
**2024 ANNUAL INTEGRATED
MANAGEMENT PLAN REPORT:**

**MIDDLE NIOBRARA NATURAL
RESOURCES DISTRICT**

&

**NEBRASKA DEPARTMENT OF
NATURAL RESOURCES**

REPORT OF 2023 DATA AND MANAGEMENT ACTIONS
ANNUAL MEETING HELD JULY 9, 2024



Purpose

In 2015, the Middle Niobrara Natural Resources District (MNNRD or District) and the Nebraska Department of Natural Resources (NeDNR or Department) began work on a jointly developed voluntary Integrated Management Plan (IMP). IMPs provide a framework for natural resources districts (NRDs) and the Department to collaboratively manage hydrologically connected surface water and groundwater at a local level. The Middle Niobrara voluntary IMP was developed in accordance with the Nebraska Groundwater Management and Protection Act, and included consultation with stakeholders from MNNRD. In late 2019, the District and the Department reached agreement on a draft IMP, and a hearing was held to take testimony from the public. After considering testimony provided at the public hearing the District and the Department agreed to adopt the IMP, which became effective on December 20, 2020.

As outlined in the IMP, the District and Department meet annually to share data, exchange annual reports, and discuss actions taken to implement the IMP. Annual IMP reports are intended to facilitate the exchange of information between the MNNRD and NeDNR, and to keep the public informed about integrated water management activities within the district. This report covers the actions and progress made by NeDNR in 2023 to implement the IMP—with a focus on surface water. The MNNRD completed a separate report that describes the actions and progress made in voluntary IMP implementation—with a focus on groundwater.

Department Reporting

The Department annually reports on data related to the following. Items in **bold** are required under the IMP. Other data presented in this report are collected by the Department and shared to present a more complete picture of water management actions in the district.

- **Surface water use**
 - ◇ **Irrigation**
 - ◇ **Municipal**
 - ◇ **Industrial**
- **Surface water permitting**
 - ◇ **New surface water appropriations granted**
 - ◇ **Transfers/cancellations of surface water appropriations**
 - ◇ Pumpsite inspections
 - ◇ Voluntary water use reporting
- **New groundwater permits issued**
- **Streamgage measurements from Department-maintained gages**
- **Surface water administrative actions taken**
- **New depletions accounting report**
- **New data collected or model/study results (conservation measures, riparian ET, etc.)**

1. Surface Water Use

The Nebraska Department of Natural Resources is responsible for issuing surface water permits in the state. In the MNNRD, 75% of all surface water permits are for irrigation, either from a naturally flowing source (IR) or from a reservoir to supplement an existing IR permit (SI). The remaining surface water permits allow for water storage, domestic and industrial uses, and instream flow protections. **Table 1** shows a breakdown of all active surface water permits in the district by use type as of December 31, 2023. It also includes the total number of each permit type, acres approved for irrigation, and the cumulative rate or volume granted for each type of permit.

Table 1: Surface Water Use in the Middle Niobrara NRD as of December 31, 2023.

ACTIVE SURFACE WATER PERMITS IN THE MIDDLE NIOBRARA NRD					
as of December 31, 2023					
Purpose of Permit		Number of Permits	Acres Approved for Irrigation	Grant (cfs)	Grant (af)
Irrigation	(IR) Diversion from naturally flowing source for irrigation	109	49,340	695.7	870
	(SI) Diversion from a reservoir for irrigation of land that is also approved to receive water from a naturally flowing source	11	36,655.5*	N/A	5,610
Irrigation Permits Total		120	49,340	695.7	6,480
Storage	(ST) Storage of water in a reservoir	28	N/A	N/A	78,403.8
	(SS) Supplemental storage	2	N/A	N/A	466
Storage Permits Total		30	N/A	N/A	78,869.8
Other	Domestic Use	6	7.4	0.1	6
	Aggregate washing	1	N/A	0.9	N/A
	Fish culture	1	N/A	N/A	98
	Instream Flow	2	N/A	110	N/A
All Other Permits Total		10	7.4	111	104
All Surface Water Permits Total		160	49,347.4	806.7	85,453.8
* SI permits allow for irrigation with water from storage on land already approved for irrigation from natural flow. Therefore, acres approved under SI permits are not counted in total irrigated acres.					

The Niobrara River Basin Alliance (NRBA)—an interlocal cooperative agreement between the three Niobrara River basin NRDs, and the Nebraska Game and Parks Commission—holds four instream basin-management (IB) permits, and five instream flow (IF) permits (listed in **Table 2**). These permits are intended to ensure that streamflow is sufficient to protect fish and wildlife habitats. The IB permits are for the reach of the Niobrara River upstream of the former Spencer hydroelectric dam and the IF permits are for the reach downstream of the Spencer dam to the confluence with the Missouri River.

Table 2: Instream Basin-management and Instream Flow permits within the Niobrara River Basin.

Purpose of Permit	Number of Permits	Grant in cfs
(IB) Instream Basin-management	4	Varies
(IF) Instream Flow	5	Varies

Instream basin-management permits are established under *Neb. Rev. Stat. § 46-290 (3) (e)* and are used to maintain streamflow for fish, wildlife, and recreation. The IB permits held by the NRBA were originally for the manufacture of hydropower at the now decommissioned Spenser hydroelectric dam. They were purchased from NPPD by the NRBA and maintain the same priority dates and preference category as the original hydropower permits. The four IB permits have the following priority dates and associated grants:

- A-359R Priority date of 9/12/1896 35 cfs¹
- A-1725 Priority date of 10/30/1923 1,450 cfs²
- A-3574 Priority date of 6/8/1942 550 cfs
- A-18503 priority date of 4/16/2007 425 cfs³

The five IF permits are A-19406A through A-19406E⁴ with each permit covering a specific period of the year. A breakdown of each permit, their associated time periods and allotted flows are listed below:

- A-19406A Jan 1 - Feb 28 (29) 2,084 cfs
- A-19406B Mar 1 – May 14 2,270 cfs
- A-19406C May 15 – June 30 2,270 cfs
- A-19406D July 1 – Sept 30 1,765 cfs
- A-19406E Oct 1 – Dec 31 1,969 cfs

¹ Administration can only be done on the Minnechaduzza creek as per the original water right.

² Administration for rights A-1725 and 3574 are allowed for a total of 2,000 cfs on the Niobrara River.

³ This water right does not have the ability to have a call placed against it for administration purposes.

⁴ Instream flow permits A-19406A through A-19406E have a priority date of 12/04/2015.

2. Surface Water Permitting

In 2023, there was one partially cancelled surface water permit in the district and no fully cancelled permits. **Table 3** lists all cancelled and expired permitting actions from 2023. There was one new surface water permit issued by the Department in 2023. Detailed information about that permit is presented in **Table 4**. There were no other modifications or variances issued for surface water permits in the district during the 2023 reporting year. **Figure 1** shows the locations of all 2023 surface water permitting actions within the Middle Niobrara NRD.

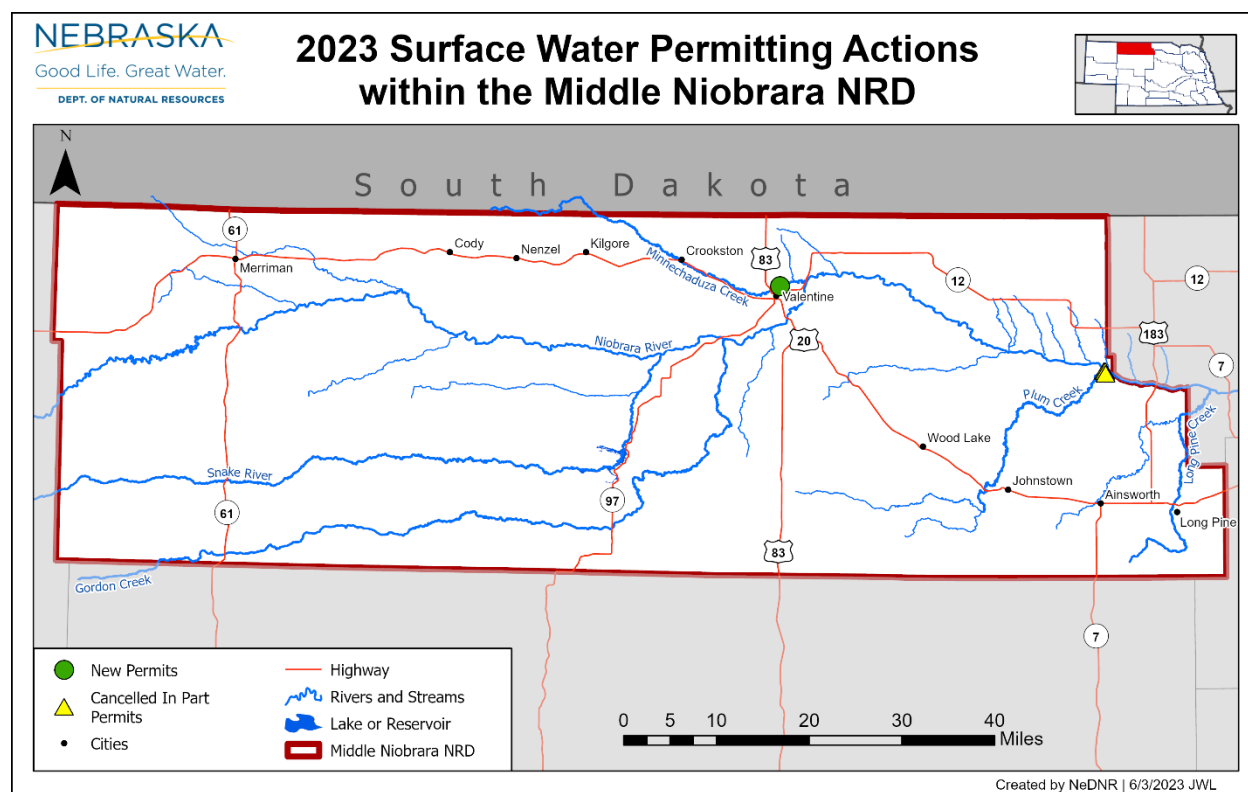


Figure 1. 2023 surface water permitting actions within Middle Niobrara NRD.

Table 3. Summary of surface water permits that expired or were cancelled in 2023.

Appropriation Number	Approval Date	Cancelled Date	Status	Point of Diversion Location	Use	Source	Begin Acres	Cancelled Acres	Cancelled Grant (CFS / AF)	Modification
A-17280 ⁵	6/17/1993	3/30/2023	Cancelled In Part	S12 T32-R22W	IR	Niobrara River	52.0	16.5	0.24 cfs 49.5 af	REL-9774 PDNU 9695

Table 4. New surface water permitting actions and associated variances granted in 2023.

Appropriation Number	Approval Date	Priority Date	Point of Diversion Location	Use	Source	Acres	Grant	Associated Variance
A-19881	01/09/2023	11/07/2022	S30-T34-R27W	DO	Minnechaduza Creek	2.0	0.03 cfs 6.0 af	N/A

3. Pump Site Inspections

The NeDNR field office staff regularly inspects pump sites of surface water diversion points as conditions allow. Not all pump sites are inspected every irrigation season and some pump sites may be visited more than once per season. See **Table 5** and **Figure 2** below. As part of inspections, field staff collect the following data:

- Evidence of pump site
- Pumps that are running
- Crops in field
- Irrigation method

Table 5. Surface water pump site inspections in the Middle Niobrara NRD in 2023.

2023 Surface Water Pump Site Inspections			
Total number of Irrigation Permits	Number of Pump Sites Inspected	Number of Pump Sites Set up for Irrigation	Total Observations Made ⁶
96	88	33	90

⁵ Permit A-17280 acres were relinquished for groundwater.

⁶ Can include multiple visits to the same pump site location.

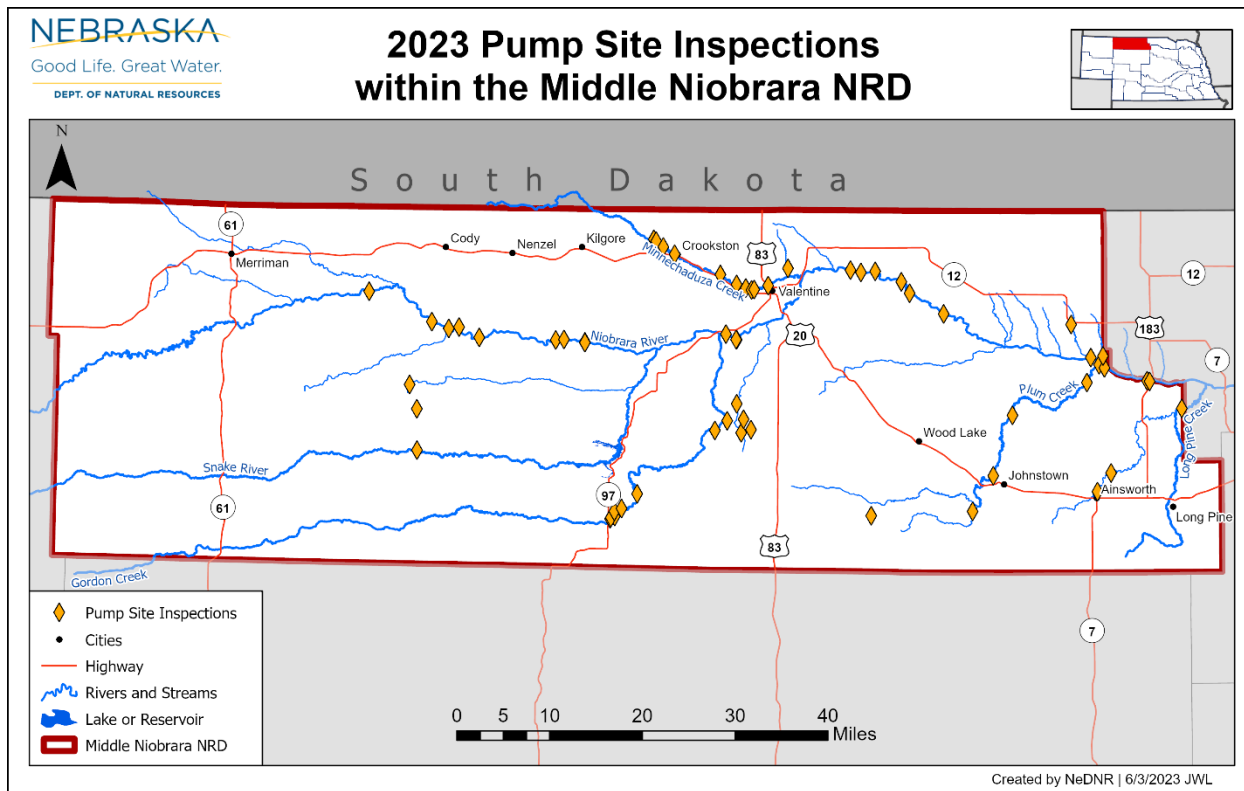


Figure 2. Pump site inspections within the Middle Niobrara NRD in 2023.

4. Voluntary Water Use Reporting

Currently surface water use reporting within the MNNRD occurs on a voluntary basis. NeDNR requests water use data from all irrigation permit holders through surveys that contain questions about use or non-use, acres irrigated, estimated amount of water applied, and type of crops grown. **Table 6** provides a summary of MNNRD’s voluntary water use survey responses.

Table 6. Voluntary surface water reporting within the Middle Niobrara NRD in 2023.

Natural Resources District	No. of Water Rights	No. of Reports	No. of Reports SW Irrigated	No. of Reports Not Used	No. of GW Irrigated Reports	SW Irrigated Acres	SW Inches Per Acre
Middle Niobrara	96	26	18	8	5	2,218	4.4

5. Groundwater Permitting

The Department, in accordance with *Neb. Rev. Stat. § 46-613.01, §§ 46-639 to 46-653*, issues groundwater transfer permits for municipal use. **Table 7** provides a summary of the permitted maximum water withdrawals for the city of Ainsworth’s municipal groundwater transfer permit. Annual reports for this permit are provided by the City of Ainsworth and available upon request.

In 2023, there were no new groundwater permits issued by NeDNR in the Middle Niobrara NRD.

Table 7. Department issued groundwater transfer permits in Middle Niobrara NRD.

Department Issued Groundwater Transfer Permits as of December 31, 2023					
Permit Holder	Appropriation Number	Priority Date	Maximum Daily Withdrawal	Total Annual Withdrawal	Required Reporting
City of Ainsworth	MT-3	12/29/2003	1,440,000 Gallons	73,730,000 Gallons	Yes

6. Stream Gage Measurements

The Department maintains four streamgages within the MNNRD portion of the Niobrara River Basin. These gages are located on the Niobrara River near Nenzel, the Snake River at Doughboy, the Snake River near Burge, and the Ainsworth Canal from Merritt Reservoir. The Department also monitors water levels at Merritt Reservoir. Additionally, The USGS operates two streamgages in the district, located on the Niobrara River near Sparks and on Long Pine Creek near Riverview. **Figure 3** shows the location of all active streamgages in the district. Yearly charts for NeDNR and USGS streamgages and water level readings at Merritt Reservoir for the 2023 water year (October 1, 2022, to September 30, 2023) can be found in **Appendix A**. Each streamgage chart contains the following information.

- Mean Daily Discharge for the reporting year and gage lifetime.
- Maximum, median, minimum cumulative volumetric discharge for gage lifetime.
- Reporting year cumulative volumetric discharge

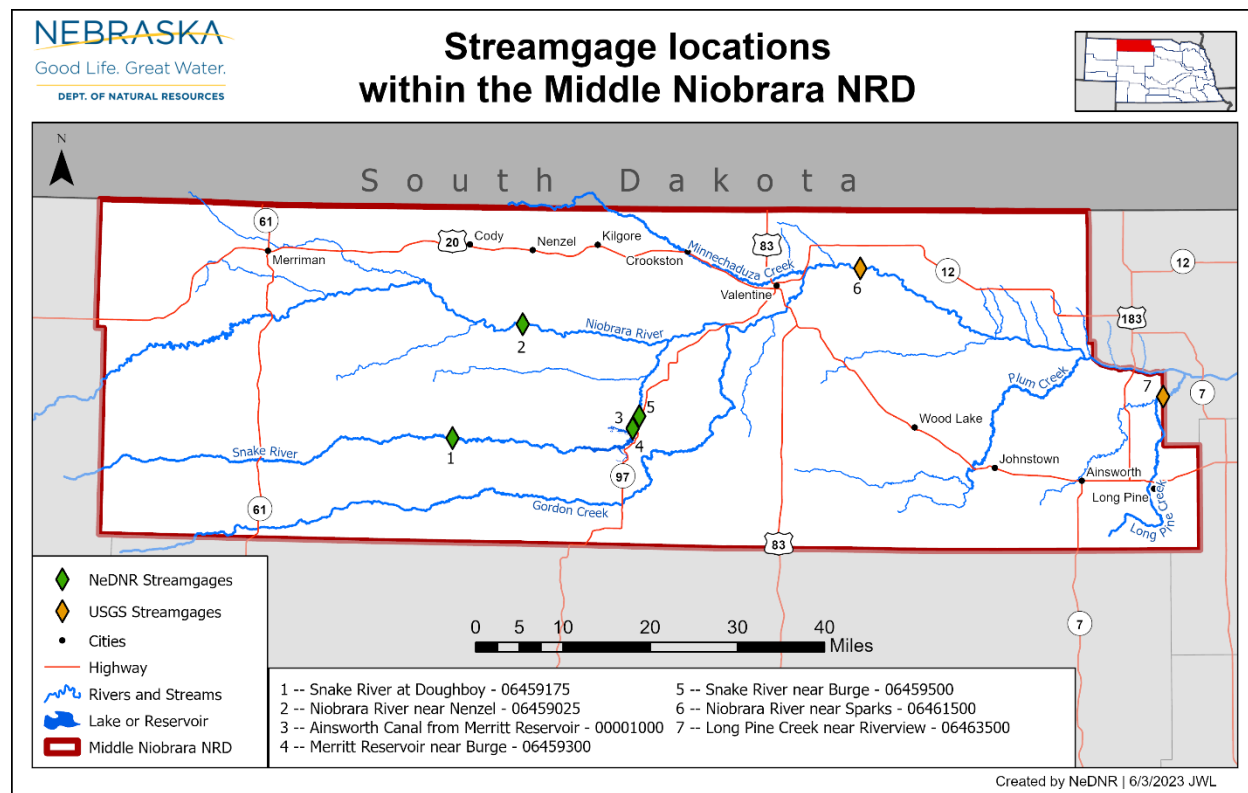


Figure 3: Location of NeDNR and USGS operated stream gages in Middle Niobrara NRD.

7. Surface Water Administration

Since 1895, Nebraska has had an administrative system overseeing the orderly use of the state’s surface water resources. All diversions of surface water for irrigation, hydropower, industrial use, municipal use, domestic use, storage, and other uses require a permit from the State with each having certain responsibilities, limitations, and conditions associated with it. The Department has jurisdiction over all matters pertaining to surface water rights including the distribution of available supply during times of water shortages and adjudication of established water rights. The activity of distributing the supply of surface water on a stream during shortages is called “surface water administration.” Rules for surface water administration are set out in Nebraska Revised Statutes, Chapter 46, and operate on a first-in-time, first-in-right principle.

No surface water administrative actions were taken in the MNNRD in 2023.

8. Groundwater and Surface Water Depletions from New Development

Stream depletions are calculated to quantify the impact that groundwater and surface water development has on a stream based on an appropriation’s estimated consumptive use and its proximity to the stream. Annual consumptive use for an appropriation is estimated by multiplying its approved acres by the net irrigation requirement (NIR) for

corn at that appropriation’s location. Consumptive use is then multiplied by the location’s stream depletion factor (SDF)⁷ to estimate the volume of water depleted from the stream by that appropriation.

$$\begin{aligned} & (\text{acres}) * (\text{NIR}) = \text{estimated consumptive use (acre-inches of water)} \\ & (\text{acre-inches}) / (12 \text{ inches}) = \text{estimated consumptive use (acre-feet of water)} \\ & (\text{consumptive use}) * (\text{SDF}) = \text{stream depletion} \end{aligned}$$

Table 8 lists estimated stream depletions resulting from new groundwater development reported by MNNRD in 2022. **Table 9** lists stream depletions associated with pending and approved surface water appropriations dating back to 2012.

Table 8. Estimated stream depletions for new groundwater permits approved by MNNRD in 2022.

2022 Approved Groundwater Permits					
Location (S-T-R)	Source	Acres	Net Irrigation Requirement (in)	Annual Consumptive Use (af)	Calculated Stream Depletion (af)
SW 8-34-24	Ground water	135	10.93	122.97	4.61
W ½ 19-34-23	Ground water	46	10.41	39.92	1.68
E ½ 24-34-24	Ground water	46	10.49	40.21	1.88
NW 34-29-22	Ground water	42	9.30	32.55	5.10
NW 7-33-30	Ground water	150	11.40	142.48	14.42
SE 10-34-29	Ground water	32	11.73	31.27	15.09
SW 34-30-23	Ground water	150	9.92	123.99	50.98
NE 14-30-22	Ground water	143	8.61	102.65	84.13
SW 1-33-22	Ground water	135	9.88	111.19	11.22
W ½ 2-33-22	Ground water	135	9.98	112.24	11.99
NE 12-33-22	Ground water	135	9.90	111.40	12.26
NE 1-33-22	Ground water	135	9.90	111.37	11.24
NW 12-33-22	Ground water	135	9.96	112.02	12.33
NE 2-33-22	Ground water	135	9.88	111.19	11.49
NW 32-33-40	Ground water	145	11.29	136.39	53.33
SW 34-34-32	Ground water	135	11.56	130.07	25.42
SW 16-33-34	Ground water	80	12.21	81.39	42.98
SW 15-34-28	Ground water	130	11.93	129.24	45.83
NE 5-33-31	Ground water	132	11.51	126.57	15.03
NW 25-34-34	Ground water	12	11.92	11.92	2.69
SW & NW 15/22-32-25	Ground water	102	11.03	93.73	22.03
SE 3-34-28	Ground water	100	11.91	99.23	16.29
NW 8-32-40	Ground water	120	11.32	113.25	61.97
NW 1-34-26	Ground water	136	11.94	135.32	29.03
NE 12-34-36	Ground water	150	12.78	159.80	29.32
W ½ 20-33-38	Ground water	63	12.38	65.01	28.57
SW 30-33-32	Ground water	25	11.73	24.44	11.78
SW 19-34-24	Ground water	120	11.00	110.00	13.79
Total		3004	306.80	2721.79	646.47

⁷ SDF represents the proportion of water that would come from streamflow (as opposed to groundwater) at a certain location over 50-years of pumping. Surface water appropriations have an SDF of 1.0.

Table 9. Estimated stream depletions for surface water applications submitted to NeDNR prior to December 31, 2023, in MNNRD.

Approved and Pending Surface Water Permits							
Location (S-T-R)	Approved Date	Priority Date	Source	Acres	Net Irrigation Requirement (in)	Annual Consumptive Use (af)	Calculated Stream Depletion (af)
30-34-27	1/9/2023	11/7/2022	Minnechaduza Creek	2	n/a	6	6
35-33-31	5/10/2024	9/22/2023	Niobrara River	74.3	11.69	72.36	72.36*
22-35-23	Pending	2/14/2012	Lost Creek	140	10.61	123.83	123.83**
*Application approved in 2024. Depletions will be accounted for in 2024 reporting.							
**Application was filed in 2012 but delayed due to a temporary stay on new development in MNNRD.							

Controls listed in the IMP state that the Department may issue new surface water appropriations as long as the cumulative stream depletions associated with those appropriations are less than or equal to the cumulative depletions associated with new groundwater appropriations reported by the MNNRD. **Table 10** lists the total calculated depletions to the Niobrara River resulting from groundwater permits approved in 2022 and surface water permits approved in 2023, as well any remaining allowable depletions from surface water development.

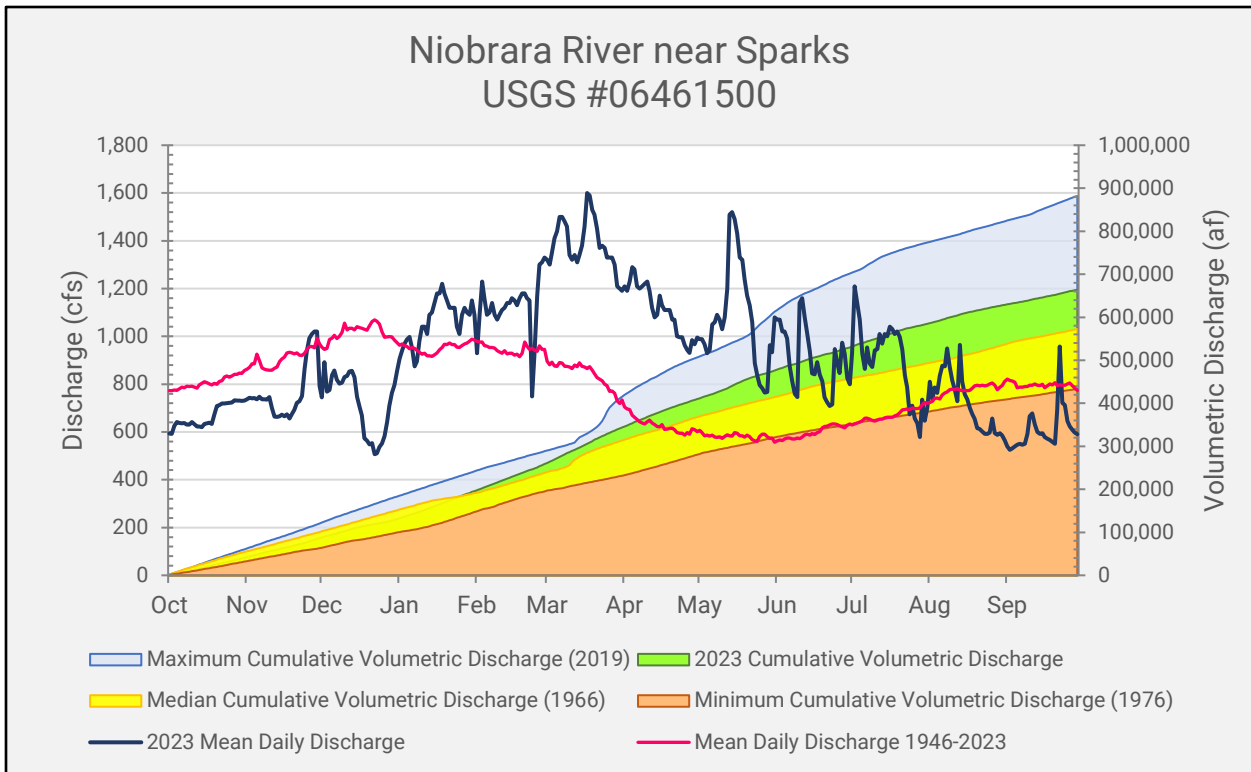
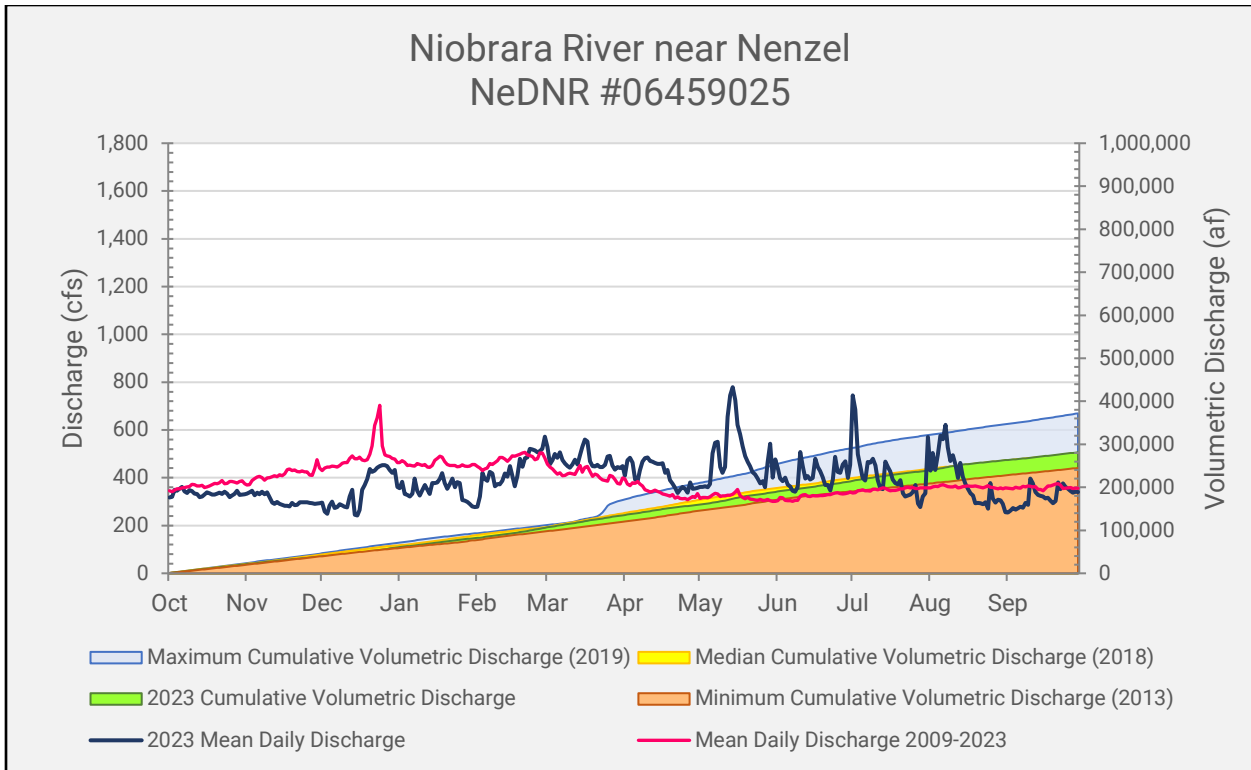
Table 10. Available surface water depletions based on 2022 MNNRD Groundwater development.

Surface Water/Groundwater Depletions Balance as of 12/31/2023	
Total depletions from new groundwater development in 2022	646.47 af
Total depletions from surface water development approved in 2023	6 af
Remaining allowable depletions from surface water development	640.47 af

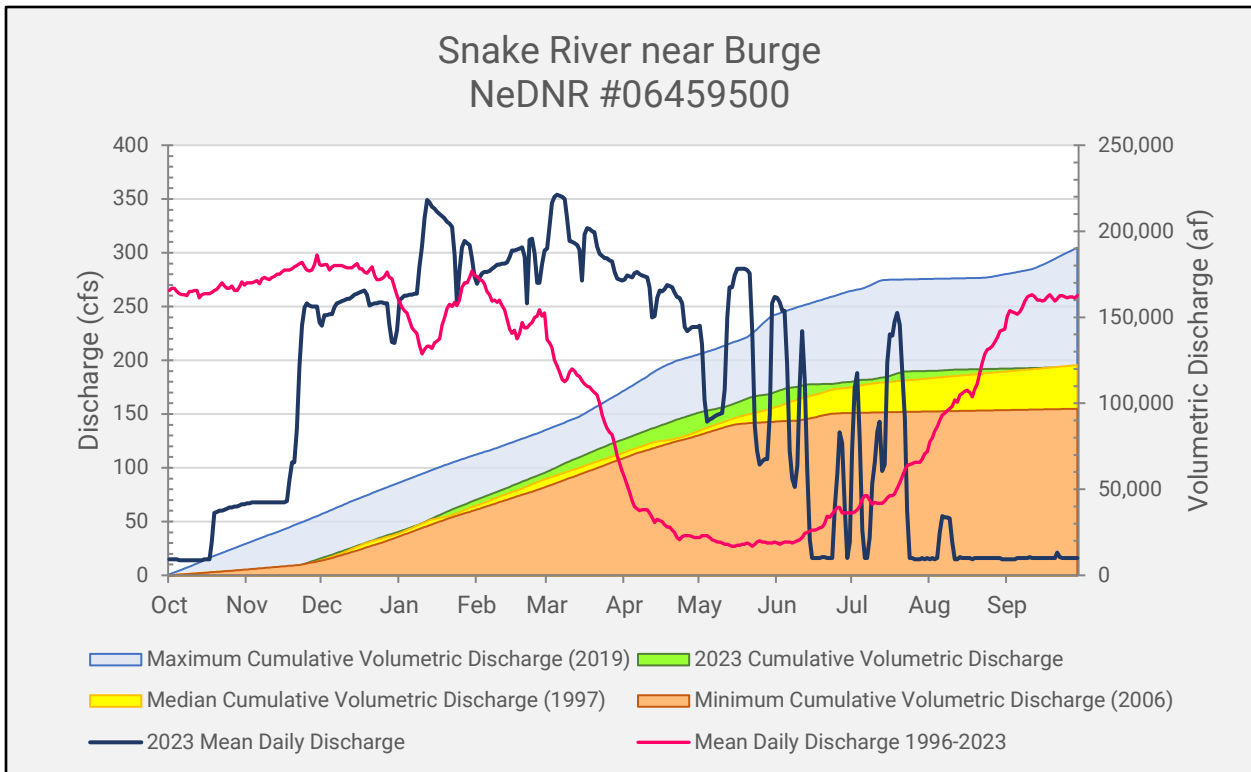
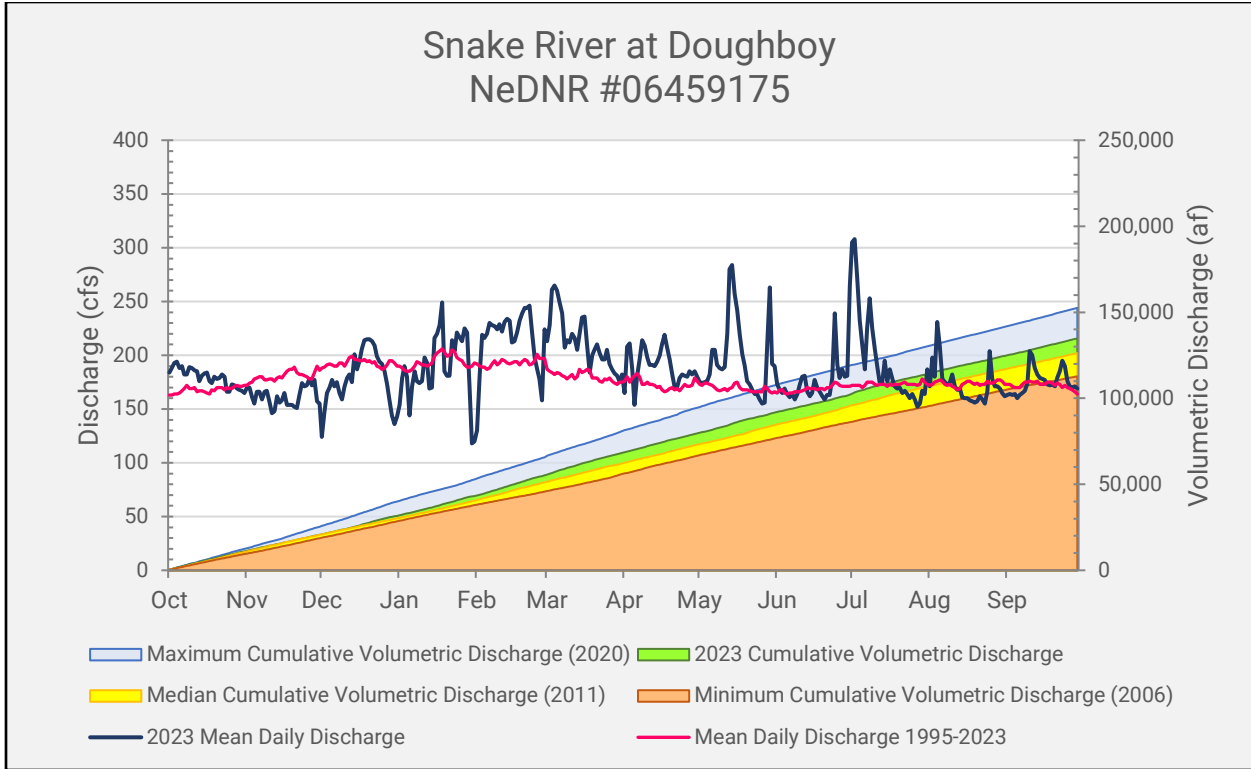
9. Current Studies and Modeling

In 2020, the Department began collaborating with the USGS and National Park Service on the development of a groundwater model that would cover the District. Calibration of this model has been completed and the USGS plans to publish the model in December 2024.

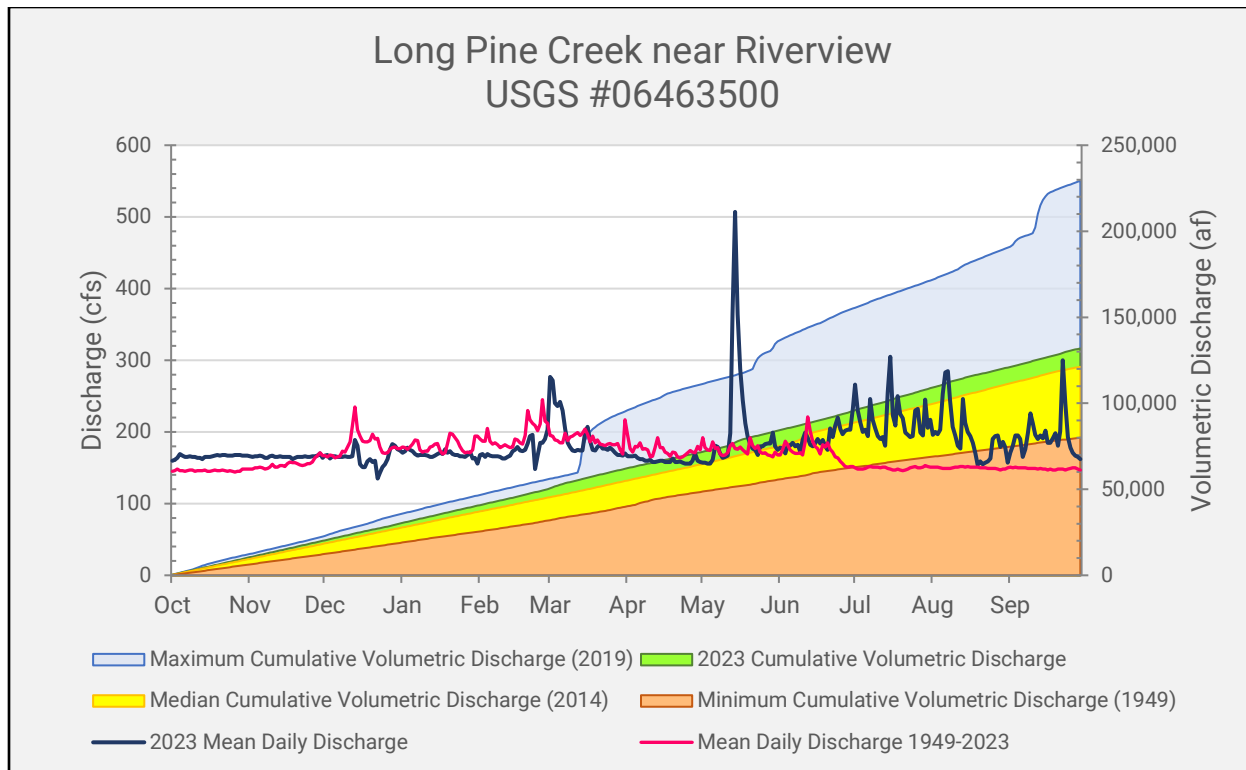
Appendix A STREAMGAGE MEASUREMENTS



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Water Today. Water Tomorrow.
Good Life. Great Water.

USGS Daily Mean

Storage - Daily Storage Values with Monthly and Annual Statistic

May 29, 2024 | 1 of 2

Period Selected: 2022-10-01 00:00 - 2023-09-30 23:39

Source Data: Total Storage_Storage@06459300, Merritt Reservoir near Burge
UTC Offset: -06:00, Start Time: 1993-05-31 00:00:00, End Time: 2024-05-28 00:00:00

Units: Acre-ft
Data Coverage Threshold: 80%

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	40390	53150	61430	61640	60830	61830	61340	61450	66000	66140	61830	51670
2	40900	54160	61430	61970	60910	61910	61290	61990	65860	66140	62460	51320
3	41480	54480	61400	62100	61020	61910	61340	61830	65860	66060	62660	50980
4	42000	54810	61430	62210	61100	61830	61340	62160	65740	65740	62850	50570
5	42420	55360	61430	62210	61290	61780	61400	62600	65740	65600	63040	50150
6	42950	55670	61430	62270	61290	61640	61340	63040	65800	65400	63240	49660
7	43520	56350	61400	62410	61340	61530	61290	63380	65860	66000	63380	49120
8	43690	56400	61400	62460	61340	61400	61290	63630	65940	66320	63380	49030
9	44490	57090	61400	62460	61340	61400	61210	64030	66000	66520	63180	49220
10	45060	57490	61340	62360	61340	61400	61150	64340	66060	66410	62660	49660
11	45390	57890	61290	62260	61340	61400	61150	64680	65940	66000	62100	50000
12	45880	58240	61340	62170	61400	61400	61150	65000	65860	65400	61450	50380
13	46300	58600	61390	62070	61400	61400	61290	65280	65800	64880	61100	50680
14	46760	58960	61150	61970	61400	61400	61340	65480	65740	64880	61340	50980
15	46380	59140	60830	61830	61340	61530	61340	65600	65650	64740	61530	51280
16	47650	59560	60780	61780	61340	61530	61340	65600	65600	64680	61450	51520
17	48020	59560	60780	61720	61340	61450	61290	65540	65650	64280	61100	51780
18	48540	59880	60720	61910	61340	61400	61340	65400	65650	64080	60480	52080
19	48890	60220	60720	61830	61290	61340	61150	65340	65540	63830	59690	52590
20	48970	61340	60670	61720	61340	61210	61100	65200	65340	63440	58910	52990
21	49560	61720	60670	61640	61430	61150	60960	65000	65140	62930	58140	54000
22	49430	61830	60590	61590	61210	61150	60910	64800	65080	62350	57390	54330
23	49850	61830	60350	61530	60780	61150	60780	64880	65400	61830	56570	55120
24	50380	61780	60300	61640	60670	61150	60720	64940	65860	61210	55840	55670
25	50930	61720	60350	61640	60830	61100	60830	65080	65940	61100	55580	56180
26	51520	61640	60350	61640	61100	61100	60960	65280	65860	61210	55290	56690
27	51710	61590	60400	61530	61430	61100	61100	65400	65860	61210	54910	57210
28	52080	61530	60720	61400	61720	61020	61290	65860	65800	60960	54250	57710
29	52520	61450	61020	61020		61150	61290	66140	65860	60910	53630	58190
30	52950	61400	61290	60780		61210	61400	66200	66000	61530	52880	58730
31	52880		61530	60780		61290		66140		61590	52210	
Total	1464000	1765000	1892000	1917000	1715000	1903000	1836000	2001000	1972000	1983000	1845000	1580000
Mean	47210	58830	61020	61820	61230	61400	61190	64540	65730	63980	59500	52660
Max	52950	61830	61590	62460	61720	61910	61400	66200	66060	66520	63380	58730
Min	40390	53150	60300	60780	60670	61020	60720	61450	65080	60910	52210	49030