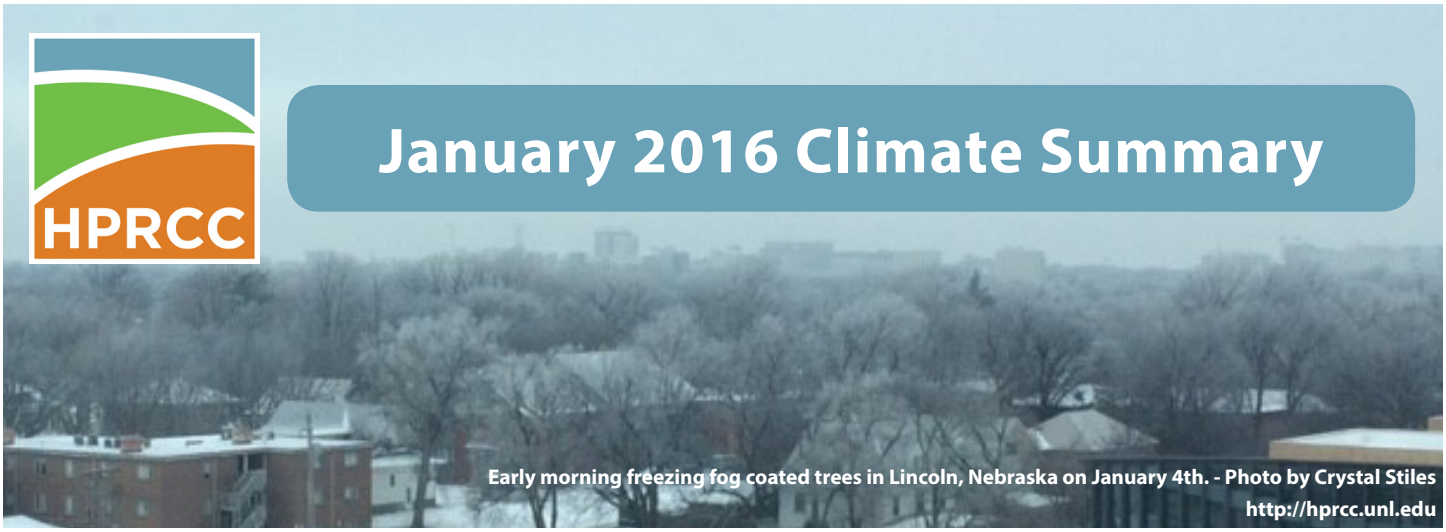
January 2016 Climate Summary



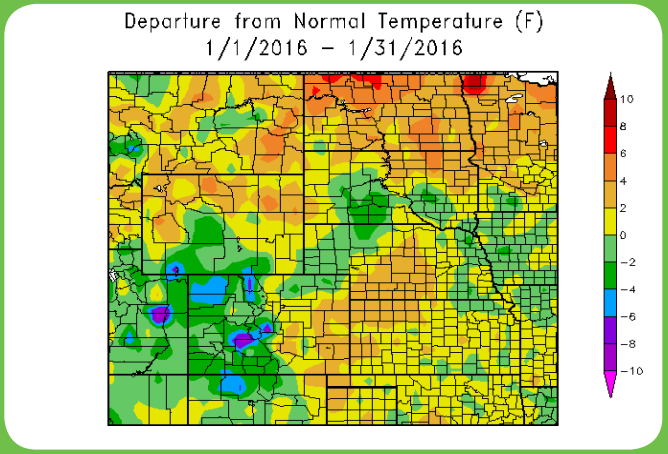
Early morning freezing fog coated trees in Lincoln, Nebraska on January 4th. - Photo by Crystal Stiles
http://hprcc.unl.edu

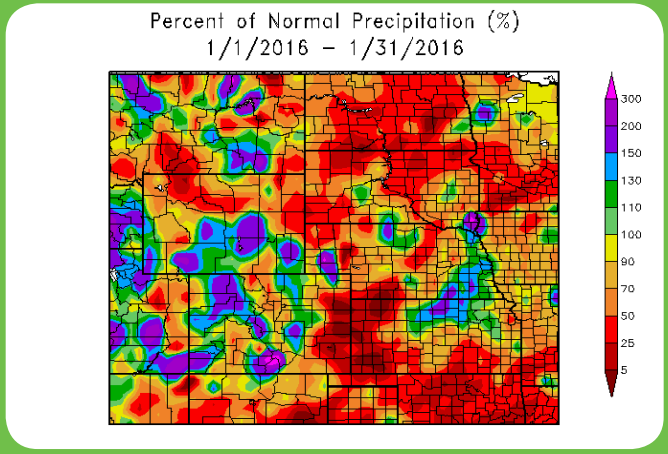
El Niño Impacting Rocky Mountain Snowpack

It would be tough to summarize January's climate conditions across the High Plains region in a few words, as a wide range of conditions occurred. There were very few top 10 rankings for temperature and precipitation this month, as most places did not see extremes one way or the other. One exception is Jamestown, North Dakota, which experienced its driest January on record and only recorded a trace of precipitation (period of record 1949-2016). Much of the state had below normal precipitation in January, as did many other areas across the High Plains. Wetter conditions prevailed in parts of Wyoming and Colorado, as well as an area from northern Kansas northward through southeastern South Dakota. Temperature records were not particularly impressive this month, but most notably, North Dakota experienced temperatures that were 2.0-6.0 degrees F (1.1-3.3 degrees C) above normal. It was cooler than normal in parts of Wyoming and Colorado, and a constant snowpack may have kept temperatures cooler across the Nebraska panhandle and western South Dakota. El Niño is also impacting Rocky Mountain snowpack, as forecasts for below normal snowpack in the Northern Rockies and above normal snowpack in the Southern Rockies have verified thus far.

A powerful winter storm struck the eastern U.S. the weekend of January 22-24. Heavy snow and high winds caused blizzard conditions and impacted an area from Arkansas to Massachusetts that included East Coast cities such as New York, Baltimore, Philadelphia, and Washington, D.C. More than 30.0 inches (76 cm) of snow fell in one day at John. F. Kennedy International Airport in New York and Allentown, Pennsylvania, obliterating their previous records for maximum one-day total snowfall. The blizzard caused major travel and transportation disruptions in the larger cities, Broadway shows in New York were cancelled, and storm surge from the blizzard caused coastal flooding in New Jersey. Even southern cities had impressive snow totals. For instance, Nashville, Tennessee received over a year's worth of snowfall with this storm, coming in at 8.0 inches (20 cm). This amount was 1.7 inches (4 cm) higher than the city's normal annual snowfall.

Temperature and Precipitation Overview





Above: Departure from 1981-2010 normal temperature (left) and percent of normal precipitation (right) for January 2016 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: http://hprcc.unl.edu/maps/current .

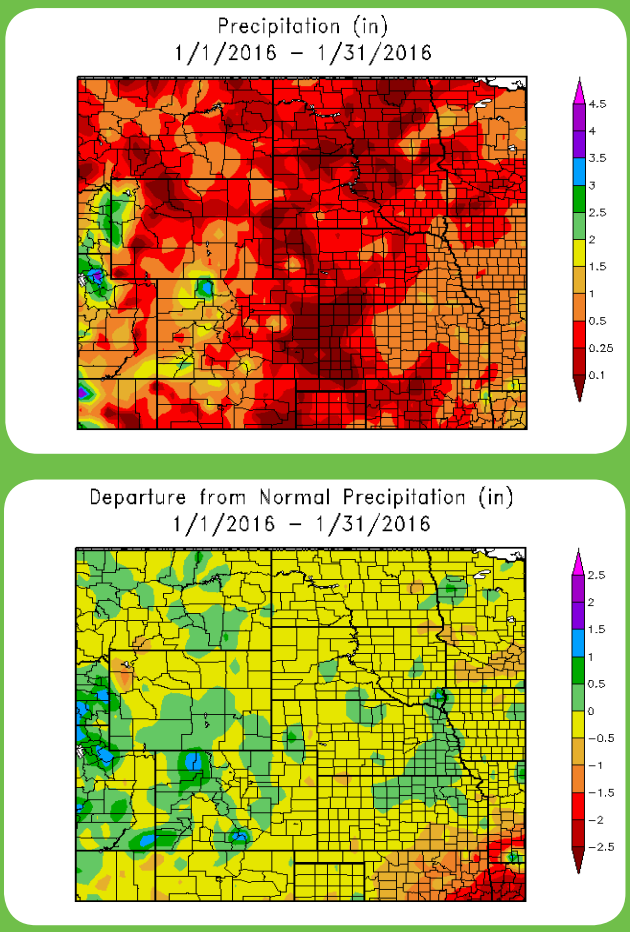
Precipitation

Both above normal and below normal precipitation occurred in the High Plains region in January, which is a very different story from the record-breaking wetness experienced by parts of the region in December. Southern Wyoming and western and central Colorado were wetter than normal, as several systems moved through and impacted this region. Casper, Wyoming recorded 0.99 inches (25 mm) of precipitation, which was its 6th wettest January on record (period of record 1940-2016). A strong storm system impacted Wyoming and Colorado at the end of the month, bringing widespread snow accumulations to the Rockies. This snowfall benefited recreational areas such as Jackson Hole, Wyoming, where skiers and snowboarders were out enjoying the fresh snow.

Northeastern Kansas and southeastern Nebraska also experienced above normal precipitation in January. A storm system came through around the 20th of the month that brought a wintry mix to the region and over 9.0 inches (23 cm) of snow to the communities of Haddam and Washington in Kansas. Another system followed soon after on the 25th that mostly impacted southeastern Nebraska, bringing an initial period of freezing rain and causing minor ice accumulations before changing over to snow. The highest snowfall total in the area was 5.5 inches (14 cm), which fell in the community of Crete. Northeastern Kansas and southeastern Nebraska were often in the path of storm systems during the past few months, which has kept the region fairly wet since November.

On the dry side, areas experiencing below normal precipitation included the Dakotas, northern Wyoming, eastern Colorado, western and central Nebraska, and western and southern Kansas. Jamestown, North Dakota had its driest January on record, recording only a trace of precipitation the entire month (period of record 1949-2016). Worland, Wyoming was also rather dry, as January 2016 came in as the 6th driest January on record with only 0.03 inches (1 mm) of precipitation (period of record 1961-2016). Worland is in the Bighorn Mountains area of northern Wyoming that has been experiencing below normal precipitation since the fall, resulting in a below normal snowpack and the development of drought conditions. Read more about the status of Wyoming's snowpack below, and read about the developing drought conditions in the state on page 3.

Regional Precipitation



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for January 2016. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: http://hprcc.unl.edu/maps/current.

Snowpack Update

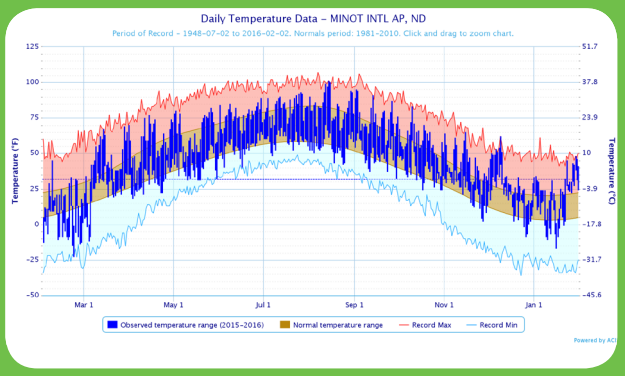
The snowpack story for January is very similar to December. Snowpack continued to do well in Colorado, as the Rockies experienced above normal precipitation. Snow water equivalent was still above 100 percent of median for most of the state as of the end of January, with the exception of a few SNOTEL sites in the northern part of the state. As for Wyoming, snowpack improved in the western and southern parts of the state, but it is still below normal in the Bighorn Mountains in northern Wyoming, a region that is now in drought. Because it is early in the season, it is important to keep in mind that these conditions can change quite dramatically over the course of the season.

For more information on mountain snowpack, please see: http://www.wcc.nrcs.usda.gov/gis/snow.html.

Temperatures

The warm pattern that had been prominent throughout most of the High Plains region since fall continued into January for parts of the area, including North Dakota, northern Wyoming, eastern Colorado, central Nebraska, and much of Kansas. The warmth in January was particularly impressive across North Dakota, as much of the state experienced temperatures that were 2.0-6.0 degrees F (1.1-3.3 degrees C) above normal. The city of Minot, North Dakota had its 8th warmest January on record (period of record 1949-2016). If you look at the temperature graph for the past year for Minot to the right, you will see that January began with above normal temperatures, then temperatures dipped below normal during a cold spell in the middle of the month, and then they soared back to above normal to end the month. The warmth of the last 10 days of January was so impressive, the entire month ended above normal. In fact, Minot set a record on January 29th for the highest maximum temperature, which was 48.0 degrees F (8.9 degrees C), and highest minimum temperature, which was 38.0 degrees F (3.3 degrees C), that were ever recorded on that day. For more information on temperatures in North Dakota in January, please see the North Dakota climate summary on page 7.

Station Spotlight: Minot, ND



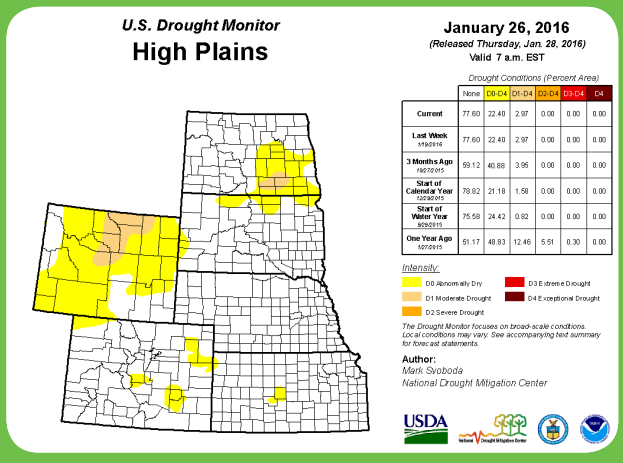
Above: Daily temperatures along with extremes and normals values over the past year in Minot, ND.

January temperatures were not above normal everywhere in the region. Southern Wyoming, western and central Colorado, southern South Dakota, the Nebraska panhandle, and eastern Nebraska experienced near normal to slightly below normal temperatures in January. It is worth noting that many of these regions also experienced above normal precipitation for the month. The below normal temperatures were not record-breaking, however.

Drought Conditions

Just like last month, drought conditions both improved and degraded across parts of the High Plains region in January, according to the U.S. Drought Monitor. The biggest improvement came in North Dakota, where moderate drought (D1) and abnormal dryness (D0) were reduced in the south-central part of the state. The region in D0-D1 improved from about 39 percent to just over 25 percent from the beginning to the end of the month. This area received some snowfall in mid-January, helping to alleviate drought and dry conditions there.

U.S. Drought Monitor



The U.S. Drought Monitor is produced as a joint effort of the U.S. Department of Agriculture (USDA), National Drought Mitigation Center, U.S. Department of Commerce, and the National Oceanic and Atmospheric Administration (NOAA). For current Drought Monitor information, please see: http://droughtmonitor.unl.edu/.

The D1 that was introduced in northern Wyoming in December expanded southward in January to include parts of central Wyoming. The area in drought in the state was nearly 13 percent as of the end of the month. Precipitation has been below normal in this region since the summer. The area in drought includes the Bighorn Mountains, where the snowpack season got off to a slow start and has yet to recover. D0 also expanded into areas west of the region in drought so that just over three-quarters of Wyoming was experiencing D0 or D1 conditions as of the end of January.

The rest of the region remained relatively unchanged in January where drought is concerned. Because this is the driest time of the year and soils are frozen, drought conditions do not normally change rapidly. Impacts from drought or dryness are also typically minimal this time of year due to factors such as little agricultural activity.

Climate Outlooks

According to the Climate Prediction Center, El Niño is expected to remain strong during winter 2015-16. This El Niño should persist into the spring, with a transition to neutral conditions sometime during the late spring or early summer 2016. If you are looking for more information about El Niño and its impacts, check out the ENSO blog here: https://www.climate.gov/news-features/department/8443/all. Or, take a look at this special update on El Niño in the Missouri River Basin states, which is available here: http://hprcc.unl.edu/pdf/ENSO-MOBasin-Feb2016-Final.pdf.

The seasonal temperature and precipitation outlooks below combine the effects of long-term trends, soil moisture, and when applicable, the El Niño Southern Oscillation cycle (ENSO). To learn more about these outlooks, please see: http://www.cpc.ncep.noaa.gov.

Temperature

The February-April temperature outlook indicates an increased chance of above normal temperatures for the northern half of the contiguous U.S., as well as the West Coast. In the High Plains region, this includes all of North Dakota and South Dakota, nearly all of Nebraska, northern and central Wyoming, and northeastern Kansas. Below normal temperatures are expected across parts of the Southwest, southern Plains, and Gulf states from eastern Arizona eastward through Florida. Other areas of the contiguous U.S. have equal chances for above, below, or near normal temperatures.

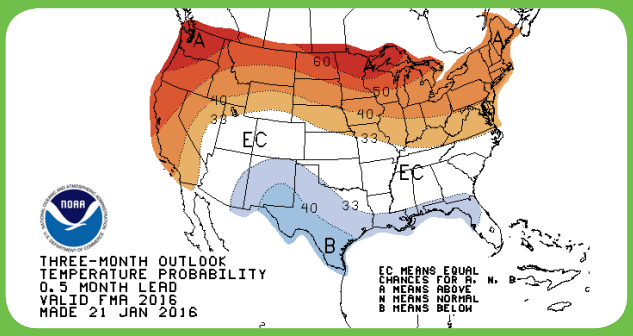
Precipitation

The precipitation outlook for the next three months calls for a higher probability of above normal precipitation across the Southwest, the southern and central Plains, the Gulf Coast, and much of the East Coast. In the High Plains region, this includes central and southern South Dakota, most of Nebraska, western and central Kansas, southeastern Wyoming, and all of Colorado. Below normal precipitation is favored in the Pacific Northwest, the northern Rockies, and the Great Lakes and Ohio Valley regions. This includes the northeastern tip of North Dakota in the High Plains region. The remainder of the contiguous U.S. has equal chances for above, below, or near normal precipitation.

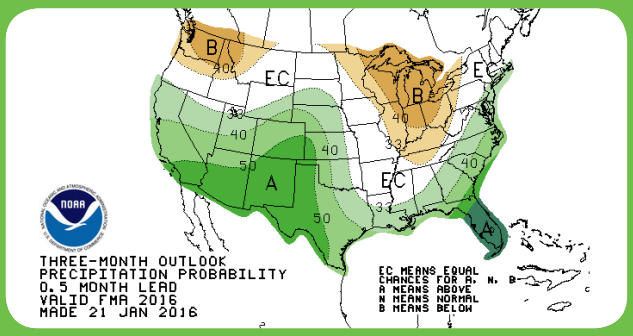
Drought

The January 21st U.S. Seasonal Drought Outlook shows that drought conditions could develop across central Montana over the next three months. Drought is expected to persist across portions of the northern Rockies, northern Wyoming/southern Montana, southern North Dakota, and a small area in western New York. Drought will remain across portions of the West but is expected to improve. Some areas of drought in the West are expected to be removed, and drought removal is also likely in the Northeast. Other than persistent drought in Wyoming and North Dakota, the rest of the High Plains region is not in drought, nor is drought expected to develop through the end of April.

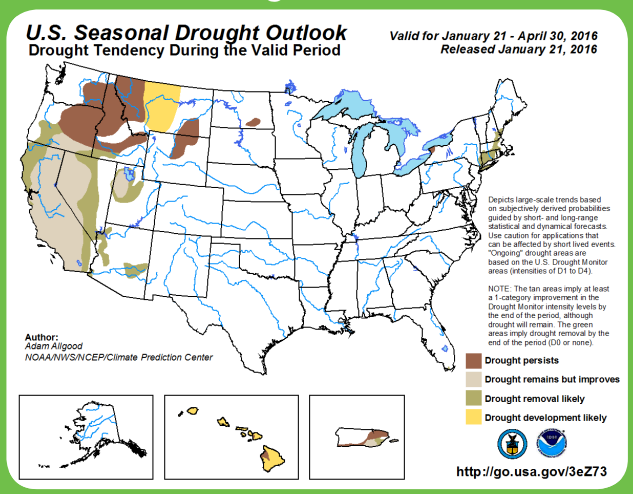
Temperature Outlook



Precipitation Outlook



Drought Outlook



Above: The three-month temperature probability outlook (top), the three-month precipitation probability outlook (middle), and the U.S. Seasonal Drought Outlook (bottom). For more information on these outlooks, produced by the Climate Prediction Center, see: http://www.cpc.ncep.noaa.gov.

Station Summaries: By the Numbers

Colorado	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Akron Washington County Airport	42.0	19.0	30.5	1.9	58	01/28	4	01/10+	0.09	-0.21	30
Alamosa San Luis Airport	31.2	-4.9	13.1	-3.2	50	01/30	-26	01/11	0.58	0.32	223
Colorado Springs Municipal Airport	45.6	19.7	32.7	2.2	68	01/30	2	01/01	0.54	0.22	169
Denver International Airport	43.5	20.1	31.8	1.1	65	01/30	5	01/10	0.50	0.09	122
Grand Junction Walker Field Airport	33.4	14.8	24.1	-3.3	45	01/30	3	01/02	0.92	0.34	159
Pueblo Memorial Airport	49.0	17.0	33.0	2.5	72	01/30	2	01/11+	0.53	0.18	151

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	38.3	21.0	29.6	1.0	58	01/29	-3	01/10	1.05	0.47	181
Dodge City Regional Airport	45.2	21.8	33.5	1.3	65	01/29+	8	01/10	0.28	-0.30	48
Goodland Renner Field	46.5	17.3	31.9	2.3	65	01/23	5	01/18	0.04	-0.34	11
Topeka Municipal Airport	40.6	21.2	30.9	1.2	68	01/29	3	01/10	0.90	0.04	105
Wichita Mid-Continent Airport	44.1	24.0	34.0	1.8	71	01/29	7	01/10	0.19	-0.64	23

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	35.7	11.9	23.8	-0.6	55	01/28	-7	01/09	0.06	-0.30	17
Grand Island Airport	35.8	18.3	27.0	1.9	57	01/29	-6	01/17+	0.32	-0.21	60
Lincoln Municipal Airport	35.3	17.6	26.4	1.8	53	01/30+	-9	01/17	0.83	0.19	130
Norfolk Karl Stefan Airfield	31.7	15.2	23.5	0.9	48	01/29	-12	01/10	0.57	-0.02	97
North Platte Regional Airport	41.1	15.8	28.5	3.5	60	01/28	-2	01/10	0.48	0.14	141
Omaha Eppley Airport	32.5	16.1	24.3	0.8	50	01/29	-6	01/10	1.11	0.39	154
Valentine Miller Field	33.1	12.2	22.7	-0.9	46	01/29+	-16	01/18	0.52	0.26	200

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	26.8	7.4	17.1	4.3	51	01/29	-23	01/10	0.21	-0.22	49
Fargo International Airport	21.1	5.3	13.2	3.9	40	01/27	-23	01/17	0.69	-0.01	99
Grand Forks International Airport	19.0	2.8	10.9	4.2	40	01/27	-23	01/17+	0.32	-0.23	58
Theodore Roosevelt Airport	26.9	9.5	18.2	1.9	45	01/29	-19	01/16	0.16	-0.14	53
Williston International Airport	26.2	7.5	16.8	5.8	44	01/29	-20	01/18+	0.38	-0.21	64

All data are preliminary and subject to change. + indicates multiple dates, latest date listed.
Data are retrieved through the Applied Climate Information System (ACIS) and are available online through the CLIMOD system.
For more information please contact us: http://www.hprcc.unl.edu/contact.php.

January 2016 Climate Summary

South Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Aberdeen Regional Airport	26.4	8.8	17.6	5.6	46	01/31+	-20	01/17	0.14	-0.33	30
Huron Regional Airport	25.4	8.0	16.7	0.0	44	01/29	-18	01/17+	0.29	-0.21	58
Pierre Regional Airport	28.4	12.1	20.2	0.3	46	01/29	-14	01/18	0.17	-0.25	40
Rapid City Regional Airport	35.5	15.0	25.3	0.3	54	01/23	-10	01/17	0.21	-0.09	70
Sioux Falls Joe Foss Field Airport	25.6	9.3	17.4	0.8	41	01/30+	-16	01/17	0.48	-0.08	86

Wyoming	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Casper Natrona County International AP	33.0	18.4	25.7	1.0	43	01/29+	3	01/31	0.99	0.48	194
Cheyenne Municipal Airport	39.8	19.3	29.6	0.8	55	01/23	-2	01/01	0.48	0.15	145
Lander Hunt Field Airport	31.1	9.9	20.5	-1.2	47	01/29	-11	01/10	0.42	0.01	102
Laramie Regional Airport	29.9	7.1	18.5	-3.2	44	01/23	-21	01/01	0.19	-0.08	70
Rawlins Municipal Airport	28.8	11.6	20.2	-1.4	38	01/30+	-18	01/01	0.41	0.05	114
Sheridan County Airport	39.0	15.1	27.0	3.2	62	01/28	0	01/17	0.56	0.00	100

January 2016 Highlights

Monthly Rankings

Temperature in degrees F / Precipitation in inches

Wettest / Driest	**Precipitation / Ranking**	**Record / Year**	**Period of Record**
Alamosa, CO	0.58 / 11th wettest	1.09 / 2005	1933-2016
Garden City, KS	0.03 / 12th driest	0.00 / 1986	1948-2016
Goodland, KS	0.04 / 13th driest	0.00 / 1986+	1896-2016
Chadron, NE	0.06 / 12th driest	0.00 / 1919	1895-2016
Jamestown, ND	T / DRIEST	0.01 / 2013+	1949-2016
Minot, ND	0.21 / 12th driest	0.04 / 2008+	1949-2016
Casper, WY	0.99 / 6th wettest	1.42 / 1987	1940-2016
Worland, WY	0.03 / 6th driest	0.00 / 1992	1961-2016
Warmest / Coolest	**Temperature / Ranking**	**Record / Year**	**Period of Record**
Minot, ND	18.4 / 8th warmest	28.3 / 2006	1949-2016
Jamestown, ND	14.6 / 13th warmest	24.9 / 2006	1949-2016

All data are preliminary and subject to change. + indicates multiple dates, latest date listed.
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North Dakota Monthly Climate Summary

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North Dakota State Climate Office, North Dakota State University
For more information: www.ndsu.edu/ndsco or www.ndawn.ndsu.nodak.edu

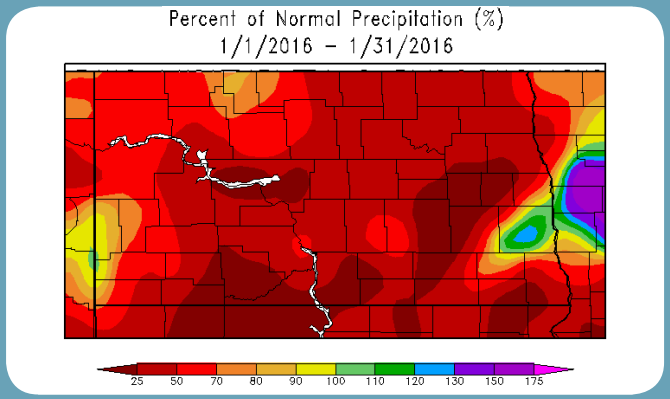
Precipitation:

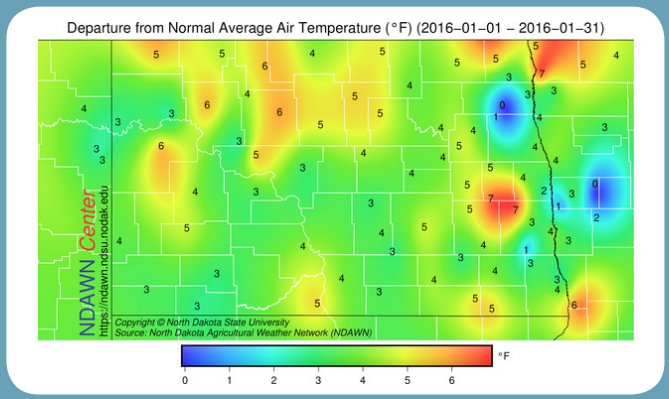
January is climatologically the second driest month in North Dakota with the state averaging just 0.49 inches of precipitation. Taking an average of the cooperative and CoCoRaHS (Community Collaborative Rain, Hail and Snow Network) observers, the average precipitation in North Dakota in January 2016 was just 0.25 inches. That dryness was widespread throughout much of the state (Figure 1). The one exception was associated with a narrow, yet heavy band of snow that fell just to the west and north of Fargo during the overnight hours of January 6 and 7. Harwood, ND recorded over 12 inches of snow from that system with others from Leonard, ND to Mahnomen, MN recording similar amounts. Because of the mesoscale nature of the heavy snow most locations 20 miles or farther away from that band recorded little if any snowfall that night.

Temperature:

For the first 20 days of the month, the temperature across much of North Dakota was averaging below normal, but the end of the month was so mild that as a whole the month of January finished with temperatures running 3 to 5 degrees above average (Figure 2). The average temperature for the North Dakota NDAWN (North Dakota Agricultural Weather Network) stations in January was 13.5° which is 4.0° above normal for those stations. It was the maximums and minimums generally in the 20s and 30s during the last 10 days of the month that pushed the monthly temperature positive. Before that, there was nearly a two week stretch of well below normal temperatures including a couple of mornings with lows in the -30s near Fargo in the same area that recorded the abundant snowfall previously mentioned.

Temperature and Precipitation Overview





Above: Percent of normal precipitation (left, figure 1, produced by HPRCC) and departure from normal average temperature (right, figure 2, produced by NDAWN) for January 2016 in North Dakota.

January 2016 Climate Summary

Kansas Climate Summary

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KANSAS STATE UNIVERSITY

Seasonally Dry

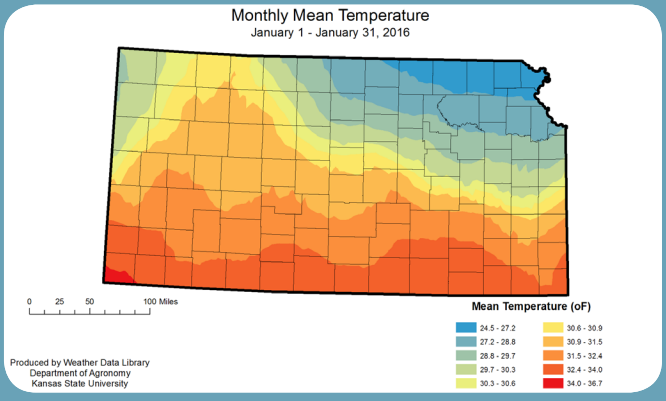
The overall pattern in January was drier and warmer than normal for much of the state. State-wide average precipitation was 0.44 inches. This ranks as the 50th driest January since 1895, and places it in the middle third of the range. The North Central and Central divisions were exceptions to this dry pattern. The North Central divisional average was 0.71 inches, or 110 percent of the normal. The Central divisional average was 0.79 inches, or 113 percent of normal. In contrast, the Northwest Division averaged just 0.06 inches of precipitation, which was 13 percent of normal. Still, there were 76 new daily record precipitation amounts. The bulk of these records occurred during the January 6-8th event. Flooding was not as much of an issue as was the case in the December storms. Despite the warmer than normal temperatures, snow was a feature during the month. The greatest 24 hour total was 9.5 inches at Haddam, Washington County, on the 22nd. Haddam was also the station with the greatest monthly total for the state at 10.5 inches.

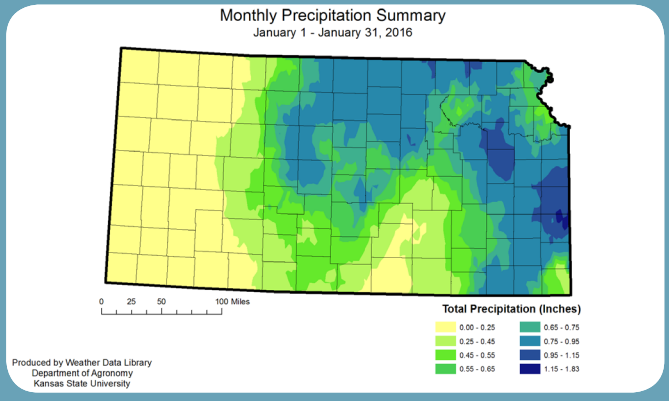
Temperatures also fell in the middle third of the distribution. The state-wide average temperature was 30.9 oF, or 1.1 degrees warmer than normal. This is much closer to the normal than it was in December, when we saw the 4th warmest December on record. The eastern divisions were the closest to normal, with departures ranging from +0.6 oF in the Southeast Division to -0.4 oF in the Northeast. The Northwest Division had the greatest departure from normal, with an average of 31.1 oF, or 2.6 degrees warmer than normal. There were 21 new daily high maximum temperature records set, although none of these were record highs for the month. In addition, 14 record warm minimum temperatures were recorded. The warmest reading for the month was 74 oF at Sedan (Chautauqua County) on the 30th. The coldest reading was -11 oF at Horton (Brown County) and Troy (Doniphan County) on the 18th. That places the range from warmest to coldest at 85 degrees.

Severe weather was of the winter variety. There were 170 Local Storm Reports received at NWS Forecast offices during the month. The majority were for snow. However, there were reports of freezing rain, sleet and non-thunderstorm wind gusts. These gusts were reported in Northwest KS in Cheyenne and Rawlins counties on the 29th. There were no reports of hail or tornadoes.

Drought conditions didn't change during the month. Abnormally dry areas remain in Central and Northwestern KS. While drier than normal conditions persisted across much of the state, this is a normally low precipitation month so changes are slow to develop. Wetter than normal conditions in the Central Division weren't sufficient to erase the abnormally dry conditions. Some long-term hydrological deficits are in place affecting water supplies and reservoirs. The drought outlook is for improving conditions, and the precipitation outlook for February is for increased chances of wetter than normal. However, we are still in a drier period of the year and either above or below normal precipitation will be slow to show impacts.

Temperature and Precipitation Overview





Above: January 2016 monthly mean temperatures (left) and total precipitation (right) in Kansas. Maps produced by Weather Data Library, Department of Agronomy, Kansas State University.

About the High Plains Regional Climate Center

The High Plains Regional Climate Center (HPRCC) is one of six NOAA Regional Climate Centers (RCCs) that has been providing timely climate data and information to the public for cost effective decision-making since 1987. The HPRCC primarily serves the six-state region of Colorado, Kansas, Nebraska, North Dakota, South Dakota, and Wyoming, but has also served people from all across the country and even throughout the world. HPRCC operates under a three-tiered structure of climate services and works closely with other organizations on the local, regional, and national levels. HPRCC staff engage with a wide range of stakeholders including K-20 education, the public, media, private industry, research, and state/tribal/federal entities, among others.

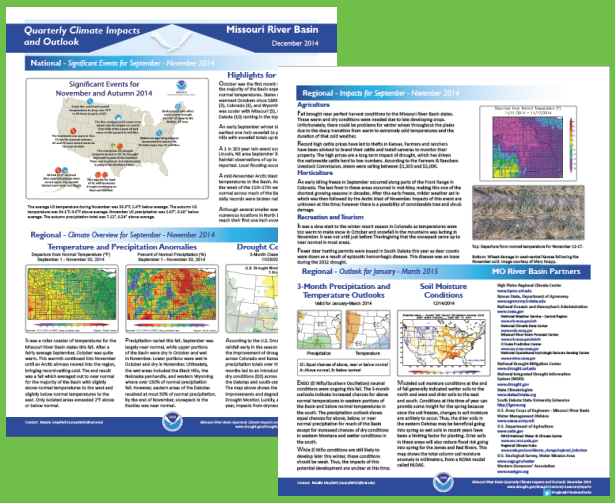
Much of the data and products found throughout this publication were built on the Applied Climate Information System (ACIS) framework. ACIS was designed to manage the complex flow of information from climate data collectors to the end users of climate data information. The main purpose of ACIS is to alleviate the burden of climate information management for people who use climate information to make management decisions.

HPRCC is involved in the ongoing development and management of ACIS. In the spring of 2014, the RCCs released a new website for ACIS. This new and improved website not only contains descriptions of ACIS and the sources of data found within, but also features real-world examples of how RCCs and external groups are using ACIS for their particular climate data needs. In addition to these examples, there is extensive documentation and tutorials on how ACIS can be used and accessed by external clients using Web Services. For more information see: http://rcc-acis.org.

ACIS Applied Climate Information System

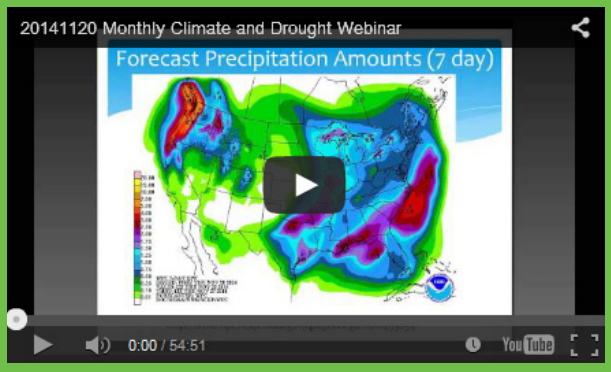
Additional Summary Information for the High Plains

Missouri River Basin Quarterly Climate Impacts and Outlook



For more information:
www.drought.gov/drought/content/resources/reports

Midwest and Great Plains Monthly Climate and Drought Webinar



To sign up for future webinars:
http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars

For an archive:
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