NRCS

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

Weekly Report - Snowpack / Drought Monitor Update Date: 21 January 2010

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: SNOTEL Snow-Water Equivalent percent of normal values for 21 January 2009 shows amounts increasing over the Tahoe region of Nevada, the Arizona mountains, and parts of New Mexico. Despite a series of low pressure systems near Washington and Oregon, warmer than average temperatures have not helped the snow pack in this region (Fig. 1). SNOTEL 7-day snow depth change reveals up to 3 foot increases over the Sierra and mountains in central Arizona. Snow depths have declined over the Front Ranges of the Rockies (fig. 1a).

Temperature: SNOTEL and ACIS-day station average weekly temperature experienced abnormally warmer conditions over the northern half of the West (typical of a strong El Nino). Cooler than average conditions existed south of a line from the Northern Sierra to the northeast corner of New Mexico (Fig.2). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of the Northern Rockies (>+15F) and the greatest negative departure occurred over parts of eastern Utah and southern California (<-2F) (Fig. 2a).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 20 January shows the bulk of the heaviest precipitation fell over the West Coast and Arizona (Fig. 3). In terms of percent of normal, well above normal amounts fell from California to Utah, Arizona, western New Mexico, and Washington. The Eastern Slope of the Rockies did not share in the effects of El Nino. The abundant moisture over parts of the Pacific Northwest is unusual for January with the current strong El Nino (Fig. 3a). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows most of the West at or below normal values despite above normal snow water equivalent over much of the Southwest (Fig. 3b).

WESTERN DROUGHT STATUS

The West: Until the recent round of Pacific storms began to batter the Far West late in the period, there was little reason for any improvement in the Southwest. The situation rapidly changed as the first in a series of Pacific storms hit California with heavy precipitation and severe weather Sunday into Monday. A widespread 2 to 4 inches of precipitation fell along coastal locations and on the Cascades and Sierra Nevada, with locally up to 10 inches near Mt. Shasta. Accordingly, D0 was trimmed away along parts of the Pacific Coast where the heaviest rains (5 to 10 inches) fell, namely southern Oregon and California's Humboldt and Sonoma counties. D1 was erased from a thin strip from Salinas southward to south of Los Angeles (2 to 5 inches), and the southern Sierra Nevada (1.5 to 3 inches). Both D1 and D2 were eased near Mt. Shasta and the Cascades (6 to 10 inches), while D2 was removed west of Los Angeles (southeast Kern, eastern Los Angeles, and southwest San Bernardino counties) where 2 to 6 inches of precipitation fell. The average basin snow water content in the Sierra Nevada increased from 78-91 percent of normal on January 15 to 87-105 percent of normal just 4 days later. In addition, the AH impact line was pushed eastward as the recent precipitation alleviated short-term dryness concerns. However, even with the recent heavy rains (Shasta Reservoir gained 100,000 acre-feet in 2 days), the reservoir is still almost 1 million acre-feet below average storage for this time of year, according to California's Department of Water Resources and the State Climatologist Dr. Michael Anderson. Furthermore, the heavy

rains are expected to cause mudslides and flash flooding in southern California from hillsides lacking vegetation due to earlier wildfires.

Farther north, repeated frontal passages in the Northwest have dropped above-normal precipitation across extreme northern Washington and Idaho the past 90 to 180-days, including 0.5 to 1.5 inches this week, somewhat easing the D1-D2 area in north-central Washington. Similarly, surrounding D0 areas near the Canadian border are at or above normal for the Water-Year-to-Date (WYTD; since October 1), and abnormal dryness was diminished.

In contrast, light precipitation (0.1 to 0.3 inches) and well-above normal temperatures, combined with subnormal WYTD precipitation and Jan. 19 basin snow water contents, prompted the expansion of D1 into the central Rockies (western Wyoming and northeastern Utah). Similar to existing D1 areas in the Rockies, WYTD basin precipitation ranged from 57-68 percent of normal, and Jan. 19 basin average snow water content stood between 45-62 percent of normal. Additionally, several USDA/NRCS SNOTEL sites in northern Utah, western Wyoming, and eastern Idaho were ranked in the lowest fifth percentile for both Jan. 20 snow water equivalent and WYTD precipitation. Author: David Miskus, Climate Prediction Center/NCEP/NWS/NOAA.

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 and 4a).

SOIL MOISTURE

Soil moisture (Figs. 5a and 5b), is simulated by the VIC macroscale hydrologic model. The detailed, physically-based VIC model is driven by observed daily precipitation and temperature maxima and minima from approximately 2130 stations, selected for reporting reliably in real-time and for having records of longer than 45 years (and various other criteria). Another good resource can be found at:
http://www.emc.ncep.noaa.gov/mmb/nldas/drought/.

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/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/ NOLLER HERBERT
Director, Conservation Engineering Division

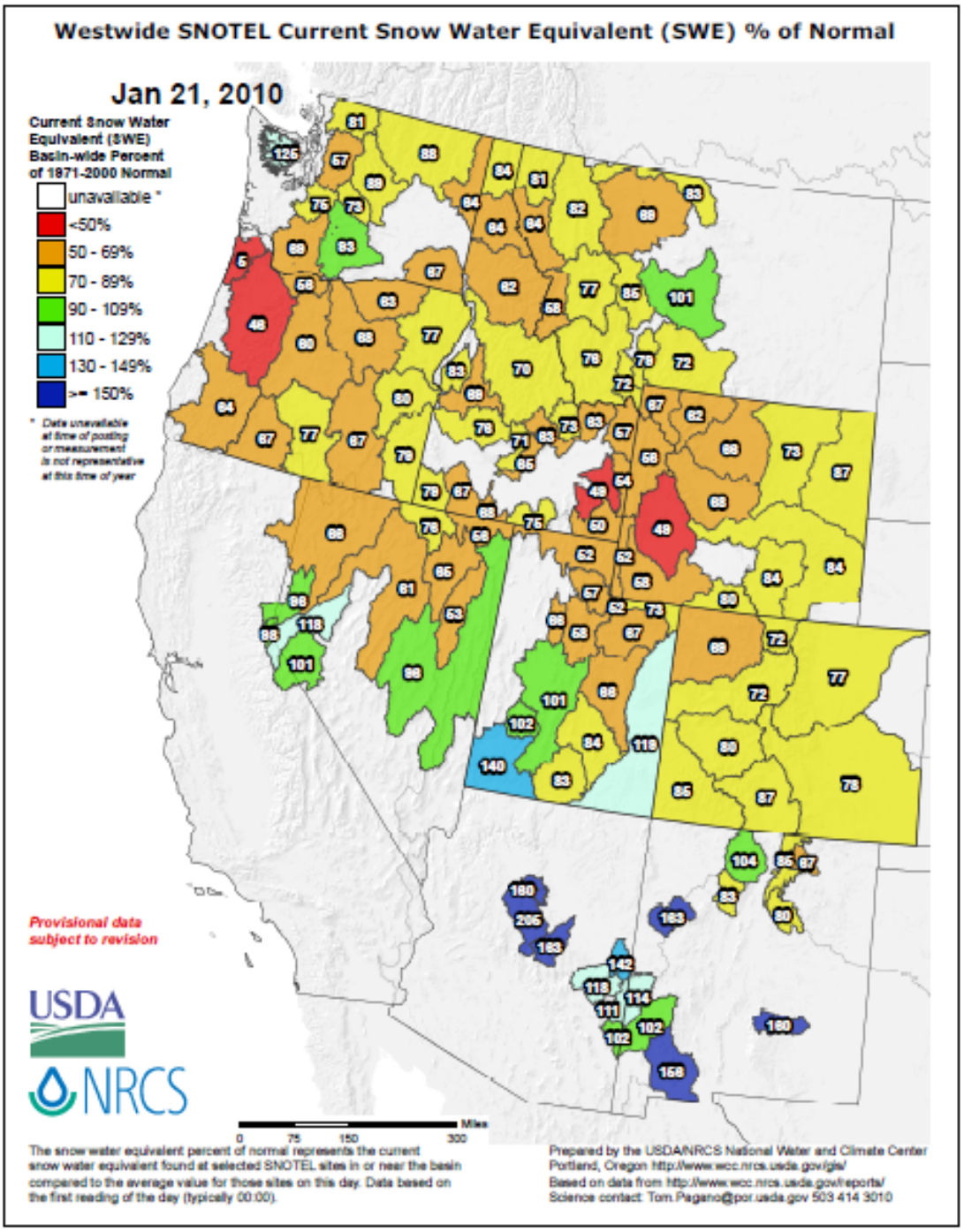


Fig 1. SNOTEL Snow-Water Equivalent percent of normal values for 21 January 2009 shows amounts increasing over the Tahoe region of Nevada, Arizona mountains, and parts of New Mexico. Despite a series of low pressure systems over Washington and Oregon, warmer than average temperatures have not helped the snow pack in this region of the Pacific Northwest. Ref: ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_swepctnormal_update.pdf

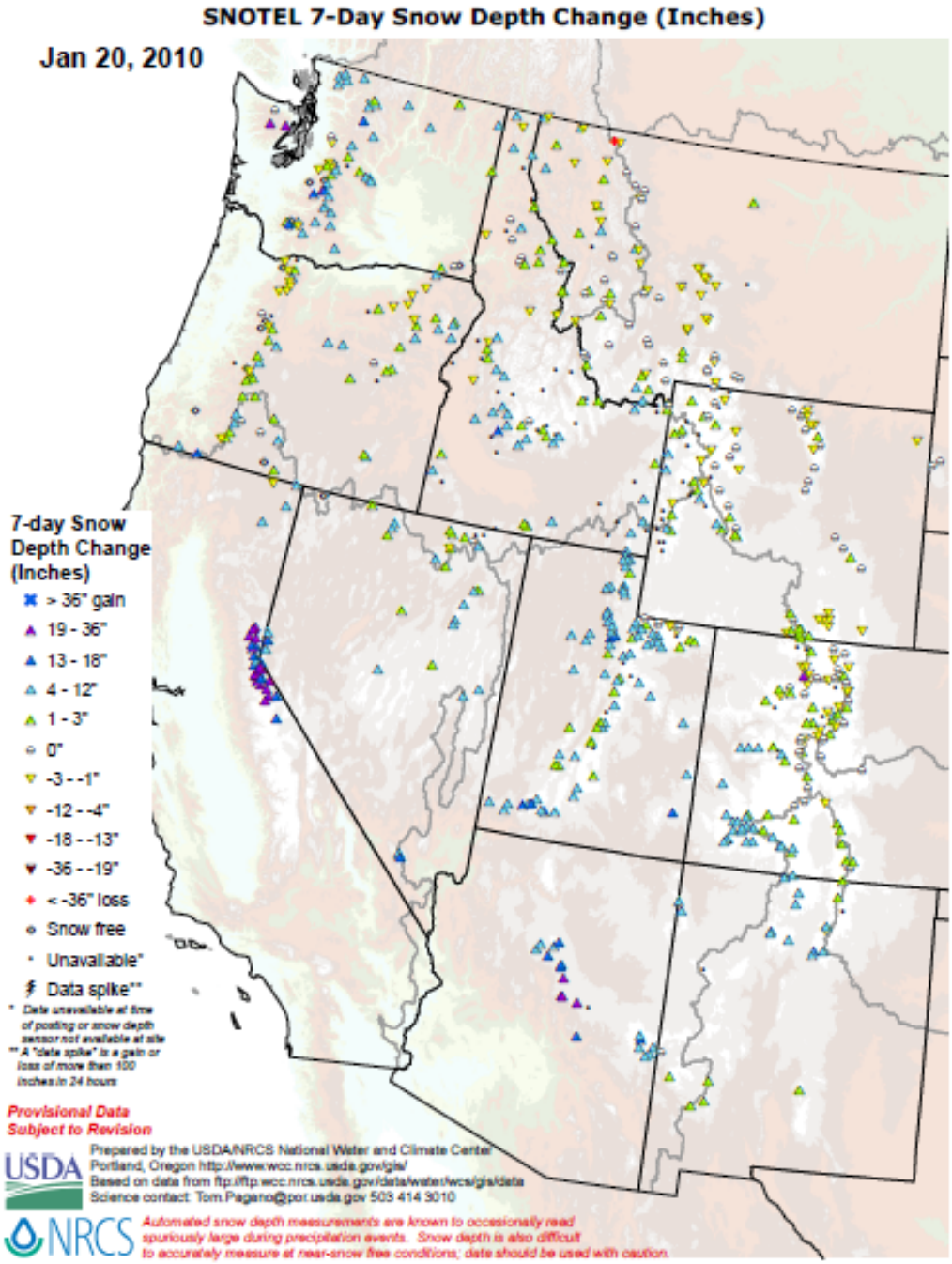


Fig. 1a. SNOTEL 7-day snow depth change reveals up to 3 foot increases over the Sierra and mountains in central Arizona. Snow depths have declined over the Front Ranges of the Rockies. Ref: http://www.wcc.nrcs.usda.gov/gis/snow.html

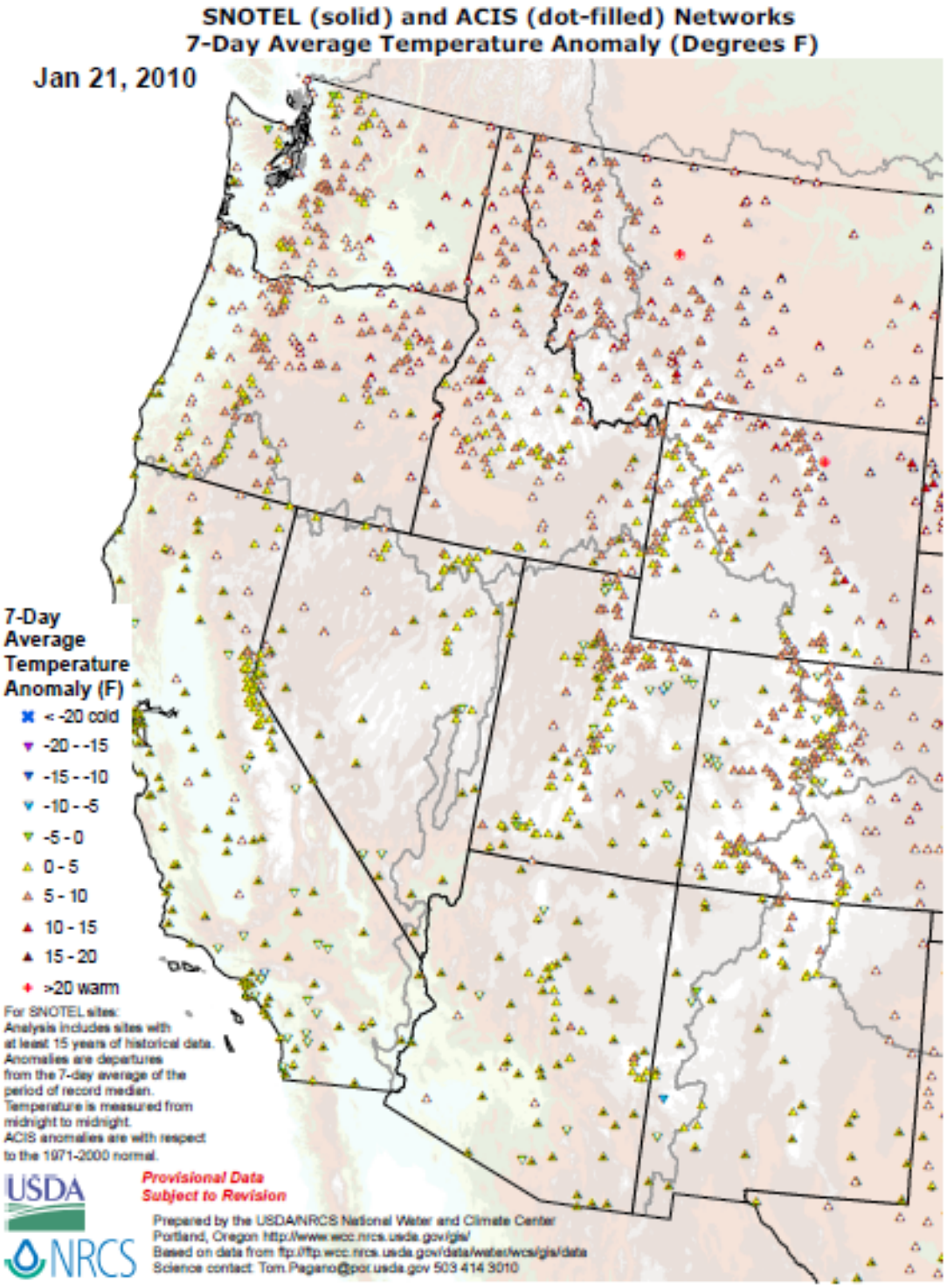


Fig. 2. SNOTEL and ACIS-day station average weekly temperature experienced abnormally warmer conditions over the northern half of the West (typical of a strong El Nino). Cooler than average conditions existed south of a line from the Northern Sierra to the northeast corner of New Mexico.

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

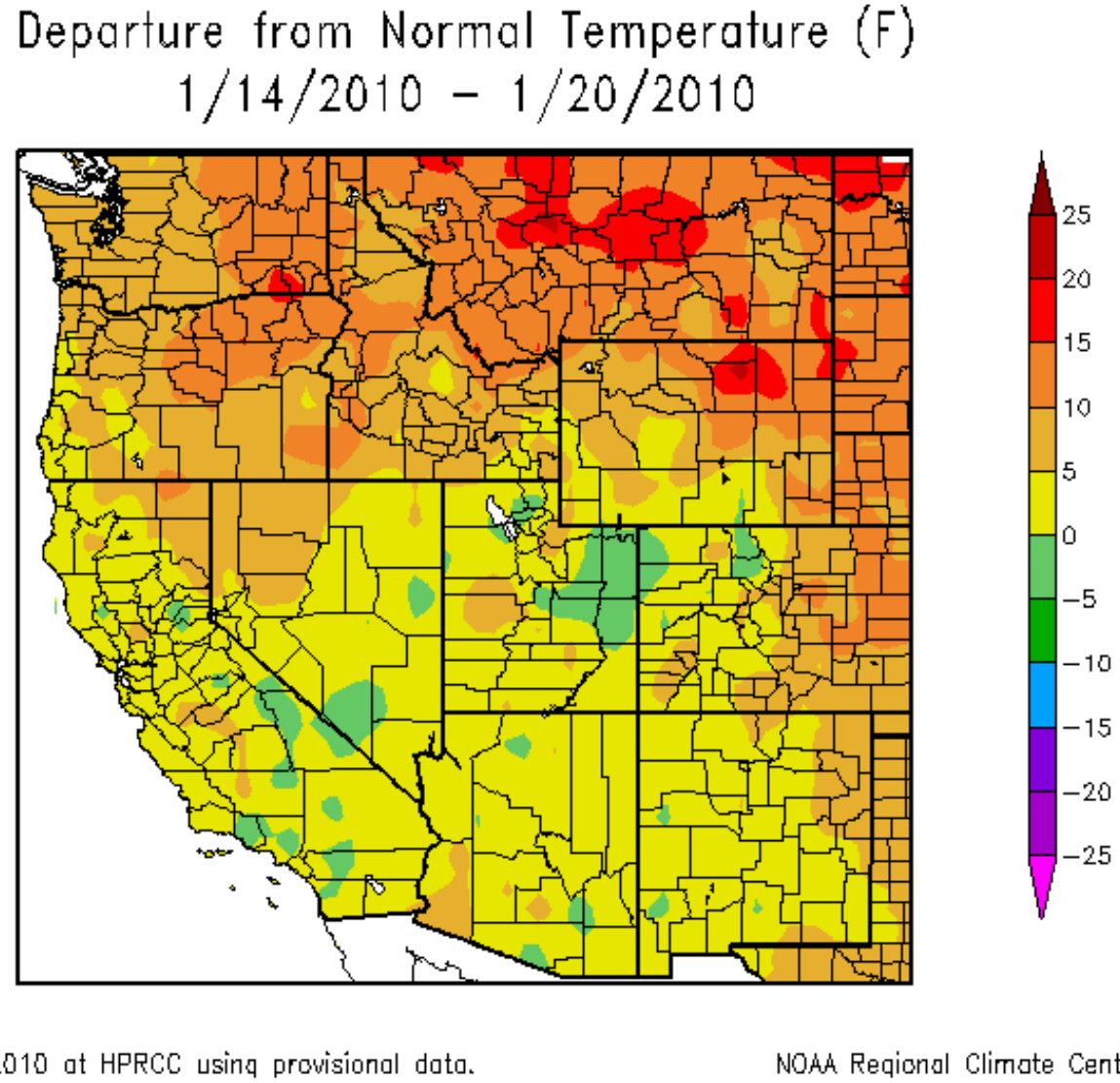
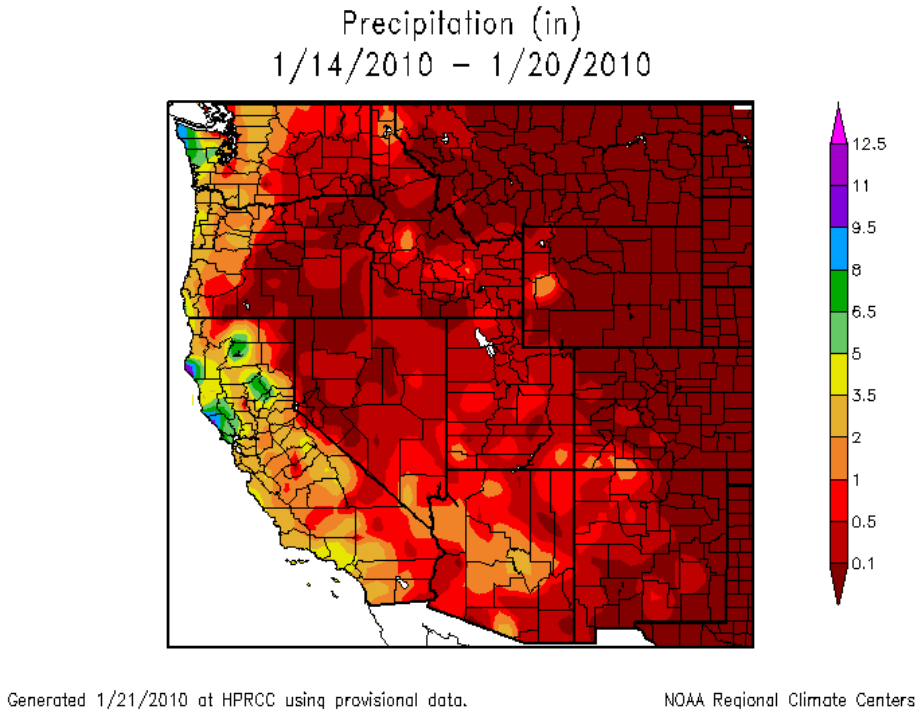


Fig. 2a. ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of the Northern Rockies (>+15F) and the greatest negative departure occurred over parts of eastern Utah and southern California (<-2F).
Ref: http://www.hprcc.unl.edu/maps/current/index.php?action=update_product&product=TDept



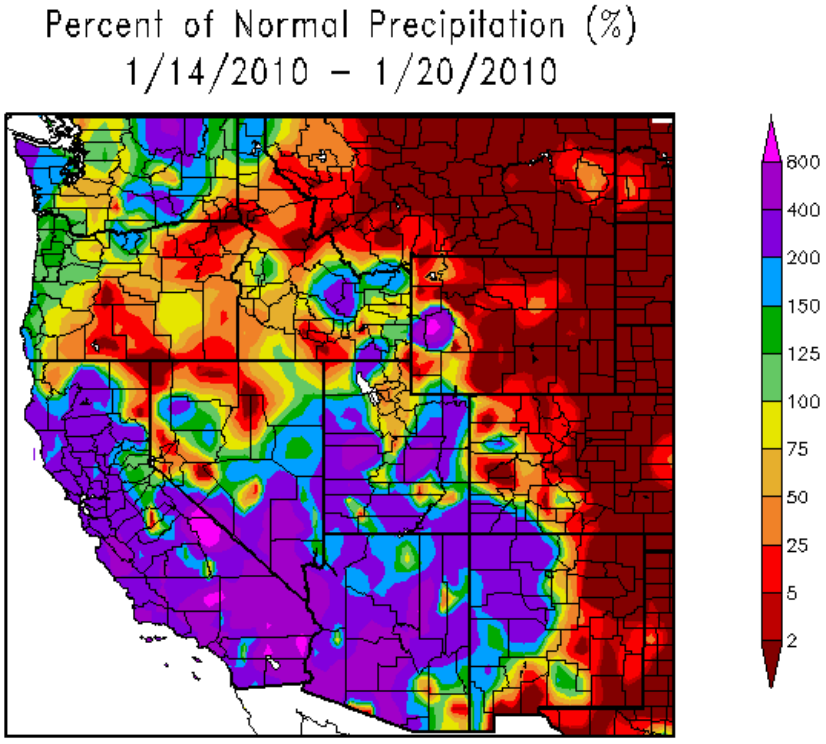


Fig. 3. and 3a. ACIS 7-day average precipitation amounts for the period ending 20 January shows the bulk of the heaviest precipitation fell over the West Coast and Arizona. In terms of percent of normal, well above normal amounts fell from California to Utah, Arizona, western New Mexico, and Washington. The Eastern Slope of the Rockies did not share in the effects of El Nino. The abundant moisture over parts of the Pacific Northwest is unusual for January with the current strong El Nino. Ref: http://www.hprcc.unl.edu/maps/current/

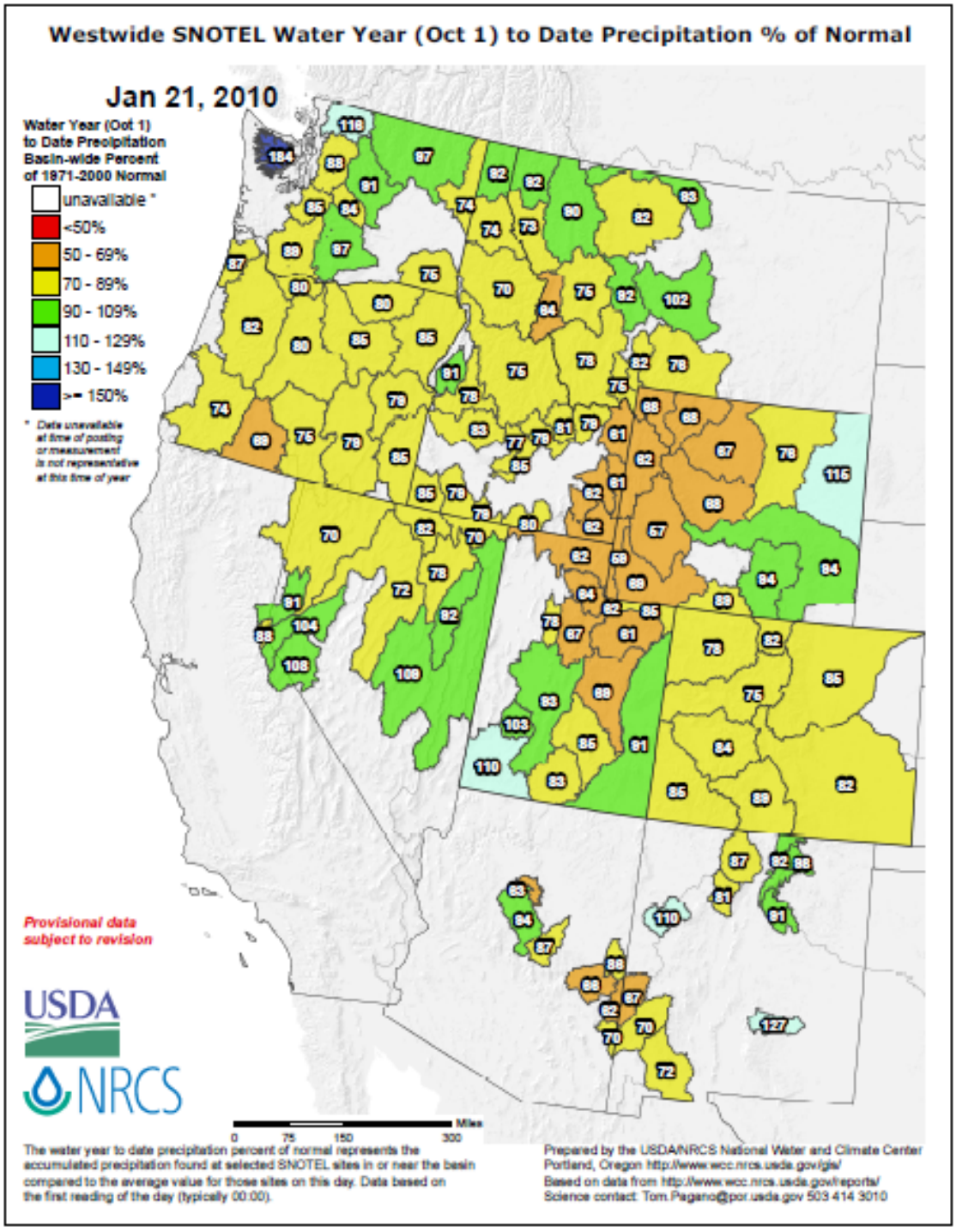


Fig 3b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows most of the West at or below normal values despite above normal snow water equivalent over much of the Southwest.
Ref: ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_wytdprecpctnormal_update.pdf

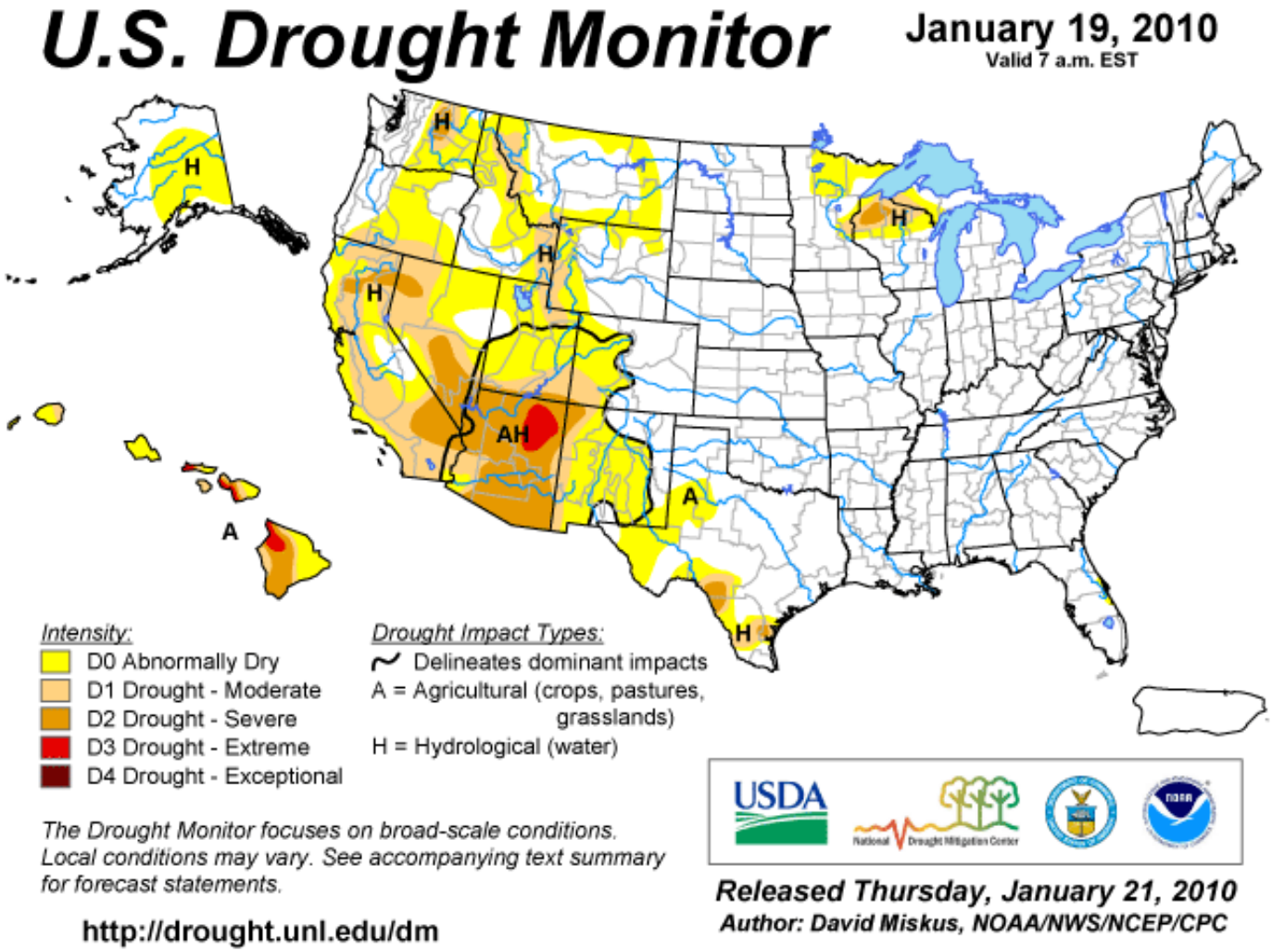


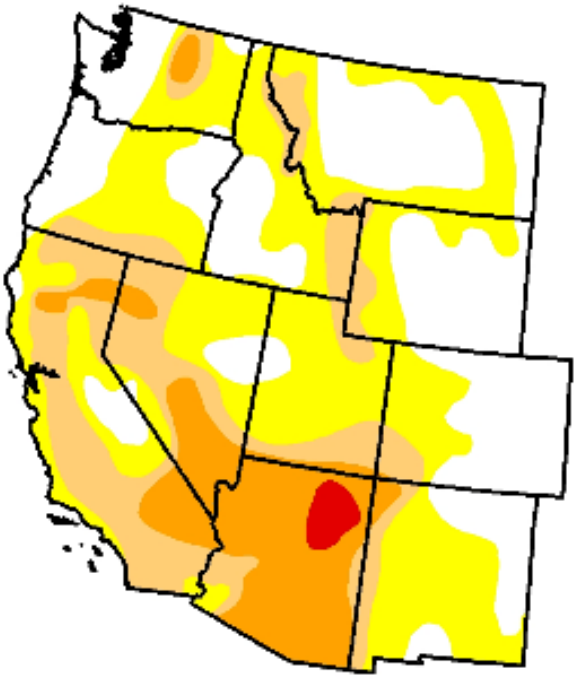
Fig. 4. Current Drought Monitor weekly summary.
Ref: National Drought Mitigation Center (NDMC) - http://www.drought.unl.edu/dm/monitor.html

U.S. Drought Monitor
West

January 19, 2010
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	32.5	67.5	31.8	13.6	0.9	0.0
Last Week (01/12/2010 map)	31.9	68.1	32.0	14.7	0.9	0.0
3 Months Ago (10/27/2009 map)	51.0	49.0	22.9	8.9	0.0	0.0
Start of Calendar Year (01/05/2010 map)	40.1	59.9	30.6	9.9	0.5	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 (01/20/2009 map)	43.2	56.8	28.2	9.8	1.7	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

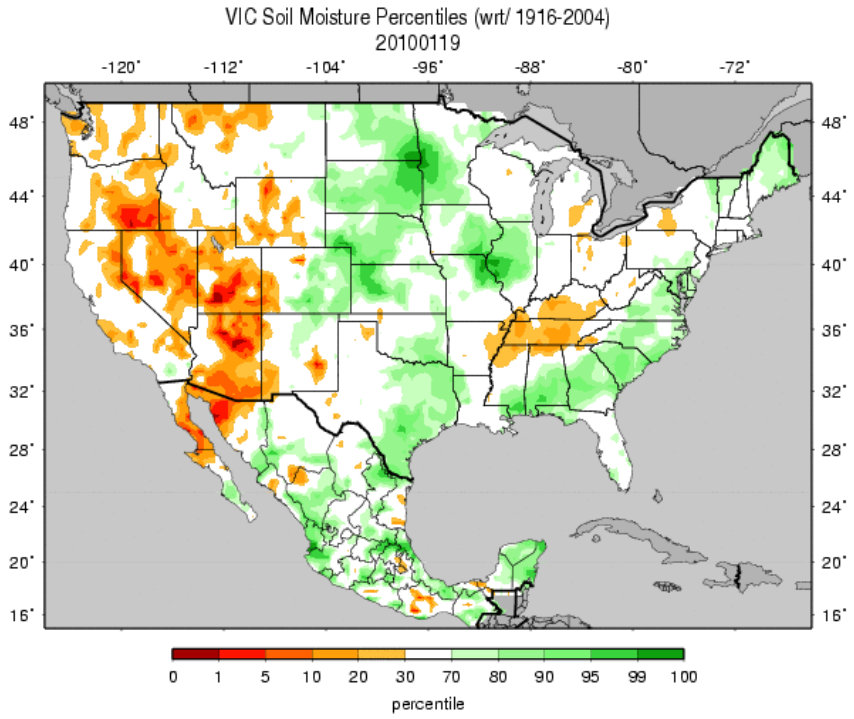
USDA National Drought Mitigation Center

Released Thursday, January 21, 201

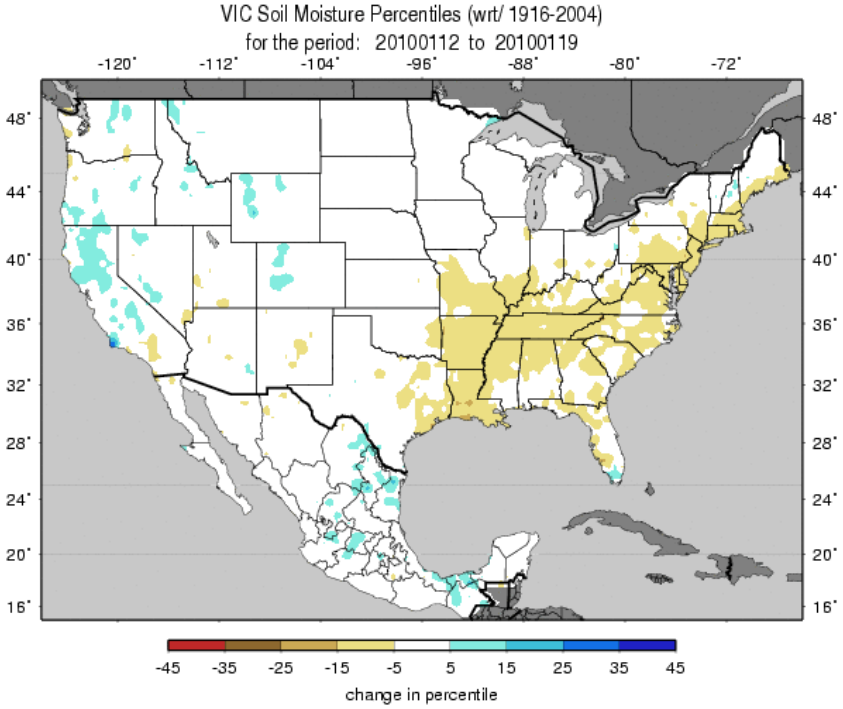
Author: D. Miskus, JAWF/CPC/NOA

Fig. 4a. Drought Monitor for the Western States with statistics over various time periods. Regionally there was little change since last week. Note Extreme drought in Arizona.

Ref: http://www.drought.unl.edu/dm/DM_west.htm



Figs. 5a: Soil Moisture ranking in percentile based on 1916-2004 climatology as of 19 January
Ref: http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.gif



Figs. 5b: Soil Moisture change in percentile based on 1916-2004 climatology for the week. Note extreme dryness over much of the eastern third of the country and increased moisture over California.
http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.1wk.gif

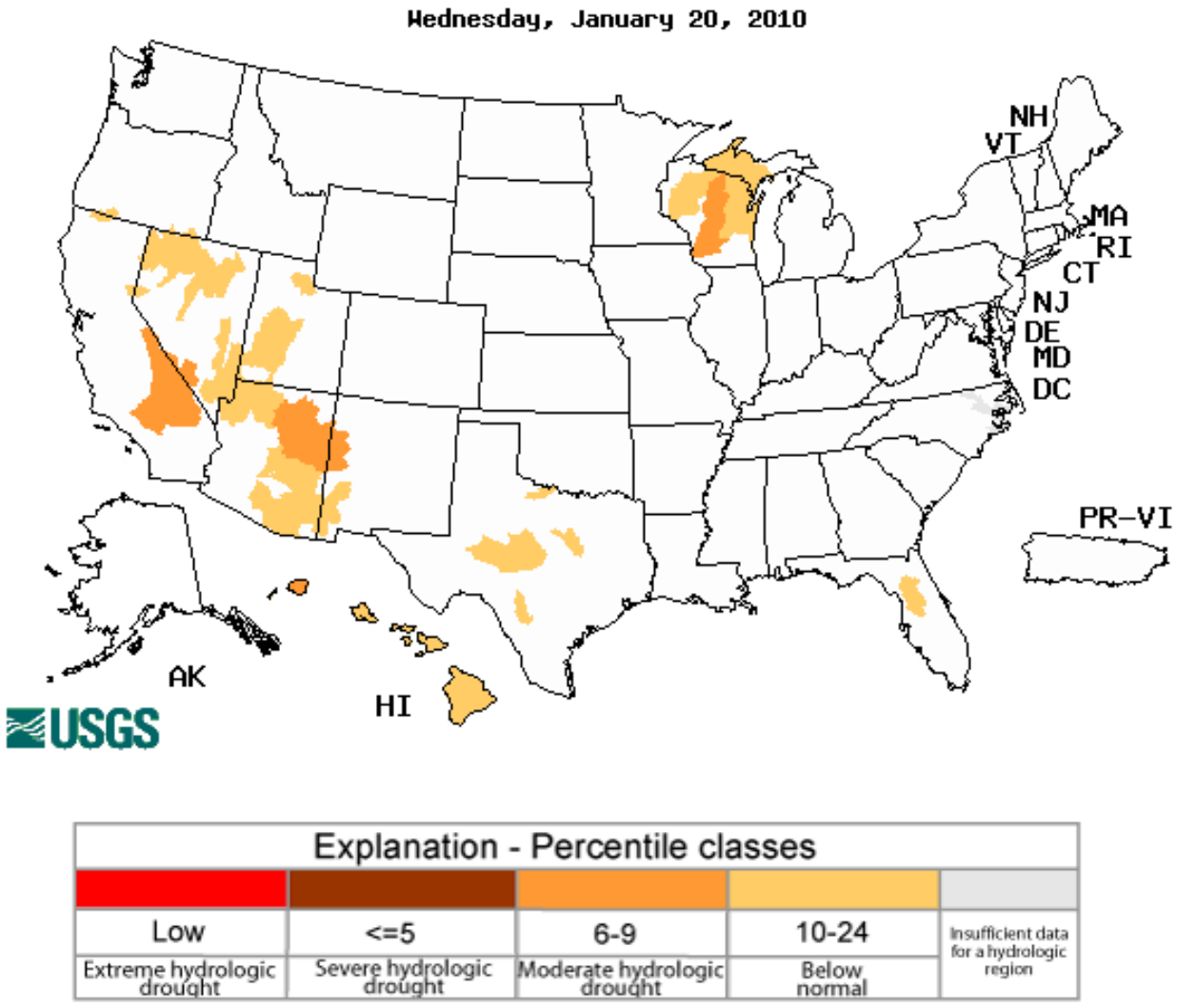


Fig. 6. Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Note, many streams are frozen and thus the flows become more unreliable during the winter. The three driest regions are: southern California, northeast Arizona, and central Wisconsin. Ref: http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us

National Drought Summary -- January 19, 2010

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/.

After a very cold December and early January, much of the lower 48 States, especially the northern tier of states, observed a dramatic warm-up, with weekly temperatures averaging up to 20 degrees F above normal in Montana and Minnesota. Early in the period, a cold front brought light to moderate precipitation to the Pacific Northwest, while high pressure kept the remainder of the Nation tranquil. During the weekend, a storm system developed over the western Gulf, bringing heavy showers and thunderstorms to southeastern Texas before moving northeastward off the mid-Atlantic Coast. Farther west, another front brought additional precipitation to the Northwest. Toward the end of this period, however, a series of Pacific storms tracked farther south, finally dropping significant precipitation on California. This weather pattern was consistent with the ongoing El Niño, now rated as strong.

Florida: As the weekend western Gulf Coast storm tracked northeastward, scattered showers and thunderstorms developed ahead of the system, dropping moderate to heavy (1 to 2.5 inches) rains on the Panhandle and northern and western sections of the state. Farther east, however, little or no rain fell on the small existing D0 area around the Space Coast (approximately Daytona Beach to Melbourne), maintaining deficits accumulated during a very dry October, November, and early January that a wet December failed to alleviate.

The Great Lakes Region: Little or no precipitation fell on the western Great Lakes region, although 6 to 15 inches of snow still blanketed the area. Temperatures, however, approached the 40 degrees F mark and averaged 8 to 20 degrees F above normal, melting some of the snow pack. This was in huge contrast to December's and early January's frigid Arctic blasts. Still, the USGS stream flow levels remained in the lower tenth percentile across northern Wisconsin and the Upper Peninsula of Michigan, and with the ground frozen and a moderate snow cover, conditions remained status-quo.

The Plains: Once again, another western Gulf of Mexico storm system generated numerous showers and thunderstorms across southern and eastern Texas, with 2 to 4 inches widespread from San Antonio southeastward to Corpus Christi and Victoria, and locally up to 6 inches at Matagorda. Accordingly, some 1-category reductions of the D0, D1, and D2 areas of south-central Texas were made where the weekly rains were greatest. D0-D2(H) still remained in this region due to long-term deficiencies, however, even though precipitation out to 6-months has been well above-normal. At 12- and 24-months, deficits were still 4 to 8 inches and 12 to 20 inches, respectively. Elsewhere, mostly dry and mild weather maintained abnormal dryness in the northern High Plains as the light snow cover melted and considerably thinned.

The West: Until the recent round of Pacific storms began to batter the Far West late in the period, there was little reason for any improvement in the Southwest. The situation rapidly changed as the first in a series of Pacific storms hit California with heavy precipitation and severe weather Sunday into Monday. A widespread 2 to 4 inches of precipitation fell along coastal locations and on the Cascades and Sierra Nevada, with locally up to 10 inches near Mt. Shasta. Accordingly, D0 was trimmed away along parts of the Pacific Coast where the heaviest rains (5 to 10 inches) fell, namely southern Oregon and California's Humboldt and Sonoma counties. D1 was erased from a thin strip from Salinas southward to south of Los Angeles (2 to 5 inches), and the southern Sierra Nevada (1.5 to 3 inches).

Both D1 and D2 were eased near Mt. Shasta and the Cascades (6 to 10 inches), while D2 was removed west of Los Angeles (southeast Kern, eastern Los Angeles, and southwest San Bernardino counties) where 2 to 6 inches of precipitation fell. The average basin snow water content in the Sierra Nevada increased from 78-91 percent of normal on January 15 to 87-105 percent of normal just 4 days later. In addition, the AH impact line was pushed eastward as the recent precipitation alleviated short-term dryness concerns. However, even with the recent heavy rains (Shasta Reservoir gained 100,000 acre-feet in 2 days), the reservoir is still almost 1 million acre-feet below average storage for this time of year, according to California's Department of Water Resources and the State Climatologist Dr. Michael Anderson. Furthermore, the heavy rains are expected to cause mudslides and flash flooding in southern California from hillsides lacking vegetation due to earlier wildfires.

Farther north, repeated frontal passages in the Northwest have dropped above-normal precipitation across extreme northern Washington and Idaho the past 90 to 180-days, including 0.5 to 1.5 inches this week, somewhat easing the D1-D2 area in north-central Washington. Similarly, surrounding D0 areas near the Canadian border are at or above normal for the Water-Year-to-Date (WYTD; since October 1), and abnormal dryness was diminished.

In contrast, light precipitation (0.1 to 0.3 inches) and well-above normal temperatures, combined with subnormal WYTD precipitation and Jan. 19 basin snow water contents, prompted the expansion of D1 into the central Rockies (western Wyoming and northeastern Utah). Similar to existing D1 areas in the Rockies, WYTD basin precipitation ranged from 57-68 percent of normal, and Jan. 19 basin average snow water content stood between 45-62 percent of normal. Additionally, several USDA/NRCS SNOTEL sites in northern Utah, western Wyoming, and eastern Idaho were ranked in the lowest fifth percentile for both Jan. 20 snow water equivalent and WYTD precipitation.

Hawaii and Alaska: In Hawaii, the impacts from a strong El Niño continued as little or no rain fell across the islands, even on the normally wet windward sides. The greatest weekly (8am HST Jan. 12 to 8am HST Jan. 19) totals were measured on the windward stations of the Big Island (1.62 inches at Kawainui Stream; 1.28 inches at Honokaa; 1.26 inches at Laupahoehoe), with no other station recording over an inch for the week. The winter months normally see an increase in rainfall, but this has yet to happen. If it was not for an extremely wet November, especially on Kauai, conditions would most likely be worse. Nevertheless, the windward portions of Kauai reported pastures drying out with no new growth, thus affirming the introduction of D1 to eastern Kauai. Elsewhere, conditions remained the same, but continued dryness will bode poorly for the islands the longer the rain fails to fall.

In Alaska, dry and very cold conditions covered the western and northern portions of the state (-56 degrees F at Bettles with a weekly temperature anomaly of -29 degrees F) while stormy and mild weather affected the extreme south and southeast sections. The heaviest precipitation fell on non-drought areas (up to 7 inches at Ketchikan), although light snow (1 to 6 inches) blanketed southern parts of the D0 region in south-central Alaska. But since the snowpack was running between 50-70% of normal as of January 1, the recent light precipitation did little to ease D0, thus maintaining conditions.

Looking Ahead: During the next 5 days (January 21-25), an active weather pattern is expected as a series of storms track across the western and southern tiers of the country, and then up the Atlantic Seaboard. This is consistent with wintertime El Niño conditions. Latest precipitation forecasts call for widespread areas of 2 inches or more liquid equivalent precipitation (with locally heavier amounts) impacting much of California and Arizona during the next three days, and more wet weather for the Southeast during the next 5 days. Lighter precipitation is expected across the upper Midwest, with drier conditions expected in southeastern Texas. Temperatures should remain above normal for areas east of the Continental Divide, but will trend below normal across much of the West due to widespread cloudiness and precipitation.

The CPC 6-10 day forecast (January 26-30) calls for above-normal precipitation for the western third of

the Nation, especially California and the Great Basin, the central Plains, the lower Missouri and Ohio Valleys, and eastern Great Lakes Region. Subnormal precipitation is expected for the northern Great Plains, southwestern Texas, the eastern Gulf and southern Atlantic Coasts, and Alaska. Temperatures are predicted to be subnormal in the North-Central States and southern Florida, while above-normal readings are forecast for the Pacific Northwest, New England, and western Alaska.

Author: David Miskus, Climate Prediction Center/NCEP/NWS/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 January 20, 2010