

Nebraska Department of Water, Energy, &
Environment

2023-2024 Biennial Review Report
for the
**Lewis and Clark Natural Resources District Integrated
Management Plan**

February 24, 2026



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INTRODUCTION

Note: On July 1, 2025, the Nebraska Department of Natural Resources (NeDNR) and the Nebraska Department of Environment and Energy (NDEE) merged to become the Nebraska Department of Water, Energy, and Environment (DWEE). In this report, NeDNR will refer to actions made before the merger, and DWEE will refer to current actions.

In September of 2016, a voluntary integrated management plan (IMP) that was jointly developed by the Lewis and Clark Natural Resources District (LCNRD) and the Nebraska Department of Natural Resources (NeDNR) became effective. This IMP addresses coordinated management of groundwater (managed by LCNRD) and surface water (managed by NeDNR – now DWEE) and recognizes that the two sources of water are hydrologically connected in certain areas.

Integrated water management planning is an adaptive process that considers the changing needs of unique Natural Resources Districts (NRDs) and their constituents. Figure 1 provides a graphic that walks through the process of adaptive management used in drafting IMPs. This includes plan development, implementation, monitoring, and plan refinement. It is through this iterative process that progress is made towards achieving the goals of the plan.

The LCNRD IMP development involved consultation with a diverse group of stakeholders to help determine the goals and objectives of the IMP (Chapter 7 in the IMP). Included in the IMP is a monitoring plan (Chapter 9) that outlines data and information to be tracked and reported as a part of plan implementation. Chapter 12 of the plan describes the IMP review process. Here, the plan lays out the framework for the LCNRD and NeDNR to conduct biennial reviews to discuss IMP implementation and assess progress towards achieving the goals and objectives of the plan. In the event that the LCNRD and NeDNR (now DWEE) jointly decide that plan refinements are necessary, amendments could be drafted, which would require a public hearing and possible reconvening of the stakeholder group.

This 2023-2024 IMP report reviews surface water monitoring such as permitting, reporting, and streamgaging. It also includes updates on collaborations with other entities, studies and research pertaining to hydrologically connected areas, and public outreach activities. As part of this review, the LCNRD and DWEE jointly decided that no amendments were necessary at this time, as progress is being made towards achieving the goals and objectives of the IMP.



Figure 1. IMP adaptive management framework

SURFACE WATER MONITORING

Chapter 9 of the IMP describes the monitoring plan to gather and evaluate data, information, and methodologies, which is an important part of IMP implementation. The following sections describe NeDNR's surface water monitoring activities for the 2023-2024 reporting period. These monitoring activities include surface water permitting actions, streamgauge monitoring, a streamgauge cooperative agreement for Bow Creek, and voluntary surface water use reporting.

NEDNR SURFACE WATER PERMITTING ACTIONS

NeDNR continued to monitor and administer surface water appropriations and maintain records for new, cancelled, or transferred rights. Figure 2 shows the geographic location of the permitting actions that happened within the district within 2023. Figure 3 shows those permitting actions that occurred within the district in 2024. Tables 1 and 2 provide information about all new, cancelled in full or in part, and dismissed or denied surface water permitting actions that occurred in 2023-2024, including the type of surface water use, the general location, and the area of irrigated land and/or volume of surface water associated with that permit.

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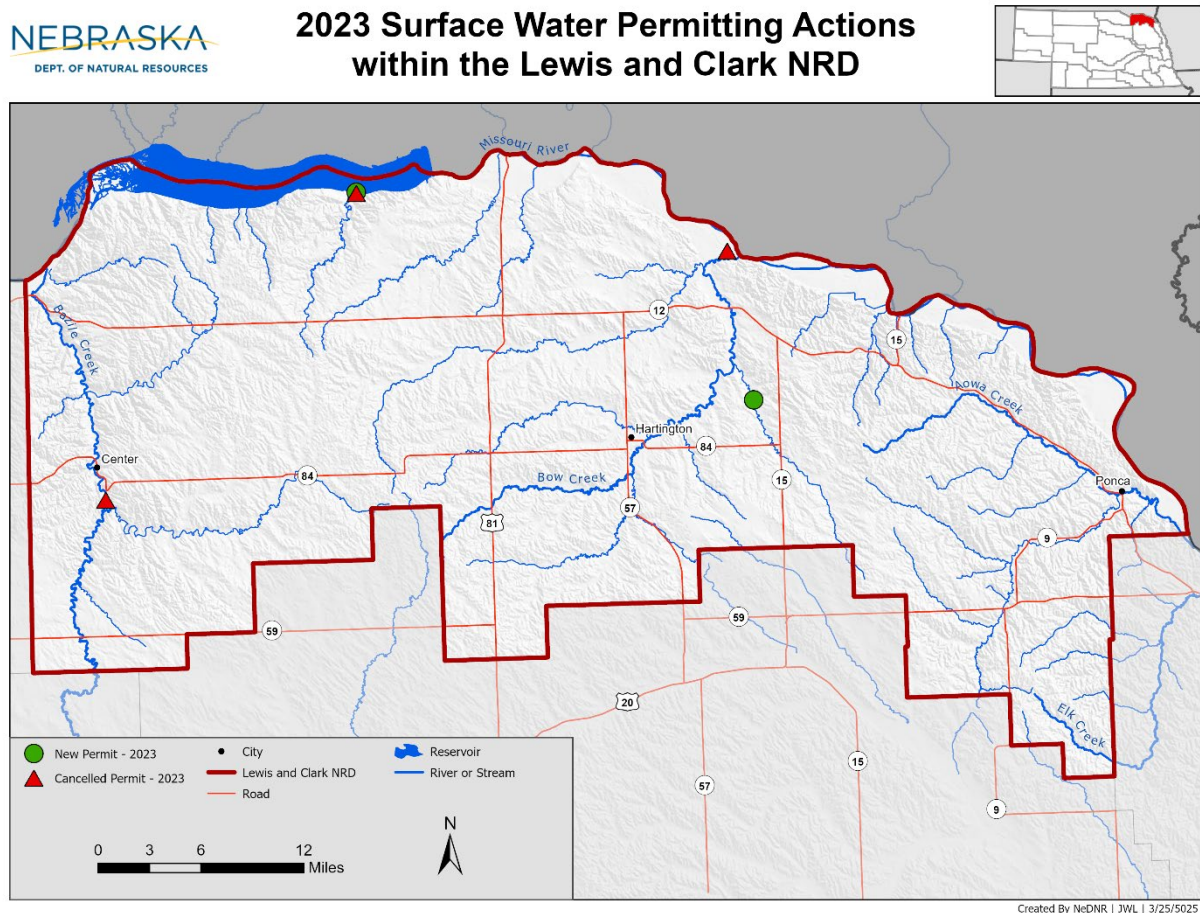


Figure 2. Locations of NeDNR surface water permitting actions in 2023

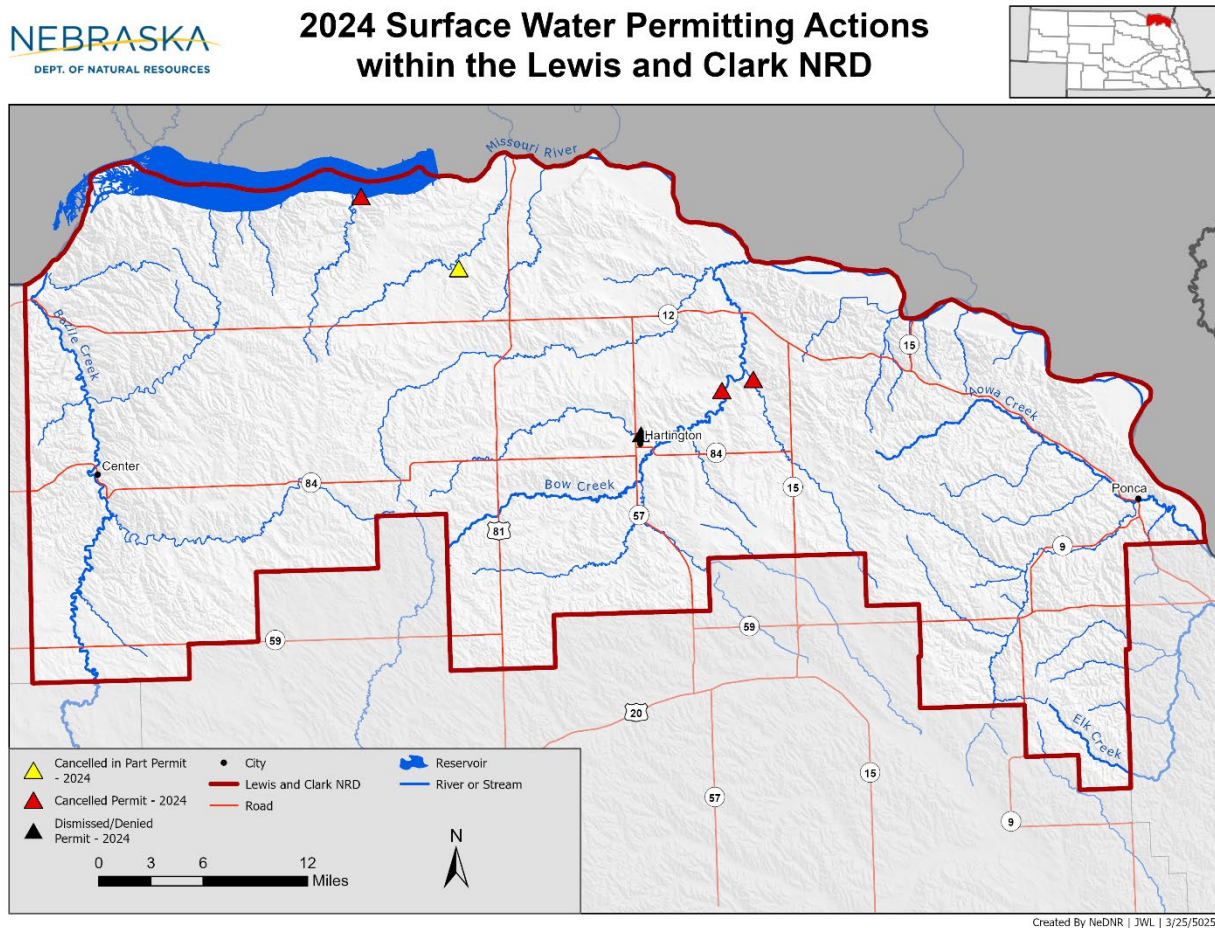


Figure 3. Locations of NeDNR surface water permitting actions in 2024

Table 1 provides a listing of new permits within the LCNRD that NeDNR approved in 2023-2024. One surface water application for irrigation totaling 165.3 acres was approved. Each of the permits has an approved map of the location of use (irrigation and domestic) and the location of the point of diversion from the stream. If the appropriators wish to change the location of use or the point of diversion, they must first obtain permission from NeDNR prior to implementation of any changes. One manufacturing permit¹ was approved for a total diversion that shall not exceed 10 acre-feet of water.

¹ Temporary permit issued for one year.

Table 1. New surface water permits approved by NeDNR in 2023-2024

Surface Water Applications Approved in 2023-2024						
Permit Number	Use	General Location	Source	Date Approved	New Acres	New Storage
A-19941	MF*	S17 T33-R2W	Missouri River	8/30/2023	N/A	N/A
A-19921	IR	S19 T31-R3E	East Bow Creek	6/12/2023	165.3	N/A

Table 2 summarizes full or partial cancellations and dismissed/denied surface water permits. Four permits were cancelled in full. Two were preliminary determination of non-use (PDNU) and two were beneficial use cancellations (BUC). One permit was cancelled in part as a BUC cancellation, and one permit was dismissed/denied. The remaining two manufacturing permits expired after one year. The beneficial use cancellations during this reporting period were because the appropriator failed to perfect the appropriation by irrigating all the approved acres. Preliminary determination of non-use cancellations occur when the Department determines that the water rights have not been exercised in at least five years.

NeDNR did not act upon any transfer applications within the LCNRD during 2023 and 2024.

Table 2. Surface water permits that were fully or partially cancelled, dismissed/denied by NeDNR in 2023-2024

Surface Water Appropriations Partially or Fully Cancelled or Dismissed/Denied in 2023-2024							
Permit Number	Use	General Location	Source	Date Cancelled	Acres Cancelled	Grant Cancelled	Status
A-18234	IR	S1 T32-R2E	Trib. To Missouri River	3/13/2023	90	270	Cancelled in Full
A-18676	IR	S11 T30-R5W	Bazile Creek	2/1/2023	140.1	420.3	Cancelled in Full
A-19866	MF	S17 T33-R2W	Missouri River	7/19/2023	N/A	10	Cancelled in Full
A-19795	IR	S14 T31-R2E	Bow Creek	9/19/2024	76.1	1.09 cfs	Cancelled in Full
A-19794	IR	S12 T31-R2E	East Bow Creek	9/19/2024	27	0.4 cfs	Cancelled in Full
A-19941	MF	S17 T33-R2W	Missouri River	8/30/2024	N/A	10	Cancelled in Full
A-19658	IR	S6 T32-R1W	Beaver Creek	7/2/2024	65	0.93	Cancelled in Part

19775	IR	S25 T31-R1E	Norwegian Bow Creek	7/11/2024	458	N/A	Dismissed/Denied
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STREAMFLOW MONITORING

The U.S. Geological Survey (USGS) operates six streamgages within the boundaries of LCNRD. A listing of these streamgages is shown below in Table 3, and the locations of the streamgages are shown in Figure 4. Streamflow data on these gages is available on the USGS's National Water Information System (NWIS) at <http://waterdata.usgs.gov/>. NeDNR regularly assesses the need for modifications to the network in the IMP area.

Table 3. An overview of USGS streamgages in the LCNRD

Streamgages in the Lewis and Clark NRD					
Name	USGS Gage ID	Start Year	Gage Height	Discharge	USGS Cooperative Partners
Bazile Creek near Niobrara, NE	06466500	1990	X	X	Lewis & Clark NRD
Bazile Creek at Center, NE	06466400	2002	X	X	Santee Sioux Tribe of NE
Bow Creek near Wynot, NE	06478522	2015	X	X	Lewis & Clark NRD, NE Dept. of Natural Resources
Howe Creek near Center, NE	06466470	2017	X	X	Santee Sioux Tribe of NE
Missouri River near Maskell, NE	06478526	2012	X		U.S. Army Corps of Engineers
Missouri River near St. James, NE	06478523	2017	X		U.S. Army Corps of Engineers

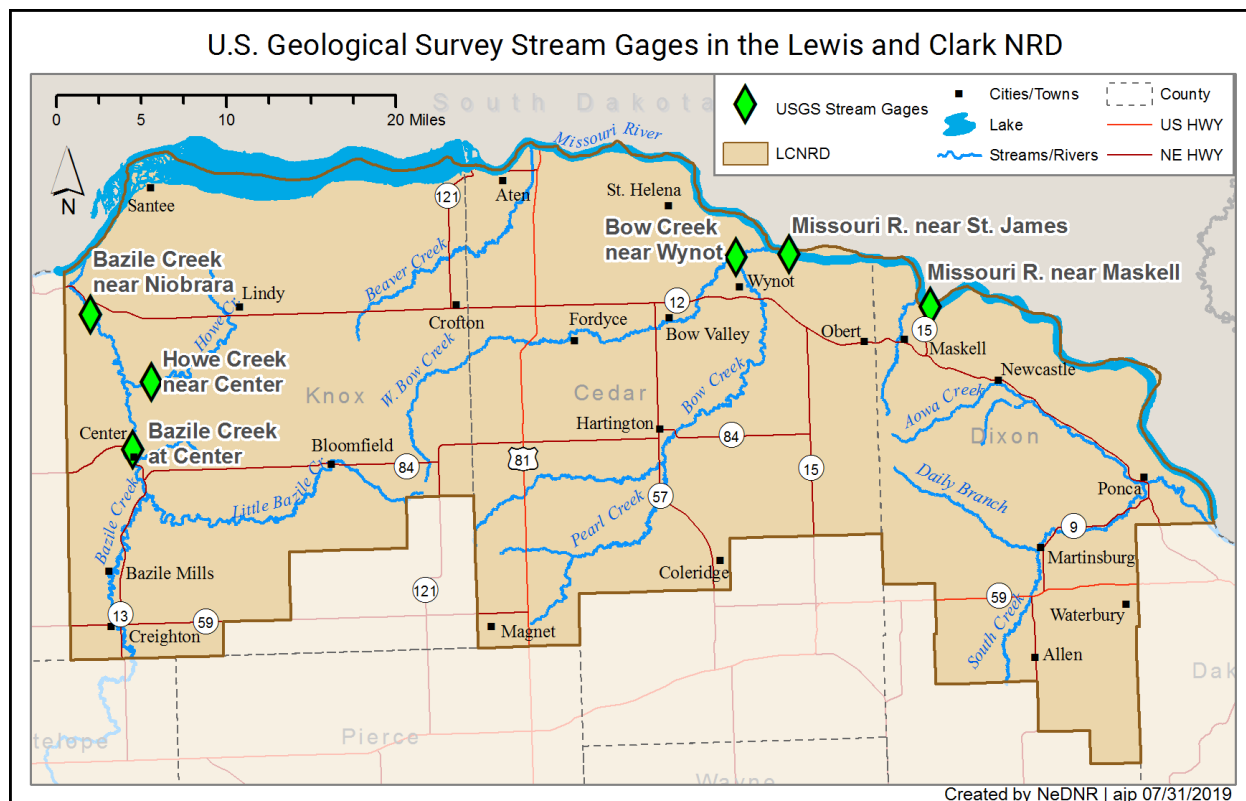


Figure 4. Map showing locations of streamgages (all USGS gages) in the LCNRD

NeDNR acquired streamflow data for select streamgages from the USGS NWIS portal (some data are provisional) as a part of this LCNRD biennial report. The streamgages include two locations on Bazile Creek and one location on Bow Creek. These gages provide insight into the overall water supply for a given year. The streamgage graphs for the 2024 reporting year show the streamflow discharge in cubic feet per second (cfs) for both the reporting year and the historical average. Additionally, the graphs show the total volumetric discharge of water in acre-feet (af) passing the gage for the maximum, mean, minimum and reporting year volumes. This graph makes it easier to see the volume of water for the reporting year compared to previous years as well as the average daily discharge compared to the historical.

The Bazile Creek at Center shows that discharge in the stream varied compared to the historical average, while the total volume was similar to the historical average. Comparing the total volumes from 58,000 af in 2024 and 47,000 af in 2023, 2024 had a 19 percent increase in total volume. Bazile Creek near Niobrara showed varied discharge during the year, though during the months of August and September the average was below the average period of record. Total volumes were greater by 14,000 af, an increase of 18 percent. Bow Creek near Wynot showed similar fluctuations in the daily discharge as Bazile Creek near Niobrara, but here the 2024 total volumetric discharge was comparable to the historical average. When comparing the 110,000 af in 2024 to the 57,000 af in 2023, there was a 48 percent increase between the two years.

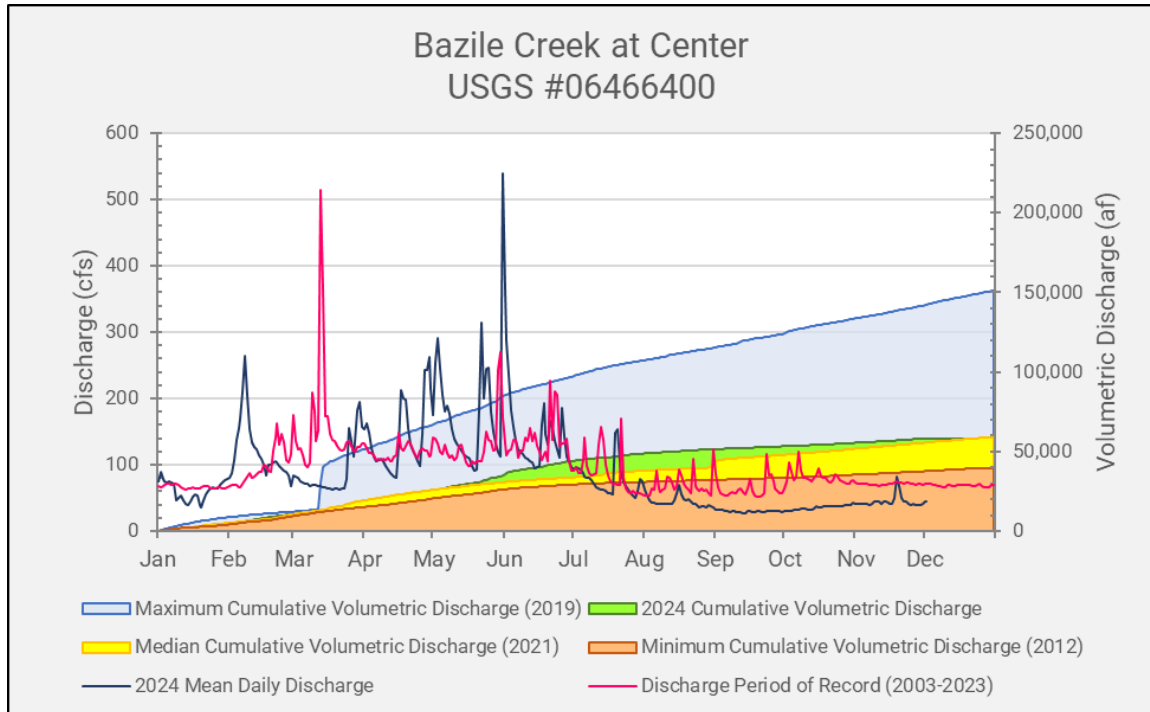


Figure 5. Discharge and Volumetric Discharge for Bazile Creek near Center, NE

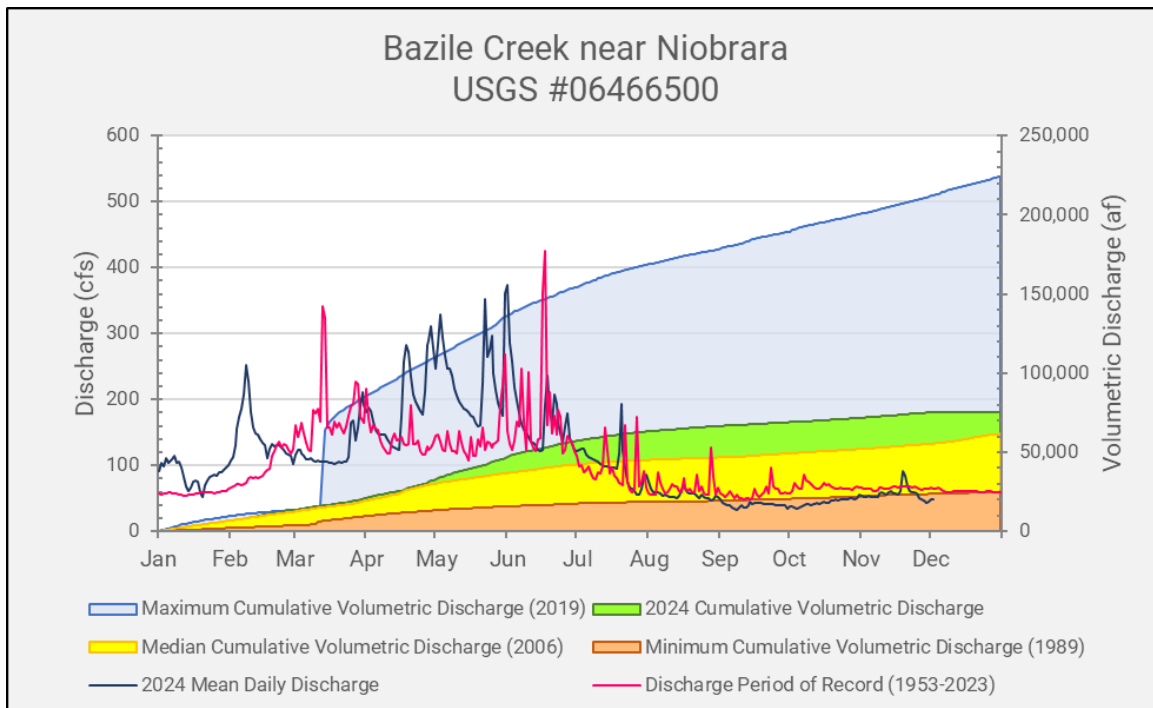


Figure 6. Discharge and Volumetric Discharge for Bazile Creek near Niobrara, NE

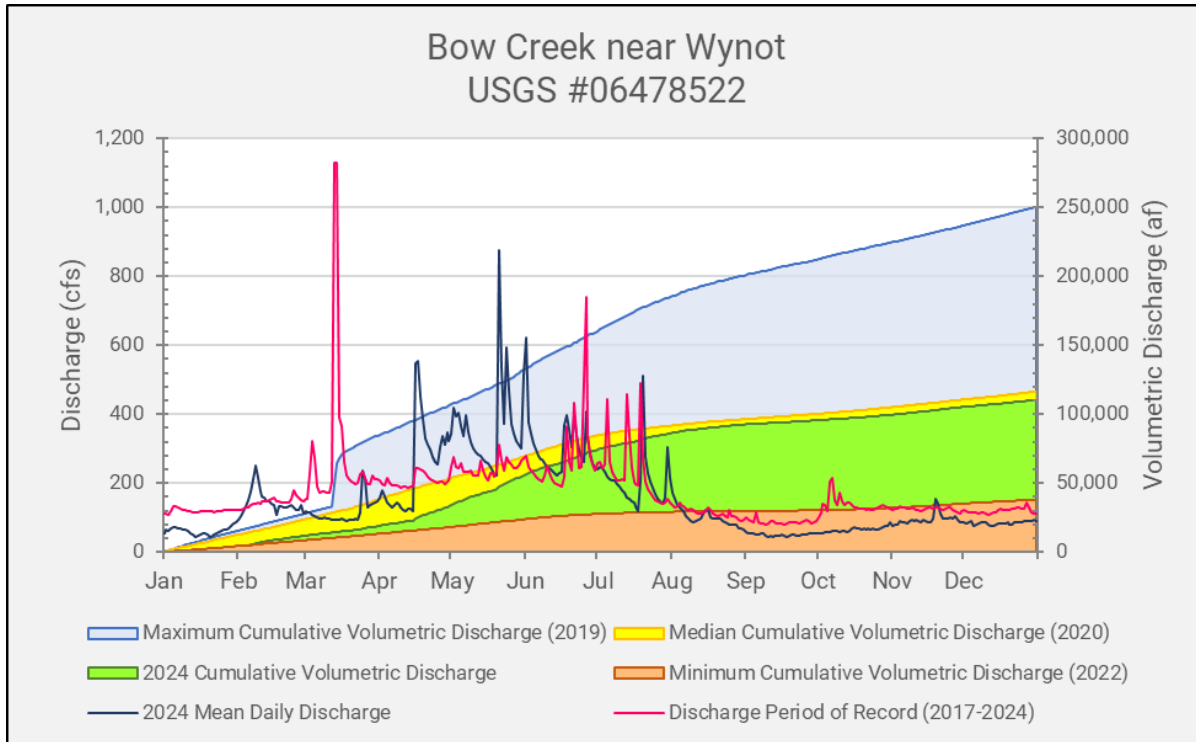


Figure 7. Discharge and Volumetric Discharge for Bow near Wynot, NE

COOPERATIVE AGREEMENT FOR BOW CREEK NEAR WYNOT STREAMGAGE

The Bow Creek near Wynot streamgage is operated and maintained by the USGS with additional funding provided by LCNRD and NeDNR. The streamgage provides discharge information for West Bow Creek and Bow Creek watersheds. When combined, these watersheds cover about 1/3 of the LCNRD land area (Figure 8). This land area is prone to flooding and had not been gaged since the closure of the Bow Creek near St. James gage in 1993. LCNRD and NeDNR considered Bow Creek gaging a priority to fill gaps in the water monitoring network.

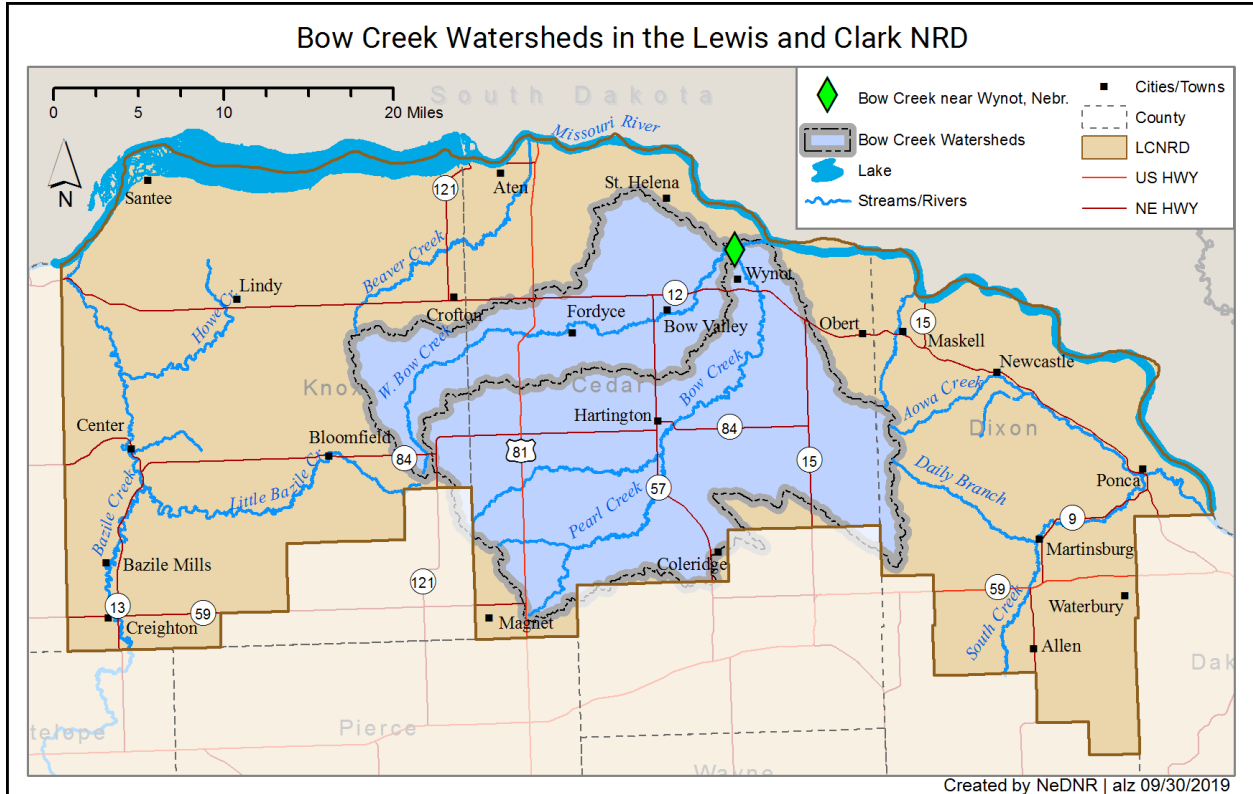


Figure 8. Bow Creek and West Bow Creek watersheds in the LCNRD

In the early 2010s, USGS installed instrumentation at the Wynot site to monitor water quality for a defined period, after which the instrumentation would be removed. Prior to removal and during IMP development, the LCNRD reached out to USGS and NeDNR to explore opportunities to keep the instrumentation in place and dedicate the site to year-round monitoring of streamflow. USGS agreed to provide roughly 40 percent of maintenance costs for continuation of the gage.

Since 2016, the LCNRD and NeDNR have been in cooperative agreements to share the remaining maintenance costs that are not covered by USGS. NeDNR has utilized Water Planning Division funds for the Bow Creek near Wynot streamgage maintenance, prioritizing the initiative as a part of statewide IMP implementation. The first cooperative agreement lasted three years and covered streamgage maintenance from June 2016 to June 2019. NeDNR and LCNRD have extended the cooperative agreement through September 30, 2029.

Benefits of the Bow Creek near Wynot streamgage include increased knowledge about water supply at a critical point just upstream of the confluence with the Missouri River, better ability to monitor and make decisions about flooding, and improved insight into climate cycles and drought. In addition, river stages at Bow Creek can be compared to static water levels at observation wells in northern Cedar County, to increase understanding of hydrologically connected groundwater and surface water areas. The partnership between NeDNR and LCNRD to maintain the streamgage is helping to achieve IMP goals and objectives, specifically objectives 1.1 (development and maintenance of a District-wide water inventory) and 1.2 (filling gaps in monitoring networks).

VOLUNTARY WATER USE REPORTING

NeDNR requests water use data through its Voluntary Water Use Reporting Program throughout the state, including surface water irrigation permit holders in the LCNRD. NeDNR sends surveys to surface water irrigation permit holders around December of each year requesting information such as surface water use or non-use, estimated water use amounts, reasons for non-use, and crops grown. Most responses are received by February of the following year when NeDNR begins to compile the information received.

In 2023, NeDNR received 41 responses from a total of 113 permit holders, a response rate of 36 percent. In 2024, a total of 29 responses were received from a total of 112 permit holders, with a response rate of 26 percent. For 2023, the response rate was similar to what was received in 2022 and in 2024 the response rate was lower.

For the 2023 irrigation season the responders that provided estimated water use indicated they had applied an average of 7 inches of water per acre with amounts ranging from 1 to 26 inches. For the 2024 irrigation season, the responders again provided an estimated water use of 5.7 inches per acre with amounts ranging between 1 and 22.6 inches of water per acre.

Table 4. Voluntary use reporting for 2023 and 2024

Voluntary Use Reporting for 2023 and 2024						
Appropriation Type	Number of Permits	Number of Respondents	Irrigated with Surface Water	Irrigated with Groundwater	Did not Irrigate	Reported Irrigated Acres
2023	113	41	23	11	18	2,670
2024	112	29	17	7	12	1,824

GROUNDWATER LEVEL MONITORING

LCNRD performs water level measurements on 34 irrigation wells across the district in the spring and fall of each year. The results of the measurements are reported to United States Geological Survey (USGS) and University of Nebraska Conservation and Survey Division (UNLCSO). A summary report is also published in local newspapers and posted on the LCNRD website. Hydrographs of 34 wells were developed by NeDNR staff and have subsequently been provided to LCNRD to maintain and update with current measurements for groundwater management. An example of these hydrographs is included in Figure 9 and the complete set of hydrographs for each monitored well can be found in Appendix 1.

Water levels of these wells are used as indicators of aquifer impact. Spring water levels in 2023 showed a decreasing trend and in 2024 there was a slight increase over all monitored wells of 0.08 ft. Most of the monitored wells still measure above the levels observed with spring readings after the 2012 drought which highly impacted wells across LCNRD. Fall water levels recorded in 2023 showed increase in the majority of wells. This trend continued in 2024 with average precipitation across most of the district. In 2015, four new wells were added to the monitoring wells that are constructed in the Dakota Formation Aquifer. The only monitored well that was previously monitoring this aquifer was located in Maskell, number 31N4E2DBAB1, which caved in in 2016 and can no longer be measured. The hydrographs include measurements for 31N4E2DBAB1 through 2016, when the well caved in, and is included in Appendix 1. Changes in observed static water levels for the monitoring wells for 2023, 2024, and compared to 2012, during drought, is in Table 5.

LCNRD has continued to drill test holes and develop observation wells in representative areas of local aquifers to better understand the hydrogeologic framework of the district and to monitor water quality and quantity. As of 2024, there are 70 total observation wells in 43

different locations. Several locations have 2 or 3 wells screened at different intervals. A complete listing of district observation wells and the geologic formation they are constructed in is provided in Table 6 and a map of their locations and aquifer of development is found in Figure 10. Dedicated transducers are installed in each observation well. The transducers are set to record water levels every eight hours in most settings and each observation well is sampled at least once a year for water quality with samples sent to a certified laboratory for testing of routine parameters. Parameters that are sampled include, but are not limited to, nitrate, pH, calcium, sulfur, and chloride. Dakota formation observation wells are also sampled and tested



UNL-CSD Hydrogeologist, Susan Olafsen Lackey evaluating geologic samples collected from drilling a test hole in the Dakota formation near Martinsburg, NE.

for iron and manganese concentrations. An example hydrograph representing static water level and nitrate concentration correlated to one another in one of observation wells is found in Figure 9. Hydrographs for the observation wells are included in Appendix 2.

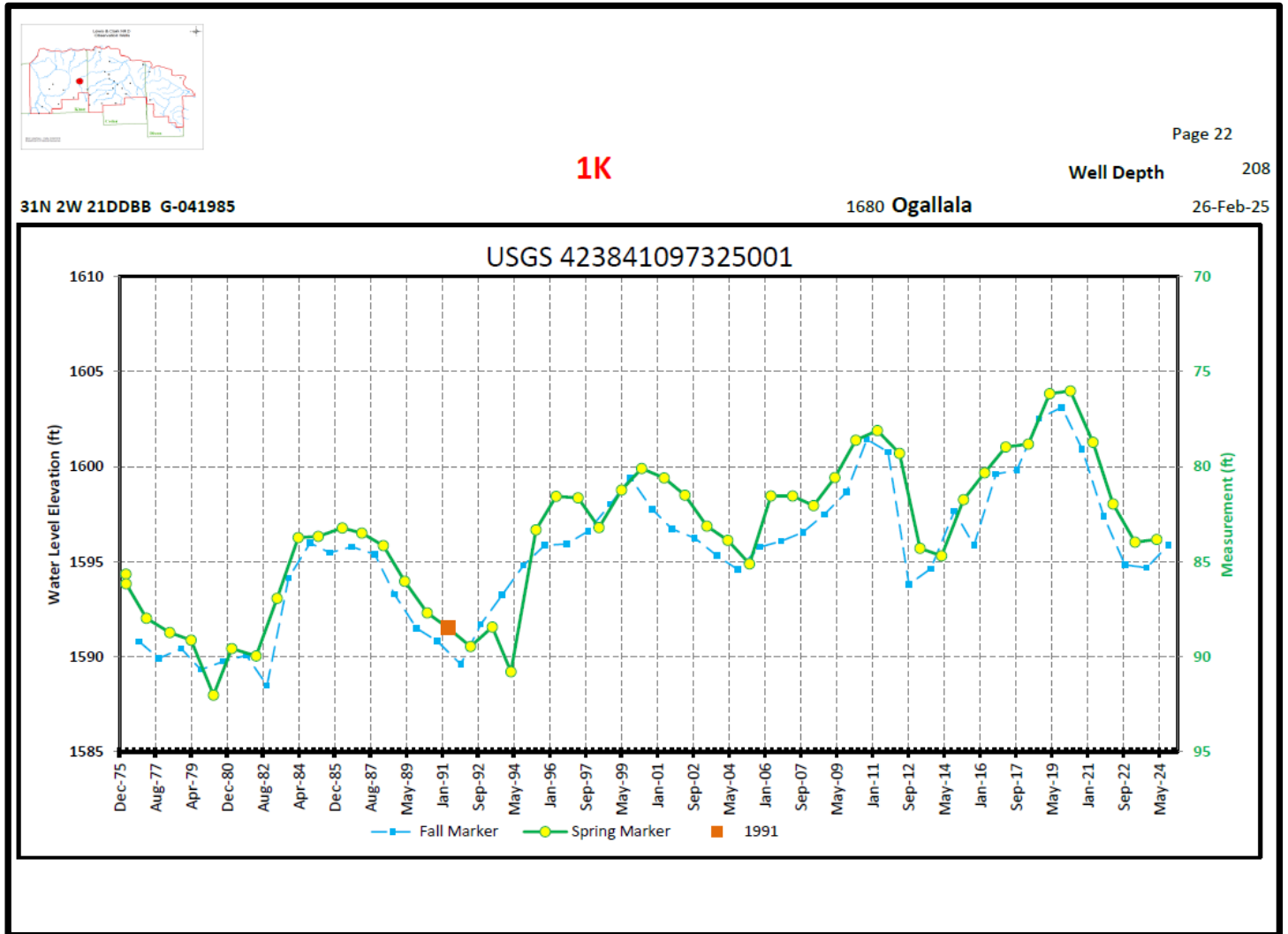


Figure 9: Example of hydrographs representing water levels from annually measured LCNRD observation wells

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Table 5: LCNRD Monitoring Well Measurements and Comparisons

Name	Registration #	Legal	Formation	2022 SWL Fall	2023 SWL Fall	2024 SWL Fall	2022 to 2023 SWL Fall Change	2023 to 2024 SWL Fall Change	2022 SWL Spring	2023 SWL Spring	2024 SWL Spring	2022 to 2023 SWL Spring Change	2023 to 2024 SWL Spring Change	2022 SWL Spring	During 2012 Drought to 2023 SWL Spring Change	During 2012 Drought to 2024 SWL Spring Change
9K	G-050508	12-30N-2W	UNDEFINED	193.99	194.30	194.12	-0.31	0.18	190.27	191.56	193.03	-1.29	-1.47	192.83	1.27	-0.20
6K	G-049645	31-30N-2W	UNDEFINED	175.82	175.79	175.35	0.03	0.44	172.51	173.35	174.61	-0.84	-1.26	174.76	1.41	0.15
7K	G-030737	12-29N-4W	UNDEFINED	132.56	132.72	131.21	-0.16	1.51	128.71	128.64	128.13	0.07	0.51	129.04	0.40	0.91
7C	G-014545	16-31N-1E	SANDGRAVEL	51.98	45.28	43.46	6.70	1.82	39.06	39.37	37.59	-0.31	1.78	41.71	2.34	4.12
10C	G-036399	36-31N-2E	SANDGRAVEL	121.21	121.98	121.76	-0.77	0.22	117.95	120.06	121.13	-2.11	-1.07	119.19	-0.87	-1.94
11C	G-042131	27-30N-2E	SANDGRAVEL	126.20	127.29	127.51	-1.09	-0.22	123.51	124.83	126.57	-1.32	-1.74	125.70	0.87	-0.87
12C	G-056403	9-30N-2E	SANDGRAVEL	56.51	56.82	55.46	-0.31	1.36	53.54	55.53	56.13	-1.99	-0.60	55.33	-0.20	-0.80
13C	G-035811	11-30N-1E	SANDGRAVEL	51.47	50.00	48.18	1.47	1.82	43.87	44.80	43.42	-0.93	1.38	44.72	-0.08	1.30
14C	G-033491	21-30N-1E	SANDGRAVEL	119.56	117.41	115.96	2.15	1.45	104.46	110.73	112.01	-6.27	-1.28	111.00	0.27	-1.01
16C	G-056206	18-29N-1W	SANDGRAVEL	293.45	289.90	290.13	3.55	-0.23	289.68	289.44	288.81	0.24	0.63	289.05	-0.39	0.24
17C	G-056985	13-29N-1W	SANDGRAVEL	95.45	95.91	95.77	-0.46	0.14	92.55	93.41	94.29	-0.86	-0.88	94.55	1.14	0.26
18C	G-054554	13-29N-1E	SANDGRAVEL	137.13	139.26	139.98	-2.13	-0.72	134.45	137.13	138.64	-2.68	-1.51	137.80	0.67	-0.84
2K	G-043855	27-31N-4W	SANDGRAVEL	84.99	85.68	87.51	-0.69	-1.83	76.77	81.95	82.66	-5.18	-0.71	77.22	-4.73	-5.44
4K	G-008604	9-30N-3W	SANDGRAVEL	56.65	57.26	54.23	-0.61	3.03	52.67	53.97	55.30	-1.30	-1.33	54.04	0.07	-1.26
5K	G-054396	9-30N-4W	SANDGRAVEL	162.48	164.15	164.27	-1.67	-0.12	160.30	161.46	163.29	-1.16	-1.83	159.91	-1.55	-3.38
8K	G-040674	13-29N-5W	SANDGRAVEL	45.24	46.76	44.98	-1.52	1.78	41.14	43.65	44.53	-2.51	-0.88	45.30	1.65	0.77
9K	G-040860	32-29N-4W	SANDGRAVEL	128.00	131.00	130.83	-3.00	0.17	121.09	125.63	126.93	-4.54	-1.30	129.89	4.26	2.96
10K	G-029546	34-29N-5W	SANDGRAVEL	8.16	6.72	7.61	1.44	-0.89	6.16	6.87	5.67	-0.71	1.20	7.31	0.44	1.64
3D	G-036891	8-29N-4E	SANDGRAVEL	163.83	159.84	156.80	3.99	3.04	157.10	159.73	159.31	-2.63	0.42	156.93	-2.80	-2.38
15C	G-050492	30-30N-1W	OGALLALA	105.79	105.61	106.02	0.18	-0.41	103.04	103.95	104.48	-0.91	-0.53	105.20	1.25	0.72
1K	G-041985	21-31N-2W	OGALLALA	85.17	85.32	84.12	-0.15	1.20	81.97	83.97	83.83	-2.00	0.14	84.30	0.33	0.47
3C	G-034181	10-32N-1E	NIOBRARA	27.52	17.55	8.64	9.97	8.91	13.93	10.39	10.13	3.54	0.26	17.12	6.73	6.99
5C	G-035972	32-32N-1E	NIOBRARA	18.76	16.31	13.77	2.45	2.54	16.03	15.32	14.53	0.71	0.79	16.20	0.88	1.67
6C	G-042255	9-31N-1E	NIOBRARA	58.86	50.26	43.35	8.60	6.91	44.52	42.03	39.57	2.49	2.46	46.13	4.10	6.56
8C	G-041937	25-31N-1E	NIOBRARA	46.25	44.74	44.07	1.51	0.67	44.34	43.68	43.20	0.66	0.48	44.33	0.65	1.13
9C	G-003900	31-31N-2E	NIOBRARA	14.39	13.18	13.07	1.21	0.11	12.43	12.17	11.01	0.26	1.16	11.87	-0.30	0.86
1C	G-030411	10-33N-1W	MORIALLV	25.37	24.45	24.12	0.92	0.33	25.81	25.98	25.15	-0.17	0.83	24.36	-1.62	-0.79
2C	G-009759	13-33N-1W	MORIALLV	22.49	21.52	19.15	0.97	2.37	20.84	21.93	19.56	-1.09	2.37	18.77	-3.16	-0.79
4C	G-005176	13-32N-3E	MORIALLV	19.52	18.85	17.66	0.67	1.19	19.11	18.34	18.74	0.77	-0.40	17.98	-0.36	-0.76
2D	G-025772	21-31N-6E	MORIALLV	17.01	16.68	14.67	0.33	2.01	19.92	16.94	16.94	2.98	0.00	15.54	-1.40	-1.40
Kd	G-169039	33-33N-1W	DAKOTA	47.55	43.50	44.17	4.05	-0.67	41.93	37.22	37.28	4.71	-0.06	N/A	N/A	N/A
Kd	G-168534	28-32N-2E	DAKOTA	64.52	57.10	58.62	7.42	-1.52	47.32	48.85	48.55	-1.53	0.30	N/A	N/A	N/A
Kd	G-167145	33-32N-2E	DAKOTA	154.22	150.39	148.68	3.83	1.71	142.88	141.28	138.54	1.60	2.74	N/A	N/A	N/A
Kd	G-163433	36-33N-1E	DAKOTA	116.16	98.61	95.75	17.55	2.86	90.80	90.30	88.31	0.50	1.99	N/A	N/A	N/A

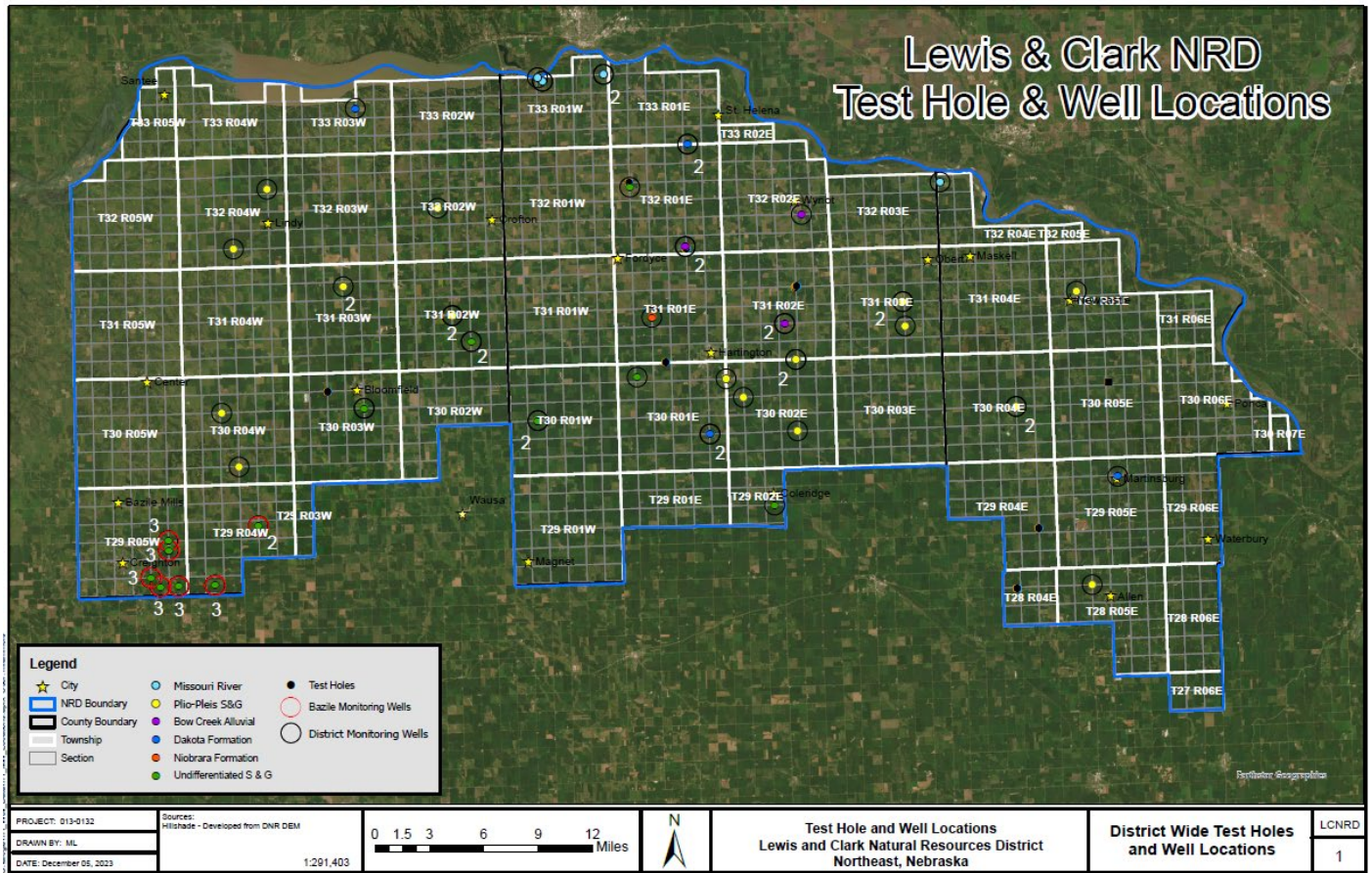
Table 6: District Observation Wells, Numbers, Locations, and the Geologic Formation of Construction

LCNRD Test Holes and Observation Wells (page 1 of 2)											
Site_#	TH_#	Well_#	lat	lon	Location	T	R	RgDir	Sec	Qtr	Targets
1	05-LC-14	06M	42.787000	-97.283683	St. Helena SW	33	1	E	35	SESW	Kd (Shallow)
1(2)	05-LC-14(2)	06D	42.786910	-97.283694	St. Helena SW	33	1	E	35	SESW	Kd (Deep)
2	03-LC-13	Test Hole	42.757481	-97.348515	Menominee SE	32	1	E	18	NENE	S&G in Kn area
3	02-LC-13	Test Hole	42.703486	-97.288859	Fordyce East	32	1	E	34	NESE	Bow Creek Alluvial
3(2)	02-LC-13	Test Hole	42.703486	-97.288859	Fordyce East	32	1	E	34	NESE	Bow Creek Alluvial
4	09-LC-13	Test Hole	42.613128	-97.314471	Hartington West	31	1	E	33	SWSE	Green Gravel
5	08-LC-13	08M	42.554956	-97.174672	Hartington SE	30	2	E	22	SESE	P-P S&G
6	04-LC-13	10M	42.727792	-97.162839	Wynot WHPA	32	2	E	23	SESW	Bow Creek Alluvial
7	07-LC-13	11M	42.496211	-97.201992	Coleridge WHPA	29	2	E	16	NENW	S&G (Deep)
8	01-LC-13	Test Hole	42.669685	-97.171923	Hartington NE	31	2	E	15	NENE	Bow Creek Alluvial
9	05-LC-13	09M	42.569667	-97.454742	Pleasant Valley South	30	1	W	17	SWSE	S&G (Shallow)
9(2)	05-LC-13(2)	09D	42.569500	-97.454906	Pleasant Valley South	30	1	W	17	SWSE	S&G (Deep)
10	06-LC-13	03M	42.598400	-97.250017	Hartington WHPA 1	30	2	E	6	SWSW	P-P S&G
11	04-LC-14	05M	42.823333	-97.643033	Knox-Dakota	33	3	W	22	SENE	Kd (Shallow)
12	01-LC-14	04S	42.554667	-97.269517	Hartington SW-Kn	30	1	E	25	NWNW	Kn
12(2)	01-LC-14(2)	04M	42.554647	-97.269111	Hartington SW-Kd	30	1	E	25	NWNW	Kd (Shallow)
13	02-LC-14	12M	42.582450	-97.796400	Central - Knox Co	30	4	W	16	NWNW	P-P S&G
14	03-LC-14	07M	42.583156	-97.231978	Hartington WHPA2	30	2	E	18	NENE	P-P S&G
15	Sp-LC-15	Test Hole	42.670239	-97.170763	Hartington NE	31	2	E	14	NWNW	Bow Creek Alluvial
15(2)	Sp-LC-15(2)	Test Hole	42.670236	-97.170453	Hartington NE-Kn	31	2	E	14	NWNW	Kn

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LCNRD Test Holes and Observation Wells (page 2 of 2)											
Site_#	TH_#	Well_#	lat	lon	Location	T	R	RgDir	Sec	Qtr	Targets
16	Sp-LC-15	19S	42.705116	-97.289792	Fordyce East	32	1	E	34	NESE	Bow Creek Alluvial
16(2)	Sp-LC-15(2)	19D	42.705147	-97.289566	Fordyce East-Kn	32	1	E	34	NESE	Kn
17	Sp-LC-15	30M	42.601908	-97.346220	Hartington West	30	1	E	5	SWSW	Green Gravel
18	Sp-LC-15	18S	42.612068	-97.173967	Hartington East	30	2	E	3	NENE	P-P S&G
18(2)	Sp-LC-15(2)	18M	42.612065	-97.173842	Hartington East	30	2	E	3	NENE	P-P S&G
19	Sp-LC-15	22S	42.655566	-97.544137	Dolphin-Bloom NE	31	2	W	22	NWNW	P-P S&G
19(2)	Sp-LC-15(2)	22M	42.655420	-97.544179	Dolphin-Bloom NE	31	2	W	22	NWNW	P-P S&G
20	Sp-LC-15	Test Hole	42.596898	-97.681292	Bloomfield West	30	3	W	9	NWNW	P-P S&G
21	Sp-LC-15	27M	42.539141	-97.779173	Bloomfield SW	30	4	W	34	NWNW	P-P S&G
22	Sp-LC-15	21M	42.741724	-97.556690	Crofton-West	32	2	W	21	NENW	P-P S&G
23	Sp-LC-15	23M	42.713402	-97.779137	Lindy-SW	32	4	W	27	SWSW	P-P S&G
24	Sp-LC-15	26M	42.681056	-97.661239	Bloomfield-North	31	3	W	10	NWNW	P-P S&G
25	Fa-LC-15	20M	42.753945	-97.347738	Menominee SE	32	1	E	17	SWNW	Narrow Paleo Valley
26	Sp-LC-16	25S	42.844789	-97.372633	Yankton South	33	1	E	12	SWSE	Missouri River Alluv
26(2)	Sp-LC-16	25M	42.844789	-97.372633	Yankton South	33	1	E	12	SWSE	Missouri River Alluv
27	Fa-LC-15	17S	42.641101	-97.184731	Hartington NE	31	2	E	27	NENW	Bow Creek Alluvial
27(2)	Fa-LC-15(2)	17D	42.641091	-97.184865	Hartington NE-Kn	31	2	E	27	NENW	Kn
28	Fa-LC-15(2)	24D	42.649353	-97.328387	Hartington NW-Kn	31	1	E	20	SENE	Kn
29	Fa-LC-15	16S	42.750000	-97.011389	Maskell-North	32	4	E	18	SENE	Missouri River Alluv
30	Fa-LC-15	Test Hole	42.423354	-96.943229	Dixon-East	28	4	E	10	NENE	P-P S&G
30(2)	Fa-LC-15(2)	x	42.423364	-96.943390	Dixon-East	28	4	E	10	NENE	P-P S&G
31	Fa-LC-15	13S	42.568525	-96.937559	Dixon-North	30	4	E	15	SESE	P-P S&G
31(2)	Fa-LC-15(2)	13M	42.568522	-96.937656	Dixon-North	30	4	E	15	SESE	P-P S&G
32	Fa-LC-15	14M	42.423901	-96.862455	Allen WHPA	28	5	E	5	SESE	P-P S&G
33	Fa-LC-15	15M	42.658864	-96.867960	Newcastle WHPA	31	5	E	17	NWSE	P-P S&G
34	Fa-LC-15	Test Hole	42.470396	-96.917631	Hwy 20	29	4	E	23	NESE	P-P S&G
35	Sp-LC-16	28S	42.583447	-97.642176	Bloomfield WHPA	30	3	W	11	SWSW	S&G
35(2)	Sp-LC-16(2)	28M	42.583355	-97.642181	Bloomfield WHPA	30	3	W	11	SWSW	S&G
36	Su-LC-17	29M	42.509738	-96.830583	Martinsburg	29	5	E	10	NENW	Kd
37	Pre-14	2S	42.491472	-97.759833	Cleveland	29	4	W	15	SENE	S&G
37(2)	Pre-14	2M	42.491472	-97.759778	Cleveland	29	4	W	15	SENE	S&G
38	Spalding	ML-1S	42.444917	-97.808172	Creighton MW-1	29	4	W	32	NWSE	S&G
38(2)	Spalding	ML-1M	42.444917	-97.808172	Creighton MW-1	29	4	W	32	NWSE	S&G
38(3)	Spalding	ML-1D	42.444917	-97.808172	Creighton MW-1	29	4	W	32	NWSE	S&G
39	Pre-14	ML-2S	42.444911	-97.847481	Creighton MW-2	29	5	W	36	NWSE	S&G
39(2)	Pre-14	ML-2M	42.444911	-97.847481	Creighton MW-2	29	5	W	36	NWSE	S&G
39(3)	Pre-14	ML-2D	42.444911	-97.847481	Creighton MW-2	29	5	W	36	NWSE	S&G
40	Pre-14	ML-3S	42.444947	-97.867272	Creighton MW-3	29	5	W	35	NWSE	S&G
40(2)	Pre-14	ML-3M	42.444947	-97.867272	Creighton MW-3	29	5	W	35	NWSE	S&G
40(3)	Pre-14	ML-3D	42.444947	-97.867272	Creighton MW-3	29	5	W	35	NWSE	S&G
41	Pre-14	ML-4S	42.452353	-97.877167	Creighton MW-4	29	5	W	27	SESE	S&G
41(2)	Pre-14	ML-4M	42.452353	-97.877167	Creighton MW-4	29	5	W	27	SESE	S&G
41(3)	Pre-14	ML-4D	42.452353	-97.877167	Creighton MW-4	29	5	W	27	SESE	S&G
42	Pre-14	ML-6S	42.473931	-97.857272	Creighton MW-6	29	5	W	24	NWSW	S&G
42(2)	Pre-14	ML-6M	42.473931	-97.857272	Creighton MW-6	29	5	W	24	NWSW	S&G
42(3)	Pre-14	ML-6D	42.473931	-97.857272	Creighton MW-6	29	5	W	24	NWSW	S&G
43	Pre-14	ML-7S	42.481344	-97.857481	Creighton MW-7	29	5	W	14	SESE	S&G
43(2)	Pre-14	ML-7M	42.481344	-97.857481	Creighton MW-7	29	5	W	14	SESE	S&G
43(3)	Pre-14	ML-7D	42.481344	-97.857481	Creighton MW-7	29	5	W	14	SESE	S&G
44	03-LC-20	31S	42.634355	-97.524246	Dolphin East	31	2	W	26	NWSW	S&G
44(2)	03-LC-20 (2)	31M	42.634351	-97.524506	Dolphin East	31	2	W	26	NWSW	S&G
45	01-LC-20 (2)	32S	42.670528	-97.583065	Dolphin West	31	2	W	8	SWSW	S&G
45(2)	01-LC-20	32M	42.670515	-97.582996	Dolphin West	31	2	W	8	SWSW	S&G
46	04-LC-19	33S	42.843697	-97.444258	Aten Shallow	33	1	W	16	NWNW	Missouri River Alluv
47	Su-LC-21	34S	42.840705	-97.439031	Aten-East	33	1	W	16	SENE	Missouri River Alluv
47(2)	Su-LC-21	34M	42.840705	-97.439031	Aten-East	33	1	W	16	SENE	Missouri River Alluv
48	Su-LC-21	35M	42.760479	-97.741131	Lindy-second	32	4	W	11	NESE	P-P S&G
49	Su-LC-20	36M	42.655407	-97.056165	Obert-North	31	3	E	15	SWSE	P-P S&G
49(2)	Su-LC-20	36D	42.655407	-97.056165	Obert-North	31	3	E	15	SWSE	P-P S&G
50	Su-LC-20	37S	42.635875	-97.054573	Obert-South	31	3	E	26	SWNW	P-P S&G
51	Su-LC-24	Test Hole	42.590005	-96.836001	Powder Creek	30	5	E	10	NWSW	Kd

Figure 10: LCNRD Test Holes and Observation Wells, aquifers of development and location



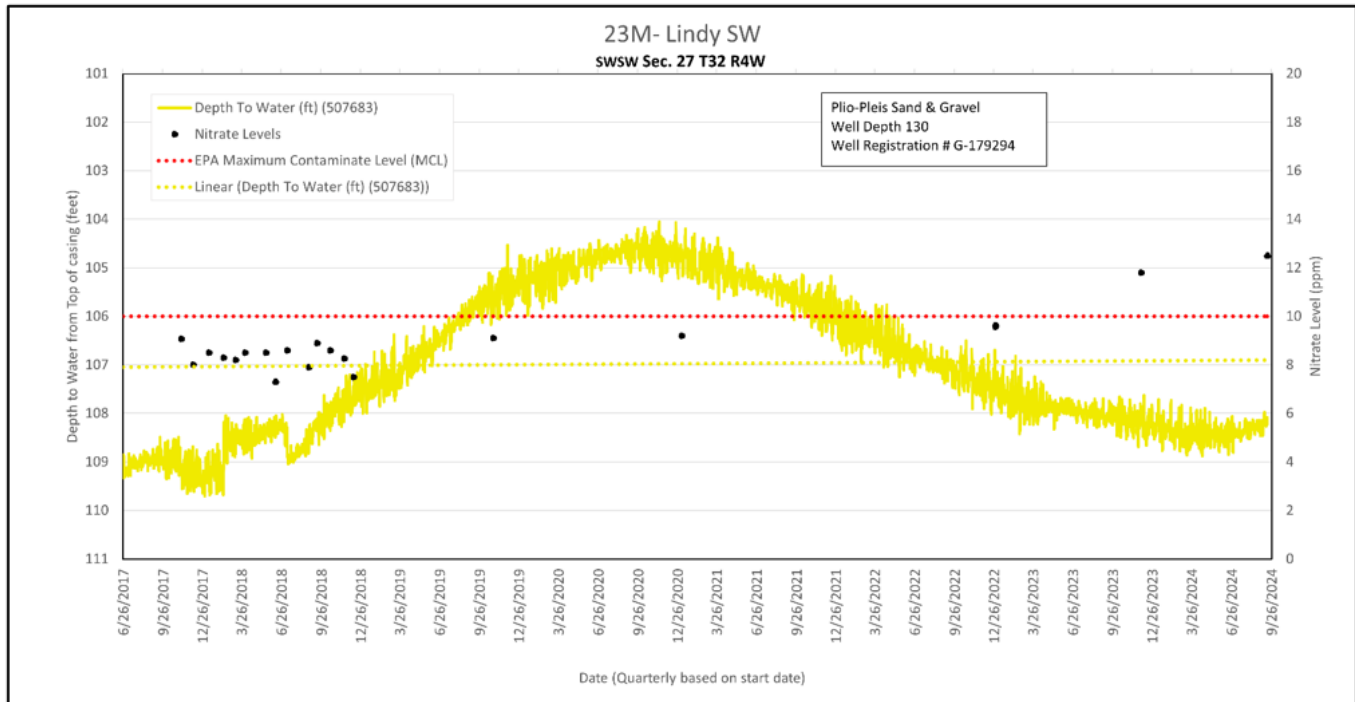


Figure 101: LCNRD Example of Observation Well Static Water Level and Nitrate Concentration Correlation hydrograph

GROUNDWATER PERMITTING AND REGULATIONS

Permits have been required since August 2014 for all new wells pumping greater than 50 gpm and for all new irrigated acres developed in the district. Each proposed well is reviewed using a scale and scoring system which includes the number of existing wells within 6,000 feet of the proposed well, the transmissivity, and the saturated thickness of sand and gravel formations to evaluate water bearing potential of each well application. Wells that are located in the Niobrara or Dakota formation do not include a transmissivity or saturated thickness score due to water bearing formation located in clay/sandstone layers. Each site proposed for groundwater irrigation expansion is also evaluated primarily to consider beneficial use of groundwater. Fields where more than 33% of the total acres are comprised of soil types that are 6e or greater with a slope of 12% or greater are required to implement an approved conservation plan with the Natural Resources Conservation Service (NRCS). In November of 2022 LCNRD entered a 180 day stay for new high capacity well permits due to the increasing trend in the number of permits received each month to allow for modification of the processes utilized to prepare the permits for review. The board of directors considered development in sensitive areas of the district and discussed drought impacts. An indicator score was established to facilitate review of permits. Any well ranking score over 40 is brought directly before the board for consideration and permits with ranking scores below 40 are discussed with a board sub-committee and recommendations are provided by the committee to the board.

LCNRD directors approved 47 well permits and 3,471 acres for irrigation in 2023. There were 50 well permits and 4,726 acres approved for irrigation in 2024. There were 5 conservation plans required over the two-year period for groundwater to be applied on acres identified for agricultural production. Table 7 and Figures 12 and 13 represent the irrigation wells and expanded irrigated acres approved during the reporting period.

Flow meters have been required on all new high-capacity wells developed following adoption of revised groundwater quantity rules and regulations in 2014. Figure 14 and 15 represent irrigation water use and crops produced for 2023 and 2024 based on pumping reports received. Annual pumping reporting will continue to be required on all permitted wells in LCNRD.

Certification of irrigated acres in LCNRD proceeded with the process being shifted to a web based app contracted through Longitude 103. As of December 31, 2024, there have been 37,909 acres certified. Table 8 summarizes the acres certified as irrigated in LCNRD in 2023 and 2024. Irrigated acres are officially certified following board approval of the documentation submitted by the landowner.

LCNRD has worked with USGS to maintain stream gages on Bazile Creek near Center and worked with USGS and NeDNR on the Bow Creek stream gage near Wynot. Stream gage hydrographs are included in the NeNRD IMP report. Additional stream gage needs will be assessed over the next two-year IMP review period.

LCNRD will revise the district groundwater management plan that is required by Nebraska Revised Statute 46-673.01 to bring it up to date with current understanding of water resources. The plan was originally drafted in 1984 and modified through an amendment in 2014. Modification to the Rules and regulations pertaining to groundwater quantity were board approved and implemented in 2021. The modifications were primarily made to clean up a variety of items to make the rules structure meet the intent of how they are carried out. Additional modifications will be considered to the rules and regulations including combining all existing rules and regulations into one document to facilitate implementation and remove duplications and conflicting requirements. Additional modifications may be needed following the groundwater management plan update.

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Table 7: Board approved irrigation well permit and expanded irrigation permit applications for 2023 and 2024

2023 Well and Expansion Permits										2024 Well and Expansion Permits									
Permit	Aquifer	New Irrigated Acres	Existing Irrigated Acres	Soils % 6e	Permit	Aquifer	New Irrigated Acres	Existing Irrigated Acres	Soils % 6e	Permit	Aquifer	New Irrigated Acres	Existing Irrigated Acres	Soils % 6e	Permit	Aquifer	New Irrigated Acres	Existing Irrigated Acres	Soils % 6e
JANUARY					JUNE					JANUARY					JUNE				
none	S&G	68	166	0.0%	LC-431	S&G	0	202	0.0%	LC-459	S&G	0	228	0.0%	None	S&G w/ Kn	7	126	0.0%
none	Kn w/ S&G	20	103	0.0%	LC-432R	S&G	0	660	7.3%	LC-460	S&G	233	0	12.5%	None	S&G	32	32	2.1%
none	Kn w/ S&G	14	115	0.0%	LC-433	Niobrara	133	0	0.0%	None	S&G	54	217	0.0%	LC-492	S&G	133	0	0.9%
none	S&G	70	66	5.7%	LC-434	Niobrara	133	0	0.0%	LC-461	S&G	0	105	0.0%	LC-493	S&G	130	0	5.3%
FEBRUARY					JULY					FEBRUARY					JULY				
none	S&G	9	119	0.0%	None	Kn w/ S&G	21	158	32.9%	LC-462L	Kd	0	0	0.0%	LC-494	S&G	65	0	0.0%
none	S&G	133	135	0.4%	LC-435	S&G	0	200	1.2%	None	S&G	35	212	47.4%	LC-495	S&G	0	220	2.2%
none	S&G	32	89	0.0%	None	S&G	116	66	0.0%	LC-463NF	S&G	0	123	0.0%	AUGUST				
none	S&G	28	261	22.2%	LC-DNR	Kn	0	365	6.0%	None	S&G	5	137	27.9%	LC-496R	Kn	0	365	6%
none	S&G	76	190	16.4%	AUGUST					None	S&G	25	137	29.4%	LC-497	S&G	73	0	0%
none	S&G	35	98	32.8%	LC-436	Kn	0	66	20%	LC-464	Kn	0	69	0.0%	LC-499	S&G	225	0	3%
none	Kn	26	87	0.0%	SEPTEMBER					SEPTEMBER					SEPTEMBER				
none	Kn	23	413	0.0%	LC-437	S&G	8	130	0%	MARCH					LC-500NF	S&G	0	0	0
none	S&G	8	265	0.0%	None	S&G	88	130	0%	LC-465R	S&G	0	124	0.0%	LC-501	S&G	0	133	0%
MARCH					LC-438	S&G	0	130	0%	LC-466NF	Kn	0	117	0.0%	LC-502	S&G	79	0	0%
none	Kn w/ S&G	6	133	29.7%	LC-439	S&G	0	0	12%	LC-467NF	S&G	0	186	0.0%	OCTOBER				
APRIL					LC-440	S&G	0	105	0%	None	S&G	12	241	0.0%	None	S&G	22	127	0.6%
LC-403R	S&G	0	133	7%	OCTOBER					LC-468	S&G	91	0	24.1%	LC-503	Kd	133	0	6.0%
None	S&G	200	0	0%	None	S&G	25	95	25.4%	LC-469	S&G	71	0	11.1%	LC-504R	S&G	0	427	3.8%
None	Kn	19	205	32%	LC-442	Kd	0	311	47.2%	LC-471	S&G	133	0	24.9%	LC-505	Kn	184	0	22.2%
None	S&G	15	118	0%	LC-443	S&G	184	0	33.0%	LC-475	S&G	0	255	20.3%	NOVEMBER				
None	Kn w/ S&G	17	118	2%	LC-445	S&G	66	0	0.0%	LC-477	S&G	317	0	30.8%	LC-507	S&G	136	0	32%
None	S&G	133	133	29%	LC-446	S&G	66	0	0.0%	LC-479	S&G	220	0	2.2%	LC-508	S&G	34	0	0%
MAY					LC-447R	S&G	0	81	Exist	LC-480	S&G	69	0	6.6%	None	S&G	67	200	0%
LC-404	Kd	0	133	6.0%	NOVEMBER					APRIL					None	S&G	19	112	0%
LC-405	S&G	172	0	29.2%	LC-448	S&G	0	427	4%	LC-481	Kd	405	0	0%	LC-509	S&G w/ Kn	173	0	20%
LC-406	S&G	0	206	29.5%	LC-449	S&G	0	63	2%	LC-482	S&G	63	0	7%	LC-510	S&G	133	0	0%
LC-407	S&G	65	0	0.0%	LC-450R	S&G	0	130	0%	LC-483	S&G	35	0	9%	LC-511	S&G	133	0	0%
LC-408	S&G	45	133	19.7%	LC-451	S&G	132	0	6%	None	S&G	7	0	0%	LC-514	Kd	230	0	48%
LC-409	Kd	0	302	3.5%	None	S&G	20	72	0%	LC-484	S&G	134	0	29%	LC-515	S&G	272	0	11%
None	Kd	135	*142*	2.7%	DECEMBER					LC-485	S&G	134	0	35%	LC-517	S&G	0	130	1%
LC-410	S&G	105	0	0.0%	LC-452R	S&G	0	113	18.9%	LC-486	S&G	82	0	12%	LC-518	S&G	0	260	3%
LC-411R	S&G	0	270	21.2%	LC-453NF	S&G	0	113	18.9%	LC-488	Kn	0	99	0%	DECEMBER				
LC-412	Kn	63	0	1.8%	LC-454	S&G	0	244	0.0%	LC-489	S&G	0	124	1%	LC-518	S&G	0	260	3%
LC-413	S&G	103	0	2.9%	None	S&G	34	256	17.4%	MAY					LC-519	S&G	0	301	6%
LC-414	Kn	110	0	10.8%	LC-455	Kn	0	115	15.6%	LC-490	Kn	0	133	0.0%	LC-520	S&G	66	0	7%
LC-415R	S&G	0	660	7.3%	LC-456	S&G	120	0	0.1%	LC-491LR	S&G	0	0	0.0%	None	S&G	67	234	1%
LC-416	S&G	36	0	25.0%	LC-457	S&G	133	0	28.9%	None	S&G w/ Kn	4	161	0.0%	None	Kn	20	35	0%
None	S&G	35	94	0.0%	LC-458	S&G	66	0	14.1%	None	Kn	53	103	0.0%	None	Kd	9	421	33%
LC-418	S&G	0	133	0.0%	None	S&G	66	0	0.0%										
LC-386	S&G	0	108	13.8%															
LC-419	S&G	133	0	21.1%															
LC-421	S&G	0	116	18.7%															
LC-423	Kn	0	77	0.0%															
LC-425	Kn	60	0	0.0%															
LC-427	Kn	66	0	1.1%															
LC-430	Kd	0	311	47.2%															

Nebraska Department of Water, Energy, and Environment and Lewis and Clark Natural Resources District
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Figure 12: 2023 Expanded irrigated acres in LCNRD

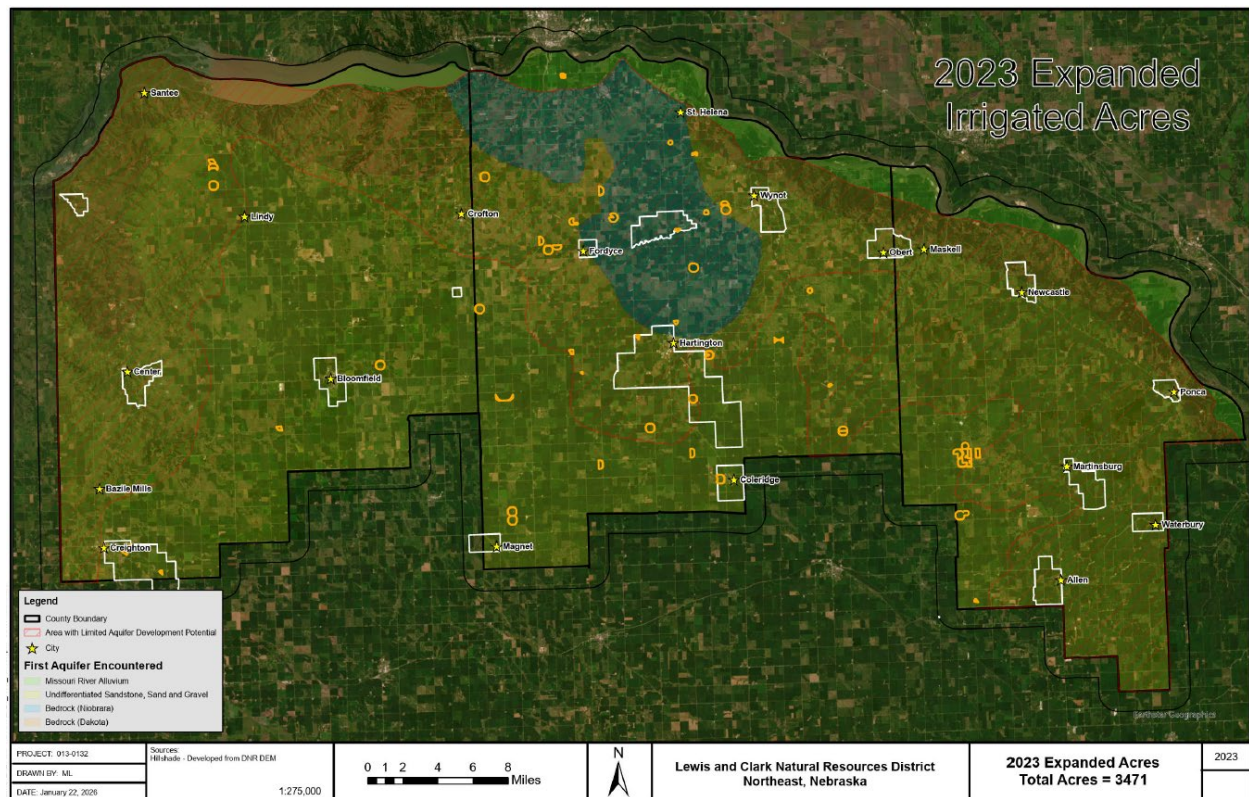
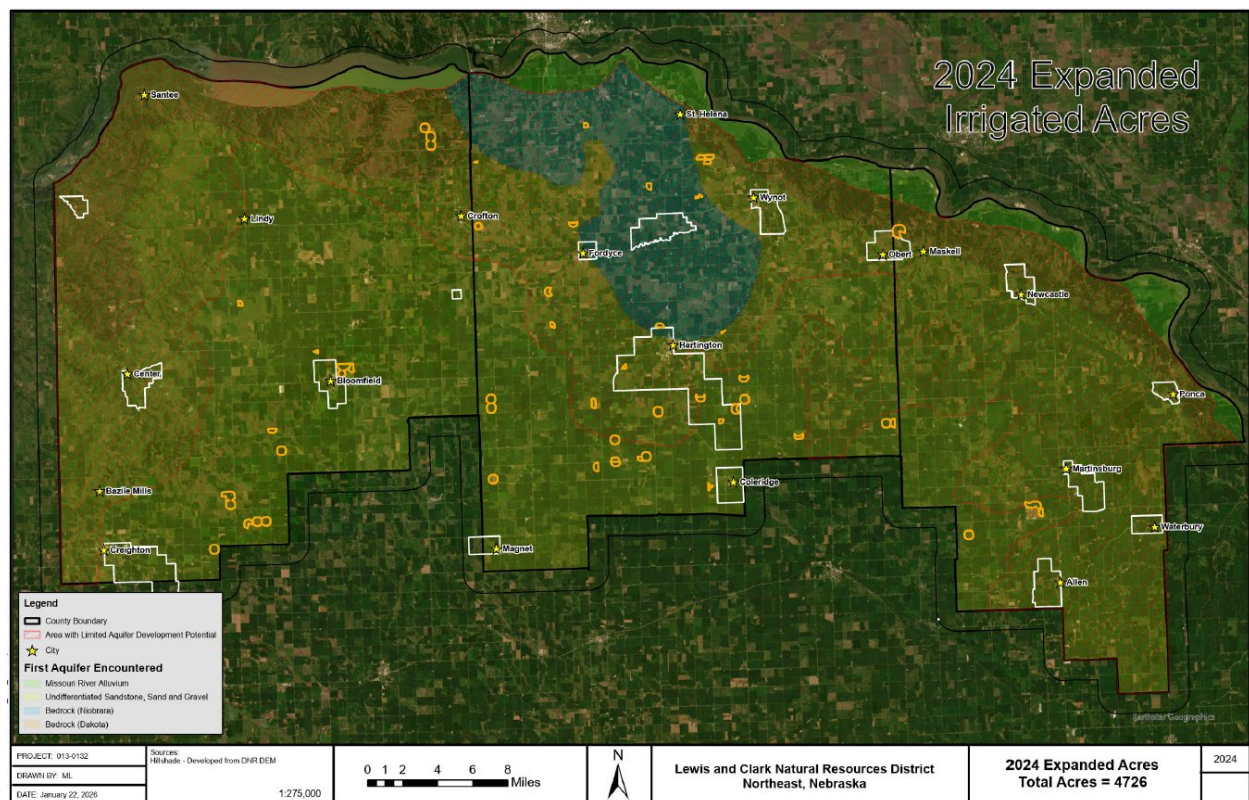


Figure 113: 2024 Expanded irrigated acres in LCNRD



Nebraska Department of Water, Energy, and Environment and Lewis and Clark Natural Resources District
2025 Lewis and Clark IMP Biennial Review
Reporting Period: 2023-2024

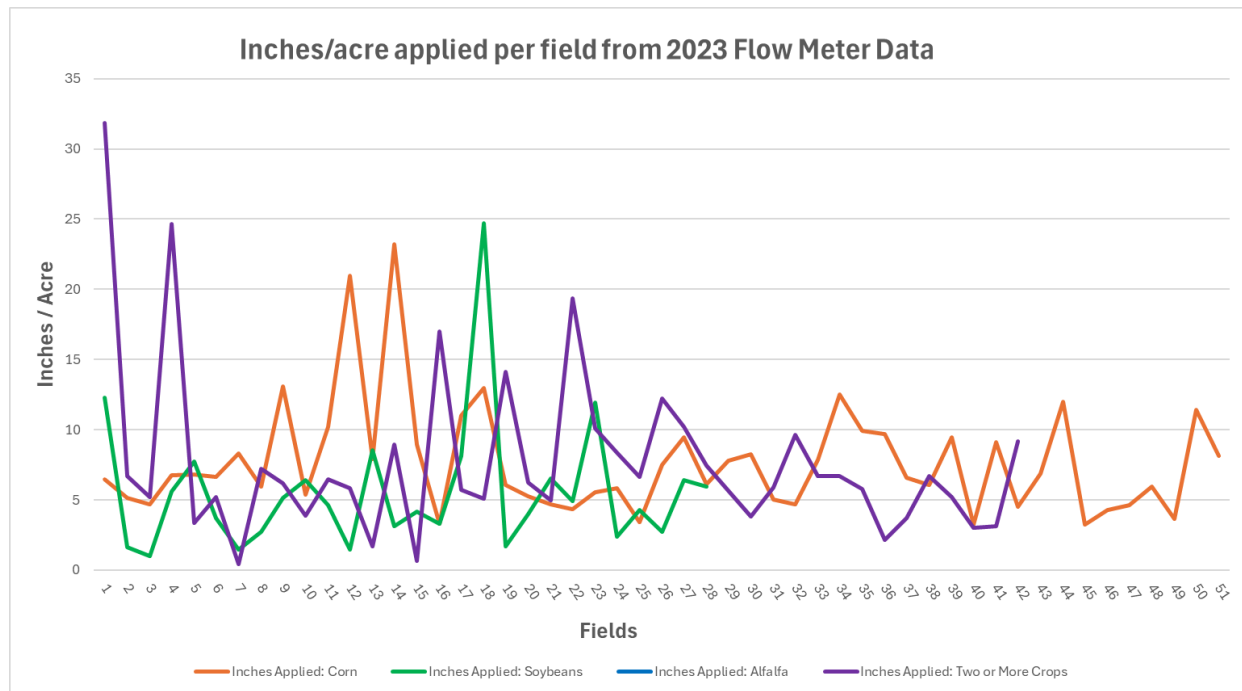


Figure 14: 2023 Flow Meter data representing groundwater applied from irrigation wells (only new and replacement wells constructed since 2014)

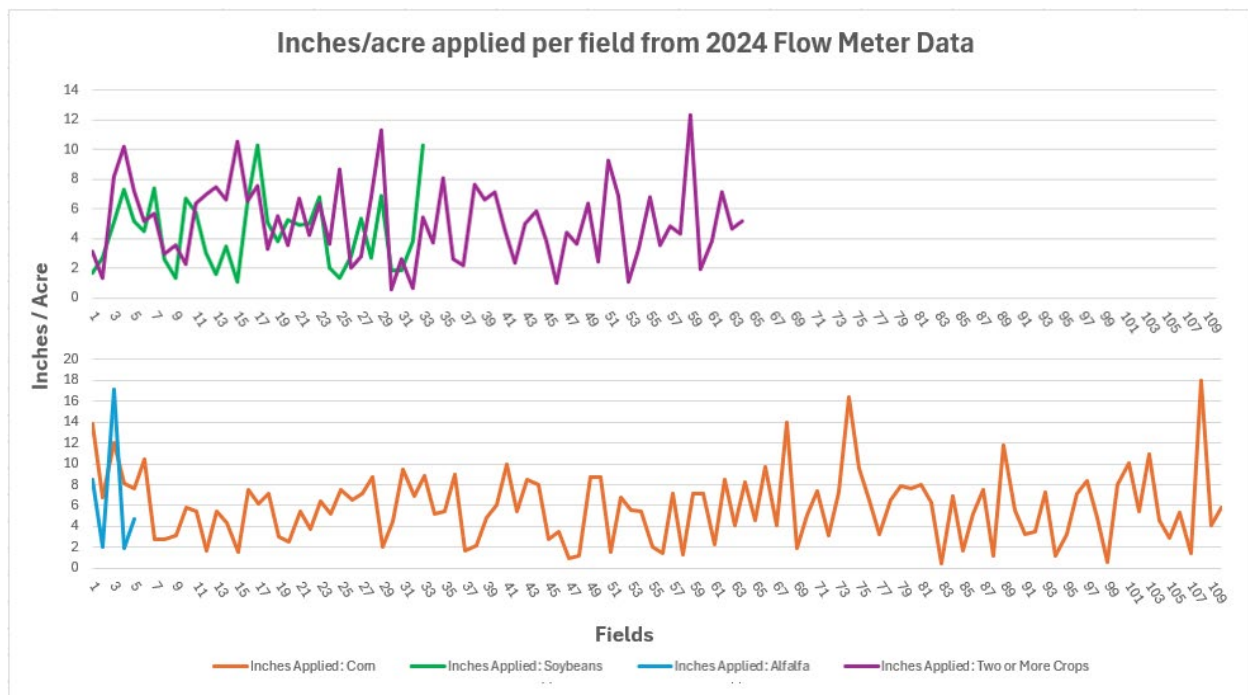


Figure 15: 2024 Flow Meter data representing groundwater applied from irrigation wells (only new and replacement wells constructed since 2014)

Table 8: Board approved certified irrigated acres for 2023, 2024 and total as of December 2024

Month Reviewed	Parcels or Certifications	Acres Certified
September 2023 Approvals	12	1752
December 2023 Approvals	8	597
January 2024 Approval	21	2589
February 2024 Approvals	6	639
April 2024 Approvals	8	586
May 2024 Approvals	24	2502
July 2024 Approvals	26	3075
September 2024 Approvals	36	4269
December 2024 Approvals	42	4893
2023-2024 Approved Acres	183	20902
End of 2024 Total Acres		37909

COLLABORATION WITH OTHER ENTITIES

MISSOURI RIVER RECOVERY IMPLEMENTATION COMMITTEE

Objective 2.2 of the IMP and its related action items outline NeDNR's responsibilities for Missouri River activities. Stakeholders and LCNRD emphasized the importance of NeDNR sharing knowledge gained through participation in the Missouri River Recovery Implementation Committee (MRRIC), as long as Nebraska remains a member. More information on MRRIC is available at <https://www.nwo.usace.army.mil/mrrp/mrric/>.

During the 2023–2024 IMP reporting period, Shuhai Zheng, Senior Engineer, represented Nebraska at MRRIC meetings, including plenary sessions held in August and December 2023 and in September and December 2024. In 2023, the U.S. Army Corps of Engineers (USACE) initiated a limited re-consultation with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act to address uncertainties in the Lower Basin pallid sturgeon population related to interception dynamics, drift, and recruitment. The re-consultation focuses on management actions for Interception Rearing Complexes and Spawning Habitat, with a revised Biological Opinion anticipated in 2026.

Under the 2018 Missouri River Recovery Management Plan and Environmental Impact Statement, the preferred alternative provides for a one-time spawning cue test release from Gavins Point Dam within the 9-10 years of implementation. During 2023–2024, MRRIC members reviewed USACE analyses on the effects of flow and temperature on pallid sturgeon behavior and discussed potential hydrograph design for a test release. Research findings to date remain inconclusive regarding the need for such a release.

The Draft Lower Missouri River Flood Risk and Resiliency System Plan and Programmatic EIS is now available for public review. The 45-day review period will be open until March 9, 2026. DWEE is a non-federal sponsor for this study. The next MRRIC meeting is expected to be held in early 2026, and further funding information should be available at that time.

LCNRD

LCNRD became an active member of the Missouri Sedimentation Action Coalition (MSAC) in 2018. The group is working to garner support and funding to draft a plan to minimize the impacts of sediment in Lewis and Clark Lake and other reservoirs on the Missouri River. Since 2018, MSAC has been working with stakeholders and the US Army Corps of Engineers to develop a Sediment Management Plan for Lewis and Clark Lake. MSAC anticipates this process will assist the other Missouri River reservoirs in future planning. Section 22 program funding has been approved to draft the plan and identify activities to reduce/mitigate sedimentation in Lewis and Clark Lake that would be eligible for future federal funding if/when available. In the fall of 2024, a pilot project using a sediment collector was conducted near the village of Niobrara on the Niobrara River. Results of the pilot project were positive for future use of this equipment for some degree of sediment management. The likelihood sedimentation would be mitigated in time to maintain the CKRWP intake in Lewis & Clark Lake is small. Therefore, LCNRD and CKRWP selected a source water alternative that avoids the buildup of sediment at the intake. LCNRD and CKRWP have entered a contract with the City of Yankton to purchase water for the CKRWP water system.

LCNRD collaborates with the University of Nebraska Conservation and Survey Division (UNL-CSD) to conduct groundwater investigation and facilitate projects to further development of the LCNRD specific hydrogeologic framework. UNL-CSD has worked and continues to partner with LCNRD to drill test holes, record stratigraphy and lithology, construct observation wells, develop grant applications and provide overall expertise relating to groundwater resources and geology of the district. The work of UNL-CSD to define areas of investigation for further study and for AEM surveys has been critical to protecting groundwater resources and defining future work in the district.

LCNRD continues to be an active member of the Eastern Nebraska Water Resources Assessment (ENWRA) which completes work through a cooperative agreement with 6 NRDs to develop a geologic framework and water budget for the previously glaciated portion of eastern Nebraska. Data compiled pertaining to LCNRD through the partnership with ENWRA including AEM surveys completed is available on the ENWRA website at www.enwra.org. Working with UNL-CSD and using AEM data, LCNRD can assist landowners and communities trying to locate groundwater for municipal, livestock, domestic, or irrigation development. With limited aquifers in some areas of the district, the AEM flights provide additional information for development of beneficial use which would otherwise be unknown to the landowners. Figure 16 represents the AEM survey lines flown in LCNRD.

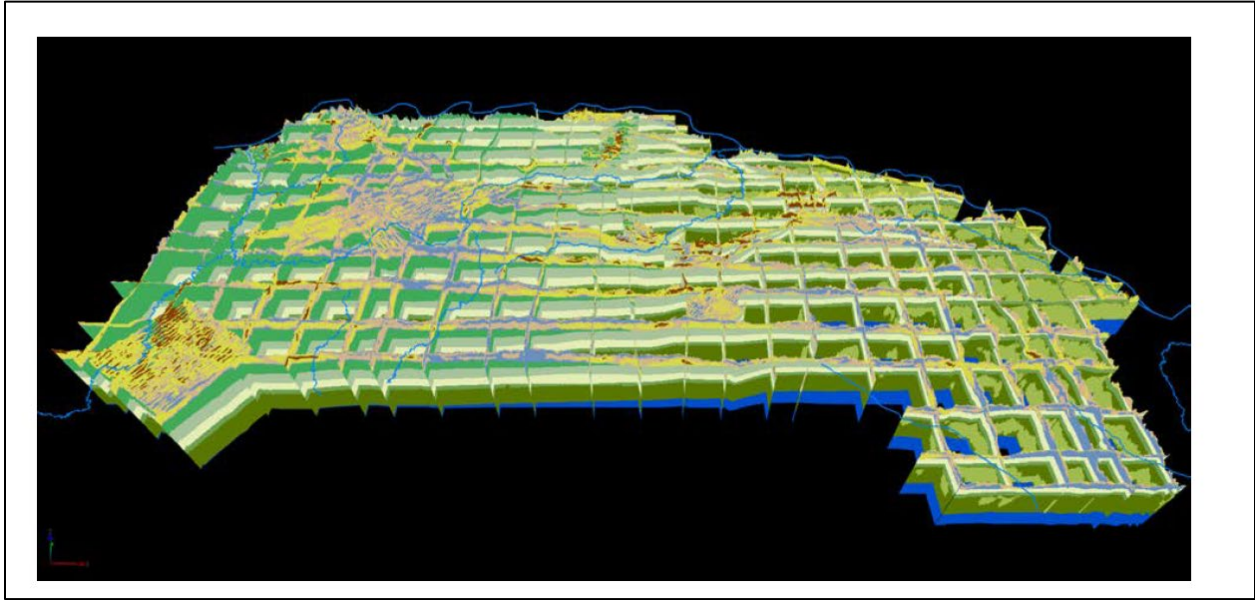


Figure 12: Airborne Electromagnetic Mapping and Hydrogeologic Framework of Selected Regions of the Eastern Nebraska Water Resources Assessment Area – Chapter on the Lewis and Clark Natural Resources District

TECHNICAL STUDIES, RESEARCH AND PROJECTS (NeDNR)

LOWER PLATTE MISSOURI TRIBUTARIES MODEL

In 2022, NeDNR began work to extend the LPMT model through 2021. There are several different inputs that are changing the way that data is gathered for the model. Weather data inputs from 2010-2021 will be sourced from PRISM grid locations, rather than from individual weather stations monitored through the High Plains Regional Climate Center. This change in inputs will reduce data gaps, both temporally and spatially, and will reduce the impacts of weather stations that might be decommissioned. Further, in 2023 NeDNR plans to update the current model from MODFLOW-2005 to MODFLOW 6. This will facilitate development of sub-regional models and analysis with coupled model scenarios.

LPMT SUB-REGIONAL MODELING

Currently the NRD's are developing models that can be coupled with the LPMT model to produce both regional and sub-regional analyses. The sub-regional models utilize the locally gathered AEM data, that then transforms that data into information that is used by the LPMT model. The data for the sub-regional models provide a higher spatial resolution and uses the LPMT model as a reference. This information along with the AEM data allows for better interpretation of the aquifer.

For additional information on what specific NRD's are doing in the Lower Platte Basin, please refer to the Lower Platte Basin Wide Annual Report that can be found on the NeDNR website at <https://dnr.nebraska.gov/water-planning/lower-platte-basin-wide-plan>.

TECHNICAL STUDIES, RESEARCH AND PROJECTS (LCNRD)

NeDNR has been working to develop the Lower Platte Missouri Tributaries Model for the last several years and LCNRD has provided information as requested for model development. LCNRD sees the need to review how data is interpreted in the model to ensure it is an accurate representation of the aquifer utilization in LCNRD. It was observed in the 2014 portion of the report provided for model production that wells were designated as bedrock wells in the southern portion of the district where very few, if any, wells are constructed in bedrock formations. This concern must be addressed with NeDNR prior to use of the model to determine Fully Appropriated Basin (FAB) status. The district plans to work with NeDNR and others to review and produce a workable, representative model for the Missouri Tributaries including LCNRD.

In the future AEM survey data could be utilized to identify areas of potential hydrogeologic connectivity and to identify where aquifer recharge occurs. LCNRD sees benefit to incorporating AEM survey data in the Lower Platte Missouri Tributaries Model prior to finalization. Currently, there is no defined plan to utilize the data to improve recharge models and calculations, however, the data is available to do so. The information from AEM surveys has been used to evaluate aquifer systems of the district and to provide landowners geologic information when considering well development.

Work continues to create a central hub for the data collected and used at the LCNRD. Currently Longitute103, which is a data driven web app developer, has created an app that LCNRD is using to track, evaluate and monitor LCNRD collected data. The web app also provides a public-facing portal for producers to enter crop, water and soil data to evaluate nitrogen efficiency, water use and yield. The web app currently provides data management for flow meters, well permits, chemigation, groundwater annual report and related data, water quality parameters, water levels and acre certification.

EDUCATION AND OUTREACH

PUBLIC OUTREACH EVENTS (NEEDNR)

In 2023 and 2024, NeDNR continued to actively engage with partnering local natural resources agencies across the state through water planning, floodplain management, and field office activities. The Department continues to seek opportunities to interact with stakeholders through participation in a wide variety of public outreach events. NeDNR also has online resources for stream simulation. The three simulations are designed for grades six through twelve or ages ten through eighteen and can be used by educators to help students understand basic water

concepts. These simulations along with their associated worksheets can be found on the Department's website at <https://dnr.nebraska.gov/water-planning/stream-simulation-games>.

The Department did participate in the following statewide or regional events in 2023 & 2024:

- Husker Harvest Days,
- Nebraska State Fair,
- Adventure Camp about the Environment (ACE Camp)

PUBLIC OUTREACH EVENTS (LCNRD)

LCNRD continues to work towards increasing public awareness of natural resources including ground and surface water conditions by providing educational materials and presentations. News articles published in 2023 and 2024 pertaining to ground or surface water include spring and fall updates on groundwater levels in the measured wells across the district, articles detailing educational events held to benefit the residents of the district, articles about the importance of sealing abandoned wells, and articles that address the importance of conservation and soil health for the protection of ground and surface water resources. Directors and staff also take part in several conferences and educational opportunities throughout the year and share that information with fellow residents of the district.

In the 2023-2024 reporting period, LCNRD participated in the following public outreach events to engage stakeholders and/or to disseminate information:

- Cedar and Knox County Fairs
- Missouri River Outdoor Expo
- AquaFest for 5th graders
- Wonderful World of Water for high school students
- Bazile Groundwater Management Area – Field Days and Winter Meetings
- Bow Creek Watershed Project - Field Days, Producer Meetings, Soil Health Workshops
- School Natural Resources Education Outreach
- Know-Your-Well Program
- Haskell Ag Lab Family Day

PROGRESS TOWARDS GOALS AND OBJECTIVES OF THE IMP

The following sections identify action items that were worked on by NeDNR during the reporting period. These actions help LCNRD and NeDNR make progress, in incremental steps, towards achieving the goals and objectives of the IMP.

GOAL 1: DEVELOP AND MAINTAIN A DISTRICT-WIDE WATER INVENTORY

- Objective 1.1. Create and maintain a comprehensive database of groundwater and surface water
 - 1.1.1 Compile and update information concerning streamflow, surface water uses and hydrologically connected areas.
 - 1.1.3 Inventory impact analyses and/or aquifer testing on new, large groundwater uses and surface water appropriations.
 - 1.1.4 Continue certification of acres District-wide.
 - 1.1.5 Update hydrographs for groundwater wells monitored.
- Objective 1.2. Address data gaps in monitoring networks.
 - 1.2.1 Implement and maintain a voluntary water use reporting system for surface water users.
 - 1.2.2 Evaluate the need for new stream or well level gages, and the best location for these.
 - 1.2.3 Expand knowledge of groundwater inventory by filling in the hydrogeologic framework with additional test holes and observation wells for monitoring in areas where deemed appropriate by CSD.
 - 1.2.4 Increase the number of monitoring wells in the Dakota and Niobrara Aquifer systems.
 - 1.2.5 Develop additional observation wells in areas that lack adequate data to follow the trends of groundwater levels.
- Objective 1.3. Improve delineations of hydrologically connected groundwater and surface water.
 - 1.3.1 Develop groundwater models for Eastern Nebraska to further understanding of hydrologically connected areas.
 - 1.3.2 Assess benefits/limitations of using remotely accessed electromagnetic data to aid interpretation of hydrologically connected areas.

GOAL 2: PROTECT EXISTING USERS WHILE ALLOWING FOR FUTURE WATER DEVELOPMENT

- Objective 2.1. Collaborate with local, state, and federal entities to better manage hydrologically connected groundwater and surface water.
 - 2.1.1 Stay up-to-date on USFWS, USACE and NPS water management efforts that may affect LCNRD and to facilitate compliance with state and federal laws.
 - 2.1.2 As hydrologically connected areas are refined, coordinate management efforts with affected local entities as needed.

- 2.1.3 Collaborate with UNL, NRCS, others to identify areas in the District where the potential for groundwater recharge has changed and why.
- Objective 2.2. Maintain and Increase knowledge about activities along the Missouri River
 - 2.2.1 Continued Department participation in MRRIC as long as Nebraska remains a participating member.
 - 2.2.2 Coordination to disseminate pertinent information to the District regarding activities along the Missouri River.
 - 2.2.3 Continued monitoring of USACE potential to charge for surface water use from storage in Lewis and Clark Lake.
- Objective 2.3. Improve water resources sustainability through innovative management strategies.
 - 2.3.1 Consider establishing different requirements for groundwater wells drilled before the designation of a management area and those drilled afterward.
 - 2.3.3 Explore methods to minimize water use conflicts (surface or groundwater).

GOAL 3: INCREASE PUBLIC AWARENESS AND UNDERSTANDING OF INTEGRATED WATER MANAGEMENT

- Objectives 3.1. Expand public outreach programs for ground and surface water.
 - 3.1.1 Increase news releases regarding groundwater conditions and activities.
 - 3.1.2 Create new educational/informational handouts about groundwater and surface water (well/surface water permitting, trends in surface water and groundwater levels, etc.)
- Objectives 3.2. Expand public outreach programs related to integrated water management
 - 3.2.1 Disseminate information through the District website about federal activities on the Missouri River with respect to groundwater and surface water supply in the District.
 - 3.2.2 Develop informational materials about integrated water management and, as needed, other groundwater and/or surface water related topics affecting the District
 - 3.2.3 Jointly participate in public outreach events related to integrated water management.

JOINTLY IDENTIFIED ACTION ITEMS FOR THE NEXT TWO YEARS

LCNRD and DWEE jointly identified actions that LCNRD will work on during the next two years and report on at the next biennial review. These actions are listed below.

GROUNDWATER LEVEL MONITORING

- Continue monitoring water levels in irrigation wells and observation wells.
- Continue updating hydrographs of water levels in irrigation wells and observation wells.
- Track and report groundwater well permit and expanded irrigated acre applications and permits.

- Track and report flow meter data from irrigation wells constructed since 2014.

COLLABORATION WITH OTHERS

- Continue working with MSAC on options to address sedimentation in Lewis and Clark Lake and other Missouri River Tributaries.
- Continue working with ENWRA and to define the hydrogeologic framework in eastern Nebraska.
- Continue working with UNL-CSD to investigate groundwater resources and hydrogeologic connection in the district.

TECHNICAL PROJECTS AND STUDIES

- Continue to utilize AEM survey data to form more accurate assessments of the District's geology and geologic frameworks.
- Work with directors, staff, and/or stakeholders to assess the need for additional projects and/or studies.

EDUCATION AND OUTREACH

- Continue distributing press releases to local newspapers to inform the public about water resource activities, conservation, and opportunities in LCNRD.
- Continue participation in educational events that promote water resource conservation and understanding.

In addition to the 3 goals of the IMP the Stakeholder Committee identified 2 long-term goals. The first long-term goal is to increase understanding of tile drainage systems in the district and their impact on water supplies. Although the district sees benefit to investigating the impact of drainage tile on ground and surface water no additional studies have been proposed or implemented. The second long-term goal is to develop programs and or guidelines to encourage water conservation for municipal agricultural and industrial applications. Development of a specific program has not been accomplished, however water saving best management practices (BMPs) are encouraged across the district.