

Nebraska Department of Natural Resources 2024 Annual Report of 2023 Data



for the jointly developed

Little Blue Natural Resources District Integrated Management Plan

Prepared by the
Nebraska Department of
Natural Resources
September 18, 2024

NEBRASKA
DEPT. OF NATURAL RESOURCES

INTRODUCTION

In 2015, the Little Blue Natural Resources District (LBNRD 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 Little Blue voluntary IMP was developed in accordance with the Nebraska Groundwater Management and Protection Act, and included consultation with stakeholders from LBNRD. In July 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 August 15, 2019.

As outlined in the IMP, the LBNRD and NeDNR meet annually to share data, exchange annual reports, and discuss actions taken to implement the IMP. This annual IMP report is intended to facilitate the exchange of information between the LBNRD and NeDNR, and to keep the public informed about integrated water management activities within the district. It covers the actions and progress made by NeDNR in 2023 to implement the IMP—with a focus on surface water. The LBNRD 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 as outlined in 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 permitting
 - All existing surface water permits
 - Permitting activity (new, cancelled, or transferred permits)
 - Variances granted by the Department
- Surface water administration
 - Pump checks
 - Voluntary reporting of surface water irrigation
 - Quantity of water pumped
 - Acres irrigated
 - Type of irrigation system
 - Evaluation of necessity for surface water flowmeters or mandatory water use reporting
- Streamgaging
- Update on current modeling projects or studies in the District
 - Depletion calculation methodologies (FAB analysis)

SURFACE WATER PERMITS

The Nebraska Department of Natural Resources is authorized by statute to oversee the permitting and adjudication of surface water appropriations in the State¹. This section provides a summary of all active surface water appropriations in the Little Blue NRD as of December 31, 2023, and includes details about all permitting actions taken by the Department in 2023.

This report addresses surface water appropriations in three categories: irrigation permits, which allow for irrigation from a naturally flowing source or from a reservoir; storage permits, which allow water from a naturally flowing source to be stored in a reservoir; and ‘other’ permits, which include domestic, industrial, and environmental uses. Additionally, a significant number of surface water permits in the LBNRD are exempt from surface water administration because they reuse groundwater that is collected in irrigation reuse pits located within the drainage of an ephemeral natural stream². A summary of all active surface water permits in the LBNRD as of December 31, 2023, is available in **Table 1**.

As of December 31, 2023 there were 554 irrigation permits in the LBNRD, allowing for the irrigation of 34,810.1 total acres. Of those permits, 231 (12,895.4 acres) are exempt from administration under Neb. Rev. Stat. §§ 46-283 to 46-287. There are also 151 storage permits that allow for a total of 13,667.3 acre-feet (af) of water to be stored in reservoirs, six of which are exempt from surface water administration. The remaining ‘other’ permits combined allow the use of 16 af of water annually and represent a relatively small proportion of surface water uses in the District.

Table 1: All surface water appropriations in the LBNRD as of December 31, 2023.

ACTIVE SURFACE WATER APPROPRIATIONS IN LBNRD as of December 31, 2023				
Purpose	Number of Permits	Acres Approved for Irrigation	Instantaneous Grant cfs	Volumetric Grant af
Irrigation Permits				
Direct Flow Irrigation (Exempt)	227	12,506.4	178	N/A
Direct Flow Irrigation (Not Exempt)	252	14,751.9	195	N/A
Direct Flow Irrigation Total	479	27,258.3	373	N/A
Storage Use (Exempt)	4	389	N/A	27.6
Storage Use (Not Exempt)	71	7,162.8	N/A	4,355.4
Storage Use Total	75	7,551.8	N/A	4,383
Irrigation Permits Total	554	34,810.1	373	4,383
Storage Permits				
Storage (Exempt)	6	N/A	N/A	46.8
Storage (Not Exempt)	145	N/A	N/A	13,620.5
Storage Permits Total	151	N/A	N/A	13,667.3
Other Permits				
Domestic	1	2	0.5	6
Cooling	1	N/A	16.7	N/A
Fish & Wildlife	1	N/A	N/A	10
Other Permits Total	3	2	17.2	16
All Surface Water Permits				
All SW Permits (Exempt)	237	12,895.4	178	74.4
All SW Permits (Not Exempt)	471	21,916.7	195	17,991.9
All Surface Water Permits Total	708	34,812.1	391.2	18,066.3

¹ Neb. Rev. Stat. § 61-206 and all of Chapter 46, Article 2

² Neb. Rev. Stat. §§ 46-283 to 46-287

2023 SURFACE WATER PERMITTING ACTIONS

In 2023, the Department took action on 13 surface water appropriations in the District. Eight of those actions were to approve new surface water appropriations and five were to cancel appropriations. The locations of these actions can be found in **Figure 1** below.

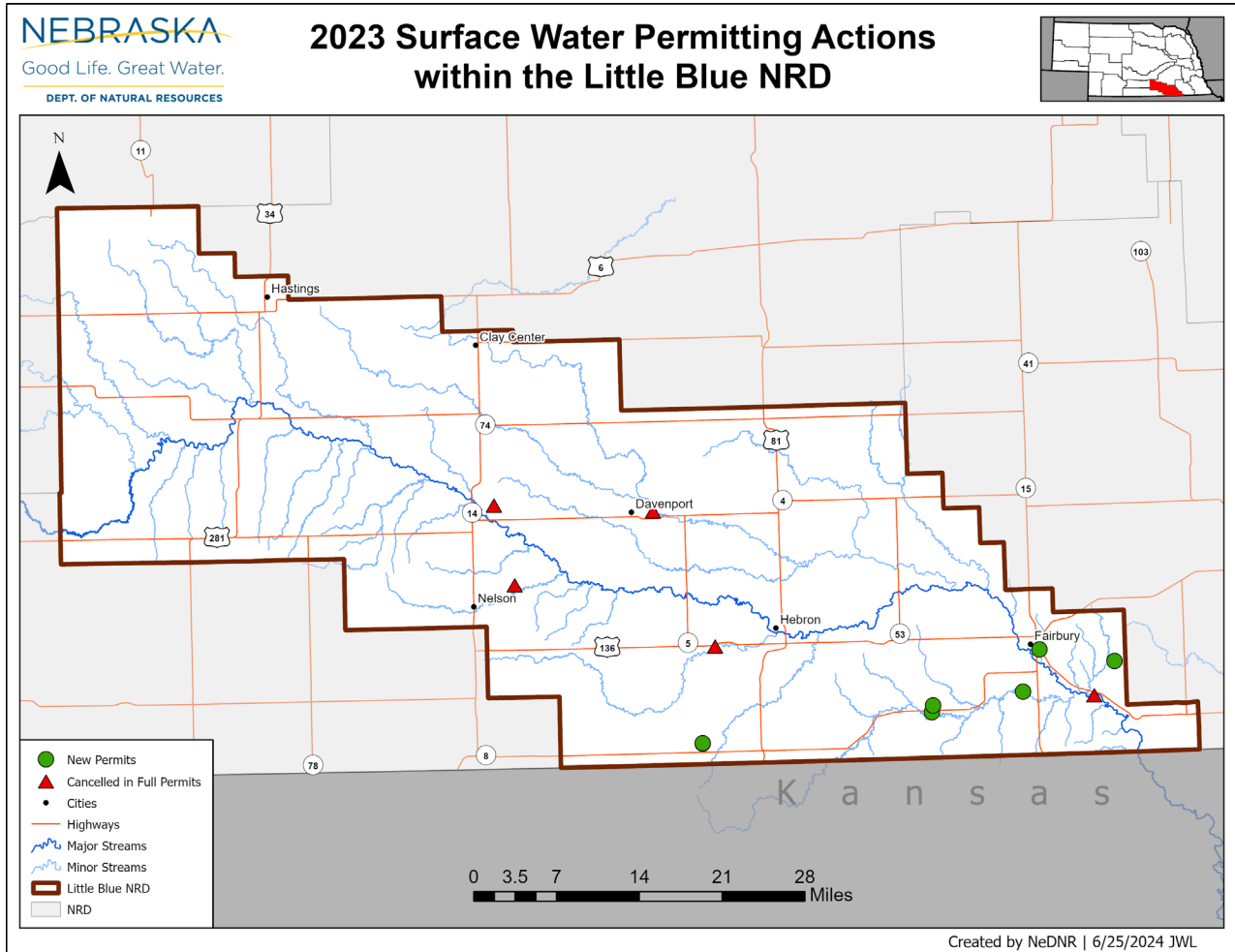


Figure 1: Surface water permitting actions in the LBNRD in 2023.

NEW SURFACE WATER APPROPRIATIONS

In 2023, the Department approved five irrigation permits in the LBNRD allowing a total 507.9 acres to be irrigated from a naturally flowing source at a total combined rate of 3.7 cfs. NeDNR also approved three new storage permits allowing a total of 139.9 af of water to be pulled from natural stream flow and stored in reservoirs. All new surface water permits approved in 2023 are summarized in **Table 2**.

Table 2: Surface water appropriations approved in 2023 in the LBNRD.

SURFACE WATER APPROPRIATIONS APPROVED IN 2023 IN THE LITTLE BLUE NRD						
Appropriation Number	Approval Date	Use	Source	Acres	Grant (cfs)	Diversion/Reservoir Location
A-19918	6/20/2023	Irrigation from natural flow	Tributary to Rock Creek	62.0	0.89	S25 T2-R3E
A-19924	8/30/2023	Storage	Brawner Creek	N/A	N/A	S23 T2-R2E
A-19934	8/31/2023	Irrigation from natural flow	Rose Creek	131.8	1.88	S3 T1-R2E
A-19939	11/13/2023	Storage	Tributary to Spring Creek	N/A	N/A	S30 T1-R3W
A-19940	11/27/2023	Irrigation from natural flow	Heitmann Sec 30 Reservoir	184.1	0.00	S30 T1-R3W
A-19953	12/18/2023	Irrigation from natural flow	Rose Creek	65.0	0.93	S17 T1-R1E
A-19954	12/18/2023	Storage	Rose Creek	N/A	N/A	S17 T1-R1E
A-19955	12/18/2023	Irrigation from natural flow	Livingston Section 8 Pond	65.0	0.00	S8 T1-R1E

CANCELLED SURFACE WATER APPROPRIATIONS

In 2023, NeDNR cancelled in full, five surface water permits that irrigated a total of 444.2 acres of land. Four permits were voluntary relinquishments, and one permit was a preliminary determination of non-use (PDNU). There were no cancelled in part permits within the District in 2023. Information about the cancelled appropriations can be found in **Table 3**.

Table 3: Surface water appropriations cancelled in 2023 in LBNRD.

SURFACE WATER APPROPRIATIONS CANCELLED IN 2023 IN LITTLE BLUE NRD						
Appropriation Number	Cancellation Date	Use	Source	Acres	Reason for Cancellation	Diversion/Reservoir Location
A-15068	4/17/2023	Irrigation from natural flow	Jones Reservoir	108.0	REL-9918	S7 T4-R6W
A-4130	4/17/2023	Irrigation from natural flow	Spring Creek	16.5	REL-9932	S17 T2-R3W
A-13407	4/17/2023	Irrigation from natural flow	Big Sandy Creek	142.0	REL-9946	S16 T4-R4W
A-8454	6/20/2023	Irrigation from natural flow	Little Blue Reservoir	146.0	PDNU-9967	S10 T1-R3E
A-19519	7/17/2023	Irrigation from natural flow	Dane Reservoir	31.7	REL-10034	S16 T3-R6W

SURFACE WATER TRANSFERS

In 2023, there were no surface water transfers in the LBNRD.

VARIANCES ISSUED

There were no variances issued in the District in 2023.

GROUNDWATER PERMITS

There was one groundwater permit, held by the LBNRD, that had actions taken on it in 2023. MNI-28, which is a municipal notice of intent, was filed on February 2, 2023, and allowed for a one-year extension on the Blue Valley Water System project (see **Table 4**).

Table 4: Groundwater permitting actions in LBNRD overseen by NeDNR

Groundwater Permitting Actions			
Date	Permit Number	Applicant	Comments
2/4/2023	MNI-28	LBNRD	Spacing for RWD well. MNI-28 extension of time for the Little Blue Valley Water System project. One-year extensions are allowed per state statute. Original filing was received on 02/04/2022. This extension was timely filed.

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. In 2023 NeDNR field office staff made a total 288 inspections on 252 pump sites and observed that 101 of the sites were set up for irrigation. See **Table 5** and **Figure 2** below.

Table 5: Surface water pump site inspections in the LBNRD in 2023.

Surface Water Pump Site Inspections		
Number of Pump Sites Inspected	Number of Pump Sites Set up for Irrigation	Total Observations Made ³
252	101	288

³ Includes multiple visits to same site for water administration.

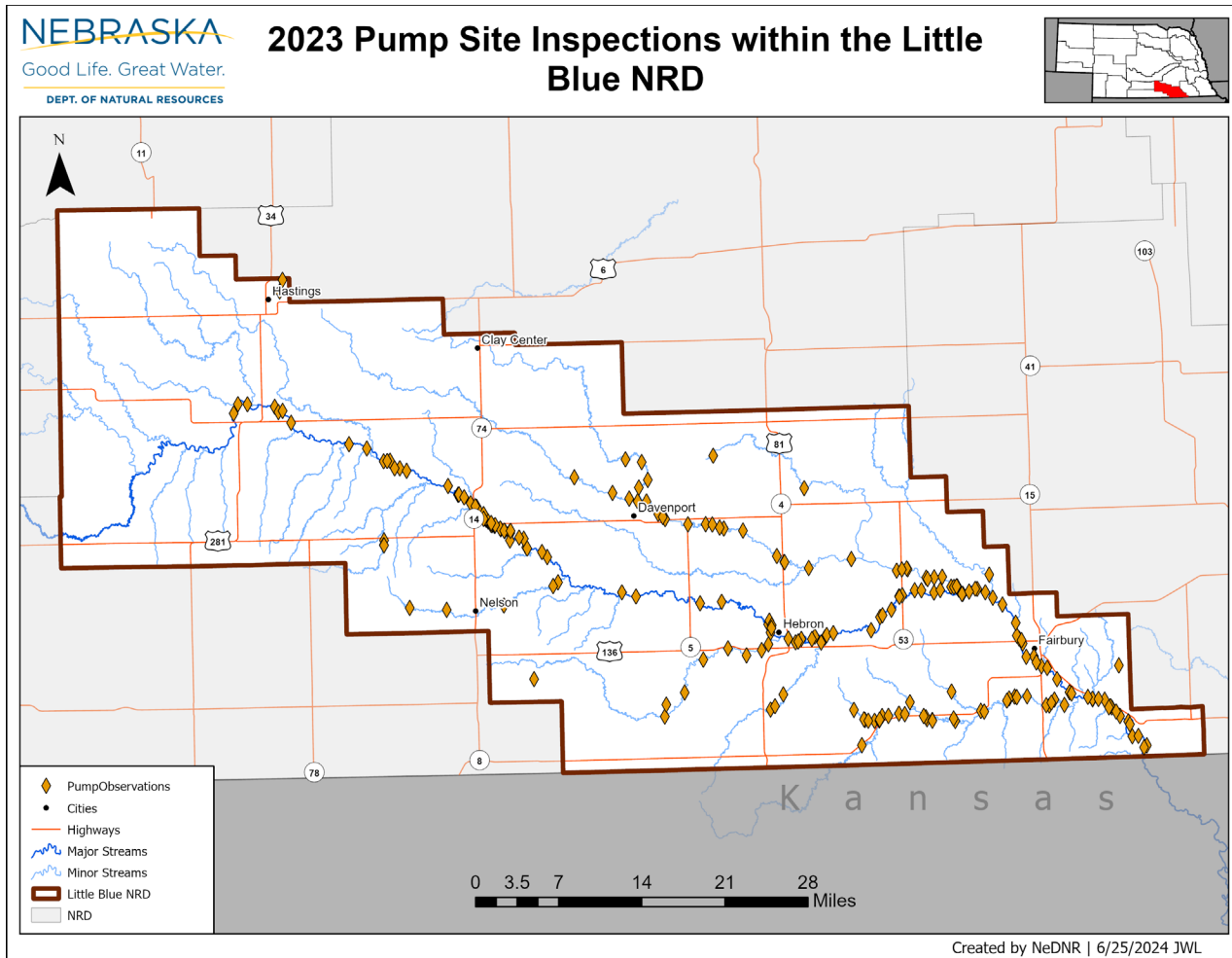


Figure 2: Pump site inspections within the LBNRD in 2023.

VOLUNTARY WATER USE REPORTING

NeDNR collects surface water use data in the LBNRD through its voluntary water use reporting program. Surveys requesting information about the number of irrigated acres, estimated amount of water applied, type of crops grown and reasons for non-use are sent to all non-exempt surface water irrigation permit holders in the basin. See **Table 6** below for data compiled from 2023 voluntary water use surveys.

Table 6: Voluntary surface water reporting within the LBNRD in 2023.

Voluntary Surface Water Reporting in Little Blue NRD in 2023						
Surveys Sent	Surveys Returned	SW Irrigated	Reported Not Used	GW Irrigated	SW Irrigated Acres	SW Inches Per Acre
319	73	41	32	12	2,976	6.4

STREAMGAGING

There are six active streamgages located inside of LBNRD and an additional gage located south of the Nebraska-Kansas state line on the Little Blue River near Hollenberg, Kansas. See **Figure 3** and **Table 7** below. Five gages monitor Little Blue River flows, and two monitor flows that contribute to the Little Blue River along Big Sandy Creek and Rose Creek. Four gages, including the Hollenberg gage, are operated by the USGS, and the remaining three gages are operated by NeDNR. Several entities including LBNRD, NeDNR, and USGS contribute funds to operate and maintain streamgages within the District.

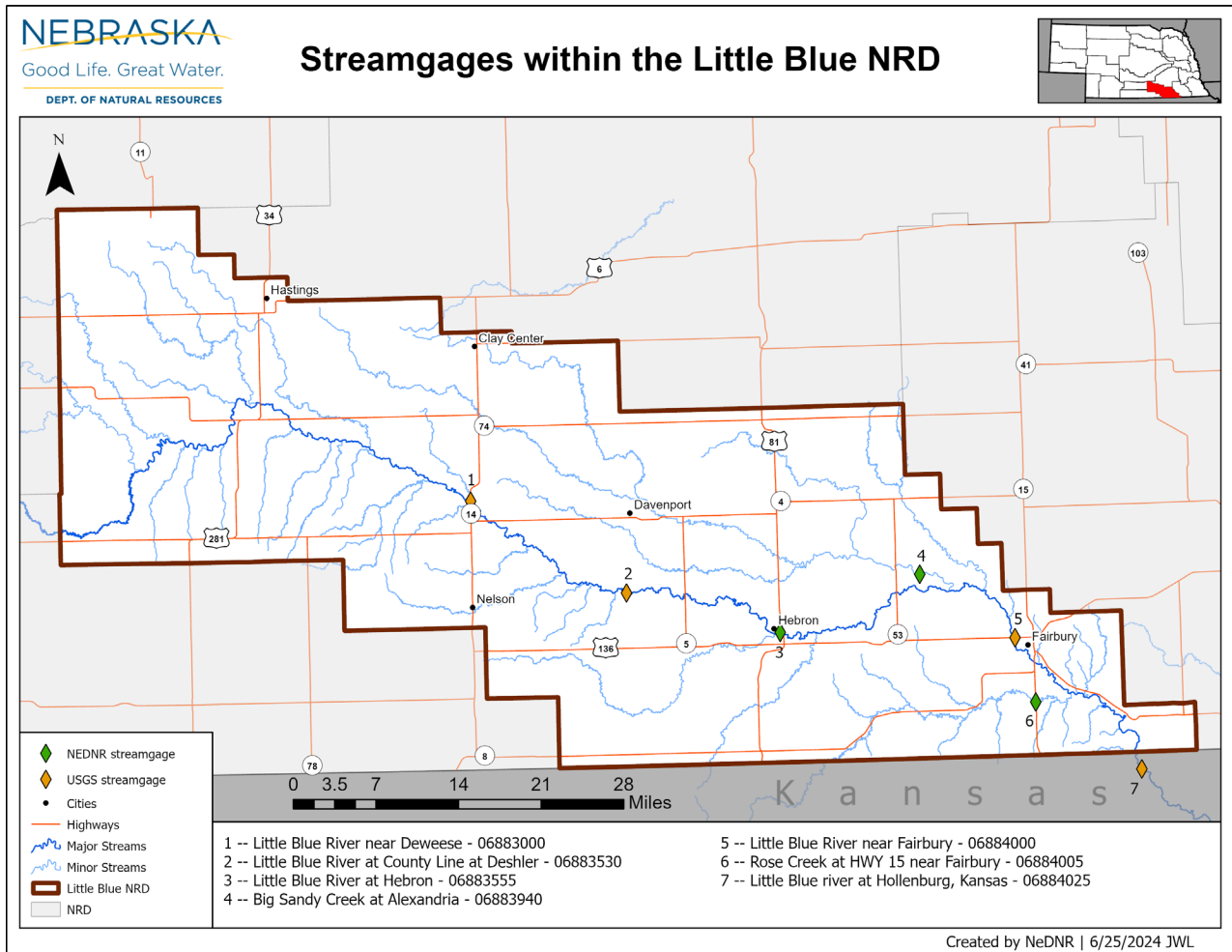


Figure 3: Active streamgages in the LBNRD.

Table 7: Active streamgages within Little Blue NRD.

Streamgages in the Little Blue NRD ⁴				
Name of Gage	Funding Source(s)	Gage ID	Active Since	Operator
Little Blue River near Deweese	USGS	6883000	1990	USGS
Little Blue River at County Line at Deshler	LBNRD, Thayer and Jefferson Counties, City of Hebron, USGS	6883530	2017	USGS
Little Blue River at Hebron	LBNRD and NeDNR	6883555	2017	NeDNR
Big Sandy Creek at Alexandria	NeDNR	6883940	1979	NeDNR
Little Blue River near Fairbury	U.S. Army Corps of Engineers, USGS	6884000	1991	USGS
Rose Creek at HWY 15 near Fairbury	LBNRD and NeDNR	6884005	2017	NeDNR
Little Blue River at Hollenburg, Kansas	USGS, Big Blue River Compact Administration	6884025	1974	USGS

Two Department-operated gages were installed in 2017 to monitor flood flows upstream of Fairbury and Hebron and to further understand contributing flows along Rose Creek. The other Department-operated gage has been in operation since 1979 and collects streamflow data above the confluence of the Big Sandy Creek and the Little Blue River. The USGS-operated gage at Hollenburg, KS has the most extensive record, beginning in 1974.

Streamgaging data indicate that 2023 saw historically low streamflow across the district. Each gage, except for the gage on the Big Sandy Creek at Alexandria reported the lowest cumulative annual discharge on record. The USGS gage at Hollenburg, Kansas, which is used to monitor streamflow for compact compliance, reported that approximately 71,000 af of water passed the gage in 2023, compared to the period of record median year (1999), which recorded 275,000 af. Charts summarizing streamflow at each of the District’s gages can be found in [Appendix A](#).

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 state permit and each permit has certain responsibilities, limitations, and conditions associated with it. NeDNR has jurisdiction over all matters pertaining to these water rights. This includes 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.” Surface water administration rules and regulations are set out in Nebraska Revised Statutes, Chapter 46, and operate on a first-in-time, first-in-right principle.

⁴ Streamgage data may be found at: <https://nednr.aquaticinformatics.net>.

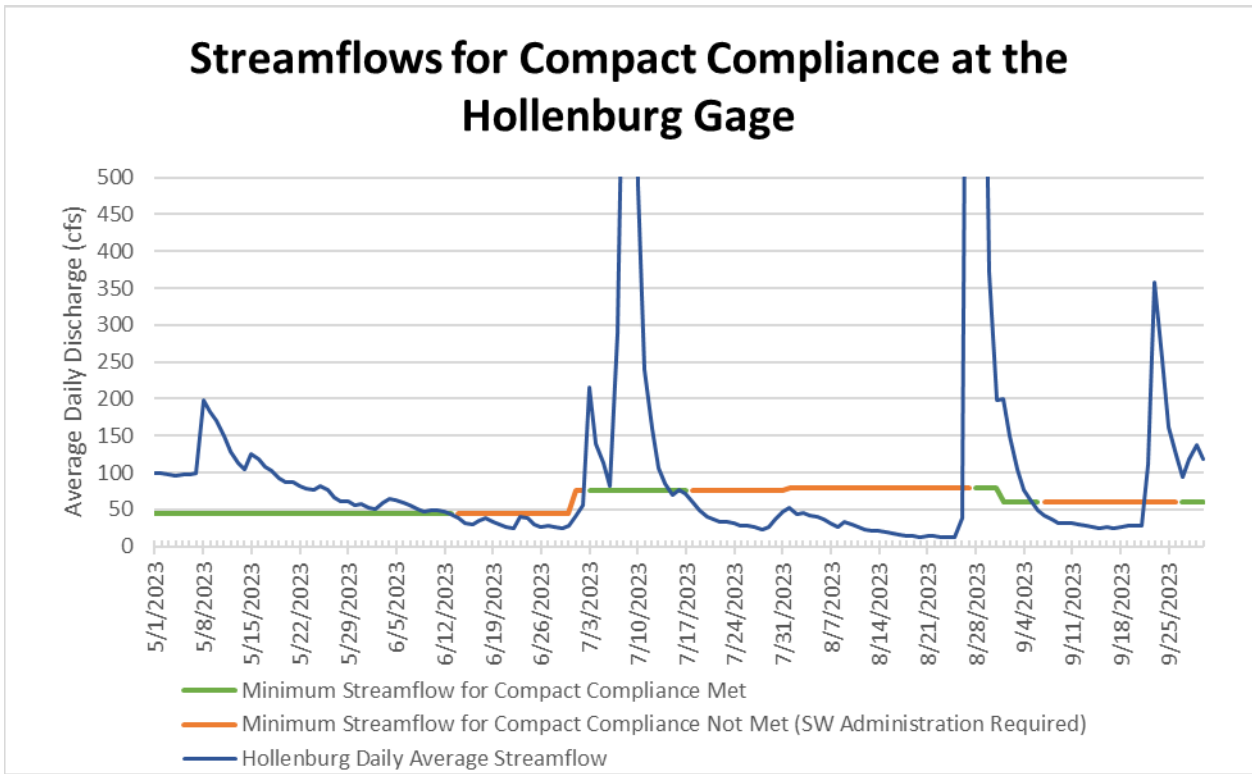


Figure 4: Hollenburg gage with surface water closure periods.

In order to meet minimum mean daily discharge requirements, set forth in the Kansas-Nebraska Blue River Compact, NeDNR prohibited surface water appropriations junior to November 1, 1968, from diverting water for a total of 78 days in 2023. **Figure 4**⁵ above shows the 2023 closures for Compact compliance due to low flows at the Hollenburg streamgage; see **Table 8** below for additional details on closures dates and number of affected permits.

Table 8: Surface Water Administration in the Little Blue NRD in 2023.

SURFACE WATER ADMINISTRATION							
Water Division	Date of Closure	Date Reopened	Days Closed	Permit Type	No. Affected	Reason for Closure	Reason for Reopening
1C- Little Blue River Basin	6/14	7/3	19	Natural flow	123	Streamflow insufficient for Blue River Compact compliance	Minimum streamflow available for Blue River Compact compliance
				Storage	142		
	7/18	8/28	41	Natural Flow	124		
				Storage	142		
	9/7	9/25	18	Natural flow	125		
				Storage	142		

⁵ To better show low flow periods, peak discharges of 1080 cfs and 2060 cfs on 7/9 and 8/28 respectively are not shown.

The IMP states: “The Department will institute mandatory reporting for all high-capacity (greater than 50 gallons per minute) surface water irrigation uses when a trigger is met. The trigger is 24 average days (over the past 20 years of record) of closure for surface water administration, between the period of July 1 and August 31. The Department reserves the right to institute mandatory reporting prior to the trigger being met, if deemed appropriate.” **Table 9** shows the number of days of closure in the Little Blue River Basin, between July 1 and August 31 from 2004 to 2023. It also includes the 20-year rolling average for each year.

Table 9: Days of closure in the Little Blue River Basin in July and August

Year	Days of Closure (July1 – August 31)	Days of Closure 20-year Rolling Average (July 1 – August 31)
2004	0	11.3
2005	22	12.4
2006	25	13.6
2007	0	13.6
2008	0	11.1
2009	14	11.6
2010	0	11.6
2011	0	4.6
2012	38	6.5
2013	26	7.8
2014	19	8.8
2015	4	9.0
2016	34	10.7
2017	14	11.4
2018	18	12.3
2019	0	12.3
2020	0	12.3
2021	0	12.3
2022	32	12.3
2023	44	14.5

There were 44 days of closure between July 1 and August 31 in 2023, which changed the 20-year rolling average from 12.3 to 14.5 days of closure. This is below the 24-day trigger outlined in the IMP. However, drought conditions and low flows at the state line are concerning to the Department and mandatory water use reporting may be implemented prior to reaching the trigger. **Figure 5** below charts the annual number of days of closure and the 20-year rolling average for each year.

ADDITIONAL CLOSURES WITHIN LITTLE BLUE BASIN

Since the Kansas-Nebraska Big Blue River Compact requires Nebraska to maintain minimum flows at the state line from May through September, surface water administration can sometimes take place outside the July-August reporting window. **Table 10** shows any additional days of closure outside of the July-August window,

and total days of closure in the Basin alongside the 20-year rolling average if all days of administration are counted (May-September).

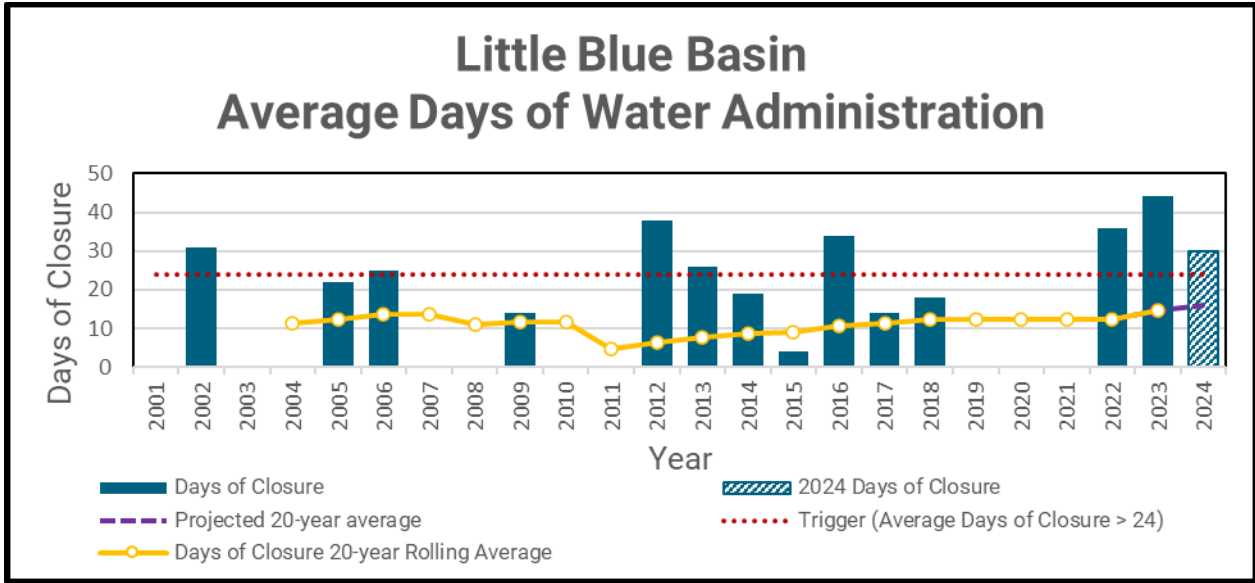


Figure 5: The average number of days of closure in the Little Blue NRD with projected 2024 data.

Table 10: Total days of closure for Compact compliance

Year	Days of Closure (Before June 1 and after August 31)	Total Closure Days (May 1-September 30)	Days of Closure 20-year Rolling Average (May 1-September 30)
2004	10	10	12.1
2005	0	22	13.2
2006	0	25	14.5
2007	0	0	14.5
2008	0	0	12.0
2009	0	14	12.5
2010	0	0	12.5
2011	0	0	5.5
2012	30	68	8.9
2013	20	46	11.2
2014	0	19	12.1
2015	5	9	12.6
2016	0	34	14.3
2017	25	39	16.2
2018	0	18	17.1
2019	0	0	17.1
2020	0	0	17.1
2021	0	0	17.1
2022	30	62	18.3
2023	34	78	22.2

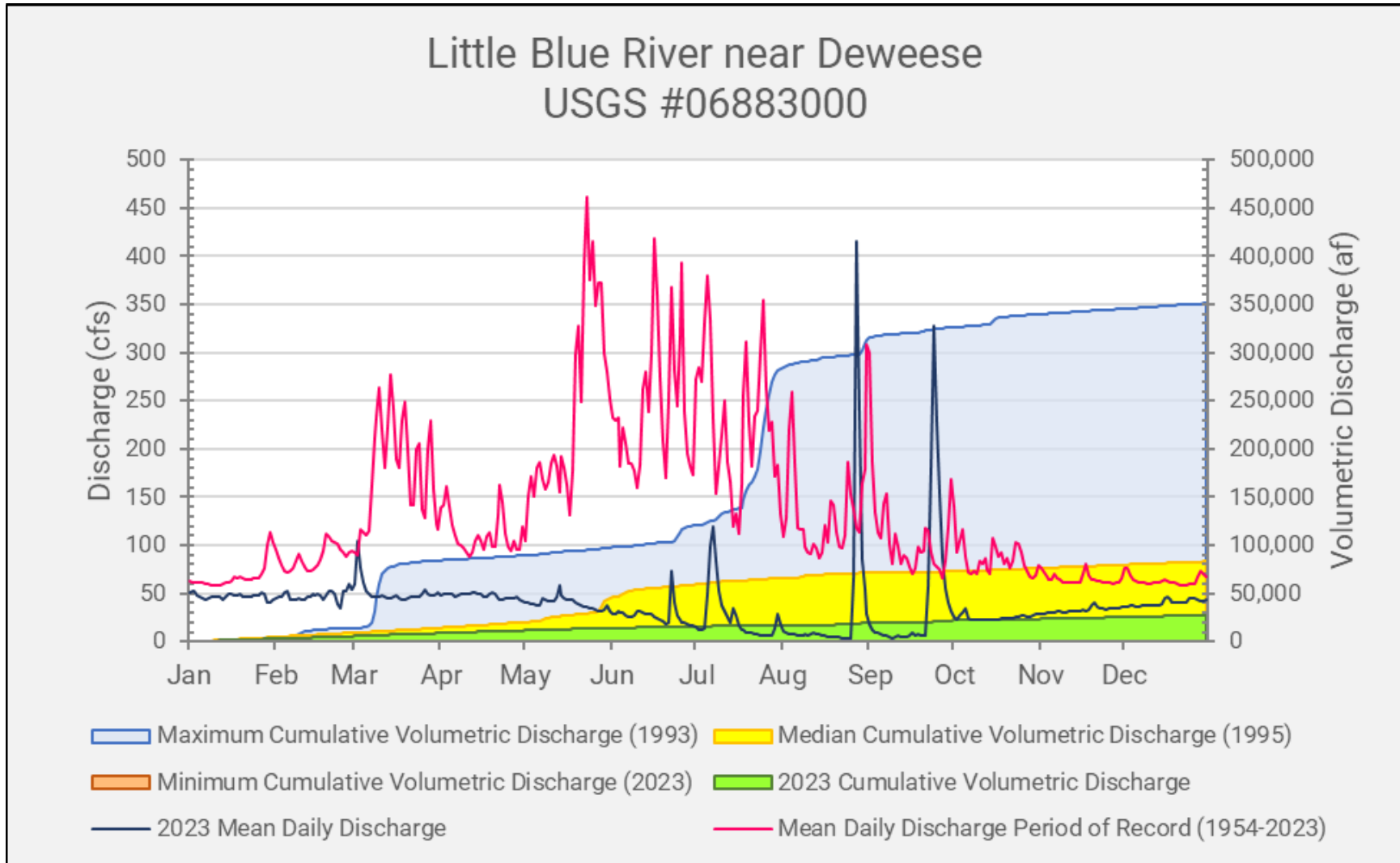
NEW DATA COLLECTED AND MODEL UPDATES

To increase the understanding of hydrologically connected water in the Blue basin, LBNRD, along with the Tri-Basin, Upper Big Blue, and Lower Big Blue NRDs and NeDNR worked with a consultant to develop a new numerical Blue Basin Groundwater Model. The model is intended to:

- Refine the delineations of hydrologically connected groundwater and surface water of the Blue River Basin.
- Simulate groundwater level changes and their impacts on stream baseflow and assess potential streamflow depletions, both spatially and temporally.
- Support NeDNR's evaluation of the appropriation status of the Blue River Basin and other management decisions related to how groundwater pumping impacts streamflows; and
- Provide a platform and datasets representing the best available data for evaluation of local-scale water issues.

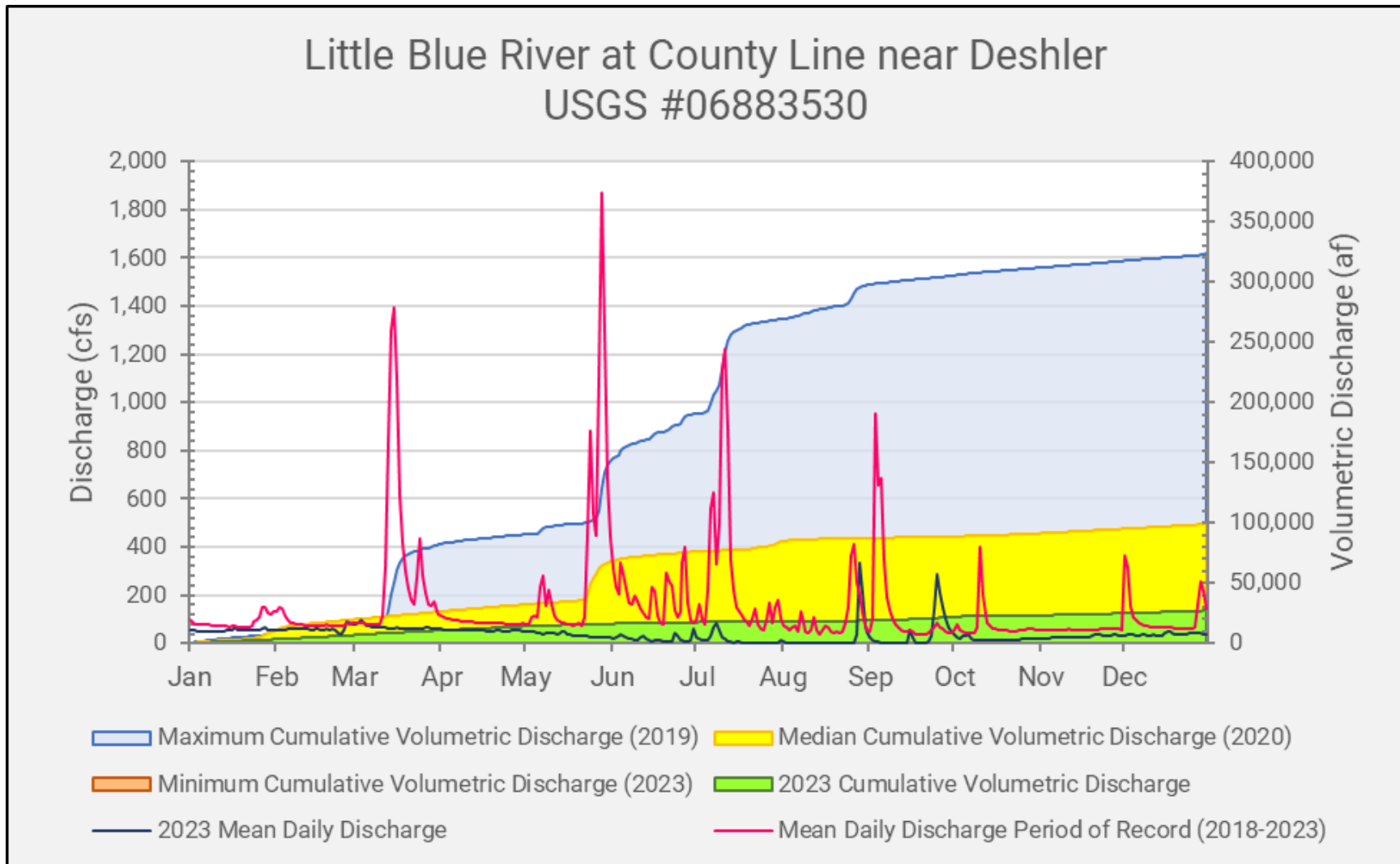
This project was completed near the end of 2023 and final documentation for the updated model was provided to NeDNR and the NRD partners. Since that time, the Department has undertaken a comprehensive review of the model and its documentation, which includes baseline and scenario model runs and a preliminary delineation of areas with hydrologically connected surface water and groundwater. Progress on this review is underway and the Department expects to share its findings with the NRD partners in late 2024.

Streamgages for the Little Blue Natural Resources District



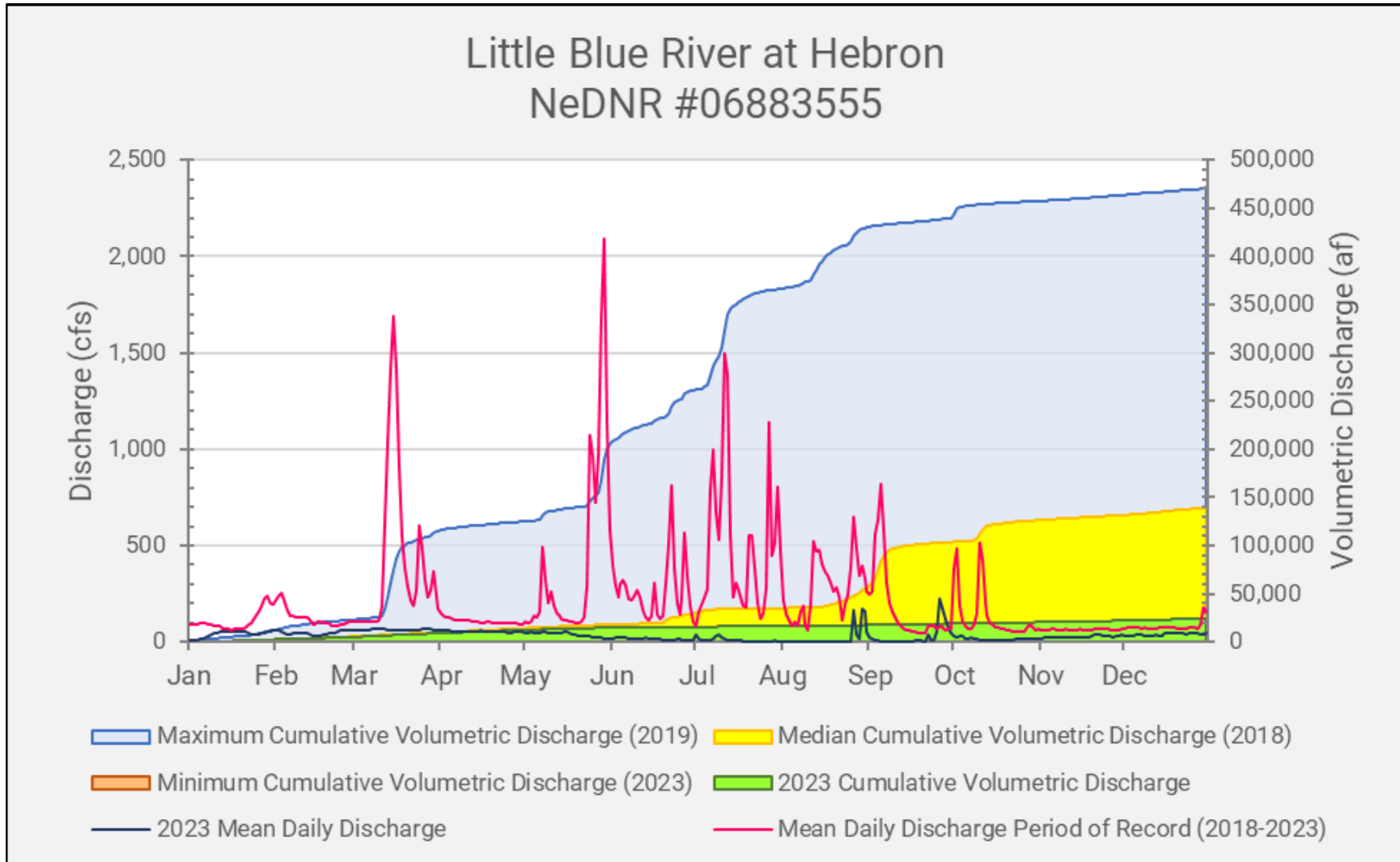
Note: Minimum Cumulative Volumetric Discharge (2023) and 2023 Cumulative Volumetric Discharge are identical so Minimum Cumulative Volumetric Discharge (2023) is hidden.

Streamgages for the Little Blue Natural Resources District



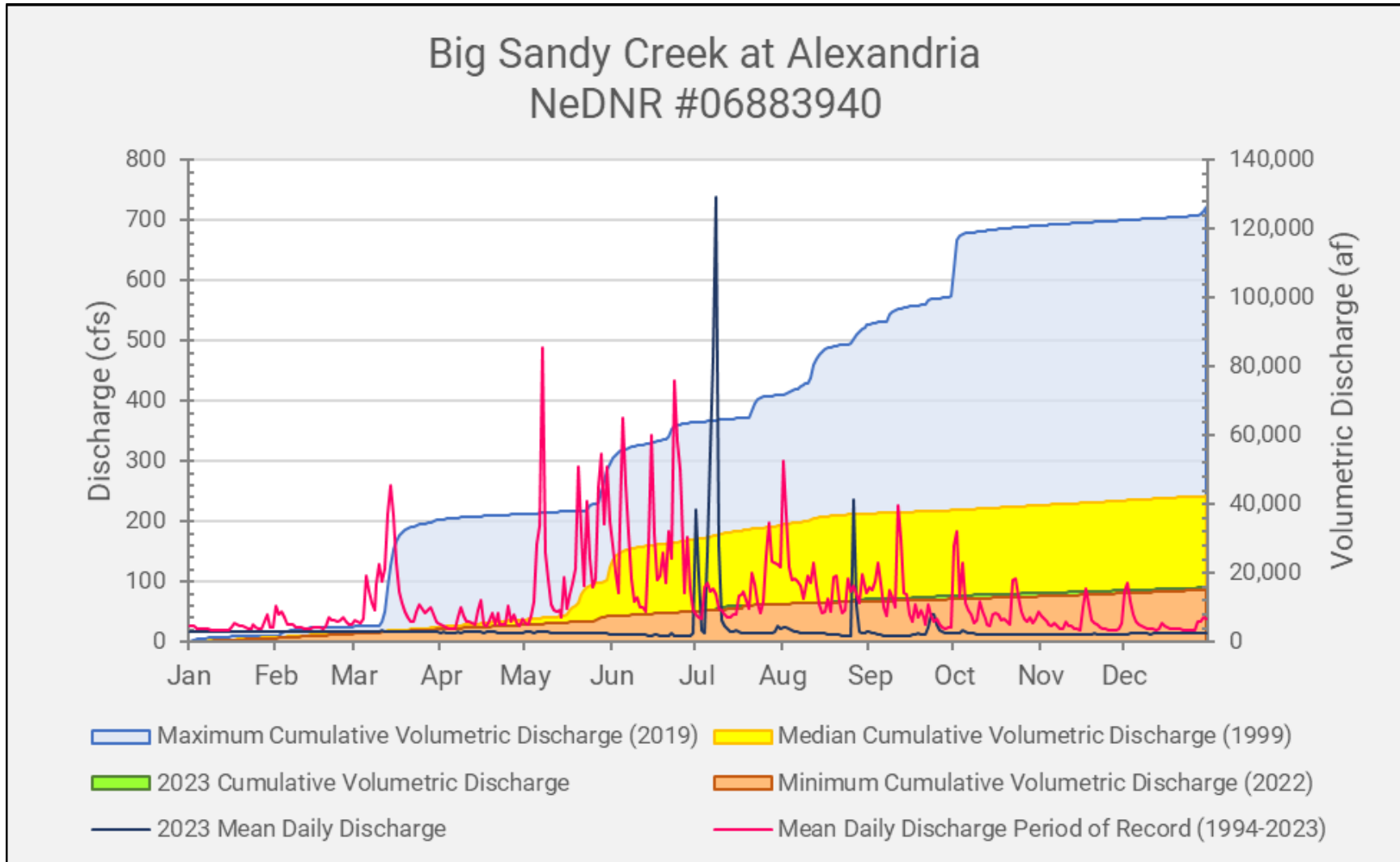
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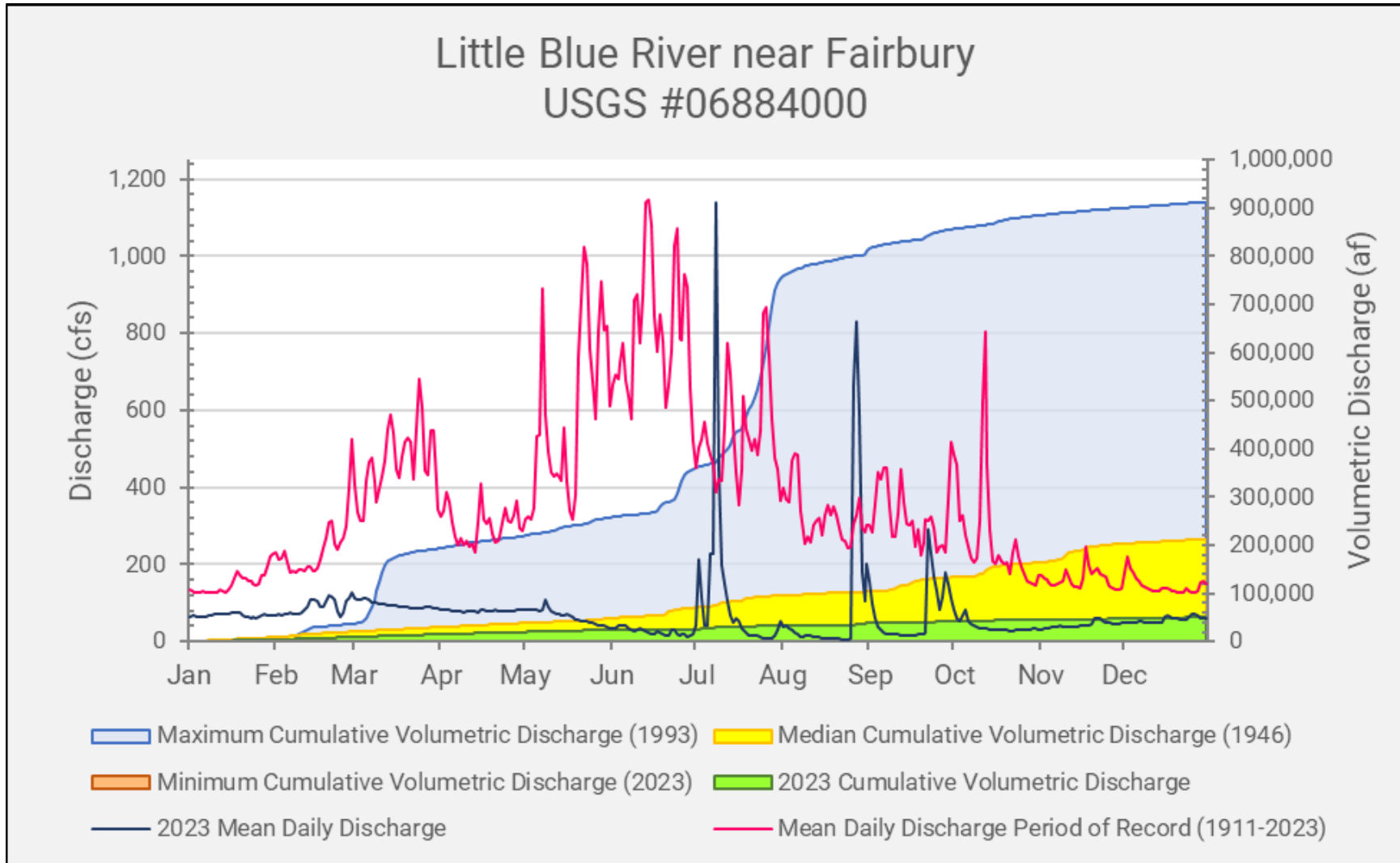


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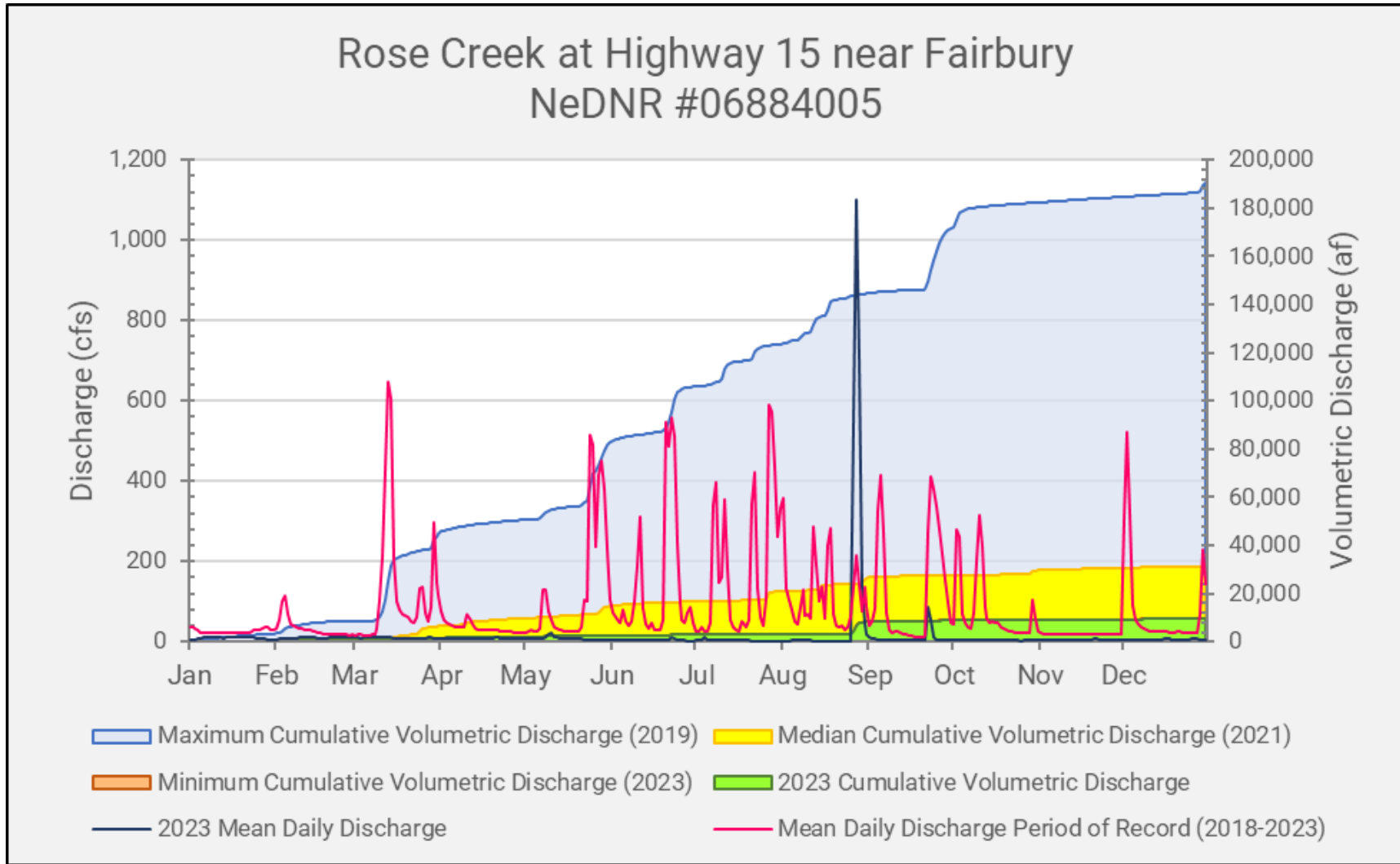


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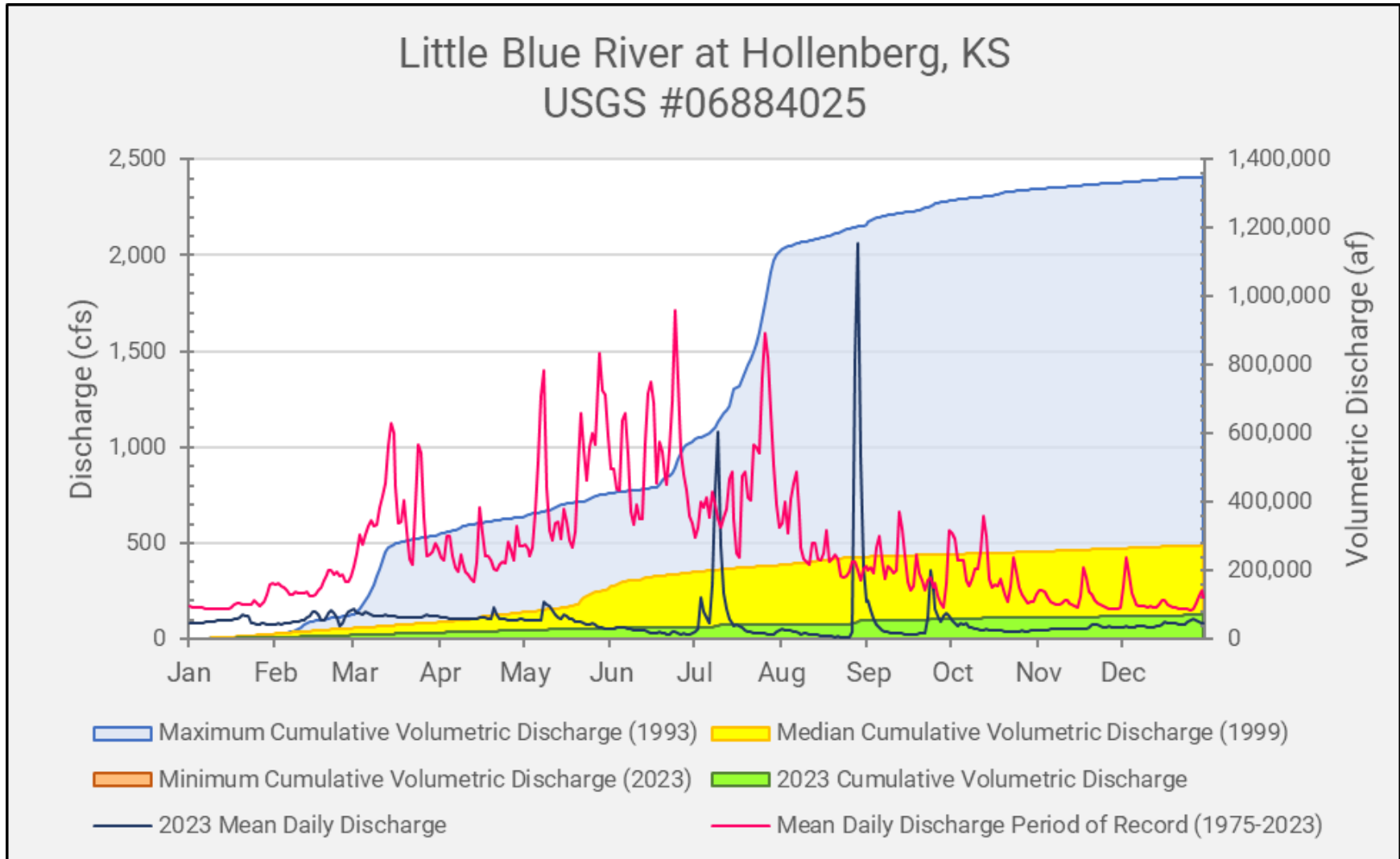
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