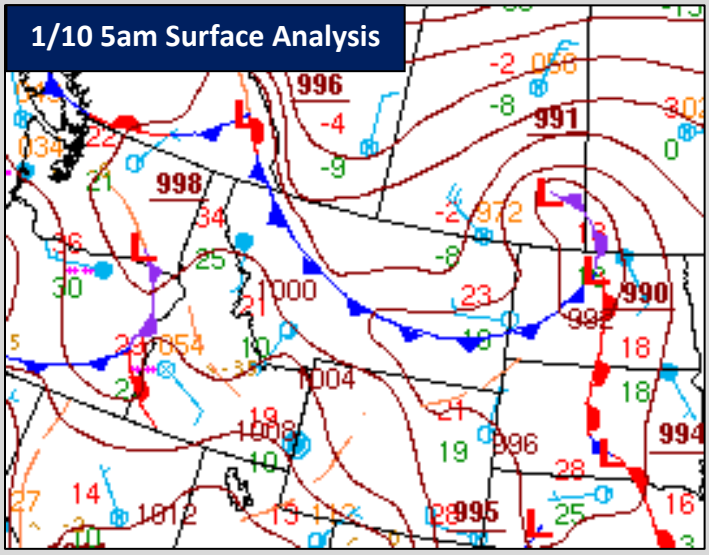
Bitter Cold

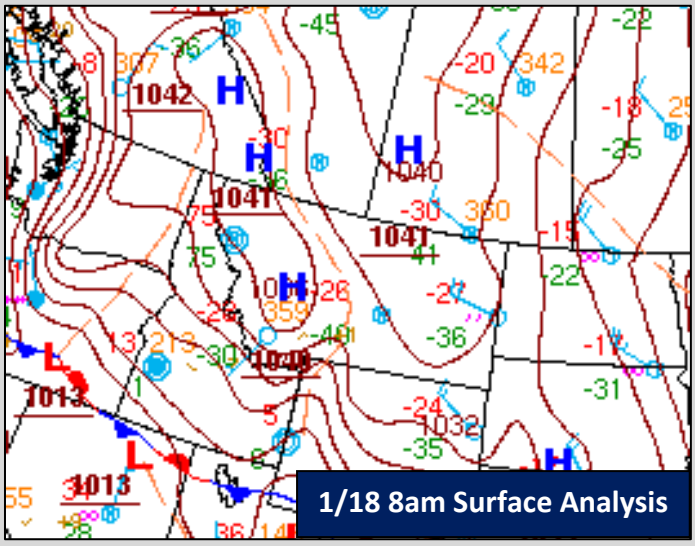
January 11-19, 2024

National Weather Service – Billings, MT

OVERVIEW: A bitterly cold air mass originating in the Canadian arctic settled over the region and brought an extended period of extreme cold from January 11th through the 19th. Temperatures were coldest in the beginning of the cold snap, from the 12th to the 15th, during which many locations reached the -30s and -40s over consecutive days. There were also several rounds of light snow, but overall snow cover was not significant. In fact, it is possible that a greater snow depth would've resulted in slightly colder temperatures, due to the moderating effects of bare ground (i.e., snow cover acts as an insulator). Based on historical records, it is safe to say that this was the coldest air mass our region has experienced since January 1997, and among the coldest over the last century. The all-time record of -38° at Billings was established in February 1936. The February 1936 cold snap was second to none and resulted in our coldest month on record.

METEOROLOGY: Weather conditions in November, December and early January were quite warm and dry. The initial Canadian cold front arrived on the morning of the 10th, and temperatures fell steadily over the next two days. The mean sea level pressure rose to near 1040mb by the morning of the 13th, a strength indicative of the cold air with which it was associated. The mornings of the 13th and 14th were the coldest for most of the region. Temperatures began to moderate by the 16th but remained well below normal through the 19th. In fact, surface pressures exceeded 1040mb on the 18th as the cold air was briefly reinforced by another cold front. Snowfall during this period was generally light, and resulted from Pacific moisture overrunning the cold air at times. This is how areas east of the mountains typically receive snowfall when arctic air is in place.





HOW COLD DID IT GET? Three factors made this an historic cold snap. First, the areal extent of the cold. This arctic air mass impacted not only our region, but all of Montana (including west of the divide) and eventually all the central plains of the U.S. Second, the magnitude of the cold, with many locations seeing their coldest temperatures since 1997, and some over an even longer time. Third, the duration of the cold. The bitterest of the cold air existed for 2-3 days, and some locations reported lows of at least 40 below on TWO consecutive days. It is much more typical to have a single "coldest" day then a warming trend. In addition, gusty northwest winds produced extreme/dangerous wind chills. Much of the region experienced wind chills in the 50s and 60s below zero! Below are summaries of the coldest observed temperatures and wind chills between January 12th and 15th. Thanks to our numerous cooperative observers for much of this information. Wind and wind chill data were taken from automated stations.

Coldest Observed Temps		Coldest Since…	Rank	Start of Period of Record
Huntley	-52°	Feb 1936	2nd coldest	1911
Hysham 25SSE	-47°	Dec 1989	2nd coldest	1951
Ryegate 18NNW	-44°		Coldest	1962
Roundup 15SW	-44°		Coldest	2004
Melville 4W	-42°	Dec 2022	4th coldest	1961
Brandenberg	-42°	Dec 1983	2nd coldest	1956
Ingomar 9E	-42°	Feb 2021	20th coldest	1955
Busby	-41°	Jan 1997	24th coldest	1907
Broadus	-38°	Dec 1990	9th coldest	1920
Columbus	-38°	Dec 1983	6th coldest	1930
Ekalaka	-38°	Dec 1989	9th coldest	1896
Forsyth	-36°	Feb 1996	8th coldest	1975
Hardin	-35°	Dec 2022	16th coldest	1948
Miles City	-34°	Dec 2013	12th coldest	1937
Baker	-33°	Feb 2021	2nd coldest	1998
Sheridan	-31°	Jan 1997	25th coldest	1907
Billings NWS	-31°		Coldest	1999
Livingston	-29°	Mar 2019	22nd coldest	1948
Billings Airport	-26°	Jan 1997	17th coldest	1934

Coldest Observed Wind Chills	
Albion 12NW	-69°
Ekalaka 7SE	-68°
Alzada	-66°
Baker	-65°
Judith Gap	-63°
Baker 13NE	-63°
Harlowton 4NNE	-62°
Big Timber	-59°
Hardin	-59°
Reed Point 9NE	-59°
Miles City	-58°
Livingston	-57°
Billings	-53°
Crow Agency	-53°
Forsyth	-52°
Columbus	-51°
Fishtail 3W	-51°

SNOWFALL: There were periods of snowfall throughout the cold snap, but none of it was heavy, and snow cover by the 19th remained no more than a few inches at most locations. Below is a summary of total snowfall reported from the 11th through the 19th. These are several of the higher reports we received.

TOTAL 9-DAY SNOWFALL (Jan 11-19)	
Big Timber	14.0”
Melville 4W	10.3”
Ryegate 18NNW	10.1”
Ekalaka	8.1”
Ingomar 9E	7.0”
Mystic Lake	6.3”
Busby	6.0”
Powderville 8NNE	6.0”
Red Lodge	5.5”
Big Horn	5.3”
Forsyth	5.2”
Springdale	5.0”
Yellowtail Dam	5.0”
Billings	4.9”
Livingston 12S	4.9”

View of Billings – courtesy of KULR8

EPILOGUE: As this summary was being written, much warmer & drier weather returned to our region. It is all but certain this will be the coldest air mass we see during the 2023-24 season. Furthermore, it is entirely possible (if not likely) that this cold snap will turn out to be the harshest of the entire 2020s decade. We’ll see! Thanks for reading.

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