



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

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

**Date: 21 June 2012**

## **SNOTEL SNOWPACK AND PRECIPITATION SUMMARY**

**Temperature:** [SNOTEL](#) and ACIS 7-day temperature anomaly showed values cooler over the Northern Rockies and warmer over the Central Rockies. Elsewhere, temperatures were within 5 degrees of the long term average (Fig. 1). ACIS [7-day](#) average temperature anomalies show the greatest positive temperature departures over north-central California ( $>+10^{\circ}\text{F}$ ) and the greatest negative departures over parts of the Washington Cascades ( $<-6^{\circ}\text{F}$ ) (Fig. 1a).

**Precipitation:** [ACIS](#) 7-day average precipitation amounts for the period ending yesterday shows the wettest areas over northern Washington northern Montana Rockies (fig. 2). In terms of percent of normal, scattered across much of the Northern Tier and Western High Plains, decent precipitation fell for this time of year (isolated activity over Utah and southern Arizona as a result of thunderstorms) (fig. 2a). Since the start of the [2012 Water-Year](#) that began on 1 October 2011, the seasonal moisture has continued to favor the Northern Tier States. Over much of the southern half of the West, drier conditions dominate (Fig. 2b). Since the start of [June](#), the Cascades and Northern Rockies have been much wetter than the long term average due to a persistent trough over the Eastern Pacific. Elsewhere, extremely dry conditions dominate (Fig. 2c).

**Weather Summary:** Showers and thunderstorms from a cool front brought areas of rain to parts of the northern and central Plains, Midwest, and Northeast during this U.S. Drought Monitor (USDM) week. The rain provided little relief to the central Plains to Ohio Valley, where deficits over the last 6 months ranged from 4 to 10 inches and locally over 12 inches. Early in the week, the remnants of an old cool front triggered showers and thunderstorms from the southern Plains to the Southeast. Pacific fronts brushed parts of the Northwest, but the week was dry for most of the West. Temperatures averaged below normal beneath upper-level troughs in the Northwest and along the Eastern Seaboard and Gulf Coast states, while above-normal temperatures dominated from the Southwest to Great Plains and Great Lakes. It was a drier-than-normal week for much of Alaska, Hawaii, and Puerto Rico.

**The West:** Scattered showers dropped an inch or less of rain in the vicinity of Tucson, Arizona, and in the southern and central Rockies, and showers brought rainfall across Montana (mostly northern Montana) and the northern portions of the Pacific Northwest. But with essentially no rainfall for much of the West this week and large wildfires burning from California to Wyoming, changes mostly involved deterioration of the drought depiction. D0 expanded in Montana and adjacent Idaho, with D1 introduced in southeast Montana. D0-D3 expanded in Wyoming, and D1-D3 grew in Colorado and Utah. D2-D3 grew in northwest New Mexico. Growing numbers of dead livestock, drying wells, and communities without water prompted expansion of D1-D3 in Arizona. More than two-thirds of the topsoil was rated short to very short in Wyoming (71%), Colorado (79%), and New Mexico (95%), and half or more of the pasture and rangeland was rated poor or very poor in Nevada (55%), Colorado (58%), Wyoming (59%), California (60%), Arizona (67%), and New Mexico (85%). The impact boundaries were adjusted northward to reflect growing short-term and long-term impacts. Author: Richard Heim, National Climatic Data Center, NOAA.

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

### **Drought Impacts Definitions**

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

### **Soil Moisture**

Soil moisture (Fig. 4), 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/>.

### **Soil Climate Analysis Network (SCAN)**

Figure 5 provides supplemental data on soil conditions (moisture and temperatures at various depths from 2 inches to 80 inches. For more information about SCAN see ([brochure](#)).

### **U.S. Historical Streamflow**

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.

### **Fire Conditions**

Fig. 7 comes from the [Predictive Services](#) (USFS) facilitates integration of comprehensive climate, weather, situation and fuels information in geospatial format.

### **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://www.drought.gov>.

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### 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>. Reports from 2007 are available on-line while ones from 2001-2006 can be acquired upon request.

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

/s/

Micheal L. Golden

Deputy Chief, Soil Survey and Resource Assessment

# Weekly Snowpack and Drought Monitor Update Report

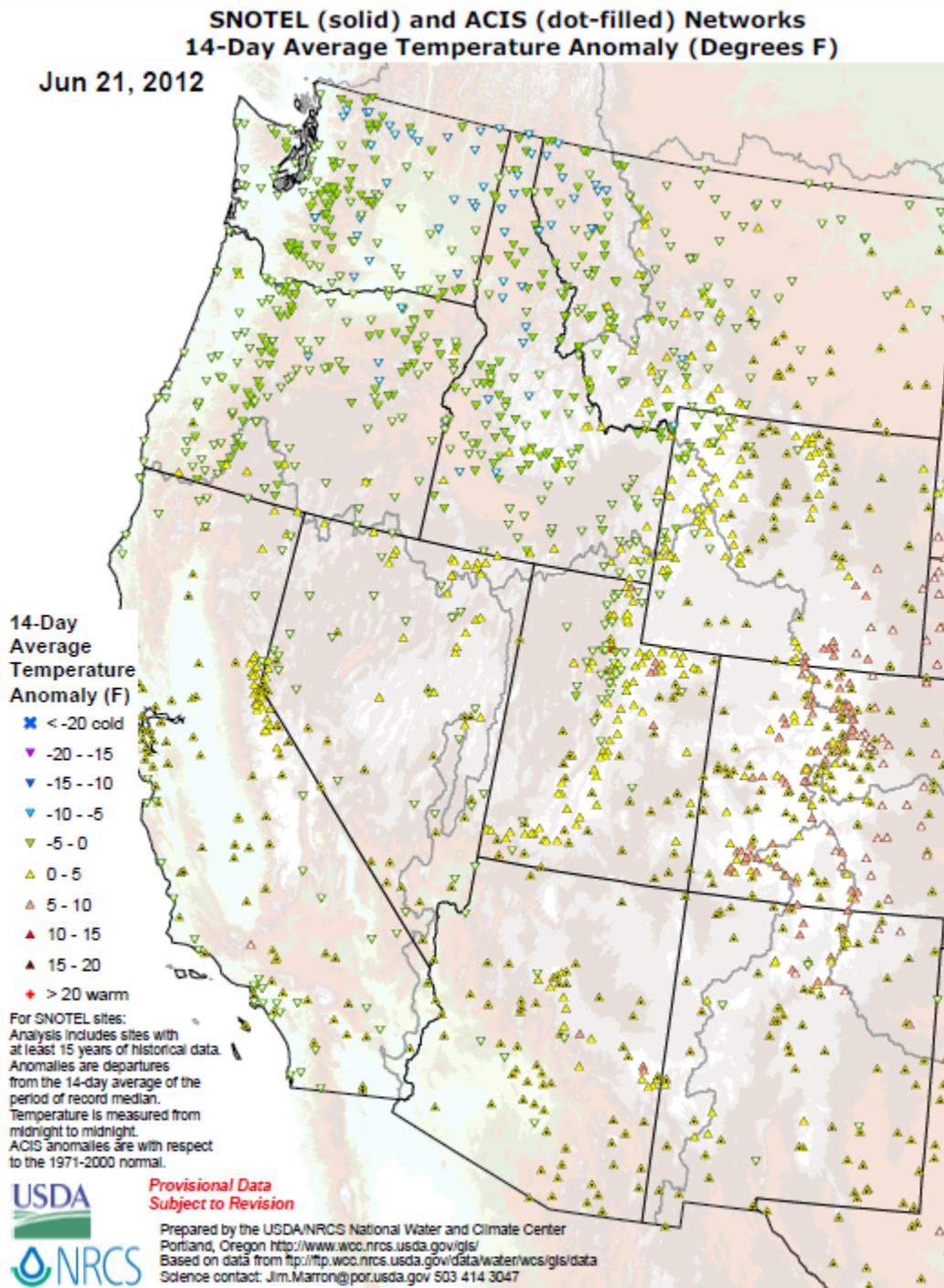
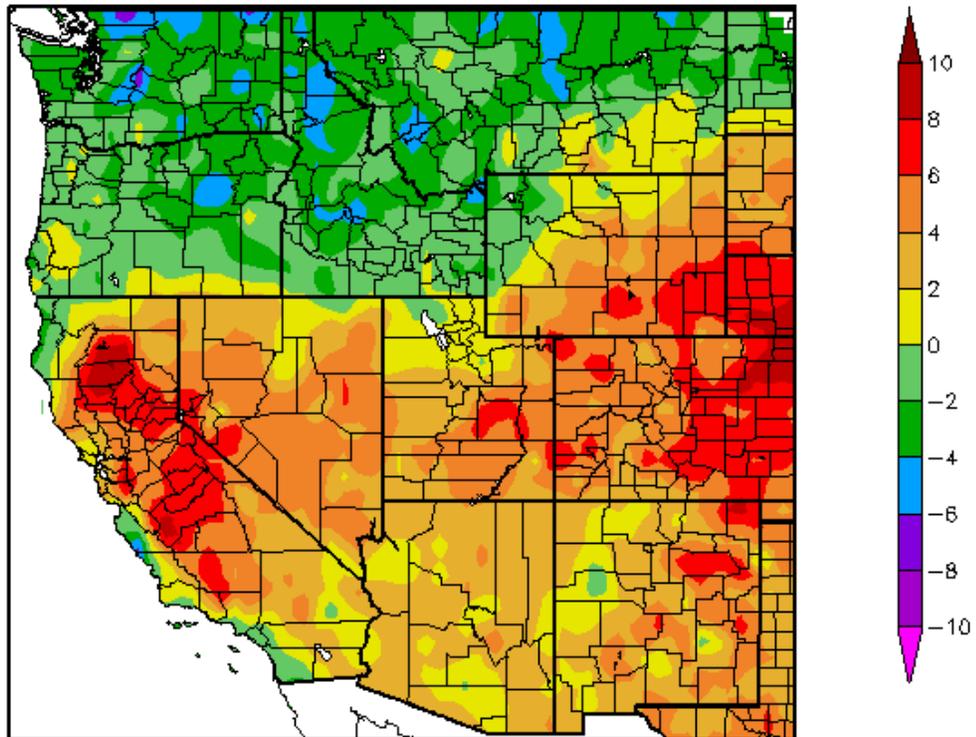


Fig. 1: SNOTEL and ACIS 7-day temperature anomaly showed values cooler over the Northern Rockies and warmer over the Central Rockies. Elsewhere, temperatures were within 5 degrees of the long term average.

Departure from Normal Temperature (F)  
6/14/2012 – 6/20/2012



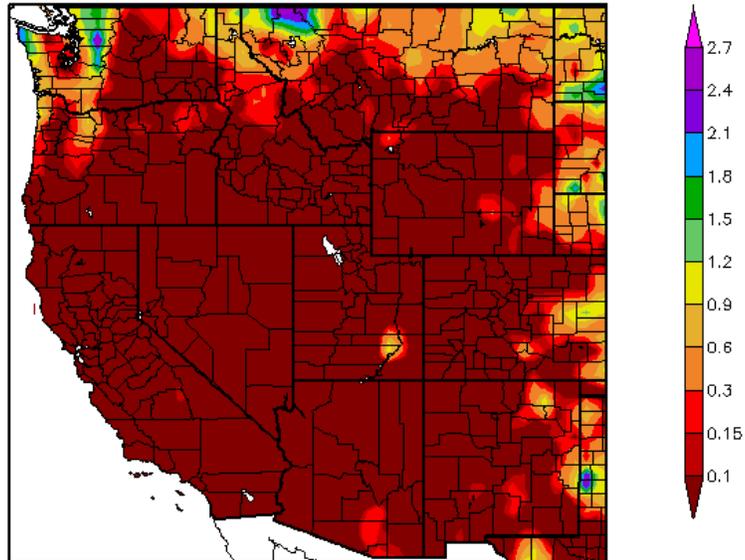
Generated 6/21/2012 at HPRCC using provisional data.

Regional Climate Centers

**Fig. 1a:** ACIS 7-day average temperature anomalies show the greatest positive temperature departures over north-central California ( $>+10^{\circ}\text{F}$ ) and the greatest negative departures over parts of the Washington Cascades ( $<-6^{\circ}\text{F}$ ).

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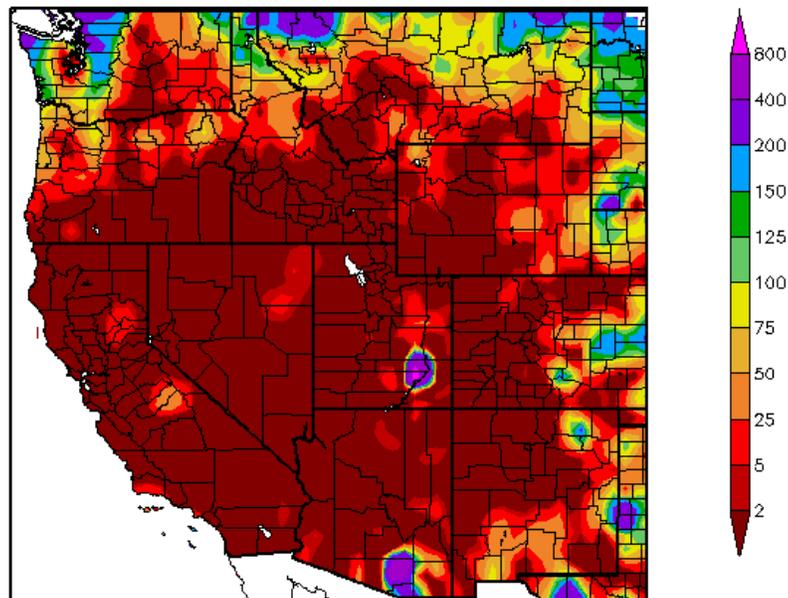
Precipitation (in)  
6/14/2012 - 6/20/2012



Generated 6/21/2012 at HPRCC using provisional data.

Regional Climate Centers

Percent of Normal Precipitation (%)  
6/14/2012 - 6/20/2012



Generated 6/21/2012 at HPRCC using provisional data.

Regional Climate Centers

**Fig. 2 and 2a: [ACIS](#) 7-day average precipitation amounts for the period ending yesterday shows the wettest areas over northern Washington northern Montana Rockies (top). In terms of percent of normal, scattered across much of the Northern Tier and Western High Plains, decent precipitation fell for this time of year (isolated activity over Utah and southern Arizona as a result of thunderstorms) (bottom).**

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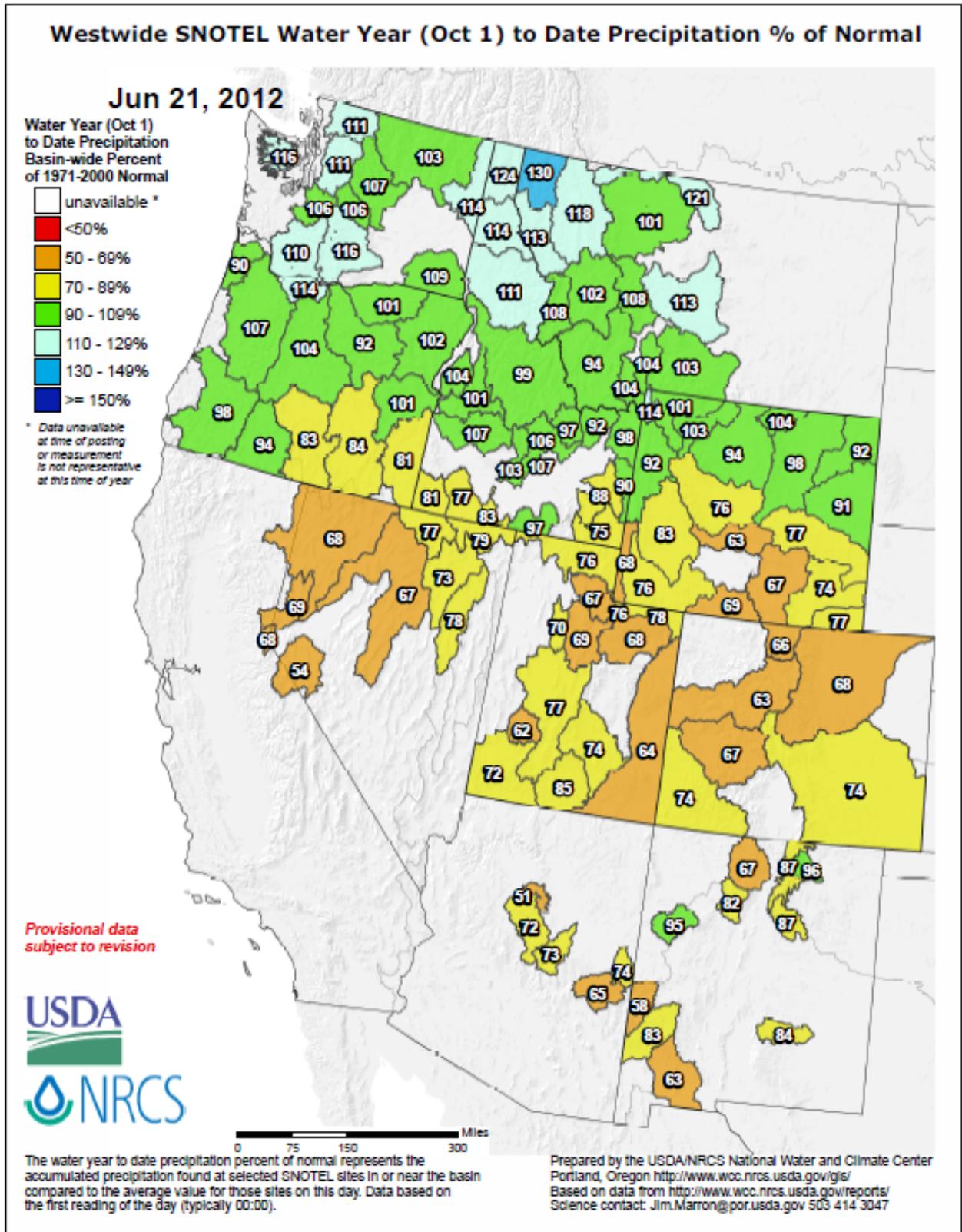


Fig 2b: Since the start of the 2012 Water-Year that began on 1 October 2011, the seasonal moisture has continued to favor the Northern Tier States. Over much of the southern half of the West, drier conditions dominate.

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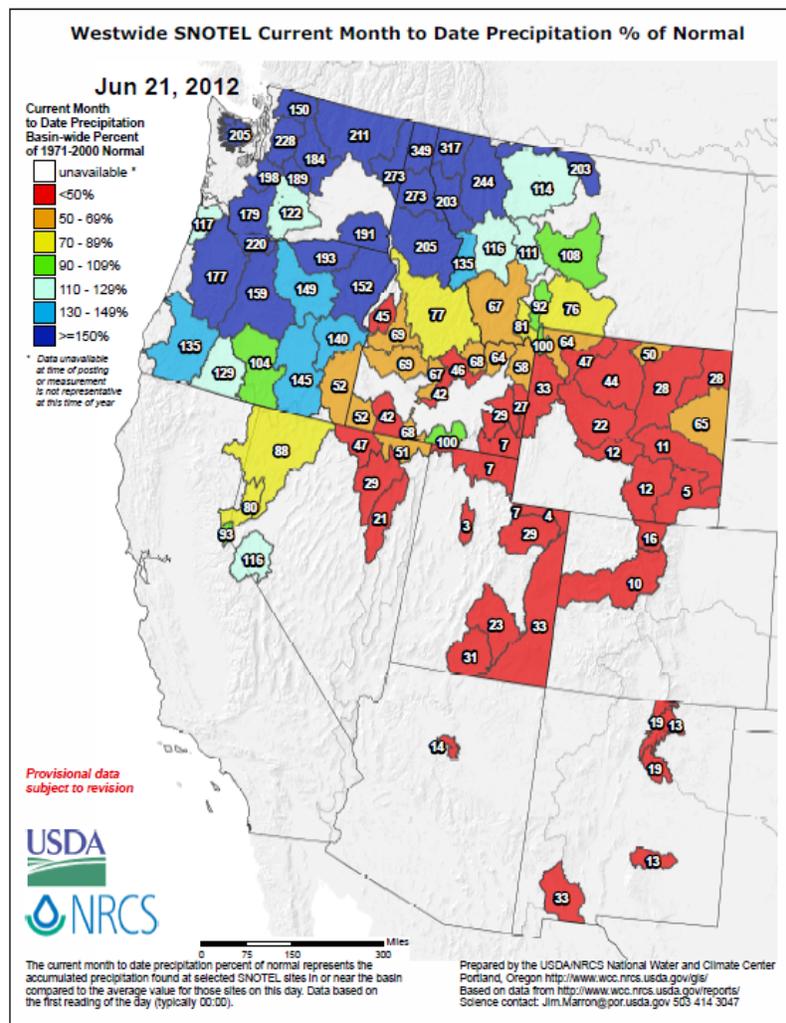


Fig 2c: Since the start of **June**, the Cascades and Northern Rockies have been much wetter than the long term average due to a persistent trough over the Eastern Pacific. Elsewhere, extremely dry conditions dominate.

### Useful Precipitation Links:

- Total precipitation (plotted by the [USGS](#), [NOAA National Weather Service \[NWS\]](#), and [NOAA High Plains Regional Climate Center \[HPRCC\]](#));
- percent of normal precipitation and precipitation percentiles ([NWS](#), [HPRCC station observations](#), [Leaky Bucket model](#));
- NCDC [statewide precipitation ranks](#);
- USGS [number of days with precipitation](#) and [maximum number of consecutive dry days](#);
- temperature departures from normal ([HPRCC](#)) and percentiles ([Leaky Bucket](#));
- NCDC [statewide temperature ranks](#);
- number of [record warm daily low temperatures](#), [record daily high temperatures](#), [record daily low temperatures](#), and [record cool daily high temperatures](#) set in May 2012 (from NCDC's [daily records analysis](#)); and
- [Utah's last precipitation](#) occurrence (in days).

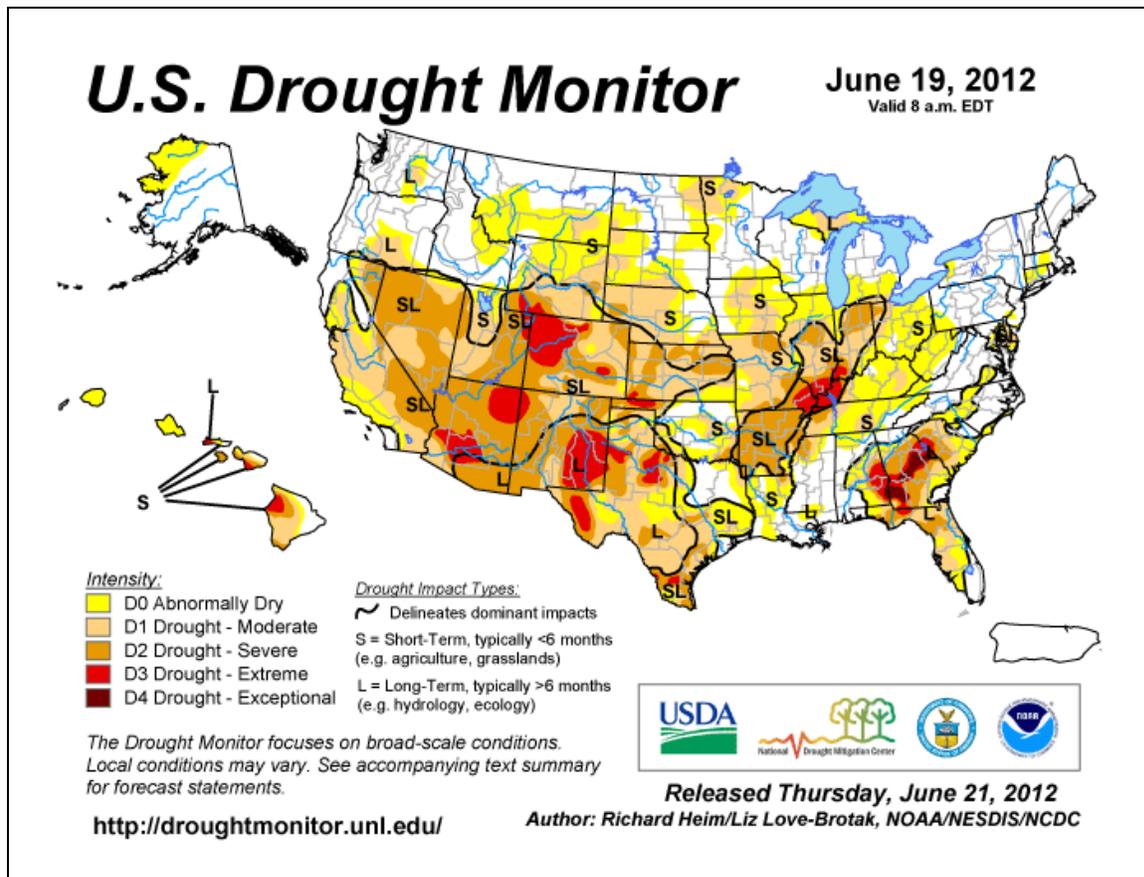


Fig. 3: Current [Drought Monitor](#) weekly summary. The exceptional D4 levels of drought are found over the Southeast US and a single small area over northern Texas. For more drought news, see [Drought Impact Reporter](#). Click for the latest statistics for [California Reservoirs](#). The monthly [drought indicator blend and component percentiles](#) spreadsheet is a great resource for climate division drought statistics. A number of these articles will be posted on the [Drought Headlines](#) page at the [NDMC website](#).

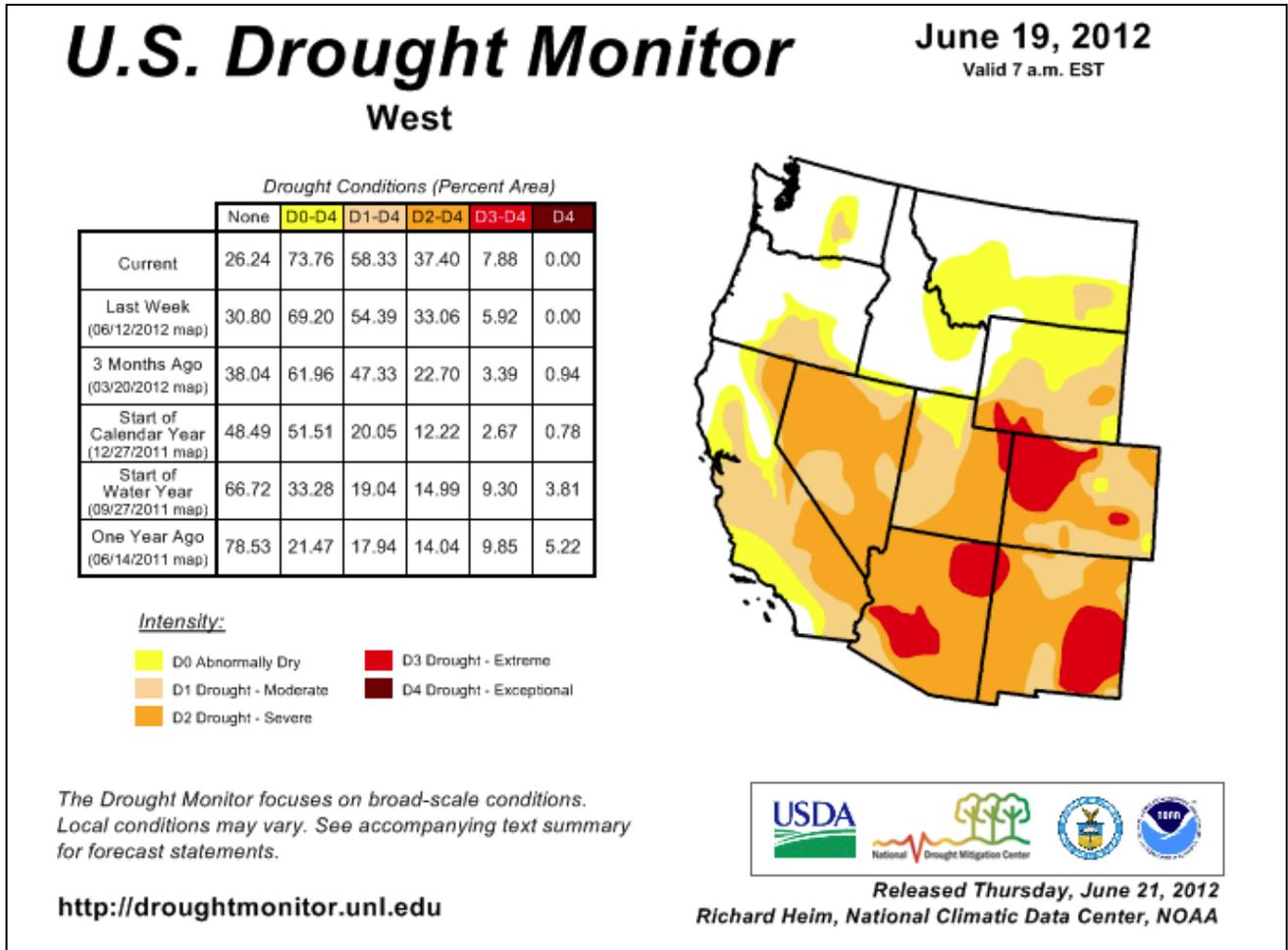


Fig. 3a: Drought Monitor for the [Western States](#) with statistics over various time periods. Note some deterioration in all categories this week (e.g. 2% increase in D3).

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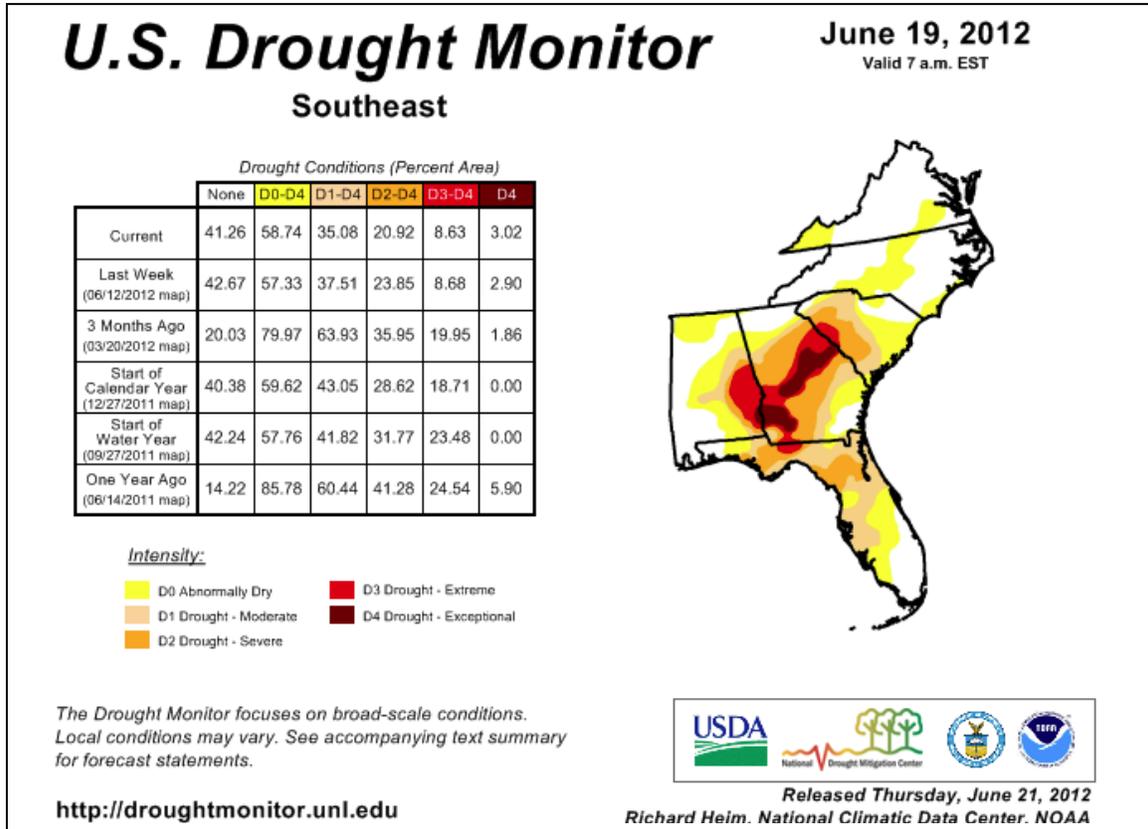


Fig. 3b: Drought Monitor for the [Southeastern States](#) with statistics over various time periods. Note slight improvement in all categories but D4 this week due to recent rains.

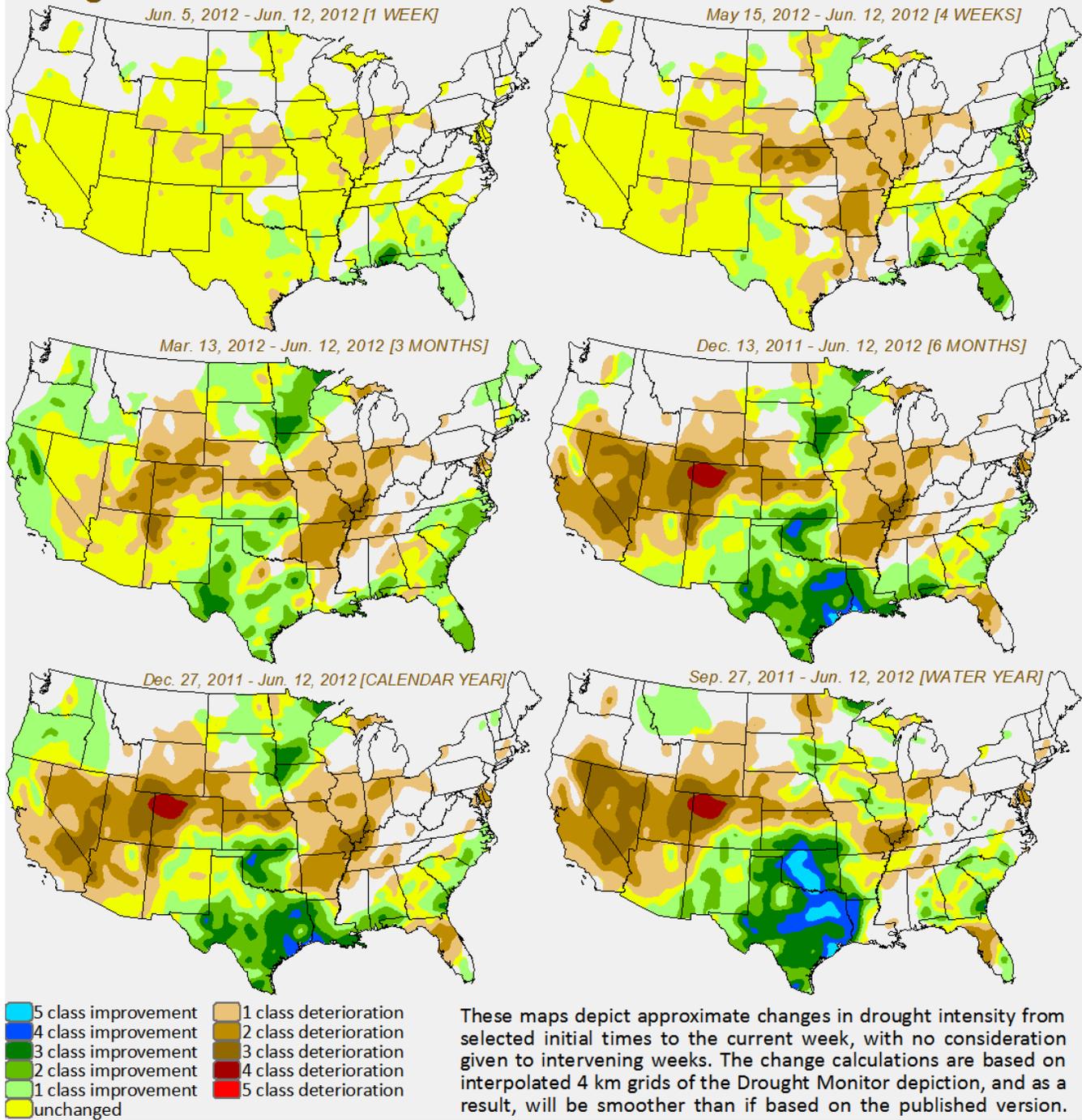
GA

According to the National Agriculture Statistics Service’s Georgia Field Office, there were 5.2 days suitable for fieldwork for the week ending Sunday, June 17, 2012. Statewide topsoil moisture was rated at 2% very short, 19% short, 67% adequate, 12% surplus. Subsoil moisture 5% very short, 31% short, 59% adequate, 5% surplus. Precipitation estimates for the state ranged from no rain up to 2.7 inches. Average high temperatures ranged from the mid 70’s to the high 80’s. Average low temperatures ranged from the high 50’s to the low 70’s.

SC

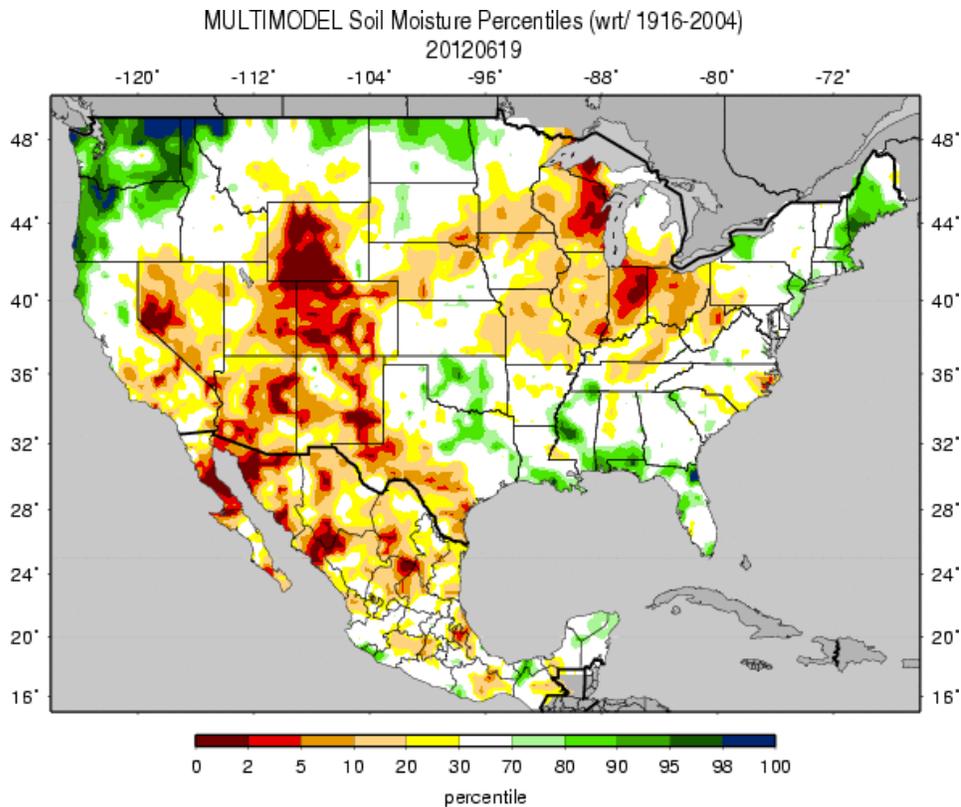
Wet weather and cooler temperatures continued during the week ending June 17, 2012. Multiple inches of rain held up field work in many parts of the State at the beginning of the week. Strong storms gave way to cooler temperatures for the weekend. Columbia averaged the coolest first two weeks in June in the past twenty years. Field crops and small grains continued to be in mostly good condition due to the cooler weather and increased rainfall. Soil moisture conditions remained consistent at 2% very short, 15% short, 76% adequate and 7% surplus. The State average rainfall for the period was 1.3 inches. The State average temperature for the period was three degrees below normal with 5.3 days suitable for fieldwork.

### Drought Monitor Classification Changes for Selected Time Periods



**Fig 3c: DM Classification Changes over various time periods show recent deterioration over much of the Mississippi River Drainage and Central Plains and improvements over Florida and the immediate Eastern Seaboard. For latest update, click link above.**

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Figs. 4: Soil Moisture ranking in [percentile](#) as of 19 June shows dryness over Indiana and the Upper Great Lakes, Central Rockies, and Western Great Basin. Conditions over Washington and northern Oregon are finally reflecting late season snow melt and recent and persistent showers.

### *Useful Hydrological Links:*

USDA western U.S. mountain snow water content anomaly map.

- USGS (U.S. Geological Service) [observed streamflow](#);
- NOAA Climate Prediction Center (CPC) modeled runoff [anomalies](#) and [percentiles](#);
- VIC (University of Washington Variable Infiltration Capacity macro scale hydrologic model) [1-](#), [2-](#), [3-](#), and [6-](#)month and [water year-to-date](#) runoff percentiles;
- NLDAS (North American Land Data Assimilation System) modeled streamflow [anomalies](#) and [percentiles](#);
- NLDAS model runoff [anomalies](#) and [percentiles](#);
- USGS groundwater observations ([real-time network](#), [climate response network](#), [total active network](#));
- USDA snow water content observations for the West (SNOTEL station [percentiles](#) and [percent of normal](#), SNOTEL basin [percent of normal](#) and [percent of average](#)) and Alaska ([SNOTEL station percent of normal](#), [SNOTEL basin percent of normal](#));
- USDA reservoir storage as [percent of capacity](#).

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## Soil Climate Analysis Network ([SCAN](#))

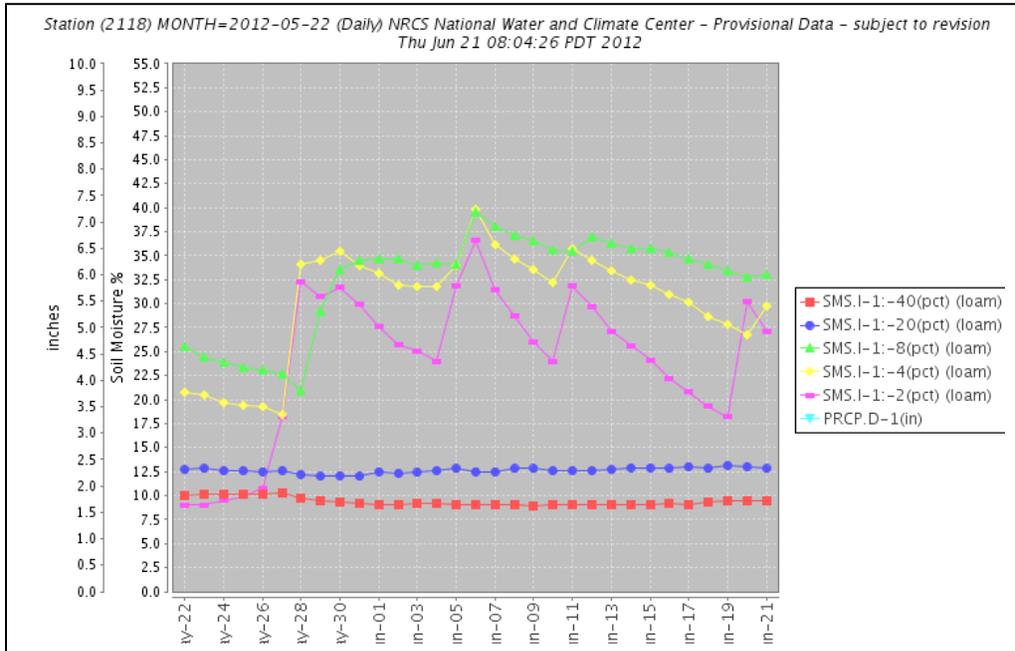


Fig. 5: This NRCS resource shows a site over [north-central Montana](#) with top soil moisture responding to recent rains.

### Useful Agriculture Links:

- USDA (U.S. Department of Agriculture) [observed soil moisture conditions, departures and percentiles](#), and comparison to [5-year average](#) and [10-year average](#);
- the Palmer [Crop Moisture Index \(CMI\)](#), which intensified during the month in the West and Lower to Mid-Mississippi Valley (weeks [1](#), [2](#), [3](#), [4](#), [5](#));
- CPC modeled soil moisture [anomalies](#) and [percentiles](#) for end of May, and [soil moisture anomaly change](#) compared to previous month;
- CPC's Leaky Bucket model [soil moisture percentiles](#);
- NLDAS modeled soil moisture percentiles for the [top soil layer](#) and [total soil layer](#);
- VIC modeled [soil moisture percentiles](#), and [soil moisture percentile change](#) compared to previous month;
- USDA observed [pasture and rangeland conditions](#);
- [Vegetation Drought Response Index \(VegDRI\)](#);
- the NOAA/NESDIS satellite-based [Vegetation Health Index \(VHI\)](#);
- the USGS agro-hydrologic model ([Soil Water Index](#), [Water Requirement Satisfaction Index](#));
- Selected [SNOTEL Sites](#) (measured 2" soil moisture depth);

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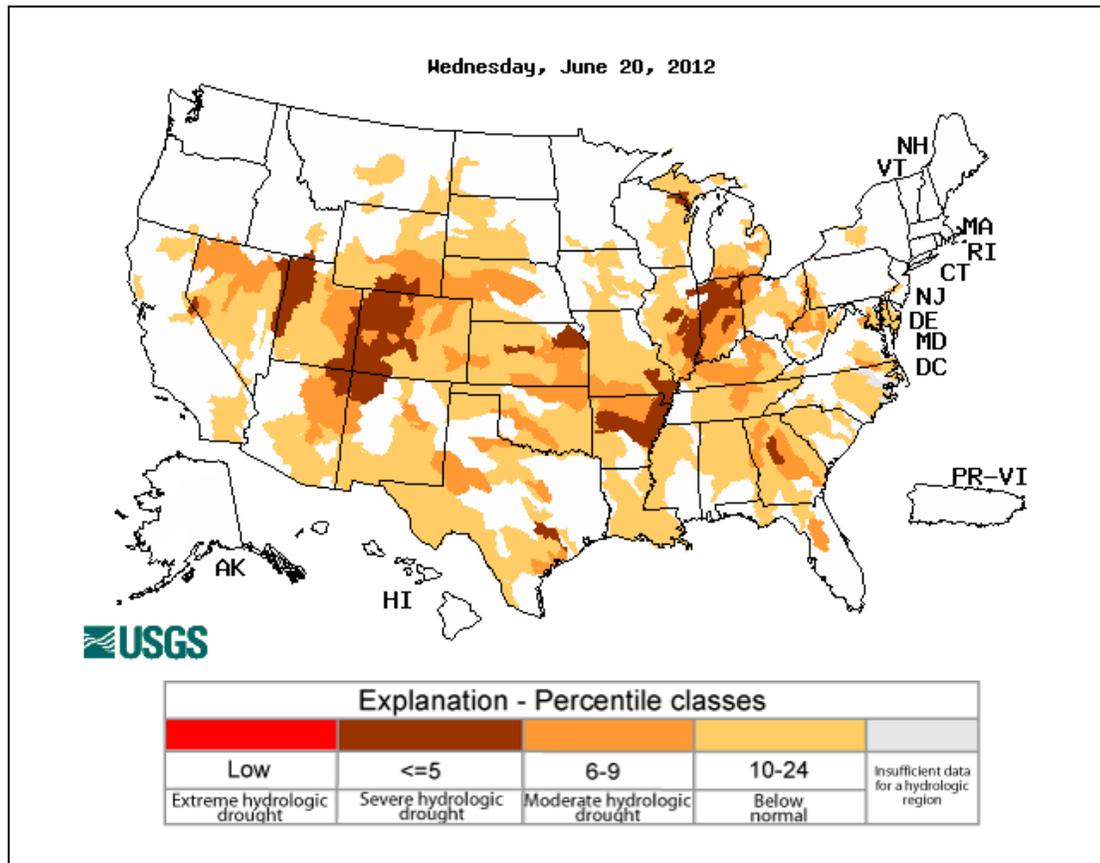


Fig. 6: Map of below normal 7-day average **streamflow** compared to historical streamflow for the day of year. **Severe** conditions are scattered from the 4-Corner States, the mid-Mississippi River and across Illinois and Indiana.

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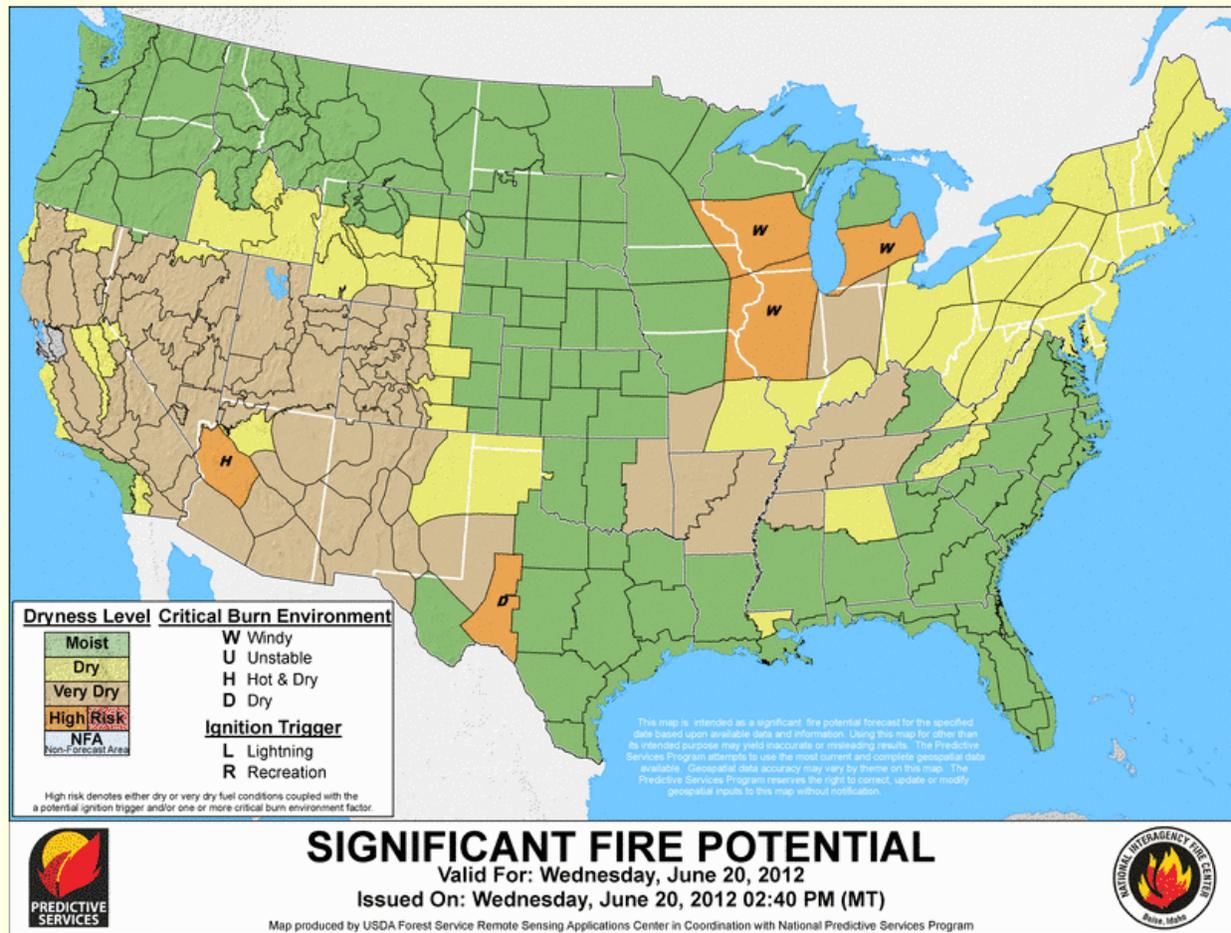


Fig. 7: **Significant fire potential** from yesterday. This resource also provides forecasts out to 7 days. Also check out: [NOAA's Fire Server](#). Risk has increased over Wyoming during the past several days. Also see: [Experimental Southwest area wildland fire smoke impact awareness page](#).

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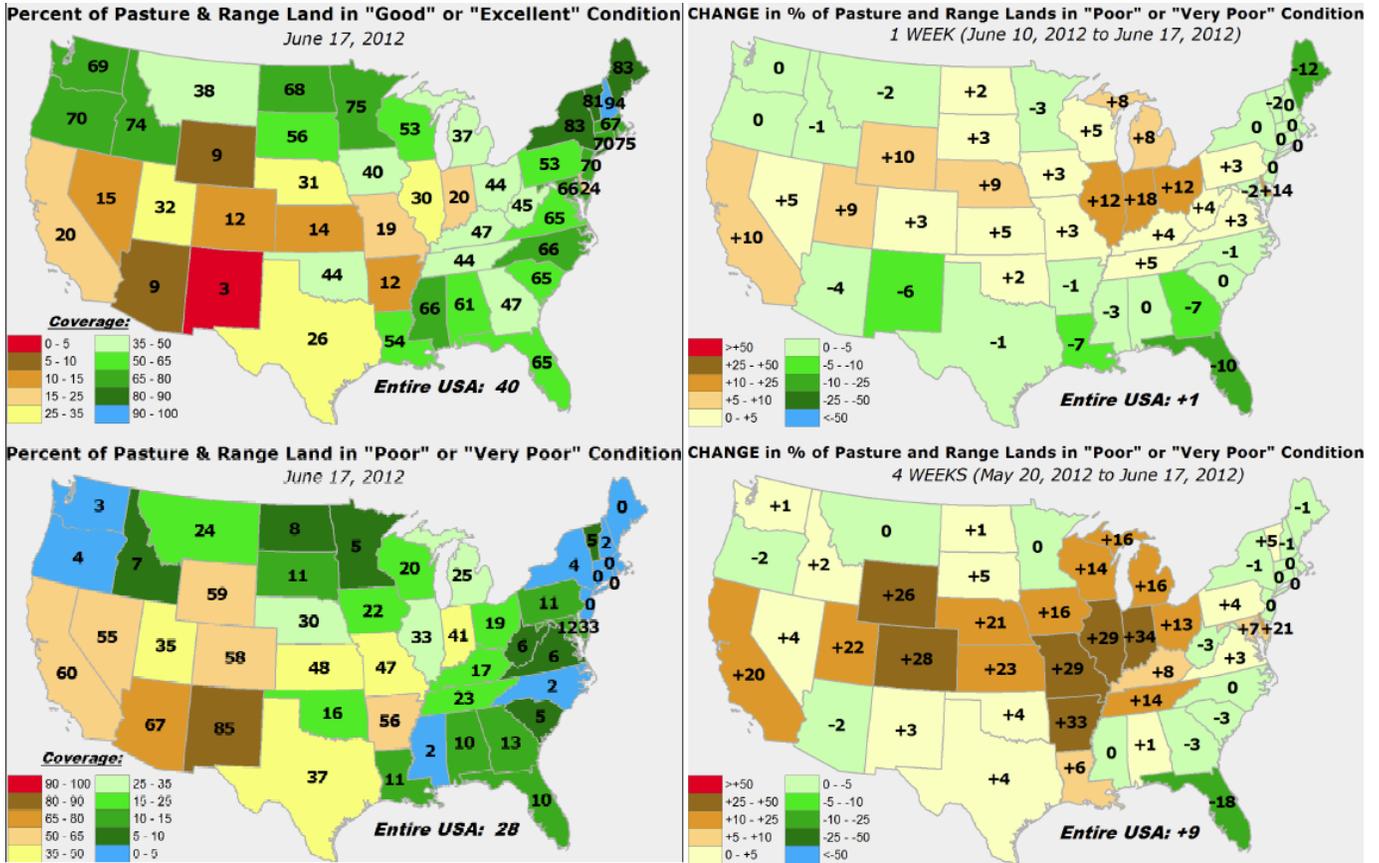


Fig. 8: Pasture and range land conditions and changes during the past week. New Mexico has the most poor or pasture or poor conditions (lower left panel) and California, Utah, and Wyoming have experienced the worst declines this week over the West (upper right panel).

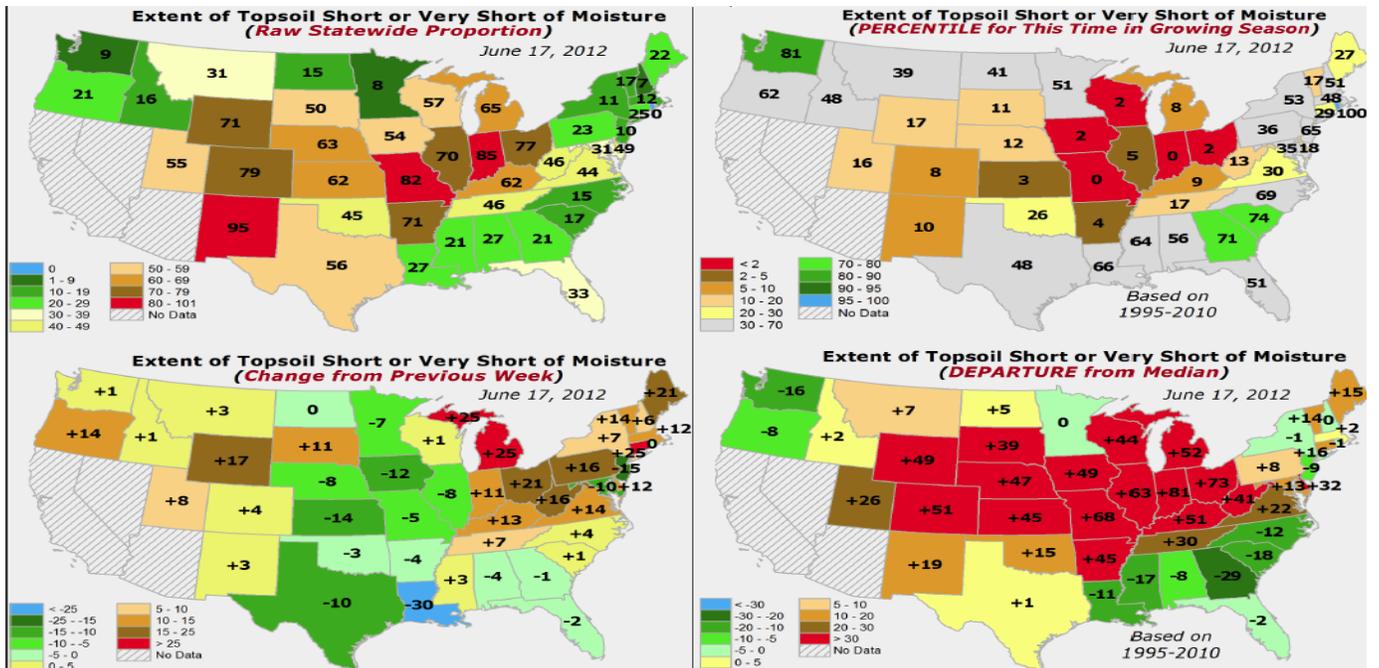


Fig. 9: Topsoil statistics shows a significant amount of dryness over the Mid-West and Central Great Plains (right panels) but has improved somewhat over the Great Plains this week (lower left panel).

## Weekly Snowpack and Drought Monitor Update Report

### National Drought Summary -- June 19, 2012

*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/>.

**Weather Summary:** Showers and thunderstorms from a cool front brought areas of rain to parts of the northern and central Plains, Midwest, and Northeast during this U.S. Drought Monitor (USDM) week. The rain provided little relief to the central Plains to Ohio Valley, where deficits over the last 6 months ranged from 4 to 10 inches and locally over 12 inches. Early in the week, the remnants of an old cool front triggered showers and thunderstorms from the southern Plains to the Southeast. Pacific fronts brushed parts of the Northwest, but the week was dry for most of the West. Temperatures averaged below normal beneath upper-level troughs in the Northwest and along the Eastern Seaboard and Gulf Coast states, while above-normal temperatures dominated from the Southwest to Great Plains and Great Lakes. It was a drier-than-normal week for much of Alaska, Hawaii, and Puerto Rico.

**The East:** Locally heavy rains (2+ inches) were enough to eliminate the D1 (moderate drought) in southern New Jersey and contract the New Jersey-Maryland-Delaware D0 (abnormally dry area) and western New York D0. The remaining D0 in eastern Pennsylvania (around Philadelphia) was reshaped to better reflect precipitation deficits.

In the Southeast, improvement was made to the depiction from northeast Florida to southwest South Carolina due to beneficial rains this week which followed the Gulf Coast deluge from last week. Rainfall surpluses for the last 90+ days resulted in generally a 1-category improvement of the D0-D2 (severe drought) across this area. D2 was contracted in east-central Florida, and D3 (extreme drought) was trimmed in eastern Alabama. But D0 was expanded in southwest Florida and west central Alabama, and D3-D4 (exceptional drought) expanded in the vicinity of Augusta, Georgia where deficits continued to grow. Augusta still suffered from its driest rolling 365-day period (June 20, 2011 to June 19, 2012) ever on record (with 25.57 inches of precipitation, or 19.16 inches below normal) and driest 2-year period (June 20, 2010 to June 19, 2012) on record (57.41 inches of precipitation, or 32.05 inches below normal).

**The Midwest:** Very dry and abnormally warm weather during spring tapped moisture reserves across the Midwest. The percentage area of Midwest states having short or very short (dry or very dry) topsoil and poor to very poor condition pastures and rangeland jumped significantly (10 to 20 points) compared to the previous week. According to June 17 reports from the U.S. Department of Agriculture (USDA), more than two-thirds of the topsoil was short or very short in Illinois (70%), Arkansas (71%), Ohio (77%) Missouri (82%), and Indiana (85%), while a third or more of the pasture and rangeland was in poor or very poor condition in Illinois (33%), Indiana (41%), Missouri (47%), and Arkansas (56%). Streams were low, ponds were shrinking, and crops were stressed across much of the area. The USDM drought depiction showed deteriorating conditions across the region. D0 expanded eastward to eastern Tennessee, western Virginia, West Virginia, Pennsylvania, and the westernmost county in Maryland, and northward further into Lower Michigan. D1 spread across most of Missouri, Illinois, and Indiana,

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expanded in Ohio, Kentucky, and Tennessee, and crept further into Iowa. D2 engulfed most of Arkansas and advanced in southern Missouri, Illinois, and Indiana, and in western Kentucky and Tennessee. Islands of D2 appeared in northern Missouri and Indiana as well as central Illinois. And an area of D3 was introduced along the confluence of the Ohio and Mississippi rivers. This week was generally drier than normal, but in the midst of this drought depiction deterioration, heavy showers and thunderstorms dropped notable amounts of rainfall in local areas. While not enough to make up for months of deficits, rainfall amounts of 2 inches or more locally held the drought expansion at bay in parts of Iowa, Missouri, Illinois, Indiana, Ohio, and Kentucky. A large area of SL impact type was introduced to reflect the combination of short-term (agricultural) and longer-term (hydrological) impacts.

Widespread heavy rains moved across the Upper Mississippi Valley, with 3 inches or more reported in southeast Minnesota and adjacent Wisconsin. D0 was pulled back here where the heaviest rains fell.

**The Plains:** Bands of heavy thunderstorms moved across southeast Nebraska to south central Kansas, northern and eastern Texas, and parts of North Dakota. In the central Plains, the 3+ inch rainfall dented the D0 in southeast Nebraska and the D2 in north central Kansas, and improved soil moisture conditions from really bad to not as bad. Half or more of the topsoil was rated short or very short in Texas (56%), Kansas (62%), and Nebraska (63%), and nearly half (48%) of the pasture and rangeland in Kansas was rated poor to very poor. But otherwise the rains simply held at bay any further deterioration. The rest of the central Plains was not as fortunate. D0-D2 expanded across the rest of Kansas to South Dakota, where dry (short to very short) topsoil jumped to half (50%) of the state. To the north, locally heavy rains eased drought conditions in part of southwest North Dakota, but the rains missed the other end of the county, so D0 and D1 expanded in Slope, Bowman, and Golden Valley counties.

In the southern Plains, the patchwork of thundershowers resulted in expansion of some D0-D2 and contraction of other D0-D3 in parts of Texas. D0-D2 expanded in Oklahoma, with D3 expanding in the Oklahoma panhandle and into southwest Kansas. The impact boundaries were also adjusted in the southern and central Plains to reflect the changing nature of hydrological and agricultural (long-term and short-term) impacts.

**The West:** Scattered showers dropped an inch or less of rain in the vicinity of Tucson, Arizona, and in the southern and central Rockies, and showers brought rainfall across Montana (mostly northern Montana) and the northern portions of the Pacific Northwest. But with essentially no rainfall for much of the West this week and large wildfires burning from California to Wyoming, changes mostly involved deterioration of the drought depiction. D0 expanded in Montana and adjacent Idaho, with D1 introduced in southeast Montana. D0-D3 expanded in Wyoming, and D1-D3 grew in Colorado and Utah. D2-D3 grew in northwest New Mexico. Growing numbers of dead livestock, drying wells, and communities without water prompted expansion of D1-D3 in Arizona. More than two-thirds of the topsoil was rated short to very short in Wyoming (71%), Colorado (79%), and New Mexico (95%), and half or more of the pasture and rangeland was rated poor or very poor in Nevada (55%), Colorado (58%), Wyoming (59%), California (60%), Arizona (67%), and New Mexico (85%). The impact boundaries were adjusted northward to reflect growing short-term and long-term impacts.

**Hawaii, Alaska and Puerto Rico:** Below-normal precipitation at time scales ranging from 7 days (this week) to the last 6 months, combined with low streamflows and the development of three large wildfires, prompted the addition of an area of D0 to northwestern Alaska. Showers

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dropped generally an inch or less of rain across the Hawaiian Islands this week, with most stations averaging below dry season normal, but no change was made to the drought depiction. The week was drier than normal across eastern and northern Puerto Rico. This pattern holds for the month to date, but streamflow was generally near to above normal, so Puerto Rico remained drought-free.

**Looking Ahead:** During the June 21-25, 2012 time period, the Pacific Northwest coast, the central Plains to western Great Lakes, the mid to northern Atlantic Seaboard, Deep South Texas, and much of Florida can expect the highest probability of precipitation. Temperatures are forecast to be above normal from the intermountain West to the Great Plains and Southeast. For June 26-July 4, below-normal precipitation is expected across most of the West, southern and central Plains, Midwest, and mid-Atlantic states, with wetter-than-normal conditions expected in the northern Plains, New England, Florida, and from monsoon showers in the Southwest. Above-normal temperatures are predicted for most of the country except the west coast early in the period and the Northeast. Wetter-than-normal conditions are expected for southern parts of Alaska, warmer-than-normal for the northeast, and cooler-than-normal for the southern and western coastal areas.

**Author:** [Richard Heim, National Climatic Data Center, 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

S ... Short-Term, typically <6 months (e.g. agricultural, grasslands)

L ... Long-Term, typically >6 months (e.g. hydrology, ecology)

*Updated June 20, 2012*

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**[The latest NOAA Climate Prediction Center Seasonal Forecast has been released today.](#)**

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### ***Special Report from the NWSFO ABQ: Forecasting the 2012 Southwest Monsoon***

The bulleted items below have been coordinated among various offices and research entities, and were compiled by Deirdre Kann.

- Precipitation deficits in NM are large enough such that even with normal to just above normal summer precipitation, drought conditions are likely to persist.

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- While cool season precipitation is fairly well correlated with the ENSO signal, there is no relationship between ENSO signal in preceding winter and summer monsoon precipitation in NM Climate Divisions 4, 5, 6 and 8. In fact, for the 14 La Niña or near La Niña winters since 1994, Jul-Sep average precip for CDs 4, 5, 6, and 8 was in the lowest tercile 4 times, near normal 5 times and in the highest tercile 4 times. (A relationship does exist in portions of Mexico.)
- Variability is high, with the dry/wet extremes (since 1950) both occurring in the last decade: average precip for CDs 4, 5, 6, and 8 ranges from 3.13 (2003) to 11.78 (2006)
- A lack of snow cover in the southern Rockies may promote an early development of the Southwestern heat low, which could bring monsoon rains as early as June, but this relationship was stronger prior to the year 2000. Additionally, some forecast tools indicate a below average monsoon signal, particularly in eastern locations.
- NAME forecasts vary, but seem to hint normal to above normal - with all results available here:

[http://www.cpc.ncep.noaa.gov/products/Global\\_Monsoons/American\\_Monsoons/NAME/precip\\_maps.shtml](http://www.cpc.ncep.noaa.gov/products/Global_Monsoons/American_Monsoons/NAME/precip_maps.shtml)

- The CFS seems to be forecasting a rather nondescript monsoon with near normal precip for the JJAS period:

[http://www.cpc.ncep.noaa.gov/products/Global\\_Monsoons/American\\_Monsoons/NAME/Figures/CFS.JJAS12.big.IC4.gif](http://www.cpc.ncep.noaa.gov/products/Global_Monsoons/American_Monsoons/NAME/Figures/CFS.JJAS12.big.IC4.gif)

- The NASA model would appear more bullish with regard to precip.

[http://www.cpc.ncep.noaa.gov/products/Global\\_Monsoons/American\\_Monsoons/NAME/Figures/NASA.JJAS12.big.IC4.gif](http://www.cpc.ncep.noaa.gov/products/Global_Monsoons/American_Monsoons/NAME/Figures/NASA.JJAS12.big.IC4.gif)

- An MJO event seems to be possible - that could affect precipitation in southern CA, AZ and NM, However, the signal seems to be stronger in Arizona (Lorenz and Hartman 2006)