



# Water and Climate Update

December 31, 2015

The Natural Resources Conservation Service produces this weekly report using data and products from the National Water and Climate Center and other agencies. The report focuses on seasonal snowpack, precipitation, temperature, and drought conditions in the U.S.

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## Weekly Highlight: Historic, widespread flooding along the lower Mississippi River

[Streamflow](#) is notably high in the Midwest, lower Mississippi River Valley, and the Southeast. A large number of rivers in the central U.S., eastern Texas, along the Mississippi River, and in the Southeast are above flood stage.



*The Mississippi River flows past the Gateway Arch in St. Louis. A rare winter flood threatens nearly two dozen federal levees in Missouri and Illinois on Wednesday as rivers rose, prompting evacuations in several places. Photo: Jeff Roberson, AP*

News: [Swollen Mississippi River to crest in Missouri](#)

## Snow

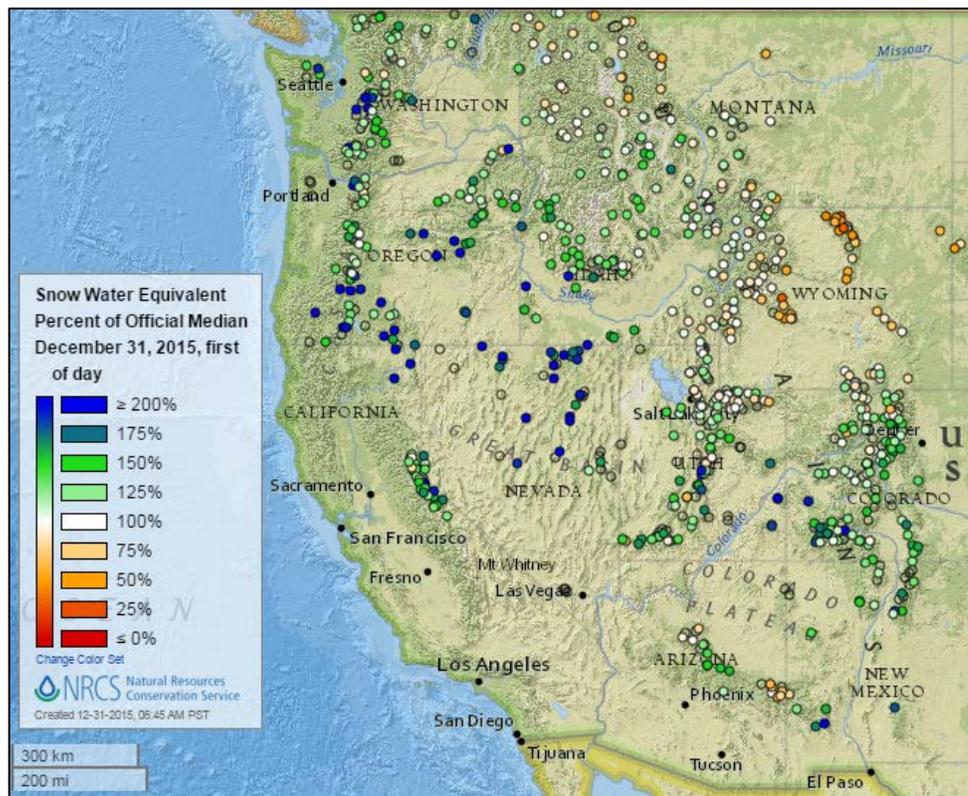
### Monthly, January 1 Snow Surveys

Snow surveys have been reported in many states in preparation for the monthly water supply forecasts. Several news stories have captured the good start to the snowpack across much of the West which was most hard hit from the current drought. News stories include:

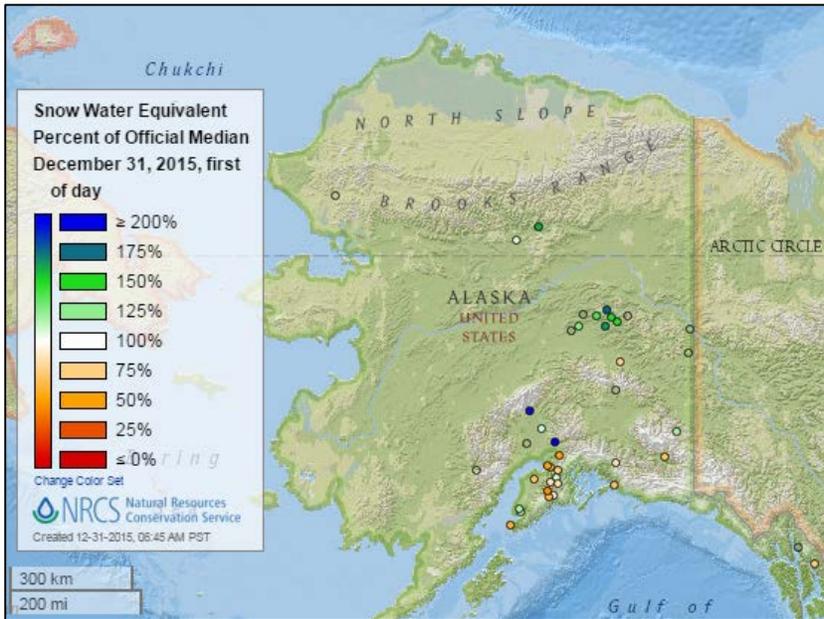
- Video: [Snow survey shows water levels above average](#) (1:32) | [KTVB-TV](#)
- [Community Ag Alliance: The science of snowmelt and water supply forecasting](#) | [Steamboat & Pilot Today](#)
- Video: [Oregon snow survey: 'Ahead of the game' on this year's snowpack](#) (0:19) | [KATU-TV](#)
- [Nevada's overlooked outback stoked on snow, at least for now](#) | [Reno Gazette-Journal](#)
- Washington State: [Drought concerns continue in Lower Valley](#) | [Daily Sun News](#)
- [Here are the latest basin high/low graphs from the NRCS](#) | [Coyote Gulch](#)
- Montana **SNOTEL**: [Snowpack still below average](#) | [Hungry Horse News](#)
- [December snow survey brings good news for California water outlook](#) | [Sacramento Bee](#)
- [Sierra snowpack 136 percent of normal](#) | [San Jose Mercury News](#)

### Current Snow Water Equivalent, Western Mountain Sites (NRCS SNOTEL Network)

The current [snow water equivalent percent of median](#) map shows that the snowpack in the West is primarily at median or above at this time. The Bighorn Mountains of Wyoming, a few stations in the eastern slope of the Rockies, and a few stations in the Southwest have areas with below median snowpack at this time.

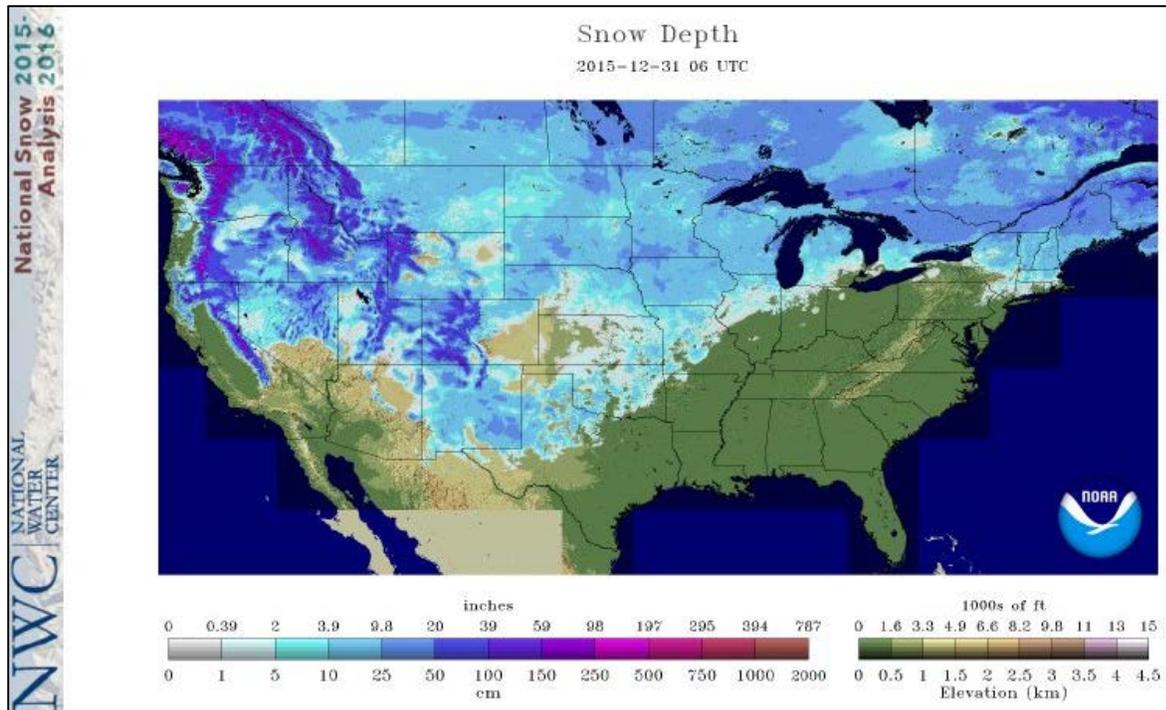


Current Snow Water Equivalent, NRCS SNOTEL Network



The current [snow water equivalent percent of median](#) map for Alaska shows median to above median snowpack in the Interior, and median to below median snowpack along the southern part of the state.

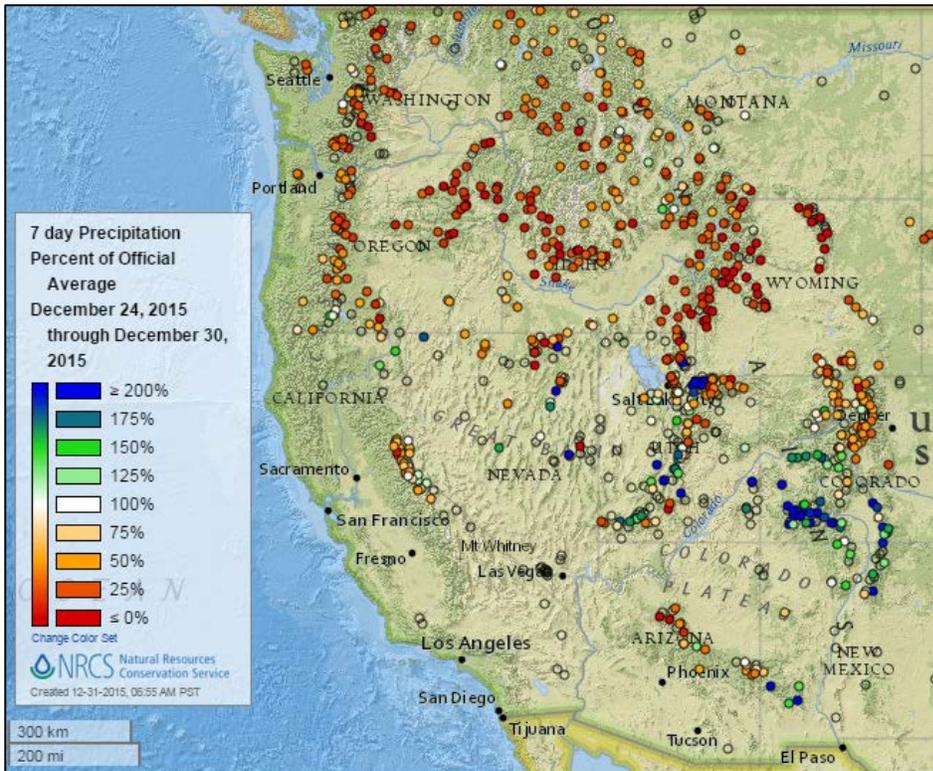
Current Snow Depth, National Weather Service (NWS) Networks



The National Water Center's current [snow depth](#) map for the continental U.S. shows areas of significant snow accumulation across much of the West and from the Northern Great Plains to the upper Midwest. There is also a start to the snowpack across the Great Lakes to New York and New England.

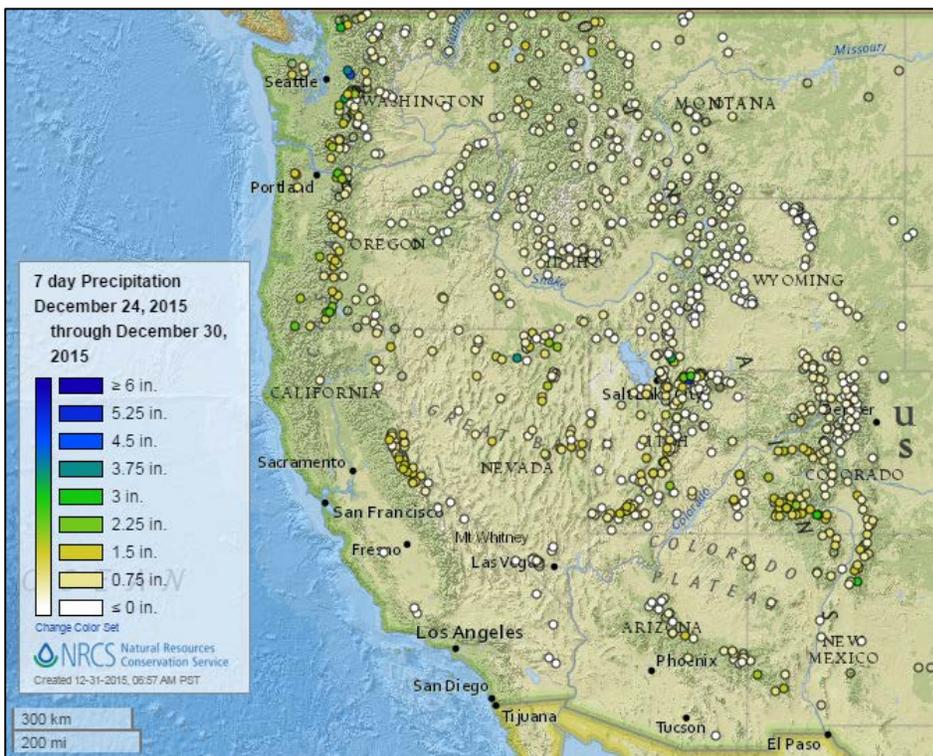
## Precipitation

### Last 7 Days, Western Mountain Sites (NRCS SNOTEL Network)



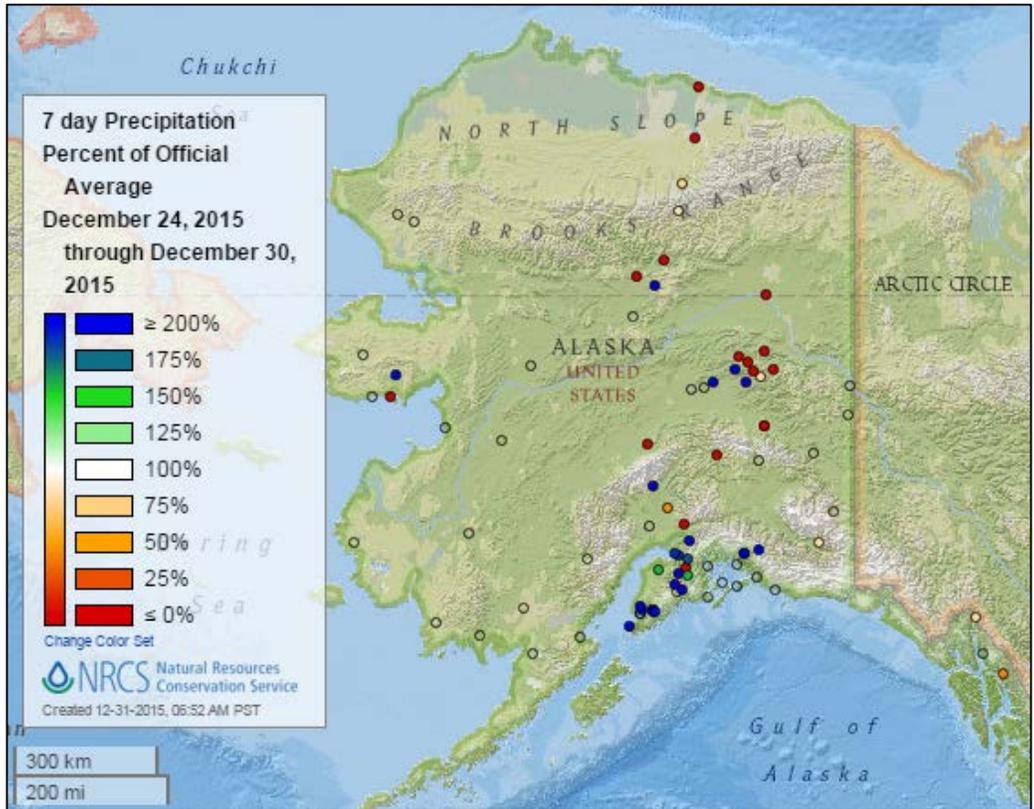
The 7-day [precipitation percent of average](#) map shows that much of the West had many stations with less than average precipitation this week.

A few stations in northern California, Nevada, Utah, Colorado, Arizona, and New Mexico reported above average precipitation.



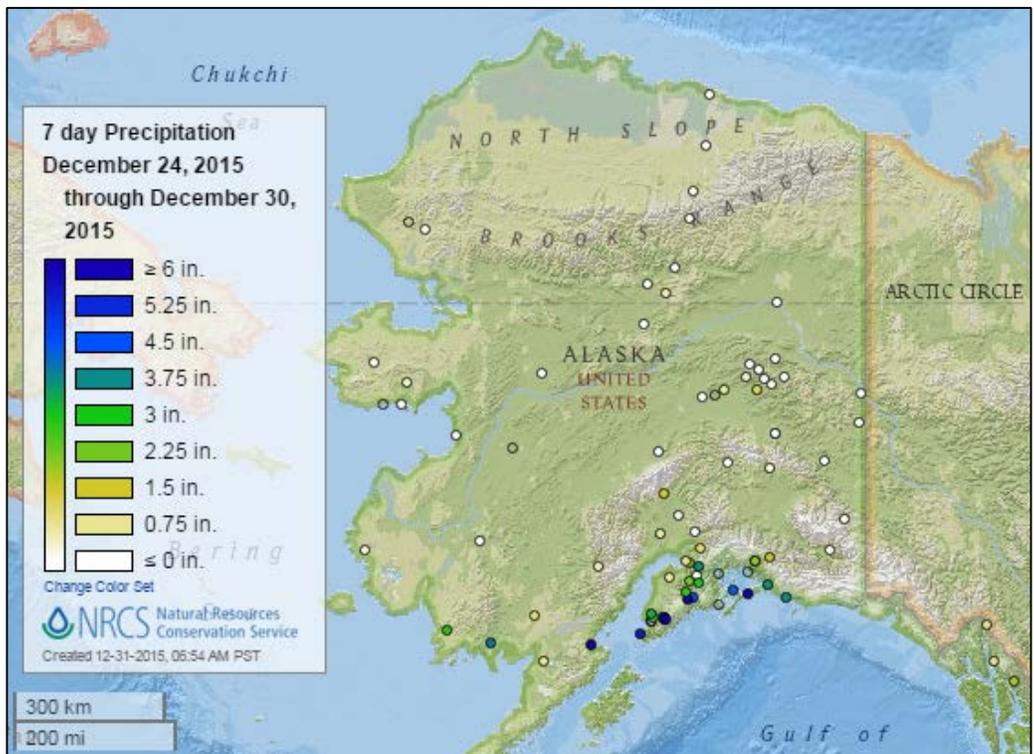
The [total precipitation](#) map shows that much of the West received less than 1.5 inches for the week. There were a few stations in Washington, Oregon, Nevada, Utah, Colorado, and New Mexico that received over 3 inches.

The Alaska [precipitation percent of average](#) map for the last seven days shows a mix of above and below average precipitation across the state.



The Alaska seven day [total precipitation](#) map shows that little to no total precipitation fell in much of the state this week.

In contrast, southern Alaska had several stations with over 4 inches along the coast.



Last 7 Days, National Weather Service (NWS) Networks

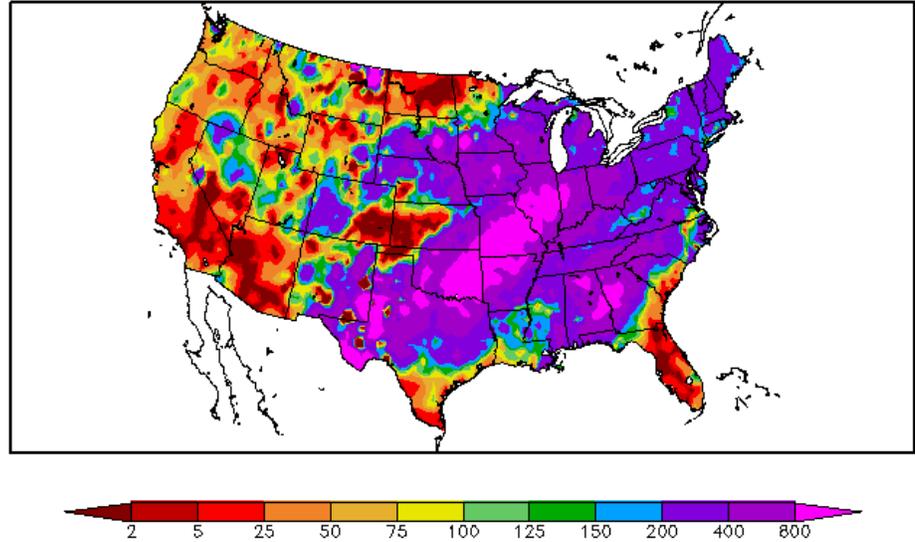
Source: Regional Climate Centers

Percent of Normal Precipitation (%)  
12/24/2015 – 12/30/2015

The [percent of normal precipitation](#)

map shows well above normal precipitation over much of the eastern half of the country. The central U.S. had a wide region receiving over 800 percent of normal precipitation.

Very dry conditions dominated areas of the Southwest, northern Plains, western Nebraska, eastern Colorado, and Florida



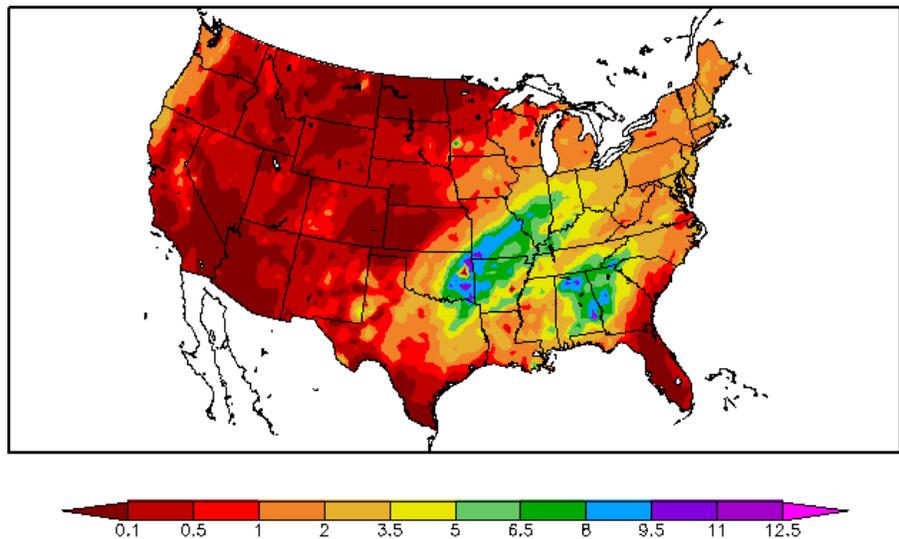
Generated 12/31/2015 at HPRCC using provisional data.

Regional Climate Centers

Precipitation (in)  
12/24/2015 – 12/30/2015

The [7-day total precipitation](#) map

prominently shows the highest amounts of precipitation over 9.5 inches in eastern Oklahoma, western Arkansas, southern Missouri, as well as parts of Alabama and Georgia. Much of the remainder of the country had less than 2 inches of precipitation or was dry for the week.



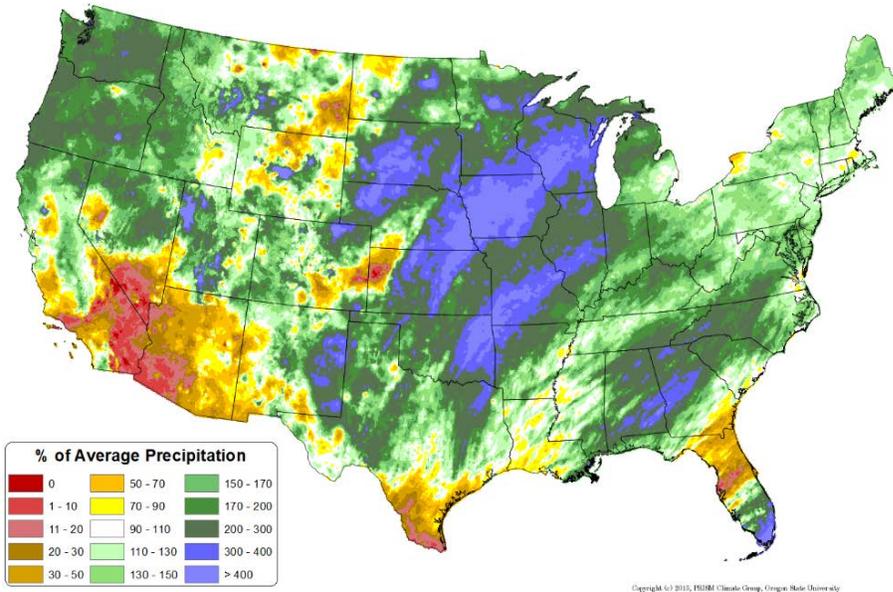
Generated 12/31/2015 at HPRCC using provisional data.

Regional Climate Centers

Month-to-Date, All Available Data Including SNOTEL and NWS Networks

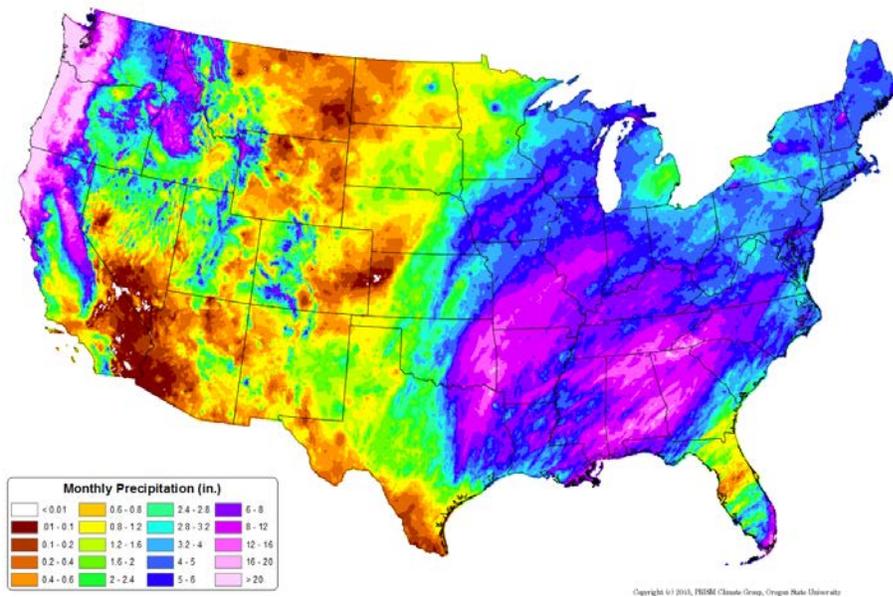
Source: PRISM

Total Precipitation Anomaly: 01 December 2015 - 29 December 2015  
 Period ending 7 AM EST 29 Dec 2015  
 Base period: 1981-2010  
 (Map created 30 Dec 2015)



For the month of December to date, the national [precipitation percent of average](#) map shows the largest area of well above average precipitation in the central to northern U.S., southern Florida, and the Southeast. Drier than average areas include parts of the Southwest, southern California, and other smaller areas across the country.

Total Precipitation: 01 December 2015 - 29 December 2015  
 Period ending 7 AM EST 29 Dec 2015  
 (Map created 30 Dec 2015)

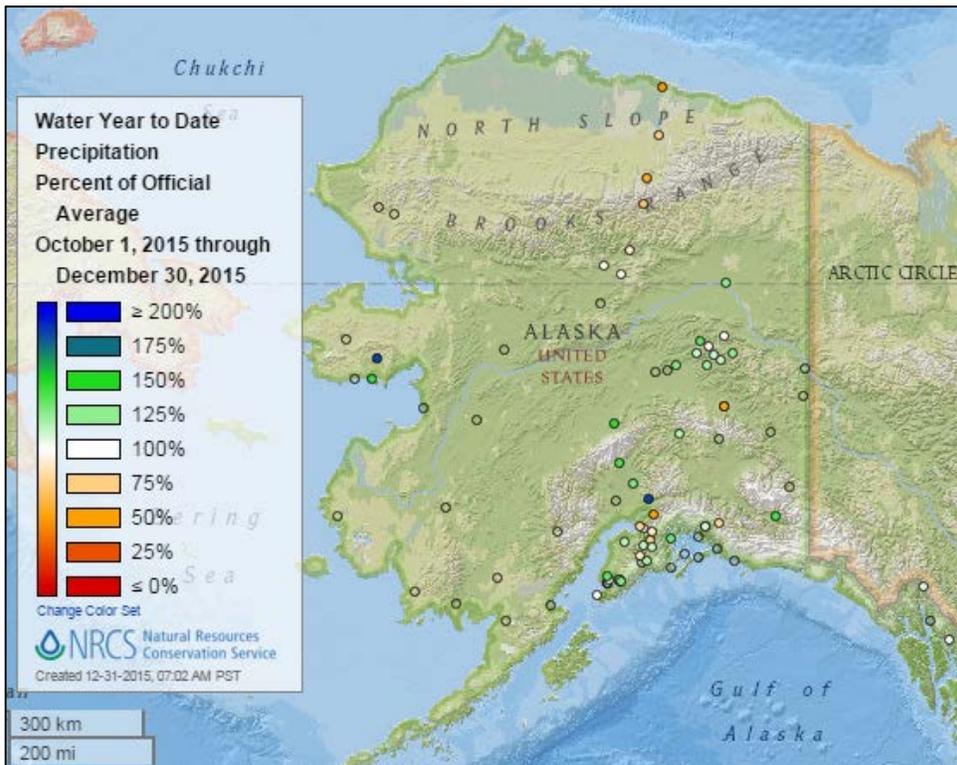
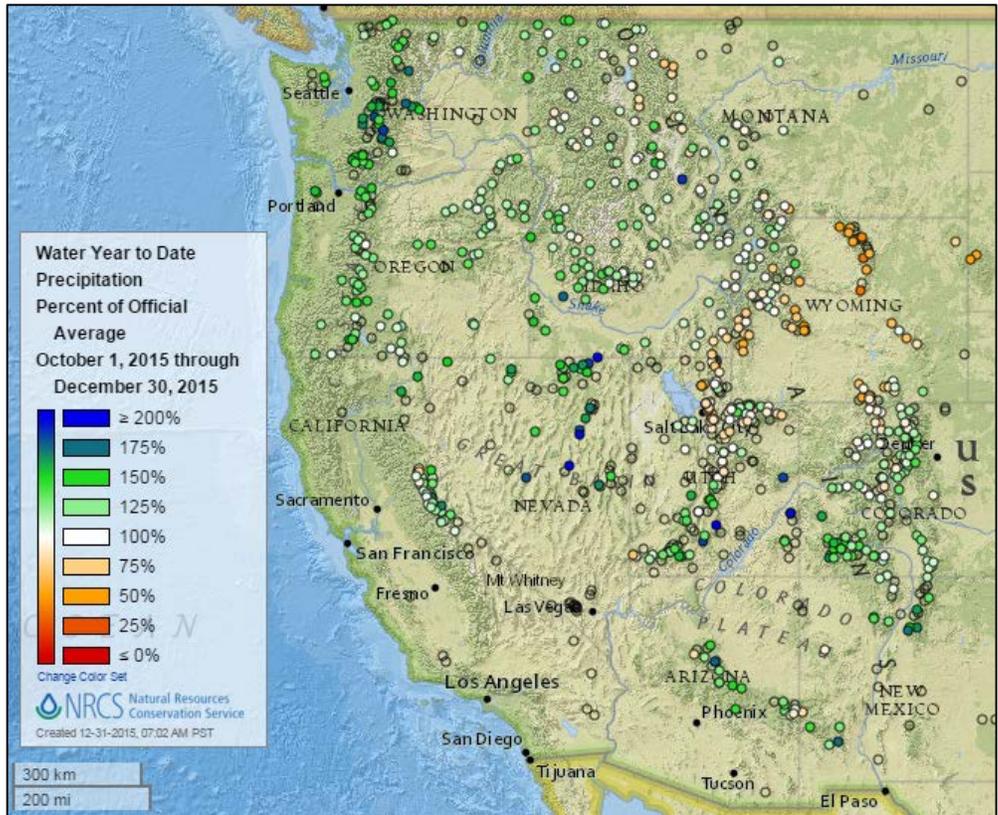


The December month-to-date [total precipitation map](#) highlights heavy precipitation in the western edge of the Pacific Northwest into northern California, the Southeast, and along the Oklahoma/Texas/Arkansas border, where amounts exceeded 16 inches. In the Southeast and southern Florida amounts exceeded 12 inches.

Noticeably dry areas include small areas of southern California, the western Great Plains, and valleys in the Southwest.

Water Year-to-Date, Western Mountain Sites (NRCS SNOTEL Network)

For the [2016 water year to date precipitation percent of average](#) that began on October 1, 2015, much of the West reported average to above average precipitation. Below average areas included much of Wyoming and a few stations east of the Rocky Mountains.



The Alaska [water year to date precipitation percent of average](#) map shows a mix of above, near, and below average sites throughout the state.

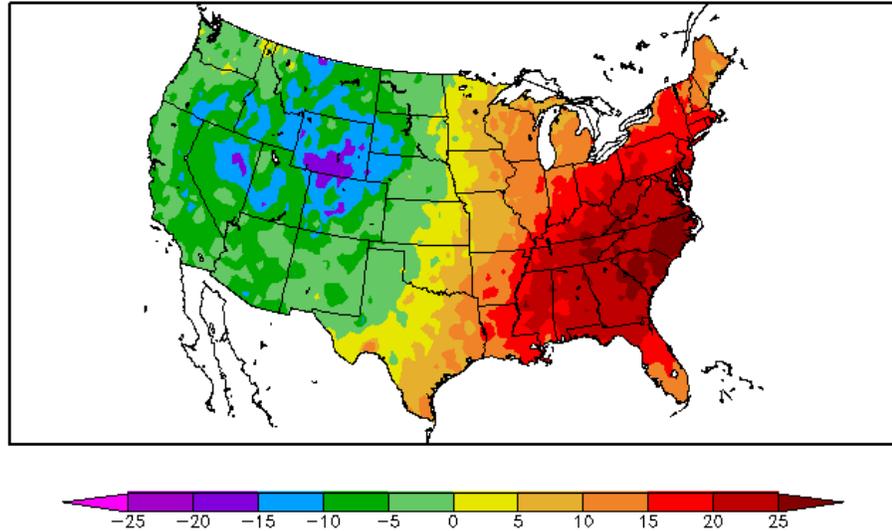
## Temperature

### Last 7 Days, National Weather Service (NWS) Networks

Source: Regional Climate Centers

The map of the [average temperature anomalies](#) for the past week shows the eastern half of the country was warmer than normal for the week. The warmest temperatures were along the east coast, with more than 25 degrees above normal temperatures. The central U.S. and the West reported temperatures near or below normal. The coolest areas of the country were in eastern Nevada and the Rockies.

Departure from Normal Temperature (F)  
12/24/2015 – 12/30/2015



Generated 12/31/2015 at HPRCC using provisional data.

Regional Climate Centers

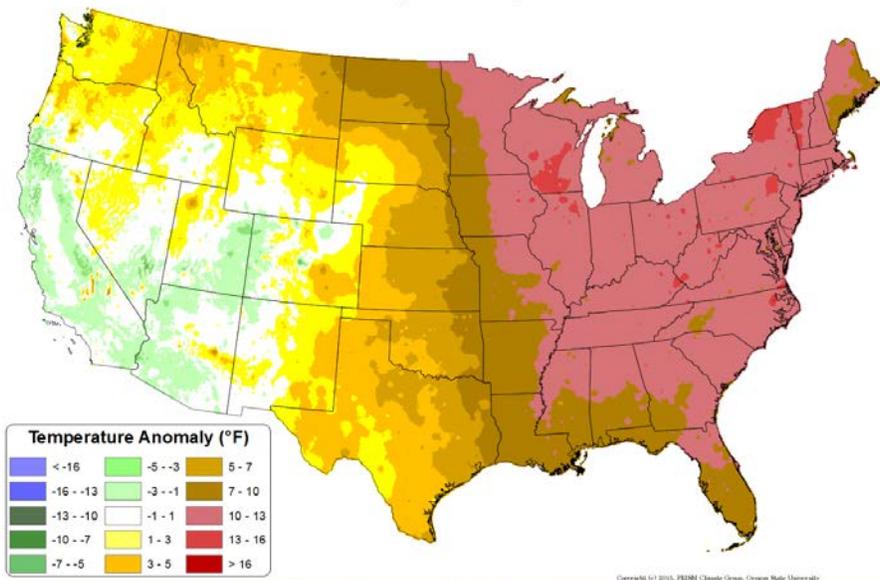
### Month-to-Date, All Available Data Including SNOTEL and NWS Networks

Source: PRISM

For December 2015, the national [daily mean temperature anomaly](#) map shows well above normal temperatures in the eastern U.S. Most of the remainder of the country was also above normal, to a lesser extent.

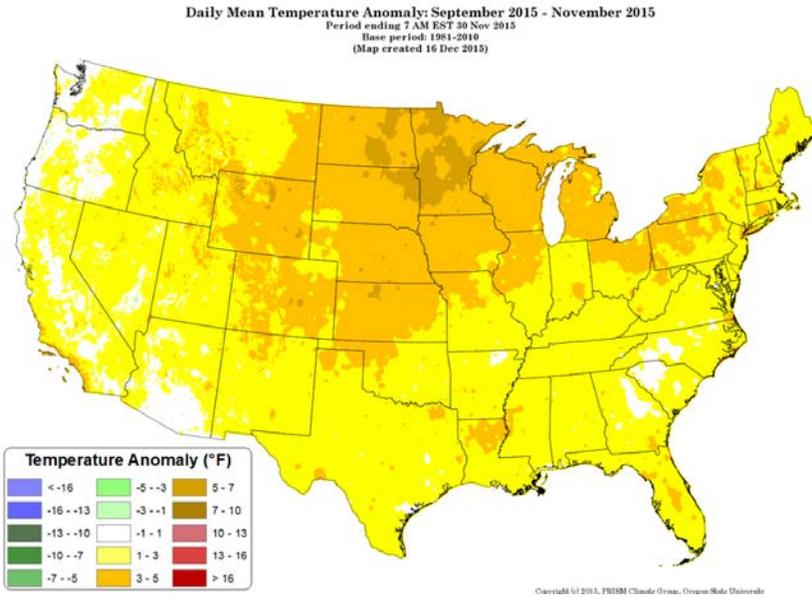
The exception to this was in California and the Southwest, which had areas near normal to slightly cooler than normal for the month.

Daily Mean Temperature Anomaly: 01 December 2015 - 29 December 2015  
Period ending 7 AM EST 29 Dec 2015  
Base period: 1981-2010  
(Map created 20 Dec 2015)



Last 3 Months, All Available Data Including SNOTEL and NWS Networks

Source: PRISM

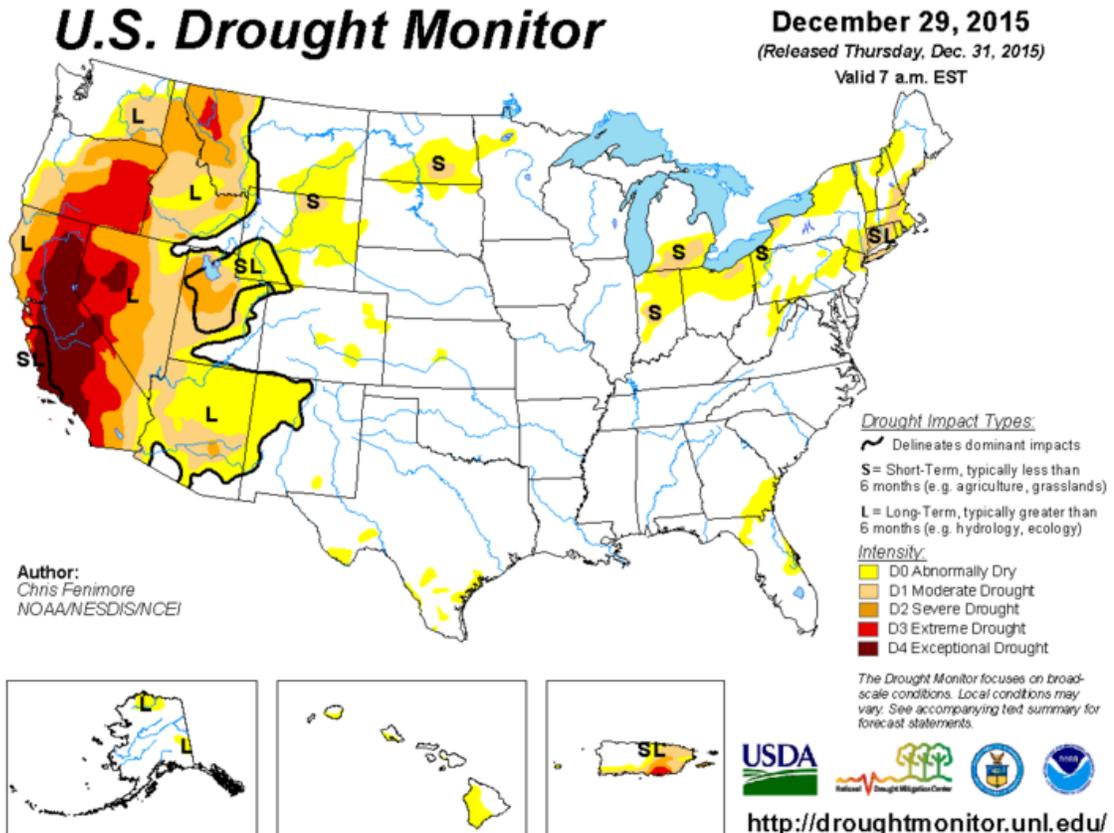


The September through November national [daily mean temperature anomaly](#) map shows most of the country reporting conditions slightly above average. The largest warm anomaly for the past three months was in the upper Midwest, centered in Minnesota.

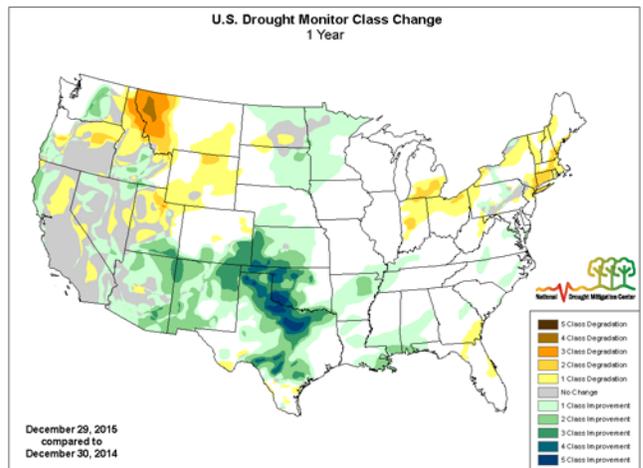
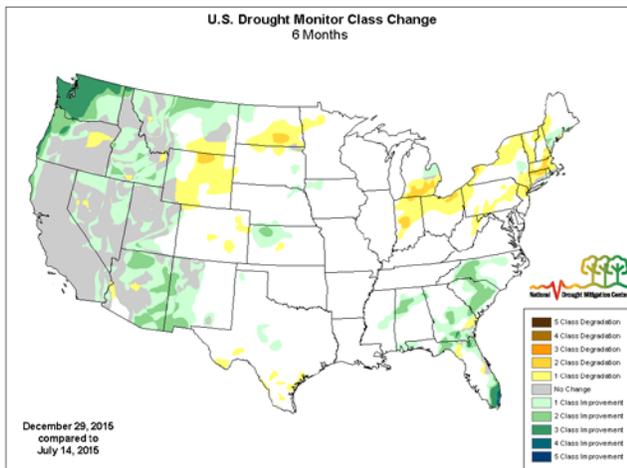
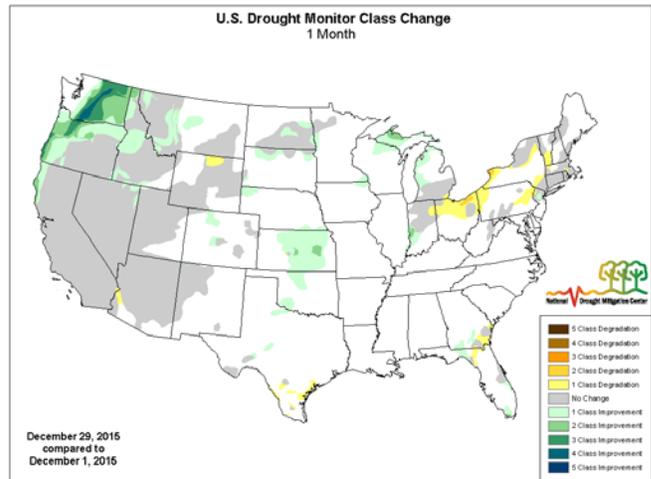
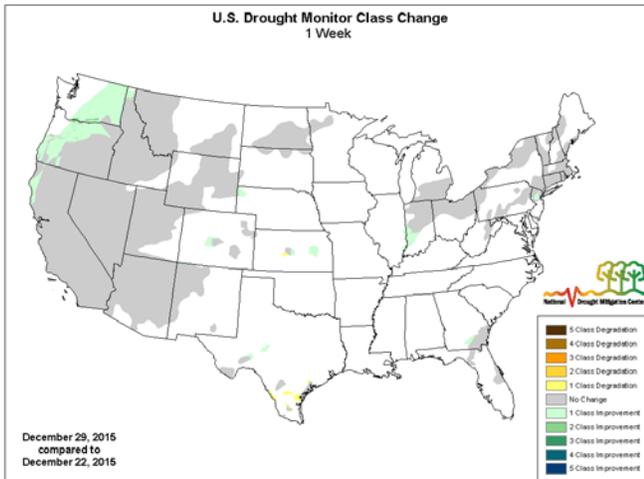
## Drought

[U.S. Drought Portal](#) Comprehensive drought resource

[U.S. Drought Monitor](#) See map below. Drought conditions continue in the West Coast states, including the exceptional drought in California and Nevada.



## Changes in Drought Monitor Categories over Time



[Drought conditions](#) have improved in much of the country, especially in the south-central U.S. The West has shown improvement, but long-term drought persists.

### Current National [Drought Summary](#), December 29, 2015

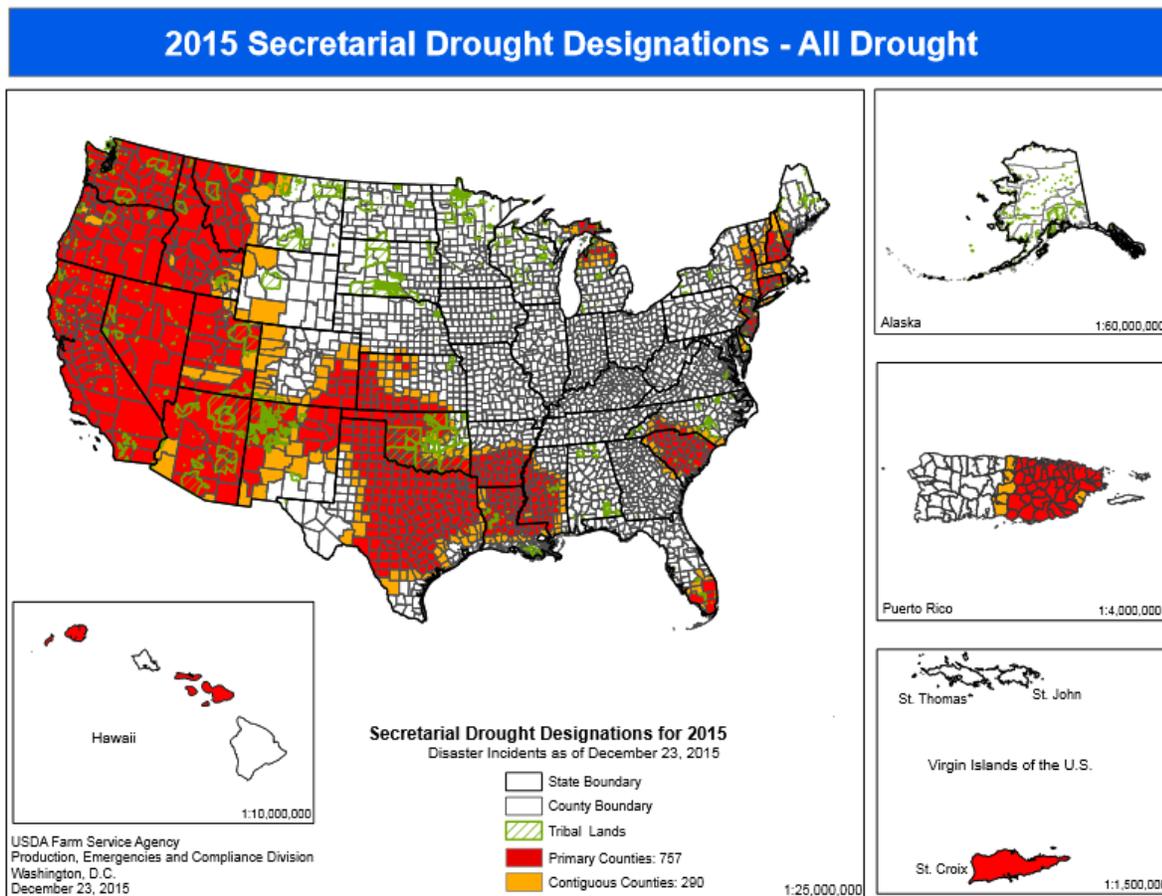
Author: Chris Fenimore, NOAA/NESDIS/NCEI

A large complex storm system produced copious amounts of precipitation in the Central and Southern US during this USDM week. The seasonably cold air behind the system mixed with the unseasonably warm, moist air that was entrenched across the east. This produced an unstable air mass kicking off heavy rains, thunderstorms, blizzards, tornadoes and historic flooding. Rainfall amounts on the warm side of the system were in excess of 10 inches, while some areas received more than 20 inches of snow on the cold side. The 7-day precipitation totals amounted to 800 percent of normal or greater for a large swath stretching from eastern Oklahoma, northwest Arkansas, much of Missouri, and Illinois. Portions of Alabama and Georgia also recorded far greater than normal precipitation amounts. The larger precipitation amounts missed areas in western Kansas, eastern Colorado, south Texas, Florida, the Desert Southwest, and areas in the Northern and High Plains. Record setting warm temperatures occurred across large portions of the eastern third of the US. Average temperature departures were in the range of 20-25 degrees above normal for the USDM week. Temperature anomalies were as much as 20 degrees below normal in the western third of the country.

The following is a list of preliminary daily and monthly temperature data records that were tied or broken during the period from December 23 – 29:

- 1926 highest daily max temperatures
- 2019 highest daily min temperatures
- 59 highest monthly max temperatures
- 240 highest monthly min temperatures”

### 2015 USDA Drought Designations



[Drought Designations as of December 23, 2015](#)

[USDA Disaster and Drought Information](#)

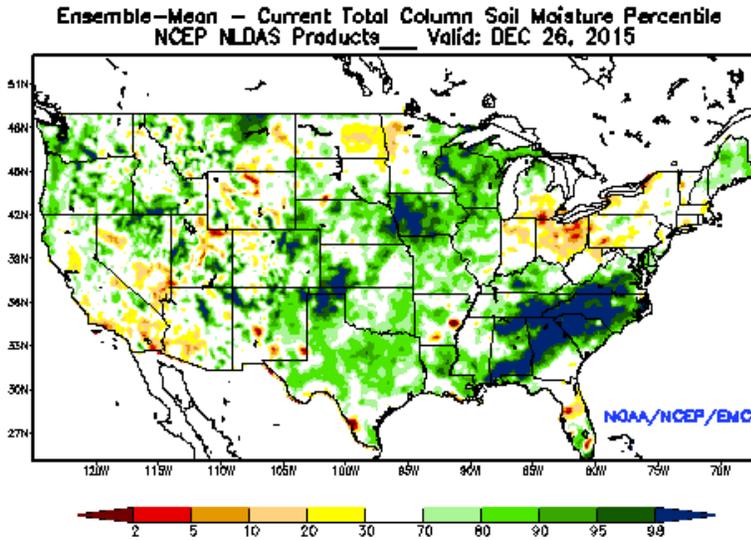
[U.S. Population in Drought, Weekly Comparison](#)

### Highlighted Drought Resources

- [Drought Impact Reporter](#)
- [Quarterly Regional Climate Impacts and Outlook](#)
- [U.S. Drought Portal Indicators and Monitoring](#)

## Other Climatic and Water Supply Indicators

### Soil Moisture



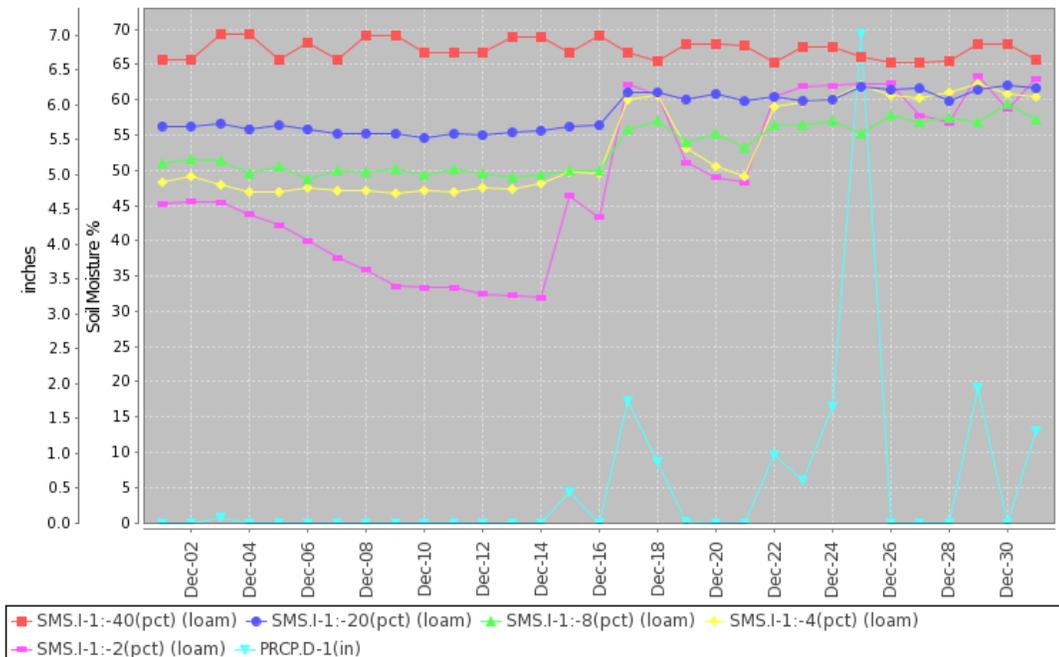
The modeled [soil moisture percentiles](#) as of December 26, 2015 show scattered areas of dryness in the West, the Midwest, and the Northeast.

Above average soil moisture was modeled in much of the Pacific Northwest, northern Texas, Iowa, and a large area in the Southeast.

[University of Washington Experimental Modeled Soil Moisture](#)

### Soil Moisture Data: NRCS [Soil Climate Analysis Network \(SCAN\)](#)

Station (2177) MONTH=2015-12-01 (Daily) NRCS National Water and Climate Center - Provisional Data - subject to revision  
Thu Dec 31 11:25:34 GMT-08:00 2015



This graph shows soil moisture (at 2-, 4-, 8-, 20-, and 40-inch depths) and precipitation for the last 30 days at the [Broad Acres SCAN Site # 2177](#) in Alabama. Soil moisture is extremely high in response to the recent very heavy precipitation events and has noticeably increased or at maximum at all depths.

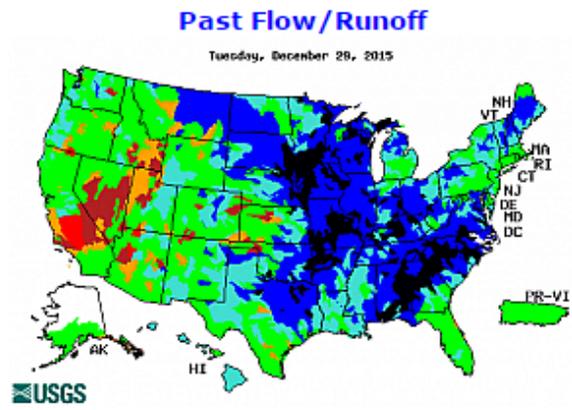
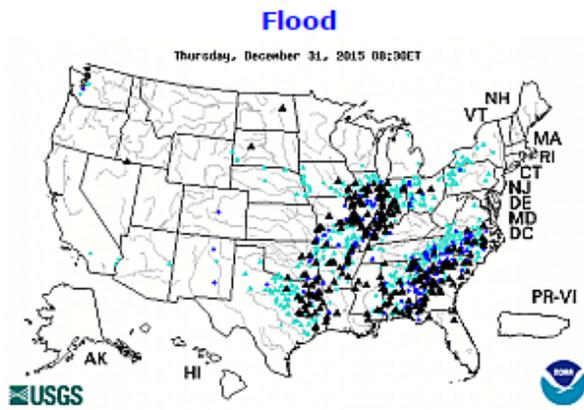
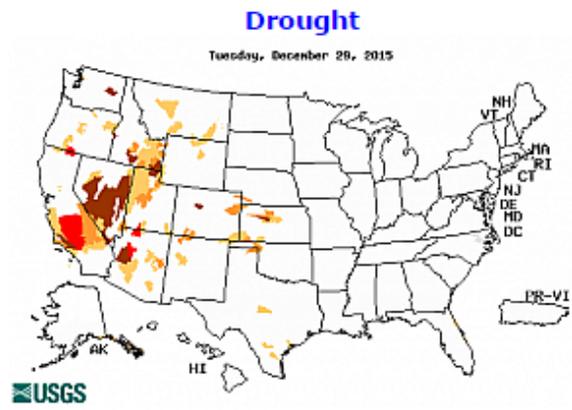
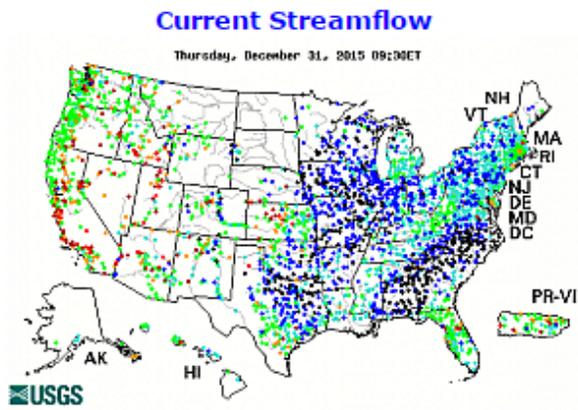
### Soil Moisture Data Portals

[CRN Soil Moisture](#)

[Texas A&M University North American Soil Moisture Database](#)

Streamflow

Source: USGS



**Streamflow** is notably high in the Midwest, lower Mississippi River Valley, and the Southeast. A large number of rivers in the central U.S., eastern Texas, along the Mississippi River, and in the Southeast are above flood stage.

Select any individual map to enlarge and display a legend.

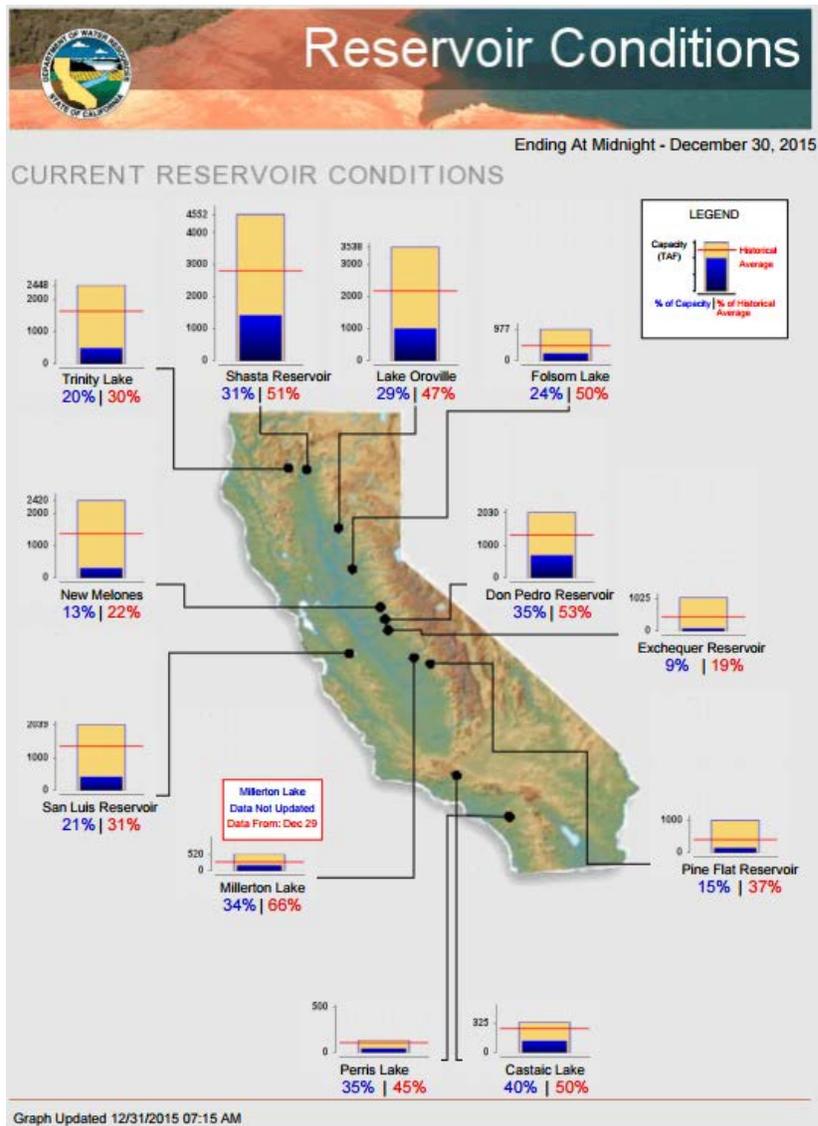
## Current Reservoir Storage

### [National Water and Climate Center Reservoir Data](#)

U.S. Bureau of Reclamation Hydromet Tea Cup Reservoir Depictions:

- [Upper Colorado](#)
- [Pacific Northwest/Snake/Columbia](#)
- [Sevier River Water, Utah](#)
- [Upper Missouri, Kansas, Oklahoma, Texas](#)

### [California Reservoir Conditions](#)



## Short- and Long-Range Outlooks

### Agricultural Weather Highlights

Author: Mark Brusberg, Deputy Chief Meteorologist, USDA/OCE/WAOB

**National Outlook, December 31, 2015:** “Showers will gradually diminish in the Southeast over the next few days, but a new surge of moisture emanating from Mexico will bring additional rain to southern Texas and Florida through the weekend. Farther north, lake-effect snow will continue to affect the Northeast. Elsewhere, snow showers currently over the Rockies are forecast to shift southward into the Four Corners Region before tapering off. By Sunday, a new Pacific storm system is expected to bring another round of precipitation to northern California. Dry weather will dominate the Nation’s mid-section as floodwaters move through the region. By New Year’s Eve, the Mississippi River crest is expected to reach Chester, Illinois, just a few feet below the August 1993 high-water mark. The NWS 6- to 10-day outlook for January 5 – 9, 2016, depicts wetter-than-normal weather from California to the Mississippi Valley and along the Gulf Coast to Florida. Drier conditions are forecast from the Pacific Northwest to the northern Plains and a large section of the Northeast. Near- to above-normal temperatures are expected over much of the Nation, the exception being the Northwest, where cooler weather should prevail. The highest likelihood of above-normal temperatures is in the Great Lakes Region and middle Mississippi Valley.”

### National Weather Hazards

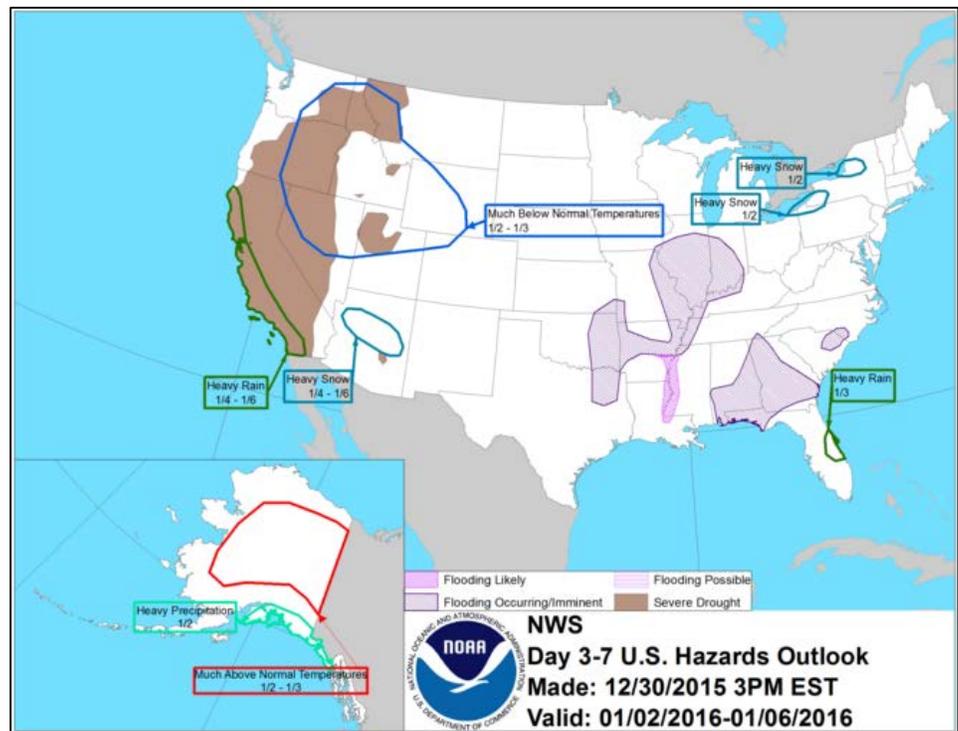
The outlook for [weather hazards](#) over the next week include heavy flooding likely in most of the middle and lower Mississippi River Basin, and across the Southeast.

Heavy lake-effect snow is expected along the eastern edge of the Great Lakes. Heavy snow is also expected in central Arizona.

Heavy rain is expected in eastern Florida and along the California coast. Cold temperatures are expected across the northern West.

In Alaska, much above normal temperatures are expected across much of the state with heavy precipitation along the southern coast.

Severe drought covers a large area of the West.

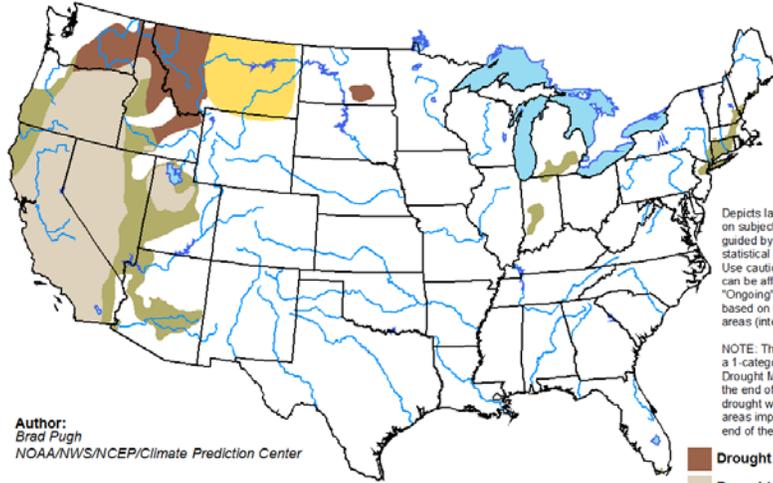


**Seasonal Drought Outlook**

During the next three months, **drought** will persist in the Northwest and may develop in eastern Montana and Hawaii. Elsewhere, most drought designations are expected to improve.

**U.S. Seasonal Drought Outlook**  
Drought Tendency During the Valid Period

Valid for December 17 - March 31, 2016  
Released December 17, 2015



Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:  
Brad Pugh  
NOAA/NWS/NCEP/Climate Prediction Center



- Drought persists
- Drought remains but improves
- Drought removal likely
- Drought development likely

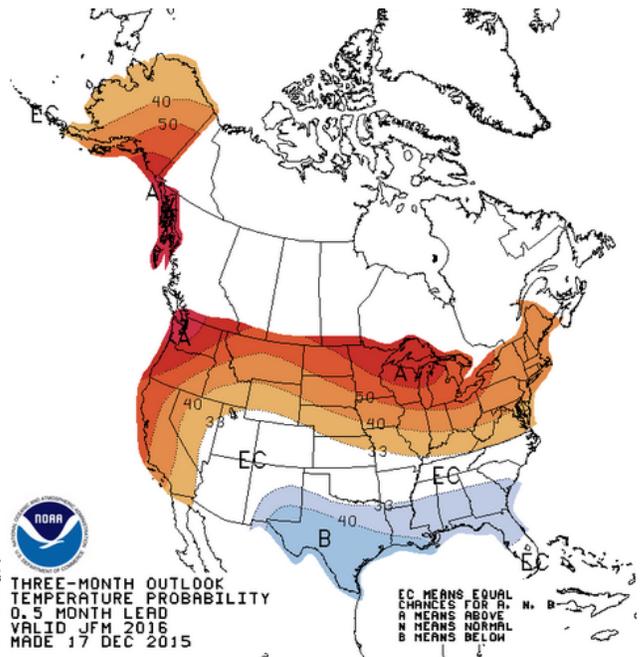
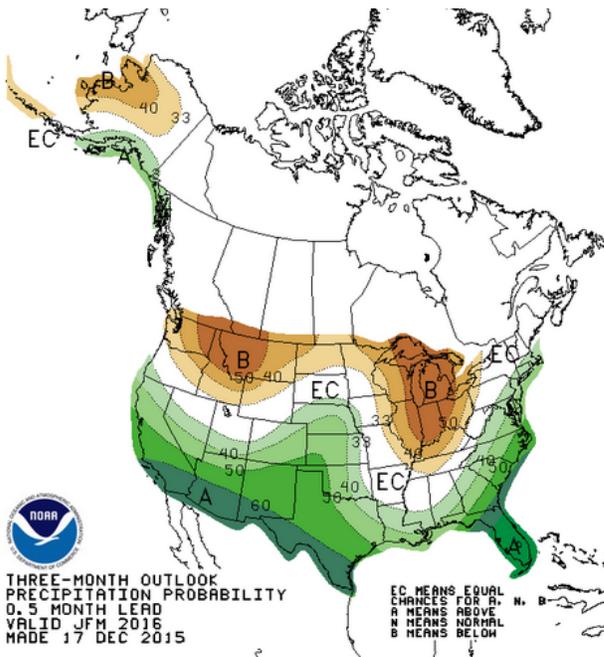


<http://go.usa.gov/3eZ73>

**NWS Climate Prediction Center 3-Month Outlook**

Precipitation

Temperature



THREE-MONTH OUTLOOK  
PRECIPITATION PROBABILITY  
0.5 MONTH LEAD  
VALID JFM 2016  
MADE 17 DEC 2015

EC MEANS EQUAL  
CHANCES FOR A, N, B  
A MEANS ABOVE  
N MEANS NORMAL  
B MEANS BELOW

THREE-MONTH OUTLOOK  
TEMPERATURE PROBABILITY  
0.5 MONTH LEAD  
VALID JFM 2016  
MADE 17 DEC 2015

EC MEANS EQUAL  
CHANCES FOR A, N, B  
A MEANS ABOVE  
N MEANS NORMAL  
B MEANS BELOW

### Outlook Summary

NWS Climate Prediction Center:

[“The January-February-March \(JFM\) 2016 precipitation outlook](#) The JFM 2016 precipitation outlook through the early spring continues to favor a pattern that is typically associated with El Niño. Enhanced odds for above-median precipitation are forecast across California, the Southwest, central/southern Great Plains, gulf coast states, and parts of the east coast. The highest probabilities (above 70 percent) for above-median precipitation are forecast across the Florida peninsula for JFM 2016 which typically has the strongest wet signal during El Niño. Below-median precipitation is favored through the early spring across the northern Rockies, parts of the northern Great Plains, Great Lakes, and the Ohio Valley. The dry signal across the Ohio Valley peaks during the JFM 2016 season during El Niño. This dry signal slowly weakens with time through late spring and early summer.”

[“The January-February-March \(JFM\) 2016 temperature outlook](#) There are very few changes to the early lead temperature outlooks, which largely harvest the low-frequency Enso response, evident among all the current dynamical and statistical guidance. Statistical guidance is generally colder than the dynamical guidance across the southeast, where a very slight shift toward colder temperatures is indicated near the Gulf Coast. Dynamical guidance indicates a slight cooling trend over that region compared to last month. In spite of the near-record warm December underway across much of the eastern two-third of the CONUS, the low-frequency climate signals still point toward a colder solution for the far southeastern CONUS. All temperature tools continue to strongly favor above-normal temperatures across the northern half of the continental U.S. Through the early spring which is consistent with a strong El Niño. Also, above-normal SSTs along the west coast contribute to the enhanced odds for above-normal temperatures in early leads. Below-normal temperatures favored for the southern high plains during the 2016 spring are partly related to the expectation of abnormally moist topsoil at that lead time.”

### More Information

The NRCS [National Water and Climate Center](#) publishes this weekly report. We welcome your feedback. If you have questions or comments, please [contact us](#).