North Dakota Climate Bulletin

Autumn 2023 **Volume 17, No. 3**

In this Issue:

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From the office of the State Climatologist

The North Dakota Climate Bulletin is a quarterly publication of North Dakota's weather and climate from the North Dakota State Climate Office in the College of Natural Resource Sciences, North Dakota State University in Fargo, North Dakota.

Autumn 2023 was slightly warmer than average in North Dakota and started off dry from mediocre summer precipitation. The average autumn temperature was 2.9°F warmer than normal (NDAWN), and ranks as the 11th warmest autumn on record (NCEI). September and November were both warmer than what is typical, with October staying fairly average. Statewide average precipitation was less than normal by only a small amount, with November receiving the least precipitation. Northern North Dakota suffered the most, entering the season with D3 (Extreme Drought) conditions.

North Dakota felt the effects as an El Nino weather pattern took place across the country. Late October brought a surprise early snowstorm which seemed like the beginning of a long winter, but those thoughts did not last as temperatures failed to stay below freezing for much of the autumn season.

Figure 1: Cattle enjoying the mild November weather with no snow on the ground (NDAWN)

Detailed monthly summaries can be found at www.ndsu.edu/ndsco

**Only North Dakota stations used for NDAWN data. All MN and MT stations omitted.*

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Seasonal Summary

Precipitation

Statewide autumn (1 September - 30 November) total precipitation averaged 3.72 inches, just below normal total precipitation of 4 inches for the three month period. Isolated regions in Central North Dakota received significant rainfall while western and southeastern portions were well below average. The most significant rainfall was measured at the Mooreton (3SW) NDAWN Station with a total of 8.11 inches, 5.68 of which fell in September. This was also the highest monthly rainfall total within the three months. On September 23rd NWS Grand Forks issued a Flood Advisory for Richland County due to excessive rainfall (Figure 3). The lowest monthly rainfall occurred at Mott (1N) with just 0.03 inches in November; despite that, earlier autumn precipitation ensured that this would keep the area around average. This autumn ranks as the 38th driest on record out of 129 years of data.

Autumn moisture begins off of a drier than average summer. The U.S. Drought Monitor reported that only 46.6% of North Dakota was without a drought on September 5th. Northern North Dakota received a decent amount of precipitation to lessen the impacts of drought, but D2 (Severe Drought) conditions persisted in the northeast region (Figure 4).

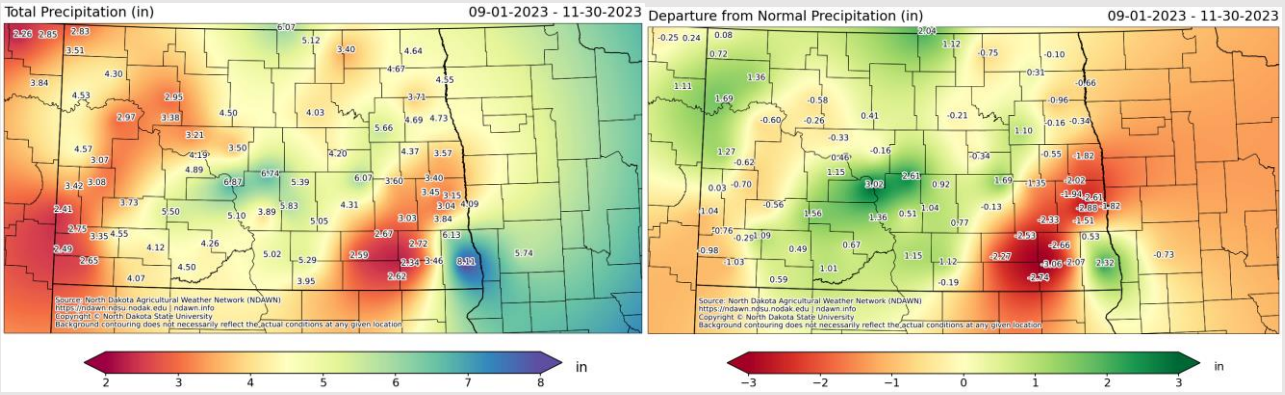

Figure 2: Total precipitation (left) and departure from normal (right) recorded by NDAWN stations between 06/01/2023-8/31/2023

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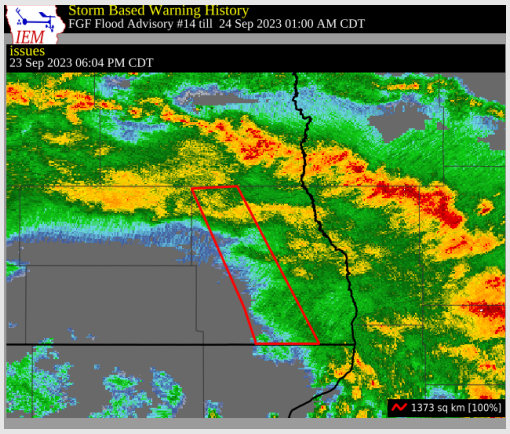

Figure 3: NWS Grand Forks issued a Flood Advisory in Richland County due to rainfall in excess of 3-4 inches (NWS, IEM)

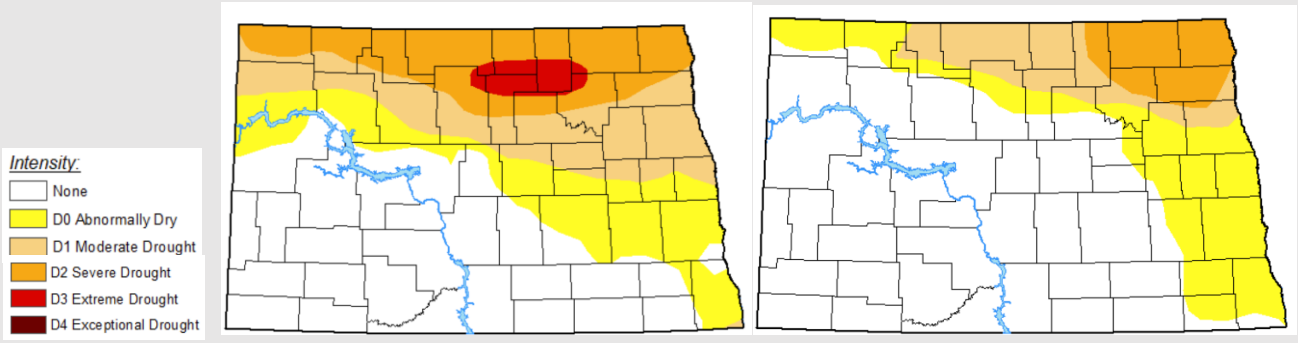

Figure 4 U.S. Drought Monitor conditions on September 5, 2023, where 46.64% of North Dakota has no drought (Left) and November 28, 2023 this improves to 65.42% of North Dakota with no drought (Right)

North Dakota Autumn Precipitation Summary

	Precipitation	Normal	Anomaly	Rank	Wettest/Driest Since	Record Year
Autumn 2023 September-November	3.72”	4.04”	-0.32”	38th Wettest	Wettest since 2021	2019
				92nd Driest	Driest since 2022	1976

Table 1: Ranking from NCEI NOAA based on data for the Summer season September-November 1885-2023. Precipitation amounts averaged from records at NDAWN stations in North Dakota.

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Temperature

The average temperature across North Dakota for the autumn season was 45°F, two degrees warmer than normal at 43°F (NDAWN) (Figure 5). September and November were much warmer than average, around 3-4°F. In September, every NDAWN station in North Dakota recorded a temperature in the 90s. Western North Dakota stayed cool in October, unable to warm up like Eastern North Dakota which saw temperatures in the 80s-90s yet again. More information about these individual months can be found at www.ndsu.edu/ndsco

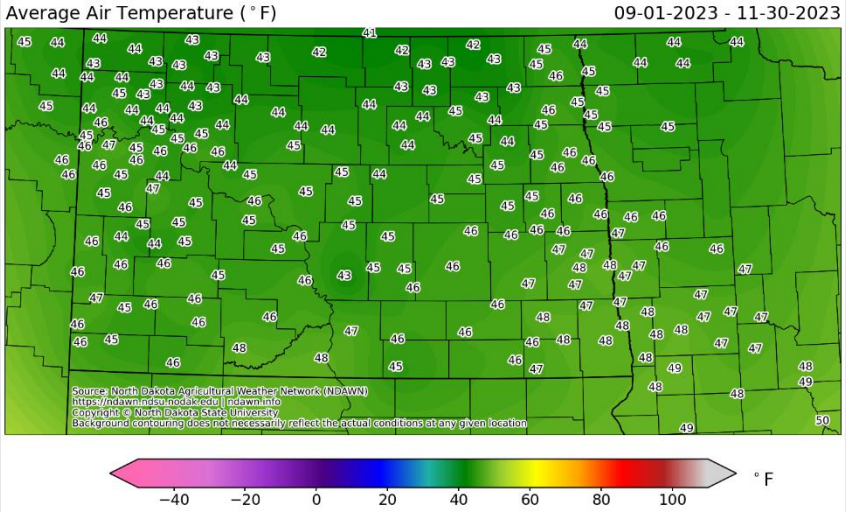

Figure 5: Average temperature across North Dakota NDAWN stations from 9/1/2023-11/30/2023

North Dakota had a few sweltering days for the time of year, but ultimately had no effect on average temperatures. Statewide average maximum temperature was 55.9°F, only 1.5°F warmer than normal. Average minimum temperatures were warmer than normal by 2.7°F at 34.1°F and 31.5°F, respectively. The maximum temperature observed during the three months was 102°F at the Fort Yates (2W) NDAWN station in Sioux County, which occurred in September. Minimum temperatures dipped below zero for most everybody except East Central North Dakota. The minimum temperature observed this season was -16°F at the New Hradec (6NW) NDAWN station in Dunn County. This occurred in October when Western North Dakota saw below average temperatures.

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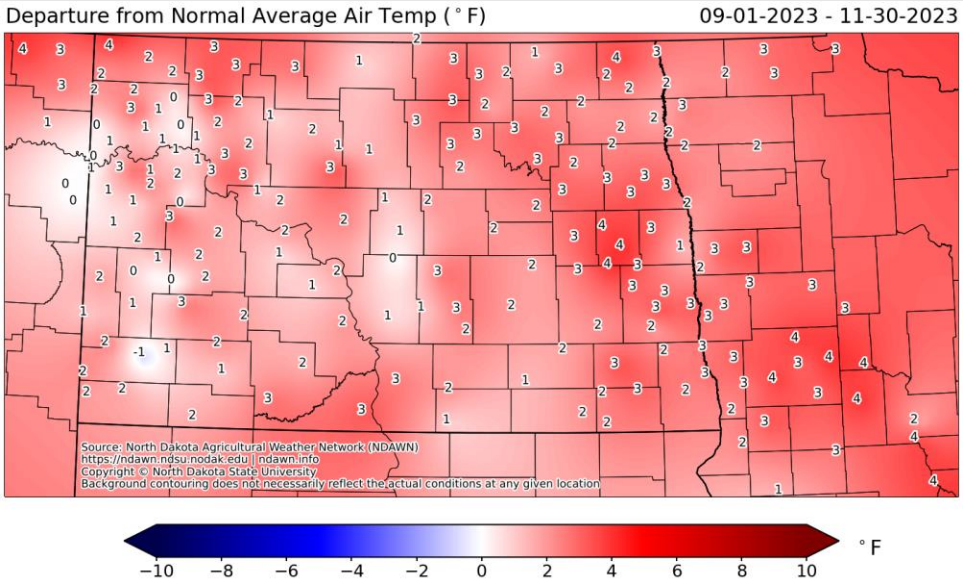

Figure 6: NDAWN Departure from normal temperatures for each station from 9/1/2023 – 11/30/2023

North Dakota Autumn Temperature Summary

Autumn 2023 September-November	**Average T**	**Avg max T**	**Avg min T**	**Maximum**	**Minimum**
	45.0°F	55.9°F	34.1°F	102°F	-16°F
Anomaly	+2.1°F	+1.4°F	+2.7°F		
Rank					
Warmest	11th Warmest	25th Warmest	7th Warmest		
Coolest	119th Coolest	105th Coolest	123rd Coolest		
Record					
Warmest	49.1°F (1963)	61.3°F (1963)	37.2°F (2016)	109°F (Larimore, 1906)	
Coolest	32.2°F (1896)	43.3°F (1896)	21.1°F (1896)		-39°F (Pembina, 1985)

Table 2: Autumn temperature summary for North Dakota. 2023 statistics from NDAWN station data. Ranking and records based on NCEI climate data (1885-2023) (NOAA)

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Storm Reports & Record Events

NWS Issued Warnings

On average, autumn is typically quiet when it comes to severe weather in the Northern Plains. However, with the mild temperatures September was able to produce few severe thunderstorms in North Dakota. The first of which and most active day occurred on September 4-5, with 17 Severe Thunderstorm Warnings issued. Another event on September 29th warranted 3 STW in Richland/Cass County, but is not related to the Flood Advisory which occurred the week prior. On October 3rd, 3 more STW were issued by FGF for a small, localized storm in Ramsey County (Figure 7,8).

Weather soon turned to a typical North Dakota winter weather by the end of October. A winter storm warning was issued for a large portion of North Dakota for a widespread snow event that dropped up to 12-14 inches of snow from West Central to Northeastern North Dakota (NWS) (Figure 9). Two snow squall warnings were issued by NWS Bismarck on October 30th in North Central North Dakota for a band of snow reducing visibility and worsening driving conditions (Figure 7).

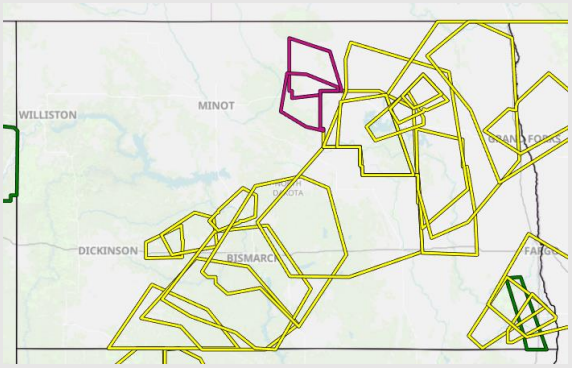

Figure 7: Severe Thunderstorm Warnings and Snow Squall Warnings (pink) issued across North Dakota from 9/1/2023-11/30/2023 by NWS Grand Forks and Bismarck (IEM, NWS)

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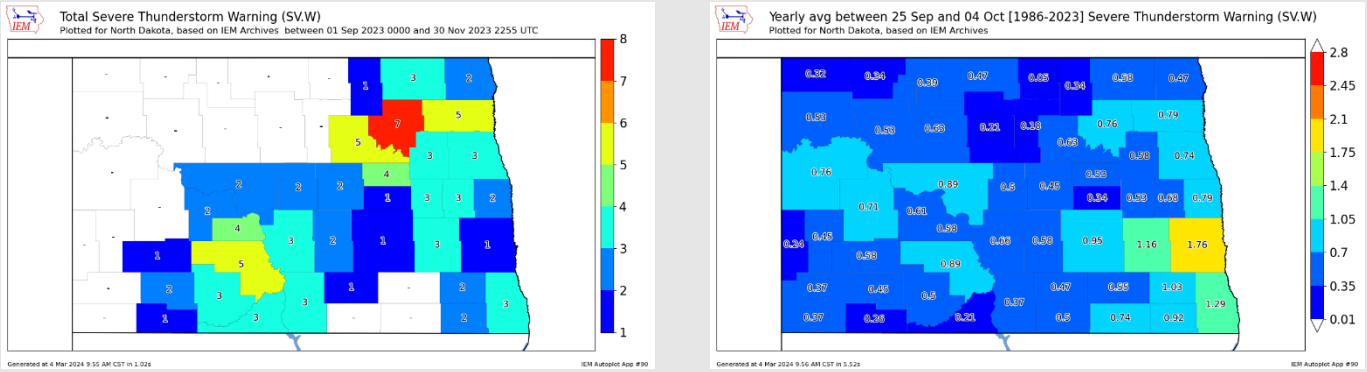

Figure 8: Total number of Severe Thunderstorm Warnings by county (Left) and 1986-2023 average number of Severe Thunderstorm Warnings between September-November by county (Right) (IEM)

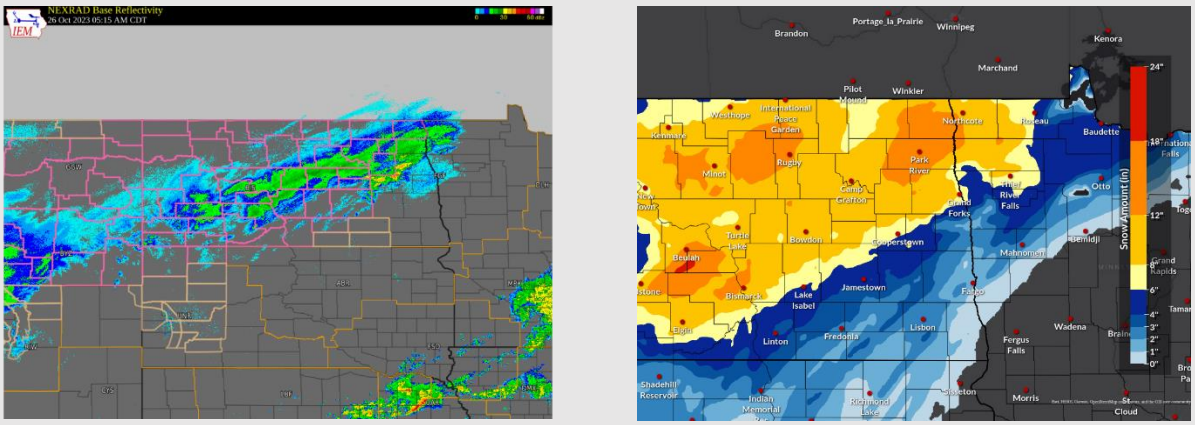

Figure 9: Radar mosaic from a winter storm on October 25-27, 2023 impacting major portions of North Dakota (Left) and snow depth following the widespread event (Right) (IEM, NOAA)

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September-November Local Storm Reports of wind gusts, hail, and tornadoes were fairly average with 25 in September, 3 in October and zero in November. Two reports in September were reported funnel clouds in South Central North Dakota that occurred on the 23rd and 24th (Figure 10).

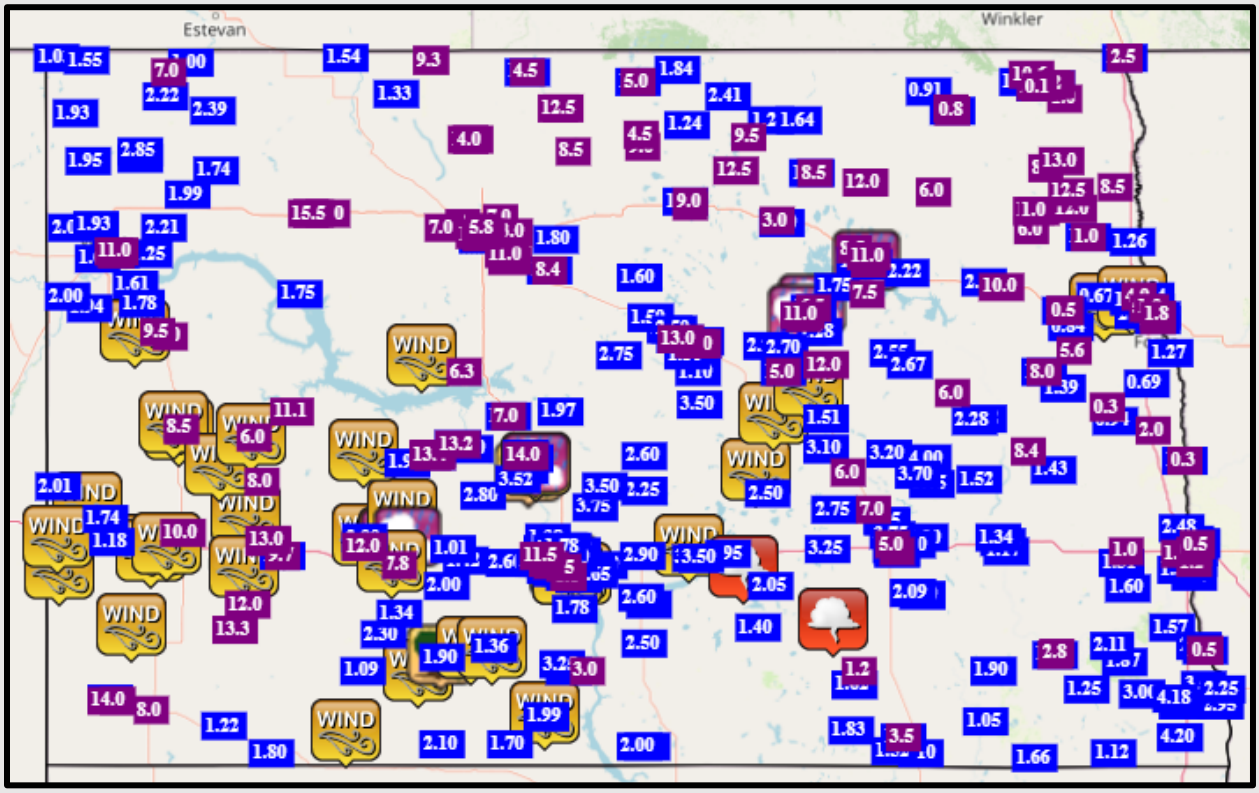

Figure 10: Map of Local Storm Reports between 9/1/2023-11/30/2023 differentiated by each respective icon. Blue numbers are reported rainfall, purple are snow depth reports (NWS, IEM)

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Image/Data Sources

Climate at a Glance | National Centers for Environmental Information (NCEI).

NDAWN Weather

Iowa Environmental Mesonet

U.S. Drought Monitor

SPC Storm Reports

NCEI Storm Events Database

NWS Grand Forks and Bismarck

XMACIS2

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