



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

Weekly Report - Snowpack / Drought Monitor Update Date: 6 August 2009

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Temperature: SNOTEL and ACIS-day station average temperature anomalies showed record level maximums over the Oregon and Washington Cascades and well below averages over the High Northern Plains during the past week (Fig.1). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures occurred over Central and Northern Cascades (>+10F) and the greatest negative departures occurred over Northern High Plains (<-10F) (Fig. 1a).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 5 August shows a mostly dry West with the exception of scattered thunderstorms across northern California, southern Oregon, northern Montana, and parts of the Central Rockies into eastern New Mexico (Fig 2 and 2a). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows surplus values over southern Idaho into Wyoming and eastern Nevada with deficits over the northernmost Tier States, southwest New Mexico, and northwest Oregon. No appreciable change since last week (Fig. 2b).

WESTERN DROUGHT STATUS

The West: The recent cool and wet pattern across northern Montana brings more changes for the better on this week's map, with a general 1-category improvement and reduction of D0-D2, although small cores of D0-D1 remain across the north and south-central portions of the state. Streamflow readings are running above normal virtually statewide, and below-normal temperatures were reported in all but the extreme western reaches.

The Pacific Northwest is another story as it has been extremely warm (8 to 15 degrees above normal) with no rains to help offset it. Expansion is noted this week in the form of D1 across the northern Olympic Peninsula. An expansion of D1 and a new pocket of D2 are also introduced this week in north-central Washington State. The entire region is feeling the effects of this recent weather pattern. Streamflows in the D0-D2 areas are running well below normal for this time of year. Forage and water for livestock are both running low in north-central Washington state as reports from the field come into USDA.

The sluggish start to the monsoon season across Arizona, coupled with above-normal temperatures, has led to the expansion of D0 across most of the state this week. Precipitation is only running at about 5-25% of normal as we reach the peak of the monsoon. Pasture land is burning up and livestock producers are concerned about culling herds if the monsoon remains quiet. USDA is reporting 61% of the state's pasture and range land as poor or very poor. This is having an impact on wildlife in the region as well.

The monsoon has been much kinder to eastern New Mexico, where rains of the past several weeks have led to more removal of D1 in the northeast. The picture in the western part of the state is about the same as Arizona's, with little monsoonal moisture and above-normal

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temperatures leading to some D0 in the northwestern corner of the state. Author: Mark Svoboda, National Drought Mitigation Center.

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

DROUGHT IMPACTS DEFINITIONS (<http://drought.unl.edu/dm/classify.htm>)

The possible impacts associated with **D4 (H, A)** drought include widespread crop/pasture losses and shortages of water in reservoirs, streams, and wells creating water emergencies. The possible impacts associated with **D3 (H, A)** drought include major crop/pasture losses and widespread water shortages or restrictions. Possible impacts from **D2 (H, A)** drought are focused on water shortages common and water restrictions imposed and crop or pasture losses likely. The possible impacts associated with **D1 (H, A)** drought are focused on water shortages developing in streams, reservoirs, or wells, and some damage to crops and pastures (Figs. 3, 3a, and 3b).

SOIL MOISTURE

Soil moisture (Figs. 4a and 4b), is simulated by the [VIC macroscale hydrologic model](#). The detailed, physically-based VIC model is driven by observed daily precipitation and temperature maxima and minima from approximately 2130 stations, selected for reporting reliably in real-time and for having records of longer than 45 years (and various other criteria). Another good resource can be found at: <http://www.emc.ncep.noaa.gov/mmb/nldas/drought/>.

OBSERVED FIRE DANGER CLASS

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

Only reporting station locations are indicated with a marker on the maps. Values between stations are estimated with an inverse distance-squared technique on a 10-km grid. This works pretty well in areas of relatively high station density, but has obvious shortcomings in other areas.

VEGETATION STRESS (Figure 6)

(http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_currentImage.php)

Image Interpretation

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

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detection, assessing drought area coverage, duration, and intensity, and for monitoring drought impacts on vegetation and agricultural crops.

Background of the Tool

Monitoring vegetation health (condition), including drought detection and watch, is based on radiance measurements in the visible (VIS), near infrared (NIR), and 10.3-11.3 micrometers thermal (T) bands (channels) of the Advanced Very High Resolution Radiometer (AVHRR). These measurements are processed to reduce long-term noise. The VIS and NIR values were converted to the Normalized Difference Vegetation Index [$NDVI = (NIR - VIS) / (NIR + VIS)$] and the T to brightness temperature (BT) using a look-up table. The NDVI and BT were filtered in order to eliminate high frequency noise. They were also adjusted for a non-uniformity of the land surface due to climate and ecosystem differences using multi-year NDVI and BT data. The NDVI and BT were converted to the Vegetation Condition Index (VCI), Temperature Condition Index (TCI), and their combination (VT).

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.

PASTURE AND RANGELAND CONDITIONS (Figure 8)

This product is produced and compiled by the NOAA's Climate Prediction Center:

<http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/pasture-range-statewide-conditions.pdf>.

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

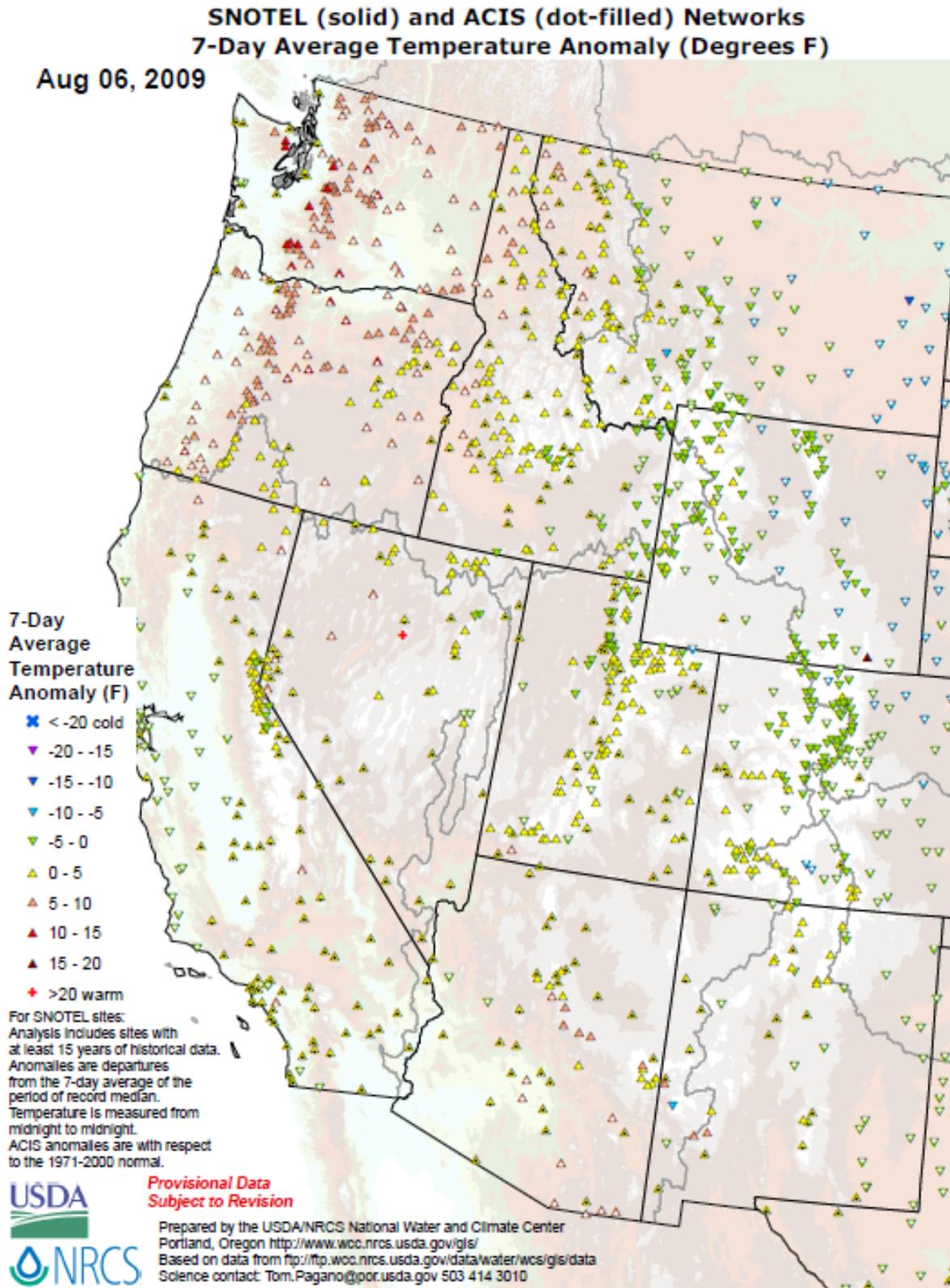
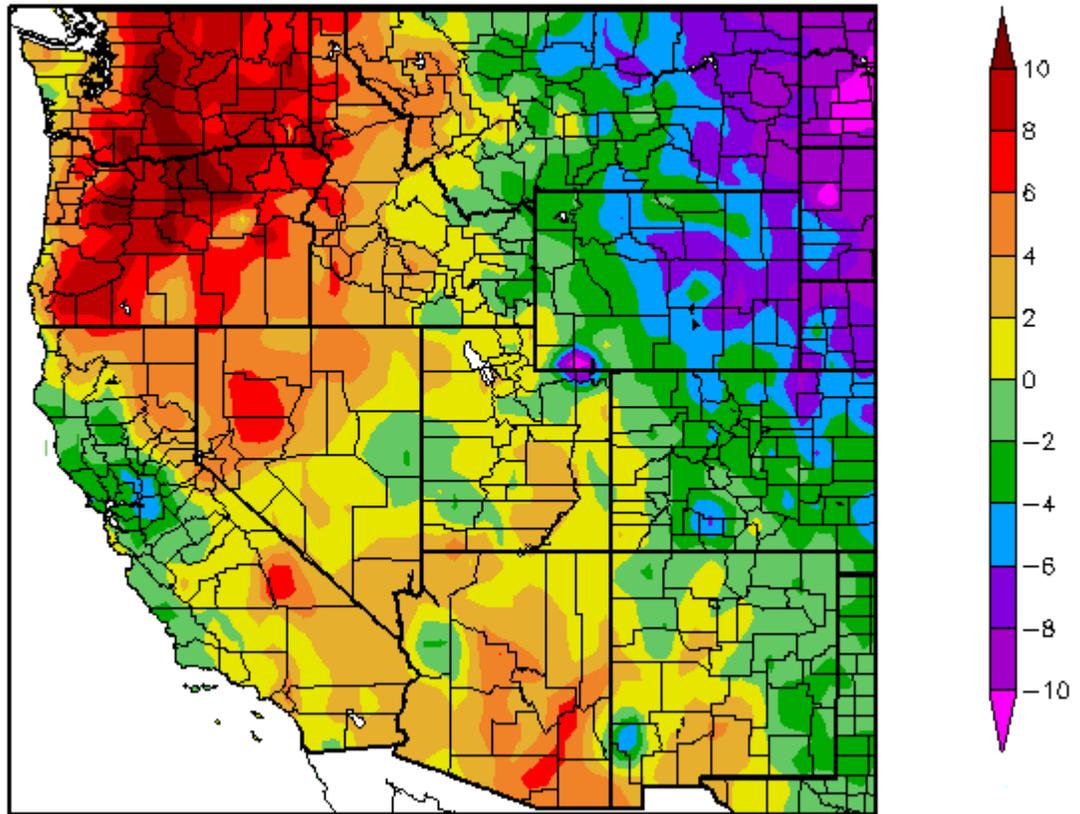


Fig. 1. SNOTEL and ACIS-day station average temperature anomalies showed record level maximums over the Oregon and Washington Cascades and well below averages over the High Northern Plains during the past week.

Ref:

Departure from Normal Temperature (F)
7/30/2009 – 8/5/2009



Generated 8/6/2009 at HPRCC using provisional data.

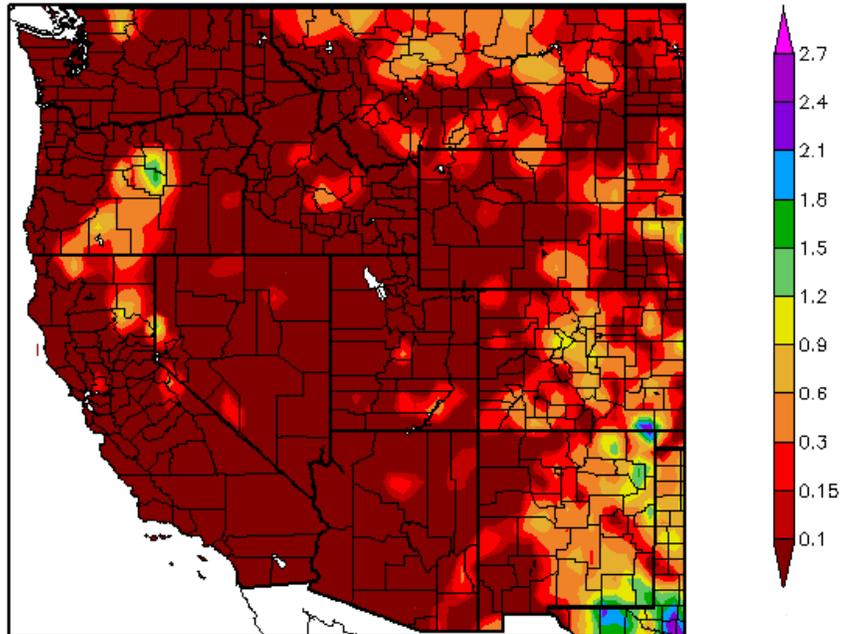
NOAA Regional Climate Centers

Fig. 1a. ACIS 7-day average temperature anomalies show that the greatest positive temperature departures occurred over Central and Northern Cascades (>+10F) and the greatest negative departures occurred over Northern High Plains (<-10F).

Ref: http://www.hprcc.unl.edu/maps/current/index.php?action=update_product&product=TDdept

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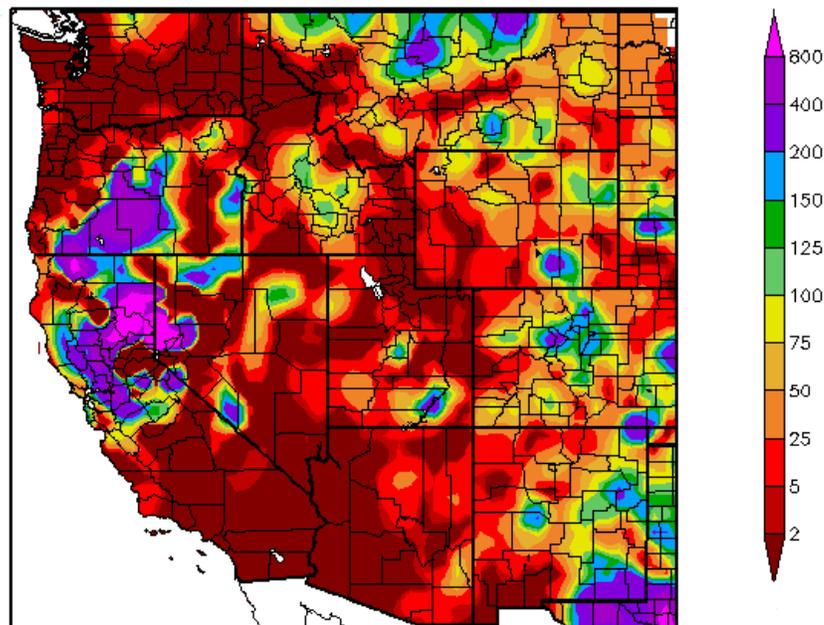
Precipitation (in)
7/30/2009 - 8/5/2009



Generated 8/6/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
7/30/2009 - 8/5/2009



Generated 8/6/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Fig. 2. and 2a. ACIS 7-day average precipitation amounts for the period ending 5 August shows a mostly dry West with the exception of scattered thunderstorms across northern California, southern Oregon, northern Montana, and parts of the Central Rockies into eastern New Mexico.

Ref: http://www.hprcc.unl.edu/maps/index.php?action=update_product&product=PNorm

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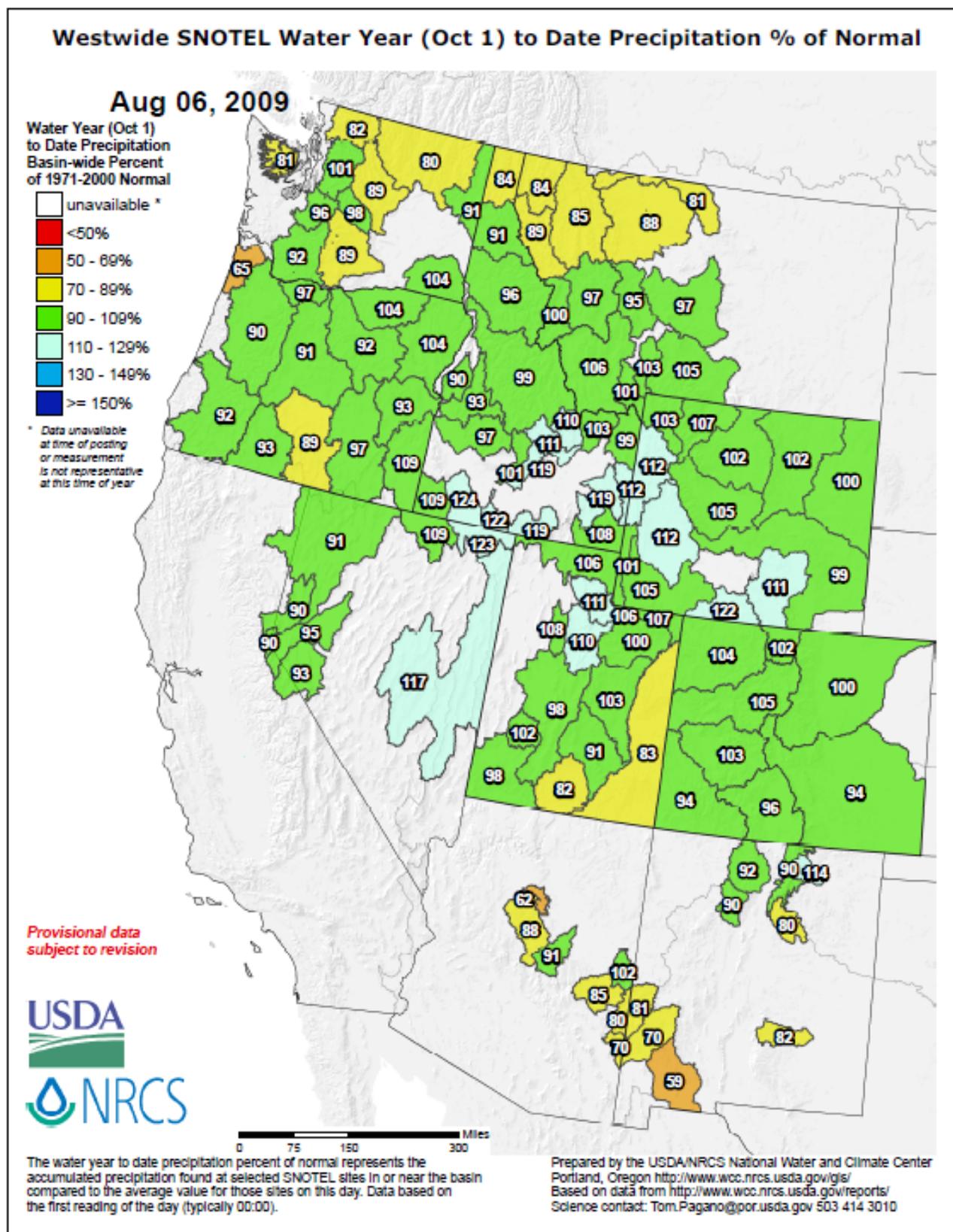
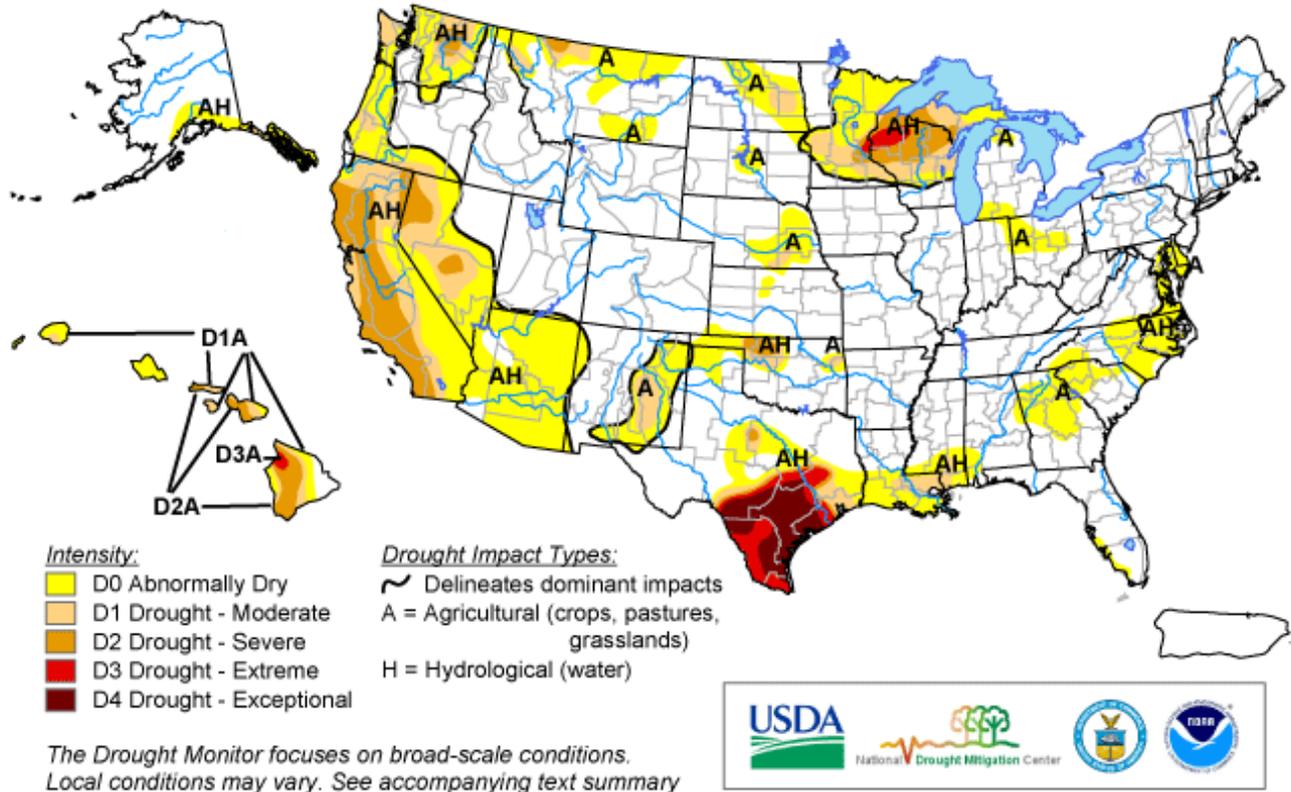


Fig 2b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows surplus values over southern Idaho into Wyoming and eastern Nevada with deficits over the northernmost Tier States, southwest New Mexico, and northwest Oregon. No appreciable change since last week.

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

U.S. Drought Monitor

August 4, 2009
Valid 8 a.m. EDT



Released Thursday, August 6, 2009

Author: Mark Svoboda, National Drought Mitigation Center

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

Fig. 3. Current Drought Monitor weekly summary.

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

U.S. Drought Monitor

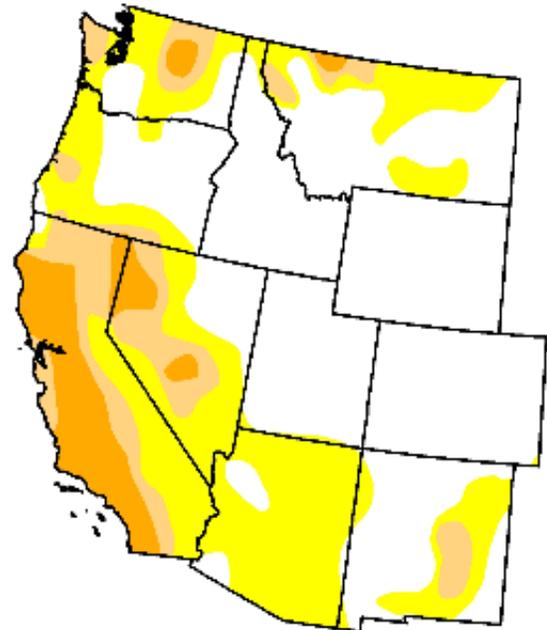
West

August 4, 2009

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	54.4	45.6	17.1	7.5	0.0	0.0
Last Week (07/28/2009 map)	57.1	42.9	17.5	7.2	0.0	0.0
3 Months Ago (05/12/2009 map)	43.3	56.7	26.2	7.3	0.0	0.0
Start of Calendar Year (01/06/2009 map)	37.4	62.6	28.9	8.8	0.4	0.0
Start of Water Year (10/07/2008 map)	41.3	58.7	28.6	10.4	0.1	0.0
One Year Ago (08/05/2008 map)	32.2	67.8	31.9	10.5	0.8	0.1



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. 3a. Drought Monitor for the Western States with statistics over various time periods. Regionally, conditions have deteriorated slightly during the past week.

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

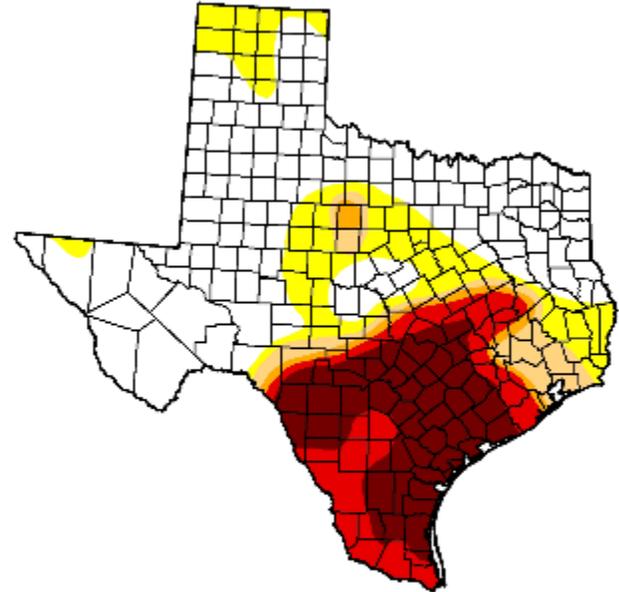
U.S. Drought Monitor

Texas

August 4, 2009
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	50.0	50.0	34.1	28.9	26.6	16.8
Last Week (07/28/2009 map)	39.0	61.0	38.1	30.2	24.7	18.7
3 Months Ago (05/12/2009 map)	31.2	68.8	50.5	38.0	23.7	14.9
Start of Calendar Year (01/06/2009 map)	41.7	58.3	24.5	15.0	9.1	4.2
Start of Water Year (10/07/2008 map)	67.2	32.8	20.5	11.0	3.6	0.0
One Year Ago (08/05/2008 map)	13.3	86.7	64.5	35.5	19.6	3.2



Intensity:

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

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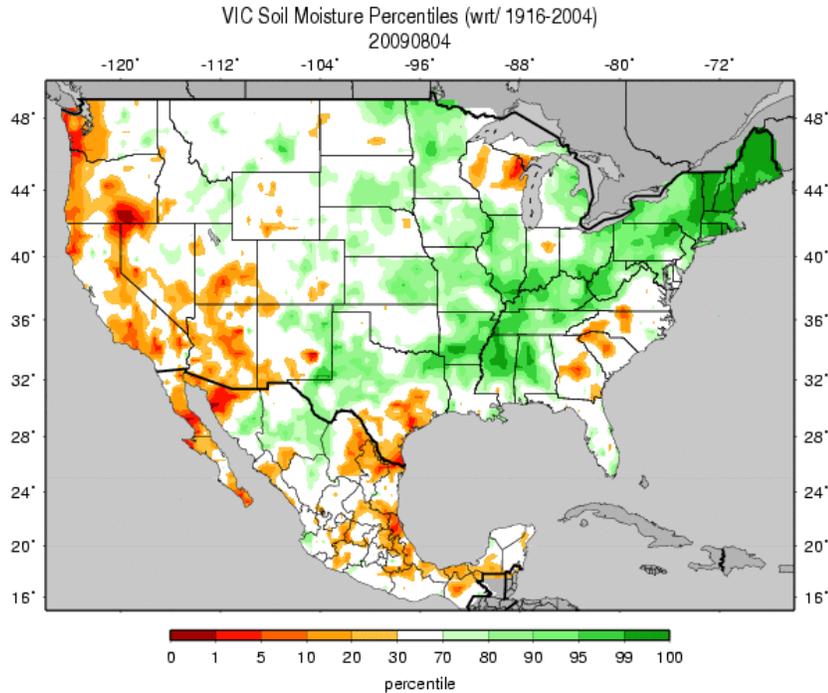
Author: Mark Svoboda, National Drought Mitigation Center

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

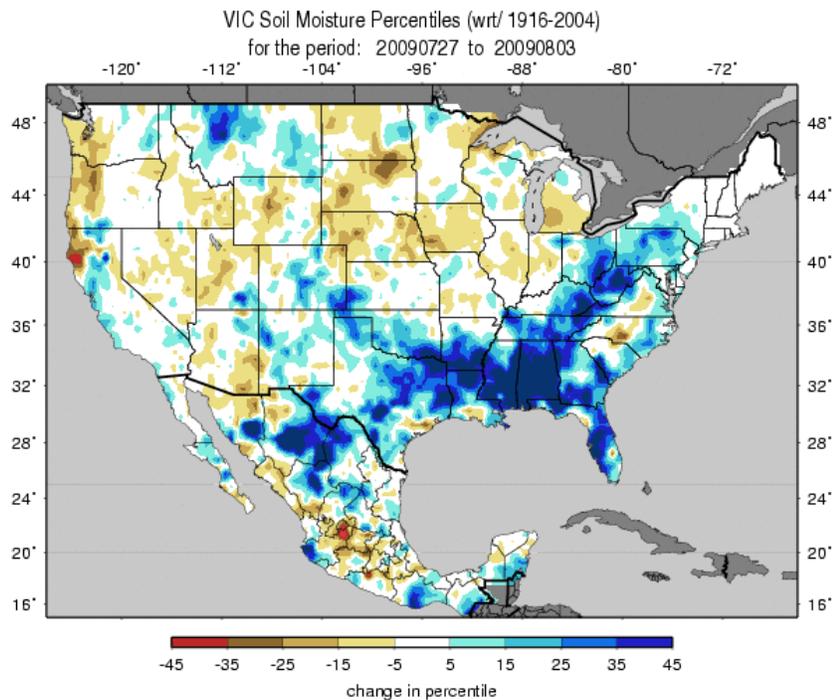
Fig. 3b: Texas is the only state with D4 drought condition in the US. Note some expansion in D3-D4 since last week. See article: "Exceptional drought" covers 32 million acres in south Texas: <http://southwestfarmpress.com/news/texas-drought-0803/>.

Ref: http://www.drought.unl.edu/dm/DM_state.htm?TX.S

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Figs. 4a: Soil Moisture ranking in percentile based on 1916-2004 climatology as of 4 August. Near saturation exists over the northeastern to the Lower Mississippi River Valley, while excessive dryness is scattered across the Gulf Coast States, Wisconsin, and parts of the West. Ref: http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.gif



Figs. 4b: Soil Moisture change in percentile based on 1916-2004 climatology for this past week. Excessive drying is found over northwest California along the coast to Washington and the Central High Plains. Excessive moistening is found over the Mid-Atlantic States southwestward into Texas and over northwestern Montana. Ref: http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.1wk.gif

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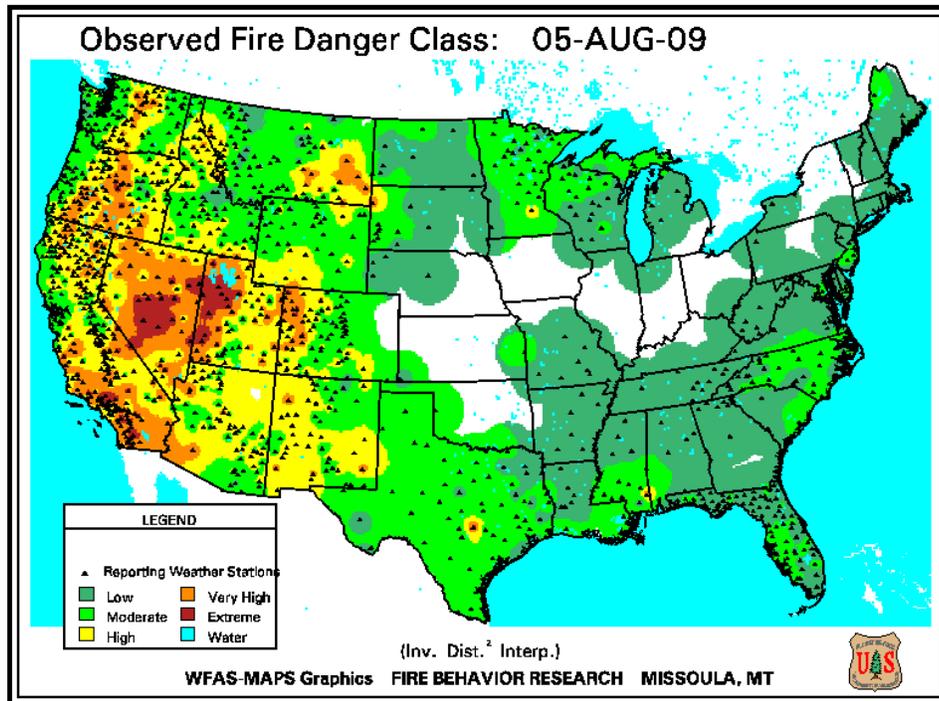


Fig. 5a. Observed Fire Danger Class. Conditions over the West have deteriorated significantly over the Great Basin, southern California, and southeast Montana since last week. Ref: http://www.wfas.net/images/firedanger/fd_class.gif

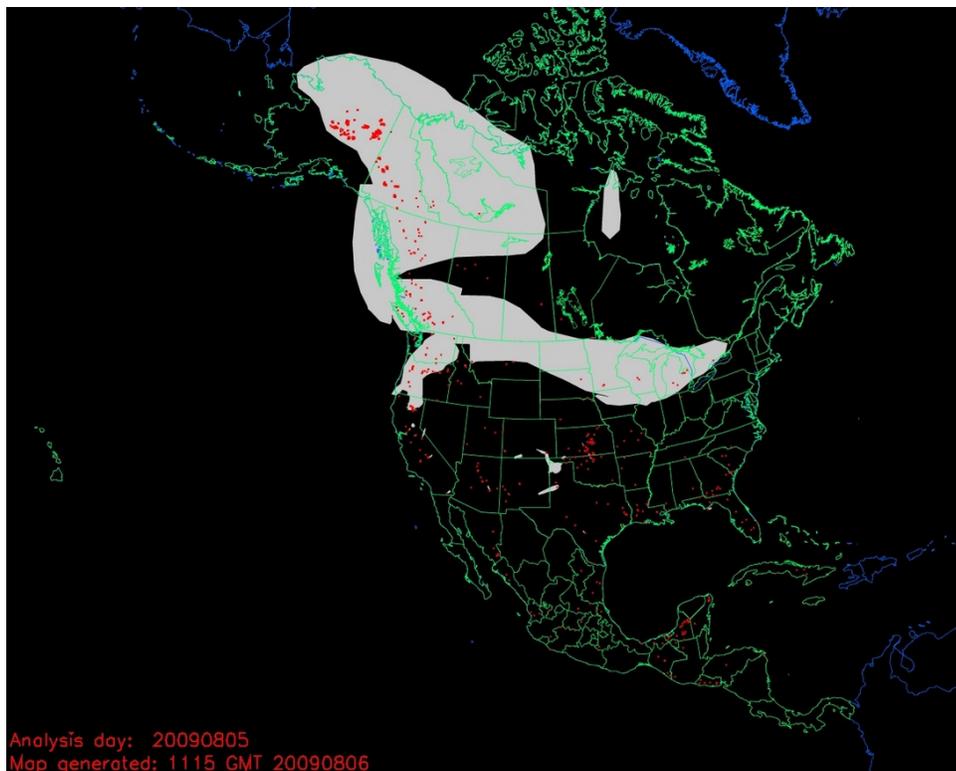


Fig. 5b. Hazard Mapping System Fire and Smoke. Analysis is for 8/05/2009 with fires shown as red dots. Fire size has been increased so fires are visible in this large view. Smoke, when detected by the analyst, is in gray. The large smoke plume is from large fires over central and eastern Alaska. Ref: <http://www.osdpd.noaa.gov/ml/land/hms.html>.

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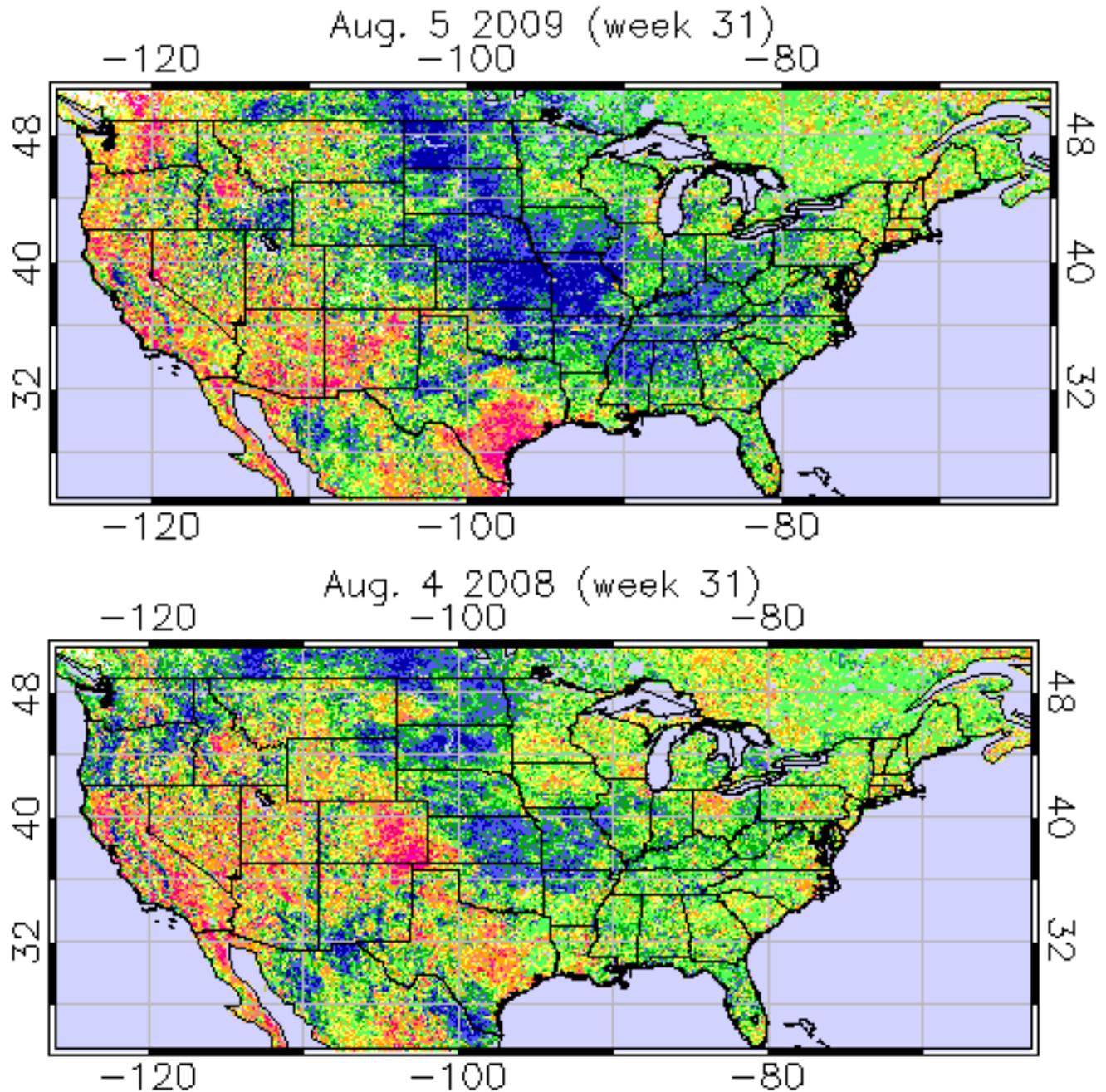


Fig. 6. Vegetation Drought Response Index: Note the comparison to last year. The Central and Northern Great Plains show very favorable conditions while Texas, California, and north-central Washington shows very stressed conditions past this week. Last year, California and Colorado were the most stressed states.

Ref: http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_currentImage.php

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Wednesday, August 05, 2009

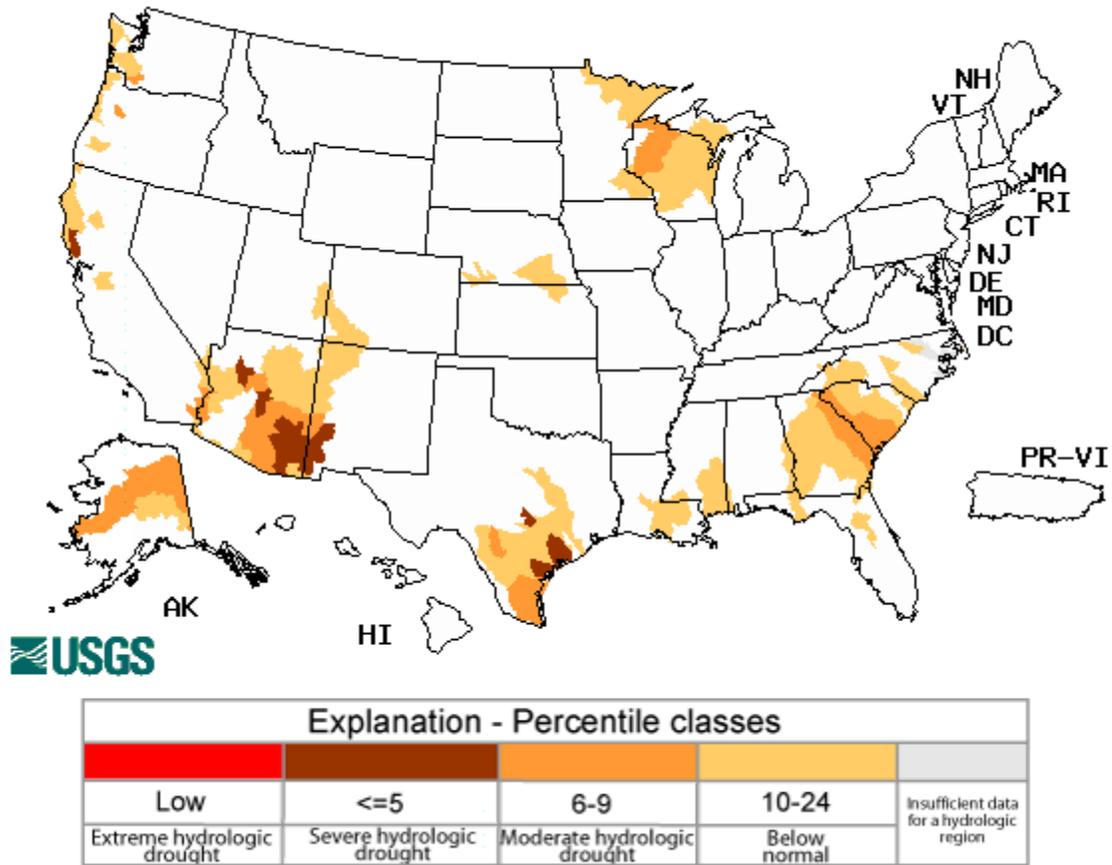
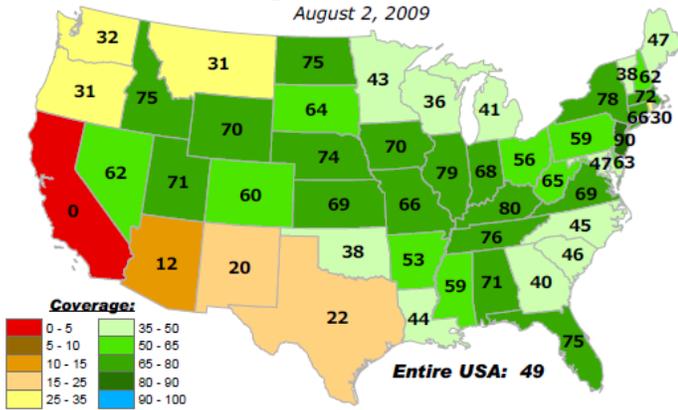


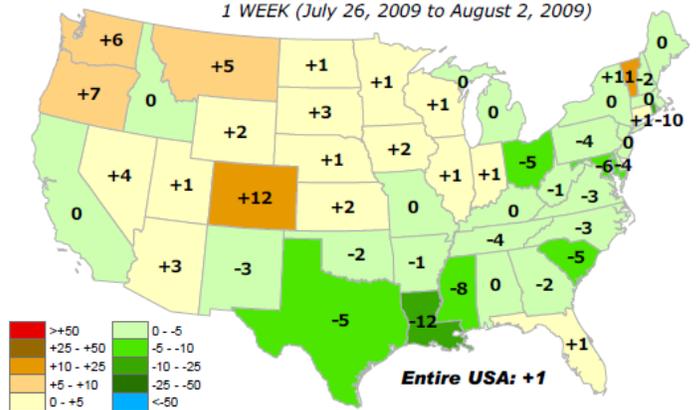
Fig. 7. Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Severe flows over parts of Texas and now over southern Arizona into southwest New Mexico exist. Ref: <http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us>.

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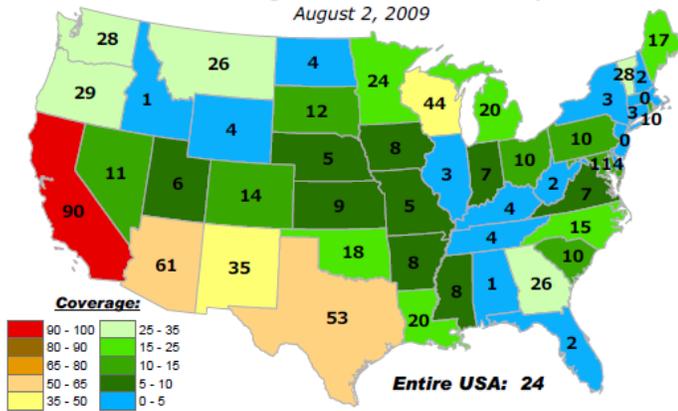
Percent of Pasture & Range Land in "Good" or "Excellent" Condition
August 2, 2009



CHANGE in % of Pasture and Range Lands in "Poor" or "Very Poor" Condition
1 WEEK (July 26, 2009 to August 2, 2009)



Percent of Pasture & Range Land in "Poor" or "Very Poor" Condition
August 2, 2009



CHANGE in % of Pasture and Range Lands in "Poor" or "Very Poor" Condition
4 WEEKS (July 5, 2009 to August 2, 2009)

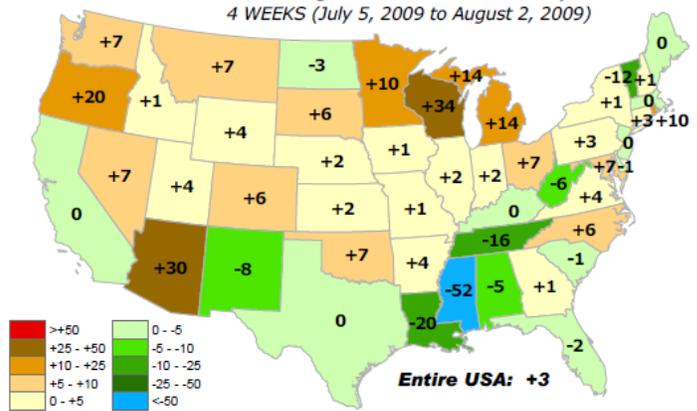


Fig. 8. Current Pasture and Range Land conditions and changes over the last week and last month.

Ref: <http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/pasture-range-statewide-conditions.pdf>

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National Drought Summary –August 4, 2009

The discussion in the Looking Ahead section is simply a description of what the official national guidance from the National Weather Service (NWS) National Centers for Environmental Prediction is depicting for current areas of dryness and drought. The NWS forecast products utilized include the HPC 5-day QPF and 5-day Mean Temperature progs, the 6-10 Day Outlooks of Temperature and Precipitation Probability, and the 8-14 Day Outlooks of Temperature and Precipitation Probability, valid as of late Wednesday afternoon of the USDM release week. The NWS forecast web page used for this section is: <http://www.cpc.ncep.noaa.gov/products/forecasts/>.

The Northeast and Mid-Atlantic: Good rains (2 to 5 inches or more) covered parts of eastern Ohio, Pennsylvania and New England last week. Abnormally dry (D0) conditions have improved in eastern Ohio but have expanded west and north this week into northwestern Ohio, northeastern Indiana and southwestern Michigan, where 90-day rainfall totals are 3 to 6 inches below normal (50-75% of normal). Heavier rainfall (3-5 inches) in the southern Appalachians across eastern Tennessee and western North Carolina leads to the retreat of D0 to the east this week. Abnormally dry (D0) conditions were also trimmed in south-central North Carolina as well after a few consecutive weeks of beneficial rain along the coastal plains.

Southeast: Relatively seasonal weather, both in terms of temperatures and rainfall, results in very little change this week across most of the region for the second consecutive week. Exceptions are noted in Alabama where heavy rains (3-5 inches) fell in the southwest and east-central regions of the state, which led to the removal of some D0 in these parts. The rains didn't come to west-central Georgia and seasonal and yearly deficits are slowly climbing again. D0 has expanded in this area. Rains in the northern part of the state were simply enough to hold serve against summer demand.

The Gulf Coast: The heaviest rains last week fell mostly north of the D0/D1 areas in Louisiana and Mississippi. However, the past two weeks have brought enough rain to the region to continue the improvement trend this week as both abnormally dry (D0) and moderate drought (D1) have once again been pushed southward in both of these states. D1 was also reduced in west central Louisiana where it was connected to D1 in Texas last week. These recent rains have not been enough, however, to offset the overall dryness of the past few months, so a core of D0/D1 still extends from central and southeastern Louisiana up into southern Mississippi.

The Plains: The northern Plains didn't see much rain last week, but it was much cooler than normal, with temperatures running 6 to 12 degrees below normal. These cooler temperatures have played a large mitigating role in keeping impacts in check, given the deficits that have been slowly building throughout the growing season. This duration component is now beginning to show in areas that don't see timely rains each week. As a result, both central Nebraska and South Dakota show an increase in the D0 conditions. In addition, the D1 in south-central Nebraska has also pushed north and east this week. Crops in these areas are seeing stress now, especially in the sloped areas and those fields with less heavy soils and lower water holding capacity. Abnormally dry conditions have also expanded a bit in North Dakota this week. It should be noted that these areas are labeled as "A" for shorter-term agricultural impacts as the longer periods are showing no stress and streamflows are generally running well above normal.

The storm pattern in the southern Plains was a little more active, with a good bit of it centered over central and northwestern Oklahoma. After degradation just last week in northwestern Oklahoma, this week's rains of 2-5 inches brings improvement, with widespread 1-category improvement in the northwest and Panhandle as well. Some D1/D2

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remains in the northwestern part of the state, where seasonal deficits are still quite impressive at 6 to 9 inches below normal (25-50% of normal) since the beginning of May.

In Texas, the storm track set up once again across parts of the southern Panhandle and the north, bringing 2-5 inches on the heels of good rains last week. This leads to more reduction of D0-D2 in these regions and tightens the gradient between the core of D3/D4 and the D0-D2 in the south. The bridge of D1 depicted last week between Texas and Louisiana has been removed this week as well after another round of 2-4 inches of rain. This led to some reduction in D0 as well. Temperatures across the northern half of Texas were below normal last week, but the thermostat was still blasting away above normal across the southern half of the state. This was generally coupled with very little rainfall, leading to a slight push east of the D3/D4 core in southern Texas and an expansion of D3 to cover the entire Rio Grande basin. Some recent rains and relatively better (when compared to those of D4) streamflows on the southwestern flank of D4 in Texas led to a slight respite this week, in the form of D4 reduction to D3.

Upper Midwest: Temperatures were cooler than normal once again, but for the most part, the region was left wanting rain. Stress is beginning to occur in the agricultural sector given the length of the dryness, and deficits are found at both the short- and long-term scales back to 12 months or more, so even those isolated pockets that saw an inch or two last week are simply treading water and aren't seeing a reversal of the trend or a break in the drought. This combination of dryness across both short- and long-term scales leads to the introduction of extreme drought (D3) this week across northwestern Wisconsin and extreme east-central Minnesota, where deficits for the year now stand at 6-10 inches (50-70% of normal and worse in some places). USDA is reporting this week that 44% of the state's pasture and range land is poor or very poor.

The West: The recent cool and wet pattern across northern Montana brings more changes for the better on this week's map, with a general 1-category improvement and reduction of D0-D2, although small cores of D0-D1 remain across the north and south-central portions of the state. Streamflow readings are running above normal virtually statewide, and below-normal temperatures were reported in all but the extreme western reaches.

The Pacific Northwest is another story as it has been extremely warm (8 to 15 degrees above normal) with no rains to help offset it. Expansion is noted this week in the form of D1 across the northern Olympic Peninsula. An expansion of D1 and a new pocket of D2 are also introduced this week in north-central Washington State. The entire region is feeling the effects of this recent weather pattern. Streamflows in the D0-D2 areas are running well below normal for this time of year. Forage and water for livestock are both running low in north-central Washington state as reports from the field come into USDA.

The sluggish start to the monsoon season across Arizona, coupled with above-normal temperatures, has led to the expansion of D0 across most of the state this week. Precipitation is only running at about 5-25% of normal as we reach the peak of the monsoon. Pasture land is burning up and livestock producers are concerned about culling herds if the monsoon remains quiet. USDA is reporting 61% of the state's pasture and range land as poor or very poor. This is having an impact on wildlife in the region as well.

The monsoon has been much kinder to eastern New Mexico, where rains of the past several weeks have led to more removal of D1 in the northeast. The picture in the western part of the state is about the same as Arizona's, with little monsoonal moisture and above-normal temperatures leading to some D0 in the northwestern corner of the state.

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Hawaii, Alaska and Puerto Rico: Alaska saw another good week of rains, and streamflows have responded as well, leading to a reduction of D0 in the southwestern Aleutian chain. The D0/D1 found in the southeast remains unchanged, though.

The past few weeks have brought more favorable trade wind rains across the eastern sides of the islands in Hawaii and improvement is noted in the removal of D1 across eastern Kauai, eastern Maui and the eastern side of the Big Island. This also led to the removal of D0 across the far eastern region of the Big Island.

Puerto Rico remains unchanged and drought free this week.

Looking Ahead: Over the next 5 days (August 6-10), some relief should come to the Pacific Northwest in the form of below-normal temperatures. The cooler weather is also expected across most of the West. A strong ridge will build into the Plains and bring above-normal temperatures with it. The warmer-than-normal readings are also expected in the Midwest and Mid-Atlantic. The best bet for beneficial rains will be confined to the northern tier states from Montana to the east across the northern Plains, upper Midwest and Mid-Atlantic.

The 6-10 day forecast (August 11 – August 15) calls for a greater likelihood of below-normal temperatures in the Pacific Northwest and the southeastern island chains in Alaska. The real story is seen in the ridging in the country's mid-section, where temperatures are expected to be well above normal for this period across the Plains, Midwest, Southeast and Mid-Atlantic. Precipitation is likely to be below normal across the same areas seeing above-normal temperatures, so this isn't a good combination. Above-normal precipitation is likely for the Pacific Northwest and the Gulf Coast states.

Author: Mark Svoboda, National Drought Mitigation 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

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