Montana Weather/Precipitation Summary

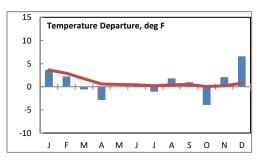
December 2020 NOAA's National Weather Service Great Falls Montana

Northwesterly flow aloft dominated during December (Fig. 1), resulting from a strong ridge of high pressure remained along the west coast. Flow is normally northwest, with a weaker ridge. This pattern produced much above normal temperatures for the month, with generally below normal precipitation. Winds averaged above normal.

December temperature anomalies ranged from 3.2°F above normal at West Yellowstone to 11.6°F above normal at Jordan. The map below shows the variation in departures. The warmest average temperatures were in central and south central Montana. The warmest average temperature of 35.4°F was at Big Timber (Sweet Grass), while the coolest was 13.5°F near West Yellowstone. The highest temperature was 70°F at Hardin on the 8th. The coldest temperature was -26°F near West Yellowstone on the 29th. This was the warmest extreme minimum in December since 2003. This range of 96°F is a bit below the December average range of 100°F. The statewide temperature average of 28.5°F was 8.5°F above normal and the 12th warmest of record. This was the warmest December since 1999. The red line on the graph shows the cumulative 12-month departure from normal, which was 1.0°F above normal. See the state summary and temperature tables below for more details.

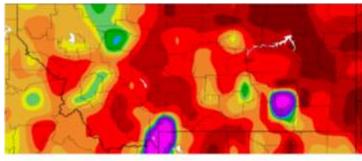
Temperature departure from normal

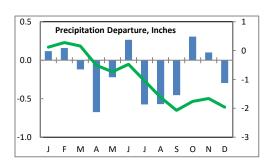




Precipitation was heaviest over mountain areas of northwest Montana. The highest amount (9.10-inches) fell over higher elevations in Lincoln County, with the highest amount at a lower elevation at Noxon (3.01-in) (Sanders). The month's statewide composite of 0.49" was 0.27" below normal. This ranks as the 28th driest December of record for Montana, and driest since 2002. As in the past three months, some areas were very dry and some ranked wetter. Bozeman airport recorded its driest December of record, Dillon, Glendive and Sidney had their second driest, Baker had its third driest, and Great Falls had its 6th driest December. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is now

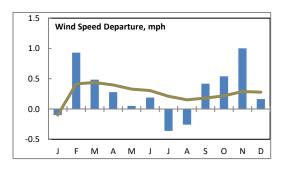
Precipitation percent of normal (gauge only)





1.62" below normal. Snowfall was below normal as well. The statewide average of 5.4-in is the 25th lowest for December and the lowest December average since 1997. See state summary and precipitation tables below for more details.

Wind speed averages were near to above normal. Even so, statewide, the month ranked as the 28th calmest December, with an average speed of 9.1-mph. This was the strongest December average since 2017. The strongest averages were along the Rocky Mountain Front and Livingston areas. The composite statewide average was 0.1-mph above normal. The brown line of the wind graph to the right shows the 12-month cumulative statewide wind departure from normal.



Refer to NCEI's State of the Climate report for the latest monthly discussion: http://www.ncdc.noaa.gov/sotc/

December was generally mild, with a couple of period with below normal temperatures. Very windy conditions accompanied the mild temperatures. On the 6th, with temperatures in the 50s in many areas, gusts reached 79-mph at Browning and 65-mph at Horse Thief RAWS (Musselshell). Temperatures peaked on the 8th when Hardin reached 70°F. This was the first 70°F in the state in December since 1995. Wind gusts reached 61-mph at Great Falls and 72-mph at Two Medicine. As mild conditions continued east of the divide, some freezing rain fell over northwest Montana on the 9th. Temperatures were falling into the -15°F range in the upper Madison Valley around West Yellowstone. Mild and windy conditions returned on the 16th. Wind gusts reached 62-mph at Browning on the 18th with more widespread stronger winds on the 19th and 20th. On the 19th, gusts reached 88-mph at Deep Creek RAWS, 81-mph west of Bynum, 79-mph southwest of Augusta, 76-mph at Big Timber, and 69-mph at Jordan. On the 20th, gusts were 96mph at Deep Creek RAWS, 81-mph at Judith Peak (Fergus), 78-mph in the Crazy Mtns, and 74mph at Livingston and near Augusta. After a one-day break, strong winds returned to western and southwest Montana. A cold front pushing through these areas produced gusts to 79-mph at Mount Sentinel (Missoula), 74-mph at Mt Aeneas (Flathead), 72-mph near Warren (Carbon) and 70-mph at Livingston and Hyalite Mountain (Gallatin). Snowfall up to one-foot fell over the northern slopes of the Little Belts on the 22nd. Snowfall of 6-8-inches fell over northwest Montana on the 22rd and 23rd. Warmer conditions brought another round of wind on the 24th, with gusts to 80-mph at Deep Creek RAWS, 69-mph at Two Medicine and 65-mph west of Bynum. The coldest temperatures of the month were felt on the 29th, when the West Yellowstone area dropped to -26°F. Generally mild conditions continued through the end of the month. Snow fell over western portions of the state on the 30th and 31st.

The highest daily temperatures in December occurred on three days at Gardiner, Jordan and Billings area. West Yellowstone had the state's lowest temperature on ten days.

Precipitation/convection

Severe convective weather occurred on zero days in December, which is normal.

December information:

| High Temperature | 70°F at Hardin (8 th) | Greatest Precip | 3.01" at Noxon |
|-------------------------|-----------------------------------|------------------------|---|
| nigii Telliperature | 70°F at Haruin (8°°) | Greatest Precip | 3.01 at Noxon |
| Low Temperature | -26°F West Yellowstone | | 8.40" at Stahl Peak SNOTEL |
| - | (29 th) | | (Lincoln) |
| Warmest Ave Temp | 35.4°F at Big Timber | Peak Wind Gust | 81 mph at 14W Bynum (19 th) |
| _ | (Sweet Grass) | | |
| Coolest Ave Temp | 13.5°F at West | | 96 mph at Deep Creek RAWS |
| _ | Yellowstone 1N | | (20 th) |
| Range of Temp | 32°F at West | Highest Ave | 28.0 mph at Deep Creek |
| departures | Yellowstone to | Wind | RAWS |
| | 11.6°F at Jordan | | 21.6 mph at Cut Bank |
| 21 city mean | 28.5/20.3F normal. | 20 city mean | 9.1 mph/9.0 mph; |
| monthly | 12th warmest of record | monthly wind | 28 th calmest of record (since |
| Temperature/Nrml | (since 1880). | speed/Nrml | 1936). |
| | 91st percentile. | _ | 34 th percentile. |
| 22 city mean | 0.49"/0.77" - 63% of | 20 city mean | 5.4"/11.2" - 25 th lowest of |
| monthly | normal. 28th driest of | monthly | record (since 1880). |
| precipitation/Nrml | record (since 1880). | snowfall/Nrml | 18 th percentile |
| | 63 rd percentile. | | |

Historical Rank of <u>Precipitation</u> (inches) for the Current Month and Water Year to Date

| for the current Honth and Water Tear to Date | | | | | | | | | |
|--|------|--------------|------|-------|-------------------|-----------|------|-------|-------|
| Location | Dec | % of Norm | Rank | Pcntl | Oct 1 – Dec 31 | % of norm | Rank | Pcntl | Years |
| Baker | 0.03 | 8% | 91 | 7 | 1.04 | 50% | 73 | 24 | 96 |
| Billings | 0.43 | 86% | 59 | 48 | 2.96 | 128% | 32 | 26 | 120 |
| Belgrade | 0.06 | 12% | 84 | 100 | 1.44 | 61% | 72 | 86 | 84 |
| Butte | 0.10 | 20% | 119 | 94 | 1.39 | 74% | 71 | 56 | 127 |
| Cut Bank | 0.25 | 125% | 56 | 49 | 2.84 | 284% | 6 | 4 | 114 |
| Dillon | 0.01 | 4% | 79 | 98 | 0.26 | 19% | 81 | 100 | 81 |
| Glasgow | 0.01 | 3% | 75 | 60 | 2.05 | 132% | 32 | 25 | 123 |
| Great Falls | 0.10 | 18% | 124 | 95 | 3.07 | 154% | 19 | 14 | 129 |
| Havre | 0.08 | 20% | 125 | 89 | 1.57 | 111% | 69 | 49 | 141 |
| Helena | 0.21 | 53% | 118 | 82 | 2.60 | 166% | 32 | 22 | 142 |
| Jordan | 0.09 | 31% | 88 | 90 | 0.87 | 55% | 79 | 81 | 97 |
| Kalispell | 1.21 | 78% | 70 | 55 | 5.69 | 142% | 18 | 13 | 127 |
| Lewistown | 0.38 | 58% | 91 | 73 | 2.05 | 82% | 91 | 73 | 125 |
| Livingston | 0.26 | 50% | 90 | 75 | 2.97 | 125% | 36 | 30 | 118 |
| Miles City | 0.02 | 7% | 136 | 94 | 1.15 | 72% | 104 | 72 | 144 |
| Missoula | 0.41 | 40% | 122 | 85 | 3.96 | 133% | 40 | 28 | 141 |
| Mullan Pass | 4.59 | 103% | 44 | 53 | 19.28 | 156% | 10 | 11 | 83 |
| Wolf Point | 0.01 | 3% | 48 | 61 | 0.71 | 47% | 62 | 79 | 78 |
| Glendive | 0.02 | 5% | 122 | 95 | 1.30 | 69% | 77 | 62 | 124 |
| Sidney | 0.01 | 2% | 80 | 99 | 0.86 | 40% | 71 | 88 | 81 |
| BZN MSU | 0.49 | 53% | 114 | 80 | 2.59 | 67% | 110 | 76 | 144 |
| W Yellowst | 2.06 | 80% | 54 | 50 | 6.48 | 105% | 37 | 33 | 110 |

Rankings and Percentiles are 1=wettest, higher numbers=drier.

For an automated version of this chart, updated daily, go to http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS

Historical Rank of <u>Average Temperature</u> (°F) for the Current Month and Water Year to Date

| | | | | | Oct 1 - | | | | |
|-------------|------|--------|------|-------|---------|--------|------|-------|-------|
| Location | Dec | Normal | Rank | Pcntl | Dec 31 | Normal | Rank | Pcntl | Years |
| Baker | 30.7 | 19.0 | 4 | 3 | 34.9 | 30.7 | 21 | 19 | 109 |
| Billings | 34.6 | 26.5 | 6 | 4 | 39.3 | 36.8 | 24 | 19 | 123 |
| Belgrade | 26.9 | 19.0 | 9 | 10 | 33.0 | 30.7 | 28 | 32 | 86 |
| Butte | 23.6 | 17.4 | 33 | 25 | 30.6 | 28.6 | 61 | 48 | 127 |
| Cut Bank | 29.8 | 22.2 | 12 | 10 | 33.9 | 31.8 | 27 | 23 | 112 |
| Dillon | 25.6 | 20.8 | 25 | 32 | 33.0 | 31.6 | 44 | 57 | 77 |
| Glasgow | 27.2 | 16.3 | 4 | 2 | 32.7 | 30.1 | 31 | 24 | 126 |
| Great Falls | 33.8 | 24.8 | 15 | 11 | 37.3 | 34.5 | 48 | 38 | 124 |
| Havre | 30.4 | 19.1 | 8 | 5 | 34.1 | 31.2 | 31 | 21 | 141 |
| Helena | 30.7 | 21.8 | 9 | 6 | 36.5 | 33.3 | 24 | 16 | 141 |
| Jordan | 30.4 | 18.8 | 4 | 3 | 35.0 | 31.0 | 26 | 25 | 102 |
| Kalispell | 28.4 | 22.7 | 15 | 12 | 34.1 | 32.2 | 30 | 24 | 122 |
| Lewistown | 30.7 | 23.3 | 14 | 11 | 35.3 | 33.0 | 36 | 29 | 121 |
| Livingston | 34.2 | 26.1 | 12 | 9 | 38.8 | 35.1 | 30 | 25 | 118 |
| Miles City | 30.1 | 20.3 | 11 | 7 | 36.0 | 32.9 | 37 | 26 | 139 |
| Missoula | 27.8 | 23.9 | 37 | 28 | 34.6 | 34.1 | 60 | 46 | 129 |
| Mullan Pass | 27.1 | 20.0 | 2 | 2 | 30.9 | 28.3 | 8 | 16 | 44 |
| Wolf Point | 26.2 | 15.0 | 3 | 3 | 31.3 | 28.8 | 25 | 32 | 76 |
| Glendive | 27.8 | 20.7 | 17 | 13 | 33.6 | 33.8 | 68 | 54 | 125 |
| Sidney | 28.2 | 19.2 | 6 | 6 | 32.9 | 32.6 | 32 | 33 | 98 |
| W Yellowst | 13.7 | 10.5 | 45 | 42 | 23.4 | 22.3 | 71 | 62 | 114 |

Rankings and Percentiles are 1=coldest, higher numbers=warmer.

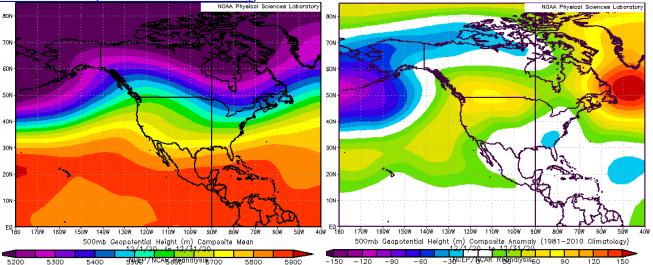
Historical Rank of <u>Average Wind Speed</u> (mph) for the Current Month and Water Year to Date

| | | | | | Oct 1 - | | | | |
|-------------|------|--------|------|-------|---------|--------|------|-------|-------|
| Location | Dec | Normal | Rank | Pcntl | Dec 31 | Normal | Rank | Pcntl | Years |
| Baker | 10.8 | 11.2 | | | 11.0 | 10.8 | | | 23 |
| Billings | 14.2 | 12.6 | 14 | 15 | 13.2 | 11.6 | 8 | 8 | 86 |
| Belgrade | 4.1 | 4.6 | 48 | 87 | 5.1 | 4.9 | 25 | 44 | 55 |
| Butte | 4.1 | 5.2 | 46 | 80 | 4.9 | 5.7 | 40 | 70 | 57 |
| Cut Bank | 14.6 | 14.4 | 42 | 53 | 15.4 | 14.0 | 12 | 14 | 78 |
| Dillon | 9.4 | 9.2 | 37 | 55 | 10.2 | 9.1 | 14 | 20 | 67 |
| Glasgow | 8.0 | 9.3 | 34 | 43 | 9.4 | 9.7 | 47 | 61 | 76 |
| Great Falls | 14.8 | 14.6 | 39 | 46 | 14.7 | 13.7 | 28 | 33 | 83 |
| Havre | 11.0 | 9.5 | 30 | 22 | 11.5 | 9.2 | 6 | 4 | 132 |
| Helena | 5.1 | 5.7 | 118 | 84 | 6.2 | 6.2 | 105 | 74 | 141 |
| Jordan | 7.7 | 7.2 | 12 | 31 | 8.3 | 7.4 | 4 | 8 | 37 |
| Kalispell | 3.0 | 4.1 | 78 | 64 | 4.6 | 4.5 | 114 | 93 | 122 |
| Lewistown | 10.2 | 10.3 | 46 | 58 | 10.7 | 9.9 | 24 | 30 | 78 |
| Livingston | 21.4 | 19.8 | 16 | 27 | 19.6 | 18.0 | 11 | 18 | 56 |
| Miles City | 9.5 | 9.6 | 41 | 31 | 9.7 | 9.8 | 40 | 30 | 130 |
| Missoula | 2.5 | 4.3 | 83 | 96 | 3.7 | 4.6 | 73 | 85 | 86 |
| Mullan Pass | 6.0 | 5.6 | 14 | 43 | 5.8 | 5.9 | 19 | 62 | 30 |
| Wolf Point | 6.9 | 7.1 | | | 7.3 | 7.4 | | | 23 |
| Glendive | 9.9 | 10.1 | 15 | 52 | 9.9 | 10.1 | 18 | 62 | 29 |
| Sidney | 8.6 | 9.0 | 20 | 61 | 9.07 | 9.0 | 14 | 42 | 33 |
| W Yellowst | М | | | | М | | | | |

Rankings and Percentiles are 1=windiest, higher numbers=calmer.

Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (left) and climatology for the month (right) (from

NOAA/ESRL Physical Sciences Laboratory).



For the latest information on mountain snowpack from the NRCS, go to: https://www.wcc.nrcs.usda.gov/gis/snow.html

For the latest U.S. Drought Monitor, issued weekly by the National Drought Mitigation Center, USDA and NOAA, go to: http://droughtmonitor.unl.edu/

These data are preliminary and have not undergone final QC by NCEI. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Centers for Environmental Information (NCEI) http://www.ncei.noaa.gov. Many more links are on the Drought Information Page of the NWS Great Falls web site at http://www.wrh.noaa.gov/tfx/main/drought.php?wfo=tfx. The climatological record for normals is 1981-2010. The ranking period for temperature, precipitation and snowfall is since 1880. The ranking period for wind speeds is since 1936. The ranking period for soil moisture is since 1995.