

2023
Voluntary Integrated Management Plan
Annual Report

for the

Lower Niobrara River NRD

Annual Meeting October 19, 2023

Prepared by the Nebraska Department of Natural Resources

Introduction

The Lower Niobrara Resources District (LNNRD) and the Nebraska Department of Natural Resources (NeDNR) developed and adopted a voluntary Integrated Management Plan (IMP), which became effective on May 1, 2014. The overarching goal of the plan is to jointly manage groundwater and surface water within the LNNRD to sustain a balance between water uses and supplies for the long term. The purpose of this report is to fulfill NeDNR's responsibilities in accordance with the plan's annual reporting obligations and provide updates on current projects or studies.

Reporting and exchanging information gathered from monitoring projects, streamflow data, or other studies provides a basis to increase understanding of the surface water and hydrologically connected groundwater system. The data gathered through the IMP's monitoring plan is designed to evaluate and measure the success of the objectives of the IMP. This information exchange also helps to test the validity of the conclusions and information upon which the IMP is based. This report contains information from January 1, 2022 through December 31, 2022.

Data Reported by the Department

The IMP requires that NeDNR report on the following water data within the LNNRD on an annual basis:

- Streamflow measurements;
- Surface water permits issued and/or denied;
- Surface water usage data such as voluntary water use reports, flow meter data, crops irrigated, and acreage irrigated;
- Groundwater transfers approved; and
- Offsets provided for depletions resulting from increased consumptive use related to any of the above-listed items.

Streamflow Measurements

There are eight active streamgages in the LNNRD (Table 1). NeDNR operates gages located on the Keya Paha River south of Naper, the Niobrara River south of Butte, and Verdigre Creek north of Verdigre (Figure 1). These gages are relatively new and all been in operation for fewer than 20 years.

The United State Geological Survey (USGS) operates five streamgages in the LNNRD, three of which record stage and discharge and two only record stage. Of the gages that record discharge and stage, one is located on Ponca Creek before it joins the Missouri river, and two are on the Niobrara River, along Highway 137 at Mariaville, and south of Verdel. The two stage-only gages are located on the Missouri river downstream of Ponca Creek and on the Niobrara River at Niobrara (Figure 1).

Table 1: Active streamgages in the LNNRD

Streamgage Number	Location	Operator	Years in Operation
06464900	Keya Paha River near Naper	NeDNR	2004-present
06464930	Niobrara River near Butte	NeDNR	2010-present
06465700	Verdigre Creek near Verdigre	NeDNR	2019-present
06463720	Niobrara River at Mariaville	USGS	1990-present
06465500	Niobrara River near Verdel	USGS	1959-present
06453600	Ponca Creek at Verdel	USGS	1957-present
06453620*	Missouri River below Ponca Creek near Verdel	USGS	1987-present
06466000*	Niobrara River at Niobrara	USGS	1956-present
*Stage only (discharge not recorded)			

USGS streamgage number 06465500, located on the Niobrara River south of Verdel has been in continuous operation since 1959. It's relatively long, and consistent period of record allows for the comparison of river conditions from year to year. Figure 2 shows average daily discharge in cubic feet per second (cfs) for 2022 as it compares to the period of record average. It also shows a comparison of cumulative discharge in acre feet (af) for the minimum, maximum and median years on record. For both average daily discharge and cumulative discharge, 2022 was a slightly above average year.

Active Streamgages in the LNNRD

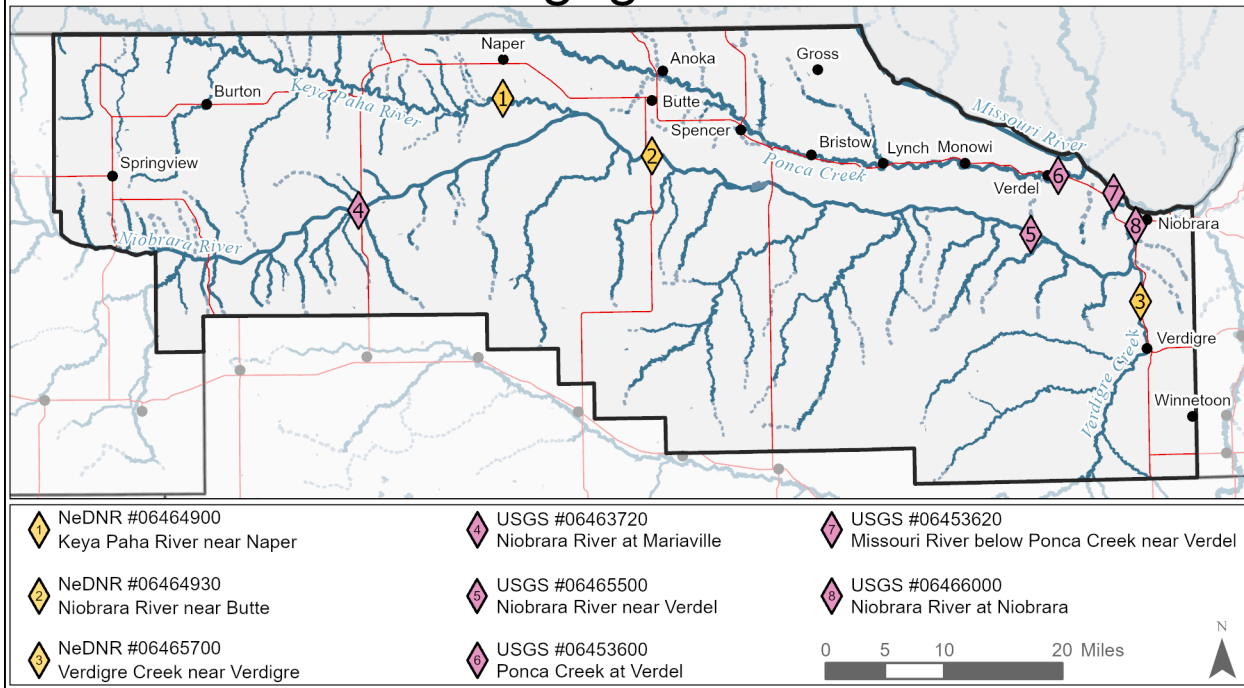


Figure 1: Location of streamgages in the LNNRD.

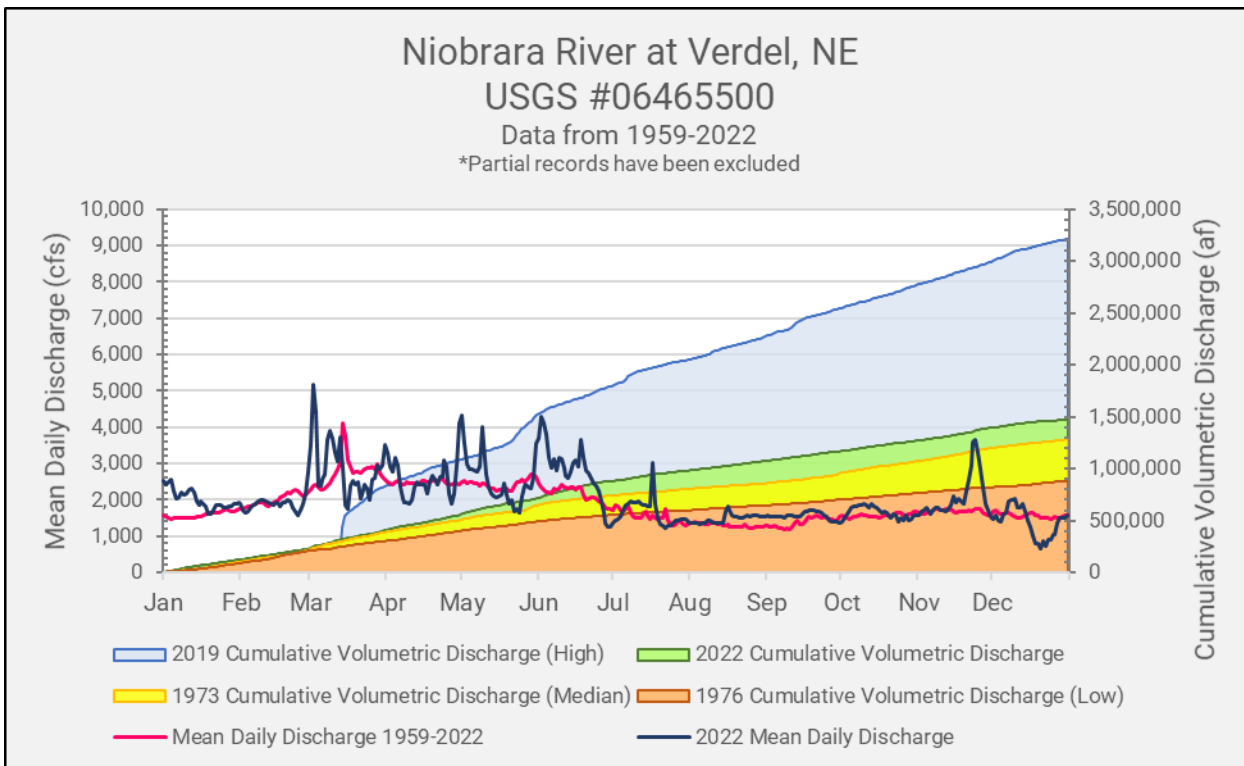


Figure 2: Streamgage data from the Niobrara River near Verdel, NE.

Surface Water Use

Table 2 shows a breakdown of active surface water permits in the Lower Niobrara NRD based on the type and purpose of permit. In total, there are 567 active surface water permits in the District. Of those, 285 permits are for irrigation diverted from a naturally flowing source (IR) and allow for irrigation of 32,025.25 acres at a cumulative rate of 449.68 cfs. There are also 47 supplemental irrigation (SI) permits that allow 6,155 acres with existing IR permits to receive a cumulative total of 2212.13 af of water from a reservoir. Additionally, there are 51 storage-only (SO) permits that allow 4,635.17 acres, not already under an IR permit to be irrigated with a cumulative total of 4,277.15 af of water from a reservoir.

Table 2: All active surface water permits in the LNNRD

ALL ACTIVE SURFACE WATER PERMITS IN THE LOWER NIOBRARA NRD as of December 31, 2022				
Purpose of Permit	Number of Permits	Acres Approved for Irrigation	Grant (cfs)	Grant (af)
Irrigation Permits				
IR - Diversion from naturally flowing source for irrigation	285	32,051.25	449.68	
SI - Supplemental Irrigation: Irrigation from reservoir on lands also covered by a natural flow appropriation	47	6,155**		2,212.13
SO - Store-only: Irrigation from a reservoir on lands not covered by a natural flow appropriation	51	4,635.17		4,277.15
All Irrigation Permits	383	36,686.24	449.68	6,489.28
Storage Permits				
(ST) Storage	147			7,632.19
(SS) Supplemental storage	13			729.1
All Storage Permits	160			8,361.29
Other Permits				
DO - Domestic	10	5.9	0.196	
FC - Fish Culture	1		3.57	
IB - Instream Basin-Management	4		2,460	
IF - Instream Flow	5		10,358	
MF - Manufacturing	2		5.54	
All Other Permits				
*There are six IR permits allowing 352.3 acres at 4.79 cfs and one SO permit allowing 141.5 af on 356.4 acres that are exempt from surface water administration under Neb. Rev. Stat. §§ 46-285 to 46-287				
**SI acres are counted with IR permits and not included in the total calculation.				

There are 147 storage (ST) permits in the LNNRD allowing a total of 7,623.19 af of storage and 13 Supplemental Storage (SS) permits allowing an additional 729.1 af. There are also two active Manufacturing (MF) permits in the District, one is a permit for aggregate washing at a rate that shall not exceed 3.34 cubic feet per second and holding pond with an available detention storage of 6.0 acre-feet and the other is for the NE Game and Parks Commission for a temporary permit for 2.2 cfs of water for the construction of a wastewater lagoon. There is also one Fish Culture (FC) permit with a grant of 3.57 cfs.

The Niobrara River Basin Alliance (NRBA), made up of the Upper Niobrara White NRD, Middle Niobrara NRD and Lower Niobrara NRD, and the Nebraska State Game and Parks Commission hold four Instream Basin-Management (IB) permits and five Instream Flow (IF) permits with a total grant of 12,181 cfs. These are new permits and are described in more detail in the next section of this report.

Surface Water Permitting

In 2022, NeDNR approved seven applications to appropriate surface water in the LNNRD. Two applications were for IR permits to irrigate a total of 375 acres at a rate of 5.36 cfs, and two were for SO permits to irrigate a total of 234.4 acres with 208.5 af of reservoir water. One of the SO permits had an associated SS permit allowing 58.5 af of supplemental storage. There was also a temporary MF permit approved for one year for the NE Game and Parks Commission for the purpose of construction of a wastewater lagoon, and one application approved for a DO permit with a 0.04 cfs grant.

Table 3: Surface water appropriations within the LNNRD that were approved during 2022.

Applications Approved in 2022 in the Lower Niobrara NRD						
Appropriation Number	Approval Date	Use	Source	Acres	Grant	Diversion / Reservoir Location S-T-R
A-19868	9/22/2022	DO	Trib. to Ponca Creek		0.04 cfs	S24-T33-R9W
A-19025	1/19/2022	IR	Niobrara River	125	1.79 cfs	S3-T33-R15W
A-19027	8/25/2022	IR	Niobrara River	250	3.57 cfs	S3-T33-R15W
A-19865	7/19/2022	MF	Niobrara River		2.2 cfs	S18-T32-R6W
A-18893	10/13/2022	SO	Reiser Reservoir No 2	125.7	150 af	S8-T33-R13W
A-19840	6/10/2022	SO	Hitchcock Reservoir	108.7	58.5 af	S33-T35-R17W
A-19839	6/10/2022	SS	Branch of Spotted Tail Creek		58.5 af	S33-T35-R17W

While the IMP does not specifically require the reporting of cancelled surface water appropriations, NeDNR provides this information for a more complete picture of surface water permitting activities within the LNNRD. In 2022, six surface water appropriations were either cancelled in full, or in part, which are listed in Tables 4 and 5 below. Two of the appropriations were cancelled in full due to the appropriator never using the water right in the time given, with one voluntarily relinquishing his water right. The other two were cancelled in full due to the water right not being used for more than five years. The other two permits were cancelled in part, one due to the appropriator filing a voluntary relinquishment of a portion of the water right, and the other having never used the water right.

Table 4: Cancelled surface water appropriations in 2022 in the LNNRD

Surface Water Appropriations Cancelled in-full January 1, 2022, to December 31, 2022. Within the Lower Niobrara NRD							
Appropriation Number	Cancelled Date	Use	Source	Cancelled Acres	Cancelled Grant	Basis for NeDNR Action	Diversion / Reservoir Location S-T-R
A-2393	3/2/2022	IR	Prouty Springs	101	1.44 cfs	PDNU-9436, REL-9452	S5-T32-R11W
A-16835	5/12/2022	IR	Missouri River	57.9	0.83 cfs	PDNU-9622	S14-T32-R6W
A-9125	9/20/2022	IR	Niobrara River	81	1.16 cfs	PDNU-9712	S29-T32-R7W
A-19136	2/8/2022	SO	Morrison Reservoir No. 1	31.5	43.5 af	BUC-9579	S21-T35-R11W

Table 5: Surface water applications within the LNNRD that were cancelled in-part during 2022.

Surface Water Appropriations Cancelled in-part January 1, 2022, to December 31, 2022, Within the Lower Niobrara NRD									
Appropriation Number	Cancelled Date	Use	Source	Cancelled Acres	Acres Remaining	Cancelled Grant	Grant Remaining	Basis for NeDNR Action	Diversion / Reservoir Location S-T-R
A-15191	4/7/2022	IR	Verdigre Creek	15	52	0.22 cfs	0.74	REL-9604	S32-T31-R6W
A-15191	7/21/2022	IR	Verdigre Creek	49.3	2.7	0.7 cfs	0.04	PDNU-9606	S32-T31-R6W

There were four non-expedited transfers approved in 2022. The non-expedited transfers NEX-9432 to NEX-9435 were approved in the District in 2022 to permanently transfer the appropriations from hydropower production purposes to Instream Basin-management (IB) appropriations for fish, wildlife, and recreation purposes pursuant to *Neb. Rev. Stat. §§ 46-290(3) (e)*. All four of the Non-expedited transfers are associated with the catastrophic

failure of the Spencer Dam along the Niobrara River on March 14, 2019, when the hydroelectric dam suffered significant damage due to ice jam flooding and was unable to continue to generate power after that date. As it had been less than five (5) consecutive years since the appropriations were last beneficially used to generate hydropower, they were not subjected to termination or cancellation. The Nebraska Public Power District (NPPD), who held the permits for the hydroelectric dam, agreed to transfer the appropriations to the Niobrara River Basin Alliance (NRBA) and Nebraska Game and Parks Commission (NGPC) to continue their future for a different purpose.

Table 6: Surface water transfers in LNNRD in 2022.

Surface Water Appropriations approved for non-expedited transfers during 2022, within the Lower Niobrara NRD							
Appropriation Number	Approval Date	Use	Source	Grant Transferred	Increase in Acres?	Application for a Transfer	Diversion/Reservoir Location S-T-R
A-359R	10/11/2022	IB	Niobrara River	35 cfs	No	NEX-9432	S30-T33-R11W
A-1725	10/11/2022	IB	Niobrara River	1,450 cfs	No	NEX-9433	S30-T33-R11W
A-3574	10/11/2022	IB	Niobrara River	550 cfs	No	NEX-9434	S30-T33-R11W
A-18503	10/11/2022	IB	Niobrara River	425 cfs	No	NEX-9435	S30-T33-R11W

Voluntary Surface Water Usage Reporting

Of the 376 voluntary water use surveys sent by NeDNR in the LNNRD in 2022, 107 surface waters responded, reporting on 88 appropriations. This 28% response rate was up 4% from 2021. Crop types reported included: corn, wheat, forage/hay/grass, alfalfa, millet, CRP, fallow, soybeans, dry edible beans, and other. Responses indicate that an average total of 9.7 inches of water was applied on the 12,033 acres that were reported.

Individuals who reported not irrigating in 2022, gave the following reasons: Didn't need to, did not farm, water level too low in pond, river changed channels and no water supply, river was too far away from shore, in safe and Pheasants Forever program, and put down a well to irrigate crop.

Department Education and Outreach Activity and Interagency Coordination in 2022

Each year, NeDNR dedicates a portion of staff time and resources to education and outreach efforts that promote a better understanding of integrated water management and

why it is important to the state's citizens. NeDNR's outreach efforts range from informal conversations with local citizens about the State's role in collaborative water management, to more complex presentations, discussions, and demonstrations about the hydrologic connection between surface and groundwater.

In 2022, NeDNR staff attended the Sandhills Ranch Expo in Bassett, NE. This event, touted as the 'largest ranch-oriented trade show in the country', provided staff an opportunity to engage with members of the public from across the Niobrara, Loup, and Elkhorn river basins.

NeDNR staff also attended the annual Niobrara basin retreat in July 2022, hosted by Middle Niobrara NRD near Valentine, Nebraska. This meeting served as a networking and coordination opportunity for Niobrara basin NRDs and various agencies and consultants, including NeDNR, the US Forest Service, Nebraska Association of Resources Districts, State legislators, and others. At this meeting, NeDNR staff gave updates on various IMP-related activities and modeling efforts and learned about other projects in the Basin.

USGS Niobrara Basin Model

The Department began working with the National Park Service and U.S. Geological Survey in 2020 to develop and calibrate a numerical groundwater model for most of the Niobrara basin in Nebraska, including a portion of the District. Model calibration has been completed and USGS is currently working on final documentation. The modeling project and final report are expected to be complete in early 2024.