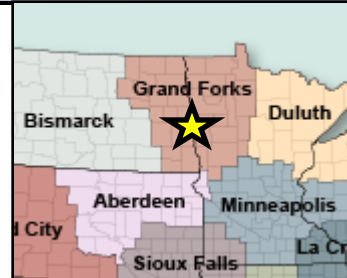


National Weather Service Grand Forks



Weather & Climate Review

January-February 2023



January

	AveT	TDept	THigh	TLow	Pcpn	PDept	Snow	AveW	WDept	Av>15	Av>20	PWnd	HDD	CDD	Tstms	DFog	Clear	PCldy	MClDy
DVL	8.6	1.8	35	-23	M	M	M	8.5	M	1	0	46	1740	0	0	7	13	7	11
NWS GF	10.0	2.9	34	-22	0.20	-0.32	3.9	M	M	M	M	M	1699	0	M	M	M	M	M
GFK	9.3	3.0	36	-25	0.12	-0.37	0.9	9.8	-1.3	3	0	54	1716	0	0	4	5	12	14
RDR	9.1	2.8	36	-22	M	M	M	7.9	M	1	0	45	1722	0	0	5	7	11	13
FAR	10.7	1.5	35	-22	0.23	-0.48	2.7	9.8	-1.3	3	0	49	1674	0	0	8	9	10	12
BDE	13.9	8.4	36	-24	M	M	M	6.3	-1.3	1	0	37	1573	0	0	4	7	8	16
PKD	11.9	4.3	34	-28	M	M	M	7.2	-1.4	1	0	38	1639	0	0	9	8	14	9
BJI	12.8	6.5	37	-23	M	M	M	5.9	M	1	0	32	1613	0	0	6	7	13	11
TVF	11.0	5.0	31	-24	M	M	M	8.8	M	1	1	37	1669	0	0	7	9	9	13
Y63	12.6	3.6	37	-24	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
AGA	9.4	3.1	31	-25	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M

Table 1 January 2023 Temperature and Precipitation Statistics

In Table 1, **DVL** = Devils Lake, **NWS GF** = NWS Grand Forks, **GFK** = GF Airport, **RDR** = GF Air Force Base, **FAR** = Fargo, **BDE** = Baudette, **PKD** = Park Rapids, **BJI** = Bemidji, **TVF** = Thief River Falls, **Y63** = Elbow Lake, **AGA** = Agassiz MN NWR. **AveT** = monthly average temperature, **TDept** = monthly departure from normal, **THigh** = highest temperature of the month, **TLow** = lowest temperature of the month, **Pcpn** = monthly precipitation, **PDept** = departure from normal precipitation, **Snow** = monthly snowfall, **AveW** = average monthly wind speed (mph), **WDept** = departure from average wind (1998-2022), **Av>15** = number of days with an average wind speed greater than 15 mph, **Av>20** = number of days with an average wind speeds greater than 20 mph, **PWnd** = peak wind speed in mph, **HDD** = monthly total Heating Degree Days, **CDD** = monthly total Cooling Degree Days, **Tstms** = number of days with thunder, **DFog** = number of days with visibility <=1/4 mile in fog, **Clear** = number of days with sky cover 0-3 tenths, **PCldy** = number of days with sky cover 4-7 tenths, **MClDy** = number of days with sky cover 8-10 tenths.

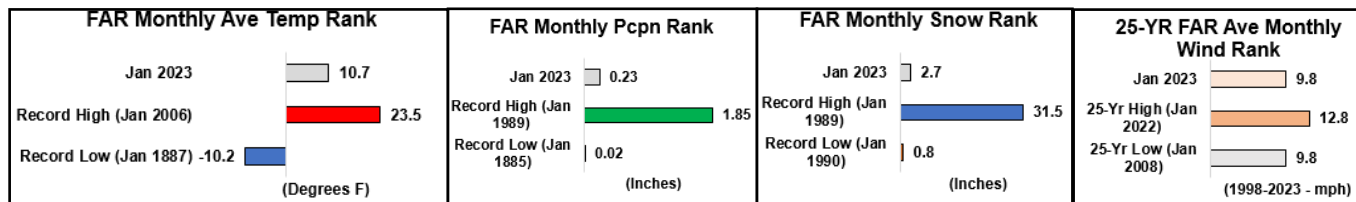


Figure 1 January 2023 Fargo Temperature, Precipitation, & Wind Statistics Compared to Records

Per Table 1, the January average temperature was above normal at all sites, but well above normal (>5 degrees above normal TDept) at Bemidji and Baudette. Precipitation amounts were below normal at the three winter sites. The monthly average wind speed was below normal at the four ASOS sites with available 25-year averages (most ASOS's were commissioned around 1998, so this data is a consistent computerized-era set, that followed manual human observations).

Figure 1 compares the January 2023 average temperature (AveT), precipitation (Pcpn), snowfall (Snow), and monthly average wind speed (AveW) at Fargo to the established records (AveW only goes back to 1998). As an interesting note, Fargo's 9.8 mph January 2023 average ties the 25-year low, set in 2008. The highest 25-year January monthly average wind speed was set last year (2022), during the 11 blizzard winter. This January has featured a lot of days with lighter winds, clear skies (at times), and mild temperatures, which has set the stage for a lot of foggy days. DFog in Table 1 shows that most sites had dense fog 4 to 9 times in January.

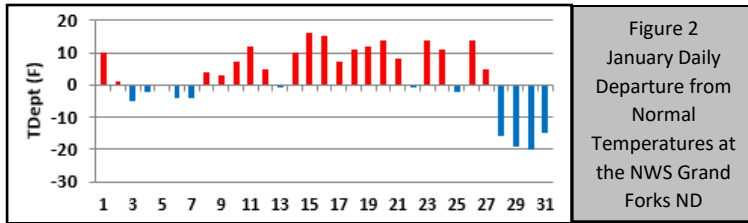


Figure 2
January Daily
Departure from
Normal
Temperatures at
the NWS Grand
Forks ND

Blue Bars = Colder than Normal Days & Red Bars = Warmer than Normal Days

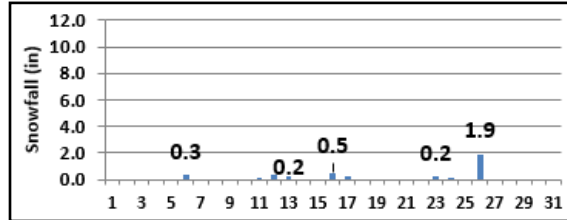


Figure 3
January Daily
Snowfall Totals
NWS Grand Forks
ND

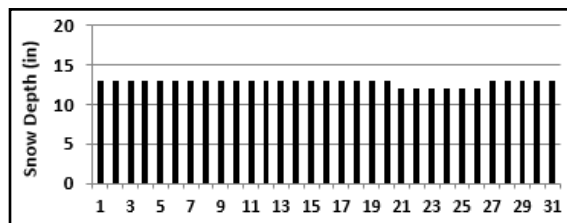


Figure 4
January Daily
Snow Depth
NWS Grand Forks
ND

Figure 2 plots the daily departure from normal temperatures in January 2023 at the NWS Grand Forks. Prior to the cold stretch from January 28th to 31st, most of the month was mild. Figure 3 shows the January daily snowfall totals at NWS Grand Forks. The highest total occurred on the 26th, with 1.9 inches of snow. Figure 4 shows the January daily snow depth at the NWS Grand Forks (which is measured at 6 am). There was not much change in the snow depth over the month.

Figures 5 and 6 below are new graphs. Figure 5 plots the daily cloud cover at the Grand Forks Airport along with the daily solar radiation at the Agassiz NWR (only January is shown so far). With the days getting longer, the amount of solar radiation is slowly increasing. Figure 6 plots the Fargo highs and lows against the normals and records. This is a different way to look the monthly temperature trends.

Records

At Fargo-Moorhead, no records were set.

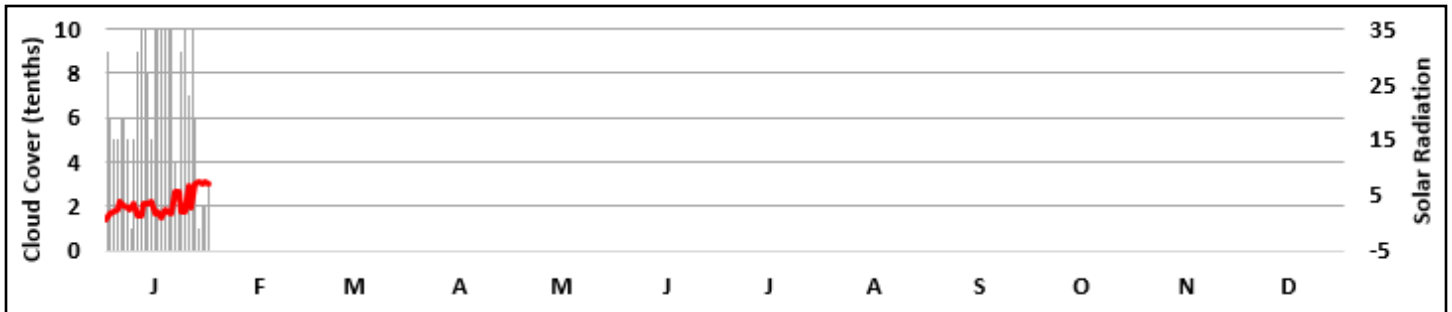


Figure 5 January 2023 - Grand Forks Airport cloud cover (tenths, in black) and Agassiz NWR solar radiation (MJ/M², in red)

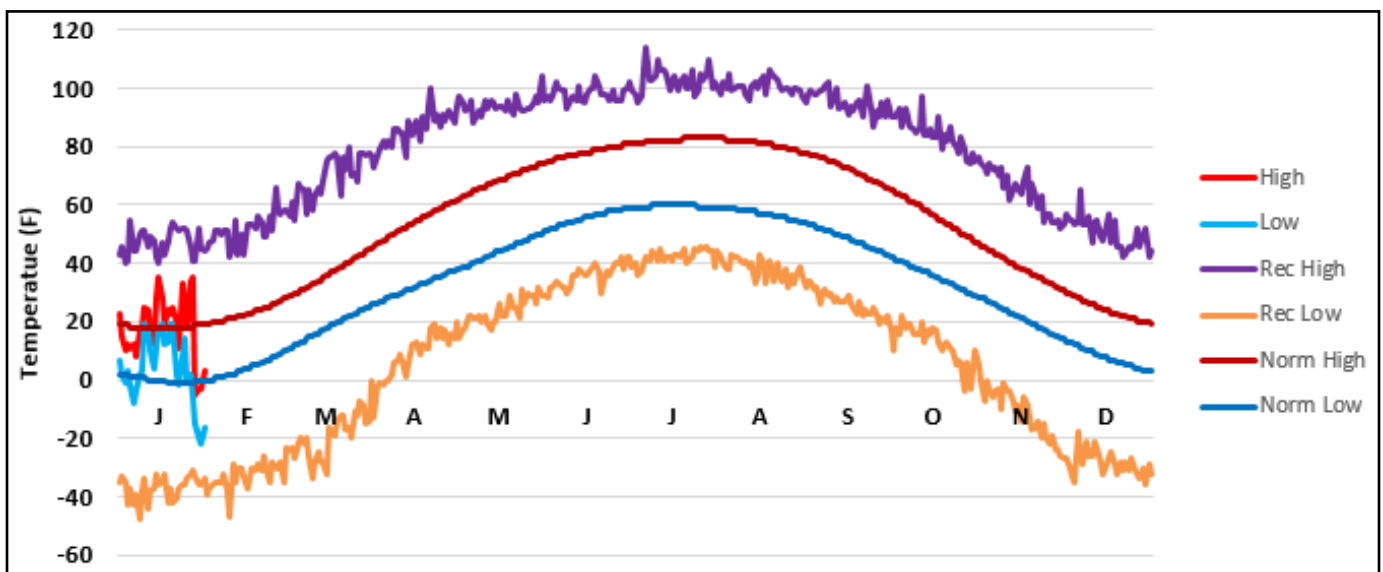


Figure 6 Fargo Airport January 2023 highs and lows compared to normal and records

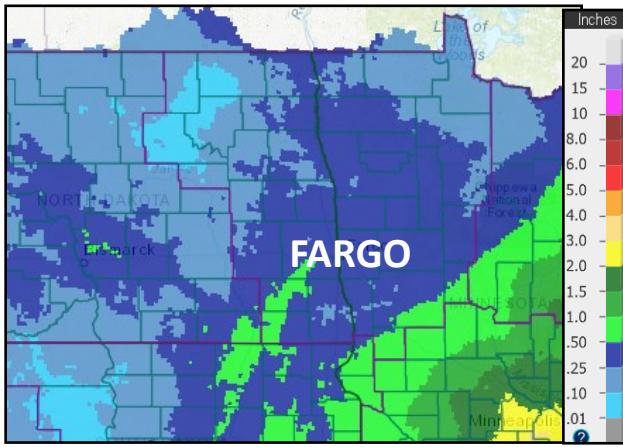


Figure 7 January Observed Precipitation

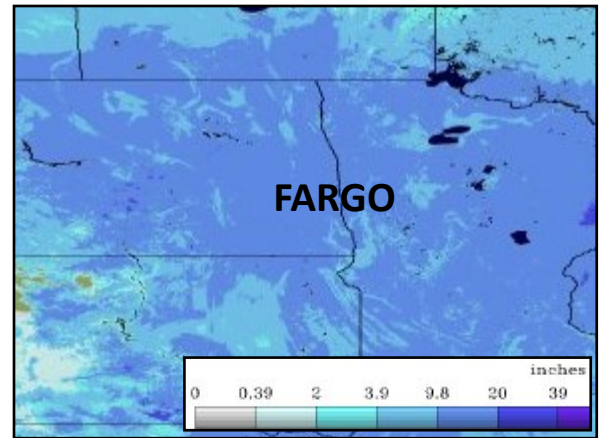


Figure 8 January 31st Snow Depth

Figure 7 gives a January precipitation estimate for all of eastern North Dakota and the northwest quarter of Minnesota. The heaviest amounts fell over portions of southeast North Dakota and portions of west central Minnesota, about 0.50 to 1.00 inches (the light green color). Figure 8 shows the snow depth across the region on January 31st. Most of the area had 10 to 20 inches of depth.

Temperature

Figure 9 CPC Temp Outlook

Precipitation

Figure 11 CPC Pcpn Outlook

Figure 10 Obs Temp Dept

Figure 12 Obs Pcpn Dept

The January temperature (Figure 9) and precipitation (Figure 11) outlooks issued by the Climate Prediction Center (CPC) in late December are shown above. Compare these with the observed January departures from normal temperatures (Figure 10) and precipitation (Figure 12).

Longer Term Trends

Looking at just the Fargo climate site (FAR), Figures 13 and 14 show how January 2023 fits into the previous 5 months. Figure 13 plots the monthly departures from normal temperatures at Fargo. The blue bars represent months that were colder than normal, while the red bars represent months that were warmer than normal. Figure 14 plots the monthly departures from normal precipitation at Fargo. The green bars represent months that were wetter than normal, while the brown bars represent months that were drier than normal.

Both November and December had below normal monthly average temperatures (Figure 13), but January was slightly above normal. December 2022 was the only month with an above normal monthly precipitation total (Figure 14).

Figure 15 tracks how much precipitation has fallen since January 1, 2023, and how it compares to normal and last year. Snowfall is also tracked for the snow season, which began on July 1, 2022.

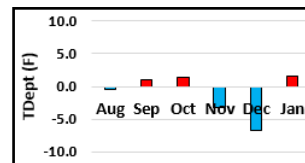


Figure 13 Monthly Departures from Normal Temps at Fargo, ND

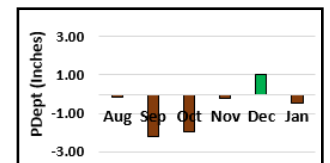


Figure 14 Monthly Departures from Normal Pcpn at Fargo, ND

	Observed Value	Normal	Departure from Normal	Last Year
Pcpn Since Jan 1	0.23	0.71	-0.48	0.63
Snow Since Jul 1	30.8	30.0	0.8	39.2

Figure 15 Yearly Precipitation & Seasonal Snowfall Trends at Fargo

U. S. Drought Monitor

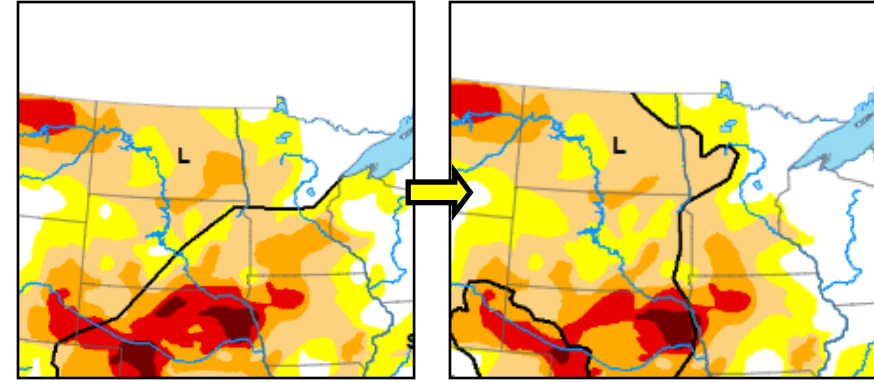
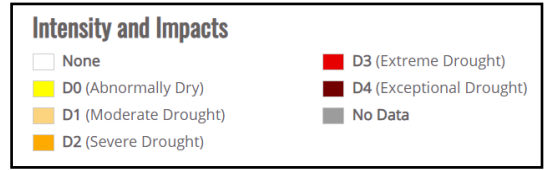


Figure 16 U. S. Drought Monitor, December 29

Figure 17 U. S. Drought Monitor, January 26

Not much changed over eastern ND and the northwest quarter of MN from December into January (Figures 16 & 17). The key for both figures is shown below.



Soil Moisture

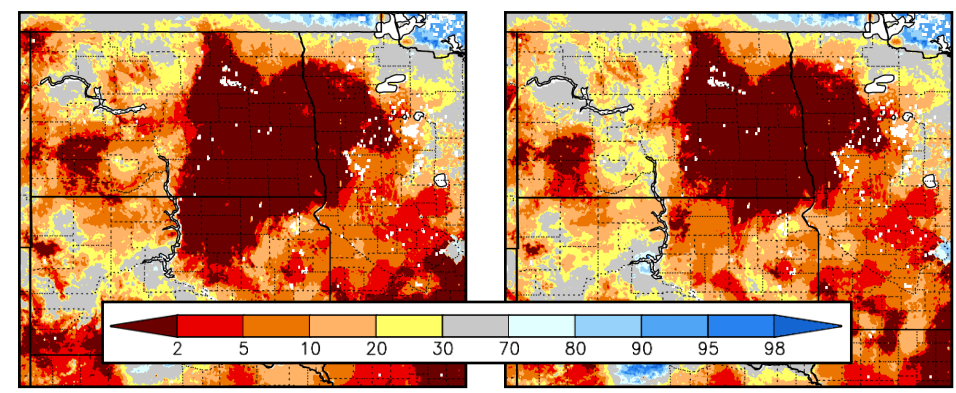


Figure 18 NASA 0-100cm Soil Moisture December 31

Figure 19 NASA 0-100cm Soil Moisture January 31

NASA SPORT: 0-100 cm soil moisture percentile data has been shown to be useful for drought monitoring. The 0-10cm layer responds quickly to heavy precipitation and rapid drying events. The 0-100cm layer evolves much slower and shows a greater utility for drought monitoring.

Figures 18 and 19 are new graphics as well. These will hopefully show more utility during the warmer months. There will not show much change over the winter.

Rivers

Gage heights on the Red River at Fargo and Grand Forks are shown (below) for the past 6 months. Both rivers are frozen during the winter months, and are only included for reference.

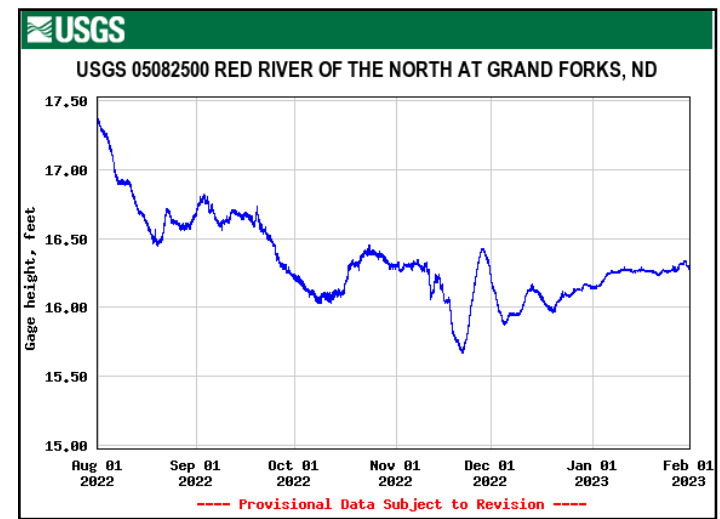


Figure 20 Red River Level at Fargo ND

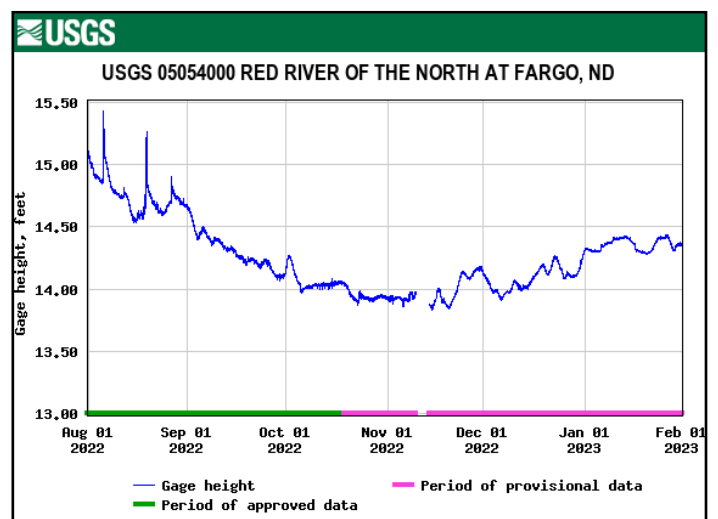


Figure 21 Red River Level at Grand Forks ND

Winter Warnings

January 2023 remained very busy, but for different reasons. For most of the month, the combination of mild temperatures, lower wind speeds, and clear skies (at times), led to many days with fog. Dense Fog Advisories were issued on multiple days.

One Blizzard Warning (Figure 22) was issued on January 27th and one Wind Chill Warning (Figure 23) was issued from January 28th through 30th (although only the northern half of the area was in the warning the entire time). Peak wind speeds during the Blizzard Warning are also included. Although there were half mile visibilities along the eastern edge of the Red River Valley from Stephen to Crookston, widespread quarter mile visibilities were not reported. Wind speeds ended up being just a bit lower than anticipated and no falling snow occurred with the strong winds. If falling snow had occurred with the winds, conditions would have been worse.

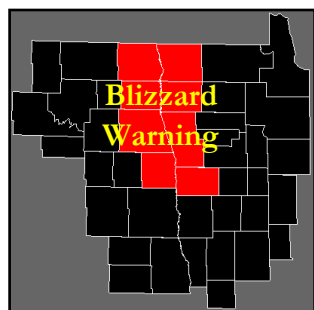


Figure 22 January 27
Blizzard area



Peak Winds

Grand Forks Airport 54 mph
East Grand Forks 51 mph
Halstad 50 mph
Grafton 46 mph
Cavalier 45 mph

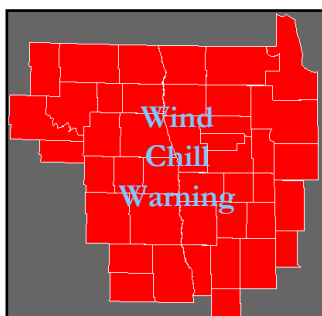


Figure 23
January 28-30
Wind Chill Warning area
(-40F to -55F wind chills)

February

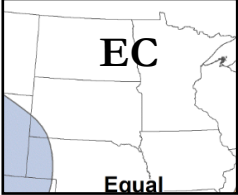


Figure 24 Temperature

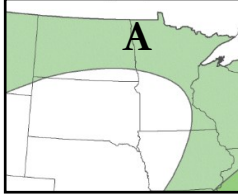


Figure 25 Precipitation

The latest Climate Prediction Center (CPC) temperature (Figure 24) and precipitation (Figure 25) outlooks for February 2023 are shown to the left. For eastern North Dakota and the northwest quarter of Minnesota, the CPC is forecasting equal chances for above, normal, or below normal temperatures and higher probabilities for above normal precipitation.

Sunrise/Sunset

Fargo, ND Feb 1 Sunrise: 7:53 am Sunset: 5:29 pm
 Feb 28 Sunrise: 7:10 am Sunset: 6:10 pm



Last Year & Normals

Per Table 2, in February 2022, the monthly average temperature (TDept) was well below normal at all sites. Precipitation amounts were above normal at NWS Grand Forks and slightly below normal at Fargo (the 2 primary winter measuring sites).

	AveT	TDept	THigh	TLow	Pcpn	PDept	Snow	PWnd
DVL	4.0	-6.6	40	-28	M	M	M	M
NWS GF	3.4	-8.8	39	-25	0.97	0.41	15.5	M
GFK	1.1	-9.5	38	-31	0.88	0.37	12.9	60
RDR	3.9	-6.7	41	-29	M	M	M	52
FAR	6.0	-7.4	39	-27	0.52	-0.17	7.0	64
BDE	0.3	-9.4	40	-34	M	M	M	48
PKD	1.9	-10.4	38	-37	M	M	M	57
BJI	1.2	-9.4	37	-37	M	M	M	44
TVF	1.8	-8.2	38	-29	M	M	M	54
Y63	6.2	-6.5	38	-25	M	M	M	M
AGA	-1.7	-13.0	37	-41	M	M	M	M

Table 2 February 2022 Temperature and Precipitation Statistics

Figure 26 shows normal highs and lows on February 1st for selected cities across eastern North Dakota and northwest Minnesota. Figure 27 shows how normal highs and lows change by February 28th. As an example, at NWS Grand Forks on February 1st, the normal high is 17 and the normal low is -1. By February 28th at NWS Grand Forks, the normal high is 26 and the normal is 9. Figure 28 shows the normal precipitation and snowfall amounts (if available) at the same sites as Figures 26 and 27. As an example, the normal precipitation at NWS Grand Forks in February is 0.56 inches and the normal snowfall is 8.0 inches.

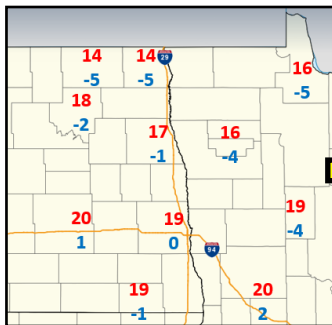


Figure 26 Normal Temps Feb 1

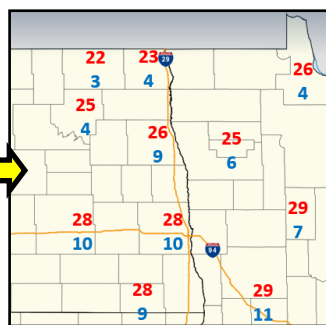


Figure 27 Normal Temps Feb 28

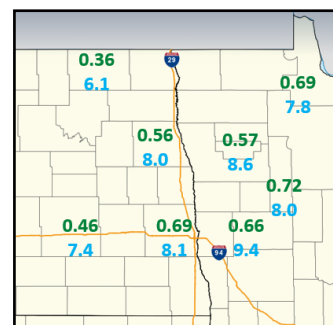


Figure 28 Normal Feb Pcpn/Snow

Winter Warnings

February 2022 was another very active weather month. 1 Winter Storm Warning, 6 Blizzard Warnings, and 4 Wind Chill Warnings were issued. The graphics below show the various warnings issued, with either the corresponding snowfall amounts or peak wind speeds for each event.

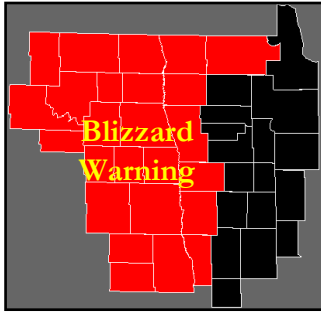


Figure 29 February 1
Blizzard area (6th overall)



Peak Winds

5S Devils Lake 70 mph
Leeds 65 mph
8N McHenry 63 mph
Cooperstown 63 mph
Valley City 62 mph

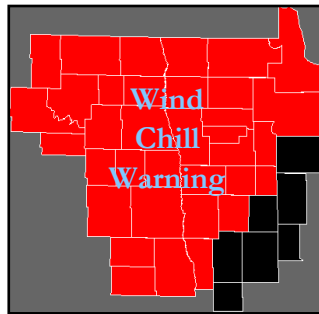


Figure 30
February 2-3
Wind Chill Warning area
(-40F to -60F wind chills)

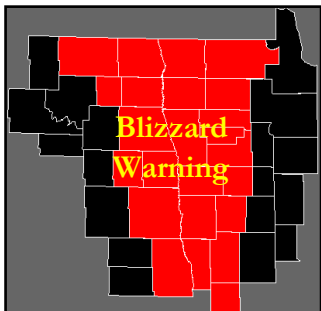


Figure 31 February 10-11
Blizzard area (7th overall)



Peak Winds

Fargo 60 mph
Grafton 58 mph
Grand Forks 58 mph
Bowesmont ND 56 mph
Fergus Falls 56 mph

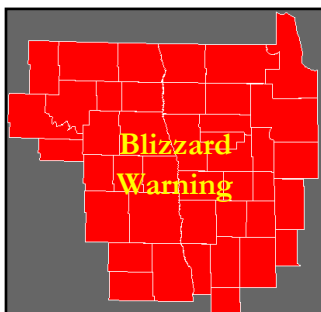


Figure 32 February 18
Blizzard area (8th overall)



Peak Winds

6SE East Grand Forks 65 mph
Fargo 64 mph
5S Devils Lake 63 mph
Grand Forks 60 mph
8N Brantford ND 59 mph

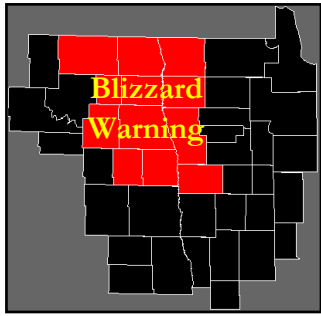


Figure 33 February 20
Blizzard area (9th overall)



Peak Winds

- Grand Forks 53 mph
- 6SE East Grand Forks 51 mph
- Grand Forks AFB 48 mph
- 4ENE Hendrum MN 48 mph
- 6SW Warren MN 45 mph

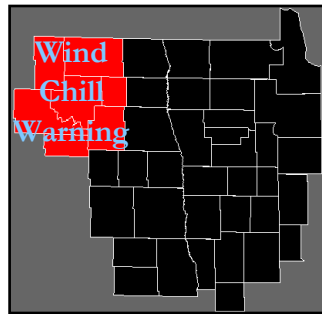


Figure 34
February 20-22
Wind Chill Warning area
(-40F to -60F wind chills)

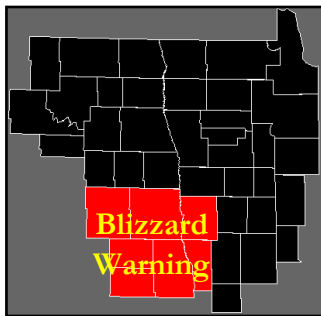


Figure 35 February 21
Blizzard area (10th overall)



Peak Winds

- Fargo 46 mph
- Gwinner 43 mph
- 18E Lisbon 41 mph
- Wahpeton 40 mph
- Buffalo, ND 40 mph

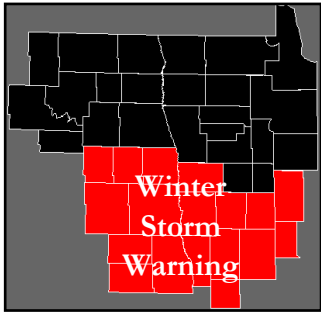


Figure 36 February 21-22
Winter Storm area

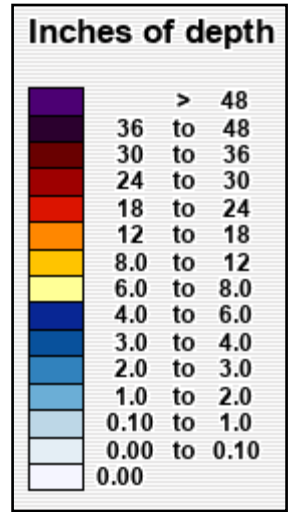
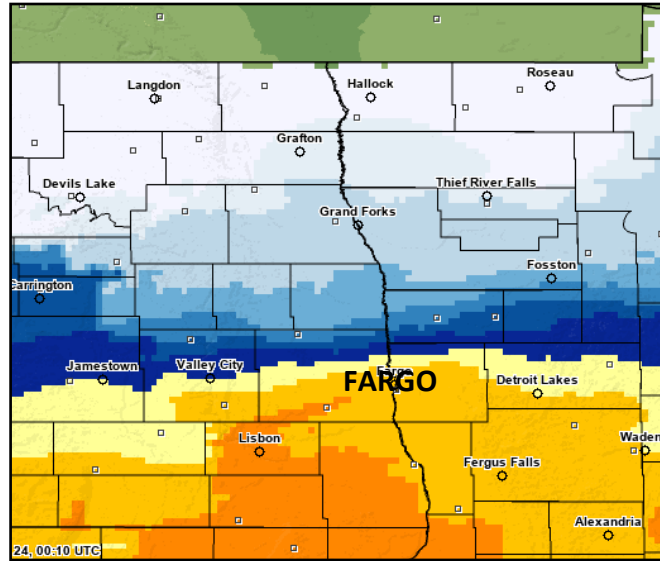


Figure 37 Observed Snowfall February 21-22
(not exact for all areas)

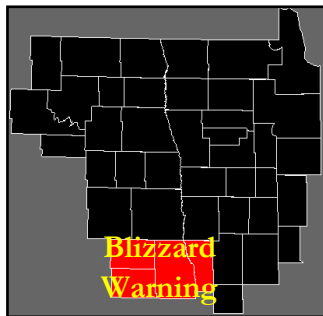


Figure 38 February 22
Blizzard area (11th overall)



Peak Winds

Fargo 45 mph

Wahpeton 43 mph

2W Tenney MN 43 mph

3SE Campbell MN 41 mph

Gwinner 40 mph

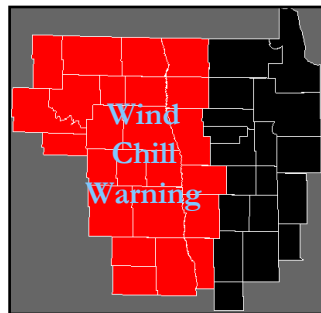


Figure 39
February 22-23
Wind Chill Warning area
(-40F to -60F wind chills)

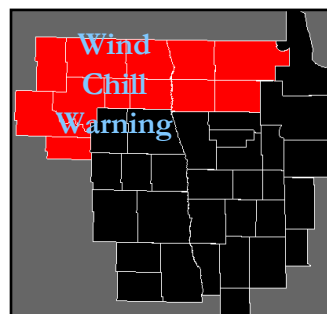


Figure 40
February 23-24
Wind Chill Warning area
(-40F to -60F wind chills)