



Natural Resources Conservation Service  
P.O. Box 2890  
Washington, D.C. 20013

**Weekly Report - Snowpack / Drought Monitor Update**      **Date:**    **18 December, 2008**

## **SNOTEL SNOWPACK AND PRECIPITATION SUMMARY**

**Snow:** Snow-water equivalent percent to date continues to show mostly low values across the West with some improvement over Colorado since last week. Few water basins are near or above the long term average for this time of year (Fig 1).

**Temperature:** SNOTEL and ACIS-day station average temperature anomalies were below normal during the past week across most locales across the West with the warmest departures over the Southwest (Fig. 2). Specifically, the greatest positive temperature departures occurred over southern New Mexico (>+5F) and the greatest negative departures occurred over Montana (<-20F) (Fig. 2a). It should be noted that the higher altitude SNOTEL sites appeared considerably cooler than the adjacent valley weather stations over western Wyoming.

**Precipitation:** ACIS 7-day average precipitation anomaly for the period ending 17 December shows significant amounts of precipitation scattered across a large region of southern California, the Southwest, Central Rockies, and northern Montana. Smaller amounts fell over portions of the Pacific Northwest (Fig. 3). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows values changing little since last week except for significant increases over Arizona and New Mexico (Fig. 3a). For precipitation totals, departures, and percent of normal for several time periods. See: <http://www.water.gov/> and <http://ciq.mesonet.org/~derek/public/droughtmonitoring/>.

For California drought: Drought Status (DS) Background:

[http://www.cnrfc.noaa.gov/products/Background\\_Drought\\_Product.pdf](http://www.cnrfc.noaa.gov/products/Background_Drought_Product.pdf)

Sacramento River DS: [http://www.cnrfc.noaa.gov/products/Drought\\_8si\\_product.pdf](http://www.cnrfc.noaa.gov/products/Drought_8si_product.pdf)

San Joaquin River DS: [http://www.cnrfc.noaa.gov/products/Drought\\_SJI\\_product.pdf](http://www.cnrfc.noaa.gov/products/Drought_SJI_product.pdf)

## **WESTERN DROUGHT STATUS**

**The West:** Despite recent storms, snowfall and water-year precipitation totals in the western U.S. continued to lag behind average as of the middle of December. A storm system dived southward into southern California during the period bringing rain to major cities and snowfall to areas above 4000 feet east of San Diego. Snow also fell in the Sierras of California during the week but as of December 15 the seasonal total in the northern and southern Sierras was near 70% of average. In much of northern California conditions continued to deteriorate as precipitation during the past month was more than 4 inches below normal. USGS streamflows remained well below average, and there were new reports of impacts to livestock operations and springs going dry for the first time in 60 years. Reflecting the deteriorating conditions, moderate (D1AH) and severe (D2AH) drought expanded westward in northern areas of the state and an area of extreme (D3) drought was introduced where deficits have been greatest. In western Oregon and southwestern Washington abnormally dry conditions (D0) expanded westward to the coast. In this area USGS 7- to 28-day streamflow values less than the 5<sup>th</sup> percentile, 30-day precipitation totals less than 50% of average and 90-day precipitation totals less than 70% of average reflected the abnormally dry conditions. In western Montana most locations received only 2 to 4 inches of snow during the past week. Early-season snowpack less than 50% of average for most areas resulted in a 1-

## Weekly Snowpack and Drought Monitor Update Report

category degradation to moderate (D1AH) drought and abnormally dry (D0) conditions. Other changes to drought designations will be made in the coming weeks as the western snowpack continues to develop. Author: Jay Lawrimore, NOAA/NCDC.

***A comprehensive narrative describing drought conditions for the nation can be found at the end of this document.***

### **DROUGHT IMPACTS DEFINITIONS** (<http://drought.unl.edu/dm/classify.htm>)

The possible impacts associated with **D4 (H, A)** drought include widespread crop/pasture losses and shortages of water in reservoirs, streams, and wells creating water emergencies. The possible impacts associated with **D3 (H, A)** drought include major crop/pasture losses and widespread water shortages or restrictions. Possible impacts from **D2 (H, A)** drought are focused on water shortages common and water restrictions imposed and crop or pasture losses likely. The possible impacts associated with **D1 (H, A)** drought are focused on water shortages developing in streams, reservoirs, or wells, and some damage to crops and pastures (Figs. 4, 4a, and 4b).

### **SOIL MOISTURE**

Soil moisture (Figs. 5a and 5b), is simulated by the [VIC macroscale hydrologic model](#). The detailed, physically-based VIC model is driven by observed daily precipitation and temperature maxima and minima from approximately 2130 stations, selected for reporting reliably in real-time and for having records of longer than 45 years (and various other criteria).

### **OBSERVED FIRE DANGER CLASS**

The National Interagency Coordination Center provides a variety of products that describe the current wildfire status for the U.S. - [http://activefiremaps.fs.fed.us/lq\\_fire2.php](http://activefiremaps.fs.fed.us/lq_fire2.php). The latest Observed Fire Danger Class is shown in Figs. 6 shows the current active wildfires across the West - <http://geomac.usgs.gov/>.

### **U.S. HISTORICAL STREAMFLOW**

This map, (Fig. 7) shows the 7-day average streamflow conditions in hydrologic units of the United States and Puerto Rico for the day of year. The colors represent 7-day average streamflow percentiles based on historical streamflow for the day of the year. Thus, the map shows conditions adjusted for this time of the year. Only stations having at least 30 years of record are used. Sub-regions shaded gray indicate that insufficient data were available to compute a reliable 7-day average streamflow value. During winter months, this situation frequently arises due to ice effects. The data used to produce this map are provisional and have not been reviewed or edited. They may be subject to significant change.

[http://water.usgs.gov/cgi-bin/waterwatch?state=us&map\\_type=dryw&web\\_type=map](http://water.usgs.gov/cgi-bin/waterwatch?state=us&map_type=dryw&web_type=map).

### **STATE ACTIVITIES**

State government drought activities can be tracked at the following URL:

<http://drought.unl.edu/mitigate/mitigate.htm>. NRCS SS/WSF State Office personnel are participating in state drought committee meetings and providing the committees and media with appropriate SS/WSF information - <http://www.wcc.nrcs.usda.gov/cgibin/bor.pl>. Additional information describing the products available from the Drought Monitor can be found at the following URL: <http://drought.unl.edu/dm/>

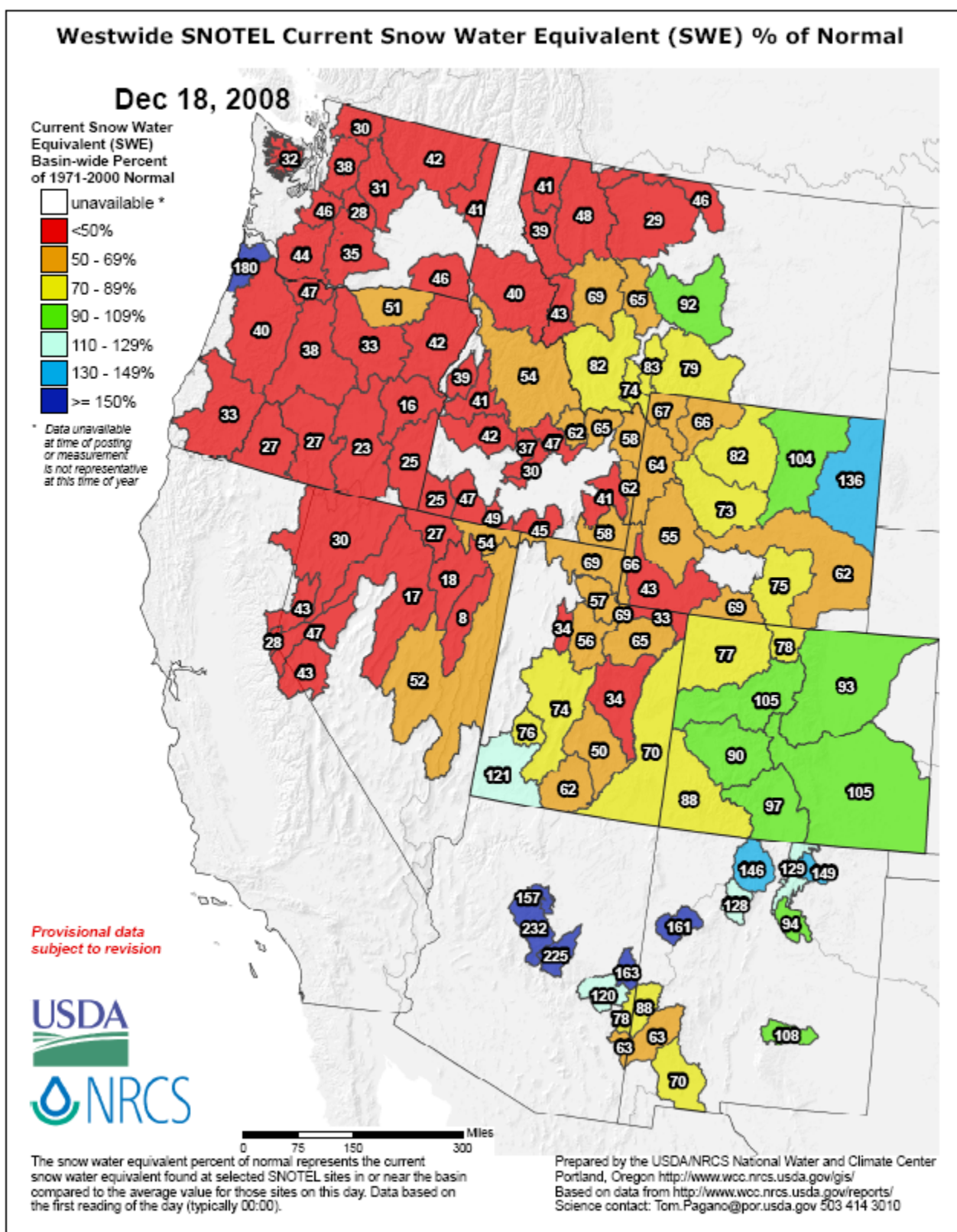
### **FOR MORE INFORMATION**

The National Water and Climate Center Homepage provide the latest available snowpack and water supply information. Please visit us at <http://www.wcc.nrcs.usda.gov>. This document is available from the following location on the NWCC homepage - <http://www.wcc.nrcs.usda.gov/water/drought/wdr.pl>

## **Weekly Snowpack and Drought Monitor Update Report**

This report uses data and products provided by the Interagency Drought Monitor Consortium members and the National Interagency Fire Center.

/s/ NOLLER HERBERT  
Director, Conservation Engineering Division



**Fig. 1. Snow-water equivalent percent to date continues to show low values across the West with some improvement over Colorado since last week. Few water basins are near or above the long term average for this time of year.**

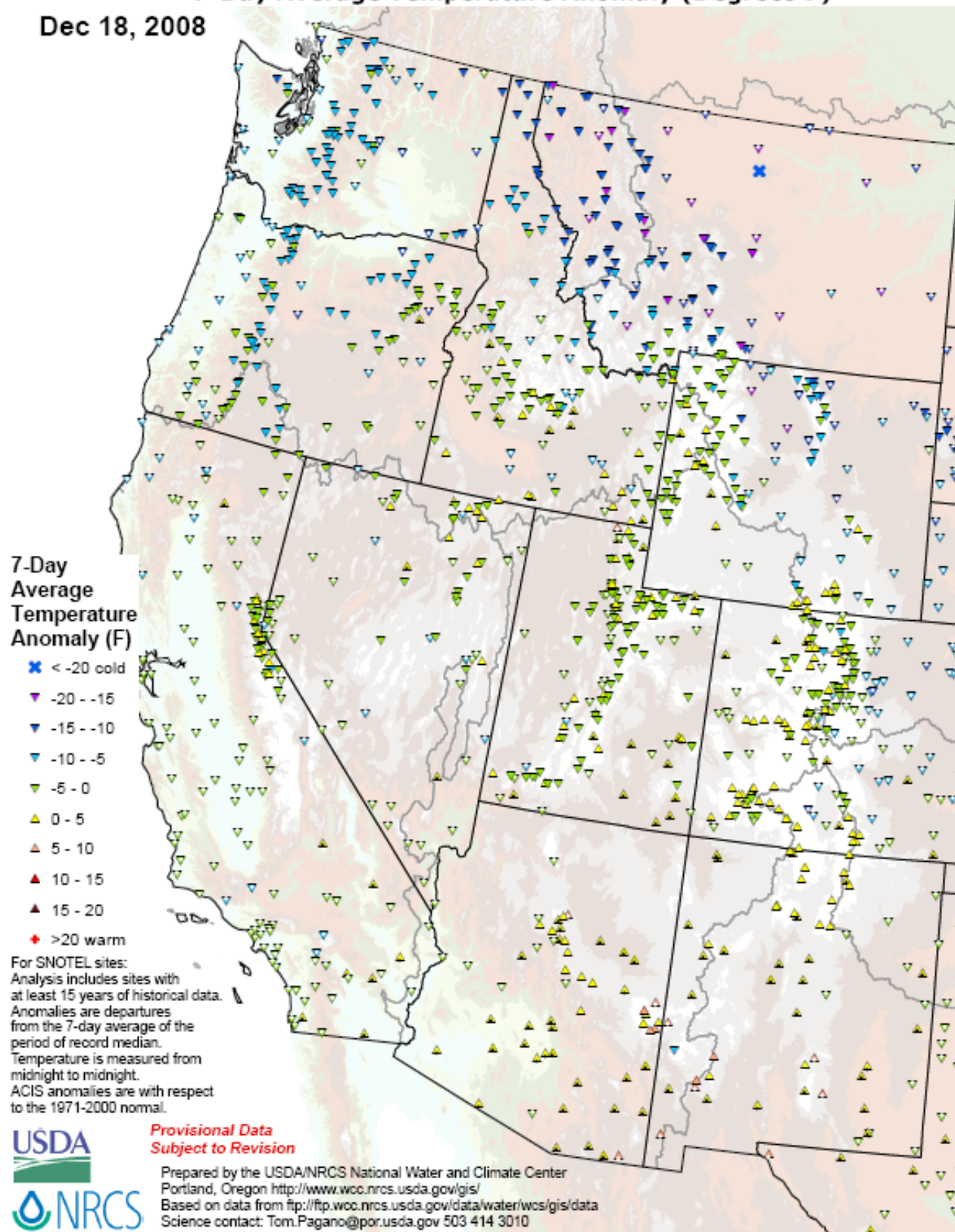
Ref: [ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west\\_swepctnormal\\_update.pdf](ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_swepctnormal_update.pdf)



## Weekly Snowpack and Drought Monitor Update Report

### SNOTEL (solid) and ACIS (dot-filled) Networks 7-Day Average Temperature Anomaly (Degrees F)

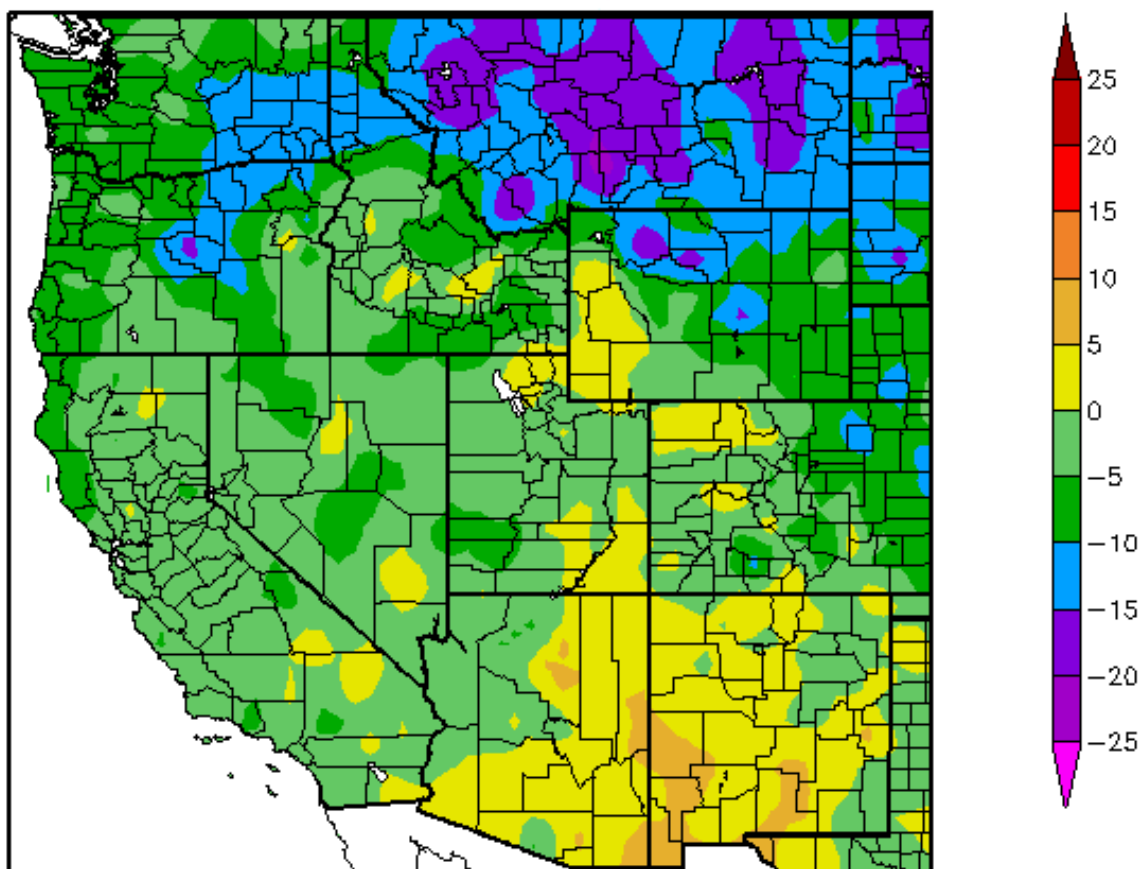
Dec 18, 2008



**Fig. 2. SNOTEL and ACIS-day station average temperature anomalies were below normal during the past week across most locales across the West with the warmest departures over the Southwest.**

Ref: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomalyAcis.pdf>

Departure from Normal Temperature (F)  
12/11/2008 – 12/17/2008



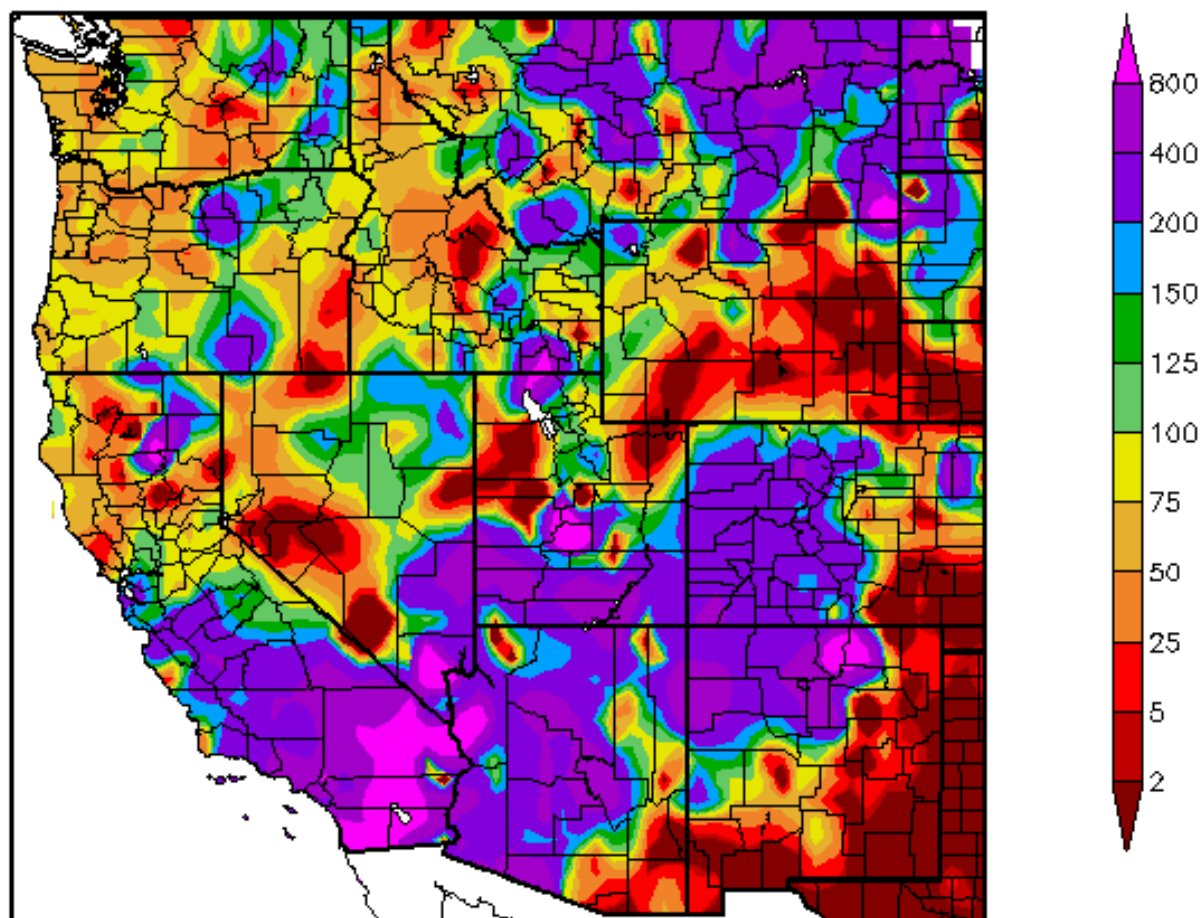
Generated 12/18/2008 at HPRCC using provisional data.

NOAA Regional Climate Centers

**Fig. 2a. ACIS 7-day average temperature anomalies: Greatest positive temperature departures occurred over southern New Mexico (>+5F) and greatest negative departures occurred over Montana (<-20F).**

Ref: [http://www.hprcc.unl.edu/maps/current/index.php?action=update\\_product&product=TDept](http://www.hprcc.unl.edu/maps/current/index.php?action=update_product&product=TDept)

Percent of Normal Precipitation (%)  
12/11/2008 – 12/17/2008



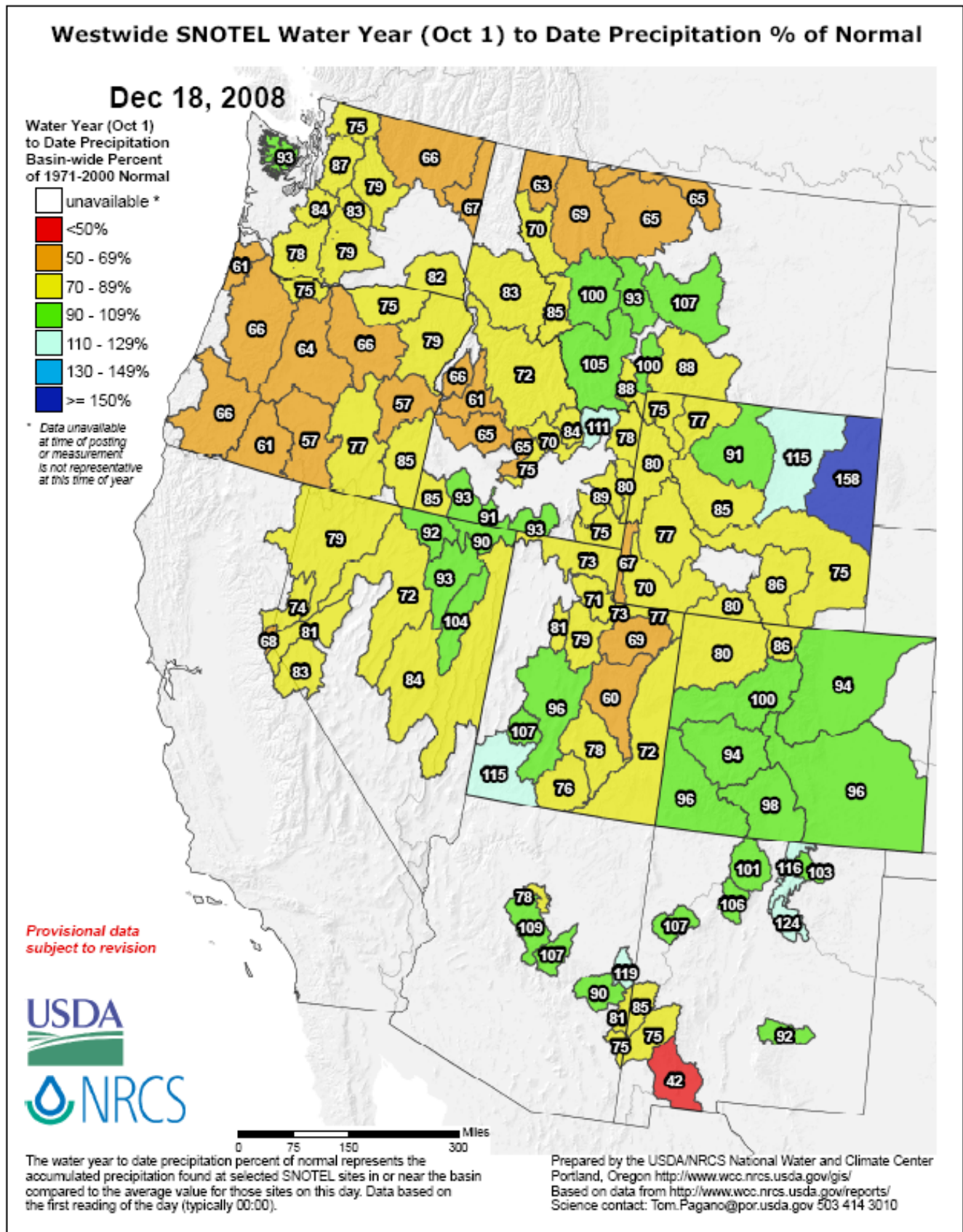
Generated 12/18/2008 at HPRCC using provisional data.

NOAA Regional Climate Centers

**Fig. 3. ACIS 7-day average precipitation anomaly for the period ending 17 December shows significant amounts of precipitation scattered across a large region of southern California, the Southwest, Central Rockies, and northern Montana. Smaller amounts fell over portions of the Pacific Northwest.**

Ref: [http://www.hprcc.unl.edu/maps/index.php?action=update\\_product&product=PNorm](http://www.hprcc.unl.edu/maps/index.php?action=update_product&product=PNorm)





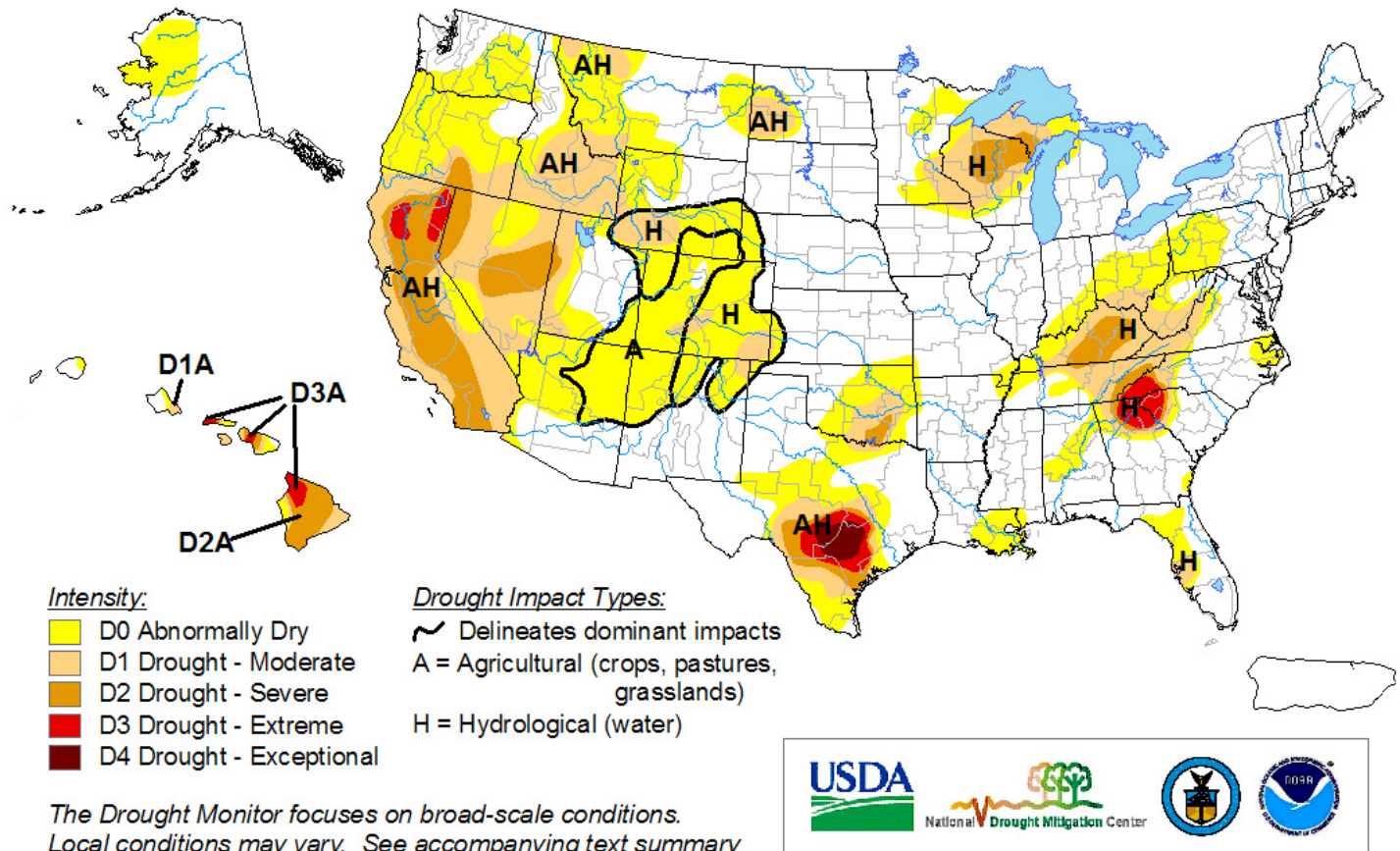
**Fig 3b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows values changing little since last week except for significant increases over Arizona and New Mexico.**

Ref: [http://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/wytdprecptnormal\\_update.pdf](http://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/wytdprecptnormal_update.pdf)



# U.S. Drought Monitor

December 16, 2008  
Valid 7 a.m. EST



Released Thursday, December 18, 2008  
Authors: Jay Lawrimore/Liz Love-Brotak NOAA/NESDIS/NCDC

Fig. 4. Current Drought Monitor weekly summary.

Ref: National Drought Mitigation Center (NDMC) - <http://www.drought.unl.edu/dm/monitor.html>

# U.S. Drought Monitor

## West

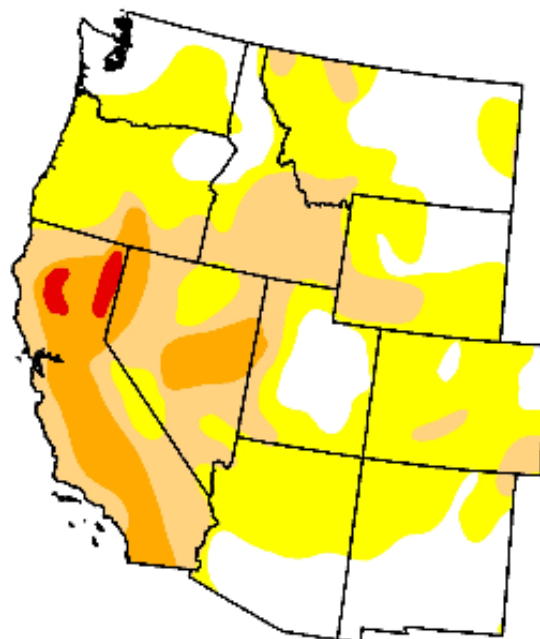
December 16, 2008

Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	27.5	72.5	31.0	10.0	0.8	0.0
Last Week (12/09/2008 map)	32.8	67.2	29.9	9.8	0.4	0.0
3 Months Ago (09/23/2008 map)	40.5	59.5	29.2	10.4	0.4	0.0
Start of Calendar Year (01/01/2008 map)	26.3	73.7	54.7	33.1	2.7	0.0
Start of Water Year (10/07/2008 map)	41.3	58.7	28.6	10.4	0.1	0.0
One Year Ago (12/18/2007 map)	26.3	73.7	54.7	33.1	2.7	0.0

### Intensity:

 D0 Abnormally Dry	 D3 Drought - Extreme
 D1 Drought - Moderate	 D4 Drought - Exceptional
 D2 Drought - Severe	



The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. See accompanying text summary  
for forecast statements

<http://drought.unl.edu/dm>



Released Thursday, December 18, 2008

Author: J. Lawrimore/L. Love-Brotak, NOAA/NESDIS/NCDC

Fig. 4a. Drought Monitor for the Western States with statistics over various time periods. In western Oregon and southwestern Washington abnormally dry conditions (D0) expanded westward to the coast. In much of northern California conditions continued to deteriorate.

Ref: [http://www.drought.unl.edu/dm/DM\\_west.htm](http://www.drought.unl.edu/dm/DM_west.htm)

# U.S. Drought Monitor

## Southeast

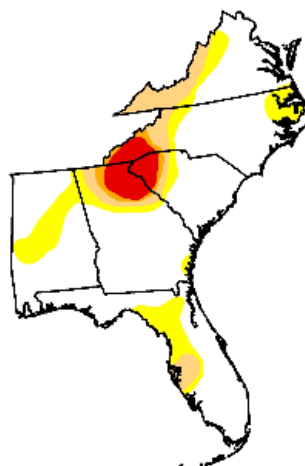
December 16, 2008

Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	70.7	29.3	14.3	6.4	4.8	0.0
Last Week (12/09/2008 map)	50.6	49.4	25.5	14.0	7.6	5.0
3 Months Ago (09/23/2008 map)	44.3	55.7	34.0	16.8	6.8	1.9
Start of Calendar Year (01/01/2008 map)	9.6	90.4	74.3	58.5	41.0	22.0
Start of Water Year (10/07/2008 map)	35.2	64.8	41.8	20.8	9.4	1.9
One Year Ago (12/18/2007 map)	9.1	90.9	78.3	63.0	47.9	36.2

Intensity:

■ D0 Abnormally Dry      ■ D3 Drought - Extreme  
■ D1 Drought - Moderate      ■ D4 Drought - Exceptional  
■ D2 Drought - Severe



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

<http://drought.unl.edu/dm>



Released Thursday, December 18, 2008

Author: J. Lawrimore/L. Love-Brotak, NOAA/NESDIS/NCDC

# U.S. Drought Monitor

## South

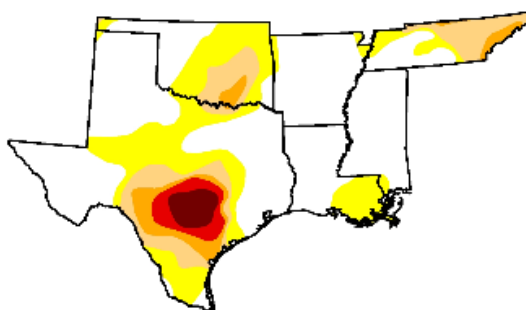
December 16, 2008

Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	58.5	41.5	19.5	8.9	4.6	2.1
Last Week (12/09/2008 map)	56.5	43.5	20.6	12.0	6.3	1.6
3 Months Ago (09/23/2008 map)	75.6	24.4	17.1	8.9	2.4	0.0
Start of Calendar Year (01/01/2008 map)	57.5	42.5	12.9	4.3	3.8	1.6
Start of Water Year (10/07/2008 map)	73.3	26.7	17.3	10.7	2.9	0.0
One Year Ago (12/18/2007 map)	63.8	36.2	9.0	4.3	3.8	1.7

Intensity:

■ D0 Abnormally Dry      ■ D3 Drought - Extreme  
■ D1 Drought - Moderate      ■ D4 Drought - Exceptional  
■ D2 Drought - Severe



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

<http://drought.unl.edu/dm>



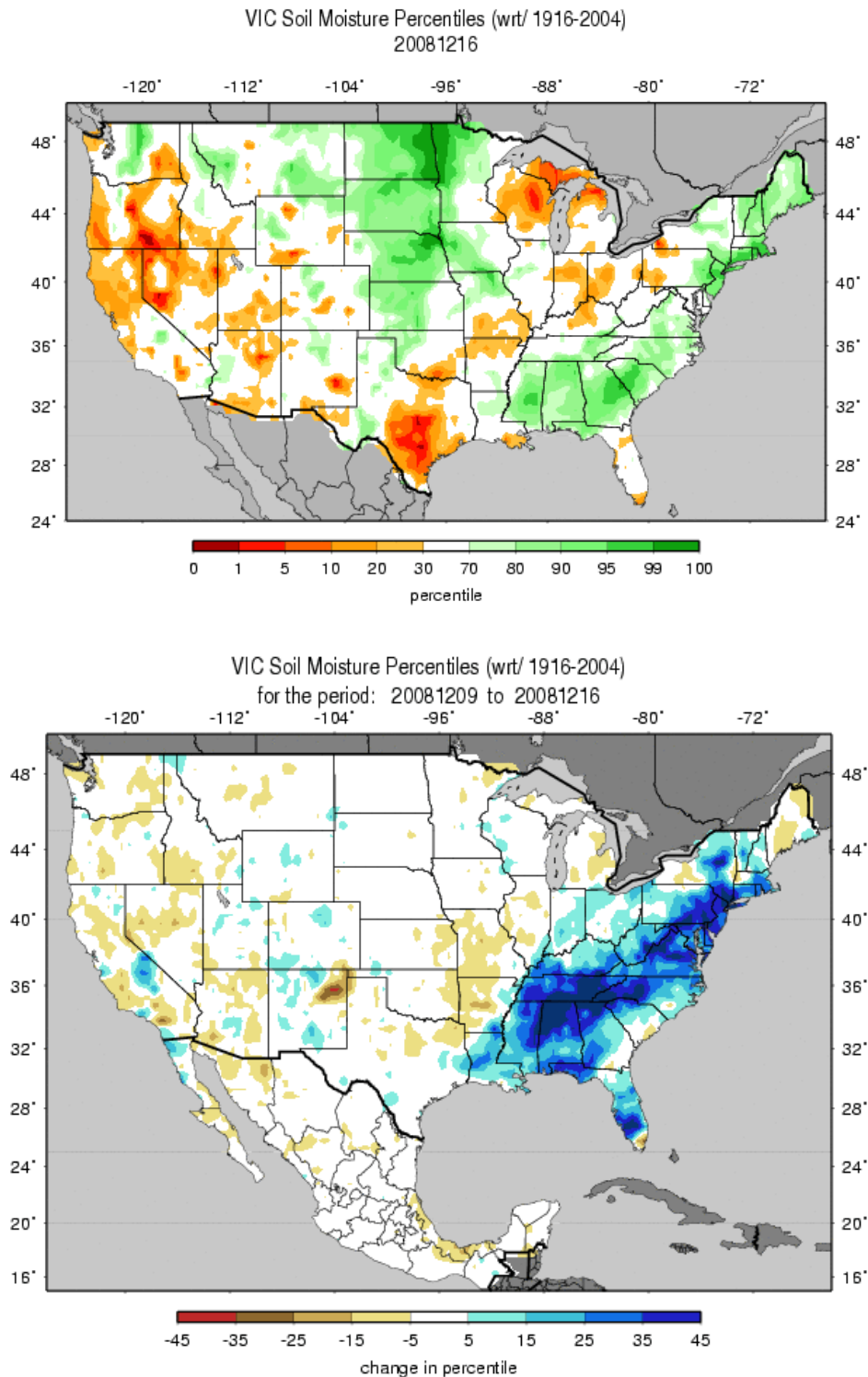
Released Thursday, December 18, 2008

Author: J. Lawrimore/L. Love-Brotak, NOAA/NESDIS/NCDC

**Fig. 4b: Widespread rainfall totals exceeding 5 inches resulted in the removal of D4 over the Southeast. There was some improvement in D2-D4 over Texas this week.**

Ref: [http://www.drought.unl.edu/dm/DM\\_southeast.htm](http://www.drought.unl.edu/dm/DM_southeast.htm) and [http://www.drought.unl.edu/dm/DM\\_south.htm](http://www.drought.unl.edu/dm/DM_south.htm).

## Weekly Snowpack and Drought Monitor Update Report



**Figs. 5a & 5b: Soil Moisture Ranking and change in percentile based on 1915-2003 climatology for this past week. Near saturation exists over the Northern Plain while excessive dryness dominates the southern Texas and the Upper Peninsula of Michigan (Fig. 5a). Increased soil moisture occurred over the eastern third of the nation this week (Fig. 5b).**

Ref: [http://www.hydro.washington.edu/forecast/monitor/curr/conus/CONUS.vic.sm\\_qnt.gif](http://www.hydro.washington.edu/forecast/monitor/curr/conus/CONUS.vic.sm_qnt.gif),  
[http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm\\_qnt.1wk.gif](http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.1wk.gif)



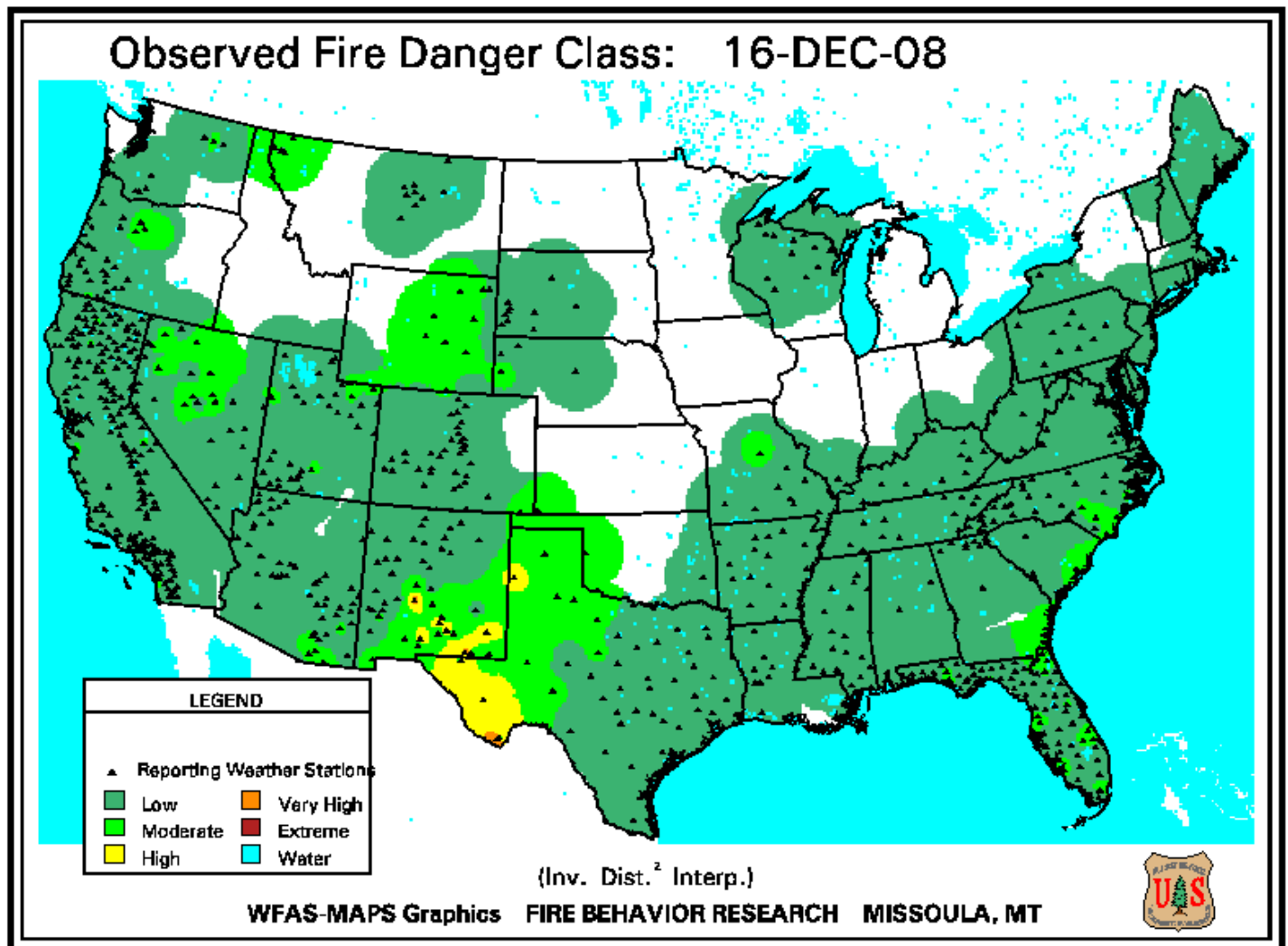


Fig. 6. Observed Fire Danger Class. This week, a vast improvement is noted over southern California.  
Source: Forest Service Fire Behavior Research – Missoula, MT.  
Ref: [http://www.fs.fed.us/land/wfas/fd\\_class.gif](http://www.fs.fed.us/land/wfas/fd_class.gif)

## Weekly Snowpack and Drought Monitor Update Report

Wednesday, December 17, 2008

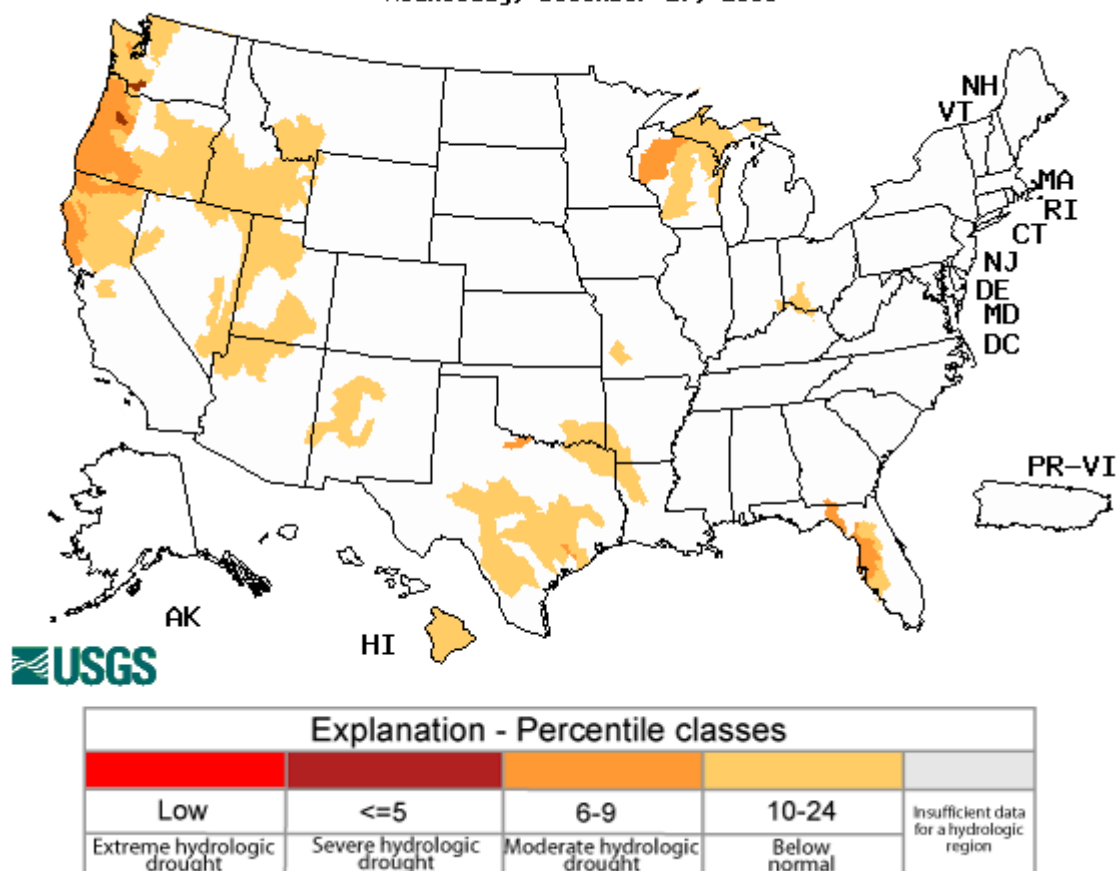


Fig. 7. Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Note moderate to severe low flows over western Oregon. A phenomenal improvement over the Southeast is reflected in this week's map. Ref: <http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us>

## Weekly Snowpack and Drought Monitor Update Report

### National Drought Summary -- December 16, 2008

*The discussion in the Looking Ahead section is simply a description of what the official national guidance from the National Weather Service (NWS) National Centers for Environmental Prediction is depicting for current areas of dryness and drought. The NWS forecast products utilized include the HPC 5-day QPF and 5-day Mean Temperature progs, the 6-10 Day Outlooks of Temperature and Precipitation Probability, and the 8-14 Day Outlooks of Temperature and Precipitation Probability, valid as of late Wednesday afternoon of the USDM release week. The NWS forecast web page used for this section is:*  
<http://www.cpc.ncep.noaa.gov/products/forecasts/>.

The week was highlighted by a major storm that brought moderate to heavy rainfall across drought-affected areas of the Southeast and parts of the Ohio River Basin from 9-11 December. Rainfall in excess of 4 inches fell across much of Mississippi, Alabama, Georgia, Tennessee and western parts of the Carolinas. This system also brought beneficial precipitation to eastern Kentucky, Virginia, and West Virginia as well as large parts of the Northeast. A severe ice storm struck areas of New York and New England, and late in the period an Arctic front brought cold air to the southern Plains and light freezing rain and sleet from northern Texas to Tennessee, Missouri and Kentucky. Precipitation was generally near average from the coastal Carolinas to Florida, and near to above average from the Midwest to the northern Plains. A major winter storm brought blizzard conditions and record low temperatures from Montana to the northern Plains, but precipitation was not sufficient to bring widespread improvement. In southern California a strong storm system brought heavy rain to drought-affected areas late in the period with snow falling in higher elevations. Precipitation remained below average from the Cascades to the coast and was near to below-average in drought-affected areas of the southern Plains

**The Northeast:** Above average precipitation fell from West Virginia to Maine with widespread near-average precipitation in western New York and northwestern Pennsylvania. This resulted in the removal of abnormally dry conditions in northern parts of West Virginia and a southward retraction of moderate (D1H) drought in west-central areas of the state and bordering areas of Ohio. An additional 2 to 3 inches of rain in southern Maryland brought an end to the last vestiges of abnormally dry conditions. Although precipitation was average to above average in abnormally dry areas of western Pennsylvania the persistence of 60- and 90-day deficits resulted in no change to the D0 areas in the state.

**Mid-Atlantic and Southeast:** Widespread rainfall totals exceeding 5 inches resulted in the removal of abnormal dryness (D0) and moderate drought (D1H) in northern Alabama and south-central Tennessee. Abnormally dry conditions ended in southeastern Alabama and broad 1-category improvements occurred across Georgia and the western Carolinas. Rainfall was sufficient to bring an end to extreme drought (D4H) in the region, and heavy rainfall in eastern Tennessee and southeastern Kentucky brought 1- and 2-category improvements there. This left a broad area of moderate drought (D1H) separating severe drought (D2H) in central Kentucky from severe (D2H) drought along the Tennessee-North Carolina border and extreme (D3H) drought over far western North and South Carolina and northeast Georgia. In northeastern North Carolina two to three inches of rain was sufficient to end moderate drought (D1H) and reduce the westward extent of abnormally dry conditions. In contrast, a persistent pattern of below-average precipitation led to growing precipitation deficits along coastal Georgia, leading to the introduction of abnormally dry (D0) conditions. Abnormally dry conditions also expanded westward in the Big Bend area of Florida where USGS 7- to 28-day streamflow was below normal and 90-day precipitation totals less than 75% of average.

**The Plains and Upper Midwest:** A major winter storm struck the northern Plains with snow totals from two to more than 12 inches in Montana and North Dakota. Improving conditions

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occurred in eastern Montana where abnormally dry conditions replaced moderate (D1AH) drought conditions, and a reduction in the spatial extent of abnormally dry conditions (D0) occurred in northeast areas of the state. In the region of moderate (D1H) and severe (D2H) drought from southeastern Minnesota to the Upper Peninsula of Michigan precipitation was generally average to above average. Mid- to long-term precipitation deficits remained and were reflected in 7- to 28-day USGS streamflow below the 10<sup>th</sup> percentile. In southern Texas the continuation of below-average rainfall combined with windy and warmer-than-average conditions led to a small expansion of extreme (D3AH) and exceptional (D4AH) drought.

**The West:** Despite recent storms, snowfall and water-year precipitation totals in the western U.S. continued to lag behind average as of the middle of December. A storm system dived southward into southern California during the period bringing rain to major cities and snowfall to areas above 4000 feet east of San Diego. Snow also fell in the Sierras of California during the week but as of December 15 the seasonal total in the northern and southern Sierras was near 70% of average. In much of northern California conditions continued to deteriorate as precipitation during the past month was more than 4 inches below normal. USGS streamflows remained well below average, and there were new reports of impacts to livestock operations and springs going dry for the first time in 60 years. Reflecting the deteriorating conditions, moderate (D1AH) and severe (D2AH) drought expanded westward in northern areas of the state and an area of extreme (D3) drought was introduced where deficits have been greatest. In western Oregon and southwestern Washington abnormally dry conditions (D0) expanded westward to the coast. In this area USGS 7- to 28-day streamflow values less than the 5<sup>th</sup> percentile, 30-day precipitation totals less than 50% of average and 90-day precipitation totals less than 70% of average reflected the abnormally dry conditions. In western Montana most locations received only 2 to 4 inches of snow during the past week. Early-season snowpack less than 50% of average for most areas resulted in a 1-category degradation to moderate (D1AH) drought and abnormally dry (D0) conditions. Other changes to drought designations will be made in the coming weeks as the western snowpack continues to develop.

**Hawaii, Alaska and Puerto Rico:** A Kona low produced heavy rainfall across the islands from December 11-13, producing flooding on Kauai and Oahu. Event totals were from 6.6 to 24.7 inches on Kauai and 4.5 to 18.8 on Oahu but were not sufficient to erase long-term deficits in all locations. One-category improvements were made across the two islands and only the eastern end of Kauai remained abnormally dry (D0), while moderate (D1A) drought and abnormally dry conditions remained on eastern Oahu. Lesser amounts of rain fell on Lanai (4.8), Kahoolawe (4.8), Molokai (3.4 to 6.3), Maui (2.5 to 6.3), and the Big Island of Hawaii (2.0 to 3.6), and the drought classifications on those islands remained unchanged.

Little to no precipitation fell outside of the Panhandle and coastal areas of southern Alaska., where totals generally exceeded 2 inches. The area of abnormally dry conditions in northwest Alaska remained the only designation for the state.

Rain fell across Puerto Rico during the past week with a southwest to northeast gradient of lighter (0.25") to heavier (>1.5 inches) amounts. Drought designations remained absent from the island.

**Looking Ahead:** From December 18 - 22, 2008, an active pattern is expected. Precipitation is likely across most of the country with above normal totals from the mid-South and Midwest to the Northeast. A strong storm system will affect the Pacific Northwest early in the period as another exits the Southwest after bringing abundant rain and snow to the region. Normal to cooler-than-normal temperatures are expected from the West to the Midwest and Northeast while the southern Plains to Southeast and Mid-Atlantic will likely be near average to warmer than average. Wintery precipitation will generally be confined to the Pacific Northwest and other high elevation areas of the West as well as the northern tier of the nation from the northern Plains to the Northeast.



## **Weekly Snowpack and Drought Monitor Update Report**

From December 23 - 27, 2008, the odds favor continued below-normal temperatures across the northern tier of the contiguous U.S. and the far West, while warmer-than-average temperatures are likely to stretch from New Mexico across the Deep South to Florida. In Alaska odds favor below-normal temperatures in the southern half of the state and warmer-than-average temperatures north of the Arctic Circle. The odds favor above normal precipitation across the western third of the nation and from the Midwest and mid-South to the Northeast, while drier-than-average conditions are more likely in Florida and Texas.

**Author: Jay Lawrimore, NOAA/NCDC**

### **Dryness Categories**

D0 ... Abnormally Dry ... used for areas showing dryness but not yet in drought, or for areas recovering from drought.

### **Drought Intensity Categories**

D1 ... Moderate Drought

D2 ... Severe Drought

D3 ... Extreme Drought

D4 ... Exceptional Drought

### **Drought or Dryness Types**

A ... Agricultural

H ... Hydrological

Updated December 18, 2008