

WATER

CURRENT

50TH ANNIVERSARY

— 1968-2018 —

**NEBRASKA WATER CENTER
PART OF THE ROBERT B. DAUGHERTY
WATER FOR FOOD GLOBAL INSTITUTE AT
THE UNIVERSITY OF NEBRASKA**

FALL 2018 VOL. 50, NO. 3

Taking a Spin Around Nebraska's Water Management History



Dear Reader,

We are pleased to offer you the third installment of our 50th anniversary edition of the Water Current. In our previous edition, we highlighted the importance of irrigation to our state's surface and groundwater development, entrepreneurial climate and university extension and research. While that issue was focused on technological innovation, this one is similarly focused on past innovations but of a social and political stripe.

In keeping with the newsletter's 50th anniversary, these pages chronicle some of the key issues and advances in Nebraska's water policy and management from the late 1960s onward. This history is complemented by a few articles on

contemporary topics and updates from our center. This issue's highlights include:

- A first-hand account of the formation of Nebraska's Natural Resources Districts.
- An in-depth look at a critical issue facing Nebraska's agricultural productivity: rural broadband.
- Overview of the past, present and future of Lincoln's water supply.
- The latest on the state's Water Sustainability Fund.
- And updates from the NWC on events, conferences and new staff.

While Nebraska is home to the world's largest irrigation equipment companies,

its rich social and political capital has also spun out innovations in water policy and management. Here's to sharing some of those stories.

Sincerely,

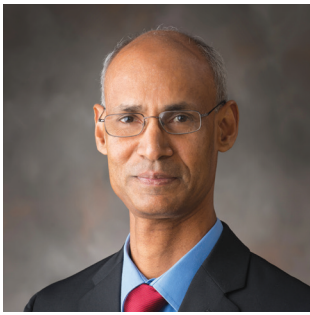
A handwritten signature in black ink that reads "Jesse Starita".

Jesse Starita
Editor, Nebraska Water Current



**Nebraska
Water Center**

Daugherty Water for Food Global Institute



Activities Fall into Place during Busy Autumn

From the Director
Chittaranjan Ray, Ph.D., P.E.

Although our newsletters this year have a retrospective quality, our work at the center today is full speed ahead. Some of this coincides with where we are in the academic calendar and some is a by-product of several larger undertakings, like the 2018 Regional Water Symposium we just hosted and intensifying our efforts in the Bazile Groundwater Management Area. While the content here looks back over a period of years or even decades, I would like to update you on a more recent time scale: the past few months at our center.

First, we are pleased to welcome several new staff and a student intern to our team. Jesse Starita joined in October as public relations & engagement coordinator, a vacancy filled after longtime NWC communicator Steve Ress retired this spring. Jesse will bring the skills, knowledge and network from his six years at the Daugherty Water for Food Global Institute (DWFI) to bear on NWC communications and activities. We also welcome Drs. Matteo D'Alessio and Sushil Kanel as NWC faculty researchers. D'Alessio, a former post-doc, will be contributing to research in the Bazile as well as on USDA and Nebraska Environmental Trust projects. Dr. Kanel, a senior environmental scientist with the U.S. Air Force Institute of Technology, will be researching the fate and transport of chemicals and nanoparticles in groundwater and possibly serving as a graduate student advisor. Additionally, University of Nebraska–Lincoln undergraduate Varun Shankar joined this fall as an intern. Varun is already working to interview our faculty and staff and generate content for an annual report.

In the Bazile, we are working on a number of fronts. I have continued to be actively involved in facilitating connections between University research and extension faculty and the Bazile Groundwater Management team. The four local NRDs (Upper and Lower Elkhorn, Lower Niobrara, and Lewis and Clark), along with NDEQ are moving into the implementation phase of efforts to reduce nitrate levels in surface and groundwater in the region. The Bazile leadership approached us about facilitating some research and demonstration work for water and nitrogen best management practices outlined in their plan. Over the last several months, I worked closely with the NRDs and Extension, particularly Bill Kranz, Associate Director of the Northeast Extension District, and are in the process of creating a jointly funded Extension Educator position. To support the demonstration fields, we also worked together to develop an Environmental Trust proposal. We hope to have these in place for next growing season. The Bazile team is also working closely with the Water Sciences Laboratory to finalize locations for vadose zone sampling in the region's wellhead

protection areas for the winter and spring. One of our Know Your Well project high schools is also located in the region. Our goal is that the research and methods developed in this region will soon be available statewide to address this critical issue.

We held our 2018 fall symposium “Water Resources of the US Great Plains Region: Status and Future” Oct. 24-26 at Nebraska Innovation Campus. This year's symposium – organized in partnership with the National Institutes for Water Resources – brought together 200 water managers, scientists, students and the general public from a nine-state region across the Great Plains. Selected highlights included hearing from fellow directors at land-grant university Water Resources Research Institutes; introductory remarks by IANR vice chancellor Mike Boehm; a graduate student poster competition with 30 entrants; and overall topical breadth, with presentations ranging from algal blooms to Ogallala Aquifer sustainability. More information on the symposium is available at watercenter.unl.edu/2018-water-symposium.

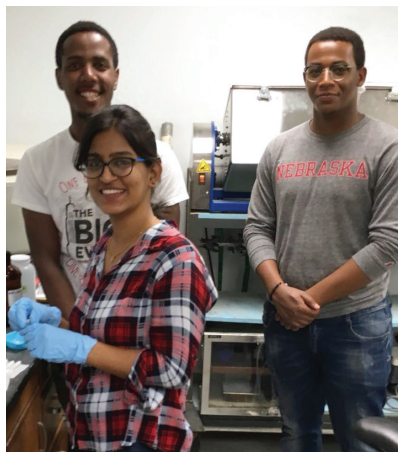
Also, it gives me pleasure to share that our Water Advanced Research and Innovation (WARI) Fellowship Program was renewed this fall for an additional three years. The program, currently in year three, is a bi-lateral exchange between Indian and University of Nebraska–Lincoln water science students and faculty. To date, more than 30 Ph.D. students and faculty from across India have come to the university, where they are researching solutions to shared water quality challenges in Nebraska and India. More than 15 of our University of Nebraska–Lincoln water faculty are serving as mentors and collaborators to these fellows. The fourth cohort is scheduled to arrive in spring 2019.

Speaking of next spring, our annual seminar series will return then too. The series will kick off in mid-January and run through mid-April with a theme of NRD Priorities and Challenges. We have already confirmed representatives from the Papio-Missouri River NRD and will invite speakers from the Bazile area and Central Platte and Middle Republican NRDs. To complement local perspectives, we've also reached out to guest speakers from Kansas and California to give special seminars. Stay tuned for a full agenda in the weeks to come.

Now that you have a sense of our recent times, I invite you to enjoy this commemorative issue looking back over years and decades to important milestones in Nebraska's water management and policy.

Updates from the Water Sciences Laboratory

By Tania Biswas, WSL Research Manager, Ph.D.



Visiting international scholars are lab regulars, such as these students from India and Rwanda.

The Water Sciences Laboratory has been bustling with a plethora of activities in recent months. We have launched our new training plan allowing new laboratory users to familiarize themselves with basic laboratory techniques such as accurately using micropipettes, calibrating and using analytical balances, cleaning and maintaining various types of lab wares and laboratory safety and waste management procedures. This is usually followed

by advanced training on specific analytical instruments depending on the client's project requirements, completed with an instrument proficiency test. Training materials, including standard operating procedures and training videos, have been created to better assist with the training process. Our lab website has been updated and better integrated with the Nebraska Water Center website, with a new 'Client Portal' to provide information to clients on services offered, sample submission procedures, updated price lists and new user training materials including an updated laboratory user guide and policies.

This year, roughly 25 new users – ranging from undergraduate and graduate students, researchers and international visiting scholars – have been trained at our laboratory. Many of them are continuing to perform a significant part of their research work at our facility. Over the summer, we hosted two international students from Egypt, through the IANR Global Engagement Program for their experiential learning in water science and technology. We are currently hosting three Rwandan students, who are enrolled in the Integrated Sciences undergraduate program at the University, for their experiential learning at our laboratory.

Also over the summer, we organized specialized tours of our facility to a variety of visitors, such as Native American students, local high school students, international scientists, the NRDs, the CEO and CTO of a private agro-technology company and international delegates from India. We are organizing a lab Open House and lunch and learn event on December 3rd at East Campus Union that will include an extensive tour of our facility. This event is open to public.

Throughout this year, more than 7,500 samples have been analyzed at our facility, generating more than \$150,000 of income. We cater to a variety of interdisciplinary and multidisciplinary clients in academia, government and industries. This scale of operation would not have been possible without the able leadership of our WSL Director Dan Snow and our team of existing lab staff and interns. Also, we have added two new Research Technicians to our team, Nathan Roddy and Suzanne Polzkill, who've trained at our facility and gained expertise in operating several advanced instrumentation such as ground water age-dating and inductively coupled plasma mass spectrometry. We look forward to finishing strong in 2018.

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Nebraska's Natural Resources Districts Strengthened by Initial Challenges, Continual Compromise

By Gayle Starr

During the 1960s many of Nebraska's natural resources officials became concerned with the large number of overlapping local entities responsible for management of land and water resources. Some of them were accomplishing their intended purposes, but most were too small to deal with the resource problems in their area and lacked the necessary financing and technical expertise to deal with those problems.

Two leaders in the effort to solve the problem were Dr. Clayton Yeutter, of the University of Nebraska–Lincoln and later Chief of Staff to Governor Norbert Tiemann and Warren Fairchild, Executive Secretary of the Soil and Water Conservation Commission. They, along with other interested parties, concluded that Nebraska needed to pass a new state law to consolidate, simplify and strengthen the structure of local districts. LB 1357, the Natural Resources District Act, was thus drafted.

Promotion of the NRD concept was led by the staff of the Soil and Water Conservation Commission, some local officials who were sold on the idea, and a number of other interested parties. Several legislators led by Senator Maurice Kremer were also heavily involved. Governor Norbert Tiemann was a strong supporter. The bill was debated at length in the 1969 Legislature and some changes were made to accommodate concerns. Debate in the Legislature was contentious at times and finally came to a vote late in that session.

LB 1357 was passed and signed by Governor Tiemann in September of 1969. The Act laid out the mechanism for the establishment of the Natural Resource Districts (NRDs) through the merger of approximately 154 existing resource districts. Each district was to be governed by a locally-elected board. The legislation provided the NRDs with significant responsibilities and authorities as well as the financial capability to meet those needs.

The NRD concept had significant opposition based on loss of local control, the feeling that existing districts were doing the job adequately, desire to maintain the status quo, and opposition to potential costs of the NRDs. Loss of local control was clearly the most common opposition expressed by local officials. Proponents countered that the existing districts had such limited authorities that there really was not much control to be lost. There were many meetings and discussions of the legislation, some of which were pretty contentious.

After the passage of the original law in 1969 there were additional amendments in the next sessions of the legislature. Most of these amendments dealt with the boundaries and size of the districts, representation on the boards and other minor adjustments. The important thing was that the basic concept of

the legislation including the merger of districts, the expansion of authorities and the establishment of a method of providing financial authority survived intact.

The Soil and Water Conservation Commission was charged with establishing the boundaries. The boundary designation went through several proposals and many meetings before settling on 24 districts (now 23 with the merger of two of the districts).

Just before the effective date of the NRDs on July 1, 1972 a lawsuit was filed in district court by the Richardson County Soil and Water Conservation District, and several area landowners, challenging the constitutionality of the law. The court denied a request for an injunction against creating NRDs, although the court did enjoin the districts from transferring or liquidating assets of the districts being merged. The decision was appealed to the State Supreme Court, which eventually upheld the constitutionality of LB 1357.

The initial board of each district was composed of all of the directors of the merged districts, which resulted in some boards being rather large. As a result many chose to operate with an executive committee of a smaller number. Each NRD established the number of directors for their permanent board – not to exceed twenty-one members to be elected in the 1973 elections and to take office in January of 1974.



Early NRD Brochure

Soon after the establishment of the districts, most hired a manager to be responsible for the day to day operations. The vast majority of those hired, while inexperienced, were very capable individuals and many of them continued to work for their district for many years. In fact, one of the original managers is still on the job 46 years later. It was important that the districts, and particularly the managers, work with the other resource districts in their area, as well as the related local, state and federal agencies with which they shared some common interest. Some of those relationships took work and time to be established because of the controversy and hard feelings concerning the establishment of the NRDs. As time passed good relationships have been developed in every case.

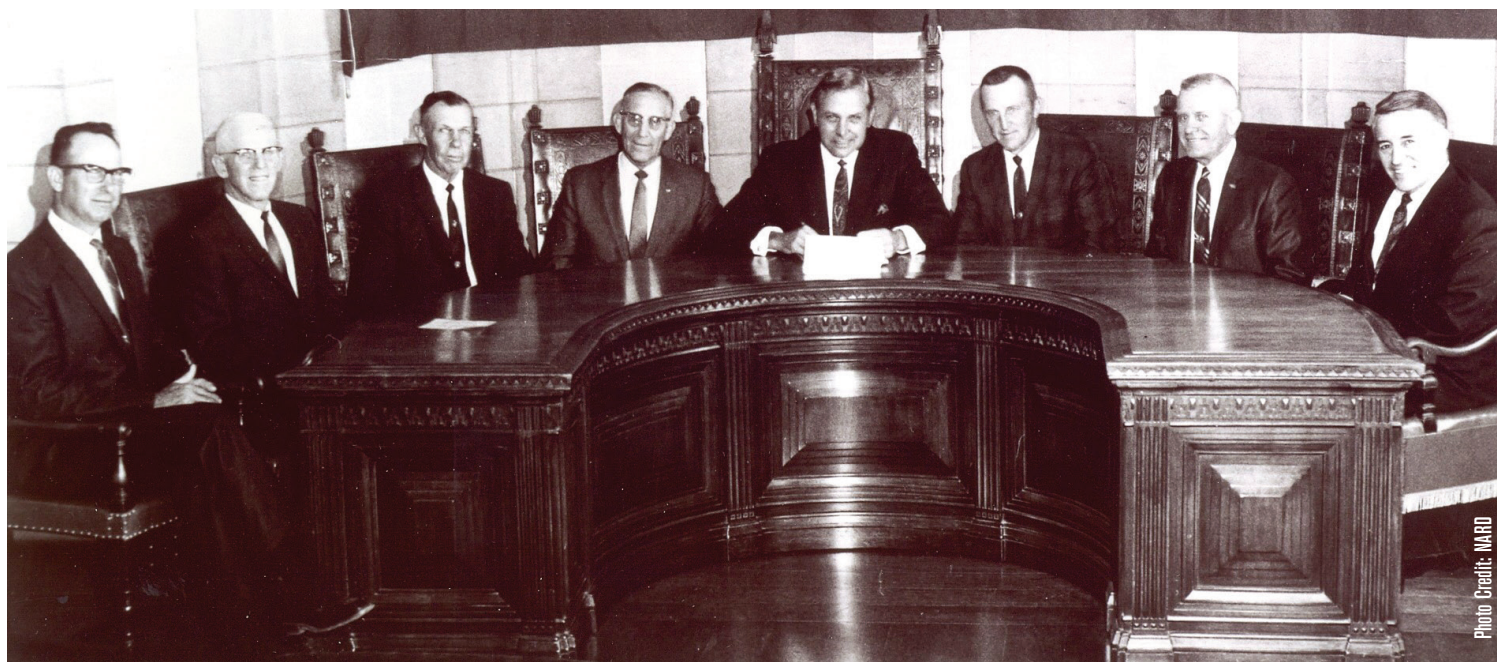
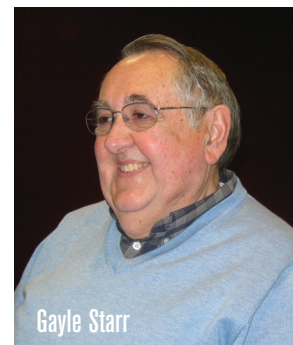
As the NRDs matured and directors and managers became fully aware of resource problems and their authorities, it was apparent that additional policies and programs needed to be developed. To meet those needs amendments to the NRD law needed to be enacted. A number of amendments to the law, particularly concerning groundwater management, were adopted. Many NRDs were reluctant to establish controls and other requirements, but as time progressed, boards became convinced that there were issues that they needed to address more aggressively. Districts became more heavily involved in management programs as opposed to structural measures.

The availability of advanced technology has greatly improved the NRDs ability to become sophisticated in the operation of their management programs. The assistance and advice of the University of Nebraska Extension Service, other technical experts at Nebraska, the USDA's Natural Resources Conservation Service, as well as private consultants and vendors allowed the districts to utilize the newest information and technology.

Close cooperation with these partners has enabled the NRDs to make great advances in the management of Nebraska's resources. Improvements in irrigation efficiency, soil conservation, and water quality management and many other efforts have been a great benefit to the state. Since 1972 the NRDs have achieved a significant role in Nebraska's local government structure.

It is important to note that Nebraska's NRDs are unique among the 50 states. Some states have taken some actions to strengthen their district structure, but none have taken the steps that Nebraska took.

During his lengthy tenure in Nebraska state government, Gayle Starr served as an administrative officer of the Soil and Water Conservation Commission, the Natural Resources Commission and the Nebraska Department of Natural Resources.



Nebraska Governor Norbert Tiemann signed LB 1357 into law in 1969, paving the way for the creation of the NRDs.

Farmers, Entrepreneurs Upload Solutions to Lack of Rural Broadband

By Will Ruffalo, Ellen Emanuel, Caleb Milliken and Jesse Starita

In twenty-first century developed countries, wireless internet connectivity is widely considered a necessity and often taken for granted. However, in many rural farming communities across America, high-speed wireless connectivity is more of a luxury. With a rapidly growing agricultural technology industry, farmers and rural residents face numerous issues regarding the lack of high-speed connectivity.

Just how connected are farmers in rural areas? According to a recent USDA report, “Nationally, 73 percent of farms have computer access...[and] computer usage for farm business is at 47 percent.” So a majority of farms have computers and nearly half of them use computers, but when farmers go online, lack of high-speed internet becomes glaring. Absence of quality connectivity directly affects the adoption of new agricultural technologies. Many of these new technologies require high-speed wireless to provide producers with accurate, real-time analytics. Therefore the current environment of wireless internet connectivity (or lack thereof) handcuffs innovation and entrepreneurship in agriculture.

Producer Contrast

Nonetheless, producers continue to operate with or without broadband access. In Hall County, Nebraska, 22-year-old Colby Spiehs has been farming 2,600 acres of family land for three years. He uses mostly spatial technology (e.g. GPS) that is already packaged within his farming equipment and does not rely on wireless connectivity. Spiehs expressed distaste for his current wireless service, and he seldom uses wireless connectivity throughout daily farming operations because his rural area lacks reliable service.

Having never used precision agricultural technology (henceforth, “ag tech”), Spiehs and farmers like him are unaware of the ways it may benefit them. Other farmers are taking full advantage of wireless ag tech and are actively

advocating for more, higher-quality broadband in rural areas. Roric Paulman is one of these trailblazers.

Paulman farms nearly 10,000 acres in Sutherland, Nebraska. He often finds himself “farming off his phone.” Paulman’s region of Nebraska is known for having unreliable service, so he took matters of connectivity into his own hands. In 2015 he negotiated a contract with a local communications provider to lay fiber optic cable to his farm. The fiber optic cable dramatically increased internet speeds over his old system. For comparison, if Paulman wanted to upload a two-gigabyte aerial imagery file using his old connection, it would take nearly 8 hours. His new connection would require only 14 minutes to upload the same file. Paulman installed the cable because he wanted to enhance overall farm connectivity and monitor ag tech like soil moisture probes and center pivot irrigation controls. Perhaps its biggest impact is on his most precious resource, “What do we have the least of now? Time.”

Startups

Regardless of the current state of broadband availability and connection to wireless service, many ag tech companies continue to invent and offer precision agricultural products that depend upon wireless technology.

Quantified Ag of Lincoln, NE is one such company. Founded in 2014 as a livestock solution startup, Quantified Ag employs a different kind of wireless connection in its products. They use low frequency radio wave, or “LoRa,” technology to provide an in-field connection between producers and the biometric ear tags on their cattle. “LoRa’s connection has a four-mile diameter range and can track up to 56,000 head of cattle all in real-time, without the presence of satellite or fiber optic cable connectivity,” stated Andrew Uden, Quantified Ag COO and co-founder. This benefits the company because it’s a low-cost and reliable alternative to other wireless technologies that tend to be unreliable in pastures anyway.



Sutherland, Nebraska producer Roric Paulman in one of his farm's many corn fields



Photo Credit: Morgan Spiels

Producer Colby Spiels explains operations on his family's farm near Wood River, Nebraska

When it comes to crop production, ag tech innovator Steve Tippery provides insight on the challenges of connectivity issues for new businesses. Tippery is President and CEO of RealmFive, a product development company focused on intelligent and revolutionary products for global agriculture. Regarding the impact of connectivity upon his company, Tippery commented “yes, it is a problem, but one that we are working towards solving.” RealmFive is addressing such issues through products like the Gateway, which picks up signals carrying data from multiple sources and forwards them in real time to the producer via a private wireless signal. Without the Gateway, each data signal would be sent separately (and usually unsuccessfully) to the producer. This is just one example of how RealmFive is working towards solving the connectivity issue. Tippery envisions a future where wireless connectivity is commonplace and reliable, a future that companies like his and Quantified Ag are helping to make a reality.

Who's Investing?

So who is investing in rural America's connectivity problem? Both public and private entities are working to provide funding and solutions. The Nebraska Broadband Initiative was instrumental in “starting conversations about broadband and providing tools to allow informed decisions to be made,” says Cullen Robbins, Director of Communications for Nebraska's Public Service

Commission. In 2018, the Nebraska State Legislature passed LB994, creating a Rural Broadband Task Force. The Task Force is charged with reviewing issues related to availability, adoption and affordability of rural broadband and making recommendations to the Legislature. According to Robbins, “one of the drivers for the development of the Task Force was agricultural concerns about broadband connectivity.”

The private sector is also making efforts to improve rural connectivity, though leading ground breakers are not the usual telecom players. Major broadband providers often see bringing connectivity services to rural areas as a low-return investment. Therefore, companies such as Microsoft and Google are investing in programs and other businesses providing high-speed access in the country's hardest-to-reach places. Microsoft announced it “pledged an unspecified amount of ‘seed money’ to local telecom providers, in over 12 states, who are trying to better high-speed internet through the use of white spaces.” Their role is that of a capital provider, as Microsoft itself will not

become a telecommunications company. They plan to reinvest profits from the program back into the program.

Through individual, private and public sector endeavors to spread connectivity, all rural areas may soon have access to reliable high-speed internet and the benefits of wireless precision ag tech. Challenges notwithstanding, Robbins sees another encouraging sign coming from the political arena.

“One positive thing about rural broadband is that there seems to be bipartisan recognition of the problem.”



Photo Credit: UCD/AMM

Wireless ag tech is an increasing necessity on the modern farm.

Lincoln Water System: Over a Century of Planning

By Steve Owen, Superintendent of Water Production, Lincoln Water System

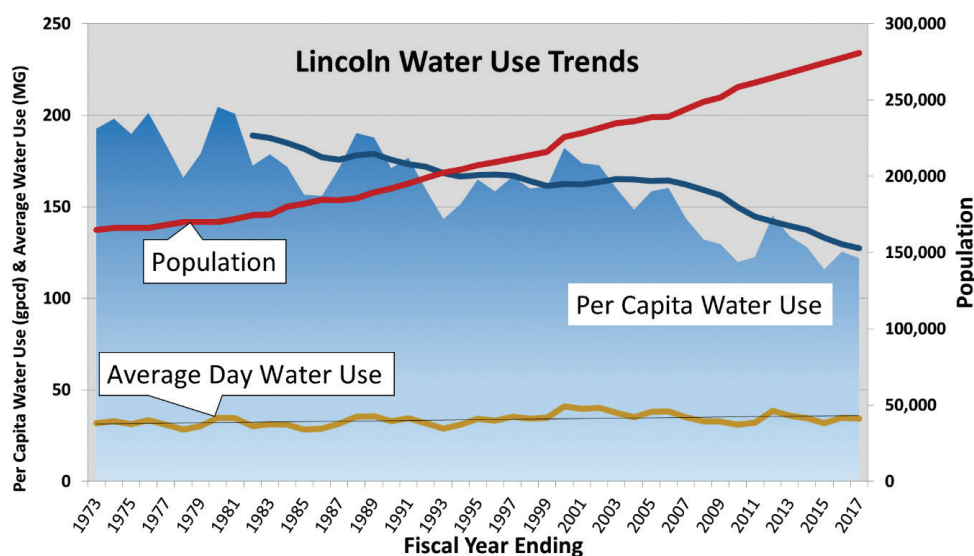
The Lincoln Water System (LWS) dates back to 1881 when a \$10,000 bond issue was passed to finance a municipal water system. Two years later the system had its first customers after a well was completed near 6th and F Street. Water supply planning has been ongoing ever since for the LWS, once part of the municipal electric system, and now a Division of the Lincoln Transportation and Utilities Department.

To meet the needs of a growing community during the last century, Lincoln expanded its water supply first by constructing wells located within the city. In the late 1920s, a second water supply source was developed through a wellfield adjacent the Platte River near Ashland. During the early 1930s a large pipeline to Lincoln was completed and a treatment system for the removal of iron and manganese followed in 1935. These facilities remain in operation today and together with additional wells and water treatment capabilities, this water supply continues to serve Lincoln.

Drought and dry periods can greatly affect water supply and customer water demands. This is especially true for water supplies along the Platte River that rely on

river flow for recharge. The relationship between seasonal water demands and available water supply also drive future water supply planning. In fact, dry periods in 1913, 1952, 1974, 1988, 2002 and 2012, when water restrictions were used to curb demand, have been the impetus for expanding Lincoln's water supply as well as showing the importance of water conservation.

Lincoln has a long history of water conservation efforts beginning with establishing a Water Conservation Task force in the late 1980s that is still active today. Establishing a rate structure that increases the rate for customers using higher volumes of water has been fundamental to water conservation. This rate structure recognizes that water is a valuable resource and its value increases during times of shortage. Lincoln has



This new collector well along the Platte River expands Lincoln's water supply during low river conditions.



A 42-inch pipeline connects Lincoln's newest well to the raw water supply in the treatment plant.



A 1,500-foot steel pipeline is inserted into borehole.

developed a Water Management Plan to better educate and coordinate water restrictions and drought response. This includes instituting additional water shortage rates to better reflect the value of water when in short supply. Through a combination of education and awareness, water conserving plumbing fixtures, water restrictions, and rate based incentives, Lincoln's per capita water use has declined by over 30% since the early 1980s.

Lincoln continues to rely on comprehensive water supply planning to efficiently plan infrastructure improvements, evaluate fiscal impacts, and forecast water rates. The most recent master plan published in 2014 focused on developing a program for infrastructure renewal and developing a reliable water supply to meet future seasonal (summer) water demands. Both of these initiatives have now been implemented as a result of this planning effort.

To meet seasonal water demands, Lincoln has installed two new horizontal collector wells since 2012 to expand its existing Platte River wellfield. With these wells, Lincoln is now better positioned to meet seasonal water demands through at least 2035. The most recent collector well that went into service in 2018 also included a pipeline across the east channel of the Platte River. The addition of this second well now allows for a reliable and sustainable water supply for Lincoln during drought conditions similar to those experienced in 2012. This nearly



Collector well construction

\$10 million project received funding from the Nebraska Water Sustainability Fund (see article about the WSF in this edition). Funding was also received for flood and stream bank protection features for critical assets in the wellfield. In total, Lincoln received up to \$7.6 million from the WSF for this critical addition of supply and protection of assets.

Ensuring a sustainable and reliable water supply will continue to be the focus of LWS planning efforts into the future. Over a hundred years ago, city

leaders were discussing this very issue and the discussion continues today. John F. Kennedy was quoted as saying...“the time to repair the roof is when the sun is shining.” Being proactive and looking forward is all important when it comes to supplying water for a growing community like Lincoln. Continuing to develop Lincoln's existing wellfield, promoting water conservation and the value of water, and planning for Lincoln's future water source are essential in providing a sustainable and reliable water supply for the next century.

Nebraska's Water Sustainability Fund

By Kent Zimmerman, Resources Development & Watershed Funds, Nebraska Dept. of Natural Resources and Natural Resources Commission members Dennis Strauch, Scott Smathers, N. Richard Hadenfeldt, Brad Dunbar and Don Kraus



The Water Sustainability Fund (WSF), created in the waning days of the 2014 legislative session (LB1098), came into being through multiple efforts begun prior to that session.

The Resources Development Fund (RDF) preceded the WSF. Since 1974, the RDF has provided financial assistance to Nebraska's political subdivisions, primarily the state's local NRDs for flood reduction, natural resource conservation and recreation projects. Nebraska's Natural Resources Commission (NRC) decided which applications to approve. Legislative appropriations for RDF were reduced for several years while the legislature, led by Senator Tom Carlson, created the Water Funding Task Force. The Task Force, charged with identifying the needs and direction for future project funding, assisted the legislature in updating the 1970s-era conservation direction. The Task Force was comprised of 34 members (27 voting members plus the DNR Director, NRC Chairman, and 5 state senators appointed by the Executive Committee). They met 12 times in locations across Nebraska to review local concerns and resource needs and to report findings back to the next legislature. Acting upon the Task Force report, statewide concerns and the need for a large sanitary sewer/storm water separation project in Omaha, the legislature adopted LB1098. This created the WSF, expressed the intent to provide funding of \$11 million per year and added 11 new NRC commissioners representing a broad range of statewide interests.

As the expanded NRC came into being, it created new rules to govern the WSF's operation. Since the first WSF applications in 2015, over \$36.9 million has been awarded to 38 projects. In

addition, the City of Omaha garnered \$4.775 million to assist its storm water/sanitary sewer separation project. Other projects funded include several Airborne Electro-Magnetic (AEM) flights characterizing a number of aquifer formations; reservoir constructions to assist flood mitigation within the Omaha Metro and several rural areas; and nearly \$14.5 million for municipalities such as Mitchell, Hastings and Lincoln to assist with unique water supply and treatment needs. Meanwhile, the state's water sustainability and compact compliance goals in the Republican and Platte River basins should benefit through projects that more precisely manage surface water uses. Additionally, producers pumping groundwater for irrigation in several NRDs received financial assistance to purchase water meters to improve individual and statewide water management. A complete listing of all projects and other related information is available at <https://nrc.nebraska.gov>.

Many of the projects funded by the WSF take years to complete. To assure funding will be available to complete each approved project, the NRC sets aside, in a separate account within the WSF, the entire grant upon approval. Consequently, the WSF has been a dependable and effective tool in providing financial assistance to projects across Nebraska. However, the original \$11 million annual

appropriation intended for the fund decreased due to recent legislative budget reductions and transfers to the RDF for previously approved projects. Consequently, the WSF has been funded at a reduced rate.

Approving only the highest-scoring projects and turning down others with lower scores gives the NRC a reputation of being good stewards of taxpayer money. To date, the single largest grant has been in excess of \$7.6 million. However, to be able to continue funding of projects statewide that size or larger, the WSF will need to receive its intended appropriation of \$11 million per year as the legislature originally determined.



Airborne Electro-Magnetic (AEM) flight

2018 Great Plains Regional Water Symposium Snapshots



Iowa Water Center Associate Director Melissa Miller giving a lightning talk on the Center.



Michael Chu, Director of the North Dakota Water Resources Research Institute, answers a question on the opening day.



USGS Hydrologist Rod Caldwell highlights a new U.S. water use report.



Nebraska Water Center Assistant Director Rachael Herpel sets the stage for the symposium.



About 200 participants from across the Great Plains and several nations attended the three-day symposium.



Phil Steinkamp of the Lower Elkhorn NRD asks a question during the symposium.



Symposium participants discuss policy and social issues during a breakout session.



More than 40 posters (seen in the background) were entered as part of the event's poster session.



The Ebb and Flow

Crystal Powers

Research and Extension Communication Specialist, NWC

I first remember thinking about nitrates in water as a kid. Our family was expecting my little sister, and I'd heard about blue babies at the Groundwater Festival. It was a vivid image, but we tested our well, and it came back under the limit, so nitrates drifted out of my mind. Even with my college courses on water, I didn't worry too much about nitrates until I was expecting my first, and this time our well was just over. However, we still found ways to mentally minimize the risk: 'we won't be making bottles' or 'it's just a little over' or 'it's expensive.'

Funny how our brains work! They are amazing – processing millions of inputs and thoughts per second. To manage it all, sociologists have determined our brains are constantly making unconscious judgements using short cuts. This serves us wonderfully when we see a deer jump in front of our car and sense immediate danger. But these short cuts impact all our decision making, so that we discount risks that seem far away in time and space, slow developing, and hard to see. This explains much of the ebb and

flow in public interest and funding in water. In droughts, let's save water! In floods, let's talk infrastructure! But then the interest wanes. We've grown 'comfortable' with our slow-developing, often hidden problems, like nitrates or erosion, making them even easier to dismiss.

I have focused these last several months on learning the history and stories of water management and research in Nebraska. I am impressed with our long history of dedicated people who care about the future of water in this state. I want to applaud all of you who have steadily kept working, no matter where we are in the cycle: capitalizing on teachable moments, adding to our core of knowledge, making investments when funds are available, teaching, and re-teaching, and re-teaching each generation. With each new wave of focus, we are able to improve our knowledge and response to the challenge. I am looking forward to joining with you this go around and helping bring together partnerships that can bring us closer to our goals.