



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

Weekly Report - Snowpack / Drought Monitor Update

Date: 17 March 2011

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: SNOTEL Snow-Water Equivalent percent of normal values for 17 March 2011 shows all but the Southwest at or above normal levels (Fig. 1). SNOTEL Snow-Water Equivalent percent of Normal peak shows slow recovery across parts of the Pacific Northwest (we are about 92% through the snow accumulation season; climatologically speaking, peak for the Southwest has been reached). Parts of the Uinta, Wasatch, and Sierra are at peak values as of this week. Northern sites usually peaks between 1 and 15 April (Fig.1a). SNOTEL 7-day snow depth changes show significant gains over parts of the Pacific Northwest. Significant decreases are noted over parts of Utah and Colorado (Fig. 1b).

Temperature: Average SNOTEL temperatures were above the long term average for this time of year over much of the West; especially over the 4-Corner States. Cooler temperatures prevailed over Oregon (Fig. 2). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures scattered across the Southwest and Northern Rockies ($>+10^{\circ}\text{F}$) and the greatest negative departures over western North Dakota ($<-8^{\circ}\text{F}$) (Fig. 2a).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 16 March shows the bulk of the heaviest precipitation confined to Western Washington, Oregon, and Northern California (Fig. 3a). In terms of percent of normal, the precipitation was highest across the Pacific Northwest, northern California, and eastern Montana. The Southwest continues to see large deficits (courtesy of La Niña) (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, eastern Oregon, and the Northern and Central Rockies (Fig. 3b).

West: Drought continues to hold its grip in the Southwest. Extreme (D3) is expanded to include parts or all of the southern New Mexico counties of Hidalgo, Luna, Sierra and Dona Ana. The Standardized Precipitation Index has values of -2 to -3 across this region, in addition to reports from locals noting increased fire danger. Moderate drought is expanded to cover central New Mexico, including Albuquerque and Santa Fe.

Although no changes are made in Arizona this week, the north area of abnormally dry conditions is expanded to include southern San Juan county in Utah. Precipitation data and other drought indicators show short-term dryness in this low-elevation region of the San Juan River watershed.

A small area of improvement is also made in southeastern Wyoming, as a reflection of near- to above-normal precipitation in the Cheyenne, WY, area for the winter season thus far.

Author: [Laura Edwards, Western Regional Climate Center](#)

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

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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

U.S. HISTORICAL STREAMFLOW

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/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/ JEFF GOEBEL

Acting Director, Resource Inventory Division

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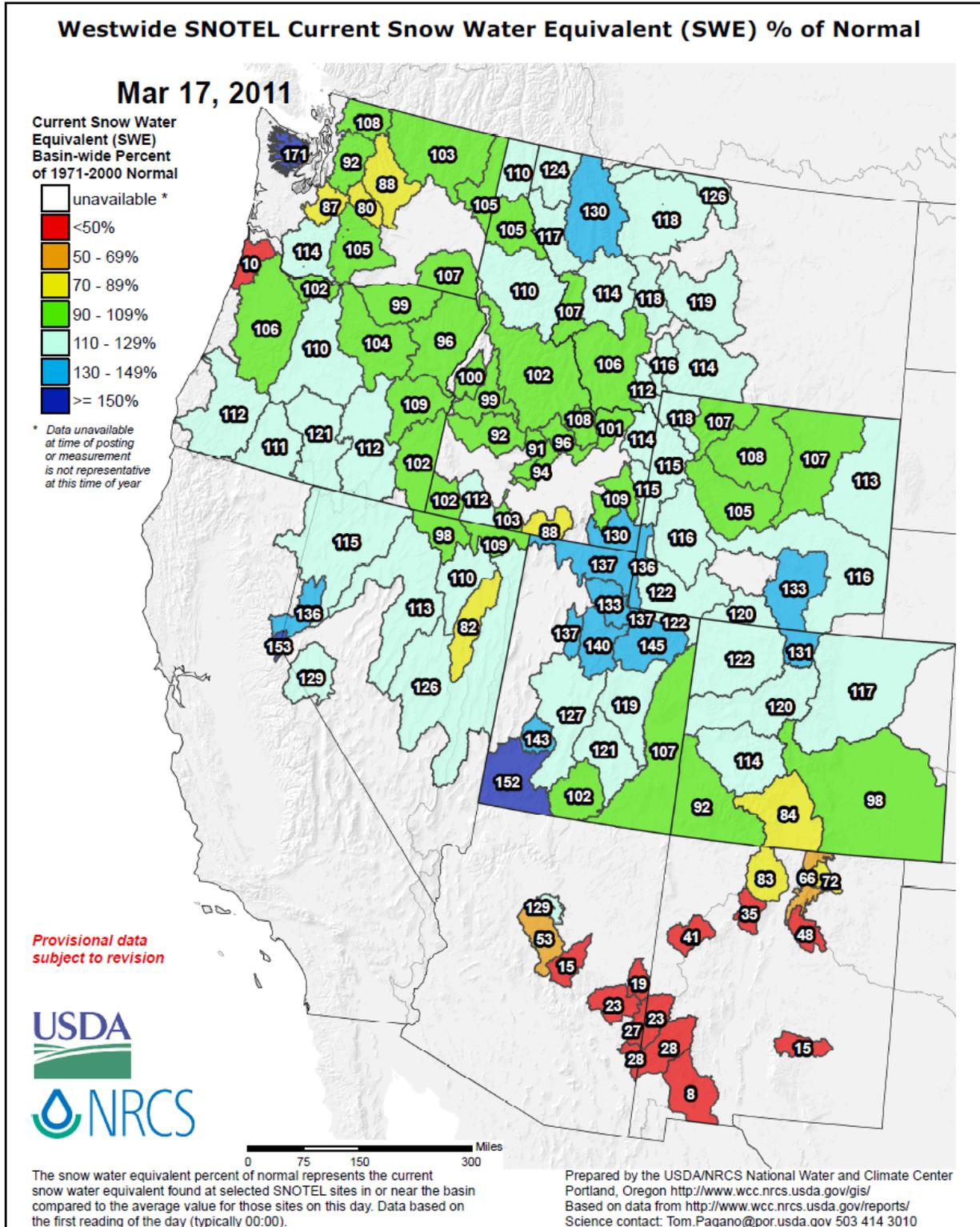


Fig. 1: SNOTEL Snow-Water Equivalent percent of normal values for 17 March 2011 shows all but the Southwest at or above normal levels.

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

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SNOTEL Current Snow Water Equivalent (SWE) Percent of Normal Peak Mar 17, 2011

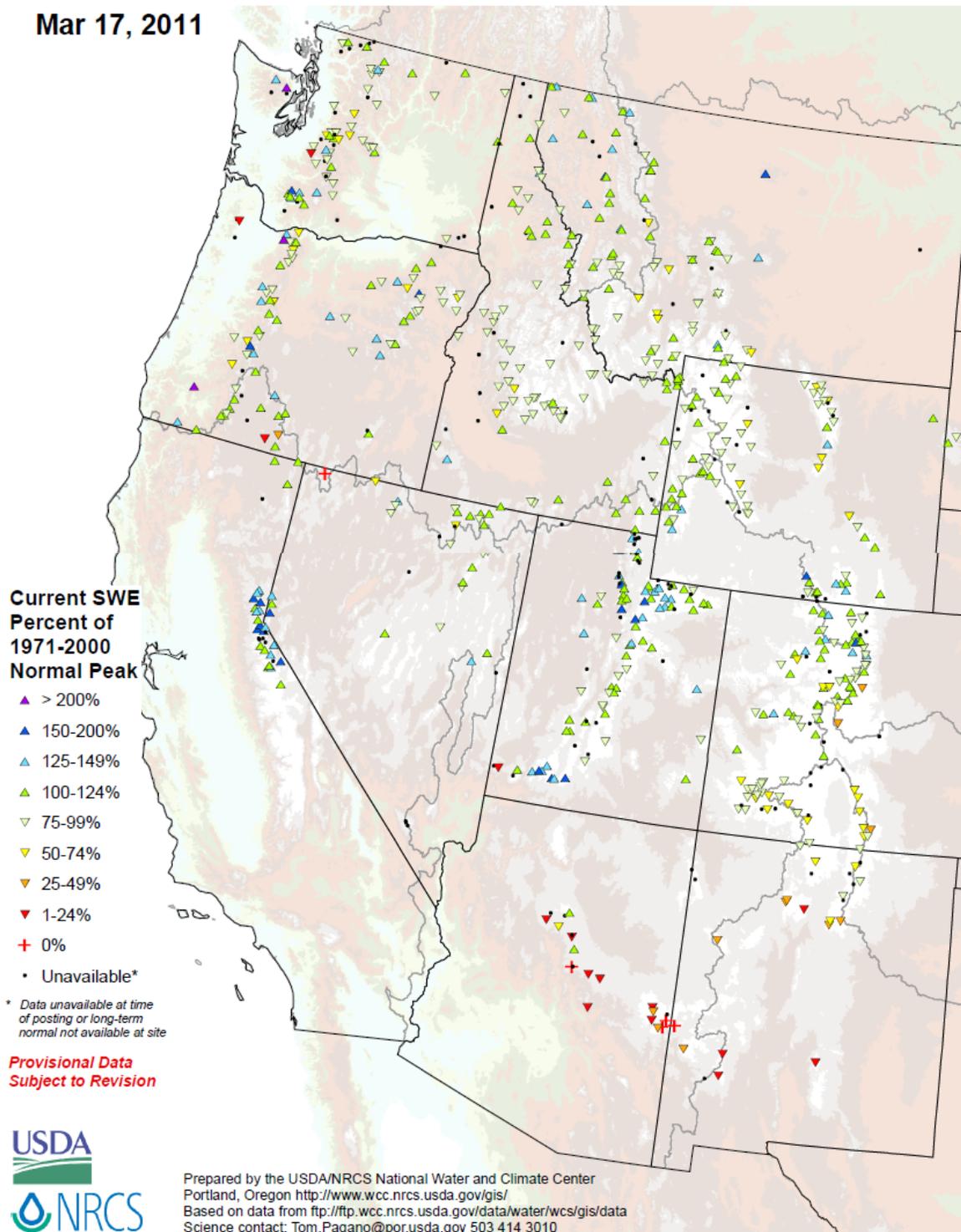


Fig. 1a: SNOTEL Snow-Water Equivalent percent of Normal peak shows slow recovery across parts of the Pacific Northwest (we are about 92% through the snow accumulation season; climatologically speaking, peak for the Southwest has been reached). Parts of the Uinta, Wasatch, and Sierra are at peak values as of this week. Northern sites usually peaks between 1 and 15 April.

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

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SNOTEL 7-Day Snow Depth Change (Inches)

Mar 16, 2011

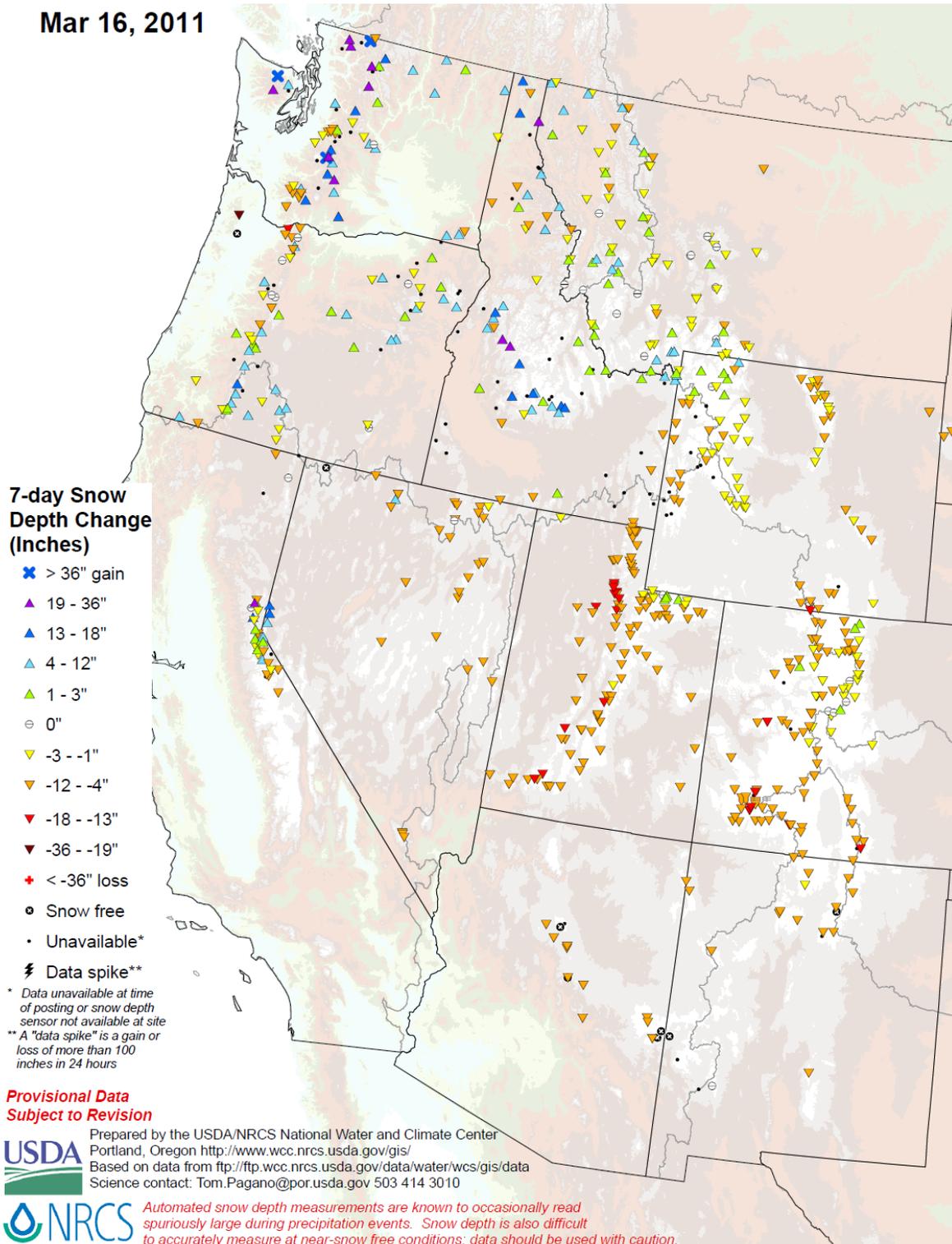


Fig. 1b: SNOTEL 7-day snow depth changes show significant gains over parts of the Pacific Northwest. Significant decreases are noted over parts of Utah and Colorado.

Ref: http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west_snowdepth_7delta.pdf

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SNOTEL (solid) 7-Day Average Temperature Anomaly (Degrees F) Mar 17, 2011

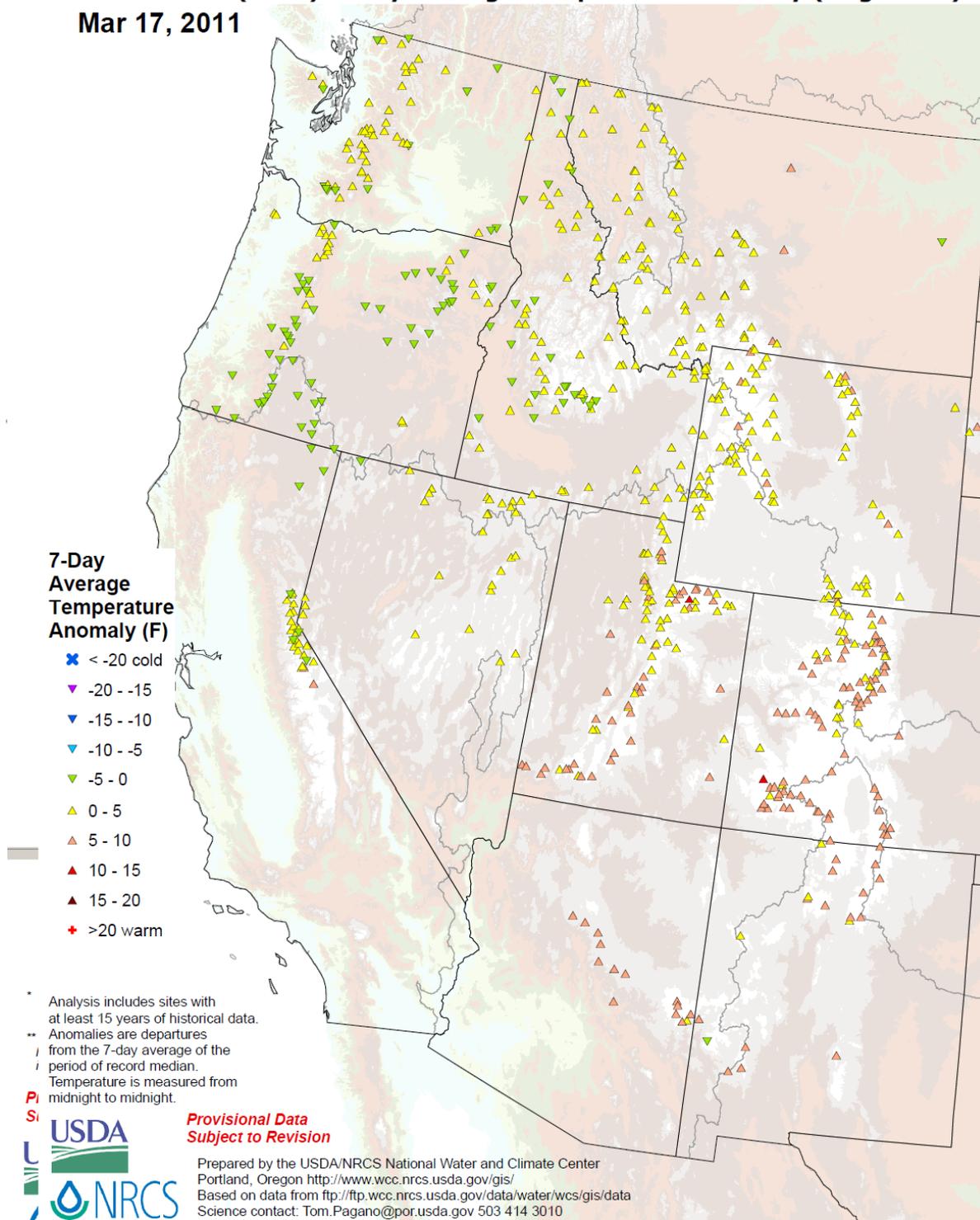
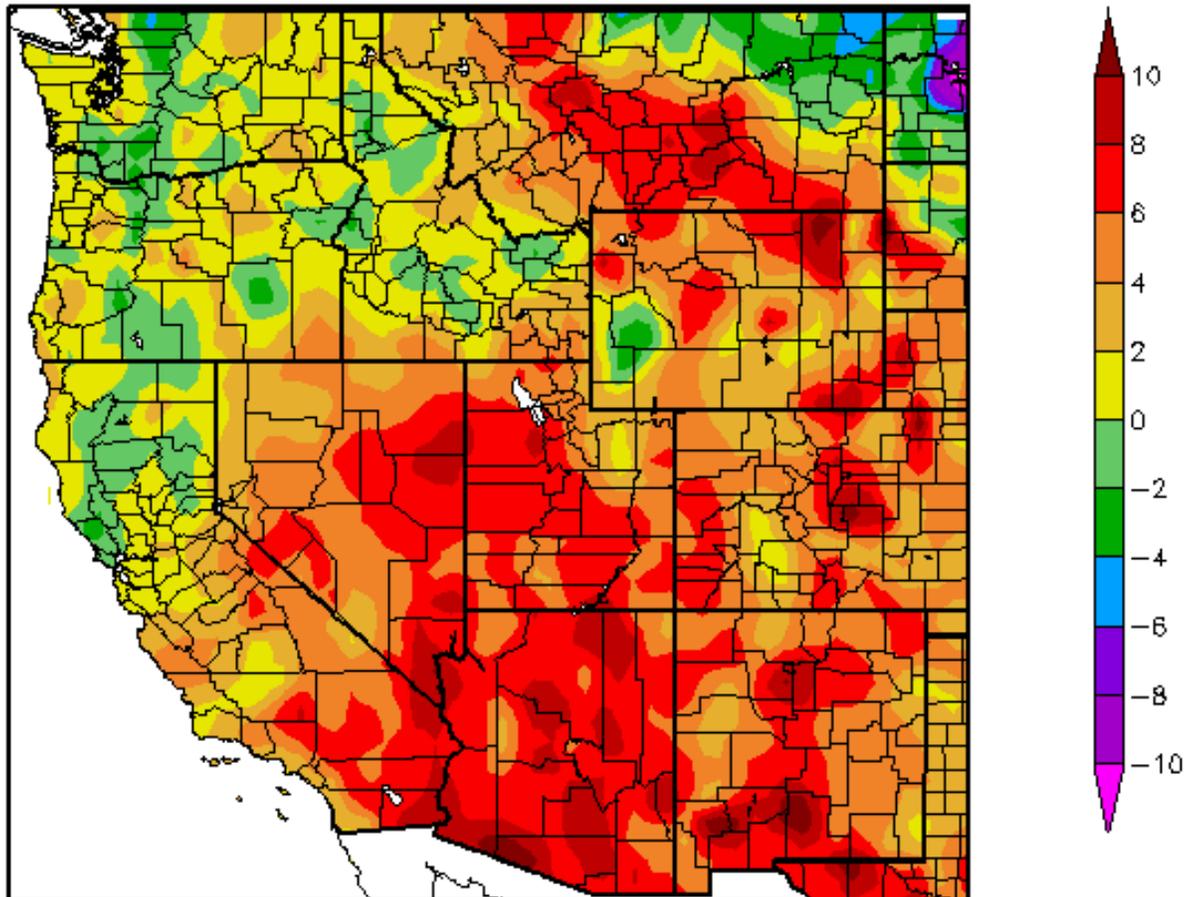


Fig. 2: Average SNOTEL temperatures were above the long term average for this time of year over much of the West; especially over the 4-Corner States. Cooler temperatures prevailed over Oregon. Ref:

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

Departure from Normal Temperature (F)
3/10/2011 – 3/16/2011



Generated 3/17/2011 at HPRCC using provisional data.

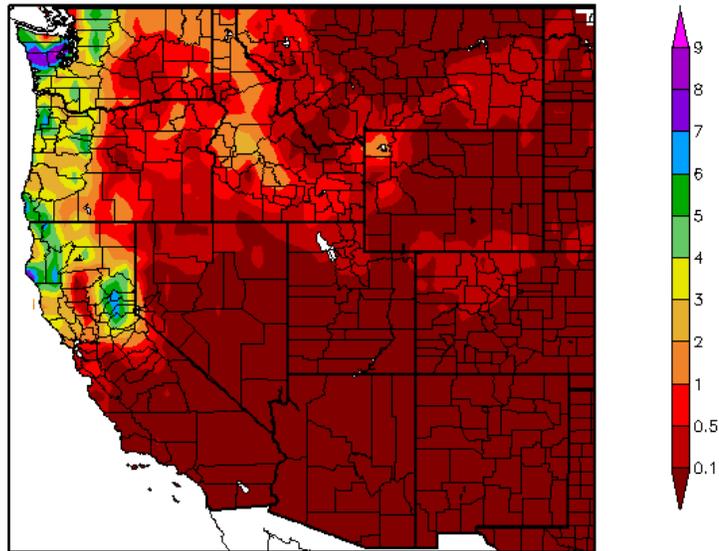
Regional Climate Centers

Fig. 2a: ACIS 7-day average temperature anomalies show that the greatest positive temperature departures scattered across the Southwest and Northern Rockies ($>+10^{\circ}\text{F}$) and the greatest negative departures over western North Dakota ($<-8^{\circ}\text{F}$).

Ref: http://www.hprcc.unl.edu/maps/current/index.php?action=update_daterange&daterange=7d

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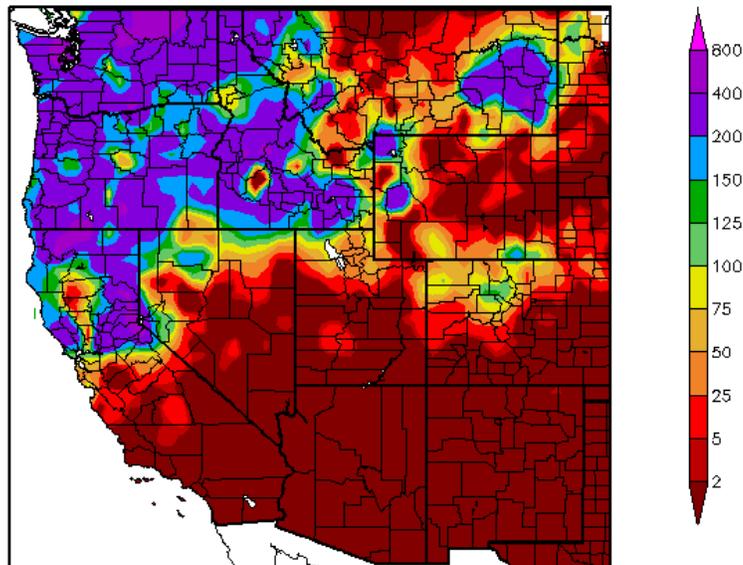
Precipitation (in)
3/10/2011 - 3/16/2011



Generated 3/17/2011 at HPRCC using provisional data.

Regional Climate Centers

Percent of Normal Precipitation (%)
3/10/2011 - 3/16/2011



Generated 3/17/2011 at HPRCC using provisional data.

Regional Climate Centers

Fig. 3 and 3a: ACIS 7-day average precipitation amounts for the period ending 16 March shows the bulk of the heaviest precipitation confined to Western Washington, Oregon, and Northern California (Fig. 3). In terms of percent of normal, the precipitation was highest across the Pacific Northwest, northern California, and eastern Montana. The Southwest continues to see large deficits (courtesy of La Niña). Ref: <http://www.hprcc.unl.edu/maps/current/>

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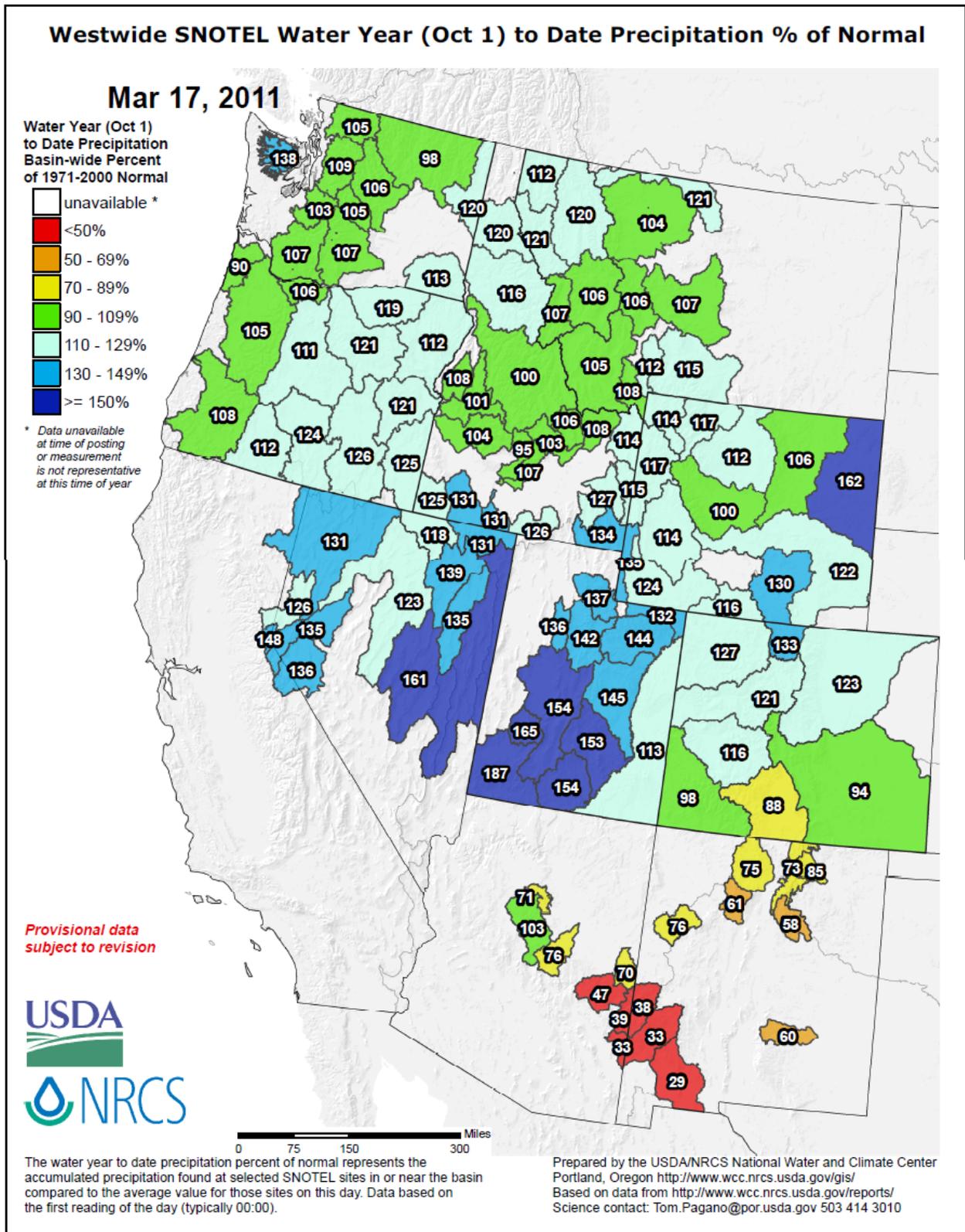
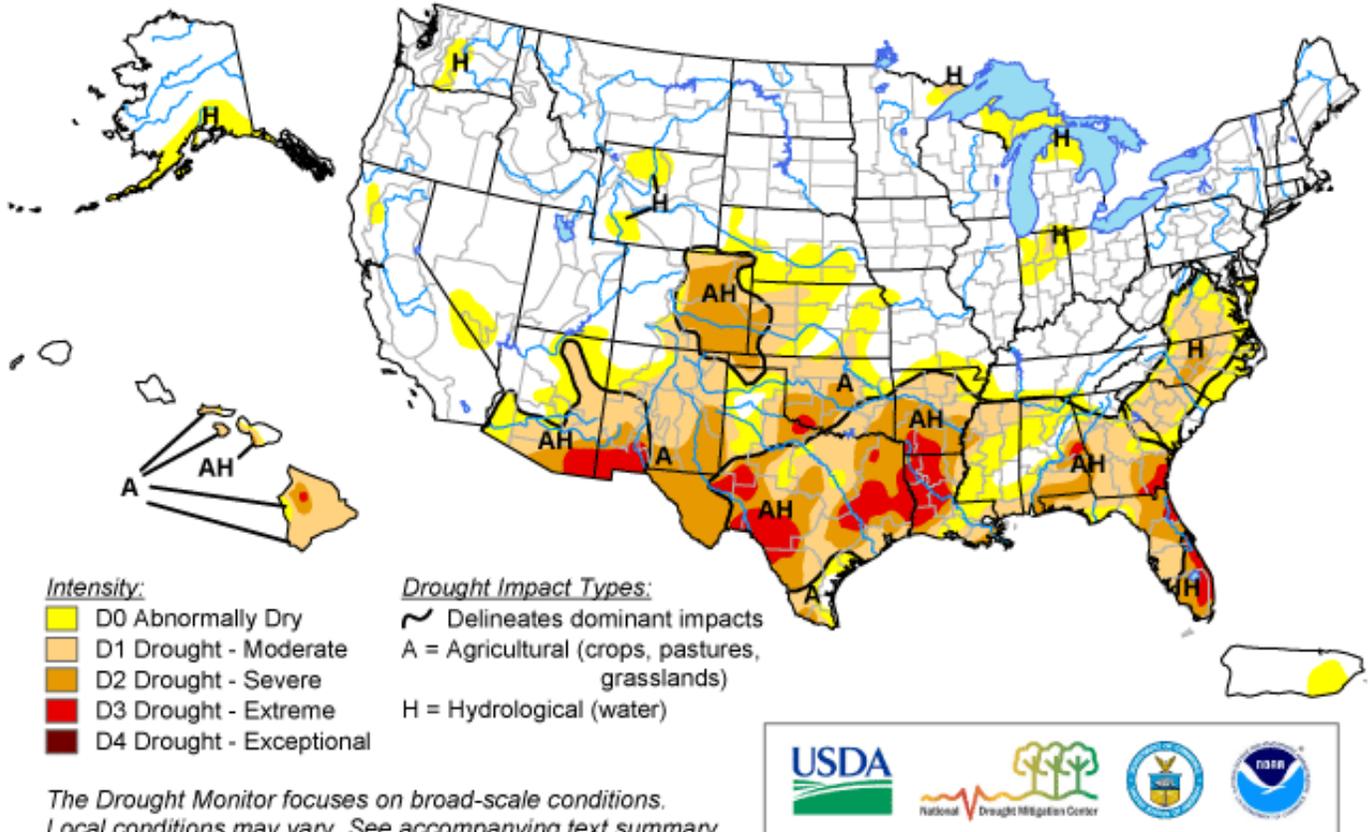


Fig 3b: For the 2011 Water-Year that began on 1 October 2010, the greatest deficits are found over the extreme southern reaches of the Southwest. Areas with the highest values are found over the Great Basin, eastern Oregon, and the Northern and Central Rockies.

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

U.S. Drought Monitor

March 15, 2011
Valid 8 a.m. EDT



Released Thursday, March 17, 2011

Author: Laura Edwards, Western Regional Climate Center

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

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 southern Arizona and New Mexico, Texas, Louisiana, southwest Arkansas, east-central Alabama, southeast Georgia, and eastern Florida.

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

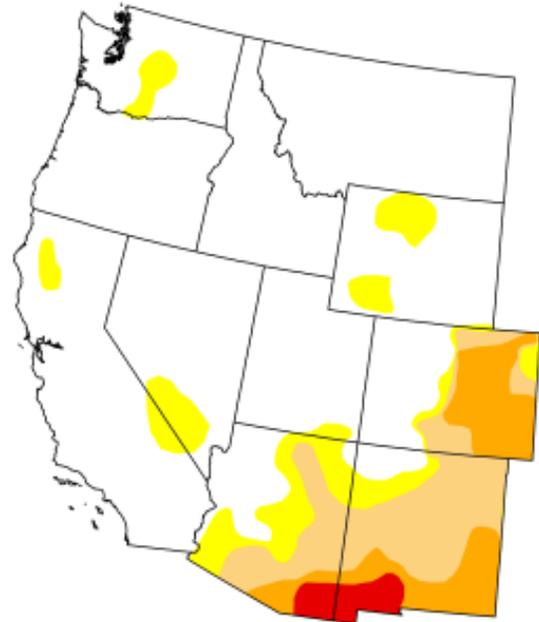
U.S. Drought Monitor

West

March 15, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	74.39	25.61	17.06	7.78	1.52	0.00
Last Week (03/08/2011 map)	74.46	25.54	14.96	7.72	0.56	0.00
3 Months Ago (12/14/2010 map)	64.03	35.97	9.83	0.88	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 (03/09/2010 map)	36.01	63.99	23.02	5.69	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, March 17, 2011
Laura Edwards, Western Regional Climate Center

Fig. 4a: Drought Monitor for the Western States with statistics over various time periods. Regionally there was some deterioration in the D1 and D3 categories during the past week. Ref: http://www.drought.unl.edu/dm/DM_west.htm

Drought Monitor Classification Changes for Selected Time Periods

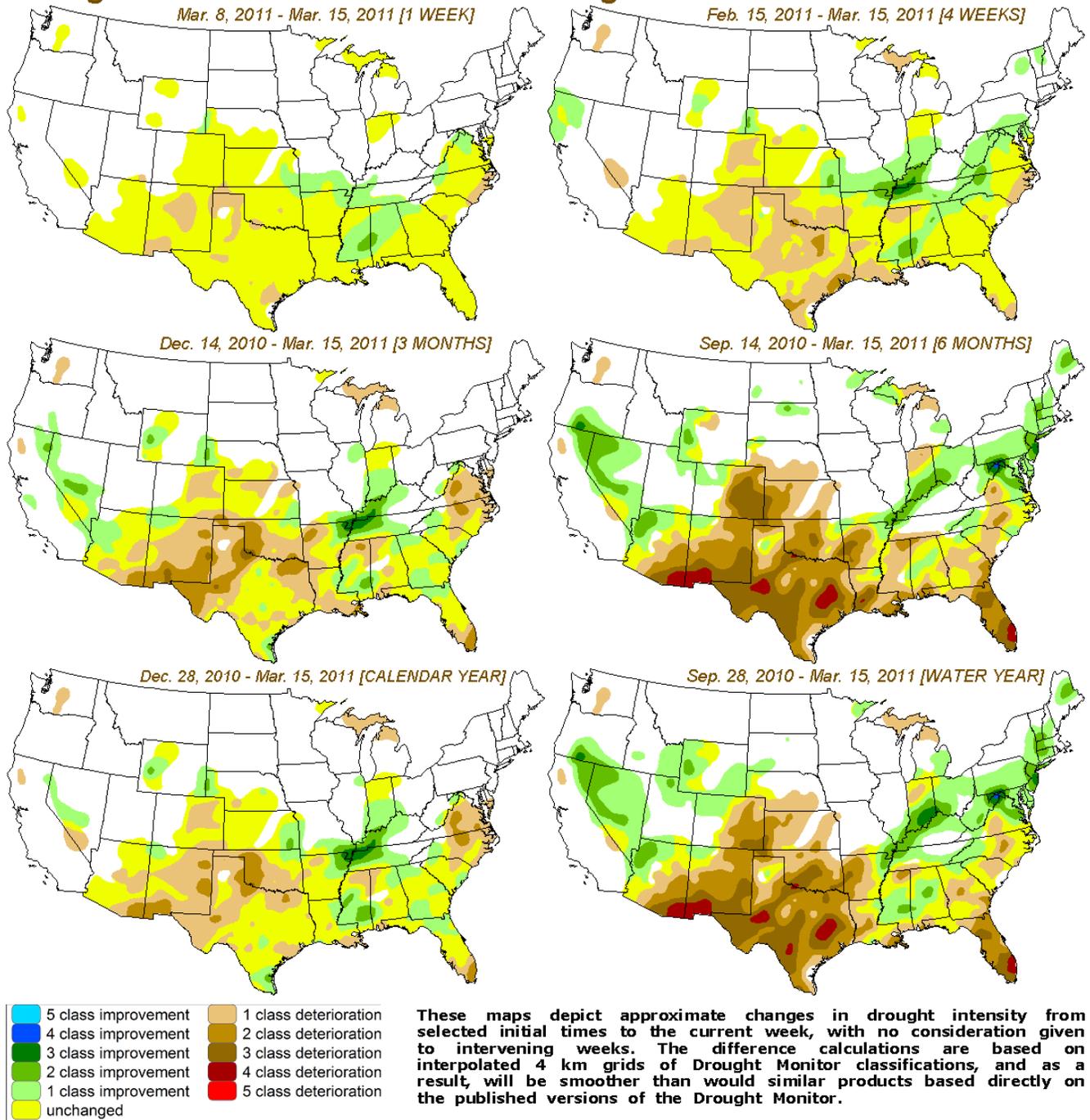
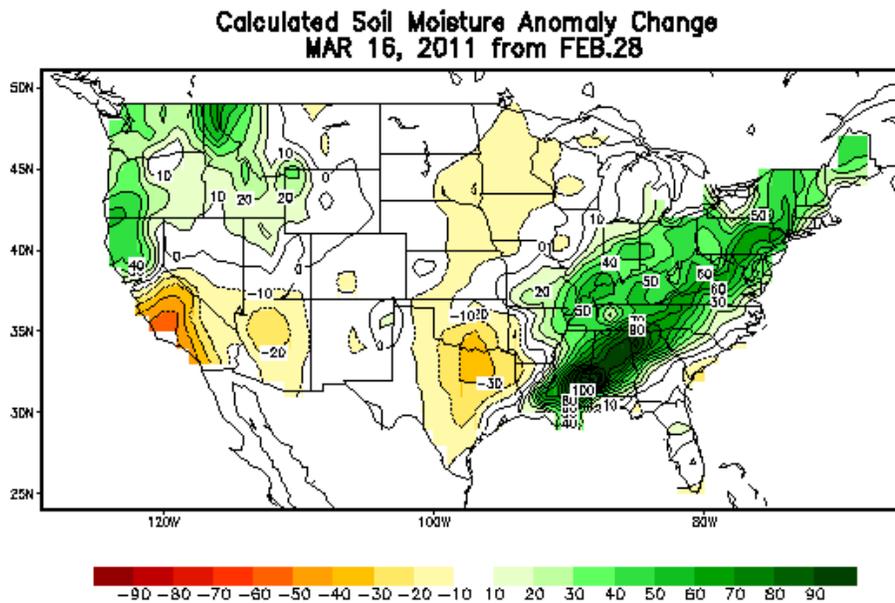
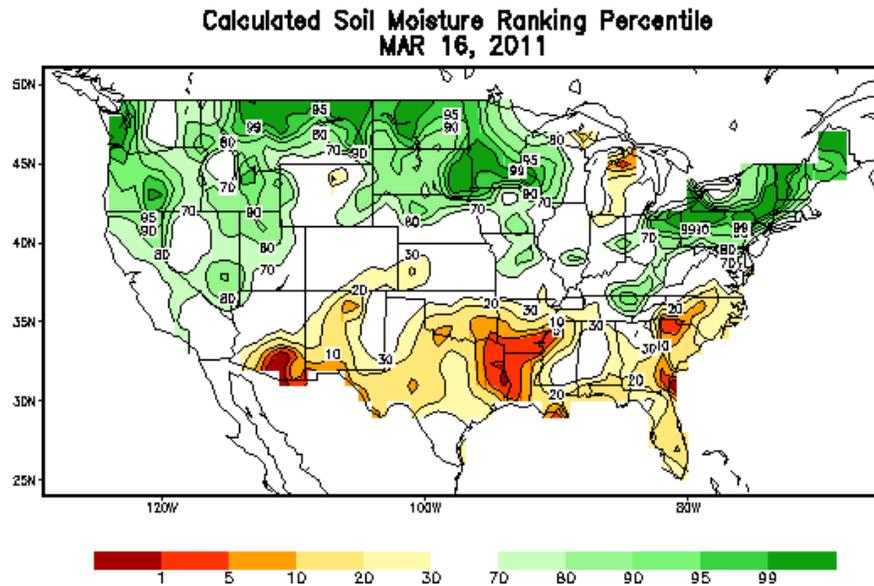


Fig. 4b: Drought Monitor classification changes over various time periods show long term drying over the Southern Tier States but lesser changes over the more recent past.

Ref: <http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/dm-change-6maps.png>

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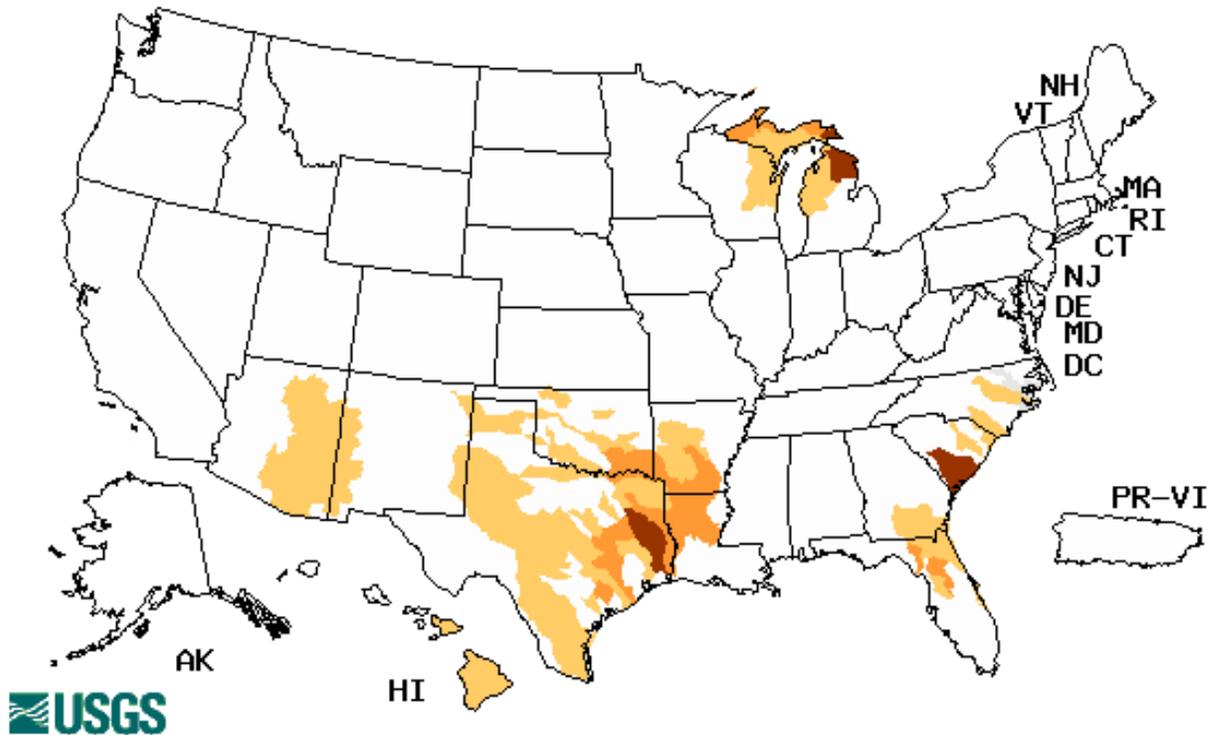


Figs. 5a and 5b: Soil Moisture ranking in percentile as of 16 March (Fig. 5) shows moist conditions over much of the Northern Tier States with dryness over Arizona and much of the Lower Mississippi River Valley and into the Mid-Atlantic States (top). For the month thus far, the Pacific Northwest and the eastern third of the country has experienced significant increases.

Ref: http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml#

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Wednesday, March 16, 2011



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. 6: Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Portions of the eastern Texas, southern South Carolina and northern Michigan are revealing severe conditions. Note: northern site gauges are less accurate as rivers and streams are probably frozen.

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

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National Drought Summary -- March 15, 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/>.

Summary: The Ohio River Valley was impacted for the third week in a row with rainfall, eliminating drought in this area. Portions of Mississippi and Alabama have received as much as ten inches of rain over the last two weeks. In Texas and Oklahoma, drought is becoming more severe and impacts in agriculture and wildland fire are apparent.

Northeast and Mid-Atlantic: Drought-free conditions continue in the Northeastern United States this week. Concerns regarding some minor flooding in western and northern Virginia and the surrounding area led to a one-category improvement from West Virginia to the Chesapeake Bay.

Southeast: Western North Carolina received some beneficial precipitation, with some local amounts totaling as much as four inches. The Piedmont and coastal plains were not as fortunate. Groundwater, streamflow and water supply concerns are waning, but rainfall has not yet arrived on the severe drought region. This week's map depicts a tightened gradient between drought-free and moderate drought in the central part of the state, and abnormally dry conditions have expanded all the way to the coast. In South Carolina, D1 is expanded in the southeast to reflect further drying in Colleton and Dorchester counties.

A large swath of heavy rainfall impacted Louisiana, Mississippi, Alabama and northern Georgia during this Drought Monitor period. Local data report nearly ten inches of rain for the seven- to 14-day period. Improvements in drought severity are made throughout this region, resulting in a two-category reduction across the Mississippi/Alabama border, and a large area of D0 that reflects long-term shortage of precipitation.

In southern Tennessee, a one-category change to no drought and D0 is shown as a result of the wet period that started a few weeks ago. This brings nearly all of the Volunteer State into drought-free status on the map.

This week's widespread rainfall, one to two inches in most areas, held constant the drought conditions in Florida, with neither improvement nor degradation made to the map.

South: Deteriorating conditions in Texas and Oklahoma led to increased drought severity this week. In addition to the widespread wildfires in the region, impacts from agricultural areas are starting to be reported in counties along the Red River that illustrate the extreme nature of drought. Other regions that have increased in severity this week include: Midland, TX, Childress and the panhandle of Texas, and south Texas. South central Oklahoma has been drying out of late, and winter wheat is not in good condition. Wichita Falls, TX, is in its second driest period for November to March 15, since 1850. Pecos county, TX, is very short on rainfall,

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with just .01 inches reported since October 1. D2 and D3 is expanded in east central Texas as well.

In the Oklahoma panhandle, severe drought is depicted as deterioration continues in field conditions and a persistent lack of rainfall.

Central: Flooding concerns continue in the Ohio River Valley, and this week's map brings this area into drought-free status. Central Missouri received two to three inches of rain for the seven-day period, and improvements are made in this region.

High Plains: The Dakotas are bracing for spring flooding as temperatures are warming and their thick snowpack begins to melt. In the Nebraska panhandle, the area of abnormally dry conditions was reduced to better reflect winter season precipitation totals that are near to above normal.

West: Drought continues to hold its grip in the Southwest. Extreme (D3) is expanded to include parts or all of the southern New Mexico counties of Hidalgo, Luna, Sierra and Dona Ana. The Standardized Precipitation Index has values of -2 to -3 across this region, in addition to reports from locals noting increased fire danger. Moderate drought is expanded to cover central New Mexico, including Albuquerque and Santa Fe.

Although no changes are made in Arizona this week, the north area of abnormally dry conditions is expanded to include southern San Juan county in Utah. Precipitation data and other drought indicators show short-term dryness in this low-elevation region of the San Juan River watershed.

A small area of improvement is also made in southeastern Wyoming, as a reflection of near- to above-normal precipitation in the Cheyenne, WY, area for the winter season thus far.

Hawaii, Alaska and Puerto Rico: In Hawaii, reports of improving field conditions on Molokai led to a one-category improvement on this island. Elsewhere in Hawaii there was no change.

An assessment of Alaska's winter season precipitation and streamflow for this time of year changed the depiction on this week's map. D0 is introduced in the south and southeast part of the state, and is reduced in the east central region.

Puerto Rico's dry season is even drier than normal, and rainfall and streamflow data are showing it. Abnormally dry, or D0, was introduced in the southeast.

Looking Ahead: A strong low pressure system will move onshore in the western US early in the next US Drought Monitor period, bringing a few feet of snow and several inches of water equivalent to the northern Sierra Nevada mountains in California. As this system moves inland, it will carry beneficial snow to the higher elevations in the northern Rocky Mountains and low elevation rain. High pressure will take hold over the Southeast, which could exacerbate drought conditions in that region over the weekend. Snow and rain will continue to impact the Northeast, particularly from upstate New York to Maine for the next few days.

In the extended three to seven day period, the unsettled, wet pattern is projected to stay in place over the Western and Great Lakes states into New England. This will be accompanied by cooler than normal temperatures in these regions. Below average rainfall and above normal

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temperatures may set the stage for more severe drought in the south and southeast, while providing a welcome respite from the heavy precipitation in Mississippi and Alabama.

Author: [Laura Edwards, Western Regional Climate Center](#)

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 16, 2011