North Dakota Climate Bulletin

Spring 2023 **Volume 17, No. 1**

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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.

The average spring temperature March-May 2023 was cooler than average by 4.7°F and ranks as the 11th coolest spring on record (NDAWN), despite May quickly warming up after the snowmelt. Statewide average precipitation was less than average by 0.38 inches, making it the 48th wettest spring in North Dakota (NCEI). Heavy rainfall in May impacted much of Central North Dakota, some places receiving over three inches more precipitation than normal. Northeast North Dakota had less than average precipitation around the Devil's Lake Basin. Despite all of the RRV being in Abnormally Dry (D0) or Moderate Drought (D1) conditions as of March, many of the conditions, including snowpack, frost depth, and continuous precipitation were ingredients for average or above average spring flooding across the basin (NWS). Western North Dakota remained blanketed in a record-breaking snowpack, with Bismarck nearly breaking the record snowfall set during the winter of 1996-97, which kept temperatures below average until a rapid warm-up in April.

Figure 1: Snow piled high below an overpass on I-94 near Jamestown on April 7 2023

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 spring (March 1-May 31) precipitation averaged 1.30 inches, just below average precipitation, 1.58 inches, during this same time period. Some central regions received well over two inches above average due to a rainy period between May 3-15 (NDAWN, Figure 2). The Steele (5NW) NDAWN station received the most rain with 7.97 inches, 2.8 inches above normal. The Sawyer (7S) station followed closely behind with 7.89 inches, 3.25 inches above normal. Northeast North Dakota lacked precipitation measuring about 2.5 inches below normal.

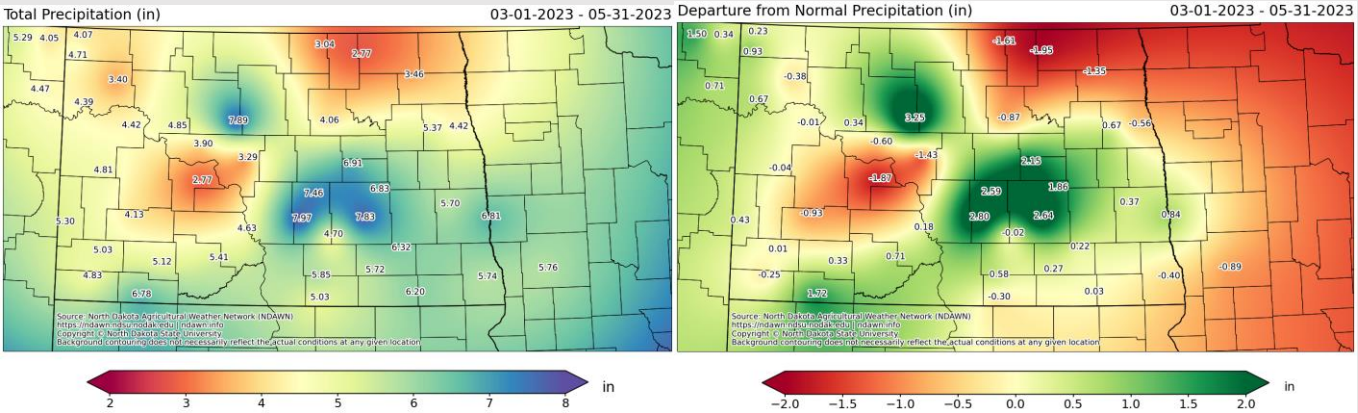

Figure 2: Total precipitation (left) and departure from normal (right) recorded by NDAWN stations between 3/1/2023-5/31/2023

Much of North Dakota was subject to near record-breaking snowpack throughout the spring. Dickinson recorded a total of 96.4 inches of snowfall through May 1st. Bismarck received over 100 inches of snow, nearly breaking the record of 101.6 inches and had 155 consecutive days of snow on the ground. Grand Forks reached 120 consecutive days of a 12+ inch snowpack on April 12th (ND DWR). Within one week, the Red River reached Moderate flood stage (40+ feet) on April 21st in Grand Forks, but dropped below minor flood stage by May 9th. Weather conditions from the previous fall assisted to reduce the impacts of spring flooding, especially in Western North Dakota, allowing melting snow to seep into the soil, rather than run off into rivers and lakes.

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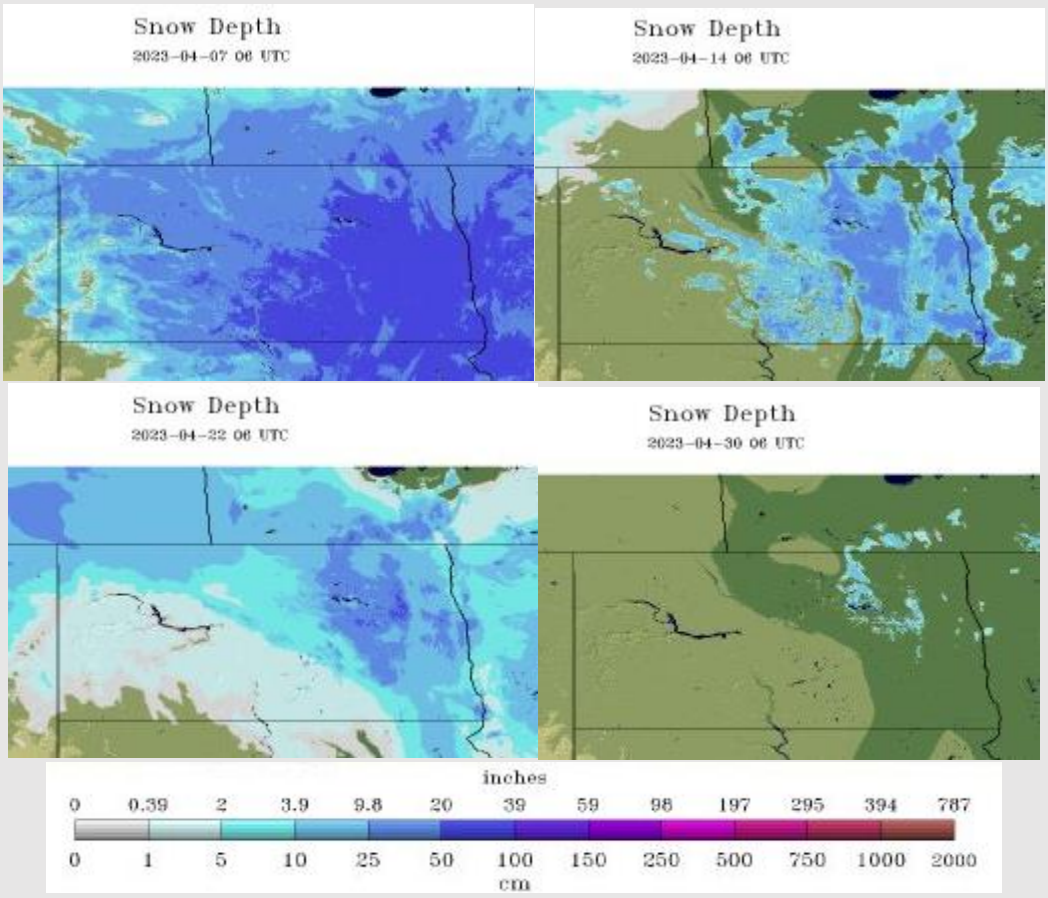
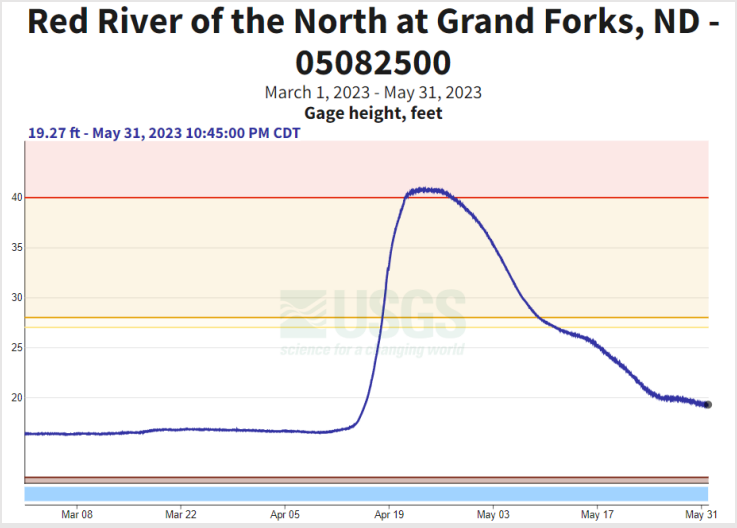


Figure 3 Snow depth maps of North Dakota showing April 7, 14, 22, & 30, representing the snow events and their rapid melt

Figure 4: Graph showing the height of the Red River from 3/1/2023-5/31/2023 (USGS). Moderate flood stage was reached after the corresponding snowmelt pictured above. The river was in a flood stage from April 18-May 9, a total of 22 days.



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

The late snowmelt concerned many farmers, especially in the Red River Valley where a late snowstorm pushed back planting prospects. Even after the snow melted in late April/early May, some regions had to deal with heavy persistent rainfall. Sugarbeet planting took a big hit, where ideal planting dates fall between mid-April to mid-May, North Dakota had merely 1% of planting done by May 8th (AGWeek). However, many saw favorable planting conditions as unseasonably warm May temperatures helped to dry out fields, and a successful season for many carried out.

North Dakota Spring Precipitation Summary

	Precipitation	Normal	Anomaly	Rank	Wettest/Driest Since	Record Year
Spring 2023 ***March-May***	5.36”	4.43”	+0.93”	48th Wettest	Wettest since 2022	1896
				82nd Driest	Driest since 2021	1934

Table 1: Ranking from NCEI NOAA based on data for the Spring season March-May 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 three-month period was 35.8°F, which is 4.7°F below the normal average temperature (NDAWN) (Figure 5). Despite a toasty May, this spring ranked as the 15th coldest on record. Using the two month temperature data for just March and April, that drops to the 2nd coldest on record with an average temperature of 24.4°F. May, standing alone, ranked as the 6th warmest May on record with an average temperature of 60.1°F (NCEI). More detailed information regarding these months can be found here.

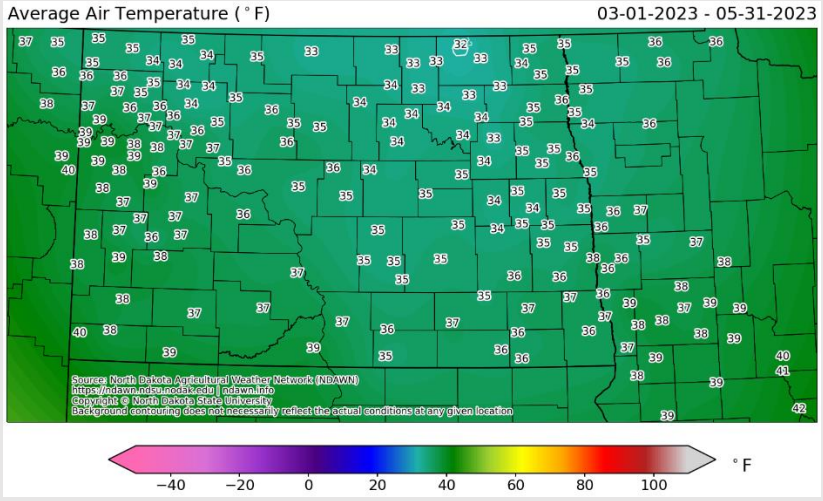

Figure 5: Average temperature across North Dakota NDAWN stations from 3/1/2023-5/31/2023

The statewide average maximum temperature was 46.5°F, just 6°F above normal. Again, excluding May, this number drops to 9°F *below* normal. Minimum temperatures averaged to 25.1°F across the state, which is less than a degree cooler than normal. Overall, all of North Dakota had below average temperatures for the spring season (Figure 6). The coldest temperature recorded was -23°F and the warmest temperature recorded was 93°F, a 116°F spread in just three months!

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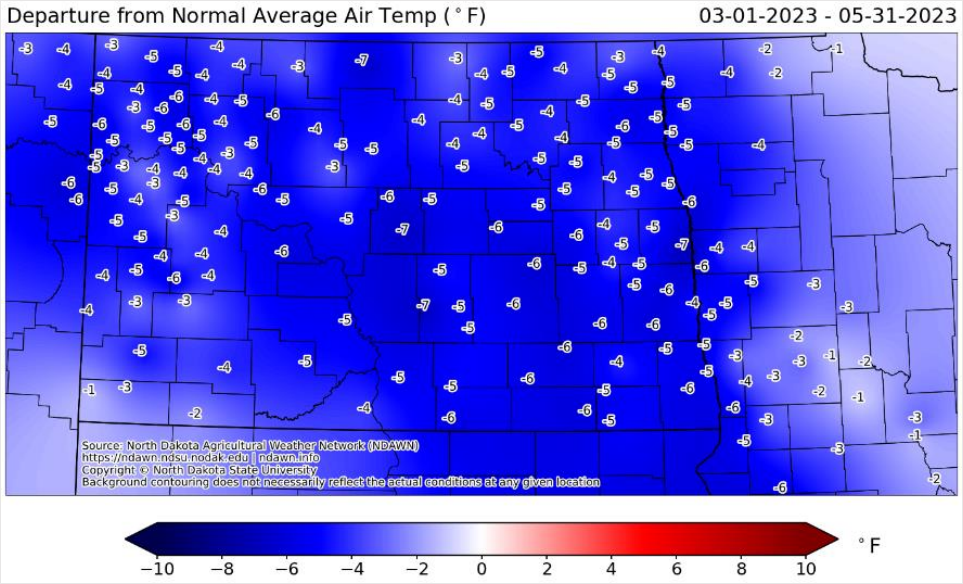

Figure 6: NDAWN Departure from normal temperatures for each station from 3/1/2023 - 5/31/2023

North Dakota Spring Temperature Summary

Spring 2023 March-May	**Average T**	**Avg max T**	**Avg min T**	**Maximum**	**Minimum**
	35.8°F	46.5°F	25.1°F	93°F	-23°F
Anomaly	-4.7°F	-5.4°F	-3.8°F		
Rank					
Warmest	115th Warmest	128th Warmest	115th Warmest		
Coolest	15th Coolest	2nd Coolest	15th Coolest		
Record					
Warmest	48.1°F (1977)	61.3°F (1977)	34.8°F (1977)	111°F (Langdon, May 30, 1934)	
Coolest	31.5°F (1899)	42.6°F (1950)	20.3°F (1899)		-48°F (Mohall, March 14, 1897)

Table 2: Spring 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

Heavy snowfall persisted statewide in March and April 2023. The first of these spring snowstorms occurred on March 5th, mainly impacting Southwest North Dakota, south of I-94. The Bismarck area received up to 9 inches, with locally isolated pockets of up to 12 inches. The following week, March 11-12, brought heavy snow and blizzard conditions to Northern and Central North Dakota. Heavy snowfall with winds over 35 mph significantly decreased visibility and made travel treacherous along the Highway 2 and I-29. The highest snow totals for this event were in Walsh County, with most of the area receiving 6-10 inches (NWS) (Figure 7).

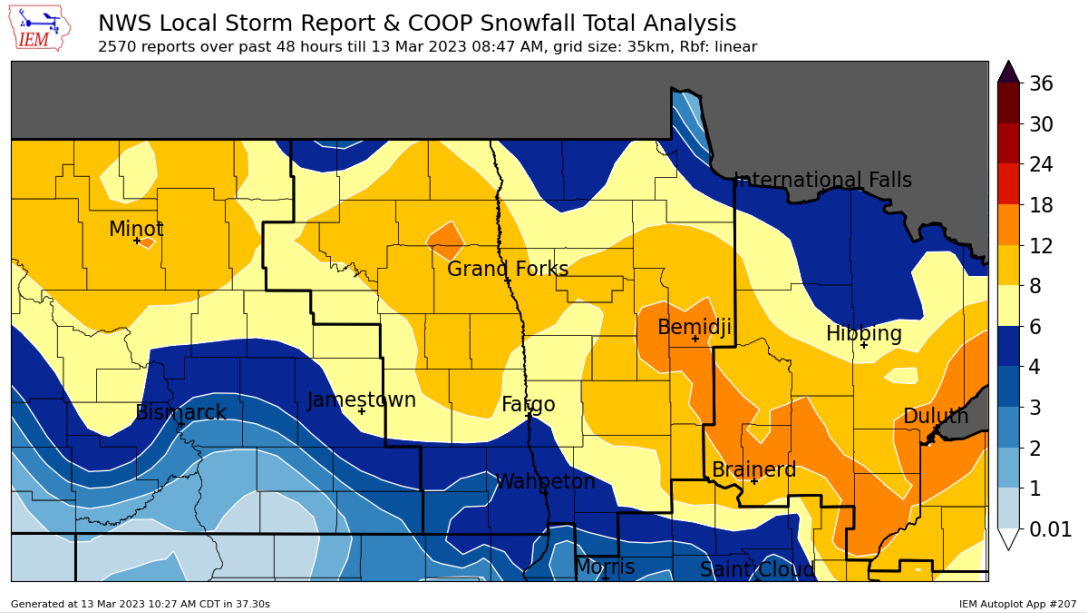

Figure 7: Map of snow totals for the March 11-12 2023 winter storm. Courtesy of Grand Forks NWS

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April 2023 brought some late season significant snow events. The first system came April 5-6 and was widespread over Southern North Dakota. Heavy snow in combination with strong winds, over 50 miles an hour in places, caused blizzard conditions and coated many major highways, including I-94 and I-29. In turn, a Blizzard Warning was issued for the Red River Valley, expanding into the Devil's Lake Basin. South Central North Dakota had up to 17 inches of snow, and much of Eastern North Dakota had over 12 inches (Figure 8) But that wasn't all for April. As soon as spring prospects had begun to set in, another warned winter storm brought 6-12 inches of snow to Northeast North Dakota on April 20-21.

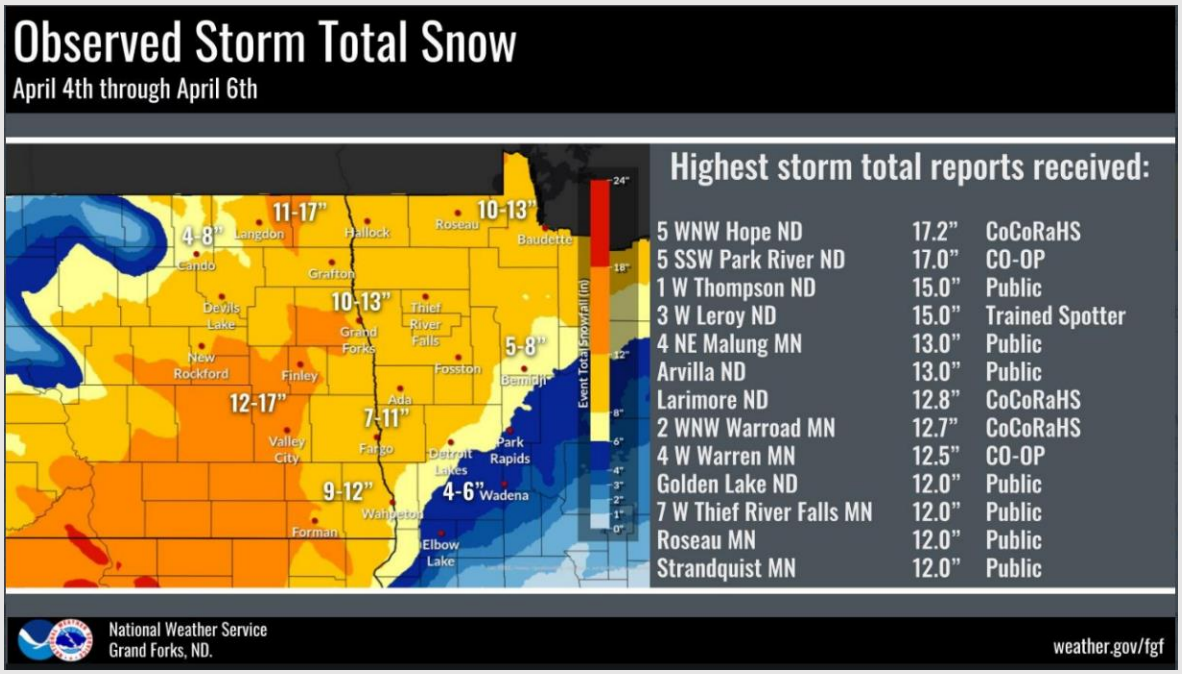

Figure 8: Map of snow totals for the April 4-6 2023 Blizzard. Courtesy of Grand Forks NWS

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Figure 9: Snow covered roads near Richardton on March 5 2023. Picture courtesy of NWS Bismarck

Figure 10: Road conditions after the April 4-6 Blizzard. ND Highway 46 near Gackle (left) and I-94 West bound between Valley City and Jamestown (Right) Pictures courtesy of Grand Forks NWS and NDDOT

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May 2023 was mild with few storm reports and, thankfully, no snow. In total, the SPC reported 3 severe wind events and 20 severe hail events in North Dakota. Moreover, the greater weather threat was persistent wildfire smoke from the Canadian Rockies in Alberta. Due to this, North Dakota measured its worst air quality on record, 1,041 µg/m^3 in Oliver County on May 17th, 2023. Smokey conditions came with poor visibility and health hazards, as AQI was often above 300 µg/m^3, considered hazardous for humans throughout the month of May.

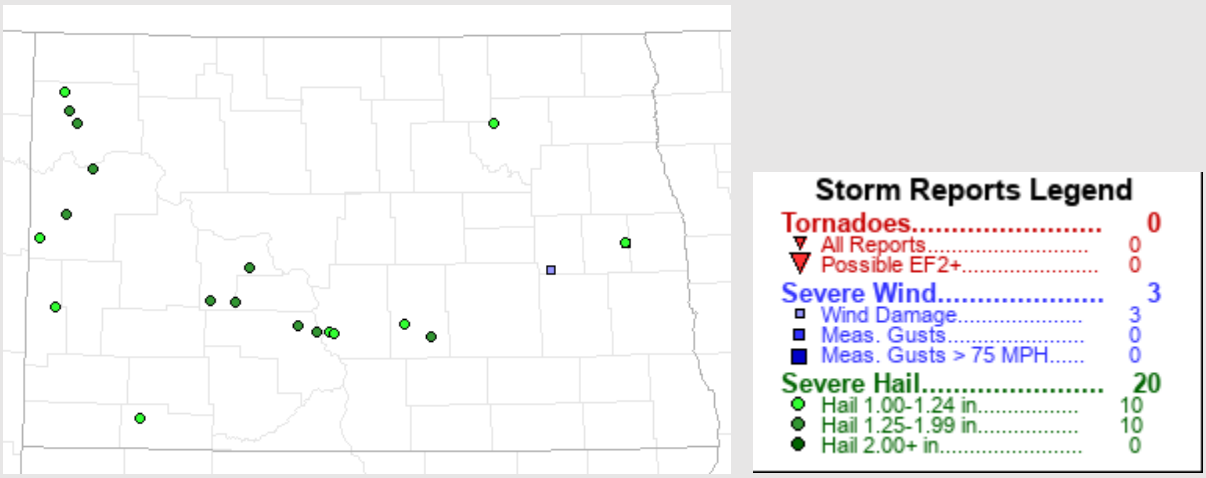

Figure 11: May 2023 Preliminary storm reports from the National Weather Service.

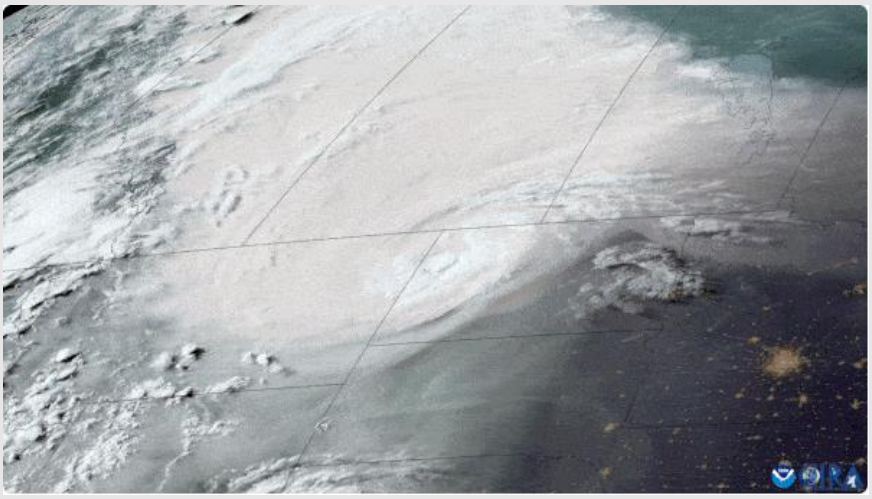

Figure 12: GOES Satellite imagery capturing Canadian wildfire smoke infiltrating the States on May 20, 2023

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Weather Highlights

Artemis looks at a snowdrift on March 19, 2023 resulting from 80+ inches of snow for the 2022-2023 season. (Left) Bare field seen outside of Grand Forks on May 12 2023, the final melt after a late season snow storm (Right) Photo Credits: Trece Hopp

Smoke from Canadian wildfires reduced visibility and created hazy skies on May 16, 2023 for many parts of North Dakota (Left) Two ducks enjoy the mild weather on May 27, 2023 (Right) Photo Credits: Cassidy Holth

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Image/Data Sources

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

NDAWN Weather

SPC Storm Reports

NCEI Storm Events Database

NWS Grand Forks and Bismarck

GOES Satellite

XMACIS2

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