



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

**Weekly Report - Snowpack / Drought Monitor Update**      **Date: March 15, 2007**

**SNOTEL SNOWPACK AND PRECIPITATION SUMMARY**

**Snowpack:** For the 2007 Water Year, the only regions continuing to show a surplus in snow water-equivalent (SWE) are over the Northern Cascades and the Front Range of the Rockies in Colorado and New Mexico (Fig. 1). Elsewhere, deficit values continue to accelerate under warmer than normal temperatures. During the week, SWE values continue to decrease across much of the West (Fig. 1a). Snow depths have decreased significantly over the Cascades (1 to 2 feet) and to a lesser extent as one travels eastward across the West (Fig 1b). Warmer temperatures and snow settlement are contributing factors for these decreases. Snow densities are approaching the melting point for snow (e.g., percent of water exceeding 45 percent) over the Cascades, northwest Montana, and portions of the Sierra Nevada (see: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideDensityPercent.pdf>).

**Temperature:** During the past seven days, temperatures ranged from up to 15°F above normal over the eastern slope of the Northern Rockies to 5°F above normal over the Northern Cascades (Fig. 2). Record high streamflows on March 13 were recorded across much of western Montana as a result of this excessive heat:

**RECORD FLOW PREVIOUS RECORD FLOW SET**

RIVER GAGE	(CFS)	(CFS)	IN
YAAK RIVER	2940	1960	1983
FISHER RIVER	3290	2250	1972
NORTH FORK FLATHEAD RIVER	3900	2580	1986
MIDDLE FORK FLATHEAD RIVER	5520	2730	1986
THOMPSON RIVER	1350	1230	1972
PROSPECT CREEK	1200	984	1972
ST REGIS RIVER	2000	1500	1972
ROCK CREEK	505	412	1986

**Precipitation:** During this report period, precipitation (rain and snow) was spotty over the Northern and Central Rockies but significant over Western Washington (Fig. 3). Elsewhere, little precipitation fell. For the Water Year, precipitation surpluses continue to persist over the Cascades, northern Idaho, northwest Montana, and across the Colorado Rockies (e.g., Front Range and Southwest Ranges). The Sierra Nevada and Arizona ranges are reflecting larger deficits (Fig. 3a) and this worsening situation is reflected in Figs. 4, 4a, and 4b. Supporting evidence for this downward trend is shown in Fig. 5 (drying of soil moisture), Fig. 6 (increase in fire threat), and Fig. 7 (lessening streamflows).

**WESTERN DROUGHT STATUS**

**The West:** The rainy season across much of the Southwest has been very dry. By March 8, the driest rain season to date was reported at several stations in southern California, including downtown Los Angeles (2.42 inches of rain, down 9.13 inches), Long Beach airport (1.59 inches, down 8.70 inches), Los Angeles airport (2.18 inches, down 8.31 inches), and Burbank

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airport (2.33 inches, down 10.82 inches). The extreme dryness was coupled with hot temperatures and very windy conditions which prompted Red Flag/Fire Weather warnings for southern California, where two large wildfires and several smaller blazes threatened homes in Orange and Riverside counties. The above-normal temperatures caused many river flows to increase because of early melt of the below-normal snowpack. In spite of the below-average precipitation this water year, especially in southern California, reservoir levels were near average across the Golden State due to a combination of above-average precipitation last year and good water management decisions since then. As of March 11, the projected median April-July snowmelt runoff for California's water supply basins remained low, ranging from 85% (Shasta Lake inflow in the north) to 46% (Kern River in the south).

An area of D3 was introduced into southern California and adjacent Arizona where the deficits were greatest. D2 was expanded in southern California and Arizona, and a spot of D2 was added in Nevada near Reno. D1 grew in Arizona, central Nevada, northern California, southern coastal California, and extreme southern Utah. D0 nudged into southwest New Mexico. Slight adjustments were made to the D0-D1-D2 boundaries in Montana to better reflect the short- and long-term moisture conditions (Figs. 4, 4a, and 4b).

***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 (Fig. 4, 4a, and 4b).

### **SOIL MOISTURE**

Soil moisture (Fig. 5) 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. Reference: <http://www.cpc.ncep.noaa.gov/soilmst/img/curr.w.rank.daily.gif>.

### **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://www.nifc.gov/information.html>. The latest Observed Fire Danger Class is shown in Fig. 6.

### **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).

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### 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>

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

/s/ DANIEL MEYER  
Acting Director, Conservation Engineering Division

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Mar 15, 2007

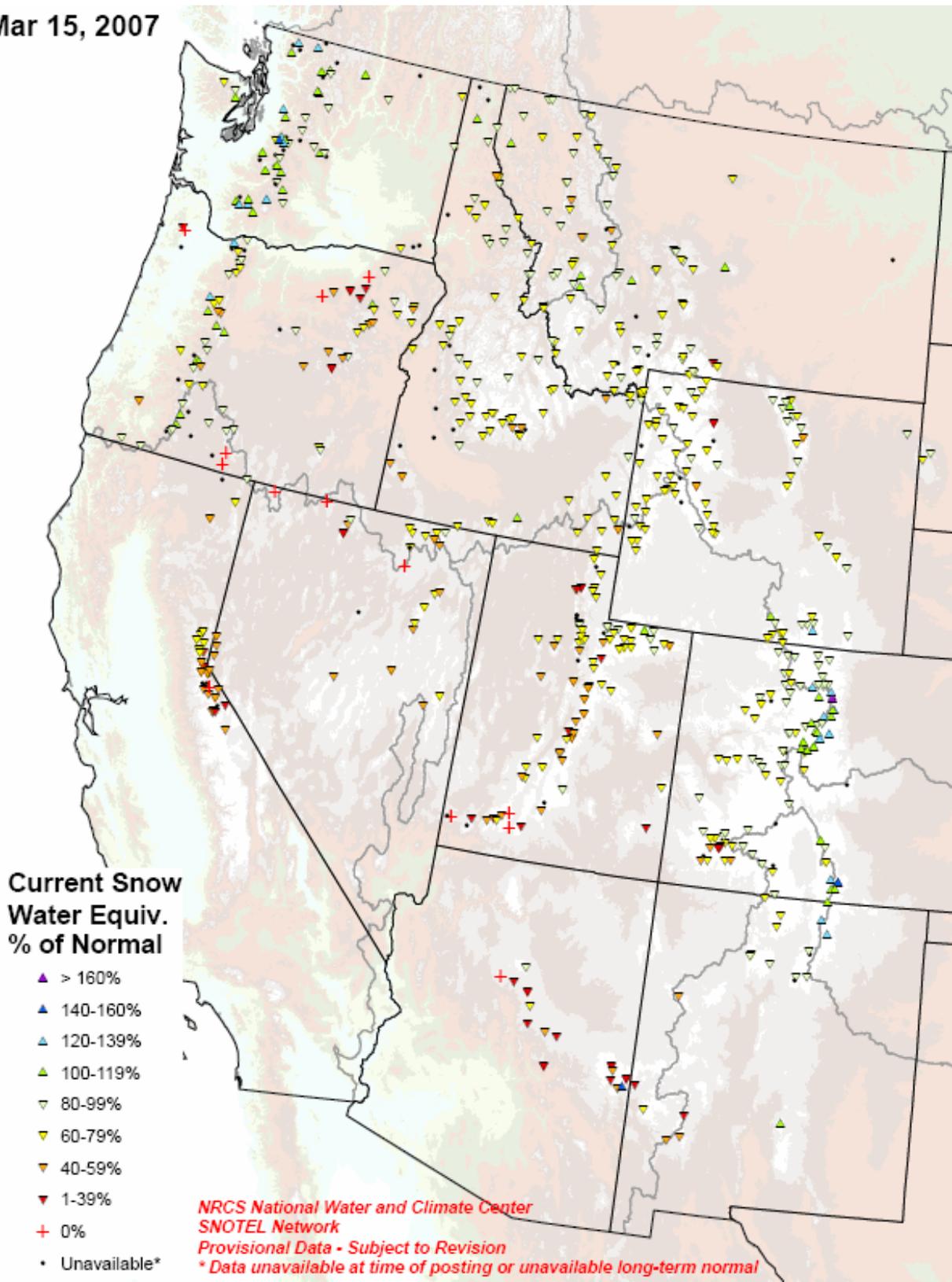


Fig. 1: Snow Water-Equivalent as a percent of normal for Water Year 2007.

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

# Weekly SWE Change

Snow Water Equivalent: Change in Percentiles (wrt/ 1915-2003)  
for the week 20070306 to 20070313 threshold = 10 mm

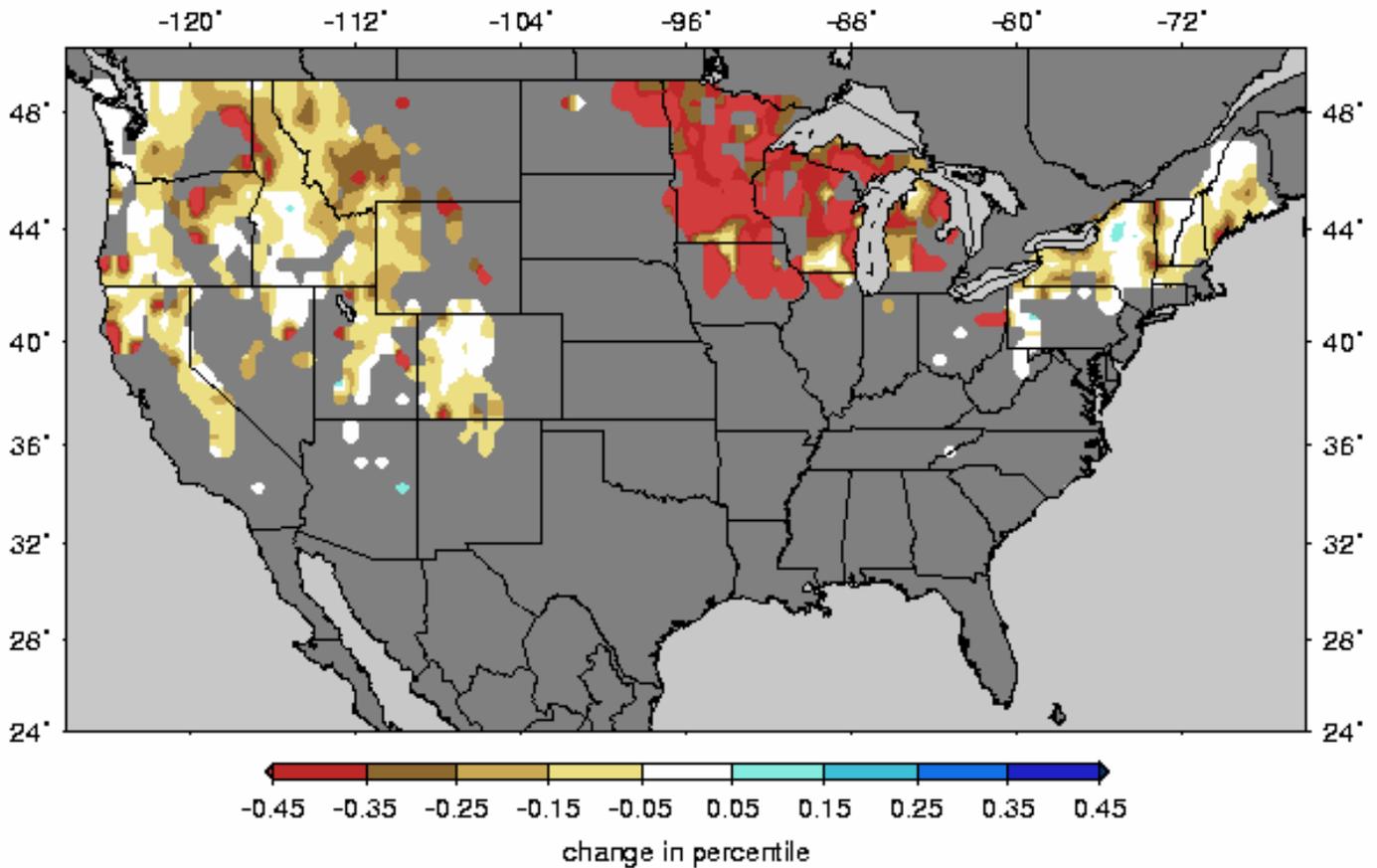


Fig. 1a. Snow Water-Equivalent changes as a percent during the period 6 to 13 March 2007 based on 1915-2003 climatology. Ref: <http://www.hydro.washington.edu/forecast/monitor/index.shtml>

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## 7-day Snow Depth Change (inches)

- ✖ > 36" gain
- ▲ 19 - 36"
- ▲ 13 - 18"
- ▲ 4 - 12"
- ▲ 1 - 3"
- 0"
- ▼ -3 - -1"
- ▼ -12 - -4"
- ▼ -18 - -13"
- ▼ -36 - -19"
- ✖ < -36" loss
- Snow free
- \* Unavailable\*
- ⚡ data spike

\* Data unavailable at time of posting or snow depth sensor not available at site  
\*\* A "data spike" is a gain or loss of more than 100 inches in 7 days

*Provisional Data  
Subject to Revision*

0 50 100 200 Miles



Prepared by the  
USDA/NRCS National Water and Climate Center  
Portland, Oregon  
<http://www.wcc.nrcs.usda.gov/gis/>

*Automated snow depth measurements are known to occasionally read spuriously large during precipitation events. Snow depth is also difficult to accurately measure at near-snow free conditions; data should be used with caution.*

**Fig. 1b. SNOTEL 7-day snow depth change.**

Ref: <http://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomaly.pdf>

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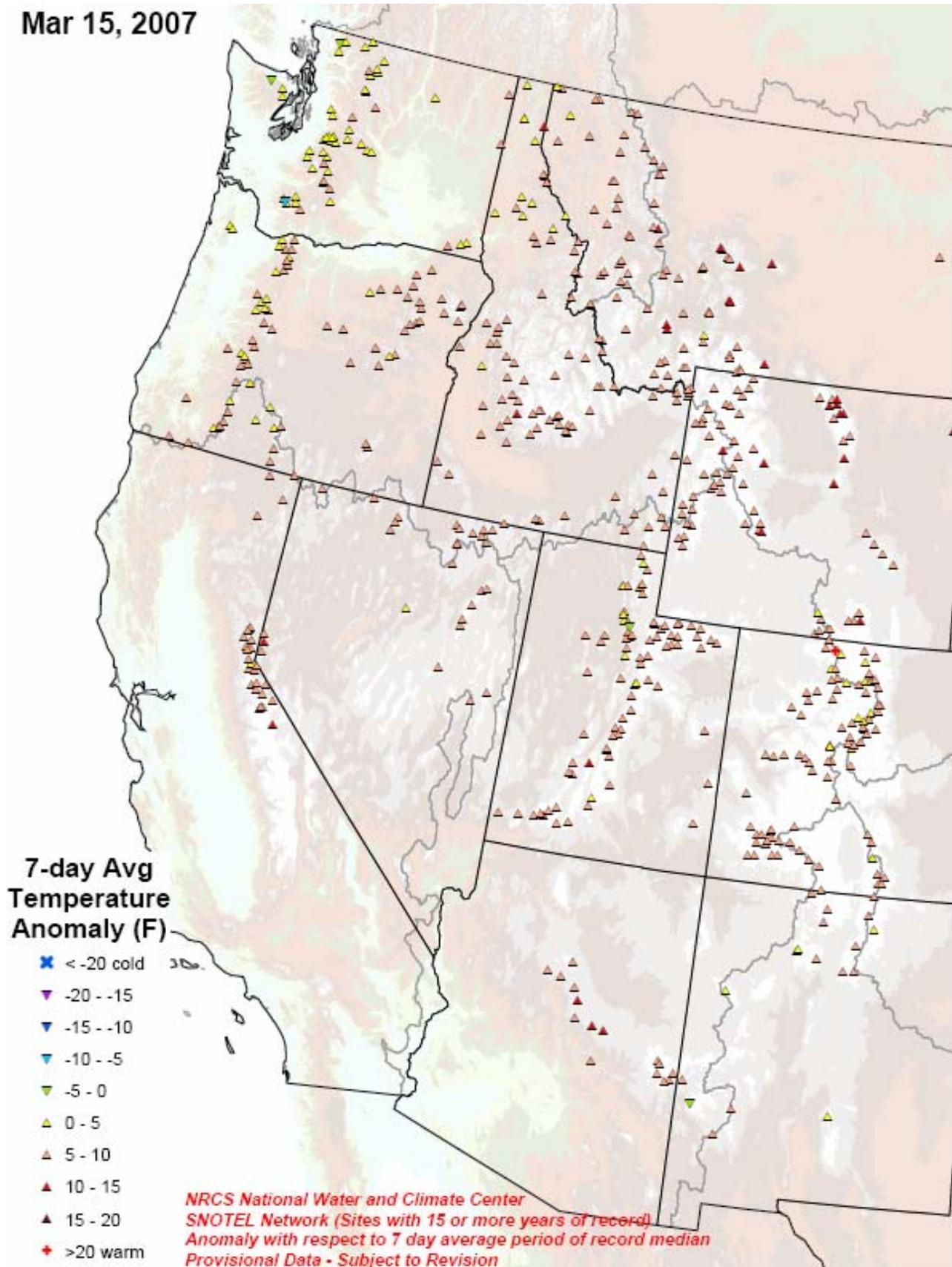


Fig. 2. SNOTEL 7-day average temperature anomaly.

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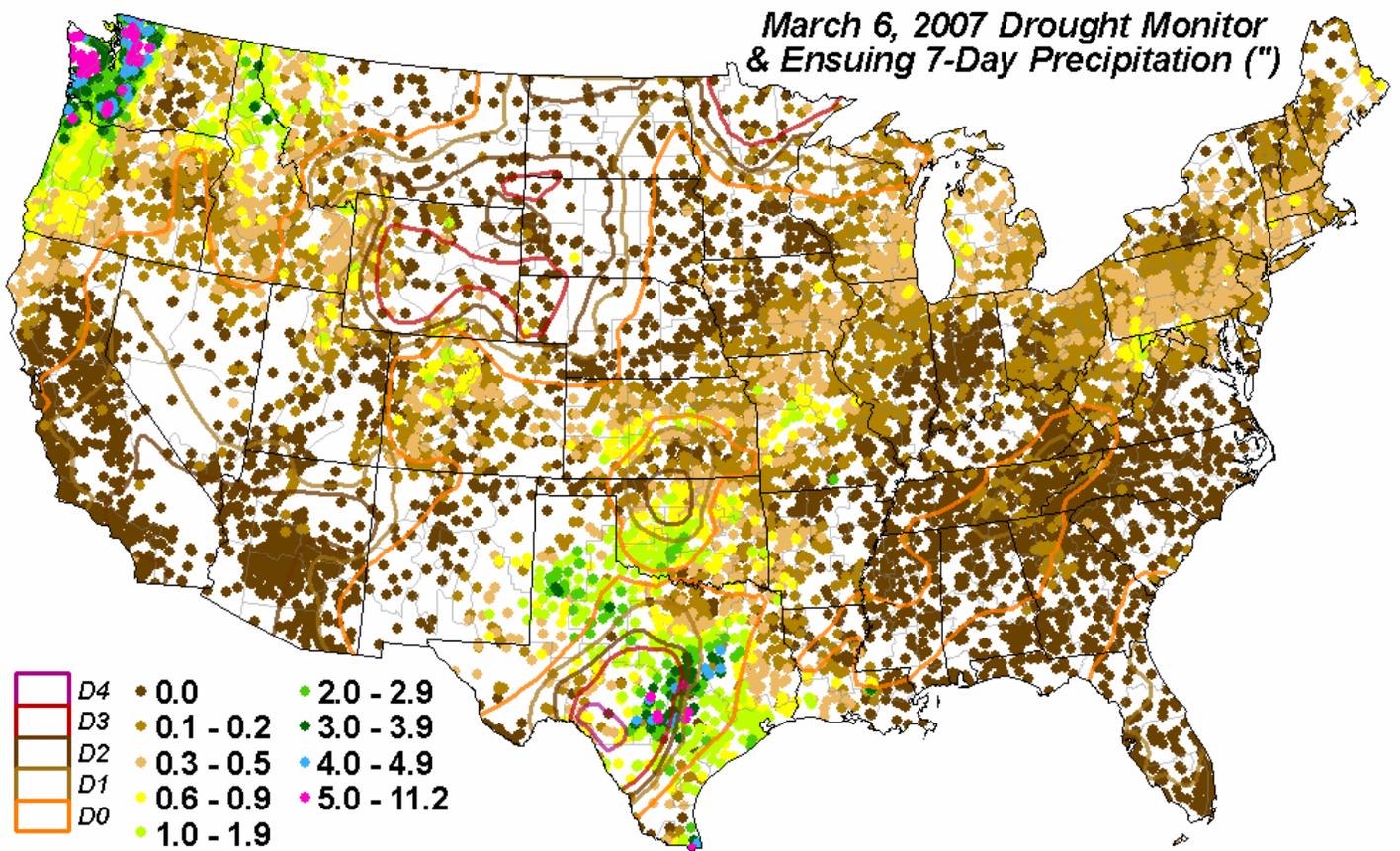
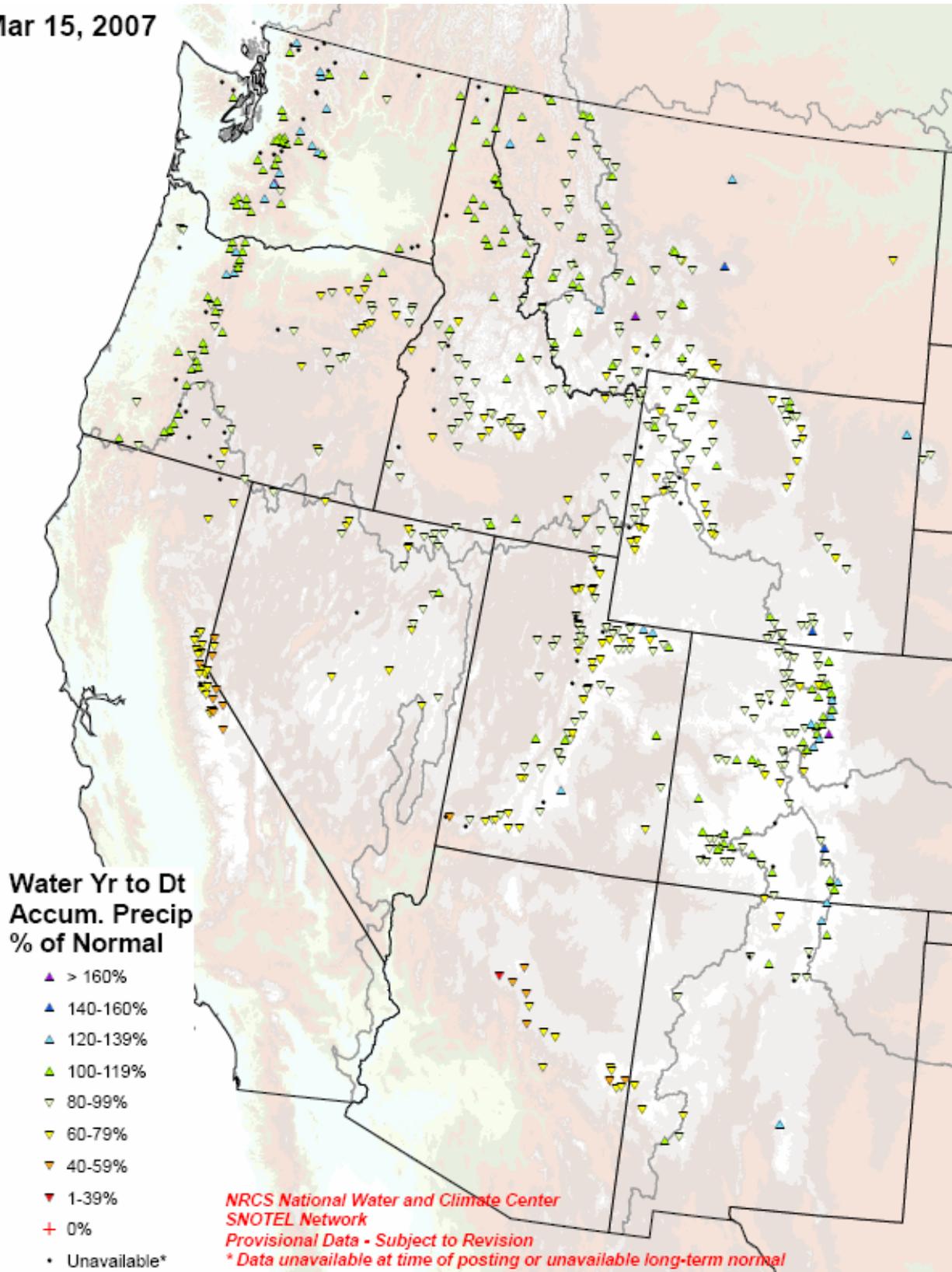


Fig. 3. Preliminary estimates of precipitation totals (inches) for the 7-day period ending March 13, 2007.

Ref: <http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/usdm-precip-overlay.gif>

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**Fig. 3a. SNOTEL station water year (since October 1) precipitation as a percent of normal.**  
Ref: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideWYTDPrecipPercent.pdf>

# U.S. Drought Monitor

March 13, 2007  
Valid 8 a.m. EDT

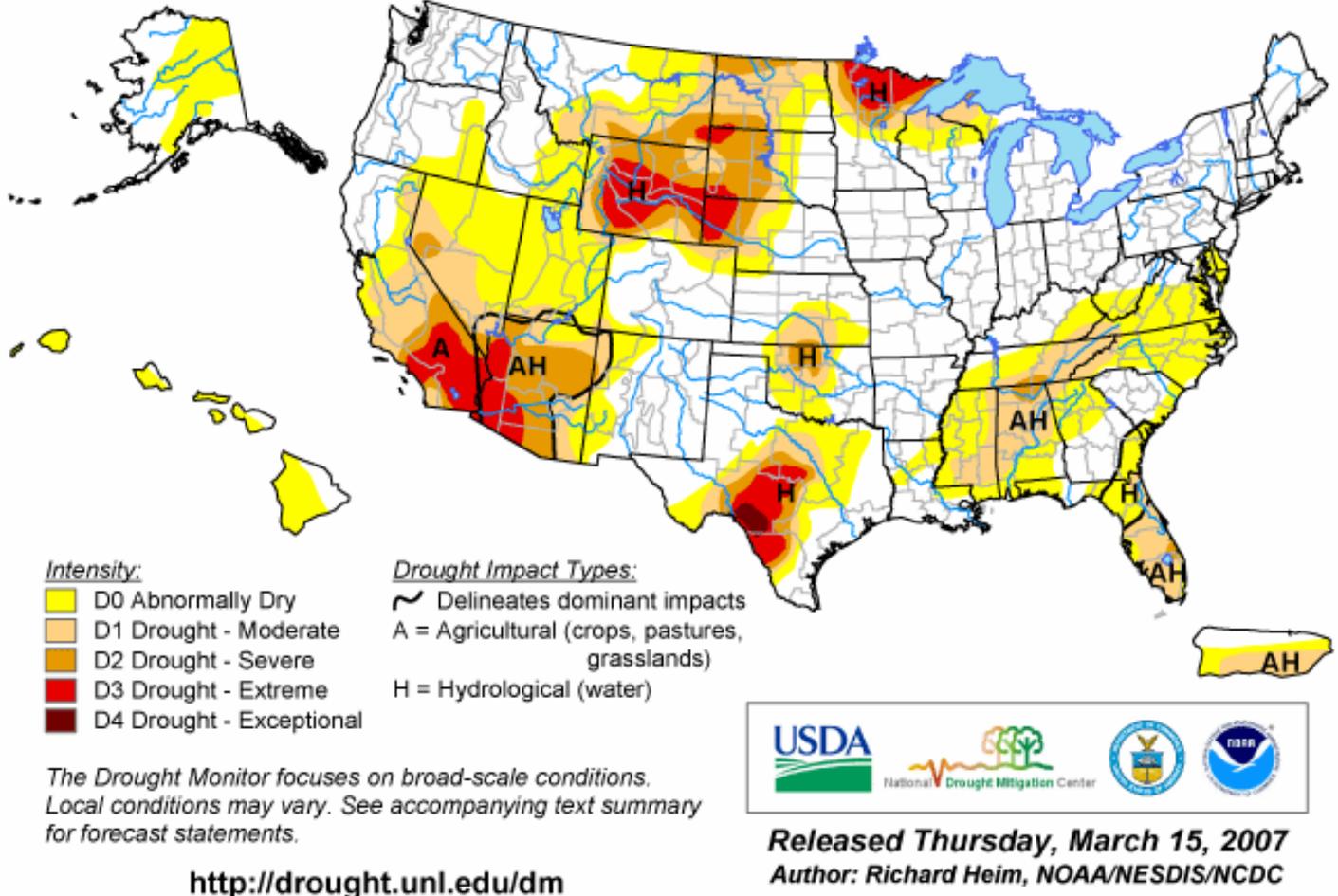


Fig. 4. Current Drought Monitor weekly summary.

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

# U.S. Drought Monitor West

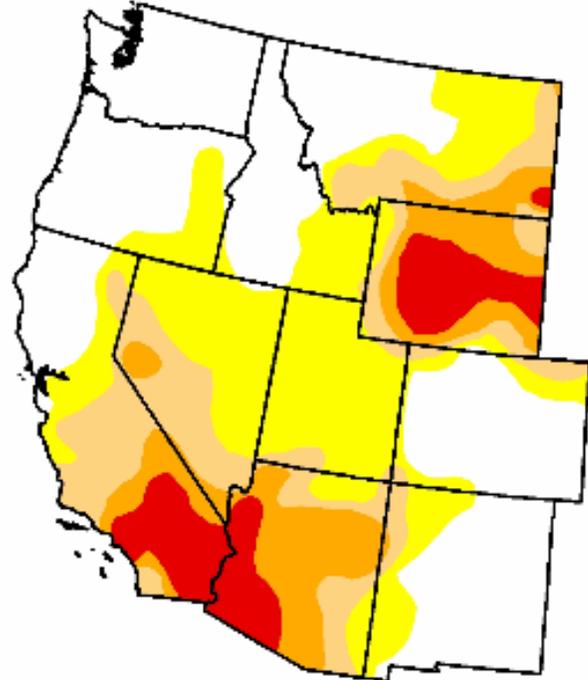
March 13, 2007  
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	39.1	60.9	34.0	19.2	8.1	0.0
Last Week (03/06/2007 map)	41.9	58.1	31.8	16.6	3.2	0.0
3 Months Ago (12/19/2006 map)	48.5	51.5	24.2	10.0	4.0	0.0
Start of Calendar Year (01/02/2007 map)	51.2	48.8	25.8	9.4	4.0	0.0
Start of Water Year (10/03/2006 map)	43.5	56.5	33.5	16.9	5.2	0.0
One Year Ago (03/14/2006 map)	59.8	40.2	25.1	15.3	5.0	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



Released Thursday, March 15, 2007  
Author: Richard Heim, NOAA/NESDIS/NCDC

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

Fig 4a. Drought Monitor for the Western States with statistics over various time periods.

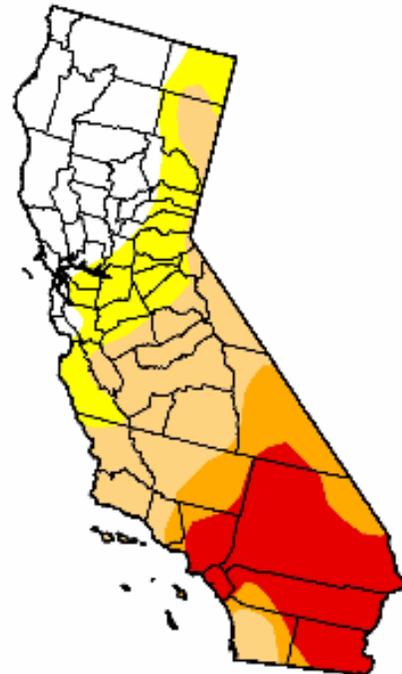
Ref: [http://www.drought.unl.edu/dm/DM\\_west.htm](http://www.drought.unl.edu/dm/DM_west.htm)

# U.S. Drought Monitor California

March 13, 2007  
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	25.4	74.6	59.4	32.6	21.2	0.0
Last Week (03/06/2007 map)	25.4	74.6	54.0	28.8	0.0	0.0
3 Months Ago (12/19/2006 map)	40.4	59.6	11.6	0.0	0.0	0.0
Start of Calendar Year (01/02/2007 map)	40.7	59.3	26.8	0.0	0.0	0.0
Start of Water Year (10/03/2006 map)	85.2	14.8	0.8	0.0	0.0	0.0
One Year Ago (03/14/2006 map)	83.6	16.4	0.5	0.0	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



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

Fig 4b. Drought Monitor classification changes for California over various time periods.

**Note** the current D3-D4 area percent increases.

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

### Calculated Soil Moisture Ranking Percentile MAR 14, 2007

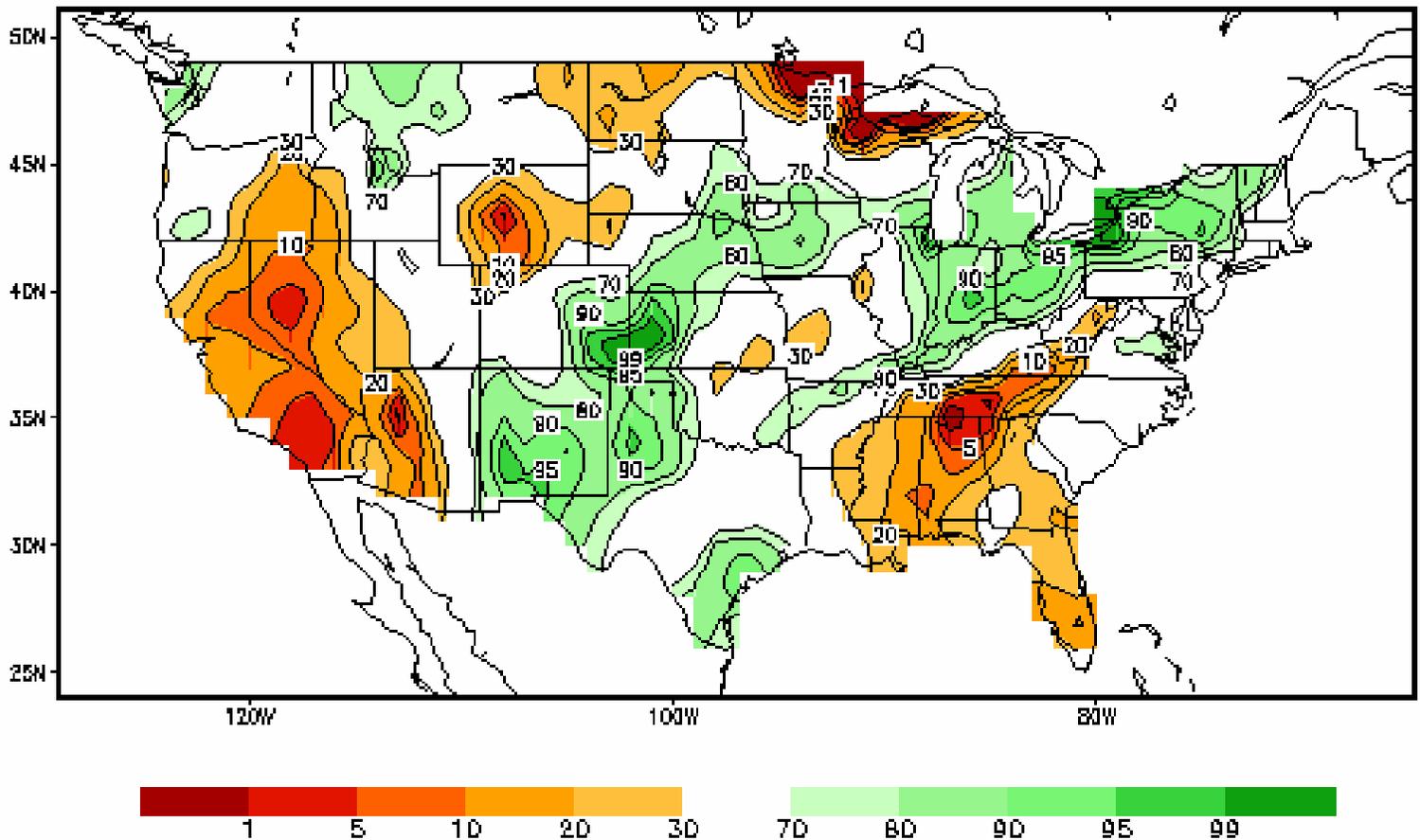


Fig. 5: Soil Moisture Ranking Percentile based on 1932-2000 climatology. Note continued severe dryness over southern California. Ref: <http://www.cpc.ncep.noaa.gov/soilmst/img/curr.w.rank.daily.gif>

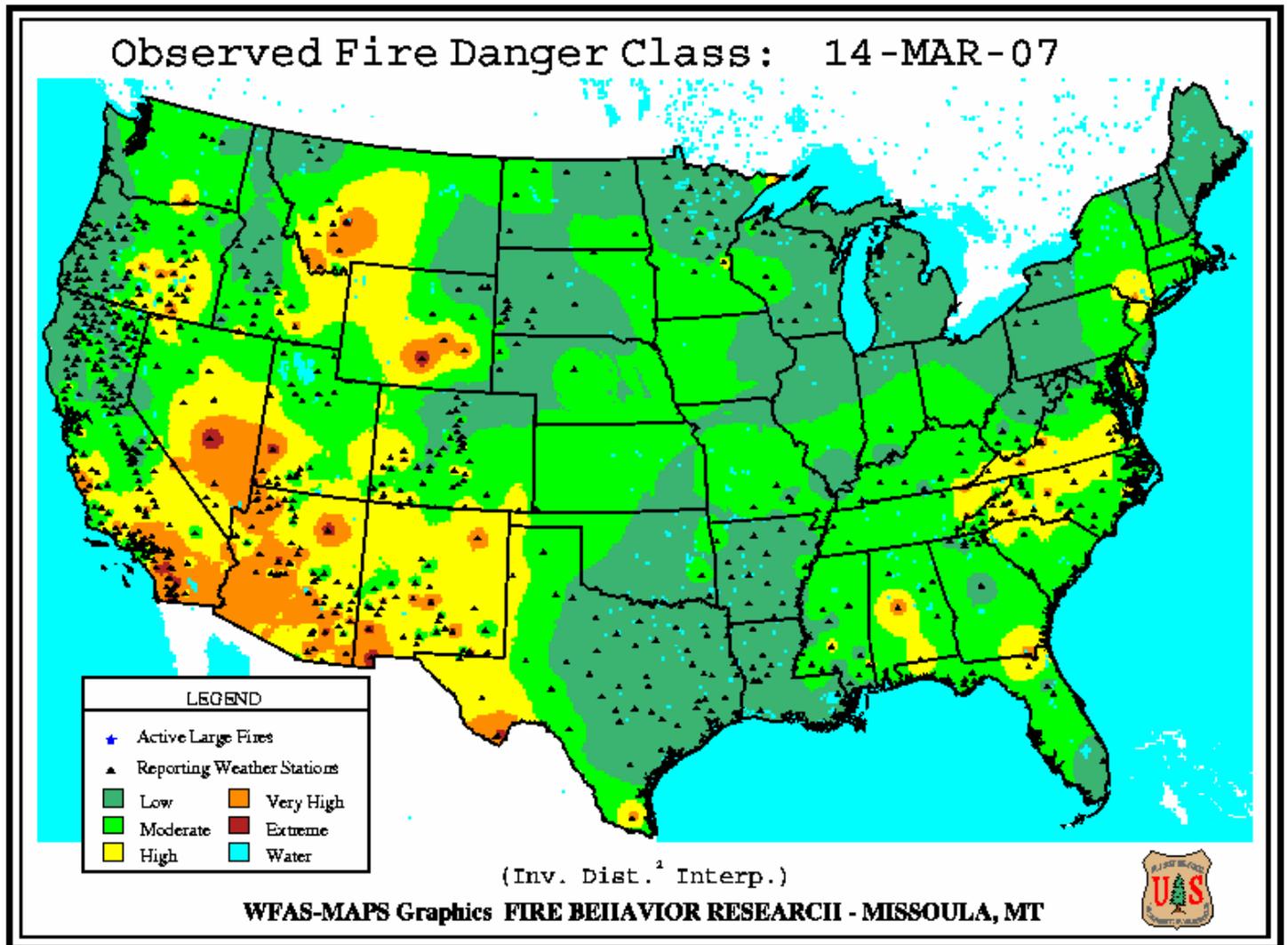


Fig. 6. Observed Fire Danger Class. Source: Forest Service Fire Behavior Research – Missoula, MT  
Ref: [http://www.fs.fed.us/land/wfas/fd\\_class.gif](http://www.fs.fed.us/land/wfas/fd_class.gif)

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Wednesday, March 14, 2007

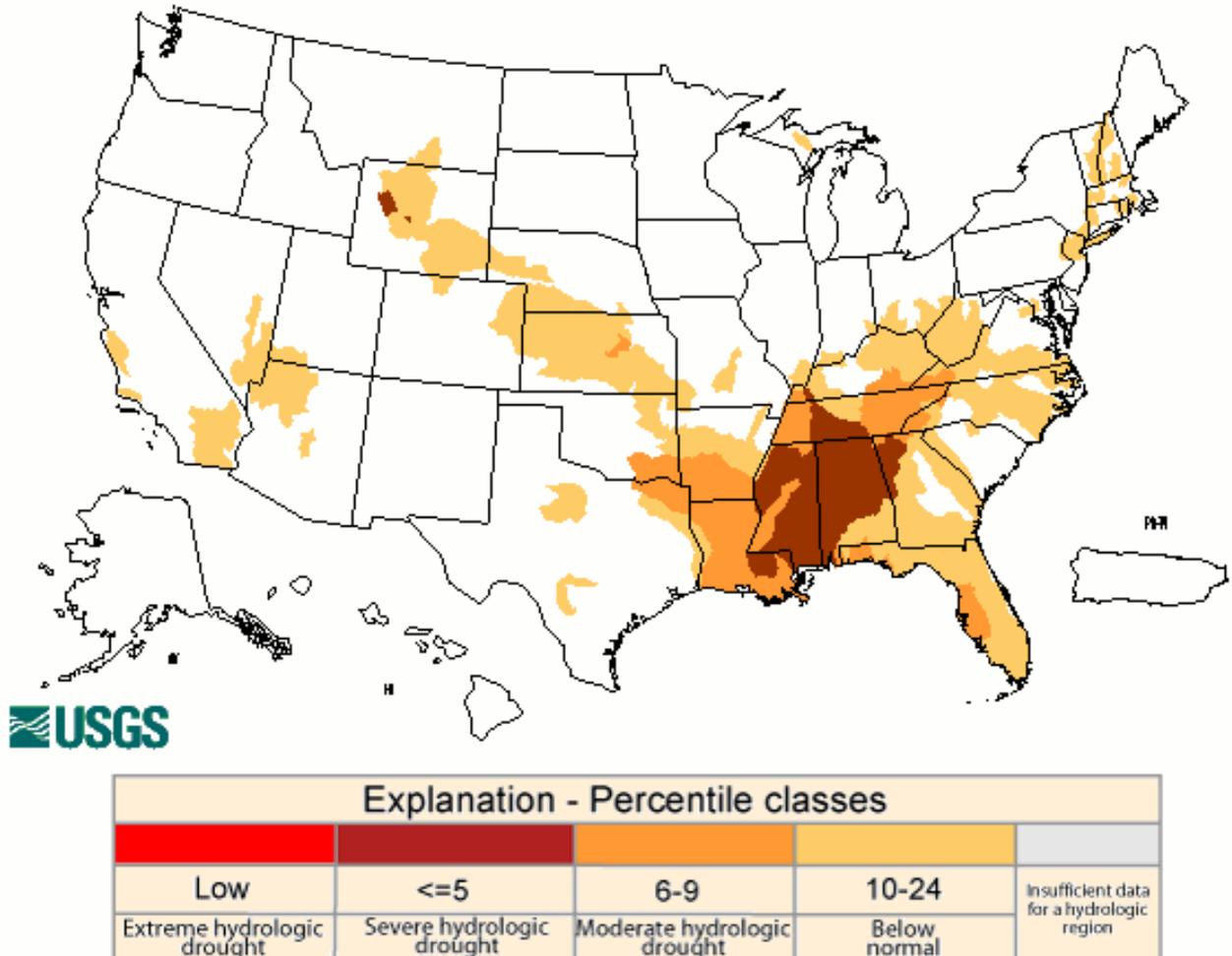


Fig. 7. Map of below normal 7-day average streamflow compared to historical stream flow for the day of the year. Ref: USGS <http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us>

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### National Drought Summary -- March 13, 2007

*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/>.

A series of cold fronts moved across the country during this Drought Monitor period, bringing areas of precipitation to the Northwest and parts of the Great Lakes and Northeast. Heavy rain fell across parts of the southern Plains as a low pressure system developed near the end of the period. Otherwise, it was a dry, quiet week.

**The West:** The rainy season across much of the Southwest has been very dry. By March 8, the driest rain season to date was reported at several stations in southern California, including downtown Los Angeles (2.42 inches of rain, down 9.13 inches), Long Beach airport (1.59 inches, down 8.70 inches), Los Angeles airport (2.18 inches, down 8.31 inches), and Burbank airport (2.33 inches, down 10.82 inches). The extreme dryness was coupled with hot temperatures and very windy conditions which prompted Red Flag/Fire Weather warnings for southern California, where two large wildfires and several smaller blazes threatened homes in Orange and Riverside counties. The above-normal temperatures caused many river flows to increase because of early melt of the below-normal snowpack. In spite of the below-average precipitation this water year, especially in southern California, reservoir levels were near average across the Golden State due to a combination of above-average precipitation last year and good water management decisions since then. As of March 11, the projected median April-July snowmelt runoff for California's water supply basins remained low, ranging from 85% (Shasta Lake inflow in the north) to 46% (Kern River in the south).

An area of D3 was introduced into southern California and adjacent Arizona where the deficits were greatest. D2 was expanded in southern California and Arizona, and a spot of D2 was added in Nevada near Reno. D1 grew in Arizona, central Nevada, northern California, southern coastal California, and extreme southern Utah. D0 nudged into southwest New Mexico. Slight adjustments were made to the D0-D1-D2 boundaries in Montana to better reflect the short- and long-term moisture conditions.

**The Central States and Southern Plains:** Heavy rains fell from a surface and upper low which slowly rotated across the southern Plains, with some stations reporting over 5 inches. Most of the rain fell to the east of the D3 extreme drought area in south central Texas. But D3-D2-D1-D0 were eroded where 2 inches or more of rain fell. D0 in the northern Low Rolling Plains of Texas retreated under 2-inch rains. Heavy rains also cut into the D2 in central Oklahoma. D0 was added to south central Oklahoma near the Red River, which has persistently missed the recent rains, bridging the D0 areas in Oklahoma and northern Texas.

**Southeast:** Rainfall in recent weeks across much of the Southeast has not been sufficient to relieve the deficits that have accumulated over the last 60 days to 12 months. Low streamflows and soil moisture will be further stressed as temperatures and evapotranspiration rise, and wildfires had flared up over parts of Florida, the southern Appalachians, and Gulf coast. This week saw an expansion of D0 across central Georgia, western Tennessee, northeastern

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Kentucky, southern Alabama, all of Mississippi, and southern West Virginia. D0 moved up the South Carolina coast, across most of North Carolina and much of Virginia and the Delmarva Peninsula, and into the Florida panhandle. D1 expanded into southwest Virginia, western North Carolina, much of Alabama, and southern Mississippi, mainly into areas that had the greatest precipitation deficits. These areas had deficits of 4 to 12 inches at 90 days, and even more at longer periods. Deficits were even as great as 3 to 6 inches for the last 60 days, and some areas were 4 to 6 inches below normal for the last 30 days. D1 also expanded across much of southern Florida, and a spot of D2 was added over Martin and St. Lucie counties in Florida.

**Alaska, Hawaii, and Puerto Rico:** Much of interior Alaska continued dry this week. D0 was expanded to the north, east, and west in the Yukon Basin to better match the pattern of low snowpack and precipitation deficits of the last 3 to 6 months. As of March 12, snow water equivalent was 42% of average over Koyukuk Basin and 55% of average over Chena Basin, with water year cumulative precipitation at 60% and 54%, respectively. In Hawaii, several stations received an inch or more of rain during the last 7 days, but 30-day and longer departures are still significantly negative, so the D0 was left unchanged. Vegetation was turning brown due to the persistent dryness over Puerto Rico. But showers this week helped abate the recent spate of wildfires, so the Puerto Rican depiction remained unchanged.

**Looking Ahead:** For March 14-19, a strong upper-level ridge will become entrenched over the western U.S. with a trough over the East. Pacific storm systems will be deflected into the Pacific Northwest and British Columbia coast, leaving most of the western U.S. warm and dry. Cooler-than-normal temperatures will dominate the eastern third of the country. A couple of storm systems will move across the eastern third of the country, bringing an inch or less of precipitation to most areas. An inch or more of precipitation is expected along part of the Gulf Coast, the Northeast Coast, and the central Appalachians, but rainfall amounts are not believed to be significant enough to erase long-term deficits, or even deficits back only 30 days.

For March 20-27, warmer-than-average temperatures are expected to spread across the Lower 48 States, with Alaska remaining colder than normal. Dry weather is forecast for much of the West, the East Coast, and western Alaska, with wetter-than-normal conditions from the southern Plains to Great Lakes and southern Alaska.

**Author:** [Richard Heim, National Climatic Data Center/NESDIS/NOAA](#)

### 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 March 14, 2007