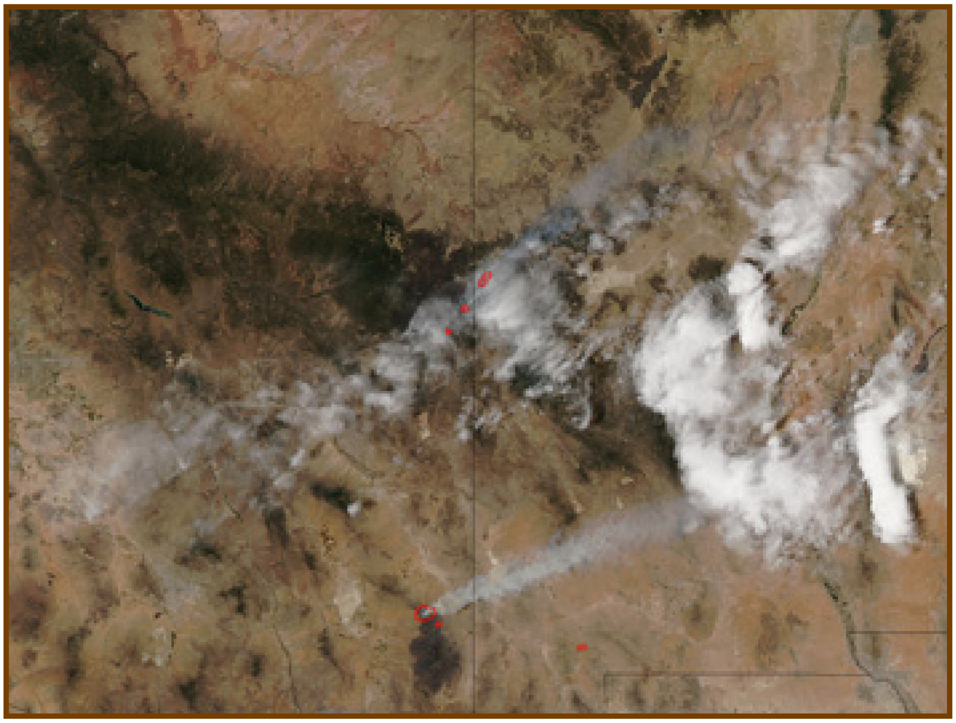
June 21, 2011

Southwest Climate Outlook

Vol. 10 Issue 6



Source: NASA

The Wallow Fire, located near Springerville, Arizona, in the White Mountains, has become the largest fire in Arizona history. It had burned more than 520,000 acres as of June 20. Other fires also are raging in the Southwest, including the Horseshoe Two, which is charing the parched landscape in the Chiricahua National Monument (visible at the bottom of the image). Image taken on June 8 and courtesy of NASA.

Would you like to have your favorite photograph featured on the cover of the Southwest Climate Outlook? For consideration send a photo representing Southwest climate and a detailed caption to: zguido@email.arizona.edu

In this issue...

As fires rage and drought intensifies and spreads in Arizona and New Mexico, questions about the monsoon are on everyone's mind. Will the monsoon deliver copious rains like it did in 2006, or will it fizzle like it did in 2008?

As of June 14, about 94 percent of New Mexico was classified with moderate drought or a more severe drought category and another 6 percent was labeled as abnormally dry. About half of the state is classified with exceptional drought, the most extreme drought category...

Wildfires have been engulfing areas of the Southwest in recent months. Through June 14, more than 1,400 wildfires had burned about 1.4 million acres in Arizona and New Mexico, according to Predictive Services at the Southwest Coordination Center.

June Climate Summary

Drought– Drought conditions intensified across southeast Arizona and much of New Mexico over the past 30 days, with extreme and exceptional drought now covering much of these areas.

Temperature–In the last month temperatures in Arizona mostly have been between 2 and 6 degrees F cooler than average, while the eastern half of New Mexico has been 2 to 6 degrees F warmer than average.

Precipitation– Scant rainfall during May meant no reprieve from dry conditions in New Mexico and southern Arizona, where southwestern drought conditions are most severe.

ENSO– Near-average sea surface temperatures across the equatorial Pacific Ocean were present again this month, providing further evidence that ENSO-neutral conditions have returned. Forecasts indicate a high probability that neutral conditions will persist through the end of 2011.

Climate Forecasts– The July–September monsoon precipitation forecast is equal chances for above-, below-, and near-average rainfall, while forecasts call for increased chances for above-average temperatures during this period.

The Bottom Line– Impacts from a dry winter are often not felt until spring. This year the point has been hammered home, as widespread and exceptional drought conditions have combined with strong winds to fan fires across the region. Both Arizona and New Mexico have set records for the most acres burned in those states, with more than 750,000 acres charred in Arizona and another 630,000 in New Mexico as of June 17. Above-normal significant fire potential is forecasted to continue across most of the Southwest through July. Monsoon storms likely will quell fire risk and improve drought conditions, but some indicators hint at a late arrival—the monsoon typically arrives in the first week of July for southern Arizona and New Mexico. Seasonal forecasts for the entire monsoon period, however, do not indicate if total rainfall will be above, below, or near average.

Comparing Arizona's Largest Fires

Arizona's largest fire is no longer the Rodeo-Chediski, which consumed about 468,000 acres in 2002. The Wallow Fire, which began May 29, has charred more than 495,000 acres as of June 17. How have these two fires compared?

When the Rodeo-Chediski flames first erupted in east-central Arizona, an extreme drought gripped the landscape and was downgraded to an exceptional drought during the fire, according to the U.S. Drought Monitor. On the eve of the Wallow Fire, drought conditions were severe to extreme, and the magnitude and duration of dry conditions were less severe than they were on the eve of the 2002 blaze. Windy conditions have played a large role in advancing the Wallow Fire, while Rodeo-Chediski spread during periods of low wind; the latter spread vigorously in large part because of very dry fuels. The Rodeo-Chediski Fire was also considerably more destructive to property, consuming about 400 homes in Pinedale and other small communities. By June 17, the Wallow Fire has destroyed 32 homes, four commercial buildings, and 34 other structures.

This year will go down in the record books as the most severe fire season for both Arizona and New Mexico since 1990, when fire record-keeping began. As of June 14, 757,076 acres had burned in Arizona, while 631,272 acres had been blackened in New Mexico.

Table of Contents:

SWCO Staff:

Mike Crimmins,
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This work is published by the Climate Assessment for the Southwest (CLIMAS) project, the University of Arizona Cooperative Extension, and the Arizona State Climate Office.

Forecasting the Monsoon: What to Expect (or not) this Summer

By Zack Guido

As fires rage and drought intensifies and spreads in Arizona and New Mexico, questions about the monsoon are on everyone's mind. Will the monsoon deliver copious rains like it did in 2006, or will it fizzle like it did in 2008? And when will it arrive this year?

The answer to all of the above? We'll have to wait and see, because the monsoon forecast isn't the crystal ball we'd like it to be.

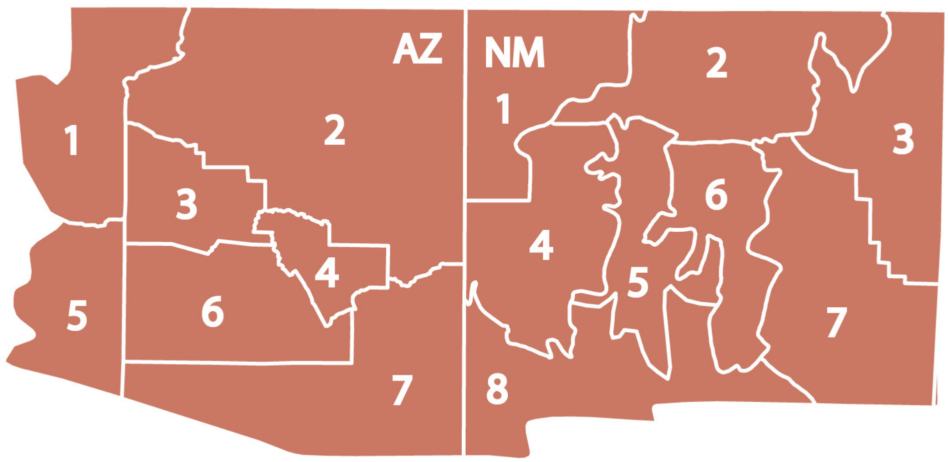
Forecasting when the raucous rain will come—let alone how much rainfall will occur over the season—is hard, plain and simple. In recent years, however, forecast models have shown some accuracy in projecting the onset, especially when strong climate signals, such as very warm or cold sea surface temperatures (SSTs), occur in the tropical Pacific Ocean, Gulf of California, and Atlantic Ocean. When these signals are weak, it's a three-way tie for early, late or on time.

On average, the monsoon season starts in early July for southern parts of Arizona and New Mexico, and later in areas to the north. Recently, the National Weather Service adopted a static start and end date to the monsoon season–June 15 and September 30—to simplify communicating the onset of monsoon hazards, such as floods.

Forecasts for the total seasonal precipitation of the Southwest monsoon, however, generally have not been accurate.

Predicting summer rain is hard, said Dave Gochis, scientist at the University Center for Atmospheric Research in Boulder, CO, and the North American Monsoon Experiment (NAME). NAME is an international scientific effort established in 2004 to observe and understand the key components of the North American monsoon system to improve forecasting. Predicting the monsoon is difficult in

Monsoon Rainfall Statistics, July–September 1895–2010



Climate Division	Monsoon Average (inches)	Monsoon Percent of Annual Total	Minimum (inches)	Maximum (inches)
AZ1–Northwest	3.12	32	0.59	9.80
AZ2–Northeast	4.83	38	1.99	8.60
AZ3–North Central	5.70	37	2.47	11.58
AZ4–East Central	6.90	35	3.25	11.94
AZ5–Southwest	1.82	36	0.45	6.54
AZ6–South Central	3.66	36	1.03	7.70
AZ7–Southeast	6.99	51	3.55	10.80
NM1–NW Plateau	4.45	41	1.73	9.09
NM2–Northern Mtns	7.19	41	3.95	11.76
NM3–NE Plains	6.94	45	2.77	14.09
NM4–SW Mtns	7.28	50	3.54	11.70
NM5–Central Valley	5.28	50	2.30	10.36
NM6–Central Highlands	7.76	49	3.97	14.23
NM7–SE Plains	6.36	47	2.17	13.44
NM8–Southern Desert	5.72	52	2.53	11.66

Figure 1. Monsoon rainfall in Arizona during July-September is, on average, highest in the southeast part of the region and diminishes to the north. In New Mexico, monsoon rainfall is less variable spatially, and the southern half of the state receives about 50 percent of its yearly precipitation during these three months. The data source is PRISM and accessed through the online web tool WestMap.

continued on page 4

Forecasting the Monsoon, continued

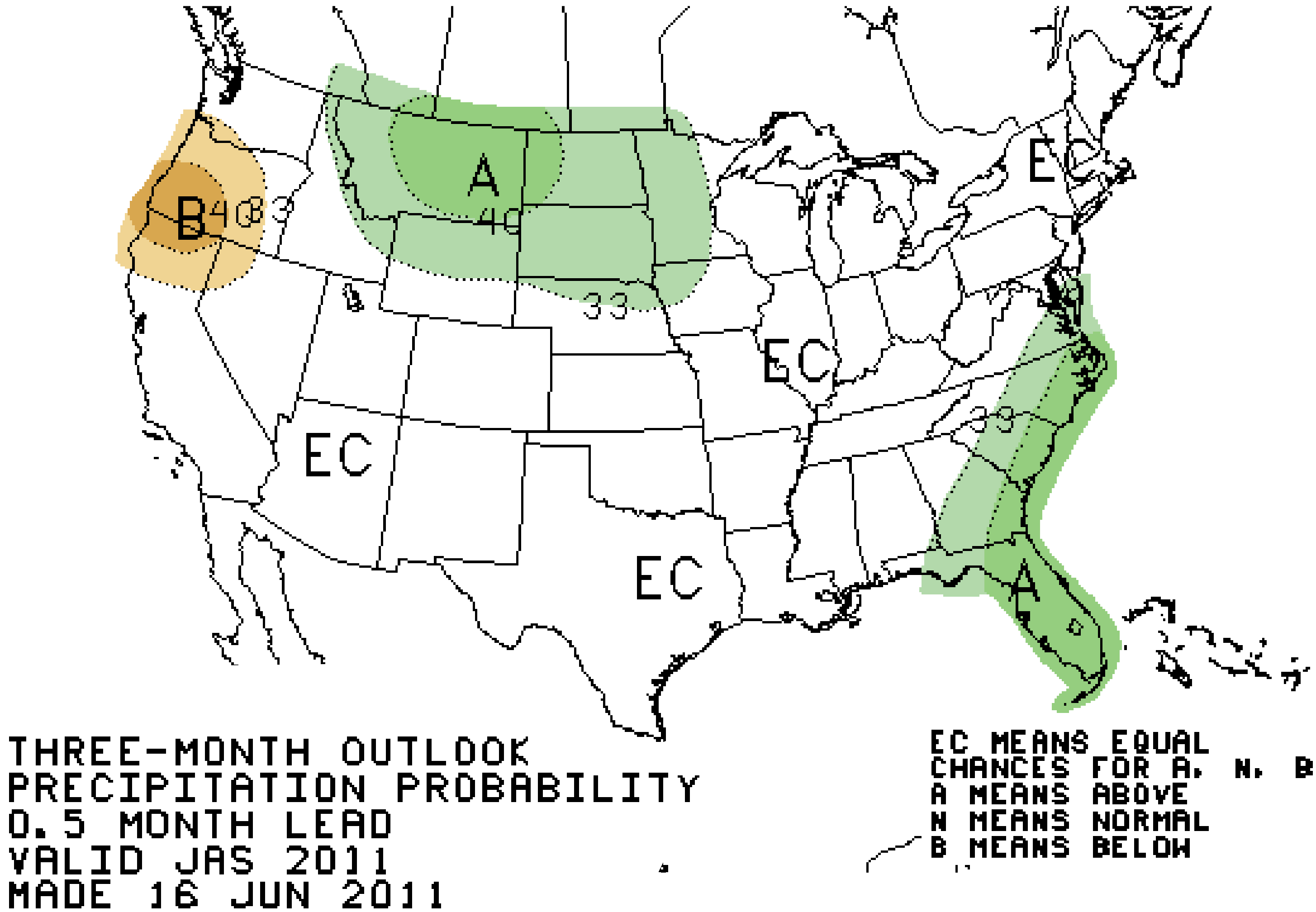


Figure 2. The NOAA-Climate Prediction Center forecasted on May 19 an equal chance that July-September rainfall will be above, below, or near average.

part because Arizona and New Mexico lie on the northern fringes of the monsoon region and are therefore influenced by many climate and weather processes: the position of the monsoon ridge, the rate at which the landscape heats up in the spring and summer, the amount of snowfall in the preceding winter, and SSTs in the tropical and north Pacific Ocean. All these factors add uncertainty to the forecasts.

"Being on the northern periphery of the monsoon region causes the monsoon to be unique every year," said Mike Crimmins, climate science extension specialist at the University of Arizona. "If you were in central Mexico, the heart of the monsoon region, you would expect it to deliver each year. But here [in the U.S. Southwest], there are additional variables that either enhance or suppress the monsoon, which causes high variability in our region."

Generally, southeast Arizona and southern New Mexico receive the most rainfall, with average summer precipitation declining to the north (*Figure 1*).

Additional questions arise related to a nascent scientific understanding of convection dynamics and the role of vegetation in recycling water back to the atmosphere through evapotranspiration. Both are important components of the monsoon but cannot be fully represented in most computer models due to the models' large spatial resolution (typically a 50-km by 50-km grid). That size effectively flattens the high elevations of relatively small mountain ranges that play a key role in initiating monsoon storms, rendering the results of computer simulations likely less reliable than if models incorporated realistic topography.

The general onset data and total precipitation of this monsoon season is proving particularly difficult to forecast. "Predictability [of the onset this year] is not what it has been in recent years because of mixed signals," Gochis said.

continued on page 5

Forecasting the Monsoon, continued

To issue forecasts, experts at the National Oceanic and Atmospheric Administration's Climate Prediction Center (CPC) mine 41 different analysis tools, from global climate models that incorporate atmospheric physics to statistical trends. The monsoon outlook, then, is a blend of science and expert judgment.

This summer, some tools point to wetter conditions and others to drier. As a result, the official U.S. seasonal climate outlooks issued by the CPC call for equal chances of above-, below-, or near-average rainfall for the monsoon season (*Figure 2*).

The primary basis for this forecast is that the moderate to strong La Niña event that delivered dry conditions this winter waned rapidly this spring and SSTs in the tropical Pacific are now near average. Meanwhile, SSTs in the Atlantic Ocean and Gulf of California are above average, but only slightly so. As a result, no strong climate signals have emerged to nudge the model one way or the other.

In addition, a heavy snowpack has blanketed the Rocky Mountains, which tends to help delay the onset of the monsoon, while a drought has gripped Texas and the Southwest, favoring an earlier onset.

The ambiguous signals make it difficult to forecast wet or dry, said David Unger, meteorologist at the CPC. Seasonal forecasts are also conservative because climatologists want to avoid false predictions.

Several other forecasts warrant mentioning. The experimental forecasts produced by NAME suggest a late onset and below-average rainfall. (Again, note that forecasts for total precipitation during the monsoon season have not been accurate).

"We haven't seen a forecast in four years since we started [these experimental forecasts] that has been this dismal," Gochis said.

Conversely, a forecast issued by Art Douglass, professor and chair of the department of atmospheric sciences at Creighton University in Nebraska, suggests that the monsoon will be above average for June through August. Douglass's approach does not rely on forecast models. Rather, he analyzes 15 different phenomena that influence the monsoon in the Southwest and selects past years that have similar climate conditions as this year. This analog year approach uses the past as a guide for the current season.

While it's unclear when the monsoon will arrive and whether it will deliver on rainfall totals, one thing is completely clear. The region is hanging its hopes on the rains to douse the wildfire flames and quench a thirsty landscape.

Temperature (through 6/15/11)

Data Source: High Plains Regional Climate Center

Temperatures since the water year began on October 1 have averaged between 60 and 70 degrees Fahrenheit in the southwest deserts and along the Arizona-California border, 50 and 60 degrees F in southeastern Arizona and along the New Mexico-Mexico border, 40 and 50 degrees F in central and northeastern New Mexico, and 40 and 50 degrees F across the Colorado Plateau and the northwestern quarter of New Mexico (*Figure 1a*). The highest elevations have seen temperature averages between 30 and 40 degrees F. These temperatures are about 5 degrees warmer than last month, with late spring finally reaching near-average temperatures. Temperatures are within 1 degree F of average across Arizona and northwestern New Mexico, while the eastern two-thirds of New Mexico has been up to 4 degrees warmer than average. The warmest spots are Otero County in New Mexico and Gila County in Arizona. The coolest areas are southwestern New Mexico and northwestern and northeastern Arizona (*Figure 1b*). The cold area in west-central Arizona is due to a station move rather than a temperature trend.

Temperatures during the past 30 days have been cooler to the west (*Figures 1c–d*). Western New Mexico has ranged from 0 to 4 degrees cooler than average, while the eastern two-thirds of New Mexico has been 0–6 degrees warmer than average (*Figures 1c–d*).

Figure 1a. Water year '10–'11 (October 1 through June 15) average temperature.

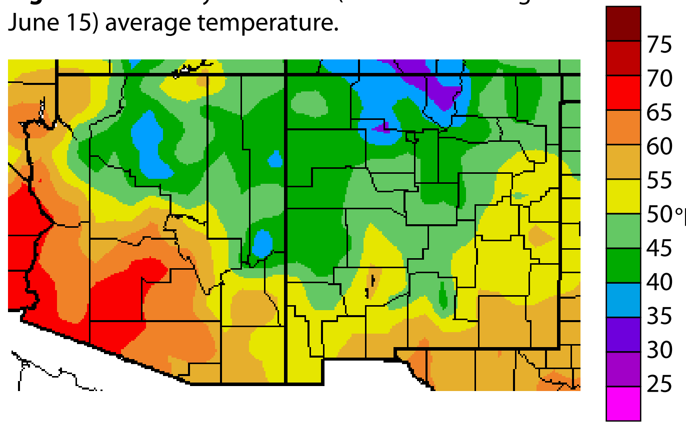


Figure 1b. Water year '10–'11 (October 1 through June 15) departure from average temperature.

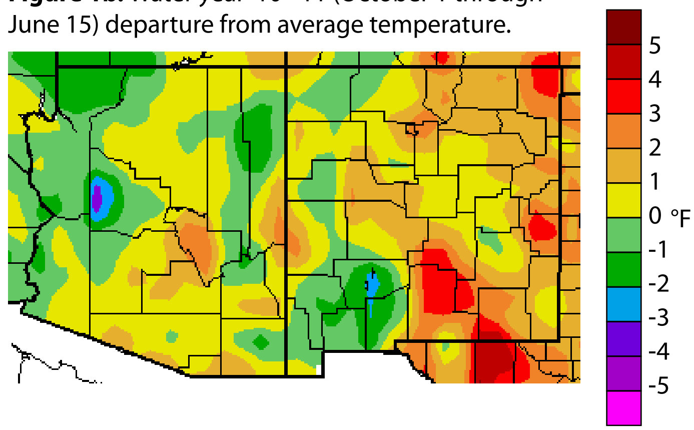


Figure 1c. Previous 30 days (May 17–June 15) departure from average temperature (interpolated).

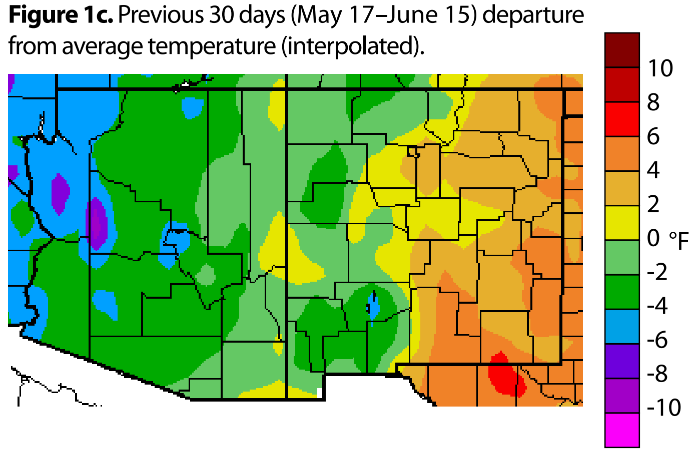
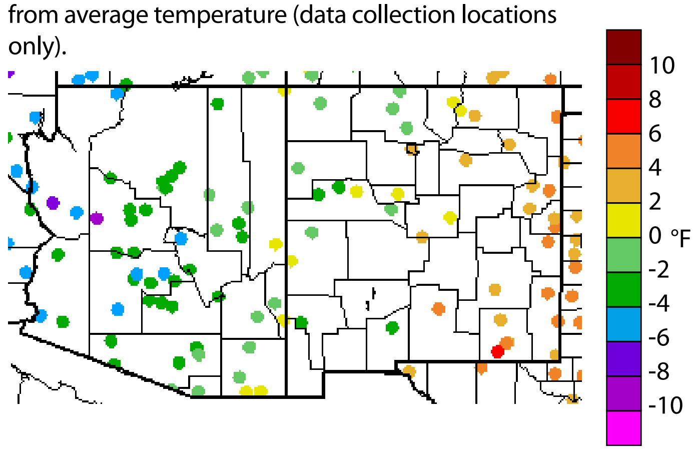


Figure 1d. Previous 30 days (May 17–June 15) departure from average temperature (data collection locations only).



Notes:

The water year begins on October 1 and ends on September 30 of the following year. Water year is more commonly used in association with precipitation; water year temperature can be used to measure the temperatures associated with the hydrological activity during the water year.

Average refers to the arithmetic mean of annual data from 1971–2000. Departure from average temperature is calculated by subtracting current data from the average. The result can be positive or negative.

The continuous color maps (Figures 1a, 1b, 1c) are derived by taking measurements at individual meteorological stations and mathematically interpolating (estimating) values between known data points. The dots in Figure 1d show data values for individual stations. Interpolation procedures can cause aberrant values in data-sparse regions.

These are experimental products from the High Plains Regional Climate Center.

On the Web:

For these and other temperature maps, visit
http://www.hprcc.unl.edu/maps/current/

For information on temperature and precipitation trends, visit
http://www.cpc.ncep.noaa.gov/trndtext.shtml

Precipitation (through 6/15/11)

Data Source: High Plains Regional Climate Center

Since the water year began on October 1, precipitation has ranged from 200 percent of average in the northwest corner of Arizona to less than 5 percent of average in parts of southeastern Arizona and southern New Mexico (*Figures 2a–b*). Only the northwest quarter of Arizona has received near-average precipitation so far during the 2011 water year. Central Arizona and northwestern New Mexico have received 50–90 percent of average, the southern counties of Arizona had less than 50 percent of average, and the southern counties of New Mexico, along with Cochise and southern Graham and Greenlee counties in Arizona, have seen less than 25 percent of average precipitation. The dry conditions have followed the typical impacts of a La Niña event, with the heavy precipitation falling north and west of Arizona and New Mexico.

The last 30 days have brought no moisture to the southern counties of Arizona and most of the counties in New Mexico. Two storms in May brought some relief to northern Arizona across Coconino, southern Mohave, northern Navajo, and Apache counties, and San Juan County in northwest New Mexico (*Figures 2c–d*). Some precipitation also fell in southern Navajo County, but it was insufficient to reduce the fire potential or improve the soil moisture. The dry conditions have worsened the drought and wildfire situation in Arizona and New Mexico. The dryness extends south into Mexico, where signs of the monsoon are virtually non-existent at this time.

Notes:

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2010, we are in the 2011 water year. The water year is a more hydrologically sound measure of climate and hydrological activity than is the standard calendar year.

Average refers to the arithmetic mean of annual data from 1971–2000. Percent of average precipitation is calculated by taking the ratio of current to average precipitation and multiplying by 100.

The continuous color maps (Figures 2a, 2c) are derived by taking measurements at individual meteorological stations and mathematically interpolating (estimating) values between known data points. Interpolation procedures can cause aberrant values in data-sparse regions.

The dots in Figures 2b and 2d show data values for individual meteorological stations.

On the Web:

For these and other precipitation maps, visit
http://www.hprcc.unl.edu/maps/current/

For National Climatic Data Center monthly precipitation and drought reports for Arizona, New Mexico, and the Southwest region, visit
http://lwf.ncdc.noaa.gov/oa/climate/research/2003/perspectives.html#monthly

Figure 2a. Water year '10–'11 (October 1 through June 15) percent of average precipitation (interpolated).

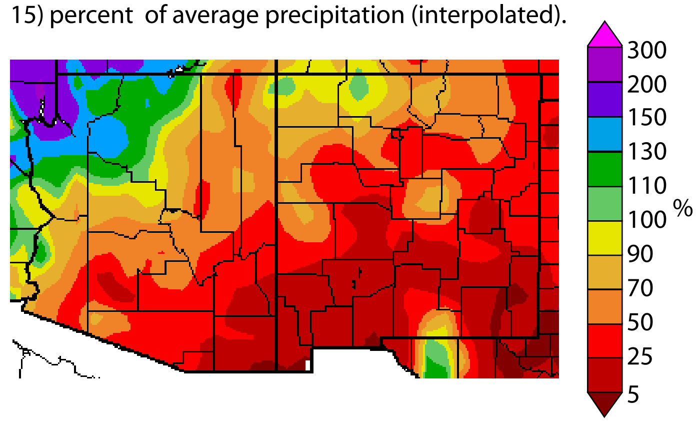


Figure 2b. Water year '10–'11 (October 1 through June 15) percent of average precipitation (data collection locations only).

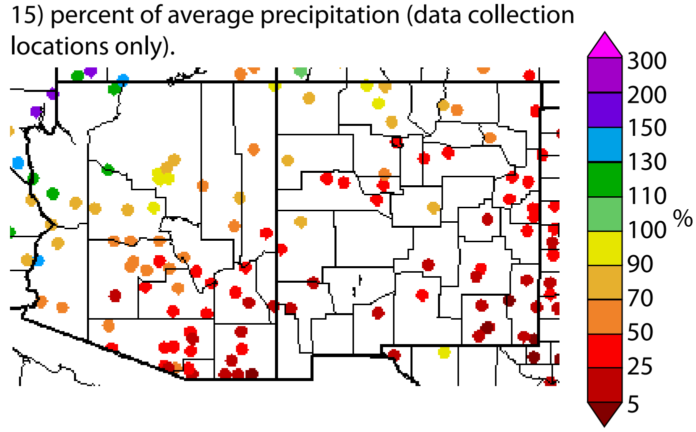


Figure 2c. Previous 30 days (May 17–June 15) percent of average precipitation (interpolated).

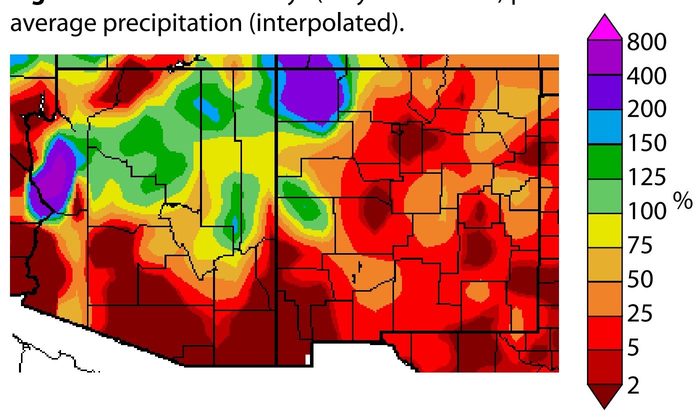
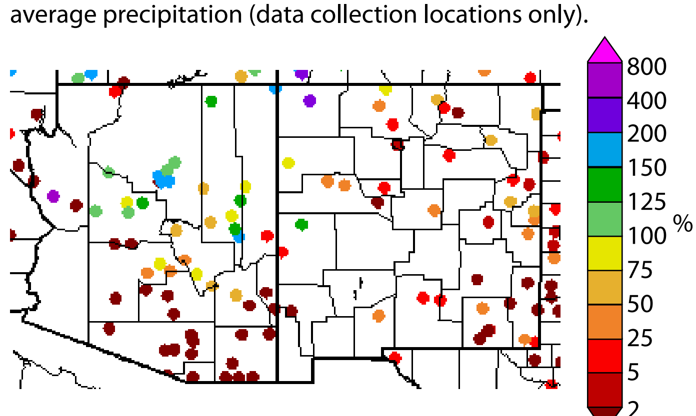


Figure 2d. Previous 30 days (May 17–June 15 percent of average precipitation (data collection locations only).



U.S. Drought Monitor (data through 6/14/11)

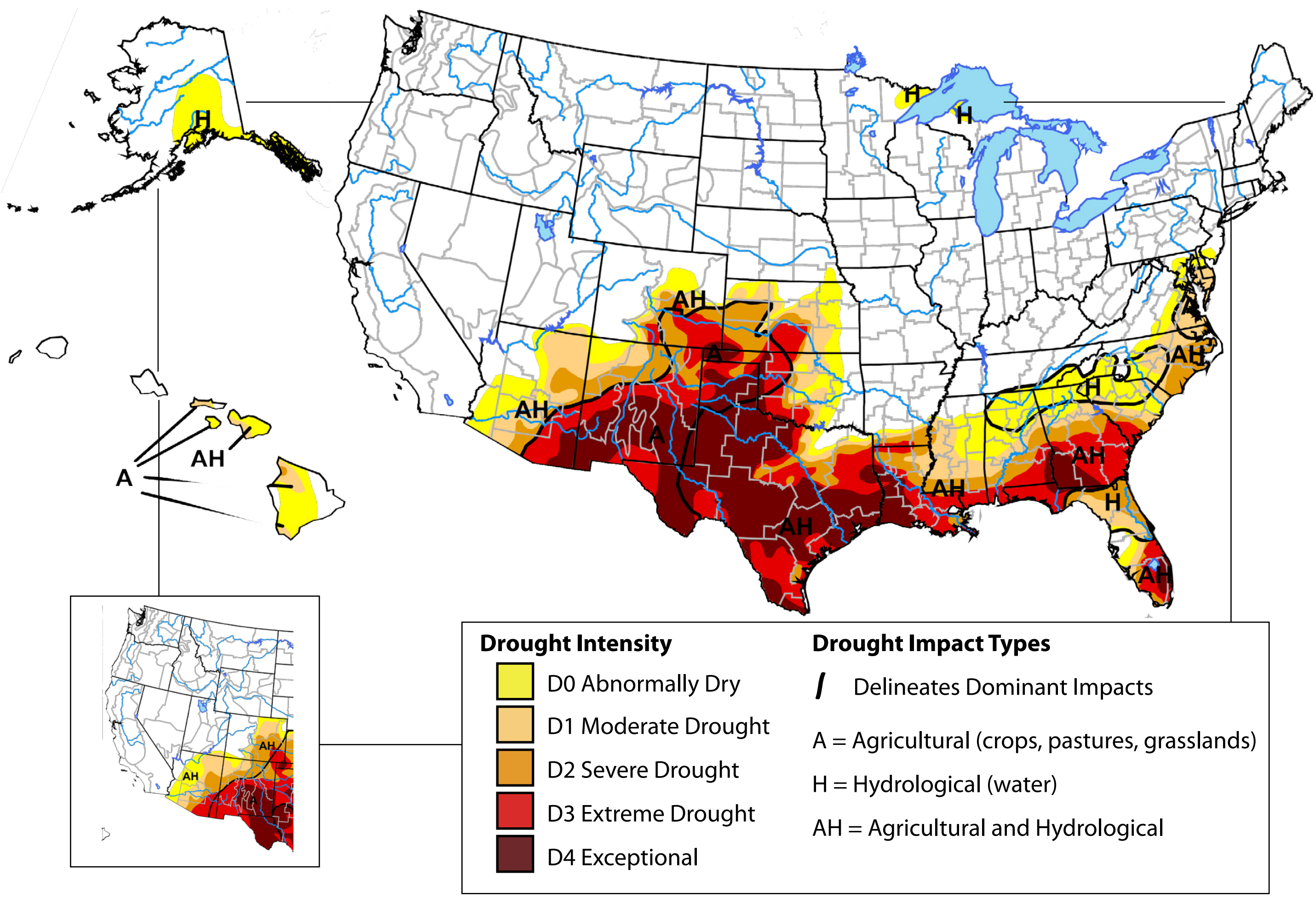
Data Sources: U.S. Department of Agriculture, National Drought Mitigation Center, National Oceanic and Atmospheric Administration

Few changes have occurred in drought conditions across the western U.S. during the past 30 days (*Figure 3*). Most of the West is experiencing wet and drought-free conditions, including parts of California and the Rockies in Montana, which have received more than 200 percent of average precipitation since late May. The Southwest including Texas, on the other hand, is mired in drought. In the past month, conditions have worsened across large parts of New Mexico, Arizona, and Colorado. Fire restrictions are in place across the Southwest and have reached up into southeastern Colorado due to the increasing drought conditions. Impacts to agriculture, including crops, pastures, and grasslands, as well as impacts to water resources are likely affecting most of New Mexico and parts of southern Arizona.

Notes:

The U.S. Drought Monitor is released weekly (every Thursday) and represents data collected through the previous Tuesday. The inset (lower left) shows the western United States from the previous month's map. The U.S. Drought Monitor maps are based on expert assessment of variables including (but not limited to) the Palmer Drought Severity Index, soil moisture, streamflow, precipitation, and measures of vegetation stress, as well as reports of drought impacts. It is a joint effort of several agencies; the author of this monitor is Brian Fuchs, National Drought Mitigation Center.

Figure 3. Drought Monitor data through June 14, 2011 (full size), and May 17, 2011 (inset, lower left).



On the Web:

The best way to monitor drought trends is to pay a weekly visit to the U.S. Drought Monitor website http://www.drought.gov/portal/server.pt/community/current_drought/208

Arizona Drought Status

(data through 6/14/11)

Data Source: U.S. Drought Monitor

While drought retreated across the northwest corner of the state in the last month, it intensified in southeastern portions (*Figure 4a*). As of June 14, about 56 percent of the state was observing some level of drought, and anther 21 percent was classified with abnormally dry conditions (*Figure 4b*). One month ago, about 58 percent of the state had some level of drought and another 28 percent was abnormally dry. Exceptional drought, the highest drought category and one that is defined as a drought that happens, on average, once in every 50 years, covers much of Cochise County and southern parts of Graham and Greenlee counties.

Drought impacts from across southeast Arizona reported through Arizona DroughtWatch indicate the severity of the situation. Reports include extremely stressed native vegetation, poor range conditions, and limited or absent surface water in springs, streams, and stock ponds. Also, the high fire danger has compelled authorities to close the Coronado National Forests in Southern Arizona to visitors until the monsoon rains moisten the landscape.

Read more impacts at: http://azdroughtwatch.org.

Figure 4a. Arizona drought map based on data through June 14, 2011.

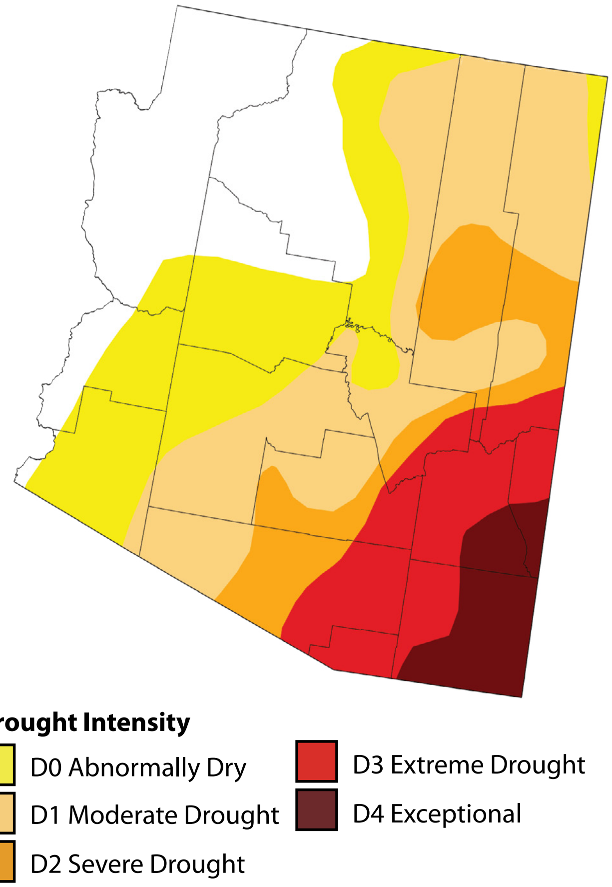


Figure 4b. Percent of Arizona designated with drought conditions based on data through June 14, 2011.

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	22.51	77.49	56.26	28.69	18.27	5.62
Last Week (06/07/2011 map)	22.51	77.49	56.26	28.69	18.34	0.96
3 Months Ago (03/15/2011 map)	28.64	71.36	40.88	12.59	5.96	0.00
Start of Calendar Year (12/28/2010 map)	31.40	68.60	32.45	0.00	0.00	0.00
Start of Water Year (09/28/2010 map)	40.00	60.00	18.58	3.23	0.00	0.00
One Year Ago (06/08/2010 map)	63.87	36.13	14.43	2.66	0.00	0.00

Notes:

The Arizona section of the U.S. Drought Monitor is released weekly (every Thursday) and represents data collected through the previous Tuesday. The maps are based on expert assessment of variables including (but not limited to) the Palmer Drought Severity Index, soil moisture, streamflow, precipitation, and measures of vegetation stress, as well as reports of drought impacts. It is a joint effort of several agencies.

On the Web:

For the most current drought status map, visit http://www.drought.unl.edu/dm/DM_state.htm?AZ,W

For monthly short-term and quarterly long-term Arizona drought status maps, visit http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/DroughtStatus.htm

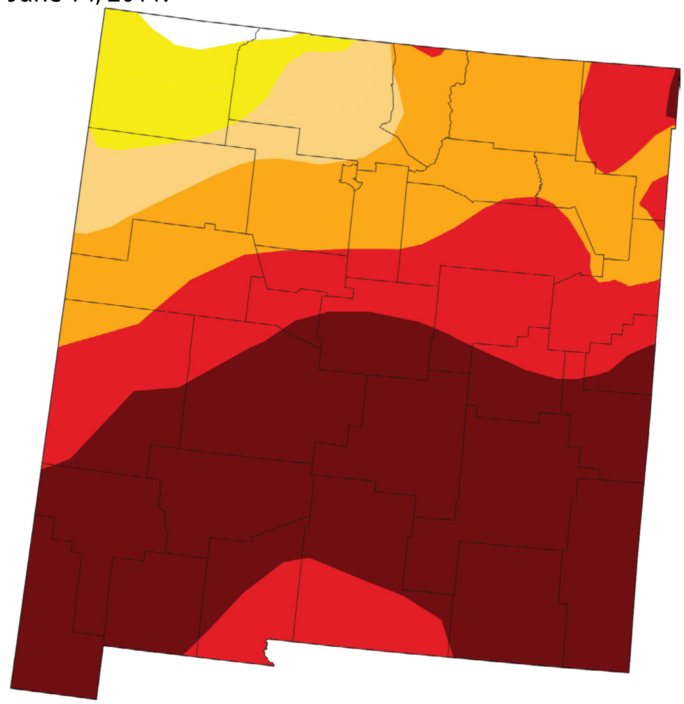
New Mexico Drought Status

(data through 6/14/11)

Data Source: New Mexico State Drought Monitoring Committee, U.S. Drought Monitor

As of June 14, about 94 percent of New Mexico was classified with moderate drought or a more severe drought category and another 6 percent was labeled as abnormally dry (*Figures 5a–b*). About half of the state is classified with exceptional drought, the most extreme drought category and one that is defined as a drought that occurs on average once in every 50 years. The biggest change since last month was the expansion of exceptional drought conditions across the southern half of New Mexico. Some limited early monsoon moisture has sneaked into the state over the past 30 days but not enough to provide much short-term relief. Widespread closures of public lands have occurred across New Mexico due to the very dry conditions and high fire danger. Ranchers and farmers across the state also have been hit hard by the worsening drought conditions. For example, poor range conditions are forcing ranchers to purchase supplemental feed each month at high costs, and the alfalfa farmers in eastern parts of New Mexico are experiencing crop yields of less than 50 percent of average (Associated Press, June 12).

Figure 5a. New Mexico drought map based on data through June 14, 2011.



Drought Intensity

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

Figure 5b. Percent of New Mexico designated with drought conditions based on data through June 14, 2011.

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.75	99.25	93.98	87.35	67.86	44.90
Last Week (06/07/2011 map)	0.75	99.25	93.98	87.35	67.91	44.53
3 Months Ago (03/15/2011 map)	7.79	92.21	84.02	33.82	9.25	0.00
Start of Calendar Year (12/28/2010 map)	6.16	93.84	40.40	0.00	0.00	0.00
Start of Water Year (09/28/2010 map)	76.66	23.34	0.00	0.00	0.00	0.00
One Year Ago (06/08/2010 map)	81.91	18.09	0.02	0.00	0.00	0.00

Notes:

The New Mexico section of the U.S. Drought Monitor is released weekly (every Thursday) and represents data collected through the previous Tuesday. The maps are based on expert assessment of variables including (but not limited to) the Palmer Drought Severity Index, soil moisture, streamflow, precipitation, and measures of vegetation stress, as well as reports of drought impacts. It is a joint effort of several agencies.

This summary contains substantial contributions from the New Mexico Drought Working Group.

On the Web:

For the most current drought status map, visit http://www.drought.unl.edu/dm/DM_state.htm?NM,W

For the most current Drought Status Reports, visit http://www.nmdrought.state.nm.us/MonitoringWorkGroup/wk-monitoring.html

Arizona Reservoir Levels

(through 5/30/11)

Data Source: National Water and Climate Center

Combined storage in Lakes Mead and Powell increased by 1.3 million acre-feet (maf) during May. As of June 1, the lakes' combined storage was at 50.3 percent of capacity (*Figure 6*), which is approximately the same as one year ago. Inflow into Lake Powell for May was 2.35 maf, or 102 percent of average, according to the U.S. Bureau of Reclamation. The forecasted unregulated inflow to Lake Powell for June is 6.1 maf, which would be the second highest inflow total for June since the operation of Glen Canyon Dam began in 1963. Lake Powell elevation is predicted to peak in early August at around 35 to 40 feet below the full pool elevation of 3,700 feet. October 2001 was the last time Lake Powell neared this elevation.

Storage in reservoirs not on the Colorado River decreased by 163,600 acre-feet in May, including substantial decreases in storage in the Verde and Salt river basins and in the San Carlos Reservoir.

In water-related news, the U.S. Supreme Court declined to consider an appeal in a 26-year battle over who holds title to the Lower Salt River (Cronkite News, June 13). For the time being the state, rather than private landowners, is considered the titleholder.

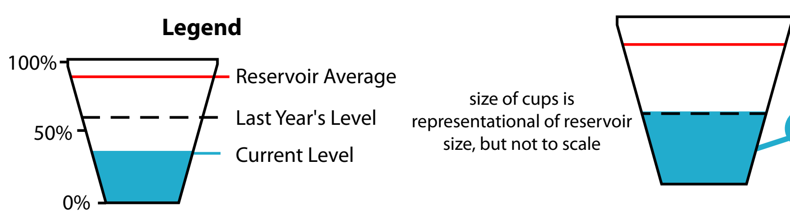
Notes:

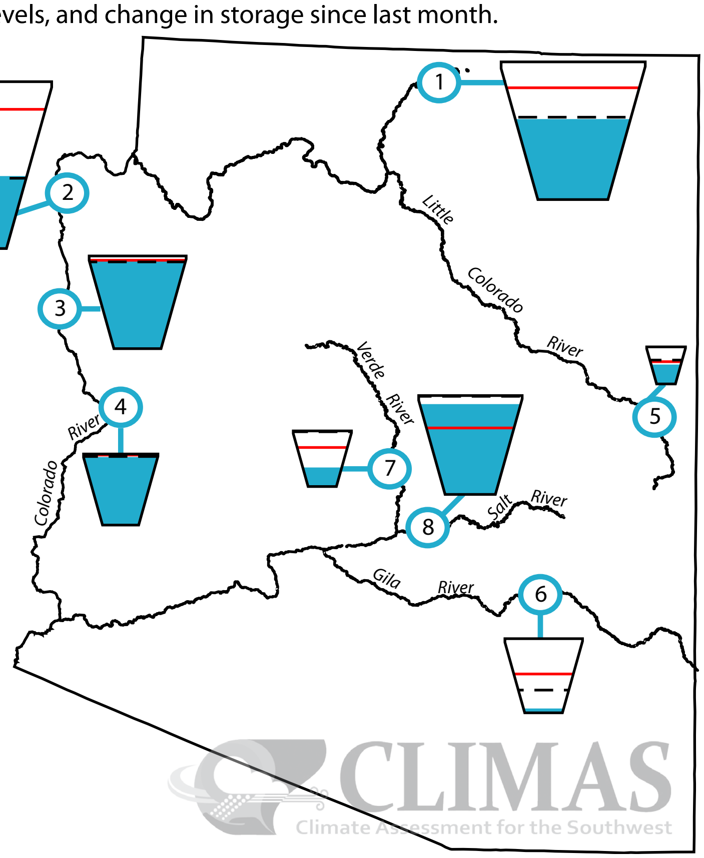
The map gives a representation of current storage levels for reservoirs in Arizona. Reservoir locations are numbered within the blue circles on the map, corresponding to the reservoirs listed in the table. The cup next to each reservoir shows the current storage level (blue fill) as a percent of total capacity. Note that while the size of each cup varies with the size of the reservoir, these are representational and not to scale. Each cup also represents last year's storage level (dotted line) and the 1971–2000 reservoir average (red line).

The table details more exactly the current capacity level (listed as a percent of maximum storage). Current and maximum storage levels are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). On average, 1 acre-foot of water is enough to meet the demands of 4 people for a year. The last column of the table list an increase or decrease in storage since last month. A line indicates no change.

These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS). For additional information, contact Dino DeSimone, Dino.DeSimone@az.usda.gov.

Figure 6. Arizona reservoir levels for May as a percent of capacity. The map depicts the average level and last year's storage for each reservoir. The table also lists current and maximum storage levels, and change in storage since last month.





Reservoir Name	Capacity Level	Current Storage*	Max Storage*	Change in Storage*
1. Lake Powell	58%	14,096.0	24,322.0	1163.0
2. Lake Mead	43%	11,304.0	26,159.0	183.0
3. Lake Mohave	95%	1,727.3	1,810.0	26.7
4. Lake Havasu	96%	593.2	619.0	4.9
5. Lyman Reservoir	52%	15.6	30.0	-1.4
6. San Carlos	6%	48.2	875.0	-27.3
7. Verde River System	34%	98.6	287.4	-1.0
8. Salt River System	91%	1,838.5	2,025.8	-67.8

*** thousands of acre-feet**

On the Web:

Portions of the information provided in this figure can be accessed at the NRCS website
http://www.wcc.nrcs.usda.gov/wsf/reservoir/resv_rpt.html

CLIMAS Climate Assessment for the Southwest

New Mexico Reservoir Levels
(through 5/30/11)
Data Source: National Water and Climate Center

The total reservoir storage in New Mexico increased by 7,200 acre-feet in May, with most of the increases occurring in reservoirs in the northern part of the state. Pecos River Basin storage (reservoirs 9-12 in Figure 7) declined by more than 20,000 acre-feet during the last month; storage in New Mexico's Canadian River Basin reservoirs (reservoirs 14-15) fell by about 10,000 acre-feet. Every reservoir in New Mexico, except Lake Avalon, is at a lower level than one year ago.

In water-related news, farmers, ranchers, and residents in eastern New Mexico's Curry County are feeling the impact of this year's drought (cnjonline.com, May 21 and June 13). Wells for some Curry County residents are drying as the drought accelerates declines in the Ogallala Aquifer. Also, the lack of precipitation is costing some farmers $10,000 to $20,000 a month to transport livestock and pump supplemental water.

Also, residents of Portales, in eastern New Mexico, are facing mandatory water restrictions (pntonline.com, June 16).

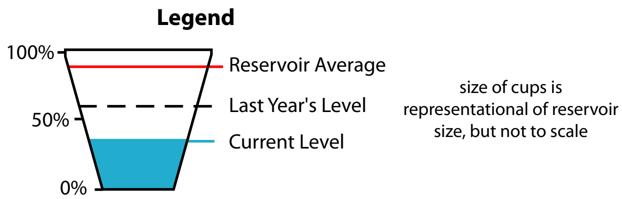
Notes:

The map gives a representation of current storage levels for reservoirs in New Mexico. Reservoir locations are numbered within the blue circles on the map, corresponding to the reservoirs listed in the table. The cup next to each reservoir shows the current storage level (blue fill) as a percent of total capacity. Note that while the size of each cup varies with the size of the reservoir, these are representational and not to scale. Each cup also represents last year's storage level (dotted line) and the 1971–2000 reservoir average (red line).

The table details more exactly the current capacity level (listed as a percent of maximum storage). Current and maximum storage levels are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). On average, 1 acre-foot of water is enough to meet the demands of 4 people for a year. The last column of the table list an increase or decrease in storage since last month. A line indicates no change.

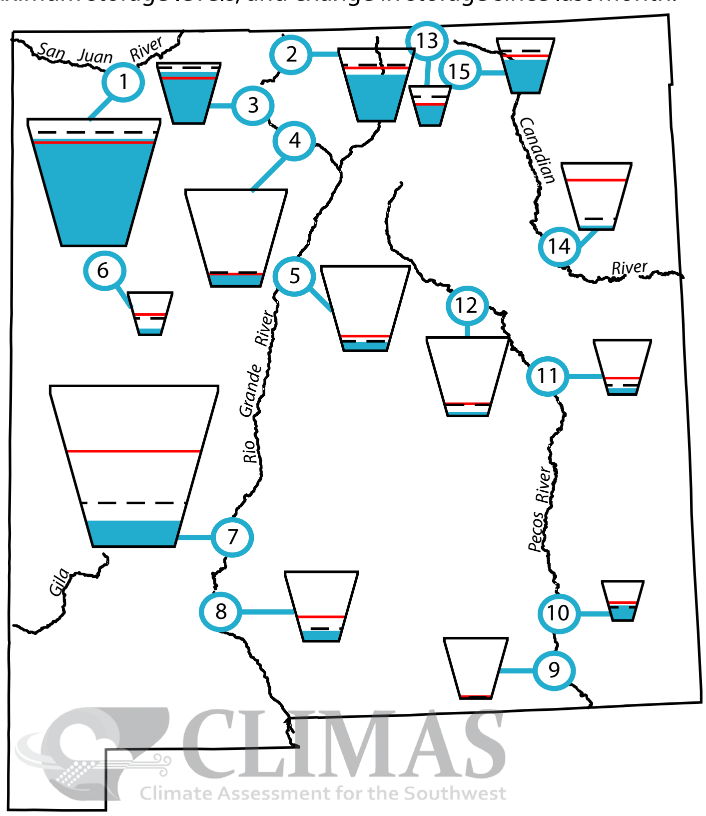
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS). For additional information, contact Wayne Sleep, wayne.sleep@nm.usda.gov.

Figure 7. New Mexico reservoir levels for May as a percent of capacity. The map depicts the average level and last year's storage for each reservoir. The table also lists current and maximum storage levels, and change in storage since last month.



Reservoir Name	Capacity Level	Current Storage*	Max Storage*	Change in Storage*
1. Navajo	84%	1,427.8	1,696.0	70.4
2. Heron	64%	254.9	400.0	19.1
3. El Vado	85%	162.3	190.3	42.9
4. Abiquiu	13%	157.0	1,192.8	-8.3
5. Cochiti	10%	50.8	491.0	-0.8
6. Bluewater	15%	5.8	38.5	-0.6
7. Elephant Butte	16%	357.7	2,195.0	-23.4
8. Caballo	15%	51.3	332.0	-12.9
9. Brantley	2%	15.5	1,008.2	-6.7
10. Lake Avalon	38%	1.5	4.0	-0.1
11. Sumner	11%	11.5	102.0	-3.1
12. Santa Rosa	5%	21.3	438.3	-0.7
13. Costilla	54%	8.6	16.0	-0.9
14. Conchas	6%	15.5	254.2	-3.5
15. Eagle Nest	61%	48.2	79.0	-2.6

*** thousands of acre-feet**



On the Web:

Portions of the information provided in this figure can be accessed at the NRCS website
http://www.wcc.nrcs.usda.gov/wsf/reservoir/resv_rpt.html

Southwest Fire Summary
(updated 6/15/11)

Source: Southwest Coordination Center

Wildfires have been raging across the Southwest in recent months. As of June 14, more than 1,400 wildfires had burned about 1.4 million acres in Arizona and New Mexico, according to Predictive Services at the Southwest Coordination Center (*Figure 8a*). A lethal combination of extreme and exceptional drought conditions; warm temperatures; dry grasses, shrubs, and trees; and continuous gusty winds have created a record fire season in the region. The year 2011 will enter the books as the most severe wildfire year since 1990, when statistical record keeping began.

In Arizona this year, more than 750,000 acres have burned—more than four times the state's annual average of approximately 182,000 acres. Most of the damage, however, has occurred during the last 30 days when fire has blackened more than 680,000 acres in the southern and eastern portions of the state (*Figure 8b*). The Wallow Fire, which began on May 29 in the White Mountains, recently surpassed the 2002 Rodeo-Chediski Fire as the largest on record in the state. The Rodeo-Chediski blaze burned almost 470,000 acres. As of June 17, the Wallow Fire had consumed more than 495,000 acres spanning five counties: Apache, Navajo, Graham, and Greenlee in Arizona, and Catron County in New Mexico. Thirty-two homes had been destroyed and another 2,700 were threatened as of June 17.

In New Mexico, more than 630,000 acres had burned as of June 14. The locations of the fires span the state but are concentrated in the southeastern corner (*Figure 8c*). The largest active fire is the Loop Fire near Carlsbad, which began on June 13 and has torched more than 30,000 acres.

Figure 8a. Year-to-date wildland fire information for Arizona and New Mexico as of June 14, 2011.

State	Human Caused Fires	Human caused acres	Lightning caused fires	Lightning caused acres	Total Fires	Total Acres
AZ	670	756,918	1	135	671	757,053
NM	717	572,628	63	58,644	780	631,272
Total	1,387	1,329,546	64	58,779	1451	1,388,325

Figure 8b. Arizona large fire incidents as of June 15, 2011.

Figure 8c. New Mexico large fire incidents as of June 15, 2011.

Notes:

The fires discussed here have been reported by federal, state, or tribal agencies during 2011. The figures include information both for current fires and for fires that have been suppressed. The top figure shows a table of year-to-date fire information for Arizona and New Mexico. Prescribed burns are not included in these numbers. The bottom two figures indicate the approximate locations of past and present "large" wildland fires and prescribed burns in Arizona and in New Mexico. A "large" fire is defined as a blaze covering 100 acres or more in timber or 300 acres or more in grass or brush. The name of each fire is provided next to the symbol.

On the Web:

These data are obtained from the Southwest Coordination Center website:

http://gacc.nifc.gov/swcc/predictive/intelligence/daily/ytd_all_wf_by_state.pdf

http://gacc.nifc.gov/swcc/predictive/intelligence/ytd_historical/ytd/large_fires/swa_ytd_combined.htm

Temperature Outlook

(July–December 2011)

Data Source: NOAA-Climate Prediction Center (CPC)

The seasonal temperature outlooks issued by the NOAA–Climate Prediction Center (CPC) in June call for increased chances for temperatures to be similar to those of the warmest 10 years of the 1981–2010 period through the spring and summer. These outlooks use the 1981-2010 period to calculate the average, as opposed to the 1971-2000 period which was used until April. This has an impact on trends because the observed warming in the last 10 years is now rolled into the average. For July–September, August–October, and September-November, CPC outlooks call for greater than a 50 percent chance that temperatures will resemble the warmest years in the climatological record in most of Arizona and parts of New Mexico (*Figures 9a–c*). These forecasts are based in part on decadal trends and low soil moisture present in June. For the October–December period, temperatures have a 40 percent chance of being above average (*Figure 9d)*.

Notes:

These outlooks predict the likelihood (chance) of above-average, average, and below-average temperature, but not the magnitude of such variation. The numbers on the maps do not refer to degrees of temperature.

The NOAA-CPC outlooks are a 3-category forecast. As a starting point, the 1981–2010 climate record is divided into 3 categories, each with a 33.3 percent chance of occurring (i.e., equal chances, EC). The forecast indicates the likelihood of one of the extremes—above-average (A) or below-average (B)—with a corresponding adjustment to the other extreme category; the "average" category is preserved at 33.3 likelihood, unless the forecast is very strong.

Thus, using the NOAA-CPC temperature outlook, areas with light brown shading display a 33.3–39.9 percent chance of above-average, a 33.3 percent chance of average, and a 26.7–33.3 percent chance of below-average temperature. A shade darker brown indicates a 40.0–50.0 percent chance of above-average, a 33.3 percent chance of average, and a 16.7–26.6 percent chance of below-average temperature, and so on.

Equal Chances (EC) indicates areas where no forecast skill has been demonstrated or there is no clear climate signal; areas labeled EC suggest an equal likelihood of above-average, average, and below-average conditions, as a "default option" when forecast skill is poor.

Figure 9a. Long-lead national temperature forecast for July–September 2011.

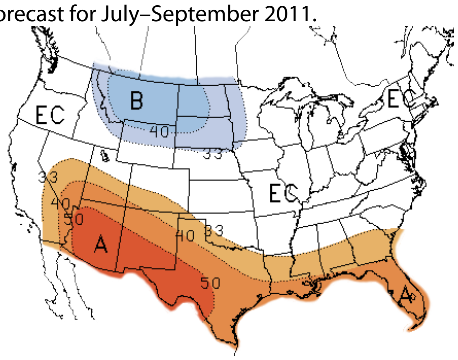


Figure 9b. Long-lead national temperature forecast for August–October 2011.

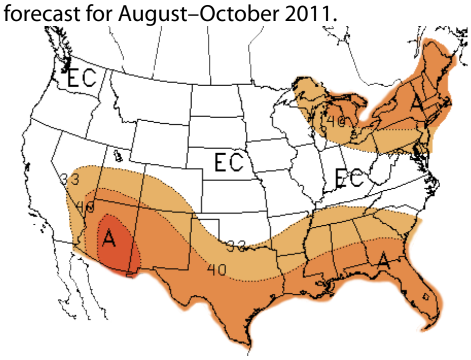


Figure 9c. Long-lead national temperature forecast for September-November 2011.

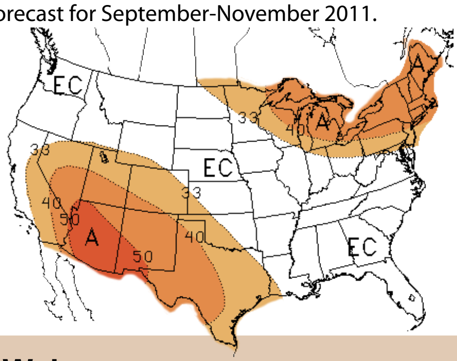
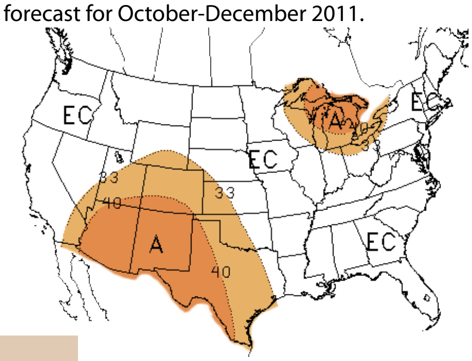


Figure 9d. Long-lead national temperature forecast for October-December 2011.



A = Above: 50.0–59.9% | 40.0–49.9% | 33.3–39.9%

B = Below: 50.0–59.9% | 40.0–49.9% | 33.3–39.9%

EC = Equal chances. No forecasted anomalies.

On the Web:

For more information on CPC forecasts, visit http://www.cpc.ncep.noaa.gov/products/predictions//multi_season/13_seasonal_outlooks/color/churchill.php

For seasonal temperature forecast downscaled to the local scale, visit http://www.weather.gov/climate/l3mto.php

For IRI forecasts, visit http://iri.columbia.edu/climate/forecast/net_asmt/

Precipitation Outlook
(July–December 2011)
Data Source: NOAA-Climate Prediction Center (CPC)

Analysis tools are providing conflicting signals for monsoon precipitation, according to the NOAA-Climate Prediction Center (CPC). Several forecast model ensembles suggest the possibility of a weak monsoon for the Southwest and southern Rocky Mountains. On the other hand, an active monsoon season has occurred in the past when spring precipitation patterns have been similar to conditions observed earlier this spring—dry in the southern Rockies and wet in the northern Rockies and Pacific Northwest. At this time, observations from western Mexico where the monsoon rains begin suggest a delayed onset and are consistent with the forecast models, which call for below median-precipitation for the July–September period. However, the historical accuracy of these models has not faired well. As a result, CPC forecasts an equal likelihood of near-average, above-average, and below-average precipitation in Arizona and New Mexico during the monsoon season (*Figure 10a*). For the two-, three-, and four-month lead times, the forecasts also call for equal chances of above-, below-, or near-average conditions, with slightly increased in chances for below-average precipitation for the southern portion of the region in early winter (*Figures 10b–d*).

Notes:

These outlooks predict the likelihood (chance) of above-average, average, and below-average precipitation, but not the magnitude of such variation. The numbers on the maps do not refer to inches of precipitation.

The NOAA-CPC outlooks are a 3-category forecast. As a starting point, the 1981–2010 climate record is divided into 3 categories, each with a 33.3 percent chance of occurring (i.e., equal chances, EC). The forecast indicates the likelihood of one of the extremes—above-average (A) or below-average (B)—with a corresponding adjustment to the other extreme category; the "average" category is preserved at 33.3 likelihood, unless the forecast is very strong.

Thus, using the NOAA-CPC precipitation outlook, areas with light green shading display a 33.3–39.9 percent chance of above-average, a 33.3 percent chance of average, and a 26.7–33.3 percent chance of below-average precipitation. A shade darker green indicates a 40.0–50.0 percent chance of above-average, a 33.3 percent chance of average, and a 16.7–26.6 percent chance of below-average precipitation, and so on.

Equal Chances (EC) indicates areas where no forecast skill has been demonstrated or there is no clear climate signal; areas labeled EC suggest an equal likelihood of above-average, average, and below-average conditions, as a "default option" when forecast skill is poor.

Figure 10a. Long-lead national precipitation forecast for July-September 2011.

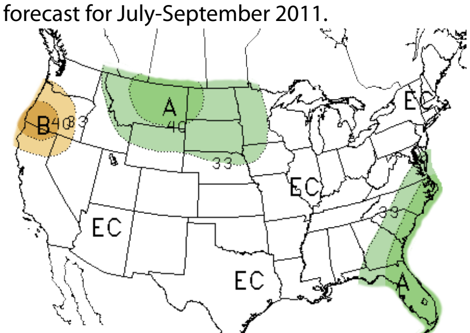
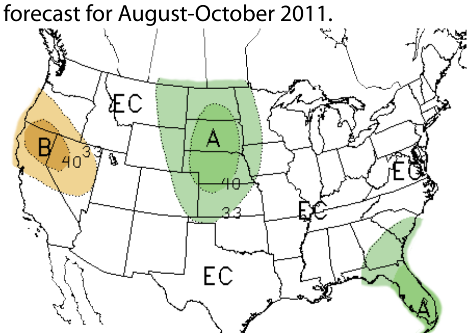


Figure 10b. Long-lead national precipitation forecast for August-October 2011.



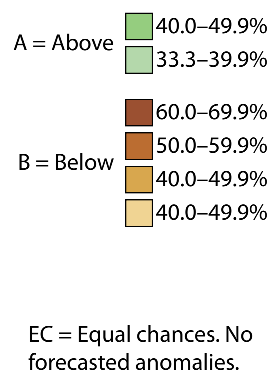


Figure 10c. Long-lead national precipitation forecast for September-November 2011.

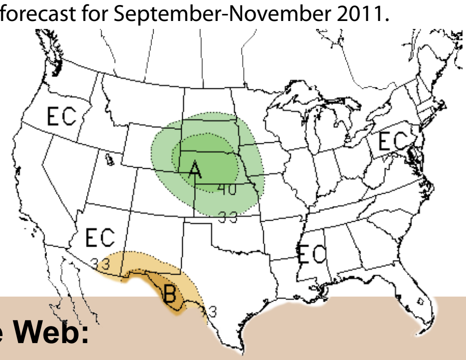
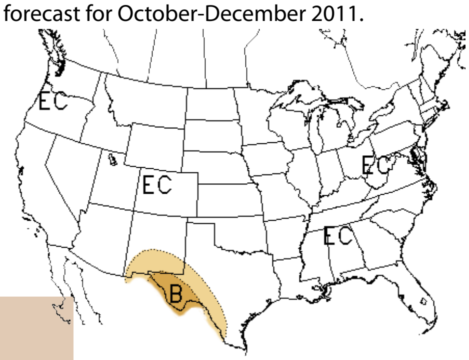


Figure 10d. Long-lead national precipitation forecast for October-December 2011.



On the Web:

For more information on CPC forecasts, visit http://www.cpc.ncep.noaa.gov/products/predictions//multi_season/13_seasonal_outlooks/color/churchill.php
(note that this website has many graphics and March load slowly on your computer)

For IRI forecasts, visit http://iri.columbia.edu/climate/forecast/net_asmt/

Seasonal Drought Outlook

(through September)

Data Source: NOAA–Climate Prediction Center (CPC)

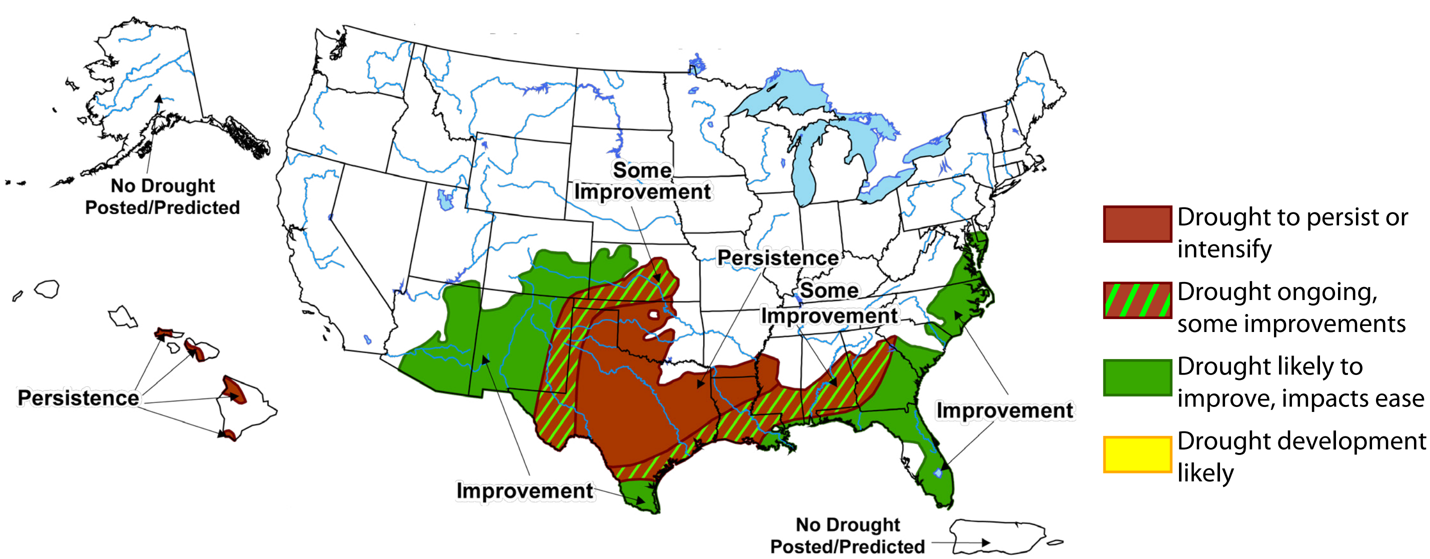
This summary is excerpted and edited from the June 14 Seasonal Drought Outlook technical discussion produced by the NOAA–Climate Prediction Center (CPC) and written by forecaster A. Allgood.

Mostly dry weather prevailed across the southwestern United States during the previous 30 days, allowing drought areas to persist or intensify. As of June 7, exceptional drought covered nearly 45 percent of New Mexico, including nearly all of the state's southern half (*Figure 11*). Exceptional drought expanded into the far eastern portions of neighboring Arizona, where the Wallow Fire has burned more than a half-million acres and currently stands as the largest wildfire in state history. During June and July, the North American monsoon shifts northward from northwest Mexico into the southwestern U.S., bringing scattered showers and thunderstorms, which account for a significant portion of the annual rainfall. The monsoon typically peaks in July and August before winding down in September. Currently, the northward progression of the monsoon through northwestern Mexico has been delayed, while models have provided conflicting forecasts of the monsoon's strength. Forecasts issued by the NOAA-Climate Prediction Center (CPC) for the monsoon season call for equal chances of above-, below-, or near-average rainfall. Nonetheless, monsoon rains will inevitably fall and it will likely bring some drought improvement to Arizona, western New Mexico, and portions of Colorado and northwestern Kansas. However, drought improvement is defined in this outlook as a one-category improvement on the U.S. Drought Monitor, rather than total drought elimination or substantial amelioration of impacts.

Notes:

The delineated areas in the Seasonal Drought Outlook are defined subjectively and are based on expert assessment of numerous indicators, including the official precipitation outlooks, various medium- and short-range forecasts , models such as the 6-10 day and 8-14 day forecasts, soil moisture tools, and climatology.

Figure 11. Seasonal drought outlook through September (released June 16).



On the Web:

For more information, visit http://www.drought.gov/portal/server.pt

For medium- and short-range forecasts, visit http://www.cpc.ncep.noaa.gov/products/forecasts/

For soil moisture tools, visit http://www.cpc.ncep.noaa.gov/soilmst/forecasts.shtml

Wildland Fire Outlook

(July–September 2011)

Sources: National Interagency Coordination Center, Southwest Coordination Center

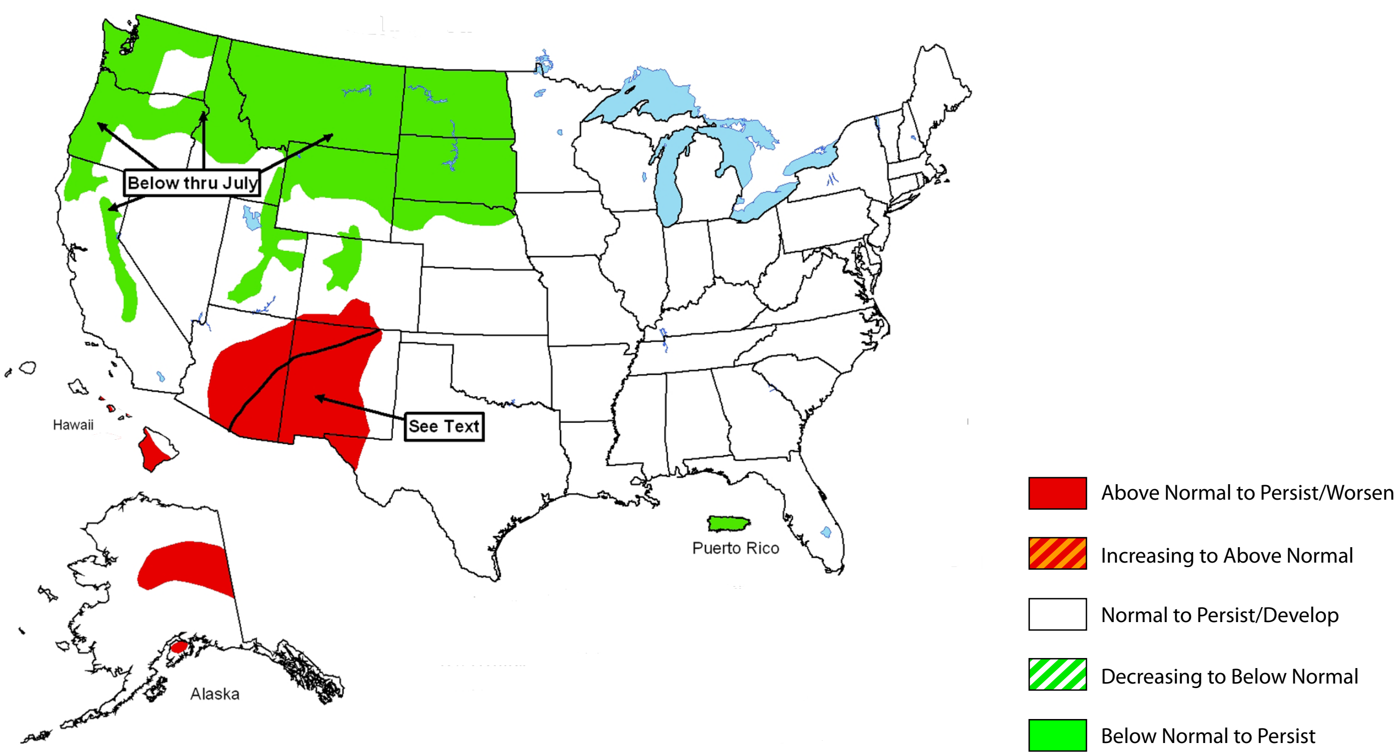
Predictive Services at the Southwest Coordination Center expect above-normal significant fire potential to continue across most of the Southwest in July (*Figure 12*). Significant fire potential is the likelihood that a wildland fire event will require additional fire management resources from outside the region where the fire originated. Dry vegetation, low levels of relative humidity, above-average temperature forecasts, and intermittent periods of hot and dry winds are factors contributing to the above-normal outlook for the region. Significant fire potential in the eastern third of New Mexico should decrease to normal in July, while above-normal levels will expand to central and northern portions of Arizona and the northwest corner of New Mexico. By September, significant fire potential is expected to decrease from above normal to normal for most of the region.

Temperature forecasts issued by the NOAA-Climate Prediction Center (CPC) show increased chances for above-average temperatures in the Southwest for July-September, which can help prime the landscape for fires until the monsoon season begins in earnest. The start date for the monsoon is currently unclear, as is the strength of the monsoon once it begins. As a result, CPC precipitation forecasts for July-September show equal chances for above-, below-, or near-average precipitation. Dry lightning strikes will likely increase during the next few weeks leading up to the start of the monsoon, especially across New Mexico.

Notes:

The National Interagency Coordination Center at the National Interagency Fire Center produces seasonal wildland fire outlooks each month. The forecasts (Figure 12) consider observed climate conditions, climate and weather forecasts, vegetation health, and surface-fuels conditions in order to assess fire potential for fires greater than 100 acres. They are subjective assessments, that synthesize information provided by fire and climate experts throughout the United States.

Figure 12. National wildland fire potential for fires greater than 100 acres (valid July–September 2011).



On the Web:

National Wildland Fire Outlook web page
http://www.nifc.gov/news/nicc.html

Southwest Coordination Center web page
http://gacc.nifc.gov/swcc/predictive/outlooks/outlooks.htm

El Niño Status and Forecast

Data Sources: NOAA-Climate Prediction Center (CPC), International Research Institute for Climate and Society (IRI)

Sea surface temperatures (SSTs) are near average across much of the eastern equatorial Pacific Ocean and ENSO-neutral conditions are returning after the rapid retreat of La Niña in early May. The Southern Oscillation Index (SOI) values have also dropped toward near-average levels, which is additional evidence that neutral conditions are gaining a stronghold in the Pacific Ocean (*Figure 13a*). The NOAA-Climate Prediction Center (CPC) notes, however, that remnants of the recent La Niña event, albeit weak, are still persisting in the atmospheric circulation patterns, including slightly enhanced easterly winds along the equator. These conditions are expected to continue to weaken through June as the atmosphere catches up with the SSTs.

Forecasts issued by the International Research Institute for Climate and Society (IRI) show a high probability that neutral conditions will continue through the summer and well into next fall and winter. The chance of neutral conditions persisting is at least 70 percent for all time periods through next December, while El Niño and La Niña have a 15 percent chance of occurring (*Figure 13b*). IRI notes that some warmer-than-average subsurface water has emerged across the eastern Pacific, raising the prospect of an El Niño event developing, but forecast models do not support this development yet. Both CPC and IRI project neutral conditions through the rest of 2011. The lack of a strong ENSO signal does not clarify monsoon forecasts, which currently have equal chances of above-, below-, and average-precipitation for the monsoon season.

Notes:

The first figure shows the standardized three month running average values of the Southern Oscillation Index (SOI) from January 1980 through March 2011. The SOI measures the atmospheric response to SST changes across the Pacific Ocean basin. The SOI is strongly associated with climate effects in the Southwest. Values greater than 0.5 represent La Niña conditions, which are frequently associated with dry winters and sometimes with wet summers. Values less than -0.5 represent El Niño conditions, which are often associated with wet winters.

The second figure shows the International Research Institute for Climate and Society (IRI) probabilistic El Niño-Southern Oscillation (ENSO) forecast for overlapping three month seasons. The forecast expresses the probabilities (chances) of the occurrence of three ocean conditions in the ENSO-sensitive Niño 3.4 region, as follows: El Niño, defined as the warmest 25 percent of Niño 3.4 sea-surface temperatures (SSTs) during the three month period in question; La Niña conditions, coolest 25 percent of Niño 3.4 SSTs; and neutral conditions where SSTs fall within the remaining 50 percent of observations. The IRI probabilistic ENSO forecast is a subjective assessment of current model forecasts of Niño 3.4 SSTs that are made monthly. The forecast takes into account the indications of the individual forecast models (including expert knowledge of model skill), an average of the models, and other factors.

On the Web:

For a technical discussion of current El Niño conditions, visit http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

For more information about El Niño and to access graphics similar to the figures on this page, visit http://iri.columbia.edu/climate/ENSO/

Figure 13a. The standardized values of the Southern Oscillation Index from January 1980–April 2011. La Niña/El Niño occurs when values are greater than 0.5 (blue) or less than -0.5 (red) respectively. Values between these thresholds are relatively neutral (green).

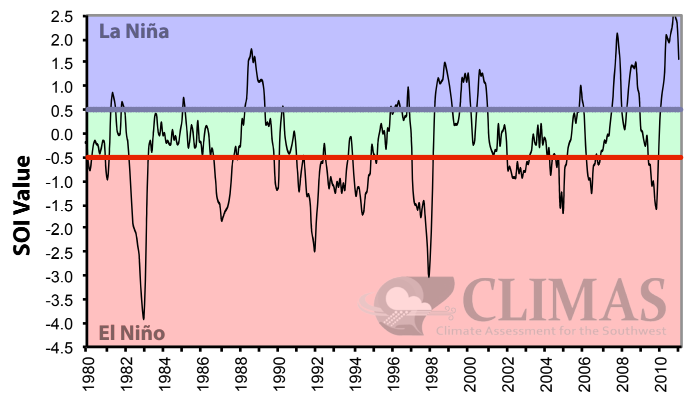
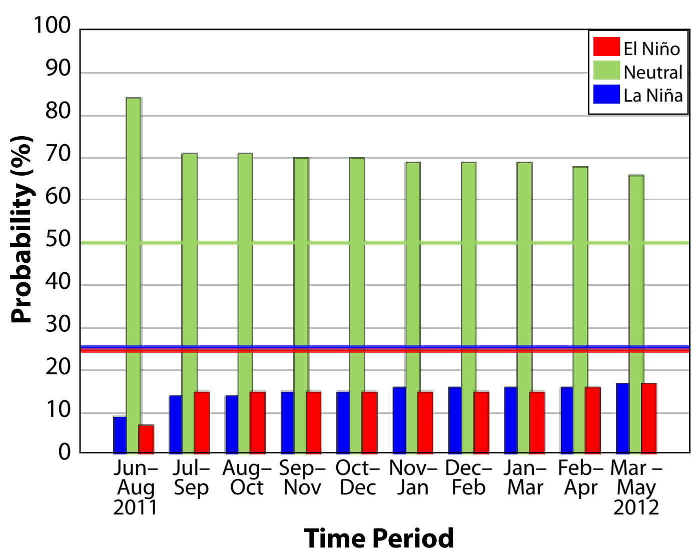


Figure 13b. IRI probabilistic ENSO forecast for El Niño 3.4 monitoring region (released June 16). Colored lines represent average historical probability of El Niño, La Niña, and neutral.



Temperature Verification
(July 2011–December 2011)

Data Source: Forecast Evaluation Tool

For a thorough description of the interpretation of these maps, see the feature article, "Evaluating forecasts with the RPSS," in the April 2009 issue of the Southwest Climate Outlook.

Comparisons of observed temperatures for July–September to forecasts issued in June for the same period suggest that forecasts have been substantially more accurate than a forecast of equal chances (i.e., a 33 percent chance that temperatures will be above, below, or near average) in western Arizona (*Figure 14a*). NOAA–Climate Prediction Center (CPC) forecasts for this season are based in part on recent trends in warming. For the August–October period, forecasts have been better than equal chances in southern and western Arizona but not as good as equal chances in New Mexico (*Figure 14b*). For the September–November period, forecasts generally have been slightly more accurate in most of Arizona and similar to an equal chances forecast in New Mexico (*Figure 14c*). For the four-month lead time, forecasts have been slightly more accurate than equal chances in most of the Southwest (*Figure 14d*). While bluish hues suggest that CPC historical forecasts have been more accurate than equal chances, caution is advised to users of the seasonal forecasts for regions with reddish colors.

Notes:

These maps evaluate the historical performance of the one- to four-month long-lead forecasts made by NOAA's Climate Prediction Center (CPC). The maps convey the historical accuracy of the CPC forecasts in relation to the reference forecast, which assigns a 33 percent chance to the three CPC categories, "above," "below," and "neutral." These categories indicate whether conditions are predicted to be similar to the warmest, coolest, or normal temperatures for 1971 to 2000. The maps are generated from the Forecast Evaluation Tool, which was developed by The University of Arizona in partnership with NOAA, NASA, NSF, and the University of California-Irvine. The maps display the Ranked Probability Skill Score (RPSS). The more the forecasts and actual weather match, the bluer the color. A bluish or reddish RPSS indicates the forecast is more accurate or less accurate, respectively, than assigning a 33 percent chance to each of the three CPC categories. The RPSS is calculated by comparing all the forecasts made since December 1994 for particular seasons and specified lead times to the actual weather of the season.

Figure 14a. RPSS for July-September 2011.

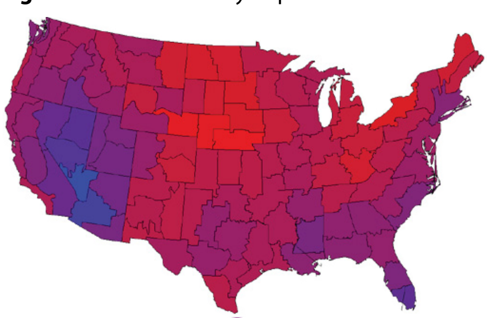


Figure 14b. RPSS for August-October 2011.

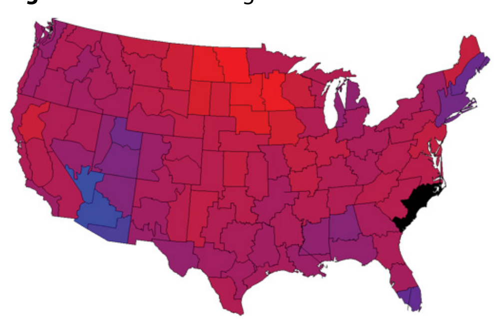


Figure 14c. RPSS for September-November 2011.

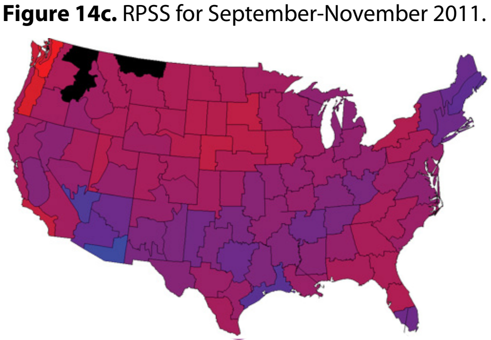
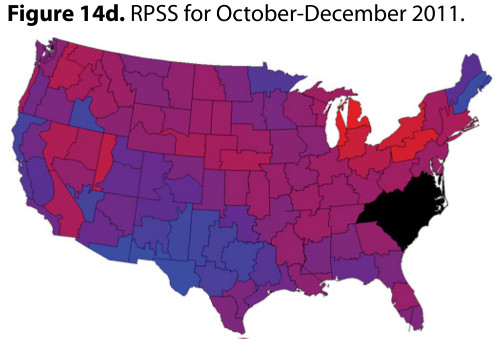
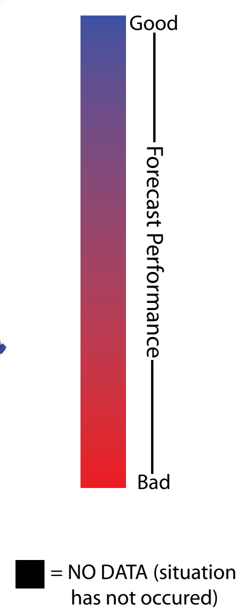


Figure 14d. RPSS for October-December 2011.





On the Web:

For more information on the Forecast Evaluation Tool, visit http://fet.hwr.arizona.edu/ForecastEvaluationTool/

For a CLIMAS publication that explains how to use the Forecast Evaluation Tool, visit http://www.climas.arizona.edu/feature-articles/november-2005

Precipitation Verification
(July 2011–December 2011)

Data Source: Forecast Evaluation Tool

For a thorough description of the interpretation of these maps, see the feature article, "Evaluating forecasts with the RPSS," in the April 2009 issue of the Southwest Climate Outlook.

Comparisons of observed precipitation for July–September, which spans the monsoon season, to forecasts issued in June for the same period suggest that forecasts are less accurate than equal chances in all of Arizona and New Mexico (*Figure 15a*). Forecasts have not fared well for this time period in regions most influenced by the monsoon, such as southwest New Mexico and southeast Arizona. For August–October, forecasts have been less accurate than equal chances in most of the Southwest, with the exception of southeast Arizona (*Figure 15b*). For the three-month lead time, forecasts have been similar to or less accurate than equal chances in most of both states (*Figure 15c*). For the four-month lead time, forecasts have shown better accuracy than equal chances in southern Arizona (*Figure 15d*). Regions with bluish hues suggest that the NOAA–Climate Prediction Center (CPC) forecasts historically have been more accurate than equal chances. However, caution is advised to users of the CPC seasonal outlooks for regions where the verification maps display reddish hues.

Notes:

These maps evaluate the historical performance of the one- to four-month long-lead forecasts made by NOAA's Climate Prediction Center (CPC). The maps convey the historical accuracy of the CPC forecasts in relation to the reference forecast, which assigns a 33 percent chance to the three CPC categories, "above," "below," and "neutral." These categories indicate whether conditions are predicted to be similar to the wettest, driest, or normal precipitation for 1971 to 2000. The maps are generated from the Forecast Evaluation Tool, which was developed by The University of Arizona in partnership with NOAA, NASA, NSF, and the University of California-Irvine. The maps display the Ranked Probability Skill Score (RPSS). The more the forecasts and actual weather match, the bluer the color. A bluish or reddish RPSS indicates the forecast is more accurate or less accurate, respectively, than assigning a 33 percent chance to each of the three CPC categories. The RPSS is calculated by comparing all the forecasts made since December 1994 for particular seasons and specified lead times to the actual weather of the season.

Figure 15a. RPSS for July-September 2011.

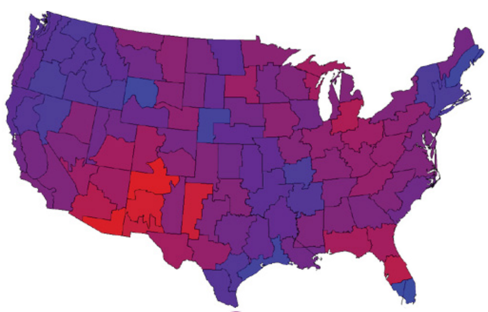


Figure 15b. RPSS for August-October 2011.

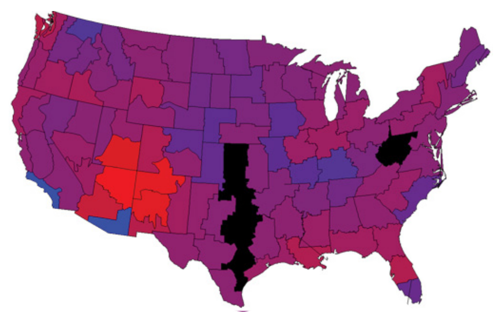


Figure 15c. RPSS for September-November 2011.

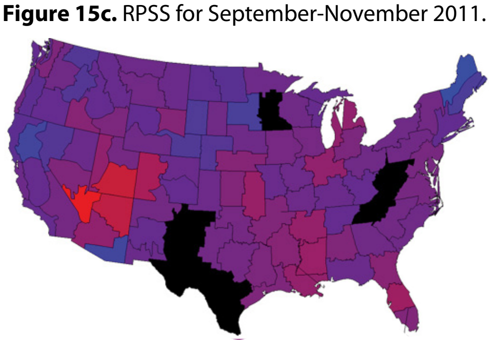
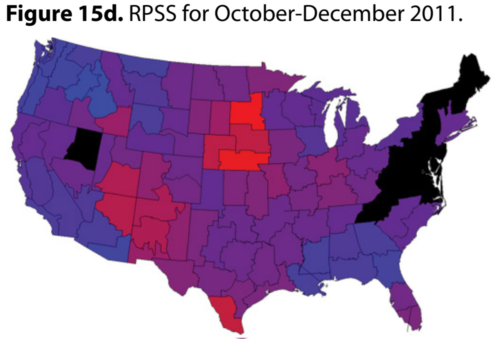
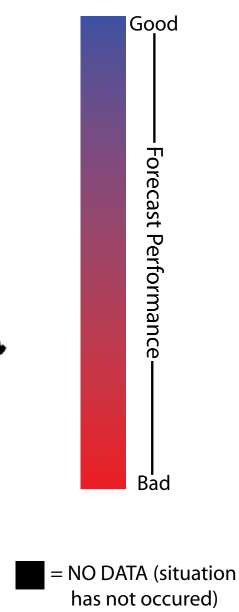


Figure 15d. RPSS for October-December 2011.





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