



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

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**Weekly Report - Snowpack / Drought Monitor Update Date: 22 October 2009**

**SNOTEL SNOWPACK AND PRECIPITATION SUMMARY**

**Temperature:** SNOTEL and ACIS-day station average weekly temperature anomalies crossed over to the warmer than average side over most of the West this week (Fig.1). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures occurred over the Southern Sierra Mountains in California (>+10F) and the greatest negative departures occurred over the northeast region of Montana Rockies (<-6F) (Fig. 1a).

**Precipitation:** ACIS 7-day average precipitation amounts for the period ending 21 October shows a moderately dry West with the exception of some heavier precipitation over northwest Washington. However, October is generally a dry period over the West and when weekly precipitation exceeds an inch, percent of normal will easily exceed 200 percent as was the situation this week (Fig 2 and 2a). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows rather exaggerated values since the Water Year is only 22 days old. There was no significant change since last week (Fig. 2b).

**WESTERN DROUGHT STATUS**

**The West:** Significant changes were in order across the West as the first strong low-pressure system of the wet season barreled onshore on October 14. Multiple storm systems then continued to come ashore across the Pacific Northwest. The Olympic Peninsula received significant rains (generally 4-8 inches with a maximum near 13 inches) through the course of the week, triggering a 1-category improvement. To the east of the I-5 corridor in northern Washington, additional rains (2-5 inches) led to some trimming of the moderate and severe drought region.

In California and Oregon, the rainfall on the western mountain slopes was noteworthy, with multiple locations in California receiving greater than 4 times the normal rainfall for the weekly period. The most significant improvements were made across southwest Oregon and central California. Rainfall totals in southwest Oregon ranged from 1.0-5.6 inches.

Across central California, 24-hour rainfall totals exceed 15 inches in some coastal locations (Mining Ridge – 19.57 inches), with most locations receiving 2-8 inches of precipitation. A general 1-category improvement was made along the entire length of the San Joaquin Valley.

In Nevada, 1-3 inch precipitation totals resulted in some minor adjustments of the severe drought depiction near Washoe County. Reports from the field indicated that almost no flooding was associated with these rains and the puddles generally disappeared within 24 hours, indicating that these recent rains did much to recharge soil moisture. Further north, rains (0.5-2.0 inches) across Idaho and Montana prompted the removal of large areas of abnormal dryness and a 1-category improvement across northwest Montana. No changes were made to Arizona as mostly near-normal rainfall was experienced across the state.

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The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve maintain and improve our natural resources and environment

## Weekly Snowpack and Drought Monitor Update Report

That being said, near normal ranges from 0.0 to 0.5 inch. Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC

***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. 3, 3a, and 3b).

### **SOIL MOISTURE**

Soil moisture (Figs. 4a and 4b), 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). Another good resource can be found at: <http://www.emc.ncep.noaa.gov/mmb/nldas/drought/>.

### **OBSERVED FIRE DANGER CLASS**

The [adjective class rating](#) is a method of normalizing rating classes across different fuel models, indexes, and station locations. It is based on the primary fuel model cataloged for the station, the fire danger index selected to reflect staffing levels, and climatological class breakpoints. This information is provided by local station managers. About 90% use the Burning Index (BI); others use Energy Release Component (ERC). Staffing class breakpoints are set by local managers from historical fire weather climatology (Figs. 5).

### **VEGETATION STRESS (Figure 6)**

([http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh\\_currentImage.php](http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_currentImage.php))

### **Image Interpretation**

The images are color-coded maps of vegetation condition (health) estimated by the Vegetation and Temperature Condition Index (VT). The VT is a numerical index, which changes from 0 to 100 characterizing change in vegetation conditions from extremely poor (0) to excellent (100). Fair conditions are coded by green color (50), which changes to brown and red when conditions deteriorate and to blue when they improve. The VT reflects indirectly a combination of chlorophyll and moisture content in the vegetation and also changes in thermal conditions at the surface. This new approach combines the visible, near infrared and thermal radiances in a numerical index characterizing vegetation health. This approach is extremely useful in detecting and monitoring such complex and difficult-to-identify phenomenon as drought. The VT values below 35 are used for identifying vegetation stress which is an indirect drought indicator. The VT is very useful for early drought detection, assessing drought area coverage, duration, and intensity, and for monitoring drought impacts on vegetation and agricultural crops.

## Weekly Snowpack and Drought Monitor Update Report

### 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/cqibin/bor.pl>. Additional information describing the products available from the Drought Monitor can be found at the following URL:

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

### 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>

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

# Weekly Snowpack and Drought Monitor Update Report

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

Oct 22, 2009

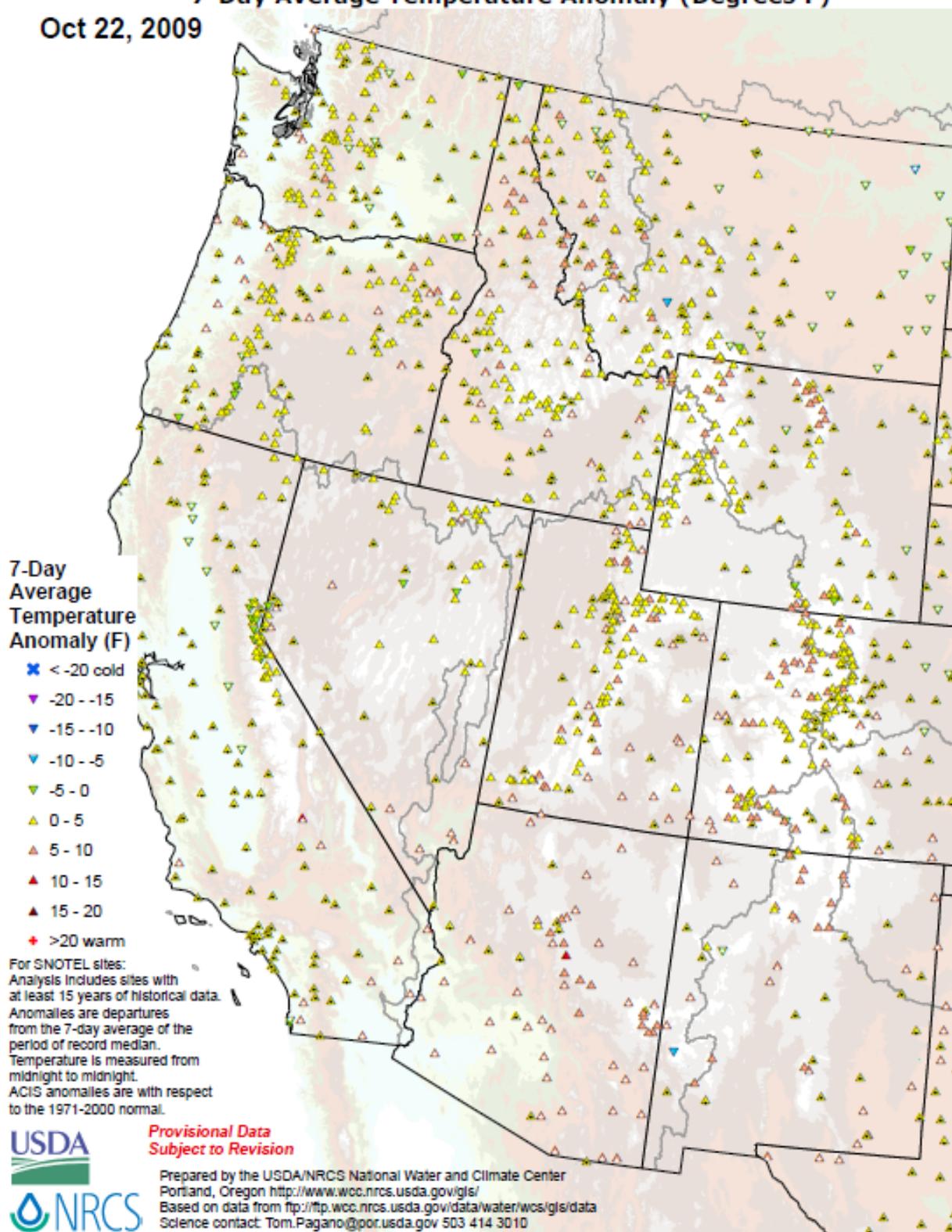
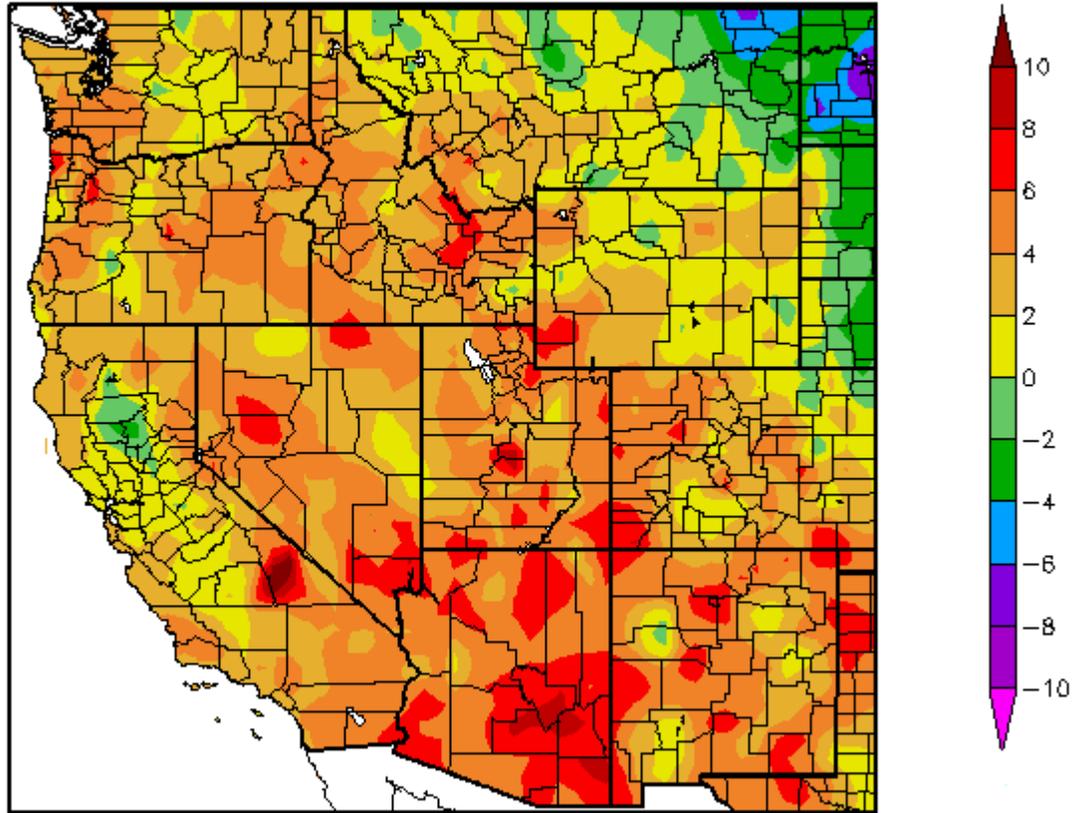


Fig. 1. SNOTEL and ACIS-day station average weekly temperature anomalies crossed over to the warmer than average side over most of the West this week. Ref: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomalyAcis.pdf>

Departure from Normal Temperature (F)  
10/15/2009 – 10/21/2009



Generated 10/22/2009 at HPRCC using provisional data.

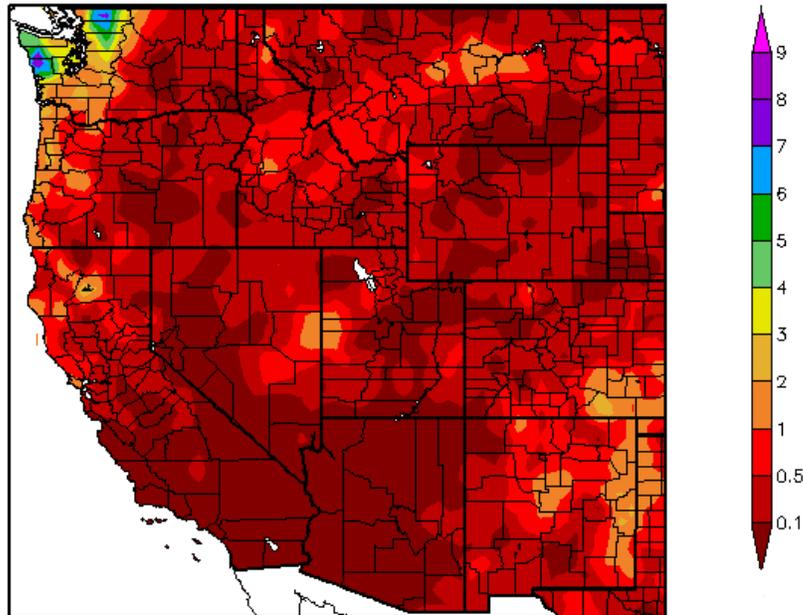
NOAA Regional Climate Centers

**Fig. 1a. ACIS 7-day average temperature anomalies show that the greatest positive temperature departures occurred over the Southern Sierra Mountains in California (>+10F) and the greatest negative departures occurred over the northeast region of Montana Rockies (<-6F).**

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)

## Weekly Snowpack and Drought Monitor Update Report

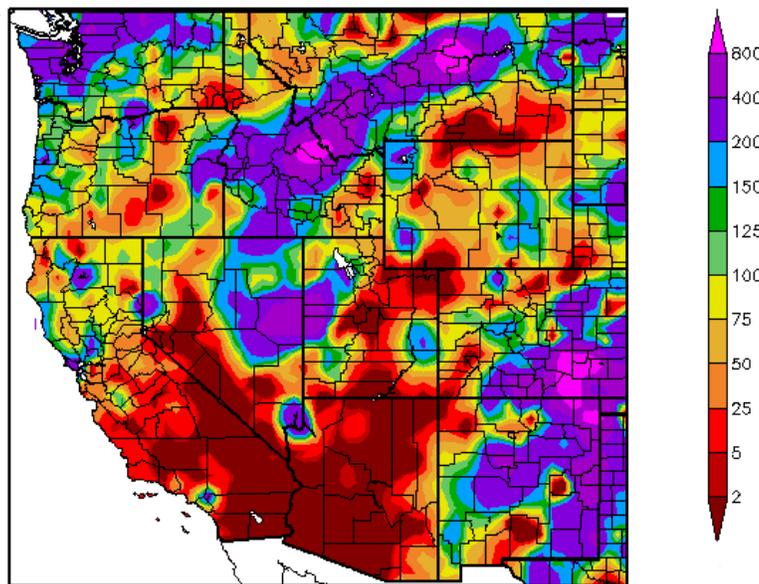
Precipitation (in)  
10/15/2009 – 10/21/2009



Generated 10/22/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)  
10/15/2009 – 10/21/2009



Generated 10/22/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

**Fig. 2. and 2a. ACIS 7-day average precipitation amounts for the period ending 21 October shows a moderately dry West with the exception of some heavier precipitation over northwest Washington. However, October is generally a dry period over the West and when weekly precipitation exceeds an inch, percent of normal will easily exceed 200 percent as was the situation this week. Ref: <http://www.hprcc.unl.edu/maps/current/>.**

Weekly Snowpack and Drought Monitor Update Report

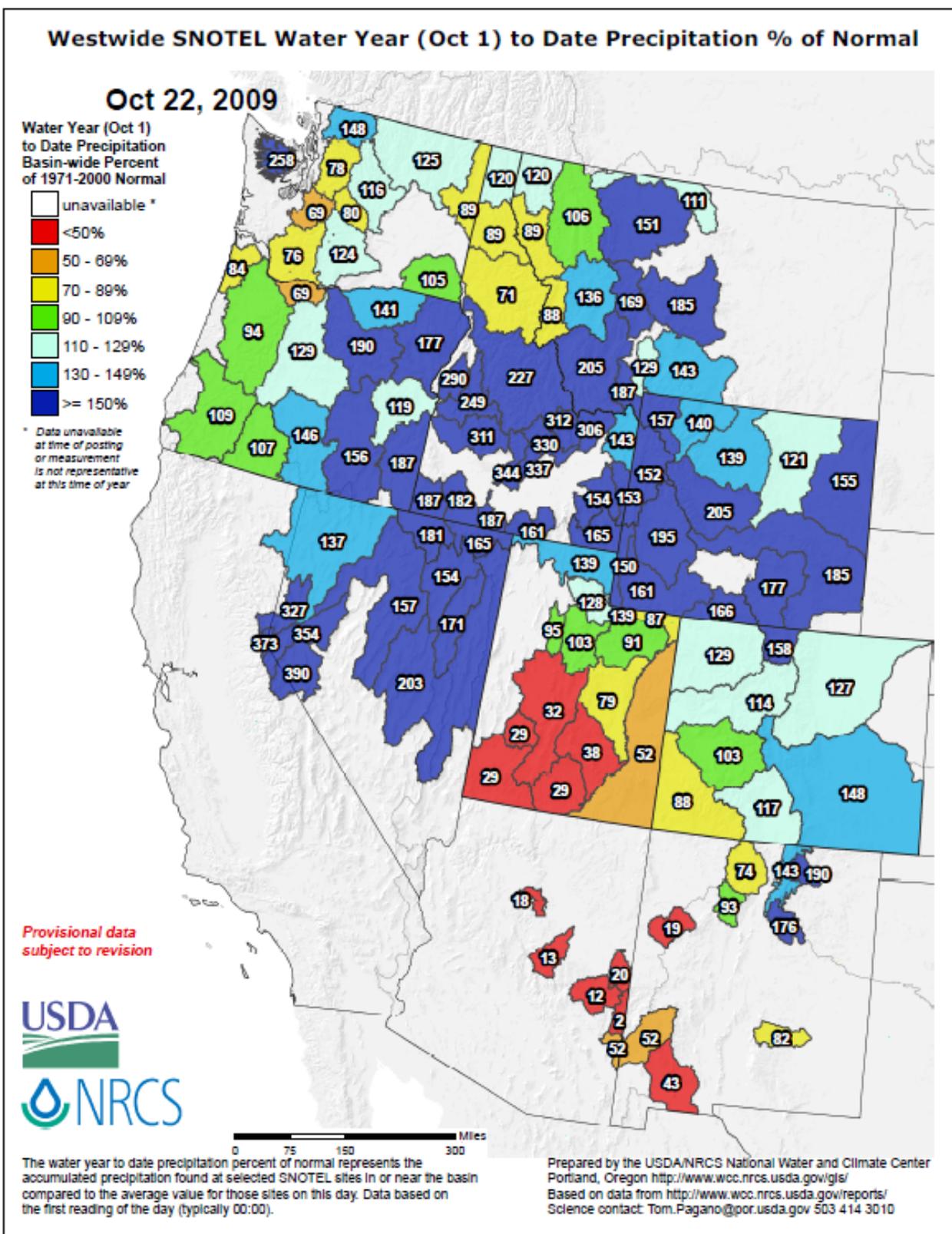
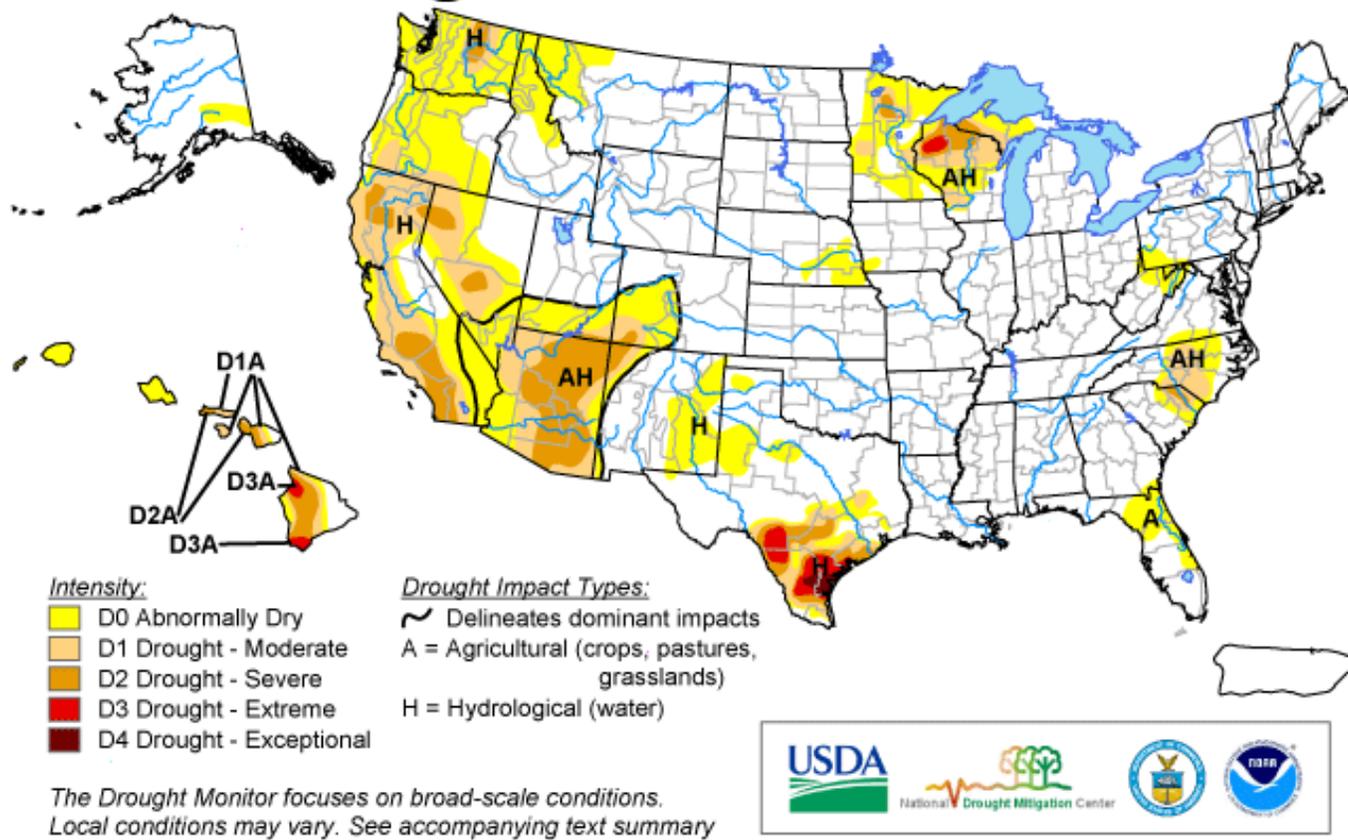


Fig 2b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows rather exaggerated values since the Water Year is only 22 days old. There was no significant change since last week.

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

# U.S. Drought Monitor

October 20, 2009  
Valid 8 a.m. EDT



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

Released Thursday, October 22, 2009  
Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC

Fig. 3. Current Drought Monitor weekly summary.

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

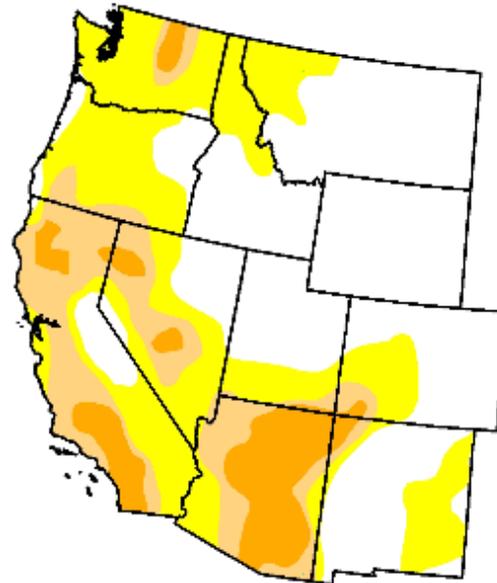
# U.S. Drought Monitor

## West

October 20, 2009  
Valid 7 a.m. EST

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	47.0	53.0	22.8	9.1	0.0	0.0
Last Week (10/13/2009 map)	41.8	58.2	26.5	13.1	0.0	0.0
3 Months Ago (07/28/2009 map)	57.1	42.9	17.5	7.2	0.0	0.0
Start of Calendar Year (01/06/2009 map)	37.4	62.6	28.9	8.8	0.4	0.0
Start of Water Year (10/06/2009 map)	42.1	57.9	25.4	8.5	0.0	0.0
One Year Ago (10/21/2008 map)	40.5	59.5	30.0	10.4	0.0	0.0



**Intensity:**

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

*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, October 22, 2009**  
Author: M. Rosencrans, CPC/NOAA

**Fig. 3a. Drought Monitor for the Western States with statistics over various time periods. Regionally, there was some improvement in all categories during the past week especially over the Pacific NW. Ref: [http://www.drought.unl.edu/dm/DM\\_west.htm](http://www.drought.unl.edu/dm/DM_west.htm).**

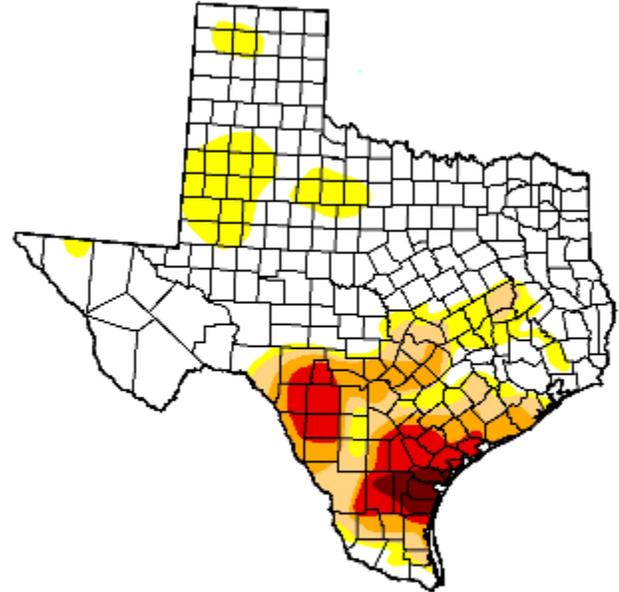
# U.S. Drought Monitor

## Texas

October 20, 2009  
Valid 7 a.m. EST

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	65.0	35.0	20.8	13.7	6.8	1.5
Last Week (10/13/2009 map)	68.9	31.1	20.8	13.3	6.2	1.5
3 Months Ago (07/28/2009 map)	39.0	61.0	38.1	30.2	24.7	18.7
Start of Calendar Year (01/06/2009 map)	41.7	58.3	24.5	15.0	9.1	4.2
Start of Water Year (10/06/2009 map)	66.1	33.9	22.4	14.5	6.8	1.5
One Year Ago (10/21/2008 map)	71.3	28.8	17.6	11.7	4.5	0.0



**Intensity:**

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

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

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

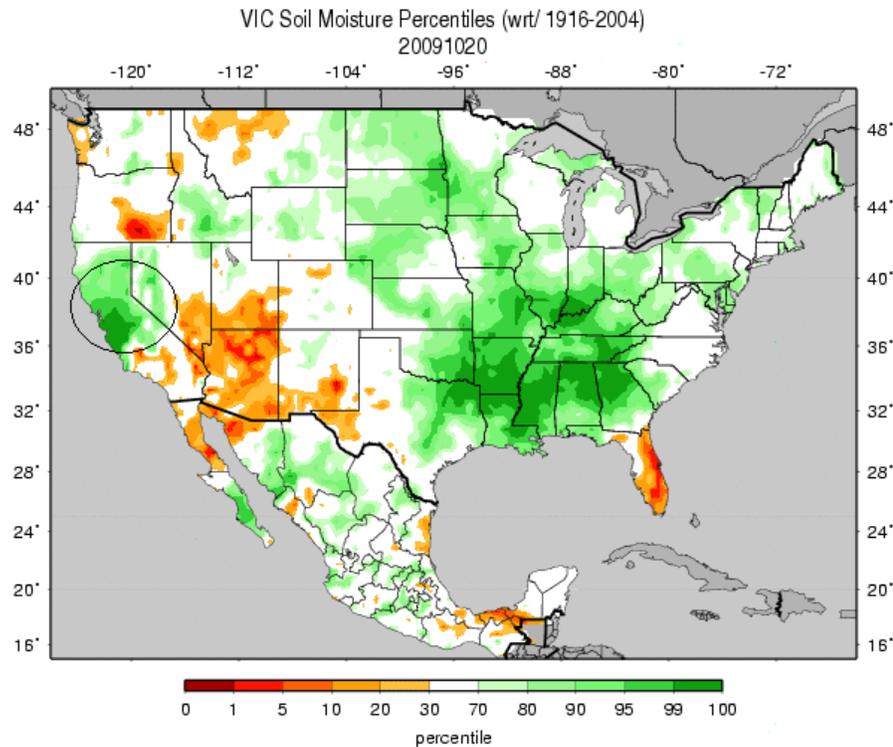


Released Thursday, October 22, 2009  
Author: M. Rosencrans, CPC/NOAA

**Fig. 3b: Texas is the only state with D4 drought condition in the US. No significant category changes this week except for improvement in D0.**

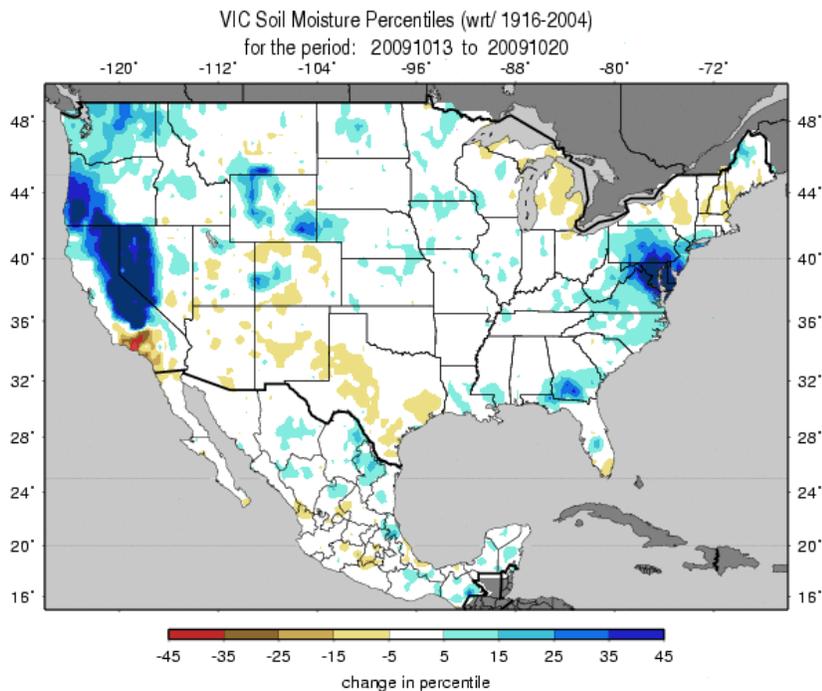
Ref: [http://www.drought.unl.edu/dm/DM\\_state.htm?TX,S](http://www.drought.unl.edu/dm/DM_state.htm?TX,S)

## Weekly Snowpack and Drought Monitor Update Report



**Figs. 4a:** Soil Moisture ranking in percentile based on 1916-2004 climatology as of 20 October. No significant change this week except for some improvement over central California.

Ref: [http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm\\_gnt.gif](http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_gnt.gif)



**Figs. 4b:** Soil Moisture change in percentile based on 1916-2004 climatology for this past week. Clearly California, Oregon and the Del-Mar-Va and PA states benefitted from heavier precipitation.

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

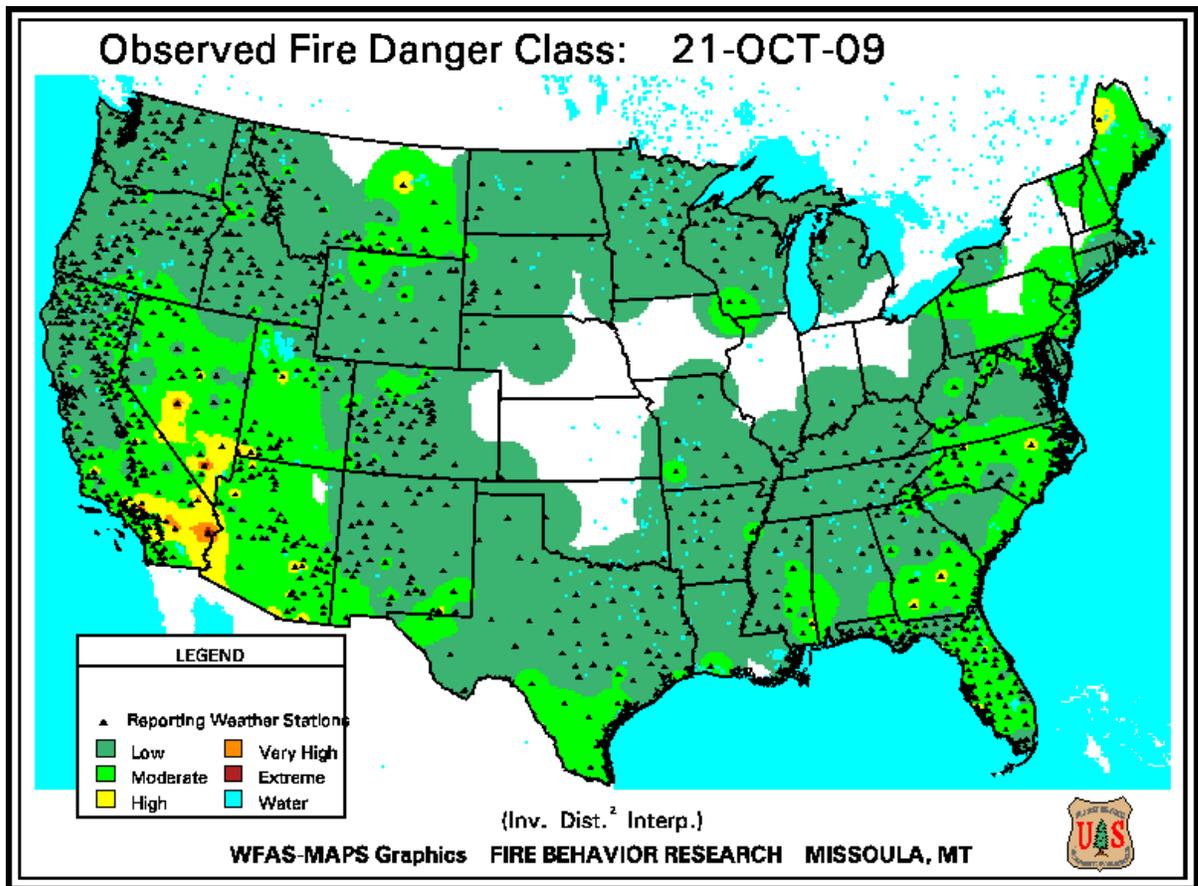


Fig. 5a. Observed Fire Danger Class.

Ref: [http://www.wfas.net/images/firedanger/fd\\_class.gif](http://www.wfas.net/images/firedanger/fd_class.gif)

Weekly Snowpack and Drought Monitor Update Report

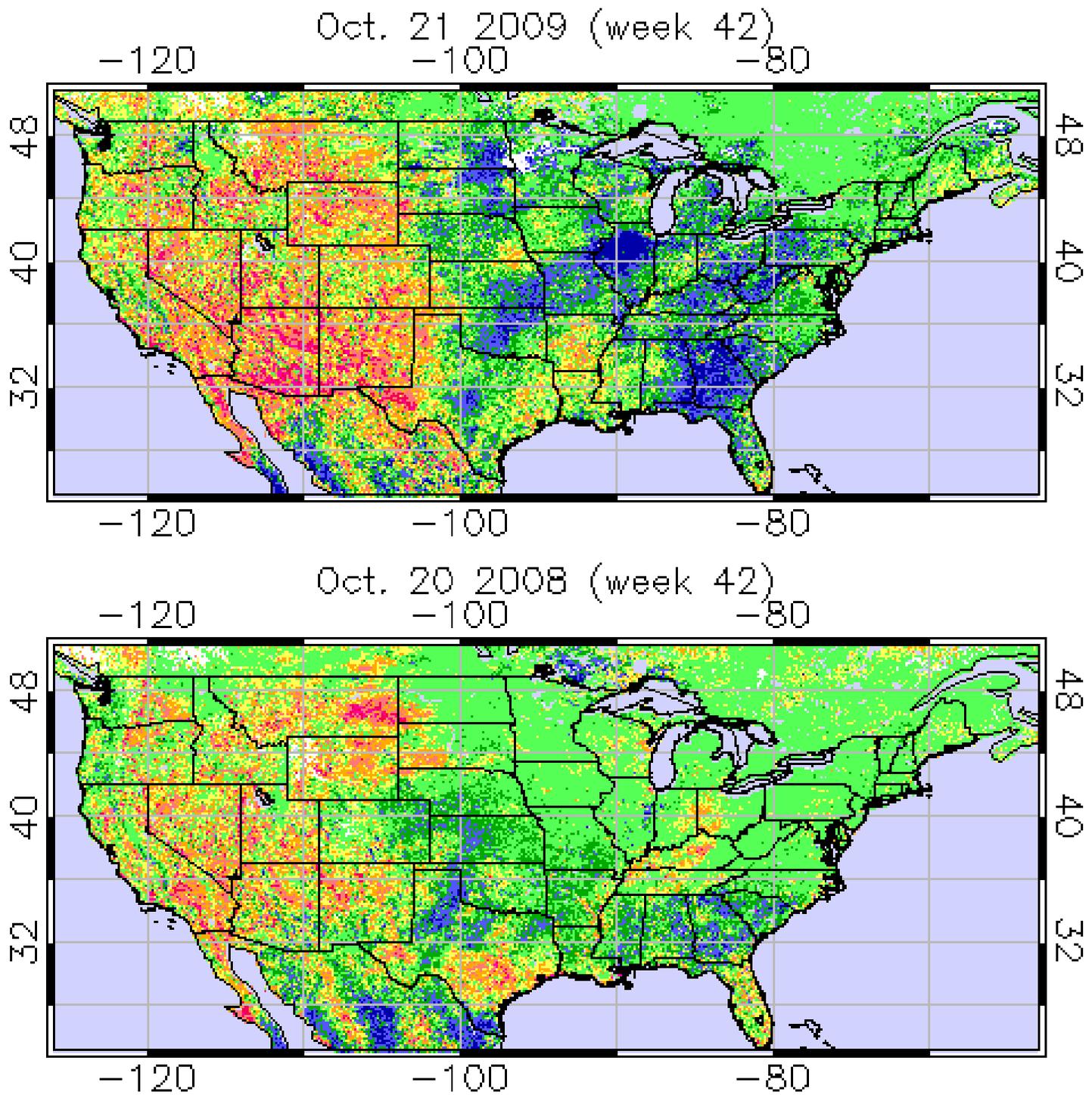
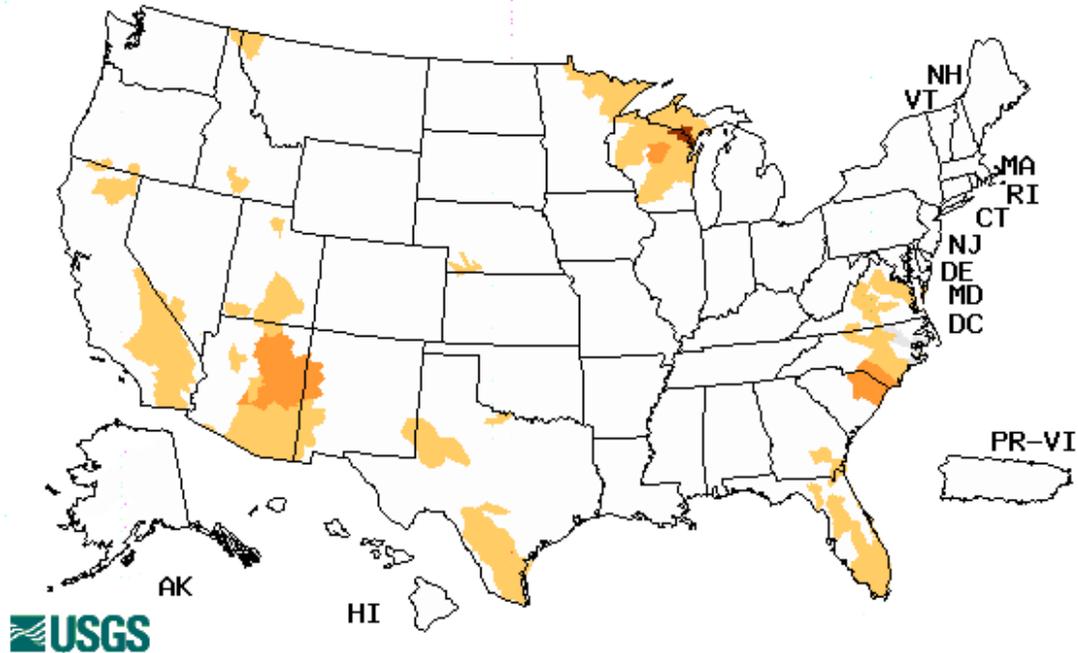


Fig. 6. Vegetation Drought Response Index: Note the comparison to last year.

Ref: [http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh\\_currentImage.php](http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_currentImage.php)

# Weekly Snowpack and Drought Monitor Update Report

Hednesday, October 21, 2009



Explanation - Percentile classes				
Low	≤5	6-9	10-24	Insufficient data for a hydrologic region
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	

**Fig. 7. Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Conditions are moderate over Arizona and South Carolina and Severe over the Upper Peninsula of Michigan.**

Ref: <http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us>.

## Weekly Snowpack and Drought Monitor Update Report

### National Drought Summary -- October 20, 2009

*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 period from October 13-20 featured generally stormy conditions on the West Coast, Southeast and mid-Atlantic with dry conditions from the southern Plains to the upper Midwest. Early in the week, a storm system over the southeast U.S. produced significant rainfall across western South Carolina, the Florida panhandle, and westward to northeastern Texas. By Friday, that storm system had moved off into the Atlantic, and a secondary low-pressure system moved along the remnant frontal boundary. This secondary system brought significant precipitation to the mid-Atlantic region. In the wake of these low-pressure systems, high pressure ushered in dryer, cooler weather for much of the eastern half of the country for the last 3 days. The storm system that moved across the western portions of the contiguous 48 brought the first significant rains of the wet season to many portions of California and Nevada on October 14th and 15th. Additional rains associated with another low-pressure system fell from the Pacific Northwest to the northern Great Plains from October 16-20.

**Mid-Atlantic and Southeast:** Significant rains across the Southeast early in the week precluded any drought indications for most of the region. The exceptions were the Carolinas and Florida. In South Carolina, the heavier rains (1-2 inches) stayed to the west of the previously depicted drought areas, with the drought areas receiving less than 1 inch of rain for the week. United States Geological Survey (USGS) measured stream flows in northern South Carolina remained low (current day out to 28-days in the lowest 10 percent), so the area remained in moderate to severe drought status. In North Carolina, a continued decline in stream flows and increased rainfall deficits stretching back at least 6 months prompted the expansion of moderate drought conditions. One-, three-, and six-month rainfall totals were all 50-70 percent of normal, with 14-day precipitations totals 25-50 percent of normal.

Across Florida, rainfall deficits continued to mount for the eastern portions of the state. Rainfall totals were generally less than 0.5 inch in this region. Rainfall deficits at many timescales continued (7-, 14-, and 30-days were 1-2, 2-3, 4-8 inches below normal, respectively). Specifically, from July to mid-October, reports from Palm Beach International Airport, Fort Lauderdale/Hollywood International Airport, and Miami International Airport reported deficits of 5.08, 11.21 inches, and 4.13 inches, respectively. Additionally, United States Department of Agriculture (USDA) reports from Florida indicated scattered incidents of drought impacts to livestock. However, local water supply managers stated that "... most ground and surface water is near where it should be for mid-October." Balancing these inputs, the result was an extension of the abnormally dry conditions southward.

Southern Pennsylvania, northern West Virginia, and western Maryland received beneficial rains (1-2 inches), easing drought conditions in this region. No impacts were reported so the agricultural classification of drought impacts was removed. Additionally, cool temperatures (10-12 degrees F below normal) minimized evaporation so the rains were able to make a substantial impact.

## Weekly Snowpack and Drought Monitor Update Report

**Northern and Central Great Plains and Upper Great Lakes:** Weekly precipitation deficits of 0.5-1.0 inch prompted an expansion of the abnormally dry conditions across the upper peninsula of Michigan. Near normal precipitation across most of Minnesota and central Wisconsin led to retention of the current drought depiction. In response to light but persistent rainfall, cooler temperatures and the end of the growing season, the area of abnormally dry conditions across the Dakotas was removed. The area of abnormally dry conditions across Nebraska was adjusted to reflect recent soil moisture measurements (10 percent to 30 percent of normal) across much of eastern Nebraska and continued below normal rains (50-70 percent of normal) for the most recent 1-, 2-, and 3-month measurement periods.

**Southern Great Plains:** Small changes were made in Texas to reflect some recent lack of rains (0.5-2 inches below normal for the week) across northern and western Texas. Standardized precipitation index (SPI) values indicated pockets of abnormal dryness from near Midland, to north-central Texas and the Panhandle. Additionally, no rainfall and temperatures averaging 6-8 degrees F above normal for the week across eastern New Mexico prompted the expansion of the abnormally dry conditions across this region.

**The West:** Significant changes were in order across the West as the first strong low-pressure system of the wet season barreled onshore on October 14. Multiple storm systems then continued to come ashore across the Pacific Northwest. The Olympic Peninsula received significant rains (generally 4-8 inches with a maximum near 13 inches) through the course of the week, triggering a 1-category improvement. To the east of the I-5 corridor in northern Washington, additional rains (2-5 inches) led to some trimming of the moderate and severe drought region.

In California and Oregon, the rainfall on the western mountain slopes was noteworthy, with multiple locations in California receiving greater than 4 times the normal rainfall for the weekly period. The most significant improvements were made across southwest Oregon and central California. Rainfall totals in southwest Oregon ranged from 1.0-5.6 inches.

Across central California, 24-hour rainfall totals exceed 15 inches in some coastal locations (Mining Ridge – 19.57 inches), with most locations receiving 2-8 inches of precipitation. A general 1-category improvement was made along the entire length of the San Joaquin Valley.

In Nevada, 1-3 inch precipitation totals resulted in some minor adjustments of the severe drought depiction near Washoe County. Reports from the field indicated that almost no flooding was associated with these rains and the puddles generally disappeared within 24 hours, indicating that these recent rains did much to recharge soil moisture. Further north, rains (0.5-2.0 inches) across Idaho and Montana prompted the removal of large areas of abnormal dryness and a 1-category improvement across northwest Montana. No changes were made to Arizona as mostly near-normal rainfall was experienced across the state. That being said, near normal ranges from 0.0 to 0.5 inch.

**Hawaii, Puerto Rico, and Alaska:** Light to moderate daily showers (generally 0.1 to 0.5 inches; 1 to 1.5 inches at a few sites) from Thursday through Sunday were common on the windward sides of Kauai, Oahu, Maui, and the Big Island, but little or no rain fell on most leeward portions. With no drought designation on the windward sides, and the summer and early fall months typically dry on the leeward portions, status-quo was kept.

In Alaska, stormy weather brought moderate precipitation (2 to 3 inches) to southern Alaska and the Alaskan Panhandle, but failed to materialize inland. Inland stream flows are still near or above normal in many places, so the depiction here remained unchanged.

## Weekly Snowpack and Drought Monitor Update Report

Rainfall in Puerto Rico was plentiful, with most stations reporting some measureable precipitation. Many stations reported in excess of 2 inches with a maximum of nearly 6 inches in the higher terrain. No dryness was depicted on the current map.

**Looking Ahead:** During the next 5 days (October 22-26), a stormy pattern is expected east of the Rockies, with multiple low-pressure systems tracking from the Great Plains through the Great Lakes to the Northeast. Rainfall totals exceeding 1.5 inches are forecast from Kansas to Michigan, from the Gulf Coast of Texas to western North Carolina, and across New England. The remnants of Pacific Hurricane Rick could bring significant rainfall to the Southeast. Additional storm systems are forecast to impact the Pacific Northwest Sunday and Monday. Rainfall amounts from 1.0-2.5 inches are possible. Little relief is expected for the drought areas in Arizona and the dry area in Florida.

The CPC 6-10 day forecast (October 27-31) calls for above-normal precipitation in the Northwest and from the Mississippi River to the East Coast. Drier weather should return to much of California, Nevada, Arizona, and Utah. Above-normal temperatures are forecast for most of the contiguous U.S. west of the continental divide with below-normal temperatures east of the Rockies. A wet pattern is forecast across southeast Alaska.

**Author:** [Matthew Rosencrans, NOAA/NWS/NCEP/CPC](#)

### 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 October 22, 2009