could contaminate drinking water, which is becoming a major problem for rural Nebraskans.

To Leininger, the benefits of cover crops and other soil health practices have never been more obvious. As severe weather events, including periods of drought followed by intense rainfall, become more the norm through this region, protecting and improving the health of the soil is becoming an urgent issue. Healthy soils absorb and retain moisture like a sponge and won't blow away in high winds. Conventionally tilled mono-cropped fields that lie naked to the elements for much of the year are doubly prone to erosion, from the wind as well as heavy rainfall.

Leininger recommends producers incorporate the five principles of soil health into their operations to prevent erosion and naturally improve fertility: Provide soil armor with cover crops and plant residue.

- Minimize soil disturbance through reduced tillage.
- Increase biodiversity through diverse crop rotations.
- Incorporate livestock to add fertilizer and increase biodiversity.
- Keep a continuous live root growing in the soil through use of cover crops.

The Upper Big Blue NRD and the NRCS have programs available to assist producers in the implementation of soil health practices. It can be challenging to get started with no till and cover crops, Leininger said. That's why the funding and guidance provided by the NRD and agency partners are available.



SOIL HEALTH



Testing Reveals Economic Impact of Soil Health

- A side-by-side comparison of soils from the Project GROW (Growing Rotational Crops on Wellfield) site and an adjacent field that is conventionally farmed shows the difference practices like no-till, cover crops, and rotational cropping can make.

In early May, NRD staff collected soil samples from two fields owned by the City of York that surround the city's wells. One of the fields is managed by the NRD as a demonstration site for soil health practices and profitability over maximum yield, while the other field is farmed conventionally and represents the agricultural norm for the area. The 0-6" soil samples were sent to Ward Laboratories of Kearney for a Haney Soil Health Analysis. This test offers a more comprehensive look at the nutrient needs and overall health of a soil system. The Haney Test differs from traditional soil tests in that it also evaluates some soil health indicators such as soil respiration, the water-soluble fractions of organic carbon and organic nitrogen and the ratio between them. Finally, a soil health score is calculated based on a combination of these different soil health indicators.

The test results were straightforward—the Project GROW field reported a soil health measurement twice as high as the conventionally farmed field.

Additionally, measurements of soil respiration and microbially active carbon were more than three times higher in the Project GROW field compared to the conventional field. These numbers reflect the biological activity present in the soil. This is significant, as greater biological activity leads to greater mineralization of soil organic matter, which essentially means free fertilizer. When there are more naturally occurring nutrients available in the soil, less inputs are needed to maintain fertility, meaning an increase in overall profitability. The test results showed a nutrient value of $153.46 per acre for the Project GROW field, while the conventional field had a nutrient value of only $98.68. Thus, to have the same measure of fertility, the conventionally farmed field

would need to add approximately $54.78 per acre in fertilizer inputs.

When it comes to residual nitrogen in the soil, the Project GROW field had half as much as the conventional field. This is an important finding, as residual nitrogen if not utilized by a growing crop can leach below the root zone into the water supply and causes contamination that can be costly to remove. Consuming water that is high in nitrate-nitrogen has been linked to negative health outcomes. This type of contamination is a major problem for communities across the Midwest.

The 160-acre Project GROW site has been managed by the NRD for the past five years. Previously, it was conventionally farmed by others with no soil health emphasis. These Haney test results show how much improvement can be made in a soil system in a relatively short amount of time by implementing soil health practices. The benefit of this improvement in soil health is a greater measure of protection for the drinking water supply for the residents of York.



Dan Leininger gives a soil health demonstration to area college students in fall 2021. As a simple way to measure soil microbial activity, Leininger buried a pair of cotton briefs in the Project GROW field in June and exhumed them in October to allow students to see evidence of the nutrient cycling provided by microorganisms.

PROJECTS



New Incentive Program Announced

Additional Payments For Producers in Water Quality Target Areas

The Upper Big Blue Natural Resources District launched a new incentive program for producers in portions of the Recharge Lake Watershed, the Beaver Creek Watershed, and some municipal Wellhead Protection Areas in the fall of 2021.

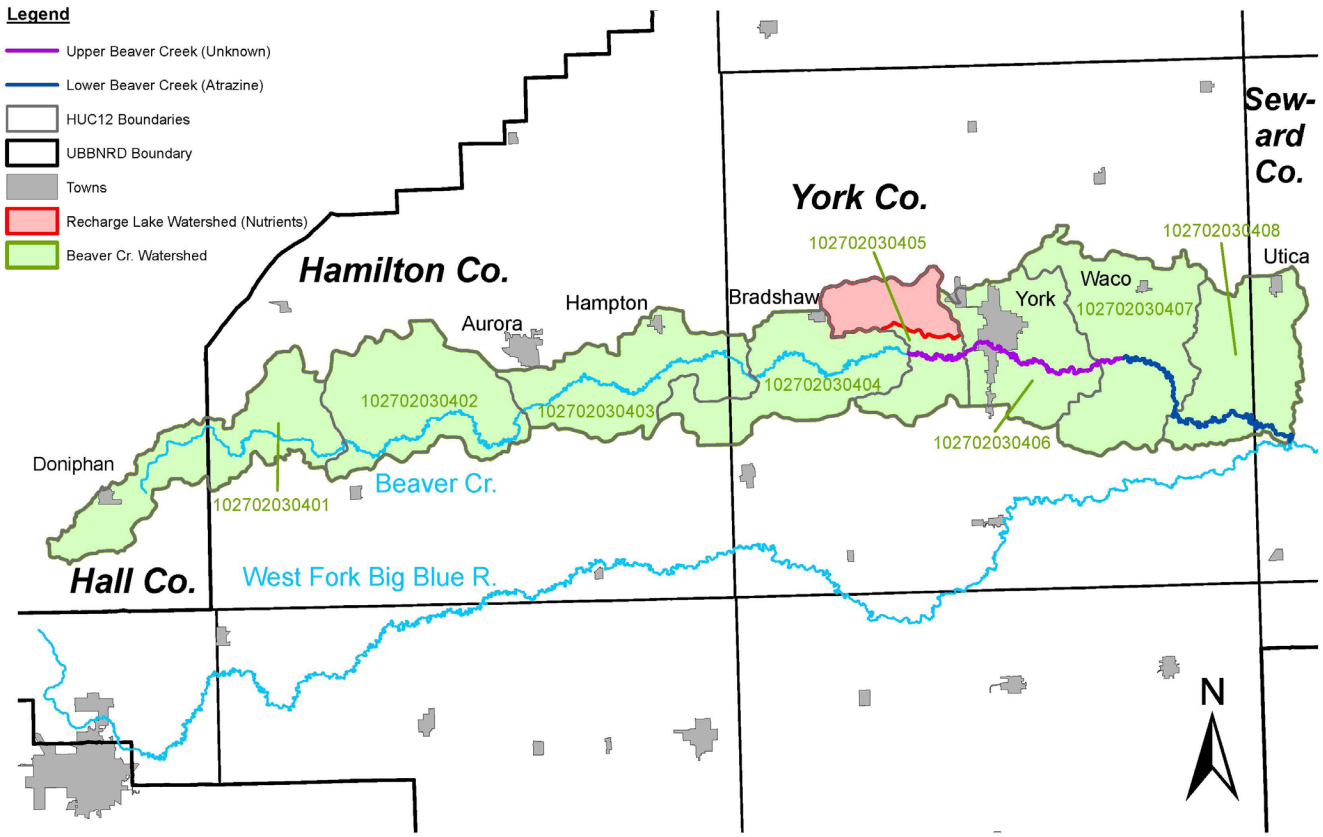
Practices included in this program are cover crops, buffer/filter strips, and land treatment practices. Qualifying producers are eligible for an incentive payment to install these practices starting in fall 2021.

The purpose of the program is to increase incentives for producers who are interested in installing these important conservation practices. Cover crops and buffer strips are simple ways to improve water quality, as they keep sediments and agrichemicals on the fields instead of washing into waterways.

"Our hope is that this program will allow more producers to plant cover crops and filter strips to improve the quality of the water in our district in key areas where we know we can make a significant impact," said Marie Krausnick, water department manager at the Upper Big Blue NRD. "We want to make it as simple as possible for producers who have been thinking about installing these practices to go ahead and take action now and get started."

These two practices were among those identified by a district stakeholders group as those that are likely to be adopted by the district's agricultural community, if the right incentives and supports were in place. The stakeholder group that made recommendations to the board of directors of the NRD included landowners, operators, agribusiness owners, recreationists, municipal representatives, and livestock producers in the Beaver Creek watershed. They met from January to March of 2021 to discuss water quality issues in the district and hosted an open house event to present ideas to the public. Materials from these meetings are available at www.upperbigblue.org/WQMP.

As with much of the state of Nebraska, water quality concerns in the area targeted by this program include nitrates, which are known to cause adverse health outcomes for humans. The program will also help with concentrations of atrazine and phosphorus, which harm wildlife that depend on streams, lakes, and rivers in the district. If widely adopted, this new incentive program could improve the quality of drinking water in the district, as well as improve the recreational opportunities at Bruce L. Anderson Recreation Area in York, where the fishery has been dramatically decreased due to poor water quality.



PROJECTS

Invasive Species Removed From Oxbow

An eagle-eyed recreation enthusiast spotted the trouble first: tall, reedy plants with fluffy seed heads were proliferating on the southern edge of property at Upper Big Blue NRD's Oxbow Trail Recreation Area.

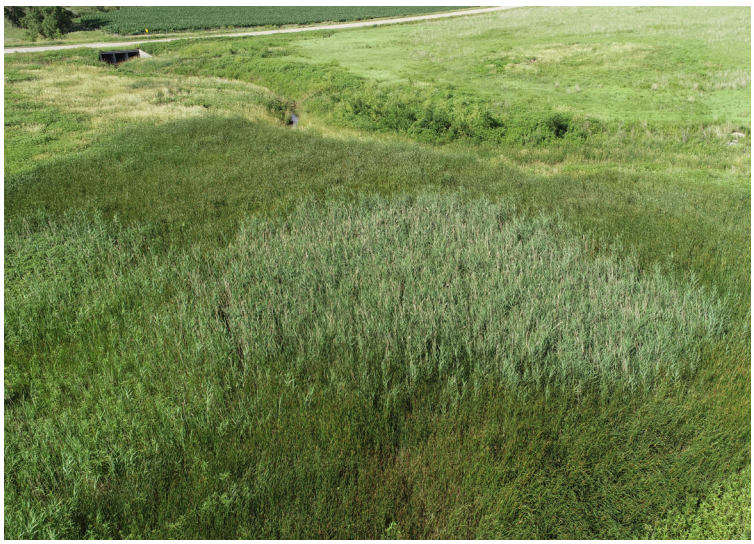
The distinctive looking plants were non-native Phragmites (frag-MY-tees), an aggressive wetland grass that outcompetes native plants and displaces wildlife. This species of reed can rapidly reach up to 18 feet tall and growth is exceptionally dense. The spread of phragmites is especially problematic at the NRD managed property, as it threatens two of the main goals of the area: human recreation and wildlife habitat. Phragmites can reduce native fish and wildlife populations by making the area uninhabitable, limiting recreation value for birdwatchers, walkers, fishers, boaters, and hunters. Phragmites creates a dense jungle of vegetation that, unchecked, will block out native vegetation while providing little or no food or shelter for most native wildlife.

The species poses another threat—fire. Phragmites grows very rapidly and each fall plant material dies back, creating large concentrations of tinder-dry vegetation that increase the potential for fast-spreading fires that can threaten surrounding property. This is a major concern for parts of Nebraska that are dealing with the impacts of drought.

Once the problem was identified, NRD staff acted quickly to remove the species at Oxbow. Due to the multiple ways Phragmites spreads (through seed production, underground rhizomes, and above ground stolons), it can be tricky to kill off completely once it gets established. Mowing or burning is generally unsuccessful in managing this species unless it is a concentrated, multiyear effort. The best way to control the species according to U.S. Fish and Wildlife is through the careful and targeted application of specific herbicides by licensed applicators.

The NRD contracted with an applicator, who used a drone to spray the phragmites stand with an EPA approved herbicide. The drone was the perfect tool to use for this job, as it was in a hard-to-reach marshy area and it required precision application to ensure that only the phragmites were impacted, not other plants growing nearby.

The NRD staff encourages all district residents to be on the watch for this invasive species and to alert the office if you spot it growing on NRD managed properties. If you see it on your land, call your county's noxious weed office. For more information on this topic, view this resource from U.S. Fish and Wildlife.





Funding Approved for All Inclusive Playground

The community effort to bring an all-inclusive playground to York has gotten an additional boost from the Upper Big Blue NRD.

In August 2021, the board of directors of the NRD approved the expenditure of $10,000 for this project, which will be used by the City of York toward the construction of a specialized bathroom facility at the park. Like other recent community enhancement projects in Geneva and Beaver Crossing, the City of York was able to apply for funds for the new playground through the NRD's parks program.

The parks program offers financial assistance to communities for the development or improvement of natural resources in nature areas, campgrounds, and park facilities. This program is available for any city, town, county, or school located in the district. The district will consider—on a case-by-case basis—providing cities and villages with planning and financial assistance for multiuse parks and recreation improvement/development that encourages tree planting, creation of wildlife habitat, open spaces, and other enhancements of natural resources. The proposed playground to be installed in York has a Nebraska natural resources theme, with equipment selected that reinforces the importance of play in the great outdoors.

The project, called the Peyton Parker Lane Playground, will be a destination for families, especially those with children with special needs, say project organizers. "It will be a destination for more than just people with disabilities," Julie Hoffman, one of the lead organizers. "This playground is being built for everyone but will accommodate anyone who lives with a disability."

The all-inclusive playground started as the passion project of Hoffman and April McDaniel, parents of children with disabilities who have passed away (Peyton, Parker, and Lane, whose memories live on in the name of the playground). Many have joined Hoffman and McDaniel's cause, including other local residents who have family members with disabilities, as well as community and business leaders. Unlimited Play, Crouch recreation, Little Tikes Commercial, and the City of York are all partners in the playground project, which is under construction in 2022.

PROJECTS

Table LT-1: Land Treatment Projects per County 2022

County	NRD	NSWCP	Total	% of Total
Adams	1	0	1	2.1%
Butler	3	13	16	34.0%
Clay	3	0	3	6.4%
Fillmore	4	0	4	8.5%
Hamilton	4	0	4	8.5%
Polk	0	0	0	0%
Saline	0	0	0	0%
Seward	12	1	13	27.7%
*York	5	1	6	12.8%
TOTAL	**32**	**15**	**47**	**100%**

Table LT-2: Expended Land Treatment Funds per County 2022

County	NRD	NSWCP	Total	% of Total
Adams	$704.17	$0	$704.17	0.4%
Butler	$20,874.11	$70,612.54	$91,486.65	56.0%
Clay	$8,393.57	$0	$8,393.57	5.1%
Fillmore	$10,615.69	$0	$10,615.69	6.5%
Hamilton	$13,594.15	$0	$13,594.15	8.3%
Polk	$0	$0	$0	0%
Saline	$0	$0	$0	0%
Seward	$26,186.47	$4,226.16	$30,412.63	18.6%
*York	$6,301.52	$1,831.24	$8,132.76	5.0%
TOTAL	**$86,669.68**	**$76,669.94**	**$163,339.62**	**100%**

* Denotes that 100% of county land area is located within the Upper Big Blue NRD.

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Table LT-3: NUMBER of Practices By Type of Land Treatment 2022

Practice Type	NRD	NSWCP	Total #	% of Total
Terrace System	1	6	7	14.9%
Mechanical Outlet	0	0	0	0%
Dam	0	0	0	0%
Grade Stabilization	0	0	0	0%
Diversion	0	2	2	4.3%
Waterway -- grassed	0	0	0	0%
Basin --Sediment Control	3	7	10	21.3%
Pasture Planting	0	0	0	0%
Windbreak Planting	26	0	26	55.3%
Planned Grazing	0	0	0	0%
Windbreak Renovation	1	0	1	2.1%
Subsurface Drip Irrigation	0	0	0	0%
Variable Rate Irrigation	0	0	0	0%
Streambank Stabilization	0	0	0	0%
Brush Management	1	0	1	2.1%
TOTAL	**32**	**15**	**47**	**100%**

PROJECTS

Table LT-4: COST of Practices By Type of Land Treatment 2022

Practice Type	NRD	NSWCP	Total $	% of Total
Terrace System	$8,159	$31,269.13	$39,428.13	24.1%
Mechanical Outlet	0	0	0	0%
Dam	0	0	0	0%
Grade Stabilization	0	0	0	0%
Diversion	0	$11,409.99	$11,409.99	7.0%
Waterway -- grassed	0	0	0	0%
Basin -- Sediment Control	$27,515.69	$33,990.82	$61,506.51	37.7%
Pasture Planting	0	0	0	0%
Windbreak Planting	$37,918.84	0	$37,918.84	23.2%
Planned Grazing	0	0	0	0%
Windbreak Renovation	$37,918.84	0	$37,918.84	23.2%
Subsurface Drip Irrigation	0	0	0	0%
Variable Rate Irrigation	0	0	0	0%
Streambank Stabilization	0	0	0	0%
Brush Management	$7,500.00	0	$7,500.00	4.6%
TOTAL	**$86,669.68**	**$76,669.94**	**$163,339.62**	**100%**

PUBLIC RELATIONS

Media Reach

- In the past year, the Upper Big Blue Natural Resources District had thousands of dollars worth of earned media with placements in district, regional, and national publications and channels, including:

TV and Radio

- News Channel Nebraska
- KTMX/KAWL York Radio
- KRVN Rural Radio

Newspapers and Magazines

- *Aurora News Register*
- *North Platte Post*
- *Hastings Tribune*
- *Henderson Service Press*
- *Seward Independent*
- *York News-Times*
- *No-Till Farmer*
- *Trader's Dispatch*
- *Farm and Ranch Nebraska Edition*
- *Doniphan Herald*
- *Nebraska Farmer*
- *Irrigation Today*
- *Grand Island Independent*
- *Midwest Messenger*


FRIENDS OF THE FARMER

Local control, local solutions, global mindset

Strong global meat demand tempered by challenges

SAVE THE SOIL

Program provides funding, allows farmers to install practices that safeguard soil health

Other

- National Association of Conservation Districts *News Clips*
- Nebraska Water Center *Water Current*
- Nebraska Farmer *Update*
- *Morning Ag Clips*
- *StripTillFarmer.com*

PUBLIC RELATIONS

Website Statistics, Top Pages Viewed and Duration

Analytics upperbigblue.org All Web Site Data

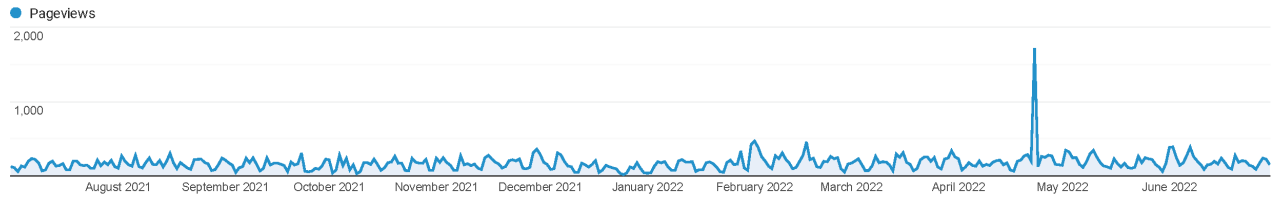
Go to report

Pages

All Users
100.00% Pageviews

Jul 1, 2021 - Jun 30, 2022

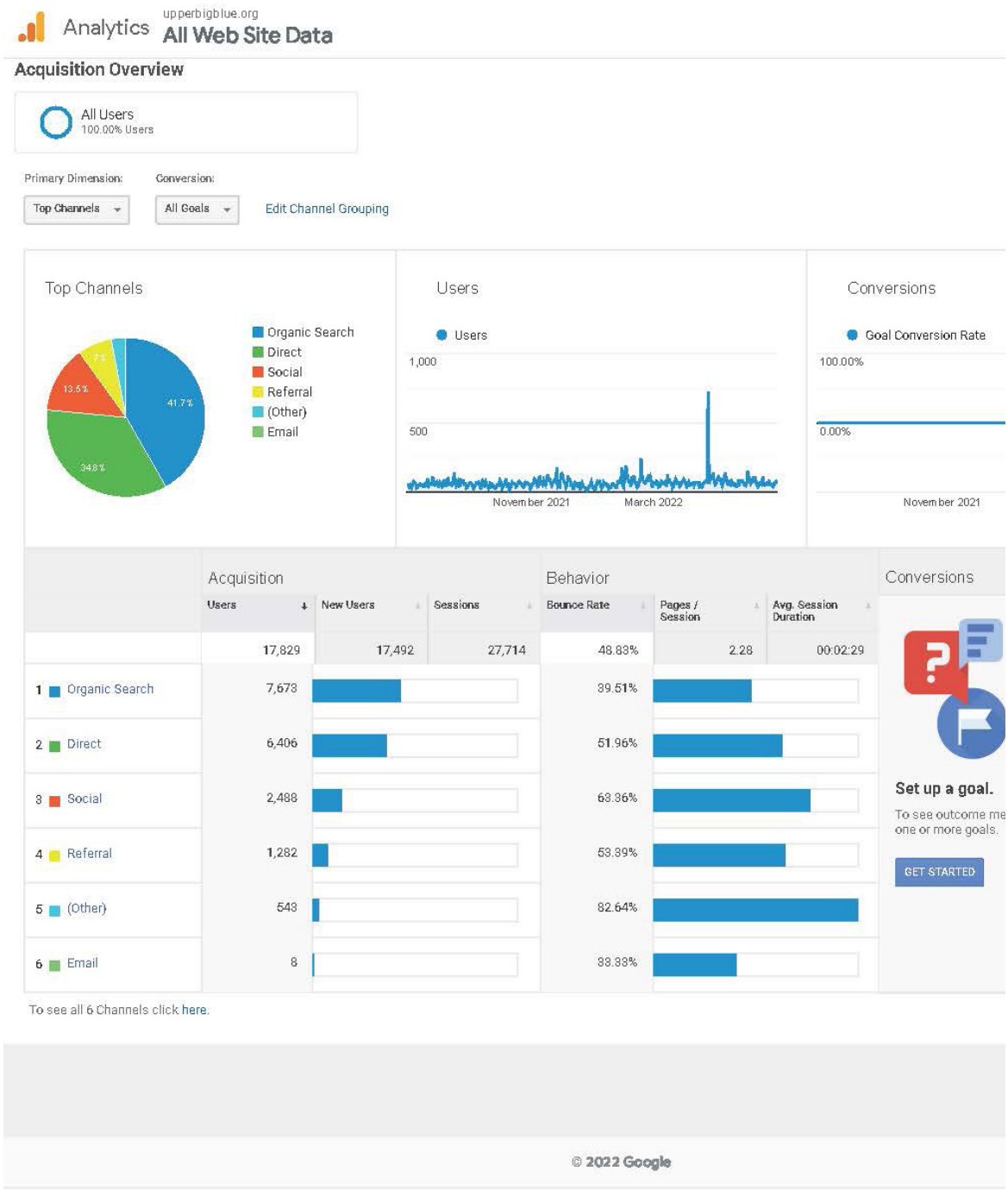
Explorer



Page	Pageviews	Unique Pageviews	Avg. Time on Page	Entrances	Bounce Rate	% Exit
	63,074 % of Total: 100.00% (63,074)	49,263 % of Total: 100.00% (49,263)	00:01:55 Avg for View: 00:01:55 (0.00%)	27,540 % of Total: 100.00% (27,540)	48.83% Avg for View: 48.83% (0.00%)	43.66% Avg for View: 43.66% (0.00%)
1. /	17,314 (27.45%)	12,534 (25.44%)	00:01:33	11,940 (43.36%)	37.52%	39.46%
2. /about/recreation-areas	2,250 (3.57%)	1,457 (2.96%)	00:00:39	744 (2.70%)	42.34%	27.64%
3. /programs/online-reporting	2,118 (3.36%)	1,559 (3.16%)	00:06:31	736 (2.67%)	19.60%	64.92%
4. /employment	2,060 (3.27%)	1,763 (3.58%)	00:02:28	1,049 (3.81%)	77.05%	69.66%
5. /recreation-areas	1,761 (2.79%)	1,045 (2.12%)	00:00:37	604 (2.19%)	34.22%	22.83%
6. /staff	1,650 (2.62%)	1,400 (2.84%)	00:02:56	417 (1.51%)	61.45%	54.06%
7. /trees	1,646 (2.61%)	1,275 (2.59%)	00:03:14	817 (2.97%)	39.16%	55.65%
8. /board	1,519 (2.41%)	1,203 (2.44%)	00:04:04	538 (1.95%)	34.92%	55.50%
9. /pioneer-trails-recreation-area	1,500 (2.38%)	1,192 (2.42%)	00:02:52	672 (2.44%)	37.83%	52.27%
10. /bruce-l-anderson-recharge-lake	1,491 (2.36%)	1,129 (2.29%)	00:02:25	534 (1.94%)	34.99%	45.61%

© 2022 Google

Website Statistics, Traffic Sources



PUBLIC RELATIONS

Education: Burke Scholars

- In 2021, three students were chosen as Burke Scholars. These students received scholarships of $2,000 each to pursue studies at a Nebraska college or university to study natural resources or a related field.



Alena Carlson is currently pursuing a degree in recreation outdoor management at University of Nebraska--Kearney where she was recently named to the dean's list. The child of Jerry and Gloria Carlson, Alena graduated from Aurora High School in 2019. Her high school activities and accolades included Junior Leadership Academy, NCPA academic all-state, National Honor Society, varsity softball, choir, and band. Her future plans include a career as an outdoor education specialist with Nebraska Game and Parks.

Blake Frink is a 2021 graduate of Adams Central High School. He plans to attend the University of Nebraska--Lincoln this fall to study agribusiness. After graduation he hopes to return to the Hastings area and to be part of the fourth generation of his family to farm. He is especially interested in advances in agricultural technology and conservation. The son of Jason and Shannon Frink, Blake was very active in high school and was regularly recognized for excellence in academics and extracurricular activities. He was involved in FFA, football, 4-H, and Quiz Bowl. He was also engaged in science fairs and other competitive events in agricultural technology, as well as livestock judging and state fair horticulture activities, for which he accumulated many ribbons.



Makennen Havlat is a 2021 graduate of Milford High School. A passion for wildlife and natural resources have guided her future plans, which involve studying rangeland management at Chadron State College and eventually working for an agency like Nebraska Game and Parks or the US Forest Service. The daughter of Doug and Kendra Havlat, Makennen has been heavily involved in FFA: she has served as the chapter president and reporter, and has annually competed in land judging, range judging, livestock judging, leadership development and career development events, and Envirothon. She was also active in musical theatre, band, and archery team. She's been a member of Seward County 4-H for ten years and has used that organization's competitive opportunities to develop livestock and other projects.

Education: Nebraska Water Leaders Academy

- Amy Jones, executive director of Prairie Plains Resource Institute in Aurora, is the first recipient of the Nebraska Water Leaders Academy (WLA) sponsorship from the Upper Big Blue NRD.



This sponsorship opportunity was announced in 2020 and Jones is the first person to apply for the program through the NRD. Jones has been with Prairie Plains for 17 years and was recently named to the top leadership position. Previously, she served as the administrative director, office manager, and development coordinator for the organization. She also has experience in sales, marketing, and media in the banking and telecommunications fields.

In a letter of support submitted by Brad Bangs, president of the Prairie Plains Resource Institute Board, Jones was described as "a strong communicator" with "intense passion for connecting people of all ages with the land." Jones says that she is interested in the Water Leaders Academy for "the opportunity to learn more about water resources in Nebraska and to be a part of conversations regarding our natural resource challenges and opportunities with other leaders from around the state."

The Nebraska Water Leaders Academy (WLA) seeks to provide learning opportunities to citizens that focus on cooperative approaches to solving the state's water issues, both of quantity and quality. Since 2009, cohorts of people from across the state (and a few from beyond Nebraska's boarders) have participated in the year-long program, seeking practical solutions to resource challenges. The program includes six 1.5-day sessions held at various locations across Nebraska, featuring expert faculty, field trips to see Nebraska's natural resources up close, hands-on educational opportunities, and networking with professionals.

This training will make Jones a more valuable resource to the district, as her work with Prairie Plains will dovetail neatly with the goals of the Water Leaders Academy and the NRD.

Prairie Plains Resource Institute has been providing high-diversity, local-ecotype prairie restoration services in southeast Nebraska since 1980. The institute owns eight prairie preserves across the state and offers several award-winning summer education programs for youth. "Grasslands provide valuable filtering services to our water resources, and our prairie restoration efforts are often conducted on or near watersheds," said Jones. "It would be beneficial to hear more about how our services could be offered to a larger audience to help improve water quality issues while enhancing habitat and providing more natural spaces for people to enjoy."

The sponsorship through the NRD will reimburse Jones for 75 percent ($1,500) of the cost of her participation in the WLA. The purpose of this sponsorship is to provide training to those who may eventually serve on the NRD board of directors or in another water leadership capacity. This sponsorship opportunity is limited to those who reside in the Upper Big Blue Natural Resources District, though anyone may apply to the WLA. The selected applicant is expected to give a brief presentation to the board upon completing the program.

PUBLIC RELATIONS

Birds and the Bees: Pollinator Event

- Dozens of youngsters clad in vibrant orange tee shirts and filled with "school's-nearly-out" energy packed the practice gym at York High School on Thursday for a Pollinator Day event, hosted annually by Nebraska Pheasants Forever. More than 130 students from local public and private schools participated in hands-on learning that reinforced the message: if you like to eat, you should care about pollinators.

Through presentations from Pheasants Forever, Upper Big Blue Natural Resources District, and University of Nebraska Lincoln College of Agricultural Sciences and Natural Resources, students learned about pollinator habitat requirements, what pollinators do, and why they are vital to a flourishing ecosystem. From the humble honeybee to the celebrated Monarch butterfly, students learned that pollinators are an essential component of agriculture in Nebraska.

"Without pollinators, we wouldn't have ice cream!" Nathan Pflueger, a precision agriculture coordinator for Pheasants Forever, told students, linking the plants that cows eat to the beetles, moths, and even spiders whose pollination activities keep the plants proliferating.

Pflueger also showed the kids a picture of the inside of a pheasant chick's crop (part of its digestive system) so they could see for themselves that pollinators form a foundational element of the food web for Nebraska's game birds. In the wild, pheasants eat only insects for the first month of their life. Pollinators not only keep the chicks' habitat full of blooming ground cover, they provide essential protein in their diets.

Students buzzed from station to station in the gym, collecting knowledge like pollen at each stop. A favorite was seeing the activity inside a beehive and learning about the social hierarchy and daily habits of these complex social creatures.



They also spent time learning about native Nebraska plants that make great pollinator and pheasant habitat, including big and little bluestem grasses, several milkweed varieties, purple coneflower, and blanket flower. Then they put their newly acquired knowledge to good use by planting a variety of these and other plants on a two-acre plot near York's wellhead on the northeast side of town. The plot is part of the Project GROW

demonstration site that is operated in partnership with the City of York and the Upper Big Blue Natural Resources District. The purpose of Project GROW is to improve the soil above the city's wellfield as a means of protecting the water that residents consume.

Students hand-broadcast buckets of seeds and used trowels to break up the dry soil to plant more mature plant starts. They also enjoyed exploring the great outdoors, from catching a garter snake to collecting bird feathers, to investigating the many badger holes. At the end of the activity, students were given their own packets of pollinator mix to plant at home, along with a stick of honey to enjoy.

To complete the educational experience, students will return this autumn to see how their plants have grown. Led by researchers from the University of Nebraska's Department of Entomology, students will have the opportunity to tag monarch butterflies as they migrate south for the winter. As monarchs and other pollinator populations continue to decline due to loss of habitat and food sources, pesticide overuse, and disease, activities that engage young people in conservation activities are ever more urgent.

Funding for this event was provided in part by EPA Region 7 Environmental Education Grant NE97768001. Pheasants Forever's Pollinator Habitat Outreach Program is made possible by funding support from Corteva, Bayer, USFWS, Bass Pro Shop's and Cabela's Outdoor Fund, Pollinator Partnership, Monarch Joint Venture, and the organization's local volunteer chapters.

For more information on Nebraska pollinators and how you can help protect them, visit http://outdoornebraska.gov/researchforpollinators/.

According to the Nebraska Department of Agriculture, "Honey bees pollinate more than 90 cultivated crops with a combined annual value of $10 billion. Nebraska crops dependent upon bees for pollination include: alfalfa, vetch, sweet clover, sunflower, and other seed crops. Many fruit and vegetable crops also benefit from bee pollination including: watermelons, cucumbers, cantaloupe, pumpkins, apples, cherries, and pears. Honey bees pollinate many plants that are important in soil conservation. Many of the wild flowers that cover our woodlands and meadows also depend on honey bee pollination. We must protect and conserve our pollinators. No other insect is more easily managed or relocated for specific pollination, nor does any other insect pollinate such a wide range of plants."





PUBLIC RELATIONS

Local Control, Local Solutions, Global Mindset

Brazilian delegation visits Nebraska to learn about water resource management

- How do Nebraskans manage water resources? What are the agricultural and environmental challenges in the state regarding water quality and quantity? And what can key decision makers from other heavily agricultural regions of the world learn from the way things are done here?

These questions and others were explored recently as a group from Mato Grosso, Brazil, visited Nebraska for a week of learning and networking. The group of more than 20 state government secretaries and technical staff, farmer association members, university scientists, and others involved in agriculture were hosted by the Daugherty Water for Food Global Institute (DWFI) at the University of Nebraska. During their visit to the Cornhusker State, the delegation spent a day in the Upper Big Blue Natural Resources District, meeting with NRD staff as well as district producers to get a closer look at the realities of water use in the state.

Nebraska's NRD system is unique within the United States. The local control of 23 natural resources districts all working in the same 12 areas of responsibility, paired with data-driven leadership from state agencies, makes Nebraska a useful case study for other states and countries. The group from Brazil had many questions about drought and allocation regulations, irrigation efficiency advancements, and water quality concerns including nitrates. Marie Krausnick, assistant general manager of the Upper Big Blue NRD, presented to the highly engaged consortium and answered questions about how decisions are made at the state and local level to address water quality and quantity challenges.

Nebraska has about 9 million acres of irrigated cropland; 1.2 million of those irrigated acres are in the Upper Big Blue NRD area, which is the district with the greatest amount of groundwater irrigated acres in the state. Like Nebraska, Mato Grosso producers raise mostly corn and soybeans, with the addition of cotton, dry beans, and pulses. Due to the warmer climate in Brazil, many producers are able to raise two to three harvests per year, as long as there is adequate irrigation. The group from Brazil was interested to learn more about how Nebraska has managed water resources through periods of drought when the needs of irrigators continues to increase.



The farm of Jerry and Susan Stahr in York County gave the group a first-hand look at how data, policy, and NRD programs translate into action at the individual field level. Jerry presented to the group on a wide-range of topics, from the added efficiencies provided by chemigation and soil moisture probes, to the on-farm research projects he has participated in for years that have informed his tillage and fertilizer practices. The Stahrs have farmed a section of ground east of York for more than 40 years, including a variety of row crops and livestock. Jerry proudly pointed out the



latest addition to their farming operation: a solar panel array that will provide electricity to their farmstead. They have sought to create continuous improvement to the land, as Jerry feels deeply that his successful stewardship of natural resources is a gift he is responsible for passing on to the couple's 11 (soon to be 12) grandchildren.

This is not the first time that Jerry has presented to international delegations with the partnership of DWFI. Over the years, several other groups with the institute have visited his farm to hear about his approach to agriculture and conservation. In 2018 he traveled to Brazil to speak at conference on these topics, as well.

Brothers Brandon and Zachary Hunnicutt farm a variety of row crops on more than 2,000 acres in Hamilton County near Giltner. Like the Stahrs, the Hunnicutts are serious about stewardship and excited about the opportunities to improve their farm by implementing conservation practices working closely with Jenny Rees, UNL extension educator. The Hunnicutts have been part of a three-year study with the Upper Big Blue NRD, Nebraska Extension, and the Nature Conservancy to test the viability of seeding cover crops between corn and soybean rows post emergence in the spring, rather than the traditional post-harvest cover crop application in the fall. Brandon told the group from Brazil about the positive impact their farm has witnessed with the addition of cover crops, including the increase in soil organic matter that improves the moisture holding capacity of the soil. Some people think cover crops will take too much moisture from the field and affect the crop, however Brandon says that in his experience, soil moisture readings are consistently higher where there are cover crops. The Hunnicutts also showed the group from Brazil their autonomous center pivots, which are equipped with ground penetrating radar that can calculate soil moisture and determine when irrigation is needed.

The delegation from Brazil was very appreciative of their hosts in Nebraska and the willingness of NRD staff as well as local producers to shine a light on the challenges and solutions faced by those who manage water in the state. According to DWFI's website, every day, nearly a billion people in the world are food-insecure, without enough safe and nutritious food to lead healthy and active lives. Many of them are also water-insecure, without reliable access to an adequate amount of clean water to meet their needs. By 2050, the global food demand will double to meet the needs of nearly 10 billion people. To ensure sustainable food and water security in the face of population and income increases, a changing climate, and the growing demand for scarce water resources, it is imperative to improve water management in agricultural and food systems.

Dr. Christopher Neale, director of research at DWFI and professor of biological systems engineering at the University of Nebraska–Lincoln, acted as host and interpreter for the group from Brazil during their visit to Nebraska. In thanking the NRD staff and district producers, Neale expressed the importance of these kinds of learning opportunities. "Nebraska has a unique way of managing its water. Sharing what we have learned here in Nebraska helps others around the world increase their agricultural productivity, while still protecting important water resources and the environment."

FORESTRY & PARKS

The NRD and Trees--50 Years of Tree Planting

- The tree planting crew for the spring of 2022 consisted of Jay Geiger, Andy Larkin, and Kyle Yrkoski, district forester. The district purchased 23,125 trees/shrubs. The trees and shrubs purchased were used for farmstead windbreaks, field windbreaks, habitat areas, and riparian plantings.

  The trees purchased from Bessey Nursery were picked up on April 19, 2022, and trees from Towner Nursery were delivered May 5, 2022. The district planted a total of 7,112 trees for 29 cooperators, an average of 245.2 trees per cooperator. There were 215 customers that bought 16,013 trees/shrubs for hand planting.

  Thirty-one percent of the trees sold were planted by the district and 69 percent went out as hand plants this year. A total of 10.7 miles or 56,496 feet of weed barriers was laid by a private contractor to enhance the tree plantings.

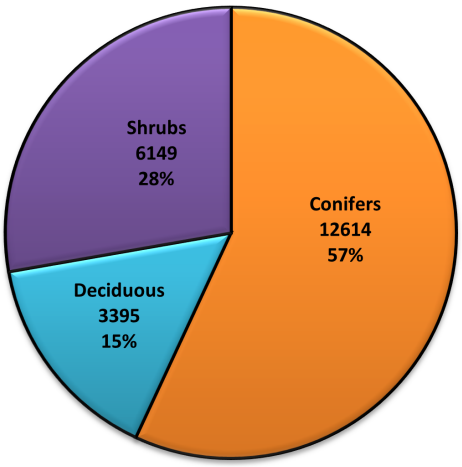
  The weather conditions during the weeks of April and May were hot and dry. Soil moisture was very dry on most sites. The soil was like concrete, which made planting extremely challenging.

  The district spent 16 days in the field planting trees. An average of 481.3 trees/shrubs were planted daily.

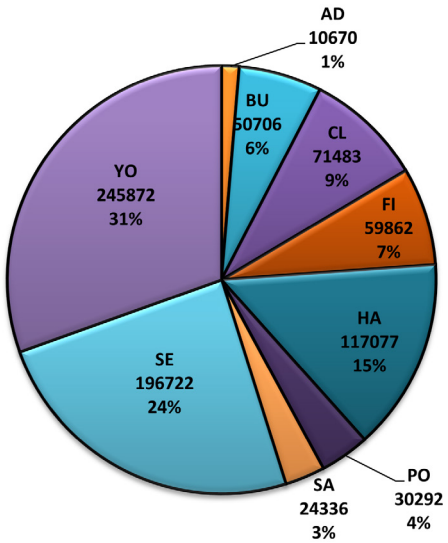
  Scheduled plantings were completed on June 2, 2022.

  The following is a synopsis of the expenditures and revenue for FY 2022.

TOTAL TREES SOLD BY SPECIES 2022



TOTAL TREES DISTRIBUTED BY COUNTY 1995 - 2022



Tree Planting Expenditures 2022

Machine Planting Materials Purchased
(includes shipping)

	Trees	Cost
NARD Bessey Nursery	19,700	$14,728.05
Towner State	3,425	$3,555.00
TOTAL	23,125	$18,283.05

Operating Costs

Tree Planter Repair	$68.75
Packing Material for Handplants	$3,266.41
Vehicle Mileage/Fuel ($0.585/mi)	$2,245.04
Nursery Dealers License	$83.00
Cooler Repairs	$229.00
TOTAL	$5,892.20



FORESTRY & PARKS

Tree Sales Report

Number of Trees Sold by County

	NRD Planted	Customer Planted
Adams	310	225
Butler	150	850
Clay	1,226	900
Fillmore	324	1,125
Hamilton	2,038	1,900
Polk	471	475
Saline	0	350
Seward	1,799	3,700
York	794	6,488
Total	7,112	16,013

Special Projects

Entity	# of Trees	Cost	Total
Polk County Extension (Osceola)	75	$0.80	$60
Kelly Nelson (Acre package drawing winner)	50		$55
Joni Ellis (Acre package drawing winner)	50		$55
UBBNRD	967	$0.80	$773.60
TOTAL	1,117		$942.60

Combined Total: 23,125 Trees

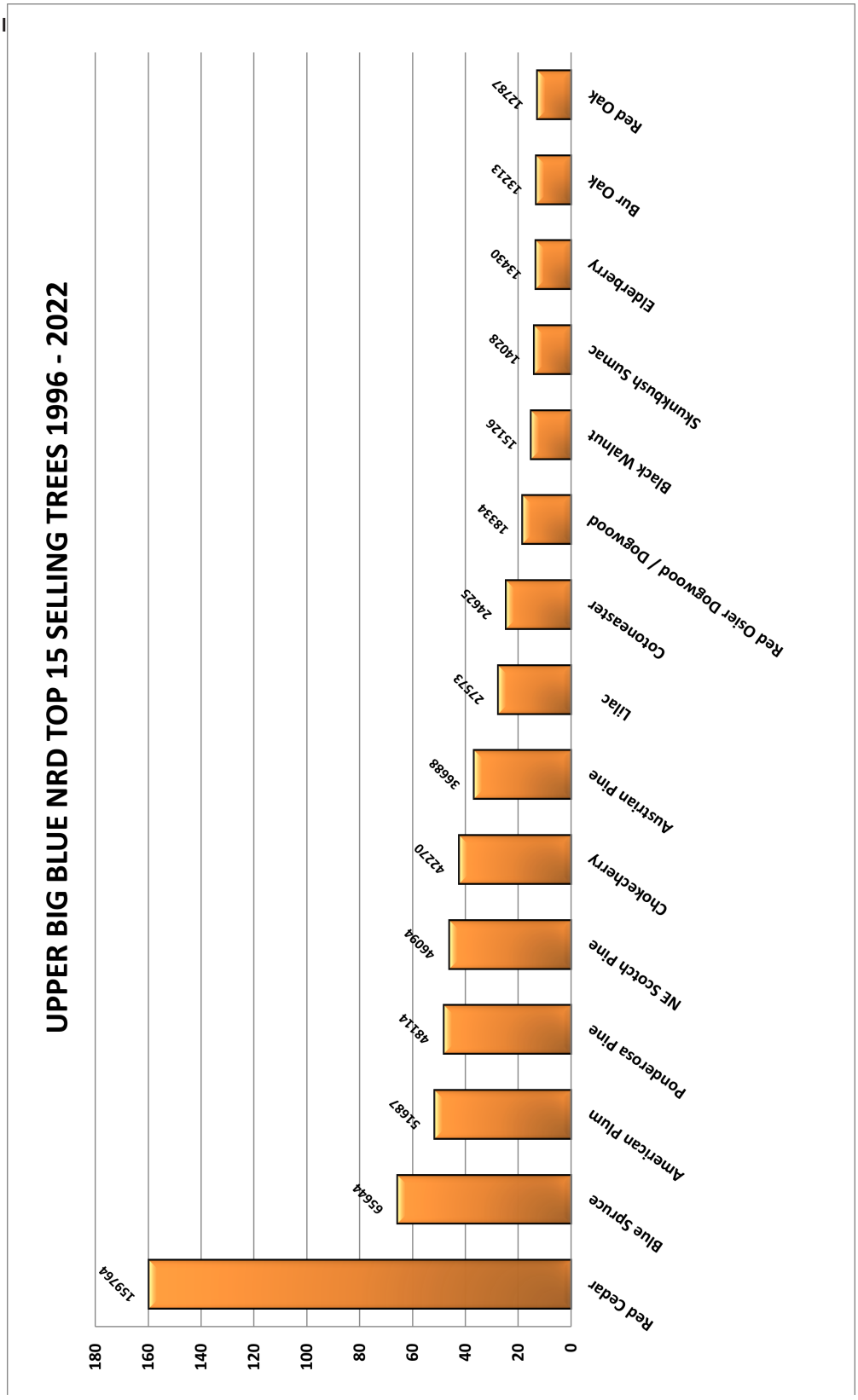
Tree Planting Revenue

Type	# of Trees	Cost	Total
NRD staff planted trees	7,112	$1.18	$8,392.16
Machine planting charge	7,112	$1.18	$8,392.16
		sub-total	$16,784.32
Customer planted trees	13,796	$1.18	$16,279.28
Acre Packages	22	$55	$1,210.00
		total	$17,489.28

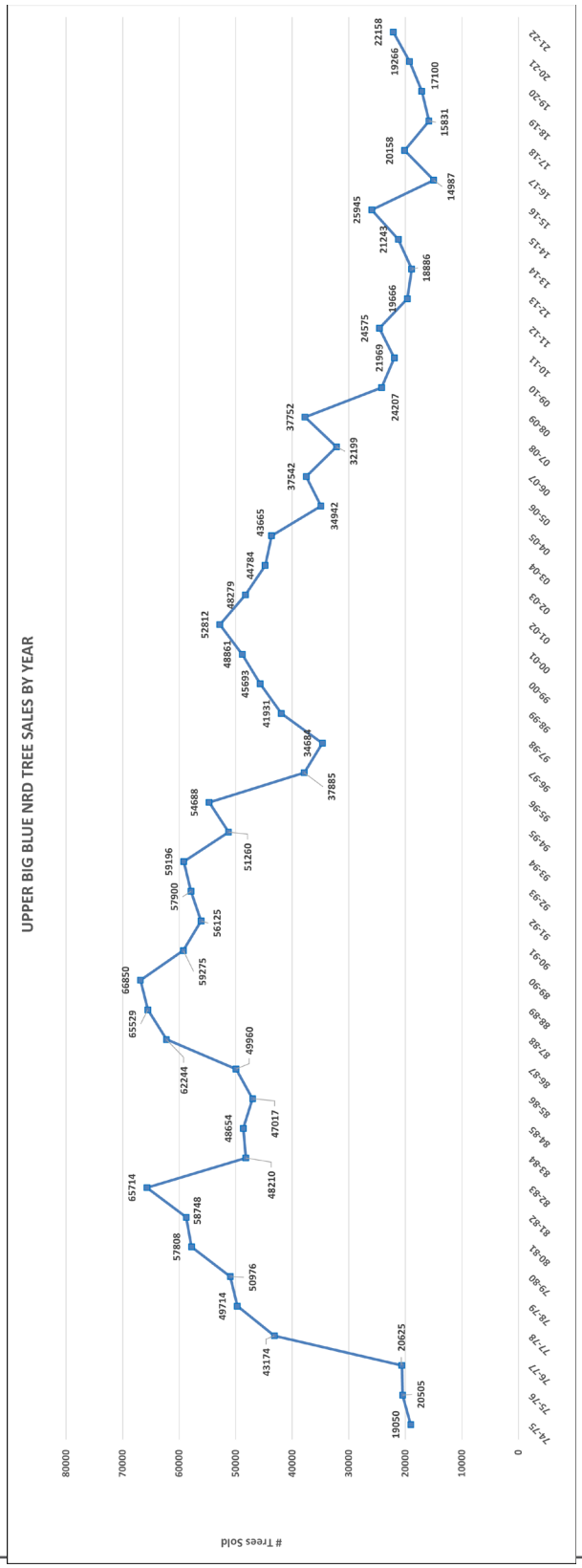
Total Revenue:
$34,273.60

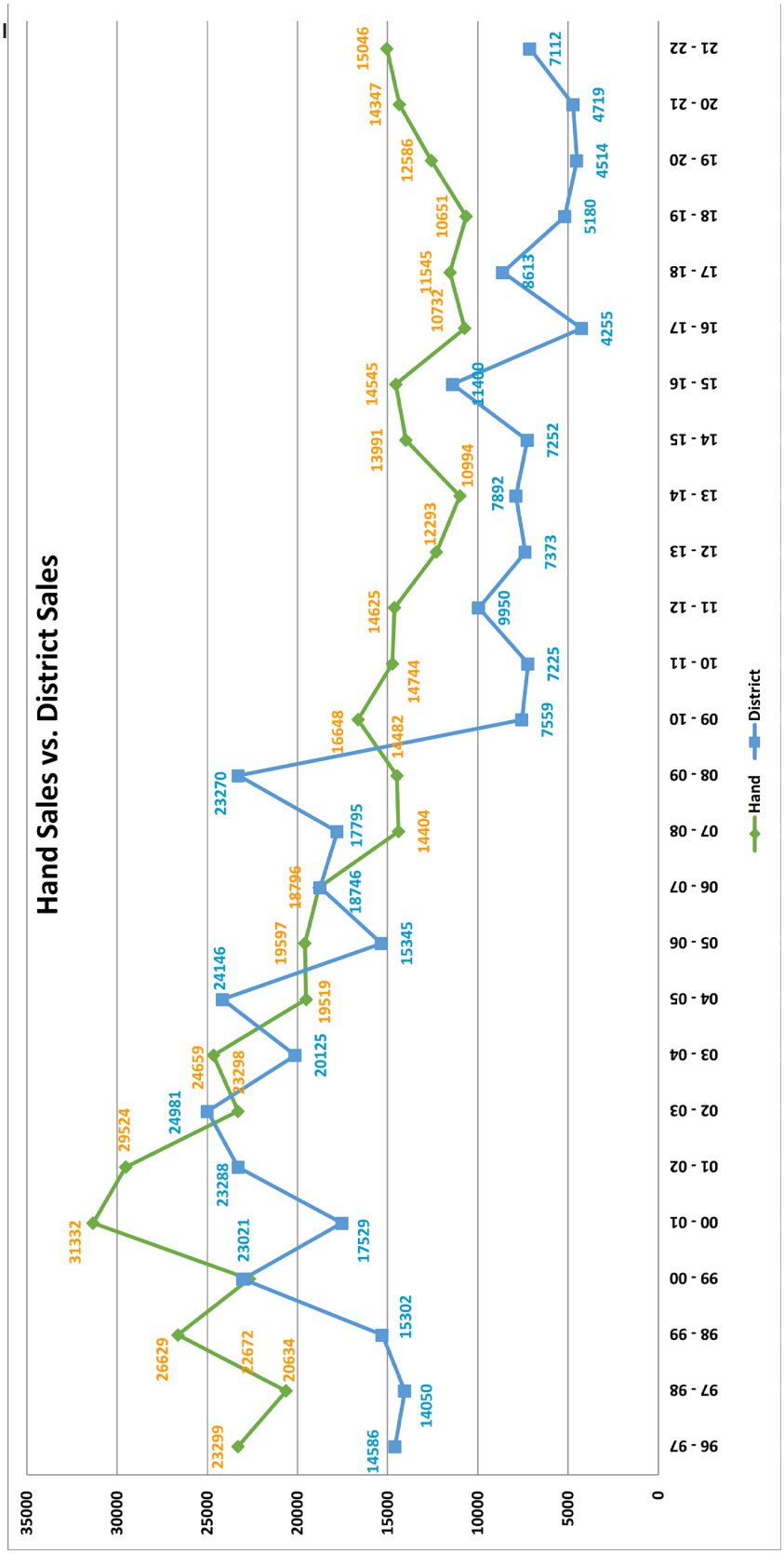
Total Expense:
$25,117.85

Total Gain:
$9,155.28


UPPER BIG BLUE NRD TOP 15 SELLING TREES 1996 - 2022
Red Cedar
159764
Blue Spruce
65644
American Plum
51687
Ponderosa Pine
48114
NE Scotch Pine
46094
Chokecherry
42270
Austrian Pine
36688
Lilac
27573
Cotoneaster
24625
Red Osier Dogwood / Dogwood
18334
Black Walnut
15126
Skunkbush Sumac
14028
Elderberry
13430
Bur Oak
13213
Red Oak
12787
180
160
140
120
100
80
60
40
20
0

FORESTRY & PARKS




Hand Sales vs. District Sales
35000
30000
25000
20000
15000
10000
5000
0
96 - 97
97 - 98
98 - 99
99 - 00
00 - 01
01 - 02
02 - 03
03 - 04
04 - 05
05 - 06
06 - 07
07 - 08
08 - 09
09 - 10
10 - 11
11 - 12
12 - 13
13 - 14
14 - 15
15 - 16
16 - 17
17 - 18
18 - 19
19 - 20
20 - 21
21 - 22
Hand
District
23299
26629
31332
24981
29524
24659
23298
19597
19519
18796
16648
14482
14744
14404
14625
12293
10994
13991
14545
10732
11545
10651
12586
14347
15046
14586
15302
23021
23288
24146
20125
18746
17795
23270
15345
17529
14050
9950
7559
7225
7373
7892
7252
11400
8613
4255
5180
4514
4719
7112

FORESTRY & PARKS



Nebraska Forestry Workshop Hosted by NRD

- The Upper Big Blue NRD hosted a statewide event for forestry professionals September 8-9 in York. The event drew more than 20 individuals representing Nebraska's NRDs and other state agencies to talk about challenges from tree diseases to public education.



Every year Nebraska's 23 natural resources districts plant nearly a million trees across the state. Many of these trees are installed as windbreaks around crop fields, livestock barns, and homes. These windbreaks have many benefits, from increasing livestock survival rates and feed efficiency, to reducing field erosion and filtering pollutants, to reducing heating and cooling costs for homes.

The tree workshop featured speakers from the Nebraska Forest Service and United States Forestry Service, Natural Resources Conservation Service, and the Nebraska Invasive Species Council. There was also time for roundtable discussion on issues facing tree planting in the state and the vital importance of continuing this work.

The second day of the event included a tour with stops in York and Geneva to examine trees and plantings. Attendees examined an established windbreak in need of renovation due to the loss of some trees from illness and age, as well as a recent planting around on an acreage around a new home. The final stop was to the campus of the Youth Rehabilitation and Treatment Center in Geneva to see a white ash that is listed on the Nebraska Champion Tree Register. When it was officially measured and recorded in 2006, the tree was 14 feet in circumference and 68 feet tall.

"We were pleased to be able to host this important event at the Upper Big Blue NRD," said District Forester Kyle Yrkoski, who was one of the organizers. "Planting trees is beneficial in so many ways. We, as foresters, want to learn all we can to make sure that trees are getting in the ground, getting well established, and having long and healthy lives. Events like this one are a great way to learn about the latest threats to our canopy and share ideas to increase tree success in Nebraska."

Trees for Conservation and Celebration

For 50 years, Nebraska's Natural Resources Districts have been committed to local conservation activities that safeguard soil and water resources. A bedrock of NRD programs has been tree planting, whether for windbreaks, wildlife habitat, or community parks and nature areas.

In the spring of 2022, the Upper Big Blue Natural Resources District provided more than 23,000 trees in the nine-county area it serves.

In addition to the successful Conservation Tree Program that is offered each year, this year the Upper Big Blue NRD also offered communities in the district the opportunity to plant a nursery stock tree (4-8 ft size) and be reimbursed for the cost (up to $300). These community tree plantings were in recognition of the 50th anniversary of Nebraska's NRD system, as well as the 150th anniversary of Arbor Day, Nebraska's tree planting holiday. The district communities of Beaver Crossing, Aurora, Stromsburg, Polk, Gresham, York, Waco, and Utica took advantage of this program and planted trees in public parks.

"Trees are great in parks, giving shade and blocking wind to make the property more usable in the summer," said Kyle Yrkoski, Upper Big Blue NRD district forester. "We were glad that several communities in the district celebrated our anniversary by adding trees to public land and enhancing their quality of life for their residents by improving their treescape."

The number of anniversary trees planted, however, pales in comparison with the number of trees sold through the NRD's Conservation Tree Program this year. The district forestry team planted more than 8,000 trees on properties from Hastings to Milford. The windbreaks they installed will protect homes and livestock, as well as provide wildlife habitat improvement and numerous other benefits. Additionally, almost 15,000 trees were purchased by individuals across the district to plant on their own.

"Each year, the Upper Big Blue NRD provides thousands of low-cost, bulk seedlings for planting across the district through our Conservation Tree Program," said Yrkoski. Orders for trees are collected November to March each year, then trees are distributed in April in time for spring planting. In total, the Upper Big Blue NRD has sold more than two million trees for planting in the district over the past half century. Across the state, Nebraska's NRDs have planted more than 100 million trees.

The Upper Big Blue NRD would like to recognize Executive Travel for offsetting the cost of a portion of five district planting projects this year as part of their commitment to reducing their carbon footprint.



FORESTRY & PARKS



Birds Abound at Teal View

If the early bird gets the worm, it's the early rising bird watcher that gets the photo.

The chooks and squawks of pheasants and turkeys, as well as the high-pitched cries of a killdeer and the vibrant song of red-winged blackbirds filled the air as a small group of nature lovers explored Teal View Wetland Education Area in the early morning hours on a Saturday morning in March 2021. The birding event hosted by the NRD drew a small crowd, but was a wonderful experience for those who attended.

Participants spread out across the 39-acre public wetland, some walking along the perimeter and others settling down among the dried stalks of vegetation to observe. The Nebraska Game and Parks Commission provided binoculars and birding guides for the event. Participants spotted a barn owl, a red-tailed hawk, geese, meadowlarks, and several other species.

Due to the low level of precipitation through the winter months, Teal View Wetland Education Area was quite dry. While it hasn't attracted the variety of ducks and other waterfowl this year as it did last year due to the dry conditions, the wetland was still filled with avian activity.
According to the Nebraska Game and Parks website, Nebraska contains more acres of wetlands than any surrounding state. These wetlands are very diverse and dynamic and include marshes, lakes, river and stream backwaters, oxbows, wet meadows, fens, forested swamps, and seeps. Wetlands are a vital piece of Nebraska's landscape as they provide water filtration, aquifer recharge, and wildlife habitat.

Teal View Wetland Education Area was restored in the last few years in partnership with Ducks Unlimited, Natural Resources Conservation Service, Nebraska Environmental Trust, and Rainwater Basin Joint Venture. Ducks Unlimited deeded the property to the Upper Big Blue Natural Resources District in 2021 as part of their Revolving Lands Program, which restores wildlife areas and then passes them on to other entities to hold in conservation easement while providing public access.

Most of Nebraska's network of wetlands has been destroyed or degraded in the last hundred years, as the land has been drained and converted to some

of the most productive agricultural real estate in the world. What has been lost is harder to quantify than the number of acres. Wetlands improve water quality by filtering agrichemicals before they enter the groundwater supply. They provide habitat for thousands of species of plants, animals, and insects. They reduce the impacts of flooding and prevent soil erosion. A functioning system of wetlands is an essential part of the landscape for a healthy and productive place to call home, for humans and animals alike.

Many of Nebraska's wetlands have been drained and filled to make way for row crops. Today the benefits of wetlands are being recognized more often as the intensity of rain events increase. As a result, there is a greater need for the flood control and water filtration wetlands provide.

The Upper Big Blue NRD partners with other agencies to protect this spot and use it to educate the public on the importance of wetlands in Nebraska. More birding events are planned for the property in the future, but it is open to the public for wildlife viewing at any time.







FORESTRY & PARKS

Gone Fishin'

Pioneer Trails Fishery Evaluated

It is overcast and cool on the lake at Pioneer Trails Recreation Area on the morning of June 1, as a team from Nebraska Game and Parks Commission (NGPC) readies their equipment: boats, buckets, long handled nets, and measuring boards.



"I'm not sure what we're going to find in there," says Brad Eifert, NGPC southwest district fisheries manager, noting the lake's cloudy water. Eifert and his colleagues, fisheries biologists Alex Engle and Drayden Bellamy, are dressed in green chest waders and neoprene gloves. The trio motors across the lake to the first of four fish traps they had set out the day before to begin a survey of the fishery. The last time such a survey was done was in 2017. Public access lakes across Nebraska that are regularly stocked with fish by NGPC are surveyed rotationally to ensure that the conditions in the lake continue to be adequate to maintain fish populations.

As two of the team members work together to haul the nets up out of the water, it is clear there are indeed plenty of fish in the 40-surface-acre lake near Aurora. The flopping mass of fish inside the trap net are deposited into large buckets on the boat, then examined one by one. Each wet and wriggling body is placed on a measuring board, then sizes and species are recorded on a clipboard. The biologists note the number of each species present and the condition of the fish, before releasing them back into the lake.

This net contains mostly channel catfish, the official fish of Nebraska, but also some white crappie. "Catfish are well suited to water of this turbidity, so we stock them every other year here," says Eifert, tossing an olive-brown, whisker-faced fish back into the lake.
Turbidity is a measure of the degree to which water loses its transparency due to the presence of suspended particulates. Erosion from nearby agricultural fields is a likely cause of the turbidity at the lake at Pioneer Trails, and many lakes in Nebraska. The more total suspended solids in the water, the murkier it is and the higher the turbidity measurement. This is a fine environment for catfish, as they hunt by smell and not by sight, however it can be a challenge for other species of fish, including largemouth bass, which rely on vision to catch their prey. The increased turbidity also means less plant growth in the lake, which leads to a loss of food and habitat for some fish species.

Still, there appears to be a decent number of fish in the lake at Pioneer Trails today, even with a higher level of turbidity. The second net trap Eifert and the team reach for is so full that they can't pull it into the boat. Filled with hundreds of struggling fish,

the net is dragged closer to the shoreline where the team gets out of the boat to catalog its contents. This one, too, is filled with mostly catfish, some reaching 27 inches in length (probably about eight pounds). According to US Fish and Wildlife, the average size for a channel catfish is 22 inches, but some can reach the gargantuan proportions of 52 inches and 40 to 50 pounds.

There are two additional net traps to check, but the team switches tactics to check on other species. While catfish congregate in the dark depths of the lake and are easily caught in the nets, other species tend to remain closer to the surface and require a different strategy to survey. The NGPC team lowers two booms with dangling metal octopus-like probes into the water. These devices send an electric current through the water near the boat that stuns the fish in a small radius. The immobilized fish float to the surface, unharmed though unable to escape. The team trawls the south end of the lake for 10 minutes, collecting what comes to the surface with long handled nets and depositing the fish into a holding tank on the boat.

Measuring this lot is faster, as the stunned fish put up less fight than the confined catfish. The shallow water survey reveals dozens of bluegills in various shades and sizes. “There must be a good spawning spot over here,” Eifert notes, pointing out the striking orange bellies of the breeding males and the large number of immature fish collected nearby. Bluegills can reach up to 12 inches in length, but most collected at Pioneer Trails today are smaller (six to eight inches).

Several keeper-size (15 inches or larger) largemouth bass also turn up during this collection, as well as an abundance of 5-8 inch bass. This species is highly sought prized by Nebraska anglers, but a challenge for many Nebraska lakes due to the turbidity factor. The survey also revealed several saugeye, a sauger-walleye cross that was created in NGPC hatcheries and released in lakes across the state. The long, spiny species cannot reproduce naturally, so regular restocking is necessary to maintain the population. The benefit of this hybrid species is that it does well in turbid waters.

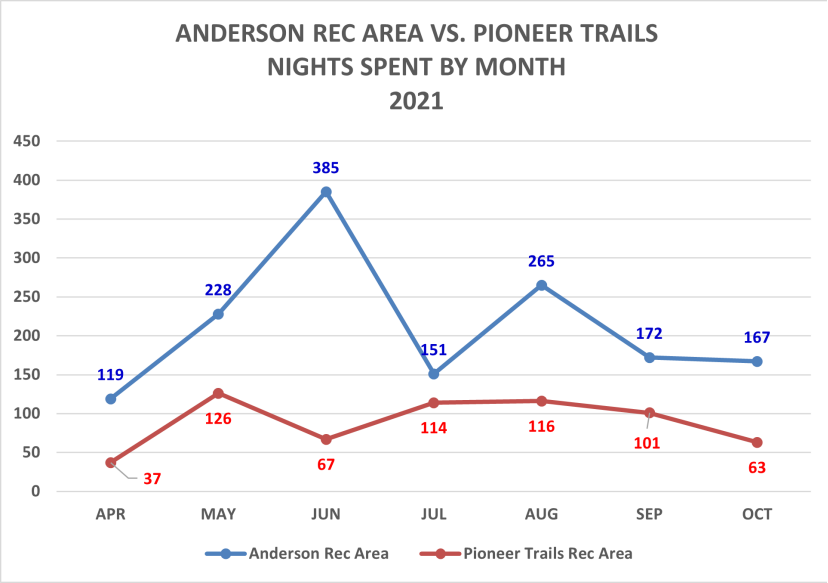
“The fact that we didn’t shock any carp is a good sign,” says Eifert. Common carp area an invasive species in Nebraska that can be very destructive to fisheries as their feeding patterns stir up the bottom of the lake in shallow areas and increases turbidity. This process kills many plants that other fish and waterfowl rely on for food and habitat. Carp can grow large quickly and are good to eat, which is why the species native to Asia was introduced into Nebraska’s waterbodies by anglers more than a hundred years ago. However, anglers are asked to never stock fish in Nebraska’s lakes without the consent and cooperation of NGPC to avoid additional damage to aquatic ecosystems.

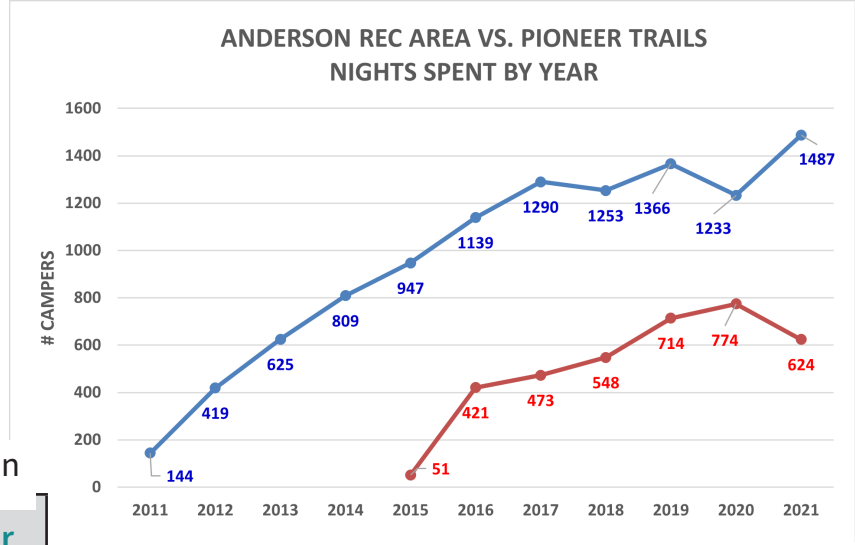
The biologists from Nebraska Game and Parks Commission will draft a summary report of the findings of the fish survey this winter, as well as make recommendations for fishery management for the lake at Pioneer Trails Recreation Area. The previous report, published in January 2018, is available on the NRD website.

Fish consumption advisory: Many waterbodies in Nebraska have an increased load of certain toxins that may cause health concerns for those that consume a large amount of fish from these lakes and rivers. As of the most recent report (2020) from the Nebraska Department of Environment and Energy, the lake at Pioneer Trails recreation area is listed as having increased levels of mercury. The advisory is not a ban on eating fish from affected waterbodies, but it is suggested that the public limit long-term consumption of fish caught from those specific waterbodies to eight ounces per week (for adults).

FORESTRY & PARKS

Recreation Area Usage & Upgrades





2021 Visitor Geographic Representation

Visitors	Anderson	Pioneer
# of Counties	34	26
# of States	30	16

- Smith Creek Recreation Area, which does not have camper pads/hookups, continues to see high usage from campers from across the state and nation, as it is listed online as one of the best free camping spots in Nebraska and is close to I-80.





In 2021, new vault toilets were added to Smith Creek and Oxbow Trails Recreation Areas. In 2022, handicap accessible parking and ramps to the ADA compliant restrooms were added.







ADMINISTRATIVE

Financial Highlights

- This discussion and analysis of the financial performance of the Upper Big Blue NRD provides an overview of the district's financial activities for the year ended June 30, 2021.

  The assets of the Upper Big Blue Natural Resources District exceeded its liabilities at the close of the most recent fiscal year by $10,119,458 (net position). Of this amount, $4,793,310 (unrestricted net position) may be used to meet the government's ongoing obligations to citizens and creditors.

  At the end of the current fiscal year, unassigned fund balance for the General Fund was $2,162,937.

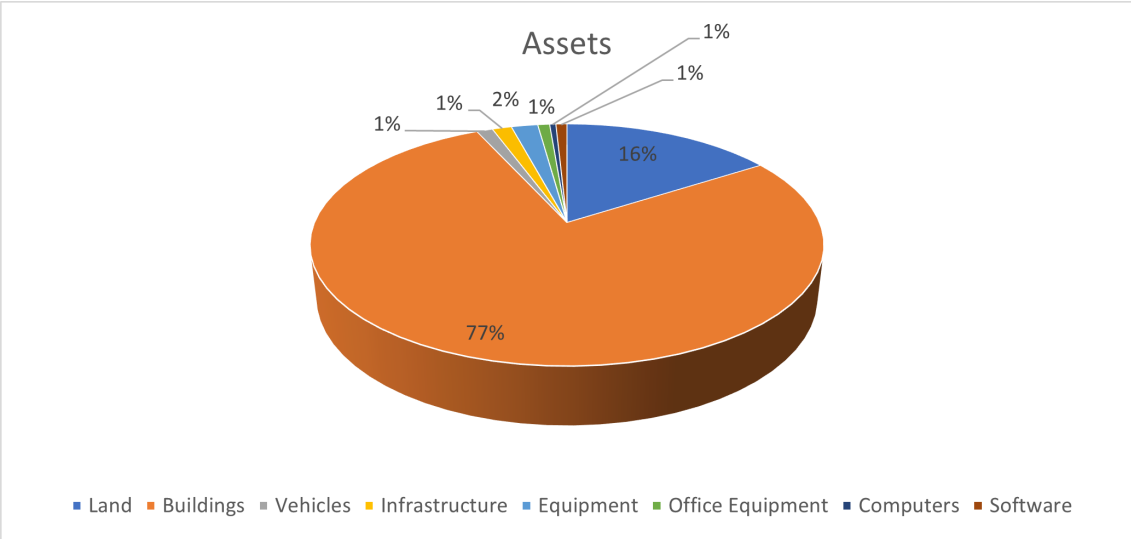
Financial Analysis of the District as a Whole

As noted earlier, net position may serve over time as a useful indicator of a government's financial position. In the case of the Upper Big Blue Natural Resources District, assets exceeded liabilities by $10,119,458 at the close of the most recent fiscal year.

Capital Assets

The district's investment in capital assets as of June 30, 2021, amounts to $5,326,148 (net after depreciation). This investment in capital assets included land, buildings, equipment, and improvements. The summary of capital assets net of depreciation follows:

Asset	June 30, 2021	June 30, 2020
Land	$849,804	$788,574
Buildings	$4,111,999	$ 4,127,865
Vehicles	$64,261	$71,532
Infrastructure	$77,233	$77,233
Equipment	$105,924	118,452
Office Equipment	$47,512	$67,171
Computers	$24,942	$33,746
Software	$44,473	$59,721
TOTAL ASSETS	$5,326,148	$5,344,294

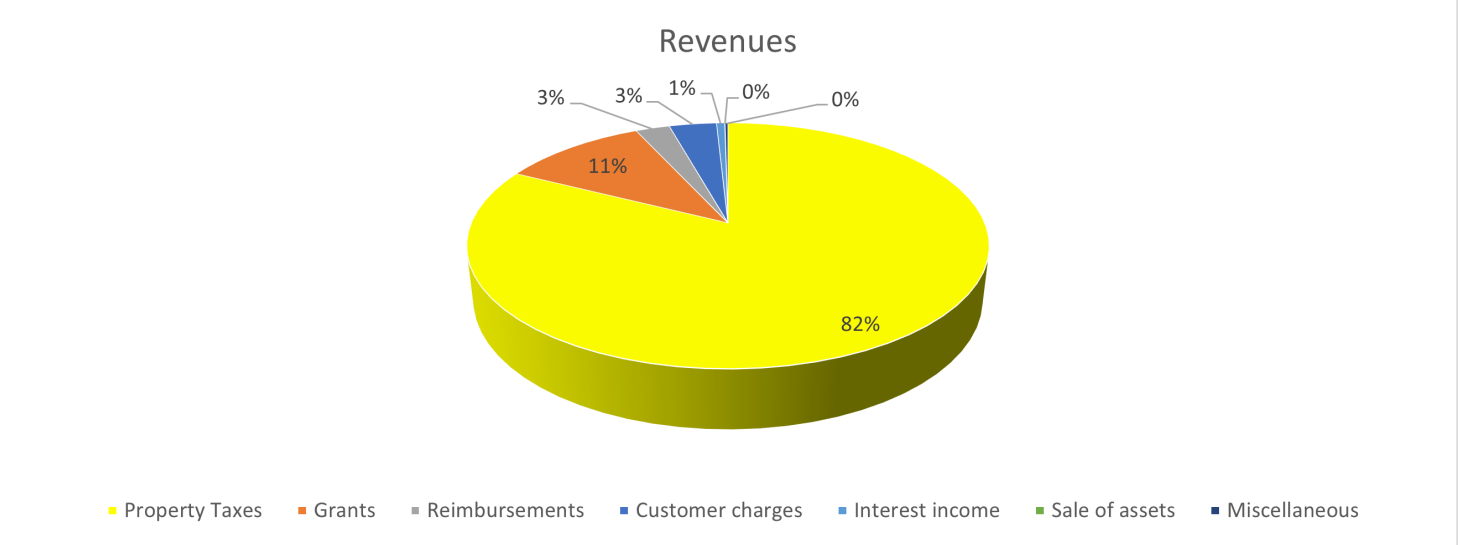


ADMINISTRATIVE

Revenues

General Funds Revenues for FY2021

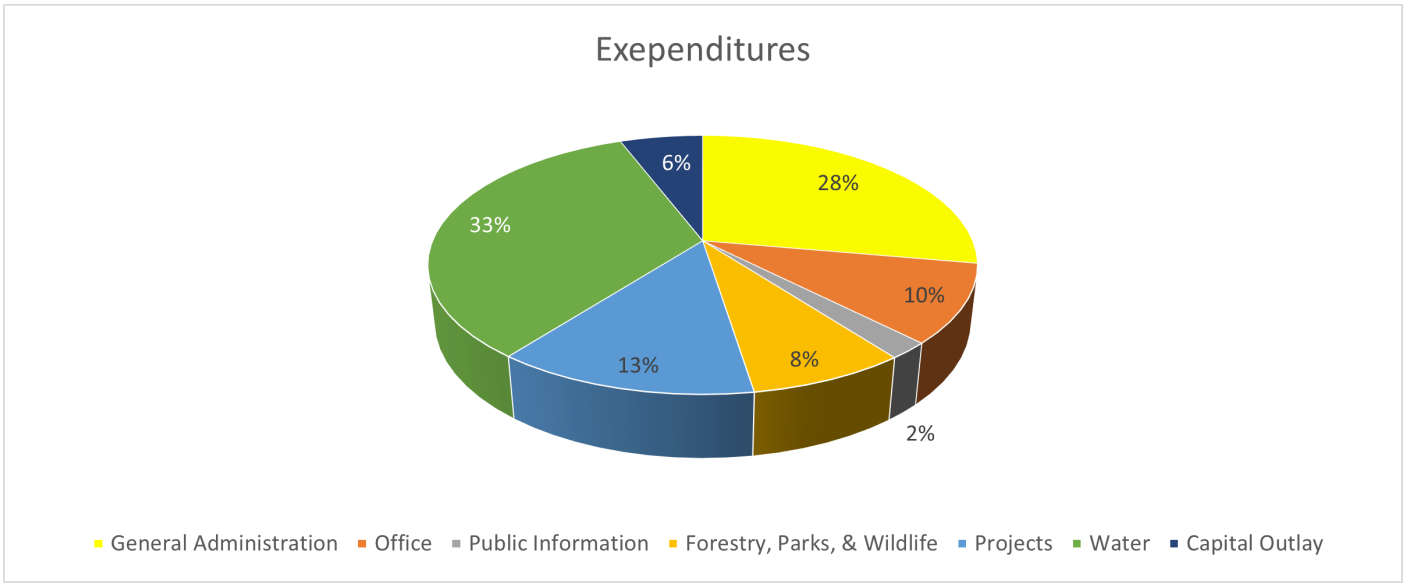
Revenue Source	General Fund	Sinking Fund	Total Funds
Property Taxes	$3,559,363		$3,559,363
Grants	$462,500		$462,500
Reimbursements	$108,912		$108,912
Customer charges	$151,216		$151,216
Interest income	$3,194	$22,931	$26,125
Sale of assets	$1,050		$1,050
Miscellaneous	$9,445		$9,445
TOTAL REVENUES	**$4,295,680**	**$22,931**	**$4,318,611**



Expenditures

General Funds Expenses for FY2021

Expenditure	General Fund	Sinking Fund	Total Funds
General Administration	$1,033,818	--	$1,033,818
Office	$364,672	--	$364,672
Public Information	$77,153	--	$77,153
Forestry, Parks, & Wildlife	$291,887	--	$291,887
Projects	$483,744	--	$483,744
Water	$1,252,831	--	$1,252,831
Capital Outlay	$216,388	--	$216,388
Total Expenditures	$3,720,493	--	$3,720,493
Excess of Revenues Over Expenditures	**$575,187**	**$22,931**	**$598,118**



ADMINISTRATIVE

General Operating Expenses

- Payroll: Salaries/Benefits/Taxes (Admin./ Clerical)
- Directors' expense & per diem
- Dues & Memberships/Fees & Licenses
- Insurance
- Legal notices
- Office supplies/Postage
- Special projects and Professional services
- Project operations & maintenance/Auto & Truck
- Supplies & maintenance/Building maintenance
- Purchases for resale
- Rent/Telephone/Utilities

Projects, Engineering Design, Cost-Share

- Sediment control basins/Stream bank stabilization
- Dams
- Diversions/Grade stabilization structures
- Pasture planting/Planned grazing systems
- Pitless irrigation water reuse systems
- Windbreak planting & renovation
- Grassed waterways/Terraces
- Water impoundment dams
- Subsurface drip irrigation
- Mechanical outlets
- Buffer Strips

Water Quantity & Quality, Cost-Share

- Rules & Regulations enforcement
- Groundwater level measuring - Observation well monitoring
- Well Permitting/Registration
- Certification of irrigated acres
- Crop water use reporting
- Nitrate monitoring
- Domestic well testing
- Deep soil sampling
- Wellhead protection
- Irrigation well pump testing
- Chemigation safety inspections
- AQWACAP and Abandoned well verification
- CROP-TIP
- Flowmeter inspection
- Zones 5 & 6 Nitrate management training

Public Education

- Quarterly newsletters
- Seminars
- Publications
- Speaking engagements
- Advertisements

Forestry, Parks, and Wildlife, Cost-Share

- Tree/shrub/Native grass planting programs
- Corners For Wildlife
- Wildlife habitat improvement
- WILD Nebraska
- Parks & Recreation management
- Parks Program
- Storm Damaged Trees Program

Balance Sheet--Governmental Funds 2021 with comparative figures for FY2020

ASSETS	June 30, 2021	June 30, 2020
Cash and Cash Equivalents	$1,809,257	$1,418,106
County treasurer cash	$44,148	$33,944
Investments	$3,337,884	$3,062,101
Accounts Receivable	$45,544	$60,468
Interest Receivable	$1,463	$1,837
Inventory	$28,943	$62,670
Prepaid Insurance	$77,589	$73,531
TOTAL ASSETS	$5,344,828	$4,712,657

LIABILITIES	June 30, 2021	June 30, 2020
Accounts Payable	$274,766	$229,346
Payroll Liabilities	$15,886	$17,197
Accrued Wages	$126,933	$137,173
Sales Tax Payable	$383	$199
TOTAL LIABILITIES	$ 417,968	$383,915

The information contained in this financial section are based upon the independent and unbiased audit performed by AMGL CPAs & Advisors of Grand Island, Nebraska. The audit was presented to the Upper Big Blue NRD Board of Directors in September 2021.

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