North Dakota Climate Bulletin

Summer 2024 **Volume 18, 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.

Summer (June-August) 2024 average temperature ranks as the 64th coolest out of 130 years of North Dakota climate data at 66.6°F. Summer 2024 finished averaged in precipitation, but majorly favored the eastern portion of the state. Central and Northeast North Dakota had the highest totals, up to 150% of normal. Drought conditions plagued Western North Dakota with most areas reaching only half of their normal precipitation.

Summer severe weather packed a punch in North Dakota this year. Every county has had a severe thunderstorm issuance this summer, and 15 tornado warnings spanned 15 counties. A +300 departure from normal Local Storm Report incidents is evidence of the intense storms that struck densely populated areas. Some of these storm reports include baseball sized hail and damaging winds.

Figure 1: Ominous shelf cloud associated with flash floods and a tornado in Stutsman County approaching the Ypsilanti NDAWN station on June 2, 2024

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

Cassidy Holth, Assistant to the North Dakota State Climatologist.

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

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Seasonal Summary

Precipitation

Statewide summer (June 1-August 31) precipitation averaged 8.41 inches, just below normal average precipitation of 8.66 inches for the season. A line of excess precipitation stretches from Bismarck to Jamestown, and northward towards Devil's Lake and Grand Forks, where NDAWN stations recorded 12-16 inches of rain. The Niles NDAWN station in Benson County received the most rain with 16.07 inches, a remarkable 6.89 inches above normal. The Streeter station followed with 15.73 inches, 6.38 inches above normal. In the Red River Valley, Cass County and Pembina County missed on much of the precipitation and ended up well below average. The Prosper NDAWN station in Cass County finished summer over 3 inches below average.

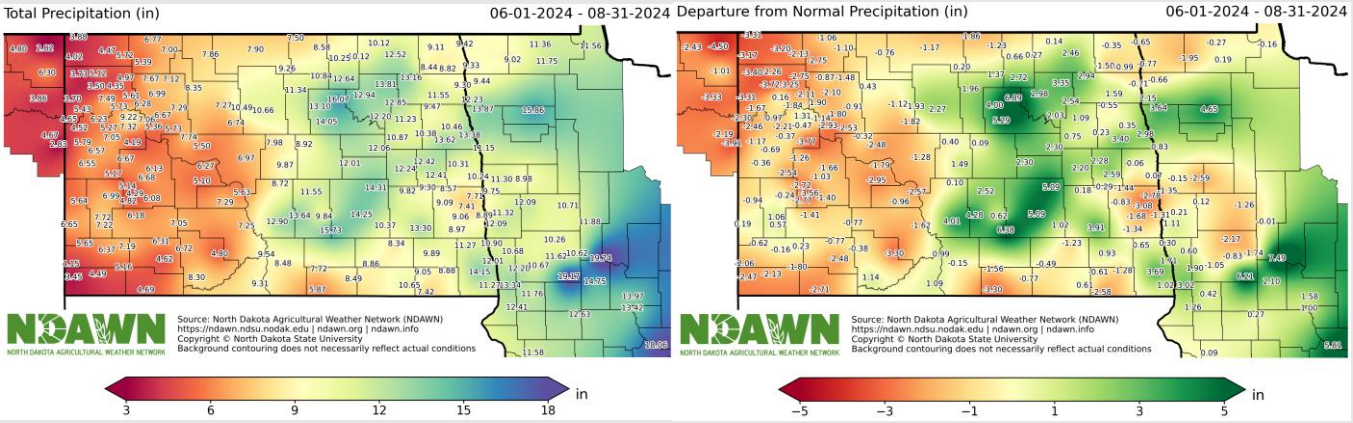

Figure 2: Total precipitation (left) and departure from normal (right) recorded by NDAWN stations between 6/1/2024-8/31/2024

Western North Dakota was a different story overall. Dry conditions persisted after a dry summer, prompting an expansion of drought conditions by the U.S. Drought Monitor. To start off summer, the Drought Monitor released on June 4 had 8.23% of North Dakota in drought conditions. This increased to 35.78% by the last Drought Monitor of the summer on August 27 (Figure 2, U.S. Drought Monitor). The least precipitation fell at the Sunny Slope NDAWN station with only 3.45 inches all summer, almost 2.5 inches below normal precipitation.

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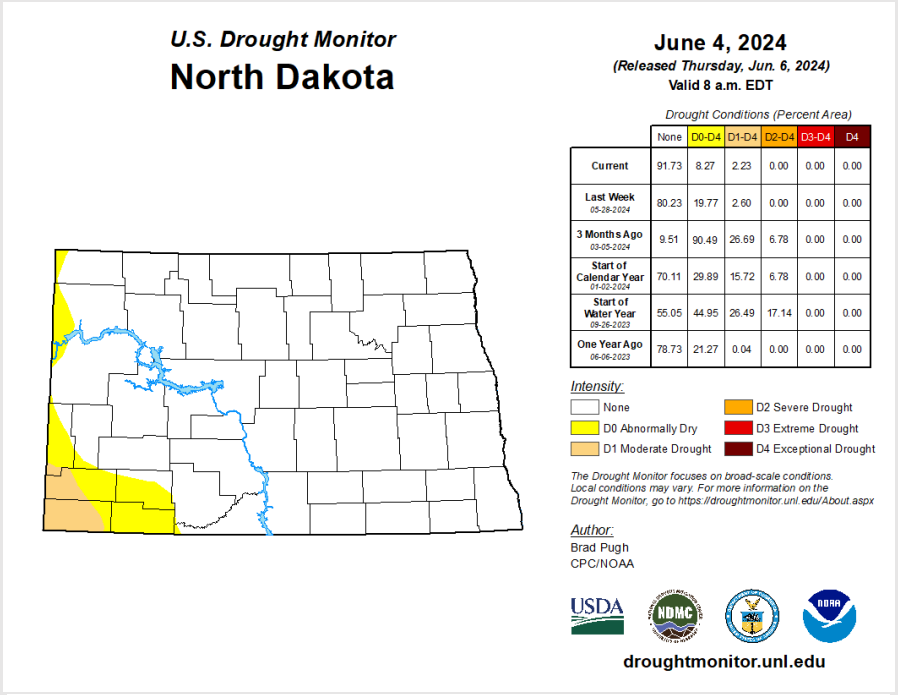

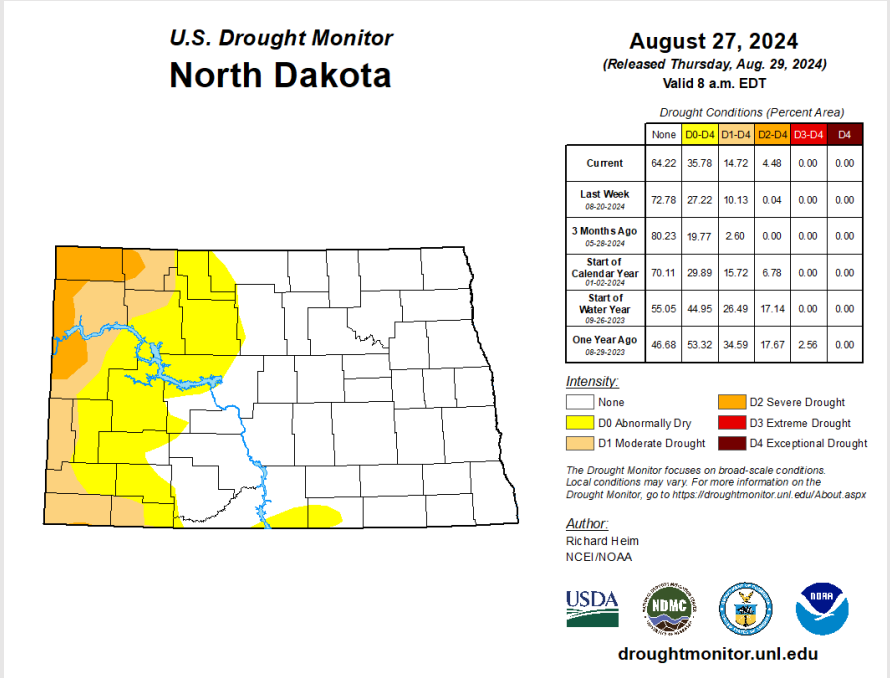

Figure 3: U.S. Drought Monitor conditions on 6/4/2024 (Top) and 8/27/2024 (Bottom) percentage of area under drought increased significantly by the end of the summer

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Historically, summertime precipitation is variable across North Dakota each year. Storms or a lack thereof contribute to a majority of summertime precipitation, making rainfall totals vary year to year. 2024 was average with 8.41 inches. The wettest summer occurred in 1993 with 15.65 inches, well above average or any other year recorded.

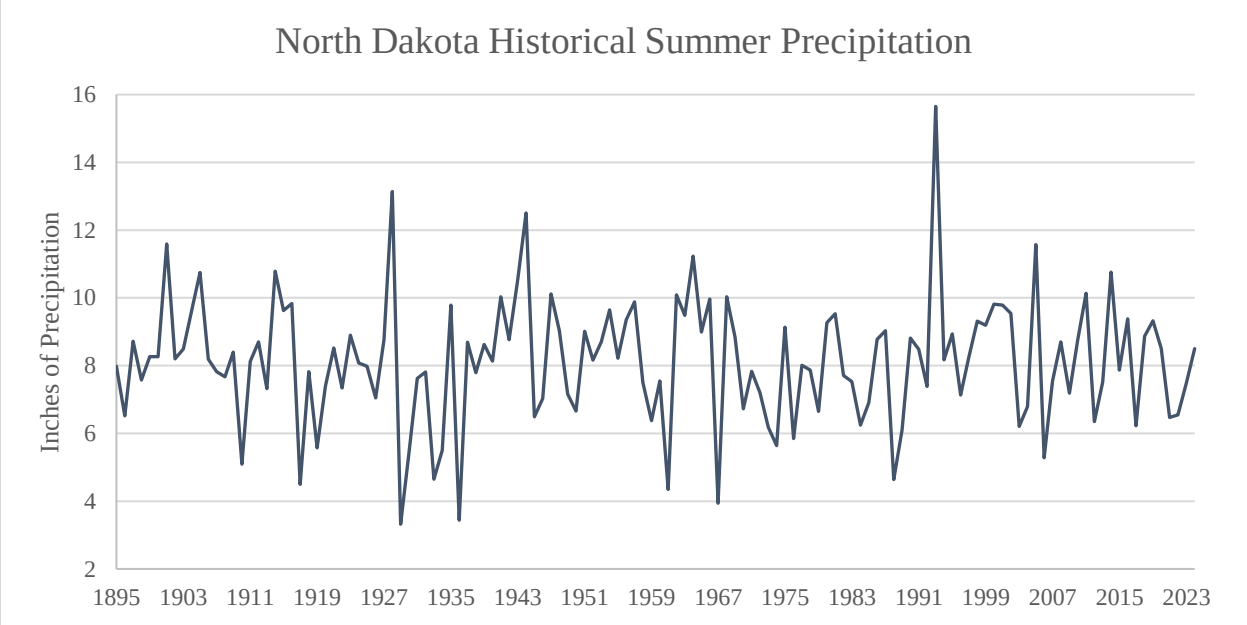

Figure 4: Historical average summertime precipitation for North Dakota. Climate data from 1885-2024 (NCEI)

North Dakota Summer Precipitation Summary

	Precipitation	Normal	Anomaly	Rank	Wettest/Driest Since	Record Year
Summer 2024 ***June-August***	8.41”	8.66”	0.25”	55th Wettest	Wettest since 2020	1993
				76th Driest	Driest since 2023	1929

Table 1: Ranking from NCEI NOAA based on data for the summer season June-August 1885-2024. Precipitation amounts averaged from records at NDAWN stations in North Dakota

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Temperature

The average temperature across North Dakota for the three-month period was 66.3°F, around the normal average temperature (NDAWN, Figure 5). In 2024, June and August measured below average, and July measured slightly warmer than average. The Northwest corner as well as Central North Dakota were a little bit cooler on average. 2024 comes in at the middle of the pack as 64th coldest summer out of 150 years, tying 1909, 1923, 1948, 1953, and 1971. 1936 warmest 72.0 1915 coldest 61.2

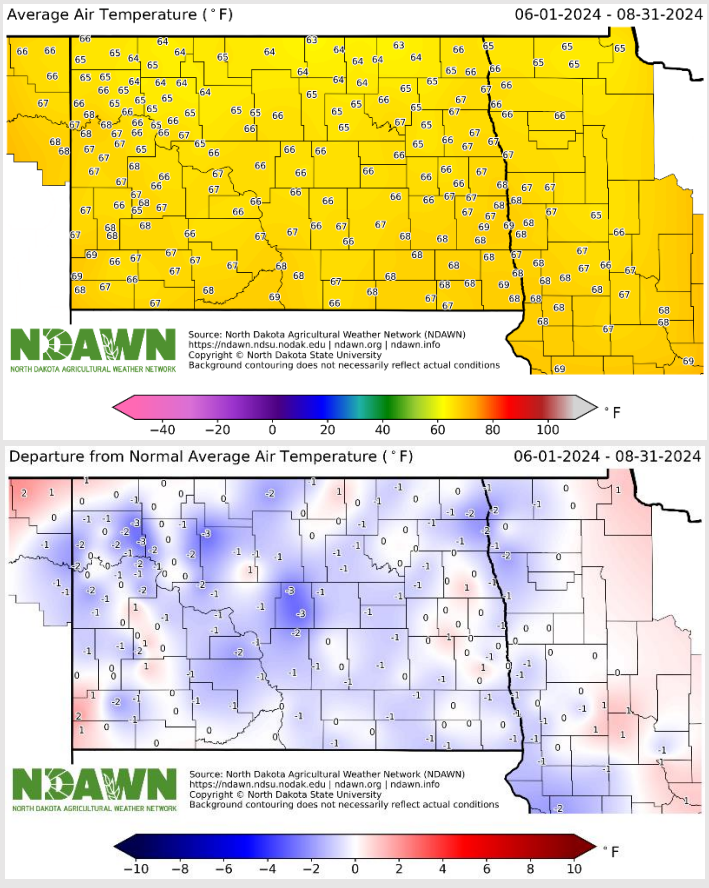

Figure 5: Average temperature (Top) and departure from normal average temperature (Bottom) across North Dakota NDAWN Stations from 6/1/2024-8/31/2024 (NDAWN)

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

The statewide average maximum temperature was 78.1°F, below average by 1.3°F. Minimum temperatures were equal to normal, 54.4°F. Temperature extremes seemed to balance the averages, as quite a few very hot days, above 100°F, occurred this summer, but for the most part daily high temperatures stayed on the cooler side. Evidence of these extremes is displayed in the seasonal minimum and maximum temperatures. The maximum summer temperature was 111°F, a record-breaking temperature for the NDAWN mesonet, recorded at the Banks NDAWN station in McKenzie County. The minimum temperature was a chilly 32°F at the Bowman NDAWN station in Bowman County.

North Dakota Summer Temperature Summary

Summer 2024 June-August	**Average T**	**Avg max T**	**Avg min T**	**Maximum**	**Minimum**
	66.3°F	78.1°F	54.49°F	111°F	32°F
Anomaly	-0.61°F	-1.33°F	+0.10°F		
Rank					
Warmest	67th Warmest	92nd Warmest	36th Warmest		
Coolest	64th Coolest	39th Coolest	95th Coolest		
Record					
Warmest	72.0°F (1936)	87.2°F (1936)	56.8°F (1936)	121°F (Steele, July 6, 1936)	
Coolest	61.2°F (1915)	72.8°F (1993)	48.8°F (1915)		18°F (Foxholm, June 6, 2000)

Table 2: Summer temperature summary for North Dakota. 2024 statistics from NDAWN station data. Ranking and records based on NCEI climate data (1885-2024) (NOAA)

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Storm Reports & Record Events

NWS Issued Warnings

Throughout June-August 2024, North Dakota had a total of 1076 (unfiltered, preliminary) Local Storm Reports consisting of rain, wind, hail, and even tornado reports. This is well over average stemming from a very active season, and the highly populated Bismarck/Mandan area was persistently in the path of severe weather (Figure 6). In total, these Local Storm Reports were categorized by the following: 5 flood-related reports, 179 hail, 30 landspout/funnel/tornado, 169 wind-related reports, and the last 663 as rain reports (IEM). An eventful season for most in the state of North Dakota, only 19 counties had less than 10 Severe Thunderstorm Warnings. Foster County and Rolette County only had 1 (Figure 7).

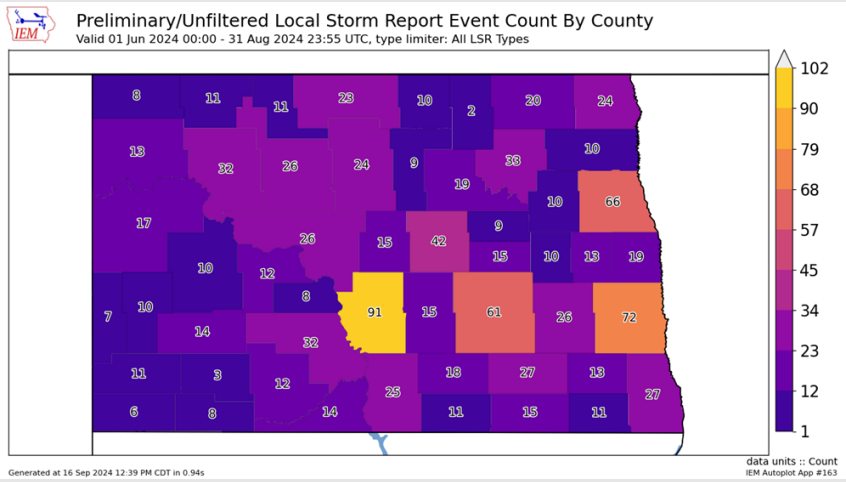

Figure 6: Number of Local Storm Reports by county in North Dakota between 6/1/2024 - 8/31/2024 Burleigh county alone had 91 Local Storm Reports.

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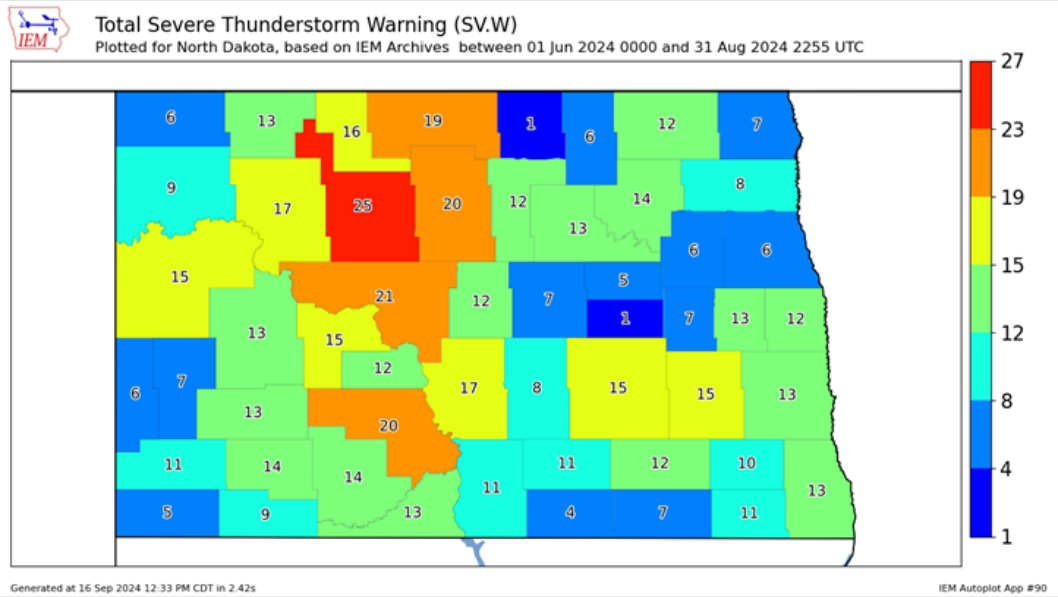

Figure 7: Severe Thunderstorm Warnings in North Dakota by County between 6/1/2024-8/31/2024 (Note this map only includes Severe Thunderstorm Warnings) (NWS, IEM)

12 tornadoes were reported in North Dakota during the summer, occurring across the state from multiple severe thunderstorms. No damage was reported from these tornadoes, as many were short-lived and in rural areas. Numerous funnel clouds were reported in July as well, 23 in just that month alone (out of 24 reports). Many of these were non-severe cold air funnels. With severe weather generally to the south, low pressure centralizing over the Northern Plains generated vorticity, but lacked conditions for severe thunderstorms. 26 Tornado Warnings were issued in North Dakota during the summer months (Figure 8). The 2024 summer monthly average of ~8-9 Tornado Warnings per month is below the normal average of ~13 warnings issued per month (IEM).

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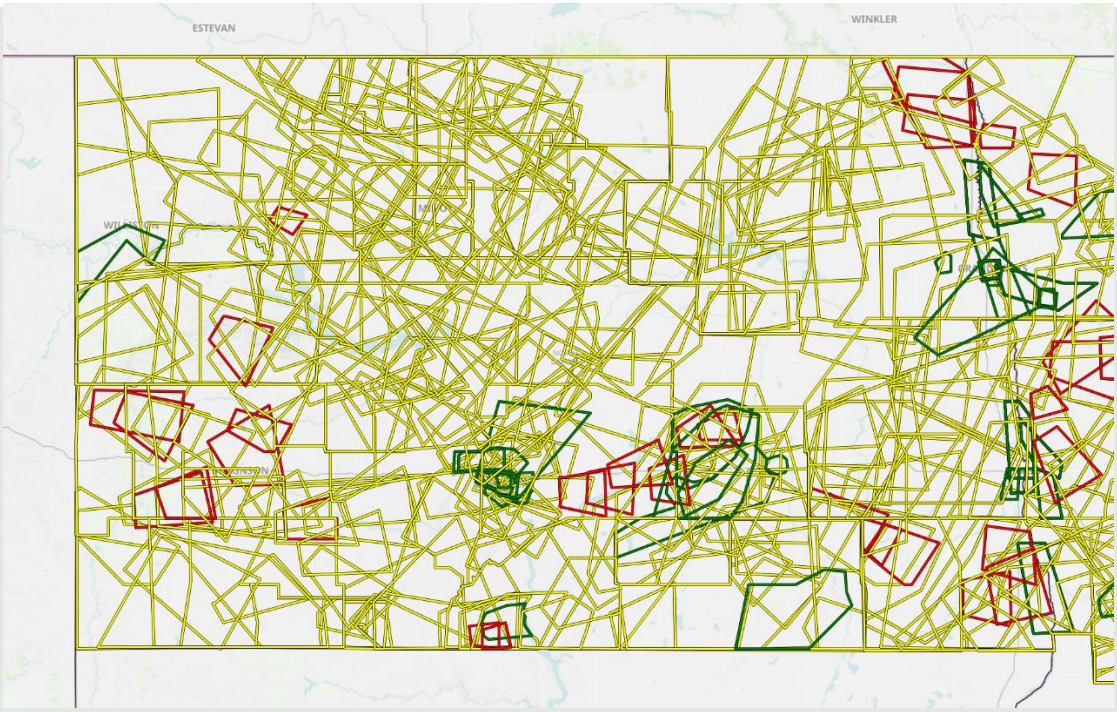

Figure 8: Visual of warning polygons issued by NWS between 6/1/2024 - 8/31/2024 Yellow = Severe thunderstorm, Red = Tornado, Green = Flash Flood (NWS, IEM)

Figure 9: Two views of a cold air funnel near Carrington caught on the NDAWN station camera on 7/6/2024

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Figure 10: NDAWN Sentinel Butte camera in Golden Valley County capturing a funnel cloud before it briefly became a tornado on 6/27/2024

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Image/Data Sources

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

Iowa Environmental Mesonet (IEM)

NDAWN Weather

SPC Storm Reports

NCEI Storm Events Database

NWS Grand Forks and Bismarck

U.S. Drought Monitor

XMACIS2

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