



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

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**Weekly Report - Snowpack / Drought Monitor Update**

**Date: 24 February 2011**

## **SNOTEL SNOWPACK AND PRECIPITATION SUMMARY**

**Snow:** SNOTEL Snow-Water Equivalent percent of normal values for 24 February 2011 shows several basins across the West have improved by one category during the past week (noted by blue circles) (Fig. 1). SNOTEL Snow-Water Equivalent percent of Normal peak shows that most basins have 50% or less of peak values at this point (we are about 66% through the snow accumulation season; 82% for the Southwest). Parts of the Uinta and Wasatch are at peak values as of this week. However, most SNOTEL sites (especially over the Pacific Northwest) will need much more snow this season in order to finish with near normal amounts (Fig. 1a). SNOTEL 7-day snow depth changes show significant gains west of the Continental Divide. All but the Central Great Basin and southern New Mexico saw gains this week (Fig. 1b).

**Temperature:** Average SNOTEL temperatures were below normal over all states except Colorado and New Mexico (Fig. 2). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures over southeastern New Mexico ( $>+10^{\circ}\text{F}$ ) and the greatest negative departures over northern Montana ( $<-20^{\circ}\text{F}$ ) (Fig. 2a).

**Precipitation:** ACIS 7-day average precipitation amounts for the period ending 23 February shows the bulk of the heaviest precipitation confined to the Sierra and central Arizona (Fig. 3). In terms of percent of normal, the precipitation pattern was extremely wet over much of the West except for the extreme northwest Pacific Northwest and southeast half of New Mexico (Fig. 3a). For the 2011 Water-Year that began on 1 October 2010, the greatest deficits are found over the extreme southern reaches of the Southwest. Areas with the highest values are found over the Great Basin, and the Northern and Central Rockies. One-category deterioration is noted by the red circle. Blue circles reflect marginal one-category improvements (Fig. 3b).

**Weekly Summary:** Stormy weather returned to parts of the West in mid-February for the first time since late-December 2010. Some of the highest precipitation totals were observed in the Sierra Nevada and the coastal ranges of northern and central California. Beneficial precipitation also spread into parts of the Southwest.

**The West:** The West's first significant storminess since late-December 2010 resulted in highly beneficial snowfall in key watershed areas of California and the Northwest. Following the six-week lull, mid-February storms added approximately 5 inches of liquid to the Sierra Nevada snow pack, according to the California Department of Water Resources. Heavy precipitation in northern California and environs eliminated an area of abnormal dryness (D0). Much-needed moisture also spread into the Southwest, although rain and snow failed to reach any farther east than central Arizona and northwestern New Mexico. Flagstaff, Arizona, noted 17.9 inches of snow from February 18-20, after receiving only one other measurable snowfall (1.2 inches on January 31) since the beginning of the year. **Author:** [Brad Rippey, U.S. Department of Agriculture](#)

## Weekly Snowpack and Drought Monitor Update Report

***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 estimated by a one-layer hydrological model ([Huang et al., 1996](#), [van den Dool et al., 2003](#)). The model takes observed precipitation and temperature and calculates soil moisture, evaporation and runoff. The potential evaporation is estimated from observed temperature.

[http://www.cpc.ncep.noaa.gov/soilmst/index\\_jh.html](http://www.cpc.ncep.noaa.gov/soilmst/index_jh.html)

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

[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).

This map, (Fig. 6) 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.

### **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/> 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 -

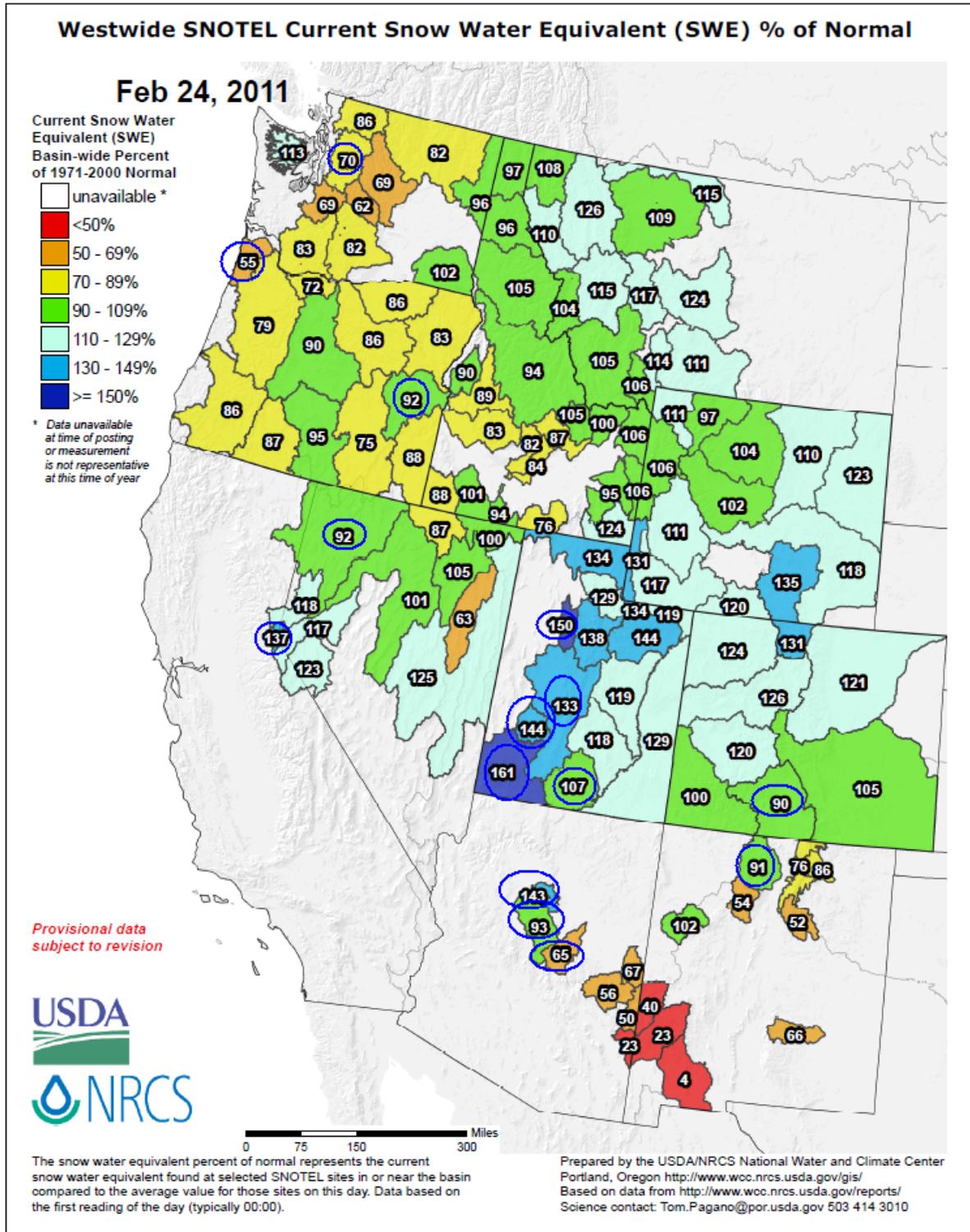
<http://www.wcc.nrcs.usda.gov/water/drought/wdr.pl>

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

/s/ JEFF GOEBEL

Acting Director, Resource Inventory Division

# Weekly Snowpack and Drought Monitor Update Report

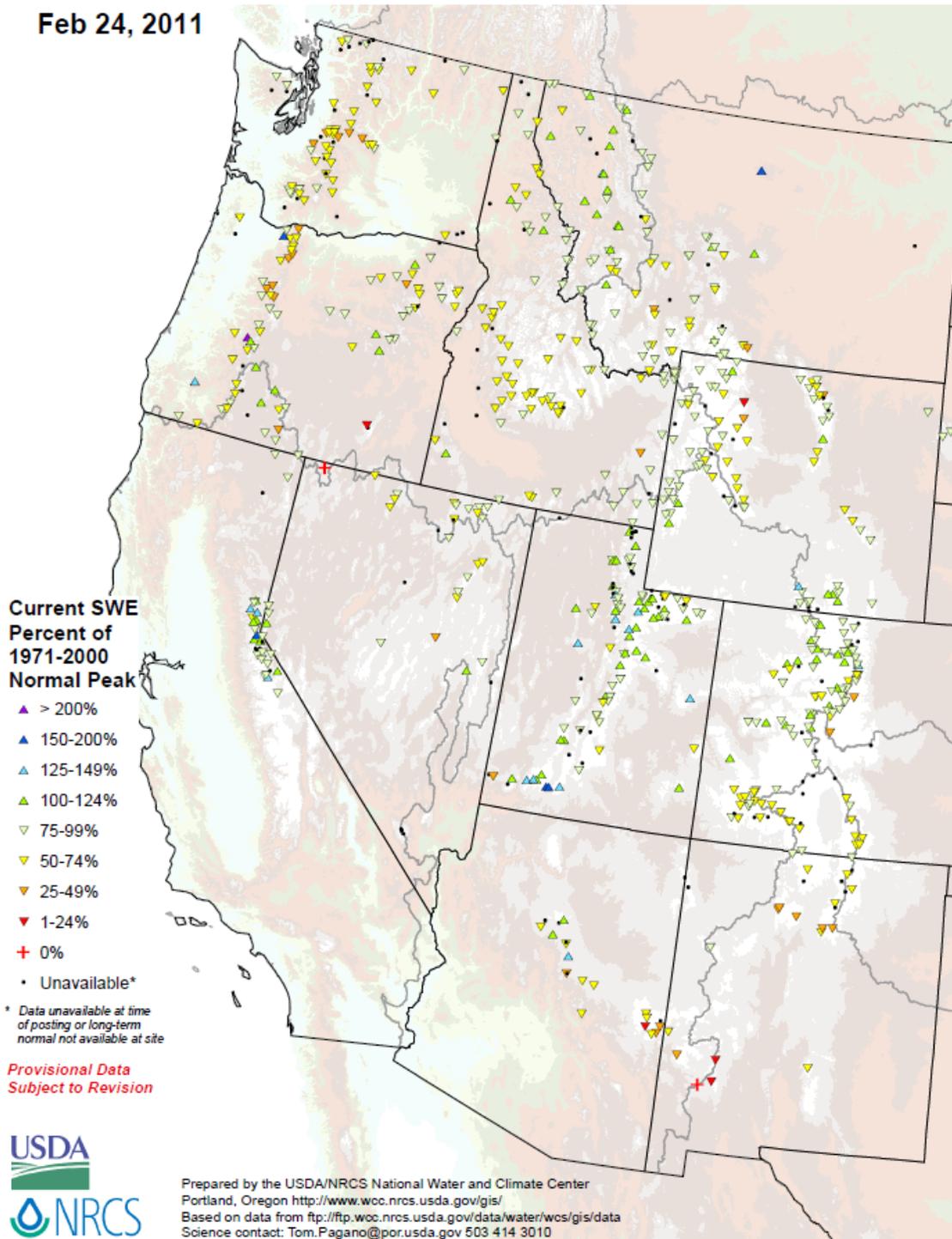


**Fig. 1: SNOTEL Snow-Water Equivalent percent of normal values for 24 February 2011 shows several basins across the West have improved by one category during the past week (noted by blue circles).**

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

# Weekly Snowpack and Drought Monitor Update Report

## SNOTEL Current Snow Water Equivalent (SWE) Percent of Normal Peak Feb 24, 2011



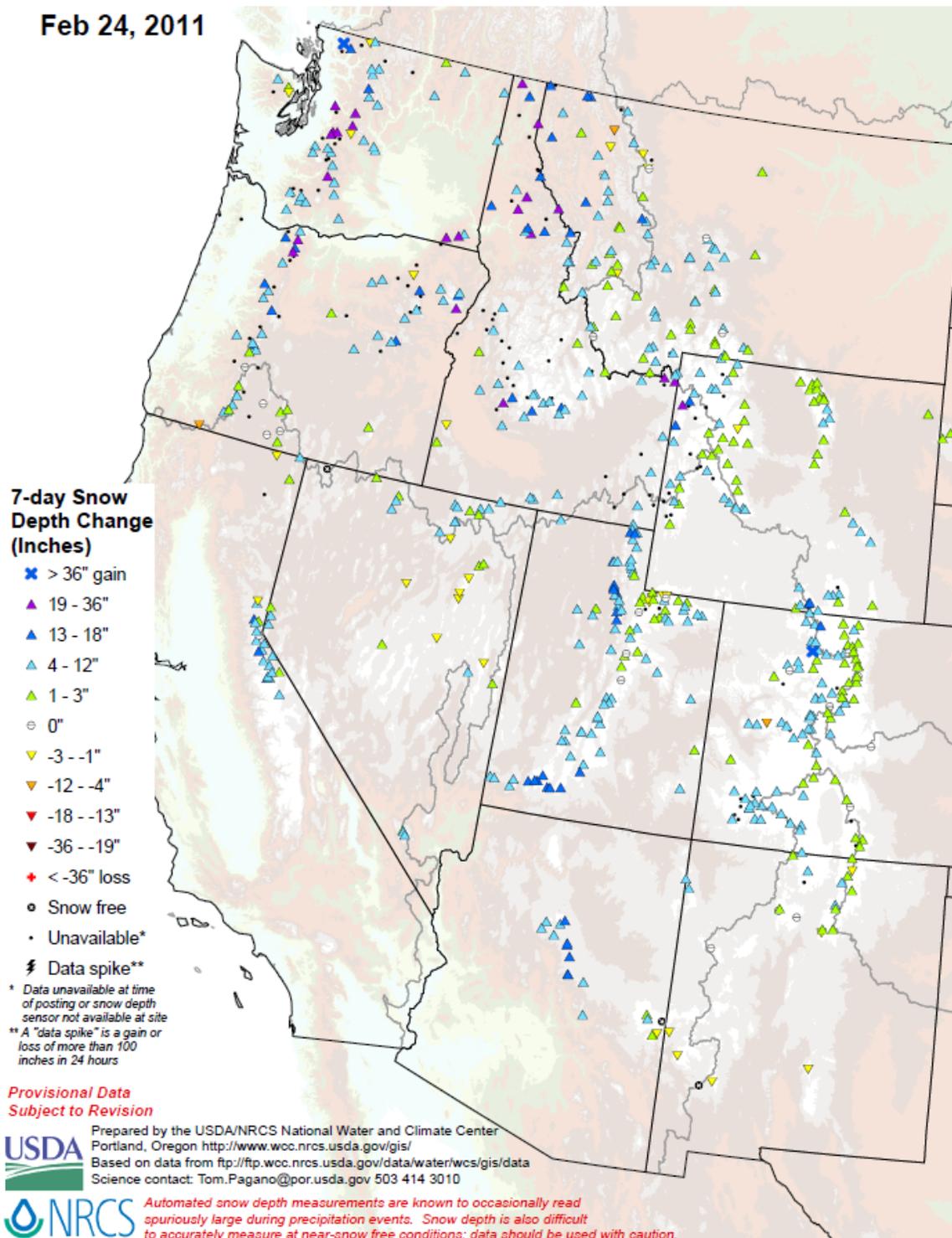
**Fig. 1a: SNOTEL Snow-Water Equivalent percent of Normal peak shows that most basins have 50% or less of peak values at this point (we are about 66% through the snow accumulation season; 82% for the Southwest). Parts of the Uinta and Wasatch are at peak values as of this week. However, most SNOTEL sites (especially over the Pacific Northwest) will need much more snow this season in order to finish with near normal amounts.**

Ref: <http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/WestwideSWEPercentPeak.pdf>

# Weekly Snowpack and Drought Monitor Update Report

## SNOTEL 7-Day Snow Depth Change (Inches)

Feb 24, 2011

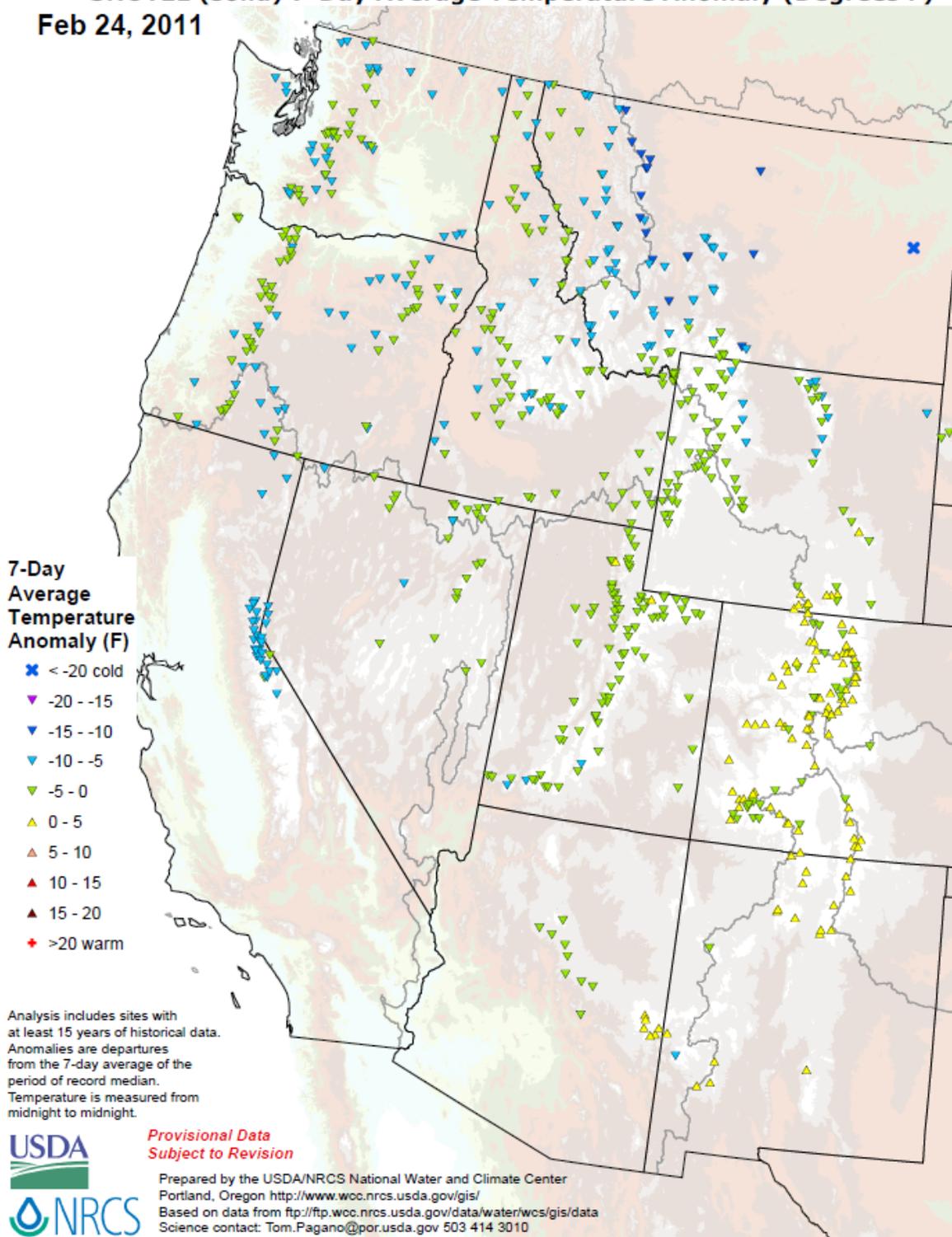


**Fig. 1b: SNOTEL 7-day snow depth changes show significant gains west of the Continental Divide. All but the Central Great Basin and southern New Mexico saw gains this week.**

Ref: [http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west\\_snowdepth\\_7ddelta.pdf](http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west_snowdepth_7ddelta.pdf)

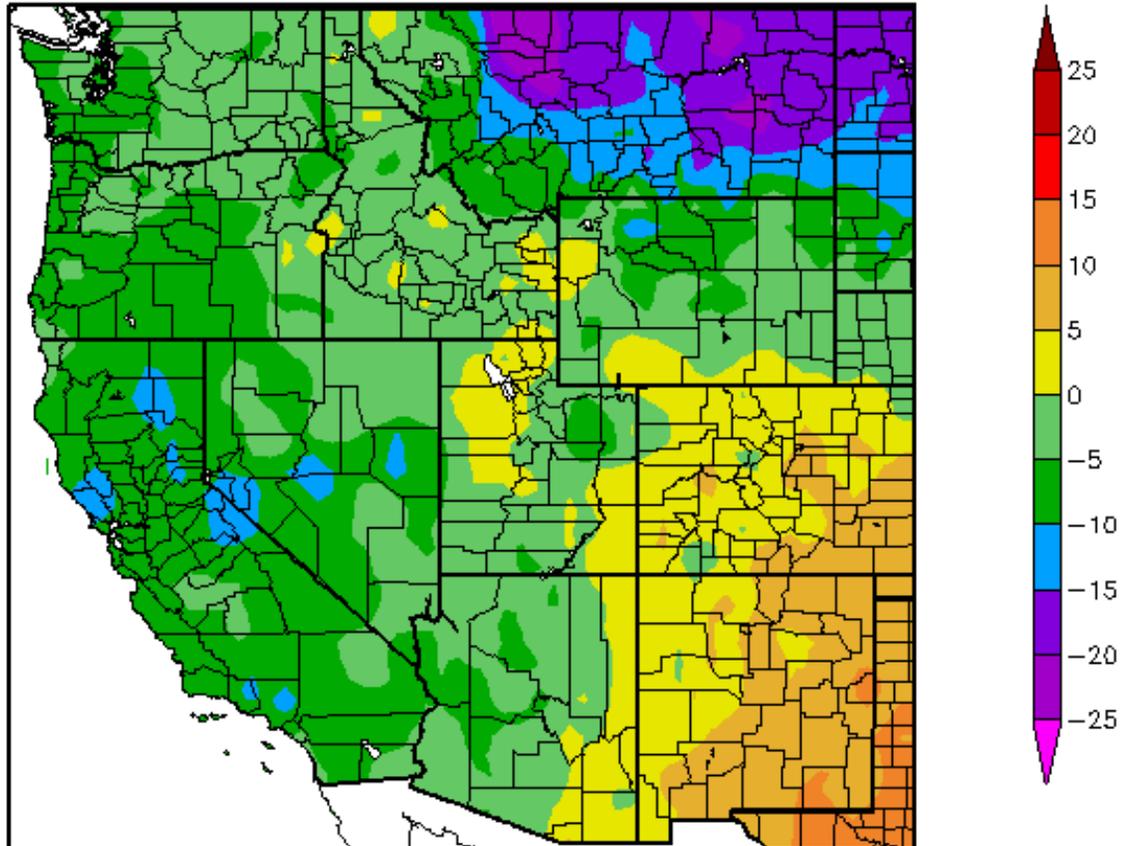
# Weekly Snowpack and Drought Monitor Update Report

## SNOTEL (solid) 7-Day Average Temperature Anomaly (Degrees F) Feb 24, 2011



**Fig. 2: Average SNOTEL temperatures were below normal over all states except Colorado and New Mexico. Ref:**  
<http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/WestwideTavg7dAnomaly.pdf>

Departure from Normal Temperature (F)  
2/17/2011 – 2/23/2011



Generated 2/24/2011 at HPRCC using provisional data.

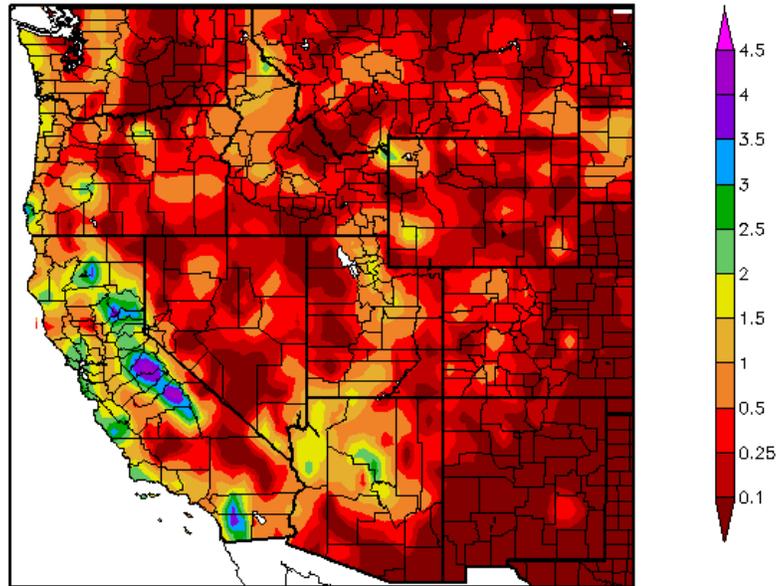
Regional Climate Centers

**Fig. 2a: ACIS 7-day average temperature anomalies show that the greatest positive temperature departures over southeastern New Mexico ( $>+10^{\circ}\text{F}$ ) and the greatest negative departures over northern Montana ( $<-20^{\circ}\text{F}$ ).**

Ref: [http://www.hprcc.unl.edu/maps/current/index.php?action=update\\_daterange&daterange=7d](http://www.hprcc.unl.edu/maps/current/index.php?action=update_daterange&daterange=7d)

## Weekly Snowpack and Drought Monitor Update Report

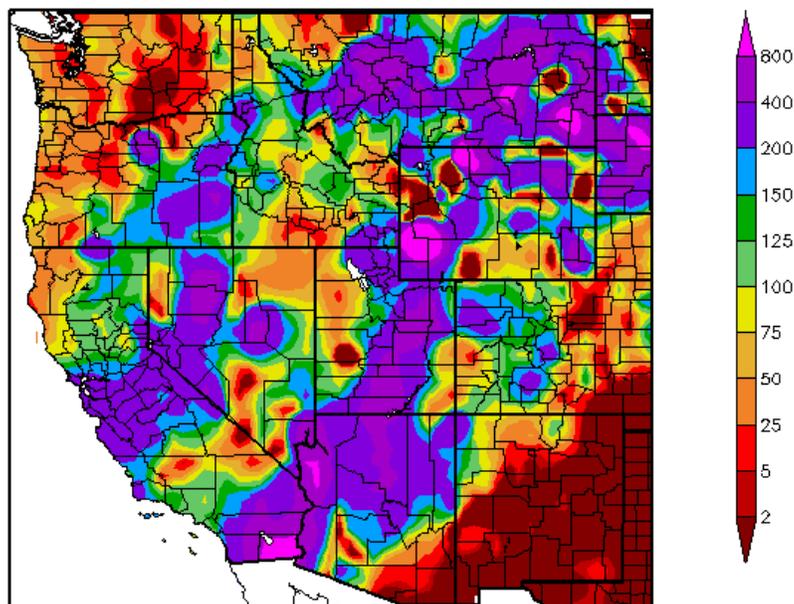
Precipitation (in)  
2/17/2011 – 2/23/2011



Generated 2/24/2011 at HPRCC using provisional data.

Regional Climate Centers

Percent of Normal Precipitation (%)  
2/17/2011 – 2/23/2011



Generated 2/24/2011 at HPRCC using provisional data.

Regional Climate Centers

**Fig. 3 and 3a: ACIS 7-day average precipitation amounts for the period ending 23 February shows the bulk of the heaviest precipitation confined to the Sierra and central Arizona (Fig. 3). In terms of percent of normal, the precipitation pattern was extremely wet over much of the West except for the extreme northwest Pacific Northwest and southeast half of New Mexico (Fig. 3a). Ref:** <http://www.hprcc.unl.edu/maps/current/>



# U.S. Drought Monitor

February 22, 2011  
Valid 7 a.m. EST

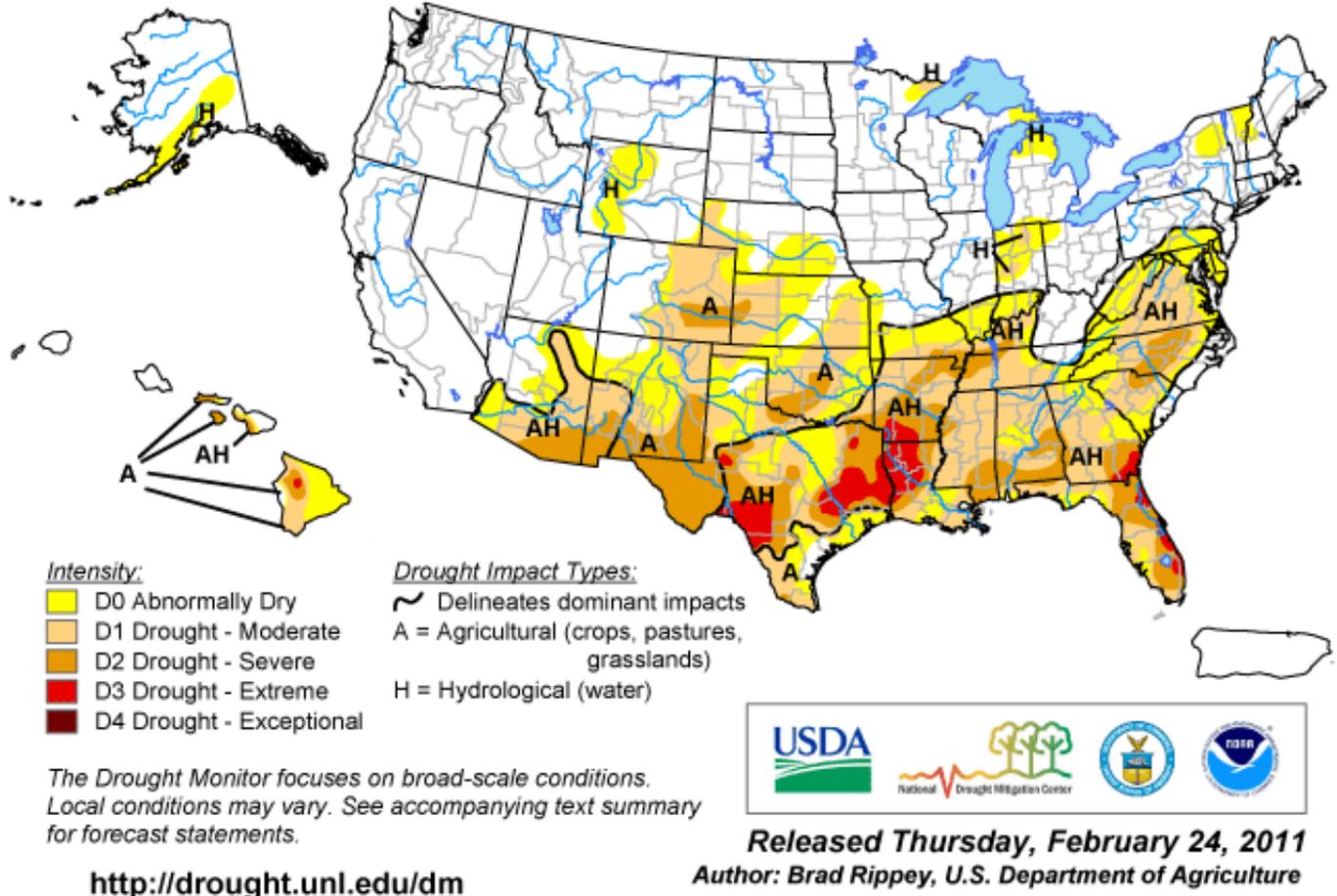


Fig. 4: Current Drought Monitor weekly summary. The severest D3 levels of drought are found on the Big Island of Hawaii and is scattered across Texas, Louisiana, Arkansas, Georgia, and Florida.

Ref: <http://www.drought.unl.edu/dm/monitor.html>

# U.S. Drought Monitor

## West

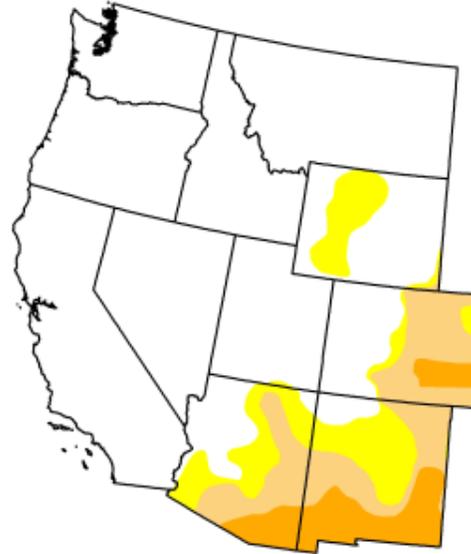
February 22, 2011  
Valid 7 a.m. EST

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	76.19	23.81	15.02	5.41	0.00	0.00
Last Week (02/15/2011 map)	72.99	27.01	13.79	4.34	0.00	0.00
3 Months Ago (11/23/2010 map)	71.90	28.10	5.75	0.00	0.00	0.00
Start of Calendar Year (12/28/2010 map)	73.26	26.74	11.98	0.89	0.00	0.00
Start of Water Year (09/28/2010 map)	62.50	37.50	8.14	0.56	0.00	0.00
One Year Ago (02/16/2010 map)	33.19	66.81	21.03	3.58	0.00	0.00

*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>



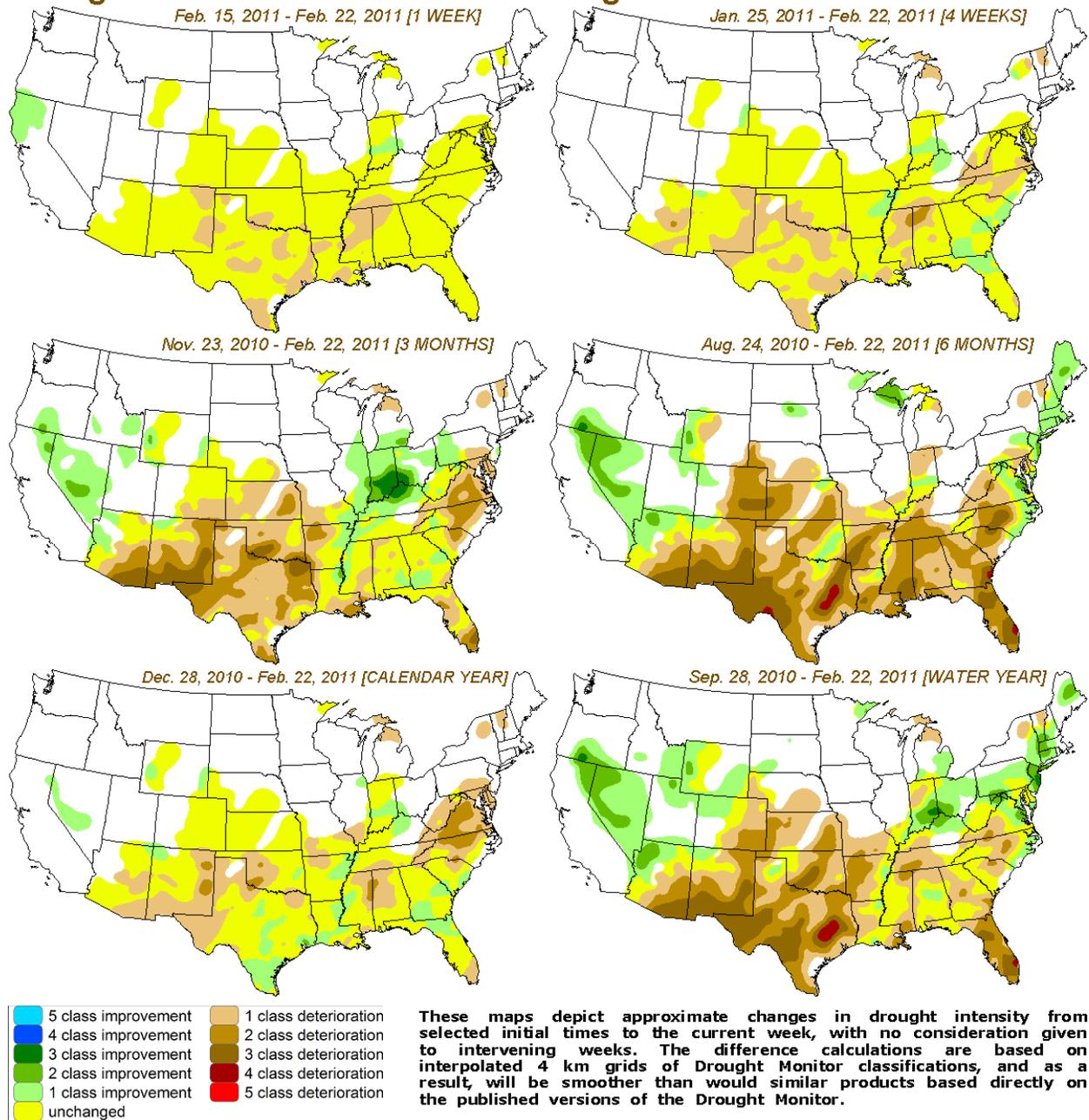
Released Thursday, February 24, 2011  
B. Rippey, U.S. Dept of Agriculture

**Fig. 4a: Drought Monitor for the Western States with statistics over various time periods. Regionally there was some deterioration during the past week.**

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

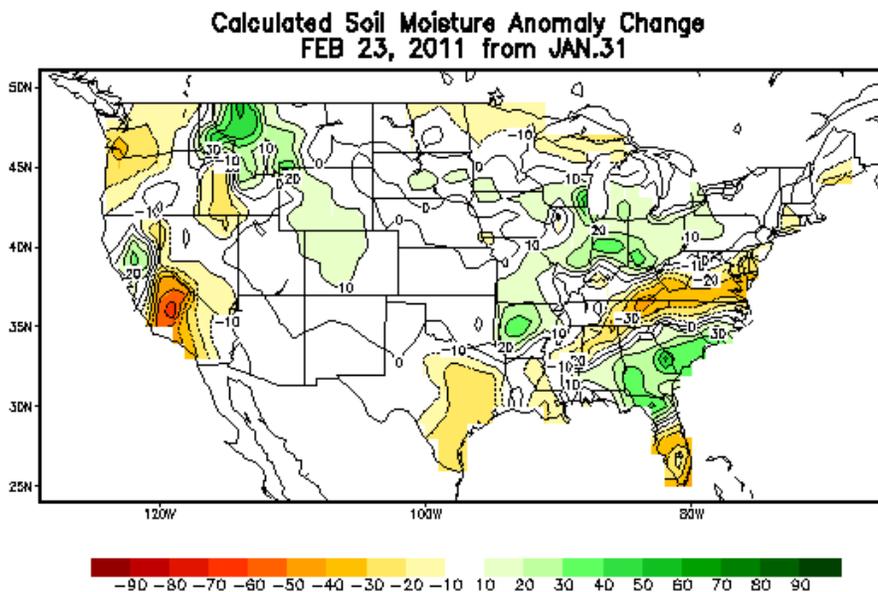
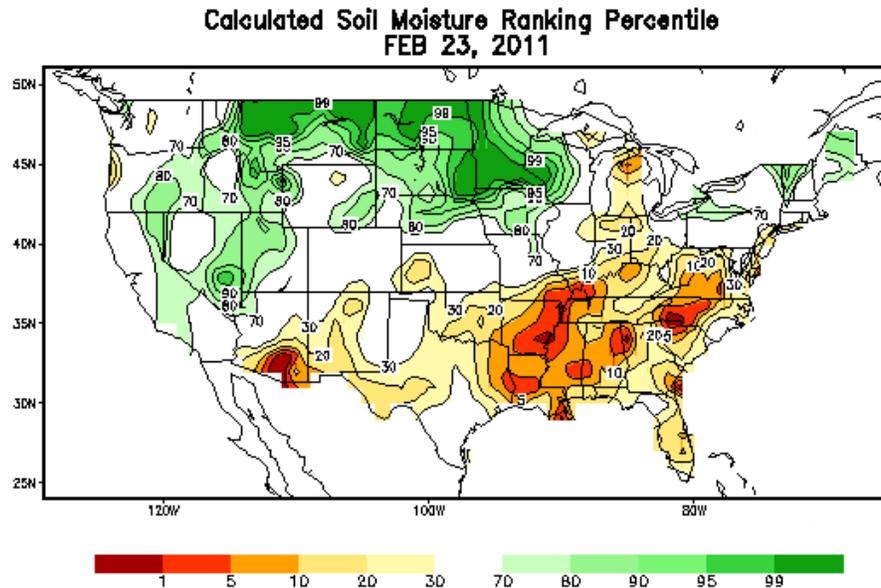
## Weekly Snowpack and Drought Monitor Update Report

### Drought Monitor Classification Changes for Selected Time Periods



**Fig. 4b: Drought Monitor classification changes for the Water-Year for various time periods show some worsening over the Southern Tier States but relatively little change over much of the Northern Tier States.**

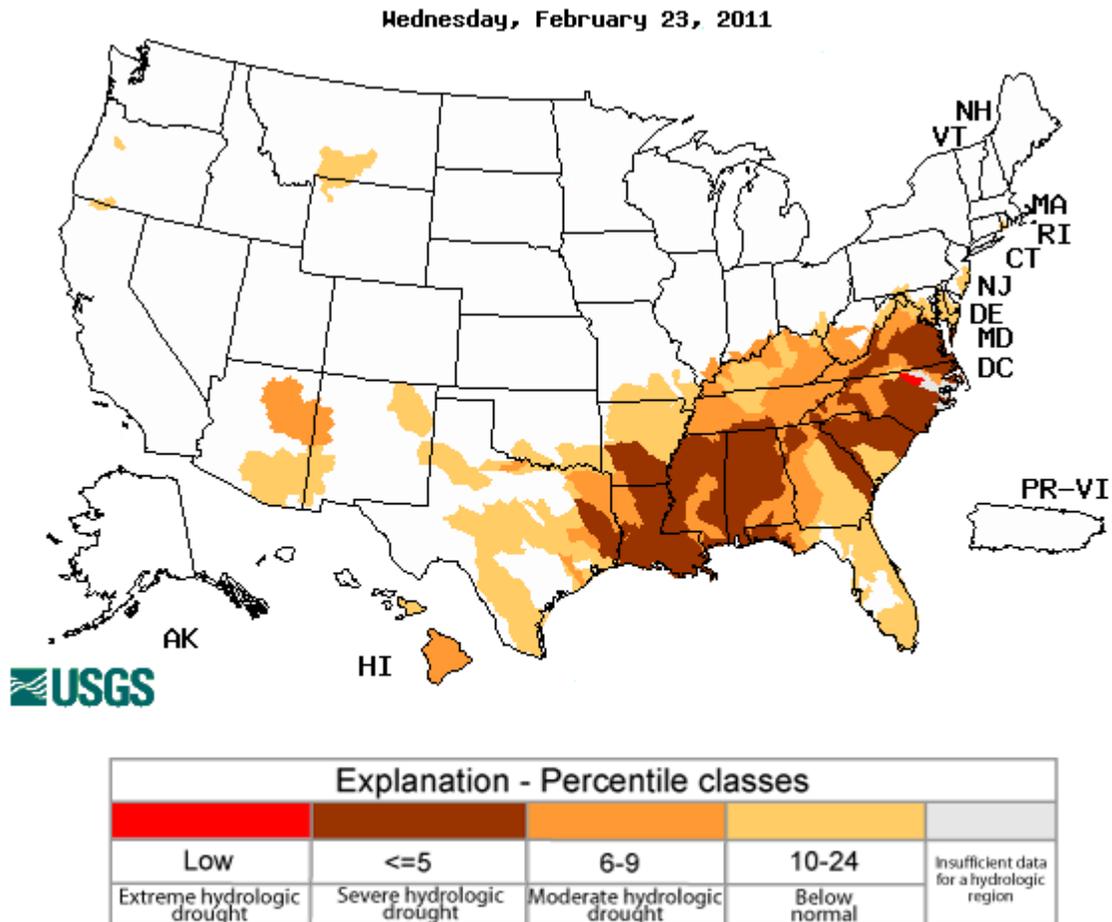
## Weekly Snowpack and Drought Monitor Update Report



**Figs. 5a and 5b:** Soil Moisture ranking in percentile as of 23 February (Fig. 5a) shows wet conditions over much of the Central Northern Tier States with dryness over Arizona and much of the Lower Mississippi River Valley and into the Mid-Atlantic States. Since the end of January, much of northwestern Montana and the Southeast have increased in moisture while dryness increased over the Mid-Atlantic States and over California (Fig. 5b).

Ref: [http://www.cpc.ncep.noaa.gov/products/Soilmst\\_Monitoring/US/Soilmst/Soilmst.shtml#](http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml#)

# Weekly Snowpack and Drought Monitor Update Report



**Fig. 6:** Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Portions of the Arizona, the Gulf States, and the Mid-Atlantic States are reflecting La Niña conditions of dryness. Note: northern site gauges are less accurate as rivers and streams are probably frozen. Ref: <http://waterwatch.usgs.gov/?m=dryw&r>

## Weekly Snowpack and Drought Monitor Update Report

### National Drought Summary -- February 22, 2011

*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/>.*

**Weekly Summary:** Stormy weather returned to parts of the West in mid-February for the first time since late-December 2010. Some of the highest precipitation totals were observed in the Sierra Nevada and the coastal ranges of northern and central California. Beneficial precipitation also spread into parts of the Southwest. In contrast, the drought situation worsened from the central and southern Plains into the Southeast, under a warm, dry weather regime. Warm, windy weather contributed to a sharp increase in wildfire activity across the South and East. Farther north, some beneficial precipitation clipped dry areas from the lower Midwest into the northern Mid-Atlantic region.

**South, East, and Midwest:** In mid-February, warm, dry weather replaced cold conditions across the South. Warmth also made a brief push into the East and Midwest. Drought continued to develop, expand, and intensify from the Mid-South into the Southeast. Agricultural concerns were mounting due to short-term precipitation shortages superimposed on longer-term deficits. On February 20, more than one-third (34%) of Florida's pastures were rated in very poor to poor condition, according to the U.S. Department of Agriculture. Stream flows remained extremely low for this time of year throughout the South. Farther north, no changes were introduced across the interior Northeast, where pockets of abnormal dryness (D0) persisted. In the Midwest, a band of heavy precipitation cut across central Indiana and southwestern Ohio on February 20-21, leading to some generally minor river flooding and the removal of abnormal dryness (D0).

**Great Plains:** Extreme weather conditions persisted on the central and southern Plains, where drought continued to gradually expand and intensify. In less than a week, from February 10 to 16, temperature rises of 80 to 110°F were observed in numerous locations. On February 16-17, temperatures peaked above 80°F throughout the southern High Plains. At the height of the warm spell, several brush and grass fires—including a 16,000-acre complex in Lipscomb County, Texas—affected the southern Plains. On February 20, the U.S. Department of Agriculture rated 60% of Texas' winter wheat crop in very poor to poor condition, along with 63% of the state's oats and 55% of the pasture and rangeland.

**The West:** The West's first significant storminess since late-December 2010 resulted in highly beneficial snowfall in key watershed areas of California and the Northwest. Following the six-week lull, mid-February storms added approximately 5 inches of liquid to the Sierra Nevada snow pack, according to the California Department of Water Resources. Heavy precipitation in northern California and environs eliminated an area of abnormal dryness (D0). Much-needed moisture also spread into the Southwest, although rain and snow failed to reach any farther east than central Arizona and northwestern New Mexico. Flagstaff, Arizona, noted 17.9 inches of

## Weekly Snowpack and Drought Monitor Update Report

snow from February 18-20, after receiving only one other measurable snowfall (1.2 inches on January 31) since the beginning of the year.

**Alaska, Hawaii, and Puerto Rico:** Stormy weather replaced cold conditions in Alaska. Fairbanks received a phenomenal 18.6 inches of snow on February 20-21, representing its sixth-greatest two-day snowfall on record. Most (17.1 inches) of Fairbanks' snow fell in a 24-hour period, marking its second-highest total on record behind 20.1 inches on February 11-12, 1966. As a result of February 1 snow pack information and recent storminess, some abnormal dryness (D0) was trimmed across interior Alaska.

The drought status across Hawaii remained unchanged, as the western islands continued to receive the heaviest showers. On the Big Island, year-to-date rainfall in Hilo through February 22 totaled just 5.16 inches (31% of normal).

Widespread showers dotted Puerto Rico, with weekly totals in excess of 2 inches common across the interior. The island remained free of drought.

**Looking Ahead:** During the next five days (February 24-28), Pacific energy will continue to migrate eastward into the central and eastern U.S. As a result, a low-pressure system will develop over the south-central U.S. on February 24 and race into the northern Mid-Atlantic States on February 25. A second storm system will develop over the central Plains by February 27 before lifting into the Great Lakes region on the last day of the month. Before heading into the nation's mid-section, the second system will also be responsible for widespread precipitation in the West. Combined rainfall from the two storms could reach 2 to 6 inches from the Mid-South into the Ohio Valley. The first storm will also trigger snowfall from the eastern Corn Belt into the Northeast, while the second system has the potential to produce major snow accumulations from the central Plains into the upper Midwest. The National Weather Service's 6- to 10-day outlook for March 1-5 calls for colder- and wetter-than-normal conditions in northern California and across the northern one-third of the U.S. In contrast, below-normal precipitation can be expected from across much of the nation's southern tier from Arizona into the southern Atlantic region. Warmer-than-normal weather will accompany the dry conditions across the southern High Plains and the Southwest.

**Author:** [Brad Rippey, U.S. Department of Agriculture](#)

### 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

February 23, 2011