National Weather Service Grand Forks



Weather & Climate Review

May-June 2023



May

	AveT	TDept	THigh	TLow	Pcpn	PDept	Snow	AveW	WDep	1 Av>15	Av>20	PWnd	HDD	CDD	Tstms	DFog	Clear	PCldy	MCldy
DVL	60.7	7.2	86	29	0.74	-1.73	м	11.0	M	4	0	38	181	55	0	2	21	8	2
NWS GF	62.5	7.5	89	31	1.22	-1.71	0.0	м	м	м	м	м	156	86	м	м	м	м	м
GFK	62.4	8.3	90	31	1.12	-1.68	0.0	11.1	-0.1	6	0	54	155	83	4	4	11	17	3
RDR	61.2	7.1	89	32	0.94	-1.86	м	9.7	м	3	0	39	170	61	3	1	18	10	3
FAR	65.1	8.5	93	33	2.57	-0.52	0.0	11.0	-1.0	7	0	44	119	128	6	0	21	6	4
BDE	61.4	9.3	86	34	2.13	-0.70	м	9.3	0.6	2	0	37	151	46	6	1	20	7	4
PKD	59.6	5.4	88	29	2.63	-0.46	м	8.6	-1.0	1	0	44	196	37	7	0	20	7	4
BJI	58.1	5.9	86	26	1.73	-1.45	м	8.2	м	1	0	39	226	21	3	1	20	7	4
TVF	61.1	6.8	85	31	1.89	-0.96	м	11.6	м	6	0	38	173	58	2	2	21	5	5
Y63	63.8	7.9	92	32	м	м	м	м	м	м	м	м	м	м	м	м	м	м	м
AGA	59.5	3.8	85	29	2.30	-0.85	0.0	м	м	м	м	м	м	м	м	м	м	м	м

Table 1 May 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 May 2023 Fargo Temperature, Precipitation, Snow & Wind Statistics Compared to Records

Per Table 1, for most sites, the May average temperature was well above normal, while precipitation amounts were below normal. The monthly average wind speed was near or below average 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 May 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). A quick glance through these charts shows May 2023 to be near record warm, lower end on precipitation, and near average for wind.



Figure 2 plots the daily departure from normal temperatures in May 2023 at the NWS Grand Forks. Most notably, there were only 5 days of below normal temperatures. Most days averaged 10 to 15 degrees above normal. Figure 3 shows the May daily rainfall totals at NWS Grand Forks. The highest total occurred on the 7th, with 0.72 inches of rain.

Figure 4 plots the daily cloud cover at the Grand Forks airport along with the daily solar radiation at the Agassiz NWR (only January through May are shown so far). With a large number of sunny days in May (see the Clear column in Table 1 on page 1), the amount of solar radiation has been increasing. Figure 5 plots the Fargo highs and lows against the normals and records. After the extended cold period from February through April, temperatures in May were mostly above normal.

Records At Fargo-Moorhead, a daily record high of 93 degrees was set on May 23rd (it broke the old record of 92 degrees set in 1928). A record high minimum of 66 degrees was also set on May 23rd. The monthly average temperature of 65.1 becomes the second highest May average on record.





Figure 4 January to May 2023 - Grand Forks Airport cloud cover (tenths, in black) and Agassiz NWR solar radiation (MJ/M², in red)



Figure 6 May Observed Precipitation

Figure 7 May Percent of Normal Precipitation

Figure 6 gives a May precipitation estimate for all of eastern North Dakota and the northwest quarter of Minnesota. Slightly higher amounts of 2 to 4 inches (the yellow and tan colors) fell over portions of east central North Dakota and west central Minnesota. Figure 7 shows the May percent of normal precipitation. The lowest totals occurred along the Canadian border (the orange to red colors), which are about 10 to 25 percent of normal.



(Figure 11).

Term

Trends

Looking at just the Fargo climate site (FAR), Figures 12 and 13 show how May 2023 fits into the previous 5 months. Longer Figure 12 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 13 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.

February, March, and April were all colder than normal (Figure 12), but May flipped to the warmer side again. That is why it seems like there was no spring. For precipitation, other than December 2022, the other 5 months have been fairly close to normal (Figure 13).

Figure 14 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 12 Monthly Departures from Normal Temps at Fargo, ND

Figure 13 Monthly Departures from Normal Pcpn at Fargo, ND

	Observed Value	Normal	Departure from Normal	Last Year
Pcpn Since Jan 1	6.44	7.28	-0.84	10.29
Snow Since Jul 1	67.4	51.4	16.0	56.2

Figure 14 Yearly Precipitation & Seasonal Snowfall Trends at Fargo



SL

Figure 16 U. S. Drought Monitor, May 30

There was not much change to the U.S. Drought Monitor from late April through late May 2023 for eastern ND and the northwest quarter of MN (Figures 15 & 16). The key for both figures is shown below.

Intensity and Impacts None D3 (Extreme Drought) D0 (Abnormally Dry) D4 (Exceptional Drought) D1 (Moderate Drought) No Data D2 (Severe Drought)

Soil Moisture

Figure 15 U. S. Drought Monitor, April 27



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 0-100 cm layer evolves much slower and shows a greater utility for drought monitoring.

Figure 17 NASA 0-100cm Soil Moisture April 30 Figure 18 NASA 0-100cm Soil Moisture May 18

Figures 17 and 18 are new graphics as well. Quite a bit of data were missing for the second half of May. Figure 18 shows more soil moisture the 0-100cm soil layer over eastern North Dakota, as compared to the adjacent areas of Minnesota.

Rivers

Gage heights on the Red River at Fargo (Figure 19) and Grand Forks (Figure 20) are shown (below) for the past 6 months. Snowmelt and runoff began in early April. The crest at Fargo was just below 30 feet around April 22nd, while the crest at Grand Forks was just below 41 feet over a more prolonged period (April 22nd to April 26th). This is strictly preliminary data.



Figure 19 Red River Level at Fargo ND

Figure 20 Red River Level at Grand Forks ND

May Warnings

May 2023 featured four Red Flag Warnings for low relative humidity, winds, and dry fuels, on May 1st (Figure 21), May 2nd (Figure 22), May 27th (Figure 23), and May 28th (Figure 24). There was a fair amount of severe weather (see Figure 25), with May 30th being the most active day, when 16 Severe Thunderstorm Warnings were issued (Figure 26)..



Figure 21 May 1st Red Flag Area



Figure 23 May 27th Red Flag Area



Figure 22 May 2nd Red Flag Area



Figure 24 May 28th Red Flag Area

Winkle

24

25

20



Figure 26 Warning Polygons for May 30th



June





The latest Climate Prediction Center (CPC) temperature (Figure 27) and precipitation (Figure 28) outlooks for June 2023 are shown to the left. For eastern North Dakota and the northwest quarter of Minnesota, the CPC is forecasting higher probabilities for above normal temperatures and below normal precipitation.

Figure 28 Precipitation

Sunrise/Sunset

Fargo, ND

Jun 1 Sunrise: 5:37 am Jun 30 Sunrise: 5:36 am Sunset: 9:13 pm Sunset: 9:26 pm



Last Year & Normals

Per Table 2, in June 2022, the monthly average temperature was slightly above normal at most sites. Precipitation amounts were below normal at most sites.

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	AveT	TDept	THigh	TLow	Pcpn	PDept	Snow	PWnd
DVL	65.3	1.8	96	39	3.15	-0.61	0.0	45
NWS GF	67.3	1.9	100	39	2.50	-1.63	0.0	м
GFK	66.8	2.2	100	37	2.16	-1.61	0.0	56
RDR	65.9	1.3	99	38	2.20	-1.57	0.0	53
FAR	68.4	1.6	101	37	2.27	-2.02	0.0	65
BDE	63.2	0.9	95	38	1.72	-2.60	0.0	41
PKD	65.7	1.5	98	37	3.86	-0.22	0.0	61
BJI	62.8	0.4	96	33	2.53	-2.04	0.0	39
TVF	65.2	0.6	99	38	1.86	-2.63	0.0	51
Y63	69.0	2.7	99	41	м	м	м	м
AGA	61.7	-4.2	97	37	5.98	2.06	0.0	м

Table 2 June 2022 Temperature and Precipitation Statistics

Figure 29 shows normal highs and lows on June 1st for selected cities across eastern North Dakota and northwest Minnesota. Figure 30 shows how normal highs and lows change by June 30th. As an example, at NWS Grand Forks on June 1st, the normal high is 73 and the normal low is 48. By June 30th, the normal high rises to 79 and the normal low rises to 56. Figure 31 shows the normal precipitation amounts for a few selected sites. As an example, the normal precipitation at NWS Grand Forks in June is 3.77 inches.



Figure 29 Normal Temps June 1

Figure 30 Normal Temps June 30



Figure 31 Normal June Pcpn

June 2022 Warnings

June 19th brought an Excessive Heat Warning to the Red River Valley and a Heat Advisory on either side (Figure 32). The high temperatures for June 19th are shown in Figure 33. Finally, a few of the highest temperatures on June 19th are shown below both images.



Figure 32 June 19th Warning Area

Figure 33 June 19th Afternoon Highs

<u>Highest June 19th Temperatures</u> Wahpeton ND 6N 104F Warren MN 6SW 103F Prosper ND 5NW 103F East Grand Forks MN 103F Eldred MN 2W 102F



Figure 34 Number of June 2022 Warnings

No convective warnings were issued until June 12th (Figure 34), but clearly the busiest day was June 24th, when a total of 59 warnings were issued. Figure 35 shows the surface map on the afternoon of June 24th. The preliminary local storm reports for June 24th are shown in Figure 36. A 2-day rainfall map showing totals from 7 am on June 23rd to 7 am on June 25th is included in Figure 37. Finally, this localized heavy rainfall washed out a road north of U. S. Highway 2 in northwest Grand Forks County (Figure 38—courtesy ND DOT).



Figure 35 June 24th 4 PM Surface Map





Figure 37 7 am June 23-7 am June 25 Rainfall Amounts

Figure 36 June 24th Preliminary Storm Reports W= Wind Damage, T = Tornado, H = Hail



Figure 38 Washed out road 9N of US Highway 2 on ND32