Mesonet
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Wind's Impact Under Low Humidities

–by Albert Sutherland

HOW CAN WIND IMPACT FIRE DANGER? Sunday, January 18, 2015 and Monday, January 19, 2015 provided us a great example of how wind contributes to fire danger. The National Weather Service offices in Norman and Tulsa designated Sunday as a Red Flag Warning fire day (see graphic below). Red flag warnings were not issued for Monday.

The fuel load didn't change overnight. The relative humidities were similar on both days. That meant the fuel moisture was similar. The air temperatures were similar. The big difference was the wind.

A Burning Index map (on page 2) for Sunday afternoon at 3:00 PM highlights why it was a Red Flag Warning day. Sunday was a day when a number of wildfires popped up across Oklahoma. The bright orange, red, and burgundy colored areas indicated high fire danger over the majority of the state on Sunday.

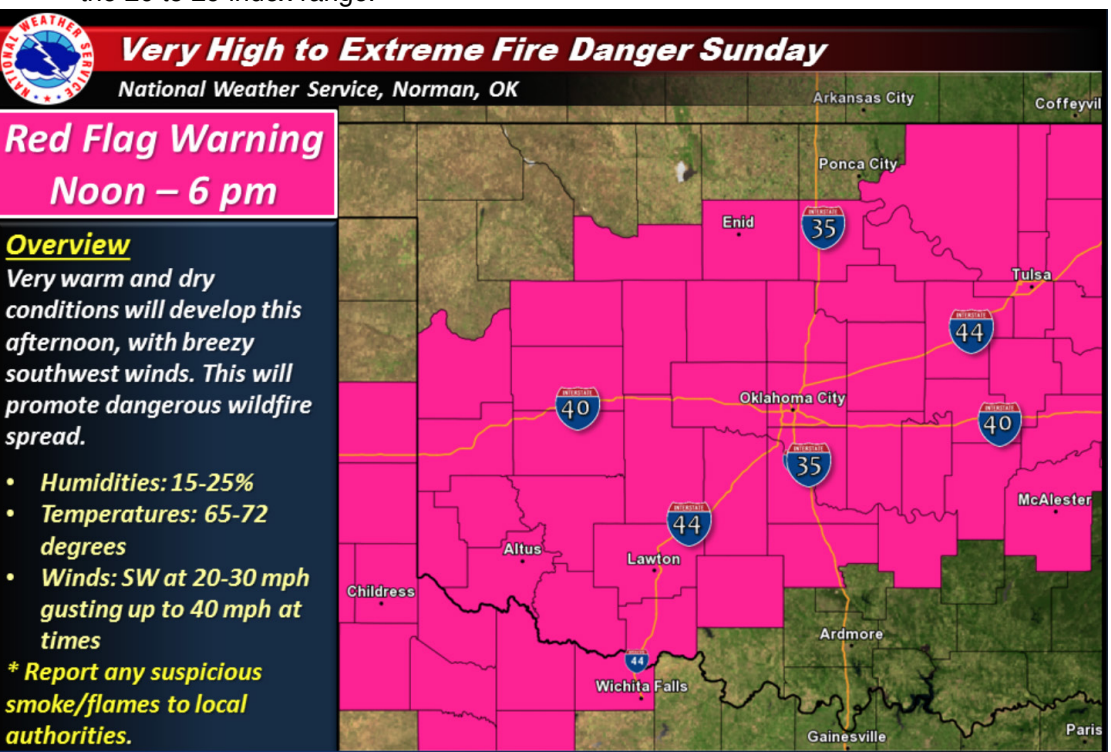
On Monday, January 19th at 3:00 PM, the Burning Index (map on page 2) was much lower. No bright red areas were indicated on the map, and most of the state was colored yellow. Burning Index values in yellow colored areas fell into the 20 to 29 index range.

The Burning Index value is not only an index of fire danger. Dividing the Burning Index value by 10 gives an estimate of flame height at the head of the fire. For the bright red areas with Burning Index values between 80 and 109, the estimated flame height would be between 8 and 11 feet. Yellow colored areas which have Burning Index values of 20 to 29 would have an estimated flame height of 2-3 feet.

Medicine Park (meteogram on page 3) gives us a look at how important wind can be in driving up fire danger. If we compare air temperature (red solid fill) from Sunday and Monday, both days peaked at close to 70°F. Relative humidities (green line) were almost the same, 13 percent on Sunday and 12 percent on Monday. Sunlight levels (orange fill) were close to maximum on both days.

The big difference between Sunday and Monday was the wind. The light blue fill shows wind gusts on Sunday afternoon were 30 to 35 miles per hour. On Monday afternoon, wind gusts were 10 to 15 miles per hour.

The Burning Index on Sunday hit a peak of 115 at 4:00 PM. On Monday, the peak was 67 at 1:00 PM.



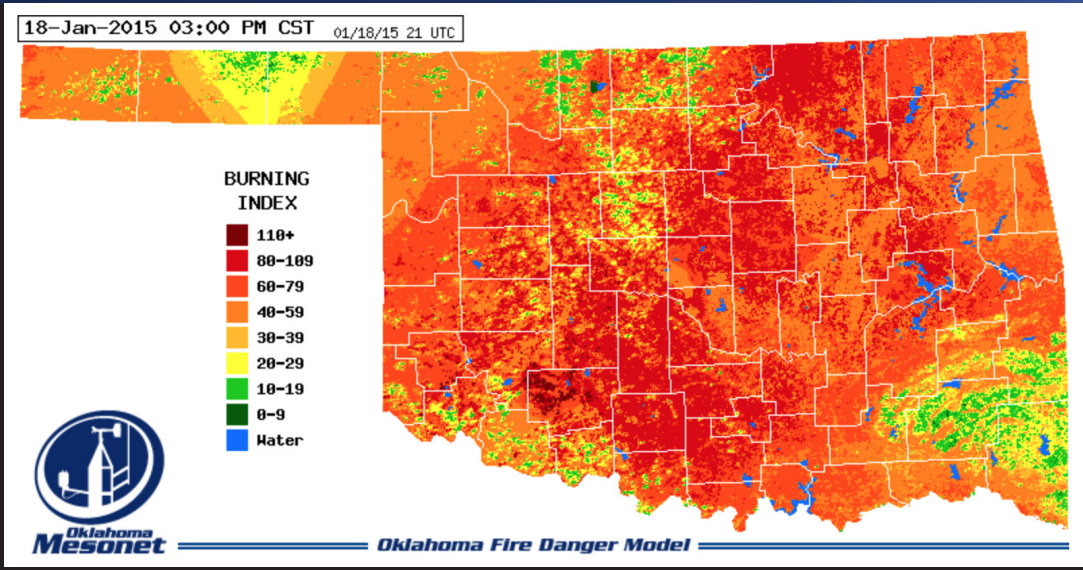
These two back to back days provided a great example of how wind drives Buning Index Fire Danger under low humidities.

Mesonet Fire Danger products are produced as components of the OK-FIRE program. The full set of products are available on the OK-FIRE website, okfire.mesonet.org. A limited number of Fire Danger products are available on the Mesonet iPhone and Android apps and on the Mesonet Mobile Website, m.mesonet.org. ■

MESONET IN PICTURES

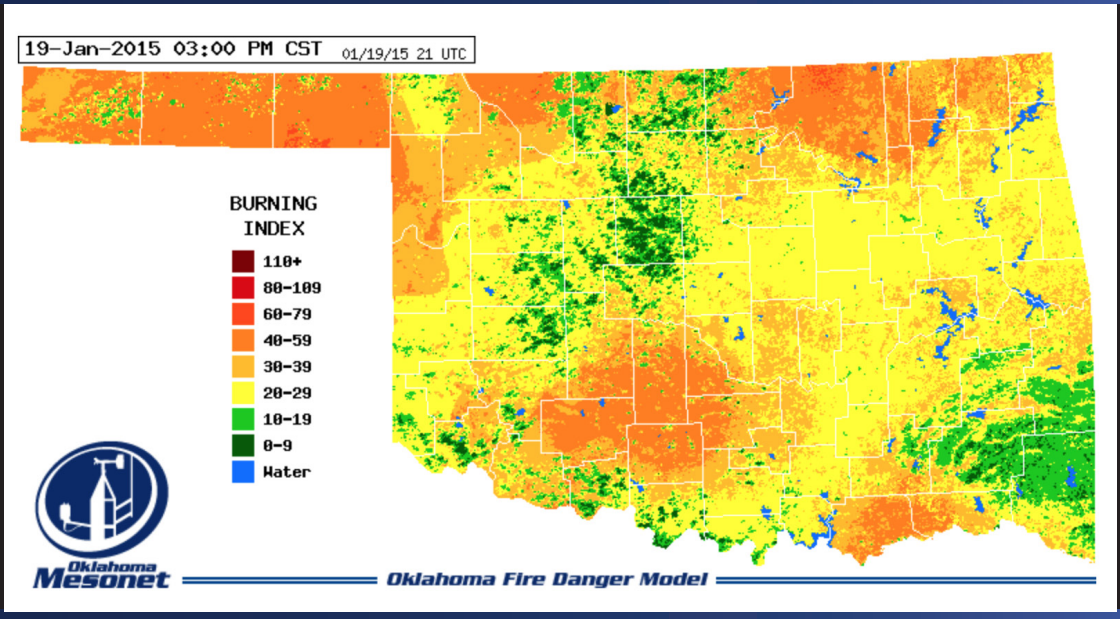
Burning Index Map on Jaunary 18, 2015 at 3 pm

- The Burning Index map for the afternoon of January 18, 2015 highlights why it was a Red Flag Warning day. Sunday was a day when a number of wildfires popped up across Oklahoma. The bright orange, red, and burgundy colored areas indicated high fire danger over the majority of the state on Sunday. To view this map, go to okfire.mesonet org then click on the “FIRE” tab.



Burning Index Map of January 19, 2015

- The most important fire danger index produced by the Oklahoma Fire Danger Model is Burning Index (BI), which relates to the intensity of the headfire and its flame length. To get the flame length in feet, divide BI by ten. Besides being a function of weather and dead fuel moisture, BI is also strongly influenced by the type, amount, and greenness levels of the native surface fuels being modeled. To view this map, go to okfire.mesonet.org then click on the “FIRE” tab.

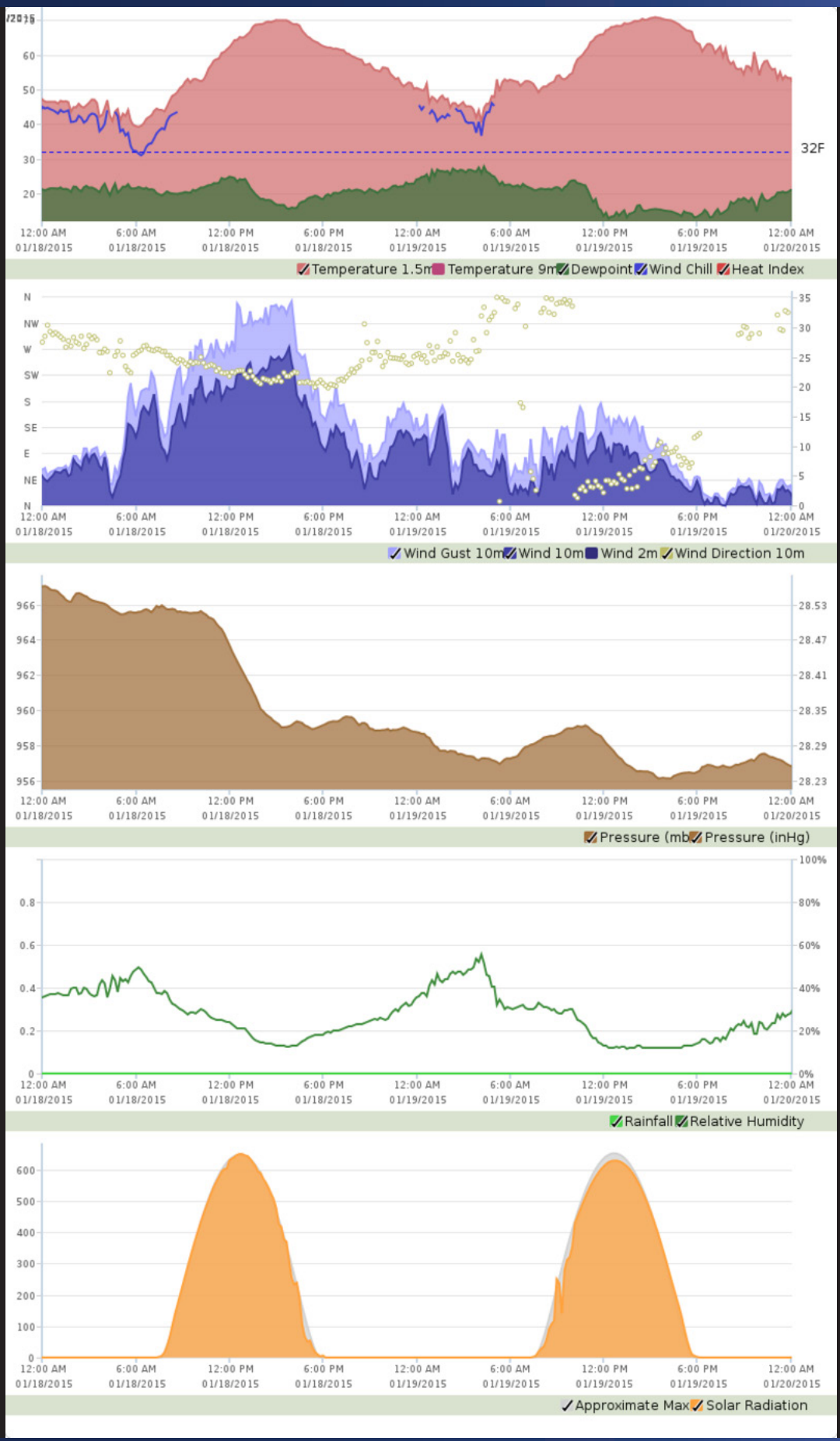


Meteogram for Medicine Park on January 18-20, 2015

- Medicine Park gives us a look at how important wind can be in driving up fire danger. Oklahoma Mesonet Meteograms provide a quick, graphical view of several weather conditions over a 24-hour period.

The Meteogram is composed of five panels of colored traces: Air Temperature and Dew Point (red and green fill), Wind Speed (blue fill), Gust (light blue fill) and Direction, Barometric Pressure (brown fill), 24-Hour Rainfall (light green line), Relative Humidity (dark green line) and Solar Radiation (orange fill).

To view meteograms, go to mesonet.org, click on the "Weather" tab, then click on the meteogram thumbnail on the right side of the page.

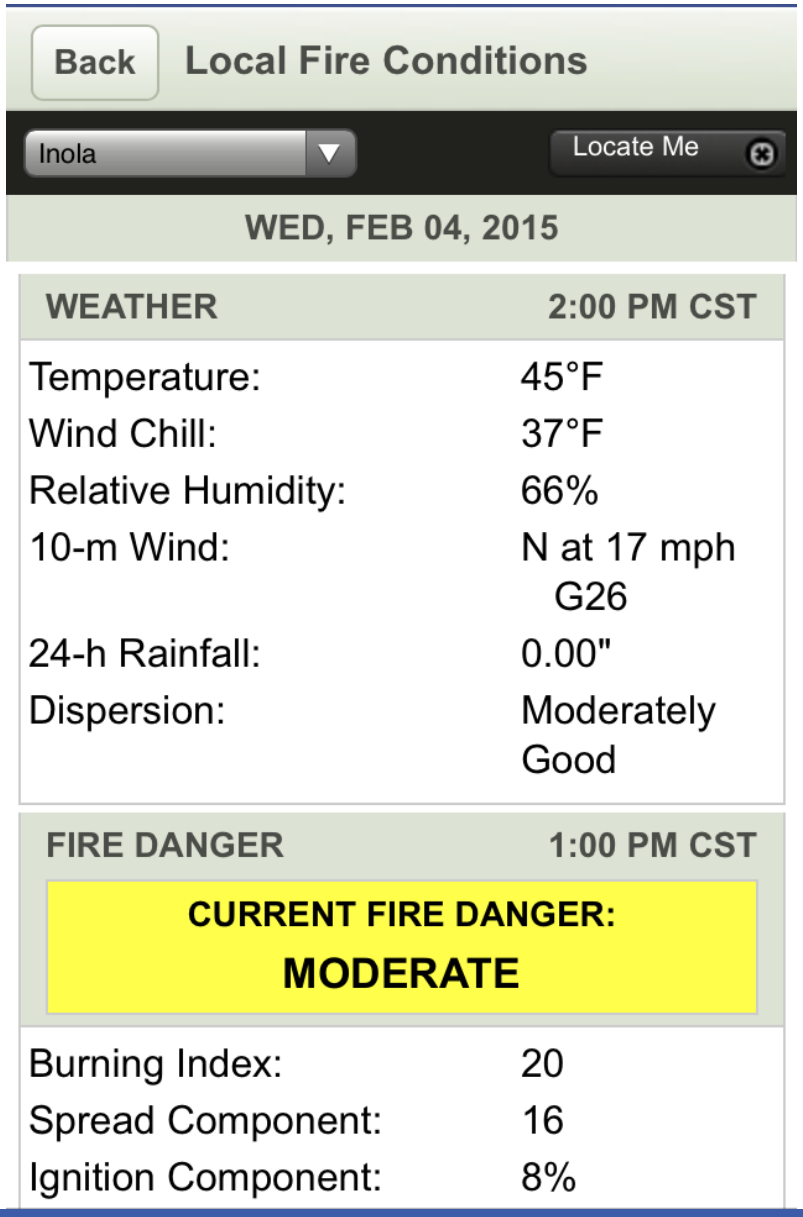


Fire Danger Products On-the-Go

–by Stephanie Bowen

JANUARY BROUGHT STRANGE WEATHER. With some days breaking record highs and strong winds, fire danger was very high. Fires broke out in many places, including Guthrie and Chickasha. For help during these high fire danger days, the Oklahoma Mesonet offers fire danger products on mobile devices for firefighters and emergency managers to make critical decisions.

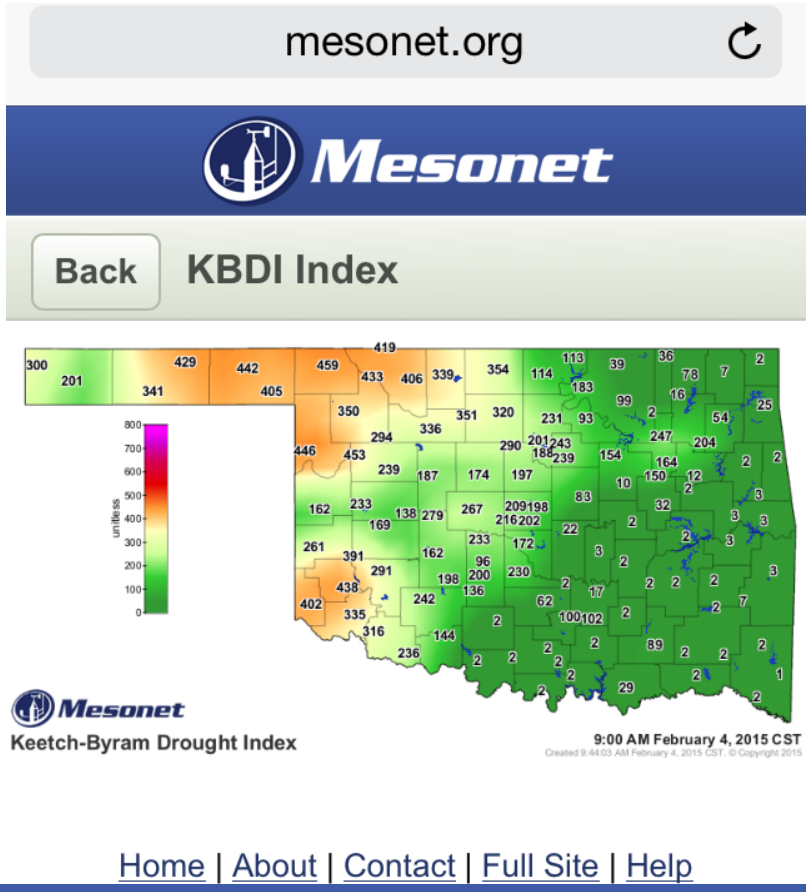
The Mesonet app, available on Android and Apple devices, provides a Day 1 and Day 2 Fire Outlook map from the Storm Prediction Center. You can also view Oklahoma Fire Advisories from the National Weather Service. Mesonet products provided on the app include Burning Index, KBDI Index, 1-hr Dead Fuel, and 10-hr Dead Fuel.



Dead fuels are those wildland fuels whose moisture contents are controlled exclusively by changing weather conditions. Examples include dead herbaceous fuels, dead roundwood, fallen dead leaves and needles, and the litter of the forest floor. For purposes of fire behavior modeling, dead fuels are divided into four "timelag" categories: 1-hour, 10-hour, 100-hour, and 1000-hour fuels. The shorter the timelag, the more responsive the fuel is to changing weather conditions. For example, 1-hour fuels only take approximately one hour to respond to changing weather conditions, which explains why fire danger can be very high even right after a heavy rain if the subsequent weather conditions allow the 1-hour fuels to dry out.

Dead fuel moisture is calculated from observed and forecast weather data. Model calculations of 1-hour, 10-hour, 100-hour, and 1000-hour fuel moisture are made every hour at all Oklahoma Mesonet weather tower sites. 1-hr and 10-hr Dead Fuel Maps can be viewed on the app by selecting "Maps" then "Fire Weather".

On the Mesonet mobile website, m.mesonet.org, you can view the same maps as in the app. Also included on the mobile website is Local Fire Conditions for all 120 Mesonet stations. To view, just select "Fire Weather" from the menu. ■



The Two Faces of January

By Gary McManus, State Climatologist

JANUARY WRAP-UP

The old adage “numbers never lie” is a good principle in theory, but often dangerous if used within the context of Oklahoma’s eccentric weather patterns. For example, the statewide average temperature and precipitation values for January ended very close to normal, but the journey to those numbers was anything but. The first half of the month was frigid and mostly dry, somewhat typical of a cold Oklahoma January. Around the 15th, however, the weather decided it was time for spring a couple of months early. The second half of the month brought a string of record-breaking temperatures, high fire danger and bursts of moisture. According to preliminary data from the Oklahoma Mesonet, the statewide average temperature was 37.9 degrees, just a couple of tenths of a degree above normal and the 51st warmest January since records began in 1895. But again, the journey to those numbers was the remarkable story. For example, the statewide average high temperature for the Jan. 1-14 period was 37.4 degrees, 11.1 degrees below normal while the second half enjoyed a statewide average high of 60 degrees, 10.1 degrees above normal. Oklahoma City broke daily maximum temperature records on four separate days, including three in a row from Jan. 26-28. During those periods of record warmth, wildfire danger rose to extreme levels with strong gusty winds and low humidity accompanying the warm weather. The highest January temperature recorded by the Mesonet was 84 degrees at Alva on January 27 and the lowest was minus 6 degrees at Boise City on the fourth.

The January statewide average precipitation total of 1.53 inches was equally unremarkable, just three-hundredths below normal to rank as the 48th wettest on record. One would be hard pressed to find a northeastern Oklahoman satisfied with their moisture totals for the month, however, since most of that region ended with a deficit of 1-2 inches. On the other hand, much of southern and western Oklahoma had a surplus. And while that moisture was much needed, it must be remembered that January is normally Oklahoma’s driest month, so a surplus is not necessarily the bounty it appears to be at first glance. The Mesonet site at Broken Bow in far southeastern Oklahoma led the state with 4.82 inches. Hooker had the lowest January total at 0.55 inches. Some of January’s moisture fell as snow and ice. Boise City reported 14 inches of snow for January, about twice the next highest total of 7.5 inches at Sayre. Boise City has recorded a total of 20.7 inches for the season thus far. Guymon and Erick are the only other locations in double digits with 11.8 inches and 10.8 inches, respectively.

The surplus moisture across western and southern Oklahoma was not enough to make a big dent in the drought, now well into its fifth year. Some areas report a shortfall of more than 50 inches since the drought began back in the fall of 2010. At month’s end, more than 60 percent of the state was considered to be in drought by the U.S. Drought Monitor, with at least 45 percent in the severe category. The amount in extreme-exceptional drought held steady at about 23 percent. The Drought Monitor’s intensity scale slides from moderate-severe-extreme-exceptional, with exceptional being the worst classification.

37.9°F
average statewide temperature for January

1.53″
average statewide precipitation for January

84°F
highest January temperature recorded by the Mesonet at Alva

45 PERCENT
of the state in severe drought according to the U.S. Drought Monitor on January 27

CALENDAR

FEBRUARY

- 6th: Okla Assoc Environmental Education 2015 Expo, NWC, Norman
- 7th: Irving Middle School Science Olympiad Invitational
- 13th: OK Crop Improvement Annual Meeting, OKC
- 13th-14th: American Farmers & Ranchers Annual Convention, Norman
- 16th: OSU Osher Lifelong Learning Institute, Session 1, Oklahoma History Center
- 19th-20th: Mesonet booth at Oklahoma Sheriff's Association Conference
- 23rd: OSU Osher Lifelong Learning Institute, Session 2, Oklahoma History Center
- 25th: EM Day at the Capitol
- 28th: Organic Oklahoma 2015 presentation, OSU-OKC

MARCH

- 2nd: OSU Osher Lifelong Learning Institute, Session 3, Oklahoma History Center
- 2nd-5th: OK-First Certification Course, Norman
- 5th: Steering Committee Meeting, Stillwater
- 9th: OSU Osher Lifelong Learning Institute, Session 4, Oklahoma History Center
- 10th-11th: OK-First Assistant Certification Course, Norman

Tweet of the Month

@CoreyLambrecht - Jan 27 - Current status: Stalking the @okmesonet

Find us on

CONTACTS

Accessing recent (within the past 7 days) Mesonet data
Contact: Mesonet Operator

Instrumentation, telecommunications, or other technical specifications
Contact: Chris Fiebrich

Mesonet agricultural data and products
Contact: Al Sutherland

Mesonet meteorological data
Contact: OCS Data Requests

Earthstorm - K-12 educational outreach
Contact: Andrea Melvin

OK-First - Public safety outreach
Contact: James Hocker

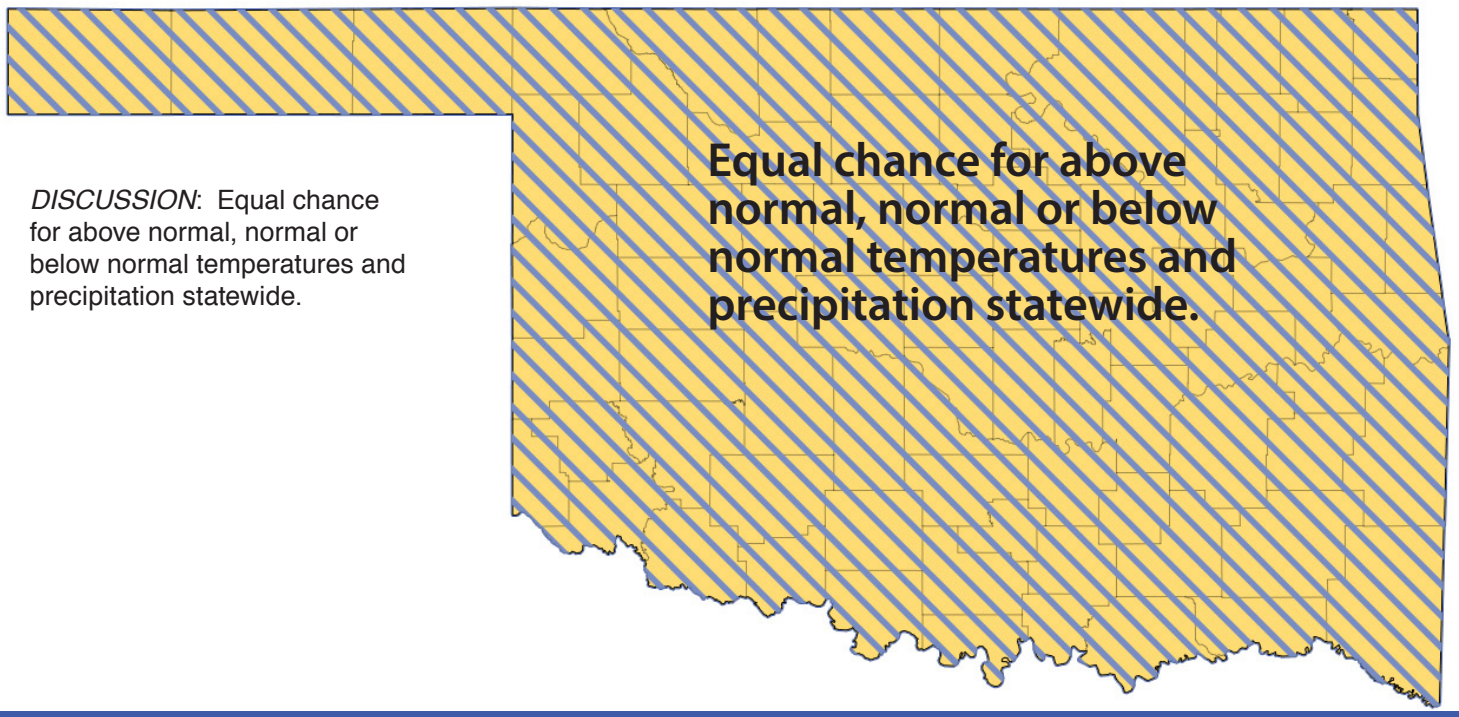
OK-FIRE - Fire management outreach
Contact: J.D. Carlson

Not sure?
Contact: 405-325-2541 or Chris Fiebrich.

FORECAST FOR FEBRUARY

Click here to view the original maps from the Climate Prediction Center.

DISCUSSION: Equal chance for above normal, normal or below normal temperatures and precipitation statewide.



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