3-2018

Umphlett QCI March 2018

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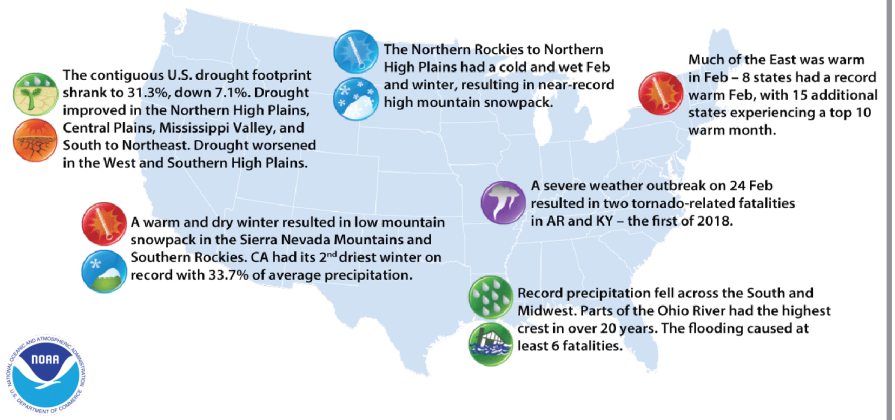
Quarterly Climate Impacts and Outlook

Missouri River Basin

March 2018

National - *Significant Events for December 2017 - February 2018*

U.S. Selected Significant Climate Anomalies and Events for February and Winter 2018



The average U.S. temperature during February was 35.4°F, 1.6°F above average. The February precipitation total was 2.84 inches, 0.71 inch above average, and the sixth wettest on record. The winter U.S. average temperature was 34.0°F, 1.7°F above average. The winter precipitation total was 6.26 inches, 0.53 inch below average.

Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: http://www.ncdc.noaa.gov/sotc

Highlights for the Basin

A mix of conditions led to extremes this winter. Montana had its 11th wettest winter, while Kansas and Colorado had their 10th and 14th driest, respectively. Colorado also had its 10th warmest winter.

Winter ended on a wet note in both upper and lower parts of the Basin. Missouri had its wettest February on record, while Montana had its 4th.

Heavy snows improved drought conditions across Montana. Although the snow season is far from over, many locations already have high rankings. For instance, the 2017-18 snow season ranks as the 2nd snowiest for Havre, MT, with 78.3 inches.

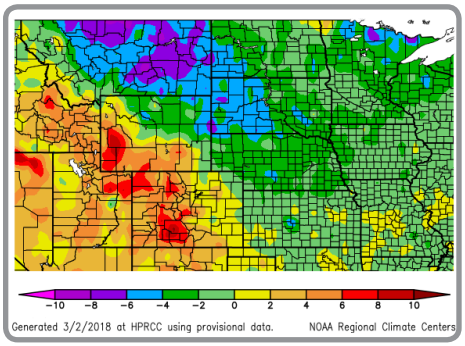
Mounting precipitation deficits caused drought to expand across southern areas of the region. New records were set in Liberal, KS, which received no measurable precipitation for 96 days (ending 1/10/2018), and Wichita, KS, which went 393 days without snowfall (ending 1/14/2018).

Chinook winds helped Ft. Belknap, MT have an 82°F temperature range in just one day, with a morning low of -37°F and afternoon high of 45°F on February 14.

Regional - *Climate Overview for December 2017 - February 2018*

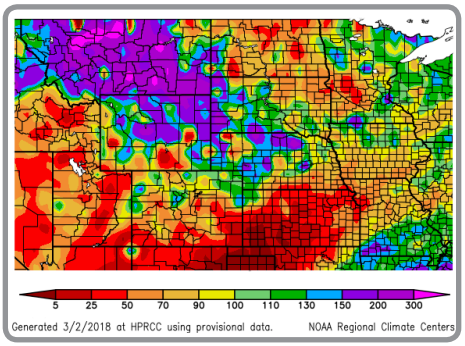
Temperature and Precipitation Anomalies

Departure from Normal Temperature (°F)
December 1, 2017 - February 28, 2018



Temperatures varied widely this winter, with seasonal departures ranging from 10°F below to 10°F above normal. The overall winter pattern was largely influenced by February, with persistent cold air intrusions impacting the region. This resulted in temperature departures up to 25°F below normal in upper parts of the Basin and many locations ranked in the top 5 coldest Februaries on record. December and January temperatures were generally within a few degrees of normal, except for warmer areas of Colorado and Wyoming.

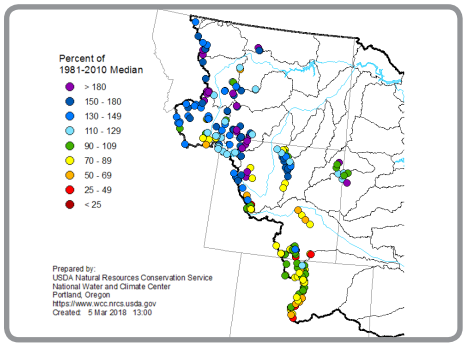
Percent of Normal Precipitation (%)
December 1, 2017 - February 28, 2018



Like temperatures, precipitation varied across the region. Parts of Montana received 200-300 percent of normal precipitation, which made for one of the wettest and snowiest winters on record. Meanwhile, it was one of the driest winters for parts of Kansas. Much of North Dakota, eastern South Dakota, Kansas, and southern Colorado consistently missed out on precipitation this winter. This caused drought to remain in northern areas and expand in the south. If dryness continues, winter wheat could be impacted as emergence begins.

Mountain Snowpack

Missouri Basin Mountain Snowpack
03/01/2018



There was a stark contrast in Rocky Mountain snowpack this winter, with northern areas far outpacing southern areas. Plains snowpack was widespread at the start of spring, but the highest amounts were confined to Montana.

According to the latest National Weather Service outlooks, minor flooding is expected this spring in upper parts of the Basin due to mountain snow runoff. Meanwhile, minor-to-moderate flooding is expected in lower parts of the Basin due to thunderstorm activity, which is typical for this time of the year.

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Regional - *Impacts for December 2017 - February 2018*

Enhanced Fire Activity During Winter

Despite being winter, several fires burned this season. In December, the Legion Lake Fire burned over 54,000 acres in the Black Hills, including portions of Wind Cave National Park and Custer State Park. According to Darren Clabo, South Dakota State Fire Meteorologist, the ongoing drought was likely a key factor in what was ultimately the third largest fire in the state's history. Fires continued to be an issue into January, with grass fires reported in South Dakota and Missouri, and a fire at a cotton gin yard burned 400 round modules in Kansas.

According to the National Interagency Fire Center, portions of the region have an above normal risk of significant wildland fire potential over the next few months. This includes some southern areas of the region through June, and portions of Montana and the Dakotas in April.

Utilities Impacted by Extreme Cold

The end of 2017 and the beginning of 2018 was marked by bitterly cold weather for much of the U.S. In early January, wind chill advisories and warnings stretched from the Canadian border to the Gulf Coast. These extremely low temperatures damaged water mains in locations such as Omaha, NE and St. Louis, MO, and placed high demands on the energy sector. According to the U.S. Energy Information Administration, for the week ending January 5th, the U.S. withdrew a record amount of natural gas from storage, beating the previous record set in January 2014.

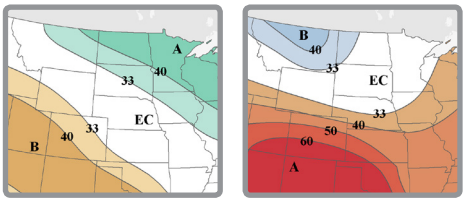
Later in the season, a combination of extreme cold and lack of snow cover drove down frost depths, which also damaged water mains in some locations. For example, water was shut off to the town of Webster, SD for a number of days due to damaged water lines, while damage was also reported north of Omaha in Washington County.

Above: (Top) Legion Lake Fire in in the Black Hills of South Dakota in December, photo courtesy Darren Clabo, South Dakota School of Mines & Technology; (Middle) Ice fog in Nebraska in January, photo courtesy Ken Dewey, University of Nebraska-Lincoln Geography; and (Bottom) Sun pillar on a cold winter day in Lincoln, Nebraska, photo courtesy Natalie Umphlett, High Plains Regional Climate Center.

Regional - *Outlook for April - June 2018*

3-Month Precipitation and Temperature Outlooks

Valid for April - June 2018



Precipitation Temperature

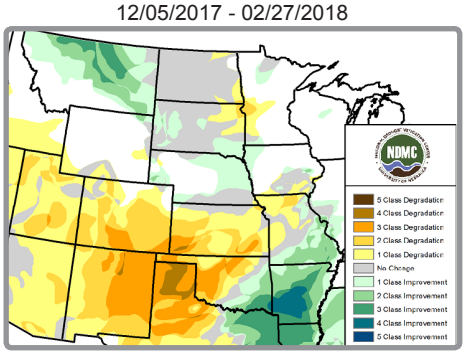
EC: Equal chances of above, near or below normal
A: Above normal, **B:** Below normal

According to NOAA's Climate Prediction Center, La Niña conditions continued this winter and early spring. However, conditions are expected to weaken, with a transition to ENSO-neutral conditions likely later in the season.

Over the next three months, below-normal temperatures are favored across upper parts of the Basin, while above-normal temperatures are favored across much of the south. For precipitation, below-normal conditions are favored in portions of Wyoming, Colorado, and Kansas, while above-normal conditions are favored for parts of Montana, the Dakotas, and Iowa.

Winter Drought Conditions and Outlook

3-Month U.S. Drought Monitor Class Change
12/05/2017 - 02/27/2018



Although not typical for this time of the year, significant changes in drought conditions occurred this winter. Two to three category improvements were made in portions of Montana where heavy snows fell, but drought conditions developed and intensified across areas of Colorado and Kansas where dry conditions prevailed. Drought had been a concern in southern and eastern parts of Missouri this winter, until a storm system the last week of the season improved conditions.

According to NOAA's U.S. Seasonal Drought Outlook, drought conditions will largely persist across southern areas, but could improve or be removed in northern parts of the region.

MO River Basin Partners

High Plains Regional Climate Center
www.hprcc.unl.edu

National Drought Mitigation Center
www.drought.unl.edu

National Integrated Drought Information System
www.drought.gov

National Oceanic and Atmospheric Administration
National Weather Service - Central Region
www.crh.noaa.gov/crh
National Centers for Environmental Information
www.ncdc.noaa.gov
Missouri River Basin Forecast Center
www.crh.noaa.gov/mbrfc
Climate Prediction Center
www.cpc.ncep.noaa.gov

North Central Climate Science Center
http://nccsc.colostate.edu

South Dakota State University Extension
http://igrow.org

American Association of State Climatologists
www.stateclimate.org

U.S. Army Corps of Engineers - Missouri River Basin Water Management Division
www.usace.army.mil

U.S. Department of Agriculture
Regional Climate Hubs
www.usda.gov/oce/climate_change/regional_hubs.htm

U.S. Bureau of Reclamation
www.usbr.gov

U.S. Geological Survey, Water Mission Area
www.usgs.gov/water

Western Governors' Association
www.westgov.org

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