Southwest Climate Outlook

Monsoon storms have come in droves in parts of the Southwest like Douglas, Arizona. The much-needed rain has helped improve short-term drought conditions in Arizona and New Mexico, although drought remains widespread and intense. Photo: Zack Guido.

August

Vol 12 Issue 8

AUG 2013

READ ONLINE

Tweet August's SW Climate

Wet monsoon in parts of SW improved drought. But more needed this winter and ENSO unlikely to help.

CLICK TO RETWEET

Contents

Contributors

Mike Crimmins
UA Extension Specialist

Jessica Dollin
Publications and Research Assistant

Stephanie Doster
Institute of the Environment Editor

Gregg Garfin
Founding Editor and Deputy Director of Outreach, Institute of the Environment

Zack Guido
CLIMAS Associate Staff Scientist

Nancy J. Selover
Arizona State Climatologist

August Climate Summary

Drought: Monsoon precipitation has brought some short-term drought relief to parts of Arizona and New Mexico, but drought remains widespread and intense.

Temperature: Record-setting heat in June has not carried into July and August in part because of widespread monsoon activity.

Precipitation: Rainfall has been largely above average since the beginning of the monsoon in both Arizona and New Mexico.

ENSO: ENSO-neutral conditions are expected to persist through the upcoming fall and most likely through the winter.

Forecasts: Above-average temperatures are expected in upcoming seasons, while precipitation outlooks are a coin flip.

Snapshot: The first half of the monsoon has not disappointed, delivering copious rain to many parts of the Southwest. Record amounts have fallen in parts of southeast Arizona and the consistent cloud cover and evaporation have helped keep temperatures near average after a record-setting, sizzling June. Characterizing the monsoon as good or bad, however, is challenging due to an inadequate number of monitoring stations to properly identify the high spatial variability. For the areas experiencing average or above-average rain, short-term drought conditions have improved. Recent updates of the U.S. Drought Monitor reflect this. In Arizona, for example, the area classified with at least severe drought decreased from about 73 to 56 percent between July 16 and August 13. In New Mexico, extreme and exceptional drought—the two most severe drought categories—decreased from about 86 to 66 percent during the same period. While improvements are evident, these numbers are still high, and New Mexico remains the most drought-stricken state in the U.S. Even if the monsoon remains active—precipitation forecasts for coming months are a coin flip—intense and widespread drought will remain a mainstay in the region through at least the early winter. Winter precipitation will therefore be critical for improving short- and long-term drought impacts, which include dwindling water supplies, particularly in New Mexico, where combined reservoir storage is at 16 percent of capacity. The Colorado River is also in need of a hefty dousing of precipitation. Water supply projections by the U.S. Bureau of Reclamation suggest high chances that Lake Mead's water elevation will fall below 1,075 feet above sea level in 2015 or 2016, a threshold that would initiate the first water shortage declaration and affect some Arizona water users. The El Niño-Southern Oscillation (ENSO) provides the best glimpse of future precipitation. ENSO forecasts call for a neutral event; there is a slight tendency for neutral events to favor drier-than-average conditions in the Southwest. However, while La Niña events almost always deliver dry conditions to the region, neutral events are less definitive.

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.

Online Resources

Temperature maps
www.hprcc.unl.edu/maps/current/

Temperature and precipitation trends
www.cpc.ncep.noaa.gov/trndtext.shtml

Notes

The water year begins on October 1 and ends on September 30 of the following year. We are in the 2013 water year as of October 1, 2012. 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 1981–2010. 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.

Temperature

DATA THROUGH AUGUST 14, 2013

Data Source: High Plains Regional Climate Center

Temperatures since the water year began on October 1 have been hottest in southwestern deserts and coolest in the higher elevations of northern Arizona and New Mexico (*Figure 1a*). This temperature pattern reflects the topography, but is also a result of the winter and spring storm tracks that favored moving over the northern half of the two states. Storms, in addition to delivering rain and snow, often bring cold Arctic air. Even though winter storms were few and far between, the highest elevations of northern New Mexico and the White Mountains and central Navajo and Apache counties of Arizona have been 1–3 degrees Fahrenheit cooler than average (*Figure 1b*). On the other hand, eastern New Mexico and southwestern Arizona have been the warmest, but temperatures in these regions have been only 1–2 degrees F above average.

In the past 30 days, most of New Mexico has had slightly warmer-than-average temperatures, but extremely warm conditions—as much as 5 degrees F warmer than average—have descended on northeastern counties (*Figures 1c–d*). The hot conditions reflect below-average precipitation in the last month (see Precipitation Summary); rainfall helps lower temperatures due to increased cloud cover and thus more evaporation. In Arizona, cooler-than-average weather is largely due to frequent monsoon activity on the Colorado Plateau, along the Mogollon Rim, and along the southern border (see Monsoon Summary).

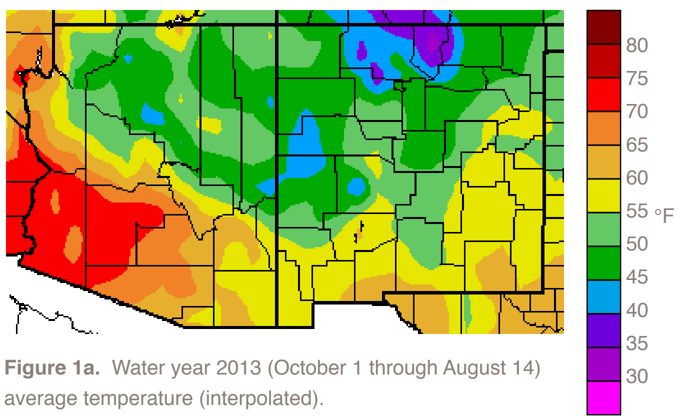


Figure 1a. Water year 2013 (October 1 through August 14) average temperature (interpolated).

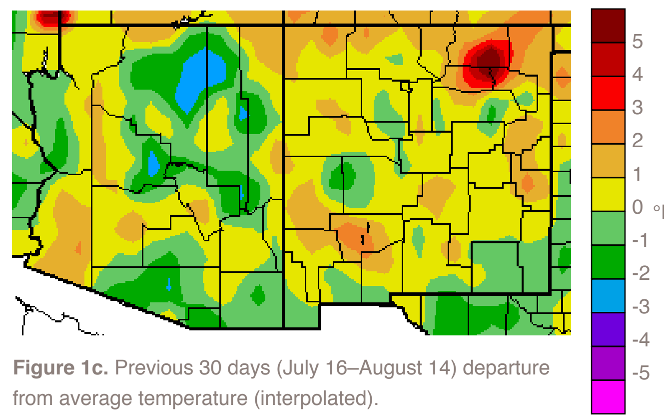


Figure 1c. Previous 30 days (July 16–August 14) departure from average temperature (interpolated).

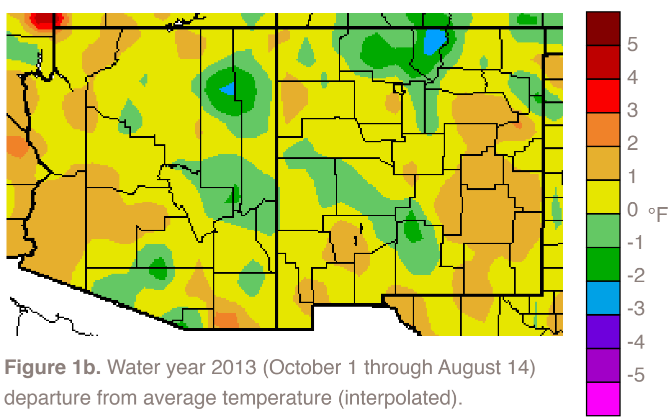


Figure 1b. Water year 2013 (October 1 through August 14) departure from average temperature (interpolated).

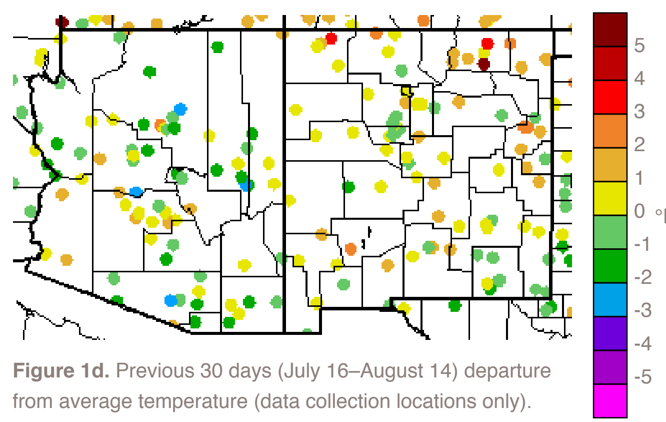


Figure 1d. Previous 30 days (July 16–August 14) departure from average temperature (data collection locations only).

Online Resources

Precipitation maps
www.hprcc.unl.edu/maps/current/

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

Notes

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2012, we are in the 2013 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 1981–2010. 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.

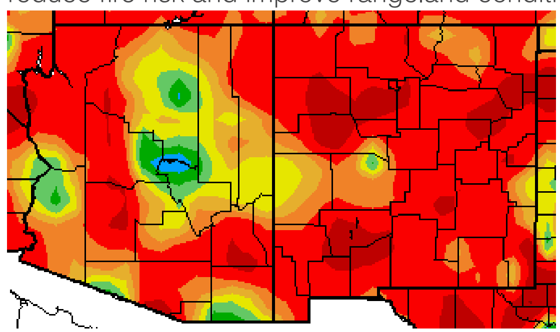
Precipitation

DATA THROUGH AUGUST 14, 2013

Data Source: High Plains Regional Climate Center

Precipitation across the Southwest since the water year began on October 1 has been below average, largely a consequence of a dry winter (*Figures 2a–b*). While precipitation in most of Arizona has been less than 80 percent, New Mexico has fared worse. Rain and snow in most of the state has measured less than 70 percent of average, but central Arizona, especially northern Gila and southern Coconino counties, received average to above-average winter rain and snow. Gila County is also experiencing a wetter-than-average monsoon. Most of the winter storms that crossed the West missed New Mexico because persistent high pressure in the Southwest prevented storms from wafting into the region.

During the past 30 days, many parts of the Colorado Plateau and the southwestern counties of Arizona received more than 200 percent of average summer precipitation (*Figures 2c–d*). Only southern Maricopa and Mohave counties in Arizona are experiencing a significantly drier-than-average monsoon. Many regions in New Mexico also have been doused by an active monsoon, and rainfall has amounted to more than 125 percent of average across the state. Figures 2b and 2d reflect precipitation measured at many locations in the region, but the number of stations is inadequate to fully capture the variability in space characteristic of the monsoon. The monsoon, as always, has been localized, with significant precipitation at one location and almost none nearby. Nonetheless, the moisture in both states has helped reduce fire risk and improve rangeland conditions.



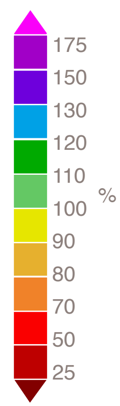
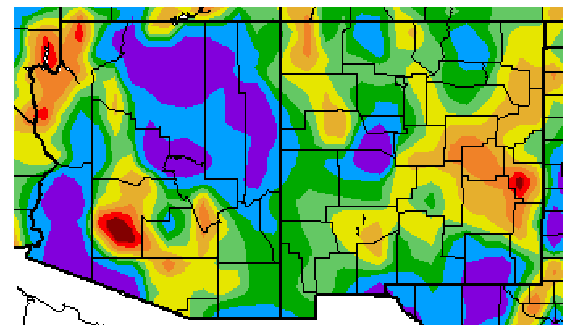


Figure 2a. Water year 2013 (October 1–August 14) percent of average precipitation (interpolated).



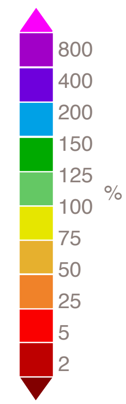
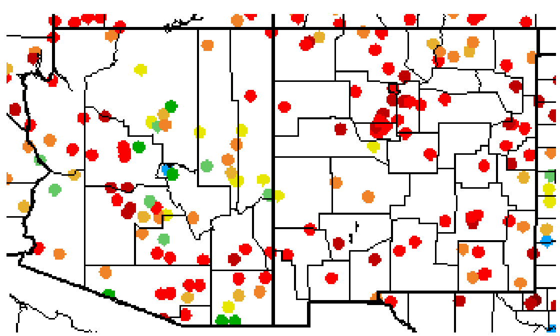


Figure 2c. Previous 30 days (July 16–August 14) percent of average precipitation (interpolated).



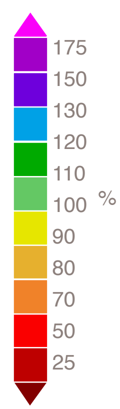
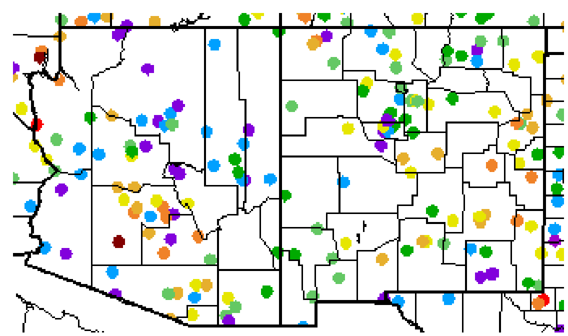


Figure 2b. Water year 2013 (October 1–August 14) percent of average precipitation (data collection locations only).



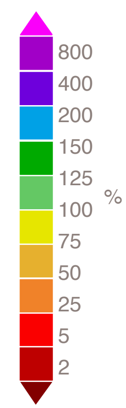


Figure 2d. Previous 30 days (July 16-August 14) percent of average precipitation (data collection locations only).

Online Resources

The weekly U.S. Drought Monitor
www.drought.gov/drought/

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.

U.S. Drought Monitor

DATA THROUGH AUGUST 13, 2013

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

Monsoon season precipitation helped improve short-term drought conditions across parts of the Southwest in the past month, but the rest of the West baked in above-average temperatures and below-average precipitation. Moderate or more extreme drought covers more than 78 percent of the western U.S. , with 56 percent of the area classified with at least severe drought, according to the August 13 update of the U.S. Drought Monitor (*Figure 3*). New Mexico continues to experience the most extensive extreme and exceptional drought. In the last month, the total area in the West classified with moderate drought changed little. The similar numbers, however, belie substantial spatial changes. Areas experiencing the largest deterioration in drought conditions occurred in eastern Oregon and western Idaho, where extreme drought replaced severe drought. Conditions also worsened in parts of Southern California due to the recent dry spell and above-average temperatures. In these parts of the West, the risk of wildfires remains high and several fires recently have grown and burned more than 100,000 acres. On the other hand, there was a 3 percent decrease in the area marked by exceptional drought; New Mexico and Colorado experienced the largest improvements in this category.

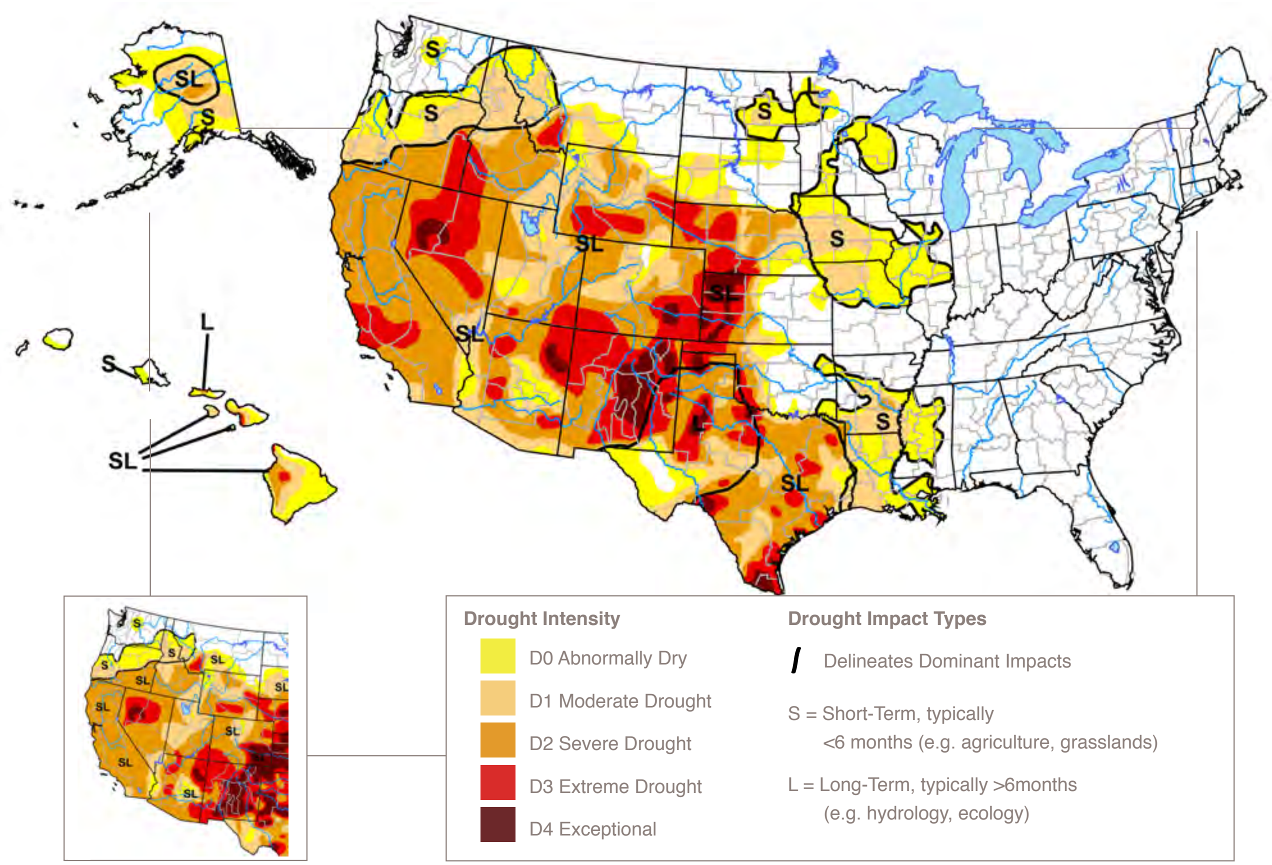


Figure 3. Drought Monitor data through August 13, 2013 (full size), and July 16, 2013 (inset, lower left).

Online Resources

Current drought status map
www.droughtmonitor.unl.edu/DM_state.htm?AZ,W

Monthly short-term and quarterly long-term Arizona drought status maps
www.azwater.gov/AzDWR/StatewidePlanning/Drought/DroughtStatus.htm

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.

Arizona Drought Status

DATA THROUGH AUGUST 13, 2013

Data Source: U.S. Drought Monitor

Monsoon precipitation has been bountiful in some areas of the state, helping improve short-term drought conditions in some regions. However, drought conditions were extensive and intense at the start of the monsoon season, and widespread and substantial improvements will likely only occur if the monsoon continues to produce copious rain and the upcoming winter delivers above-average rain and snow.

Currently, all of Arizona is at least abnormally dry, with severe or more intense drought covering 56 percent of the state, according to the August 13 update of the U.S. Drought Monitor (*Figures 4a–b*). This marks an improvement from one month ago in the area designated with severe, extreme, or exceptional drought, which stood at about 73 percent on July 13. The biggest short-term drought improvements, the result of above-average monsoon precipitation, were in southeast Arizona and along the high country of the Mogollon Rim. Some areas in southeast Arizona, including Douglas and Sierra Vista, recorded near-record or record precipitation totals during July. Douglas, for example, experienced its wettest July on record and is on track to notch its wettest summer. This very wet period prompted a two-category improvement in short-term drought conditions from severe in mid-July to abnormally dry in mid-August.

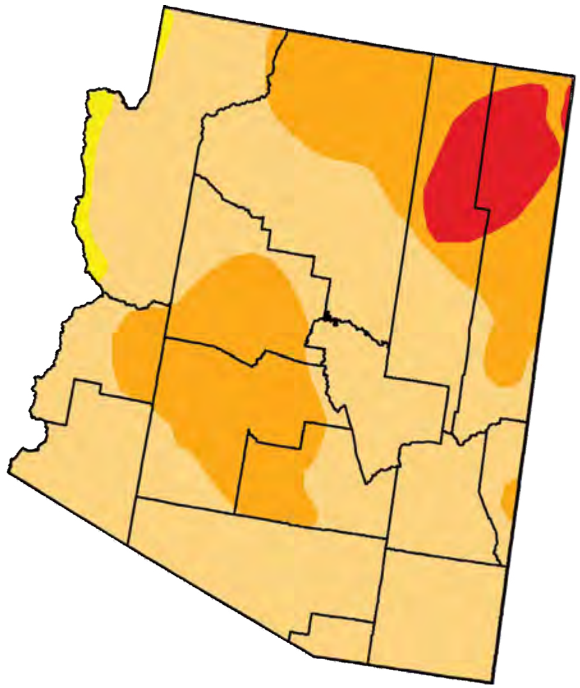


Figure 4a. Arizona drought map based on data through August 13.

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	85.78	56.39	20.86	3.04
Last Week (08/06/2013 map)	0.00	100.00	85.78	56.39	20.86	3.04
3 Months Ago (05/14/2013 map)	0.00	100.00	86.66	69.64	18.95	0.00
Start of Calendar Year (01/01/2013 map)	0.00	100.00	97.91	37.78	8.68	0.00
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	31.93	5.67	0.00
One Year Ago (08/07/2012 map)	0.00	100.00	100.00	93.97	24.91	0.00

Figure 4b. Percent of Arizona designated with drought conditions based on data through August 13.

Online Resources

Current drought status map
www.droughtmonitor.unl.edu/DM_state.htm?NM,W

Current Drought Status Reports
www.nmdrought.state.nm.us/MonitoringWorkGroup/wk-monitoring.html

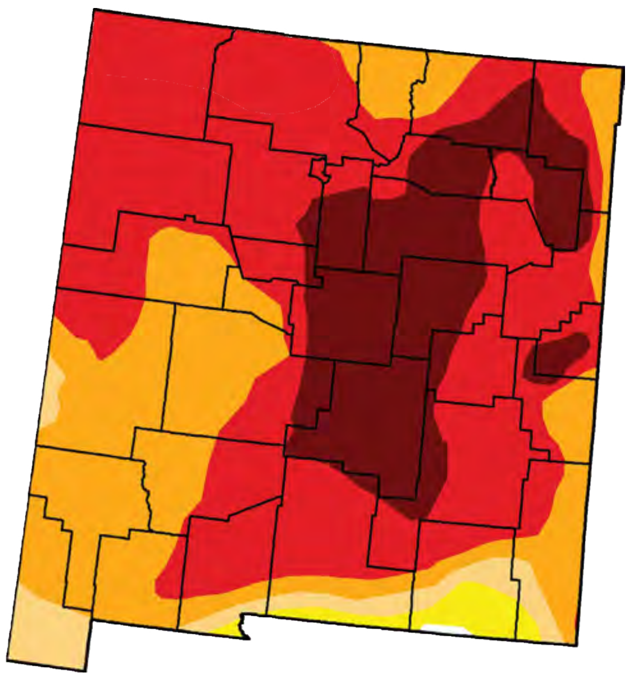
New Mexico Drought Status

DATA THROUGH AUGUST 13, 2013

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

Monsoon rain has been falling in the right places across almost all of New Mexico, helping spur improvements in short-term drought conditions. However, even with rainfall exceeding 125 percent of average in many parts of the state since July 1, a full recovery from drought conditions remains far off—drought is slow to develop and slow to disappear. The improvement in long-term drought conditions, which are most visible in water resources stored in reservoirs, requires many successive seasons of average or above-average conditions. Even with copious summer rains so far, the state, on average, has experienced 77 percent of average precipitation since October 1, when the water year began, due to a dry winter.

Currently, almost all of New Mexico is experiencing at least moderate drought, according to the August 13 update of the U.S. Drought Monitor (*Figures 5a–b*). Extreme and exceptional drought cover about 46 and 20 percent of the state, respectively. Despite these high numbers, intense drought has improved substantially in the last month, when extreme and exceptional drought covered 48 and 38 percent of the state, respectively. Also on the bright side, a small area of actual drought-free conditions cropped up in southern Eddy County, where summer precipitation has been 300–400 percent of average.



Drought Intensity

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

Figure 5a. New Mexico drought map based on data through August 13.

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.14	99.86	97.77	93.40	66.46	19.80
Last Week (08/06/2013 map)	0.14	99.86	98.65	93.61	68.84	20.60
3 Months Ago (05/14/2013 map)	0.00	100.00	99.04	97.63	81.68	44.14
Start of Calendar Year (01/01/2013 map)	0.00	100.00	98.83	94.05	31.88	0.97
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	62.56	12.25	0.66
One Year Ago (08/07/2012 map)	0.00	100.00	99.93	80.24	25.74	0.00

Figure 5b. Percent of New Mexico designated with drought conditions based on data through August 13.

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.

Online Resources

Portions of the information provided in this figure can be accessed at NRCS
http://1.usa.gov/19e2BdJ

Notes

The map gives a representation of current storage 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 (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 (dotted line) and the 1971–2000 reservoir average (red line).

The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage 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 Resources Conservation Service (NRCS).

Arizona Reservoir Volumes

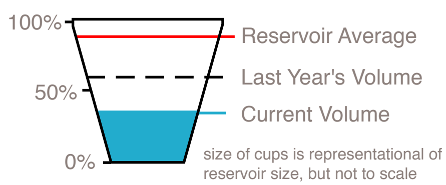
DATA THROUGH AUGUST 7, 2013

Data Source: National Water and Climate Center

Combined storage in Lakes Mead and Powell stood at 46.5 percent of capacity as of July 31 (*Figure 6*), a decrease of 561,000 acre-feet from the previous month and about 10 percent lower than it was one year ago. The water elevation of Lake Powell peaked in mid-June and will continue to decline until spring 2014. Monsoon rainfall gave a small boost to San Carlos Reservoir storage, which increased for the first time in many months. Combined storage in the Salt and Verde river basins decreased by about 45,000 acre-feet and currently stands at 56 percent of capacity, down almost 3 percent from last year, and at about 82 percent of average.

In water-related news, the White Mountain Apache Tribe and the U.S. Department of the Interior signed a water rights agreement on July 30 that guarantees the tribe 23,000 acre-feet per year of water from the Central Arizona Project (*Cronkite News*, July 30). This ends a long-standing legal dispute and resolves issues related to Phoenix metropolitan water users, who depend on water originating in the Salt River watershed, which flows through the White Mountain Apache Tribe Reservation.

Legend



Reservoir Name	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Lake Powell	46%	11,202.0	24,322.0	-555.0
2. Lake Mead	5%	12,27.0	26,159.0	-6.0
3. Lake Mohave	95%	1,711.1	1,810.0	0.0
4. Lake Havasu	95%	589.9	619.0	1.2
5. Lyman	10%	3.1	30.0	0.3
6. San Carlos	0%	1.1	875.0	0.8
7. Verde River System	62%	177.0	287.4	4.1
8. Salt River System	55%	1,111.1	2,025.8	-49.5

*thousands of acre-feet

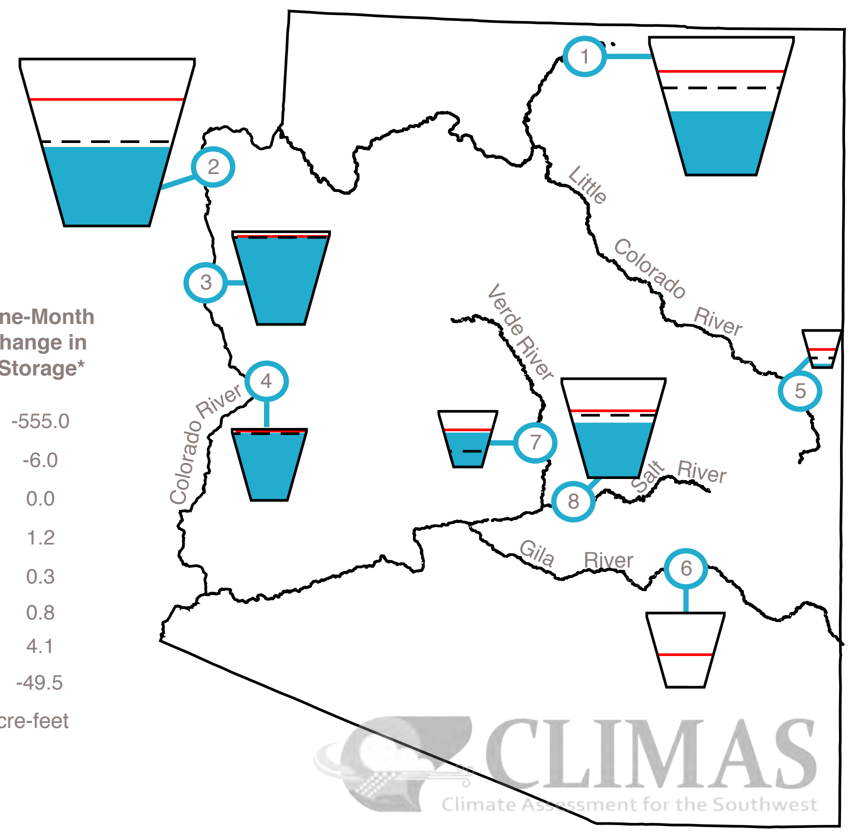


Figure 6. Arizona reservoir volumes for the end of July as a percent of capacity. The map depicts the average volume and last year's storage for each reservoir. The table also lists current and maximum storage, and change in storage since last month.

Online Resources

Portions of the information provided in this figure can be accessed at NRCS

www.wcc.nrcs.usda.gov/wsf/reservoir/resv_rpt.html

Notes

The map gives a representation of current storage 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 (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 (dotted line) and the 1971–2000 reservoir average (red line).

The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage 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 Resources Conservation Service (NRCS).

New Mexico Reservoir Volumes

DATA THROUGH AUGUST 7, 2013

Data Source: National Water and Climate Center

Combined water storage in the 15 New Mexico reservoirs reported here was 16.5 percent of capacity and only 36.6 percent of average as of July 31 (*Figure 7*). New Mexico total reservoir storage decreased by 16,000 acre-feet in the last month, primarily as a result of decreases in Navajo and Heron reservoirs in northern New Mexico. Storage in several New Mexico reservoirs increased during the last month, due to much needed summer monsoon precipitation. Elephant Butte Reservoir is still at an exceedingly low 3.4 percent of capacity. These reservoir levels reflect the effect of two consecutive years of extremely low snowpack in the mountain ranges in northern New Mexico and southern Colorado from which most of the water originates.

In water-related news, the Ogallala Aquifer, which lies under Portales and other eastern New Mexico towns, is decreasing at a rate of about four feet per year, signifying "an impending crisis," according to the program manager of the Ute Water Project (*Portales News-Tribune*, July 25). The federally approved Ute Water Project will pipe water from the Ute Reservoir in eastern New Mexico's Quay County to Curry and Roosevelt counties, helping to diversify water resources. Phase one of the project will be completed in 10 years, about the life of the Ogallala Aquifer's saturated sediments at current rates of depletion.

Legend

Reservoir Name	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	52%	887.1	1,696.0	-68.3
2. Heron	27%	106.0	400.0	-18.6
3. El Vado	9%	16.3	190.3	-5.5
4. Abiquiu	12%	138.8	1,192.8	13.4
5. Cochiti	10%	47.1	491.0	-0.2
6. Bluewater	6%	2.4	38.5	-0.1
7. Elephant Butte	3%	74.5	2,195.0	4.1
8. Caballo	18%	59.5	332.0	38.0
9. Lake Avalon	60%	2.4	4.0	N/A
10. Brantley	1%	5.9	1,008.2	N/A
11. Sumner	4%	4.5	102.0	N/A
12. Santa Rosa	2%	8.4	438.3	5.1
13. Costilla	13%	2.1	16.0	-0.9
14. Conchas	5%	13.9	254.2	13.9
15. Eagle Nest	29%	22.9	79.0	N/A

N/A–value not available

* thousands of acre-feet

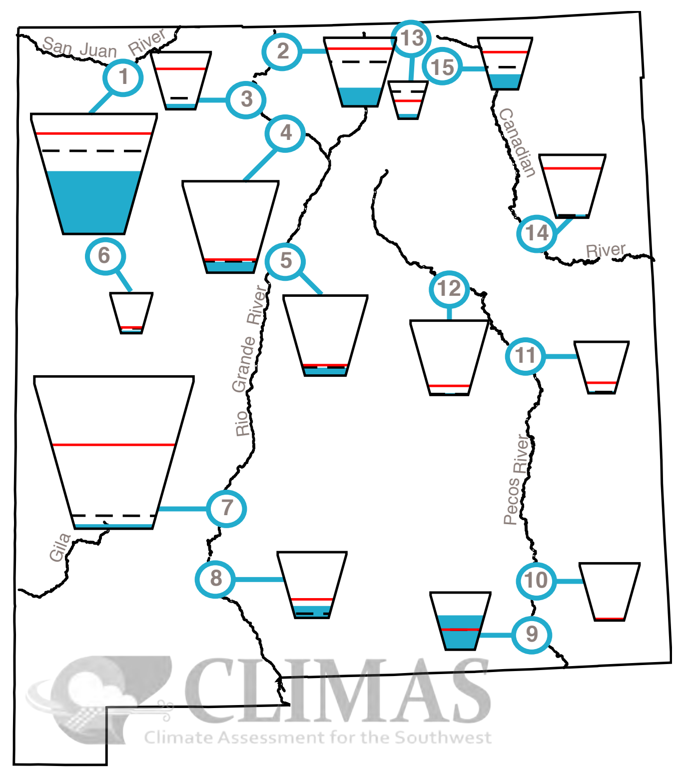


Figure 7. New Mexico reservoir volumes for July as a percent of capacity. The map depicts the average volume and last year's storage for each reservoir. The table also lists current and maximum storage, and change in storage since last month.

Southwest Fire Summary

DATA THROUGH: AUGUST 11, 2013

Source: Southwest Coordination Center

A decrease in fire activity accompanies the onset of the monsoon. The median dates for the end of the peak fire season in Arizona are between July 7 and 15 in the eastern half of the state and July 15 and August 1 in the state's western half. In New Mexico, the median dates mostly fall in the first week of July. Between 2000 and 2012, for example, only about 10 percent of the acres burned during the calendar year occurred after July.

This year, despite widespread and intense drought conditions that increased the risk of large wildland fires, the number of acres burned has been below average in both states. As of August 11, wildland fires have charred about 85,000 acres in Arizona, about 200,000 acres below the 2000–2012 average. In New Mexico, wildland fires consumed about 197,000 acres, 139,000 of which burned in the Silver Fire in the Gila National Forest (*Figures 8a–c*). Between 2000 and 2013, about 314,000 burned on average in New Mexico. Since July 1, when monsoon activity began in earnest, only five fires have ignited in Arizona and only two in New Mexico. Each of these fires has burned less than 1,000 acres to date.

While these totals are both below average for this time of year, the 2013 fire season has been tragic. Low humidity, high temperatures and extremely dry and dense fuels created a worst-case fire scenario near Prescott, Arizona. On June 30, a passing thunderstorm abruptly reversed the wind direction and trapped 19 firefighters between two ridges; these men ultimately lost their lives in the Yarnell Fire.

Fire risk was downgraded to level 1 on July 19. Level 1 risk is present when conditions are not conducive for frequent large fire growth in most of the Southwest and normal fire-fighting staff is adequate. Level 1 usually is present during the winter or when rain conditions or green fuel conditions predominate. A level 4 risk, which was present from June 3 to July 9, occurs when large fire behavior and threats to life and property are high. In coming months, fire risk will likely not increase unless an unusually long break in the monsoon brings hot and dry conditions.

State	Human Caused Fires	Human caused acres	Lightning caused fires	Lightning caused acres	Total Fires	Total Acres
AZ	659	29,151	451	56,296	1,110	85,447
NM	477	44,581	449	152,680	926	197,261
Total	1,136	73,732	900	208,976	2,036	282,708

Figure 8a. Year-to-date wildland fire information for Arizona and New Mexico as of August 11, 2013.

Figure 8b. Arizona large fire incidents as of August 11, 2013.

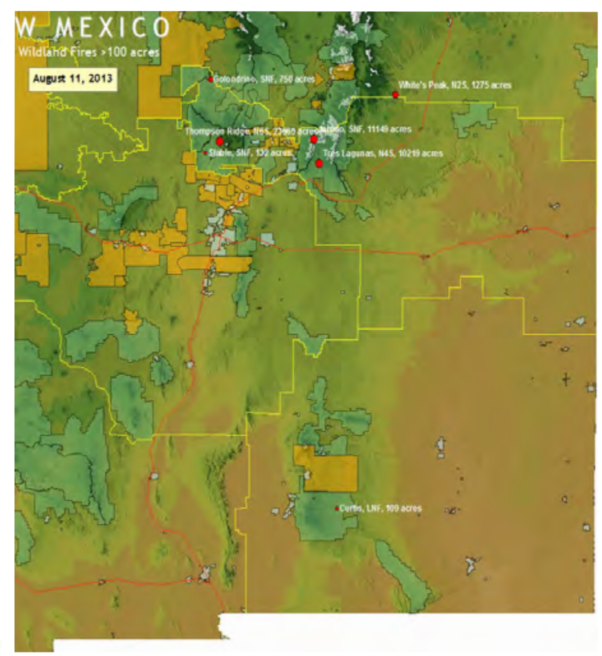


Figure 8c. New Mexico large fire incidents as of August 11, 2013.

Online Resources

Data obtained from the Southwest Coordination Center

gacc.nifc.gov/swcc/predictive/intelligence/daily/ytd_large_wf.pdf

gacc.nifc.gov/swcc/predictive/intelligence/ytd_historical/ytd/wf/large_fires/swa_ytd_large_fires.htm

Notes

The fires discussed here have been reported by federal, state, or tribal agencies during 2013. The figures include information both for current fires and for fires that have been suppressed. The table shows year-to-date fire information for Arizona and New Mexico. Prescribed burns are not included in these numbers. The two figures indicate the approximate locations of past (in 2013) and present "large" wildland fires 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.

Online Resources

Data obtained from High Plains Regional Climate Center
www.hprcc.unl.edu/maps/current/

Notes

The continuous color maps (figures at right) 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.

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. Departure from average precipitation is calculated by subtracting the average from the current precipitation.

Monsoon Summary

DATA BETWEEN JUNE 15-AUGUST 13, 2013

Data Source: Western Regional Climate Center

The first half of the monsoon produced generally wetter-than-average conditions across much of the Southwest, particularly in southeast Arizona (*Figure 9a*). However, the monsoon has been spotty, and the spatial extent of rainfall in July was different than in August.

The monsoon started off around July 1 in southeast Arizona and slightly later in regions to the north. For many locations in both Arizona and New Mexico, the monsoon delivered more than 200 percent of average precipitation in July. Storms in the White Mountains and San Francisco Peaks areas, as well as the Rio Grande Valley in central New Mexico, doused the landscape with more than two inches of rainfall. Rain gauges at airports in major metropolitan areas in Arizona and New Mexico—Yuma, Phoenix, Tucson, and Albuquerque—logged above-average rain (El Paso has also received above-average rain). The hardest hit region was around Douglas along the Mexico-U.S. border in Arizona. The Douglas airport recorded 10.12 inches of rain, making it the wettest July there since 1948. A series of low-pressure systems boosted wet conditions. One of these originated in the Gulf of Alaska and flowed over Canada and the northern United States before dipping south toward Pennsylvania where it began wafting West. Eventually, this system meandered into the Southwest, where it lingered for several days. Systems like this tend to bring overnight showers and thunderstorms with activity lasting into the early morning, modifying the usual pattern of afternoon rainfall.

The first two weeks of August were generally dry for most of southern Arizona and in the metropolitan areas noted above, whose airports have yet to record substantial rainfall. Douglas and many regions in New Mexico, however, continue to experience copious rain. Combining July and August precipitation, even with dry conditions in some parts, paints the Southwest as generally wetter than average (*Figures 9b–c*). This is welcome news for a region in the throes of widespread drought, which has improved slightly since the monsoon began (see Arizona and New Mexico Drought Status).

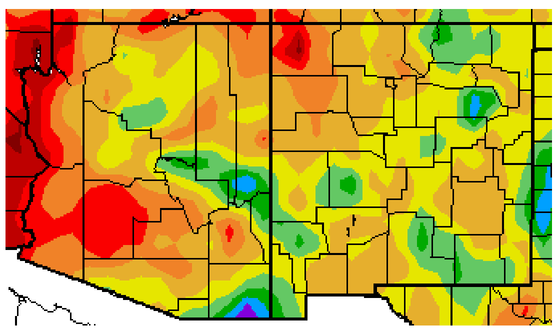
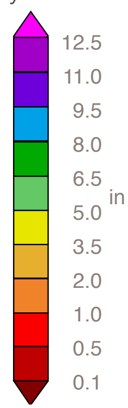



Figure 9a. Total precipitation in inches for June 15– August 13, 2013.

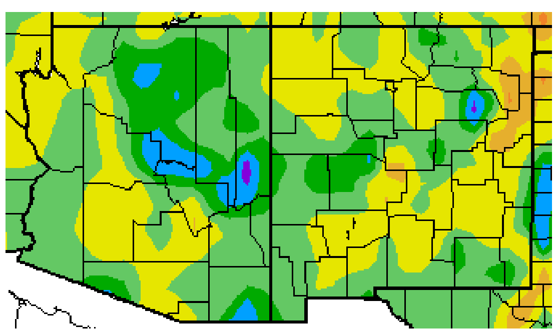
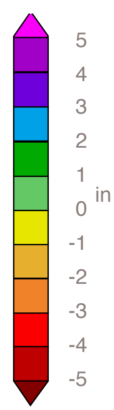



Figure 9b. Departure from average precipitation in inches for June 15–August 13, 2013.

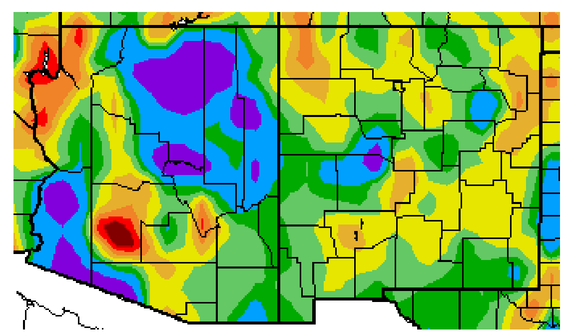
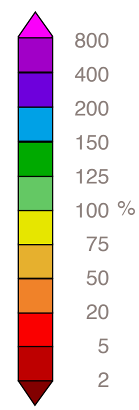



Figure 9c. Percent of average precipitation for June 15–August 13, 2013.

Online Resources

CPC forecasts
www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.php

Seasonal temperature forecast downscaled to the local scale
www.weather.gov/climate/l3mto.php

IRI forecasts
iri.columbia.edu/climate/forecast/net_asmt/

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 three-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 a 33.3 percent 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 40.0–49.9 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.

Temperature Outlook

FORECAST PERIOD: SEPTEMBER 2013–FEBRUARY 2014

Data Source: NOAA-Climate Prediction Center (CPC)

The seasonal temperature outlooks issued by the NOAA-Climate Prediction Center (CPC) in August call for increased chances that temperatures will be similar to the warmest 10 years in the 1981–2010 period for the three-month seasons spanning September through February (*Figures 10a–d*). The seasonal forecast for the September–November period is based largely on dynamical models. The seasonal forecasts for the other periods are based on a suite of decision support tools, including long-term trends.

For the September–November period, forecasts indicate a 50–60 percent chance that temperatures will be above average, and the most likely range of temperature anomalies is between 0.6 and 1.0 degrees F above average in all of Arizona. There are slightly lower anomalies in New Mexico. The expected temperature anomalies increase from east to west, with the largest in northwest and southeast Arizona. Chances for above-average temperatures are between 40¬ and 50 percent for the October–December and November–January periods.

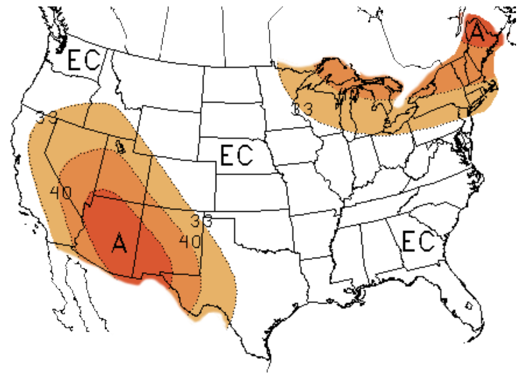


Figure 10a. Long-lead national temperature forecast for September–November 2013.

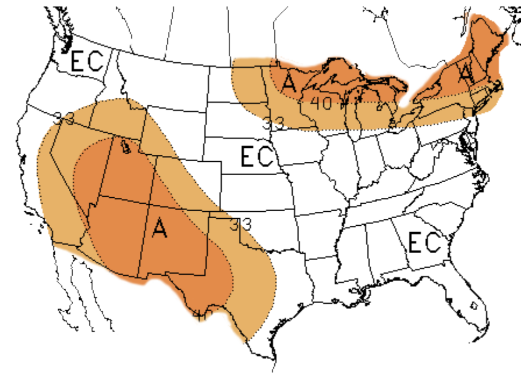


Figure 10b. Long-lead national temperature forecast for October–December 2013.

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

B = Below average: 40.0–49.9%, 33.3–39.9%

EC = Equal chances. No forecasted anomalies.

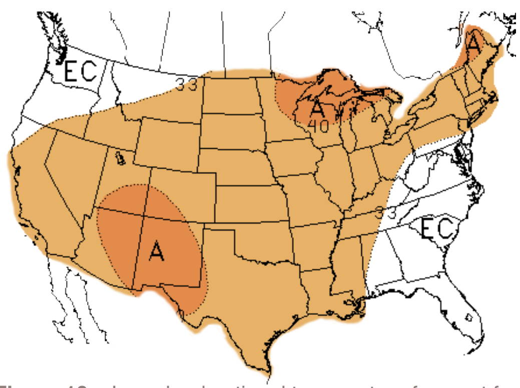


Figure 10c. Long-lead national temperature forecast for November–January 2014.

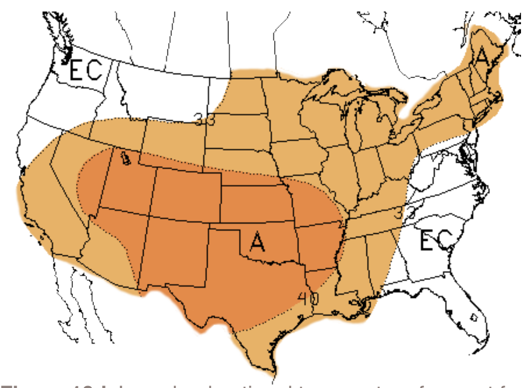


Figure 10d. Long-lead national temperature forecast for December–February 2014.

Online Resources

CPC forecasts
www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.php

Seasonal temperature forecast downscaled to the local scale
www.weather.gov/climate/l3mto.php

IRI forecasts
iri.columbia.edu/climate/forecast/net_asmt/

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 a 33.3 percent 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 40.0–49.9 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.

Precipitation Outlook

FORECAST PERIOD: SEPTEMBER 2013–FEBRUARY 2014

Data Source: NOAA-Climate Prediction Center (CPC)

The seasonal precipitation outlooks issued by the NOAA-Climate Prediction Center (CPC) in August call for equal chances that precipitation will be above-, below-, or near-average for the Southwest during the September–February periods (*Figures 11a–d*). This forecast in part reflects the expectation that the El Niño- Southern Oscillation (ENSO) may remain in a neutral state (see El Niño-Southern Oscillation). ENSO-neutral events can bring both above- and below-average rain and snow to the Southwest; La Niña conditions usually deliver below-average precipitation. Tropical Pacific Ocean storms and hurricanes are also a source of uncertainty and usually waft into the region during the September–November period. It is difficult projecting the frequency of these events as well as their storm tracks.

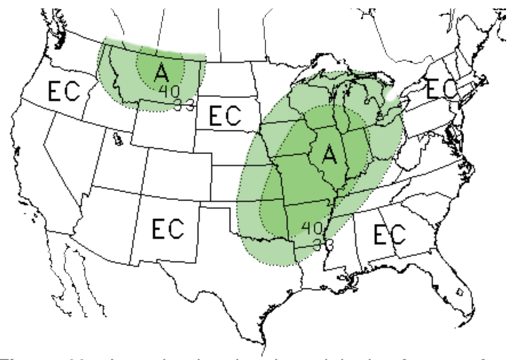


Figure 11a. Long-lead national precipitation forecast for September–November 2013.

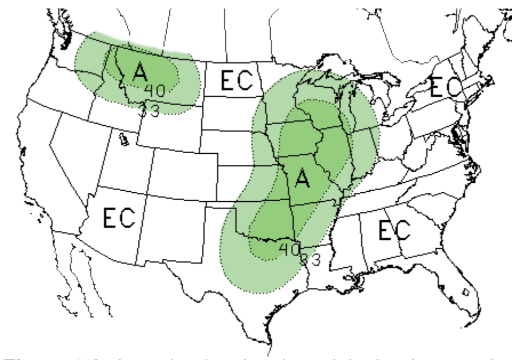
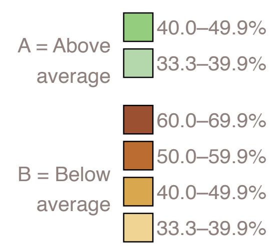


Figure 11b. Long-lead national precipitation forecast for October–December 2013.



EC = Equal chances. No forecasted anomalies.

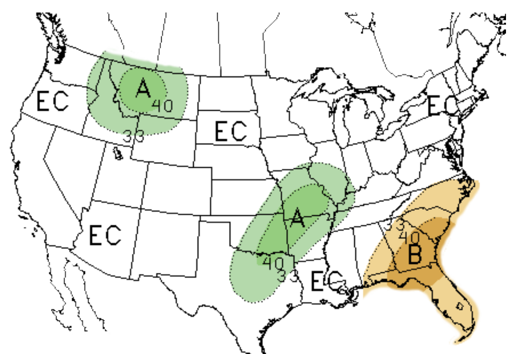


Figure 11c. Long-lead national precipitation forecast for November–January 2014.

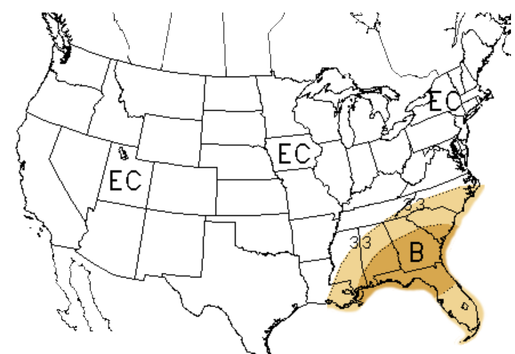


Figure 11d. Long-lead national precipitation forecast for December–February 2014.

Online Resources

More information

www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.html

Medium- and short-range forecasts

www.cpc.ncep.noaa.gov/products/forecasts/

Soil moisture tools

www.cpc.ncep.noaa.gov/soilmst/forecasts.shtml

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.

Seasonal Drought Outlook

DATA THROUGH NOVEMBER 2013

Data Source: NOAA-Climate Prediction Center (CPC)

This summary is partially excerpted and edited from the August 15 Seasonal Drought Outlook technical discussion produced by the NOAA-Climate Prediction Center (CPC) and written by forecaster B. Pugh.

Drought improvement is expected for parts of Colorado, New Mexico, and Arizona in coming months, particularly in New Mexico (*Figure 12*). Drought is also expected to persist in many areas in the Southwest. Drought improvement is noted because the September precipitation outlook issued by the NOAA-Climate Prediction Center (CPC) indicates enhanced odds for above average precipitation. In addition, the 6-10 day outlook tilts the odds toward above average precipitation across eastern Colorado. Since rainfall associated with the monsoon diminishes during September, forecast confidence for widespread drought improvement across Arizona, Colorado, and New Mexico is low.

Elsewhere in the West, drought is forecast to persist across the Great Basin, intermountain West, and northern half of the Rocky Mountains. Since decision support tools suggest above-average temperatures will accompany dry weather from August 16–30, drought may worsen across these areas. While the CPC seasonal outlook for the September–October period suggests slightly enhanced odds for above average precipitation across northern Idaho and Montana, precipitation later in this period is expected to be offset by hot, dry weather during the remainder of August. The CPC assigns a high confidence in this forecast.

Along the West Coast, the wet season usually doesn't begin until later in the September–November period and historically delivers 20–30 percent of the annual precipitation to northern California and southwest Oregon. Farther south, across central and Southern California, only 10 to 20 percent of the region's annual precipitation occurs during the September–November period. Due to the relatively dry climatology until late in the period, drought persistence is forecast for the West Coast. The CPC assigns a high confidence for this forecast.

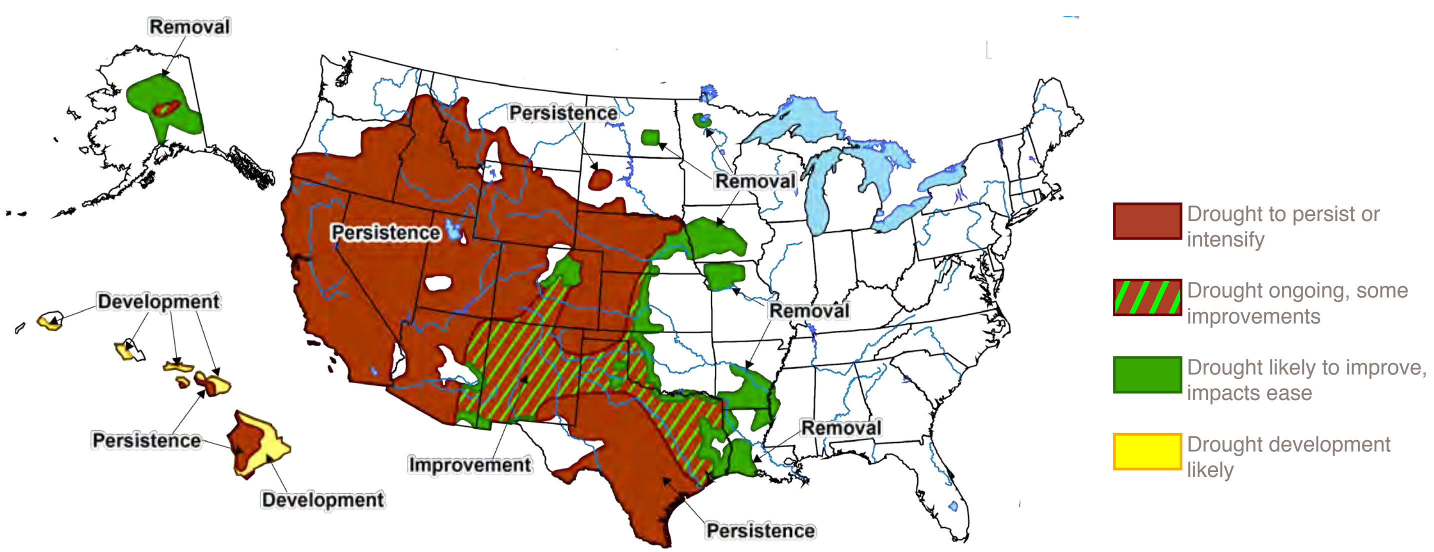


Figure 12. Seasonal drought outlook through November 2013 (released August 15).

Online Resources

National Wildland Fire Outlook
www.predictiveservices.nifc.gov/outlooks/outlooks.htm

Southwest Wildland Fire Outlook
gacc.nifc.gov/swcc/predictive/outlooks/seasonal/Fire_Season_Potential_and_Outlook.htm

Notes

The National Interagency Coordination Center at the National Interagency Fire Center produces seasonal wildland fire outlooks each month. They are subjective assessments that synthesize information provided by fire and climate experts throughout the United States. The forecast (Figure 13) considers observed climate conditions, climate and weather forecasts, vegetation health, and surface-fuels conditions in order to assess potential for fires greater than 100 acres.

Wildland Fire Outlook

FORECAST PERIOD: SEPTEMBER 2013

Sources: National Interagency Coordination Center, Southwest Coordination Center

The September forecast, issued by the National Interagency Coordination Center, calls for normal wildland fire activity, which will likely be present through the winter (*Figure 13*).

The onset of monsoon precipitation in southern portions of Arizona and New Mexico occurs around July 1 and peak fire activity wanes soon thereafter. During the 2000–2012 period, on average only 10 percent of the total acres burned in the calendar year occurred after July. This summer has followed that pattern. As of August 11, only 3,388 and 882 acres have burned since July 1 in Arizona and New Mexico, respectively, while 82,612 and 185,118 burned before July 1. Consequently, fire risk was downgraded to level 1 on July 19. Level 1 risk is present when conditions are not conducive for frequent large fire growth in most of the Southwest and normal fire-fighting staff is adequate. Level 1 risk usually occurs during the winter or when rain conditions or green fuel conditions predominate. Grasslands may be more prone to fires during the monsoon season, as they can dry out quickly from breaks in the monsoon.

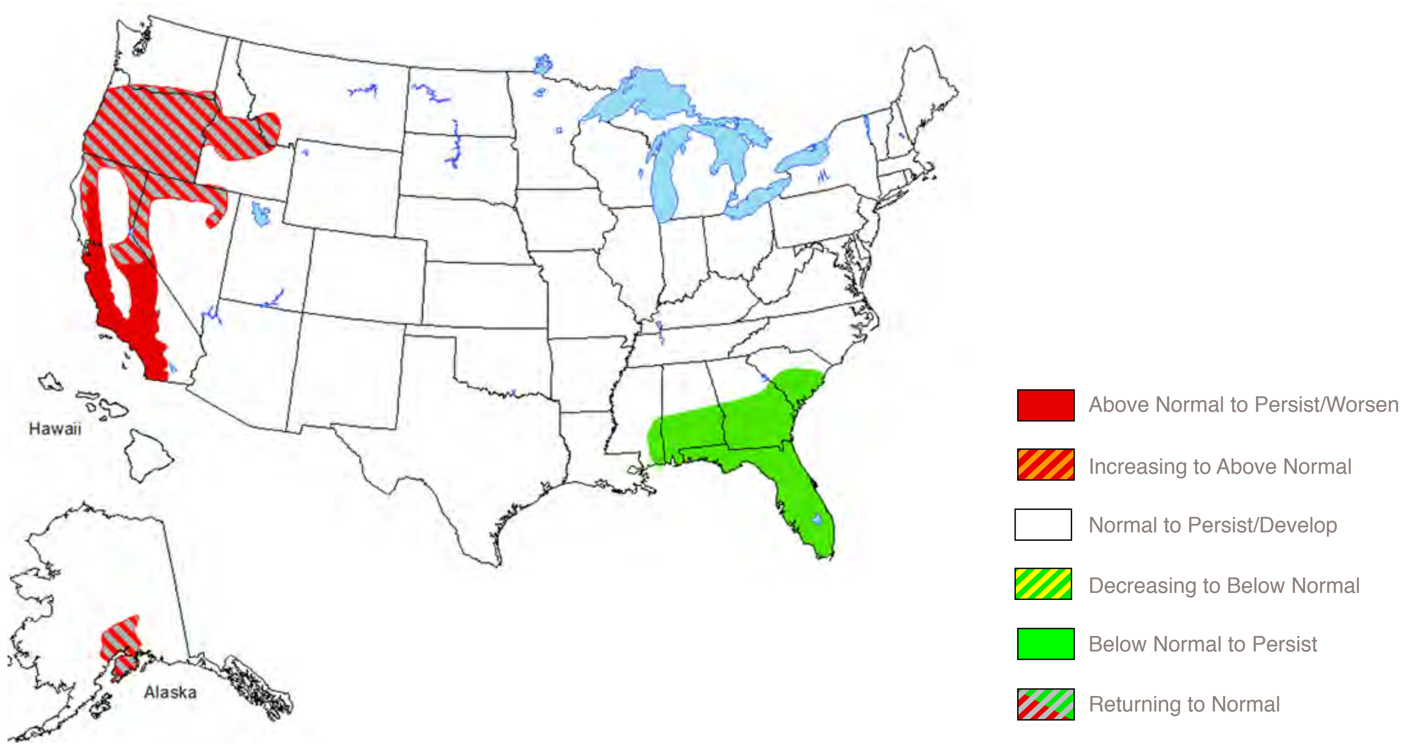


Figure 13. National wildland fire potential for fires greater than 100 acres for September 2013.

El Niño Status and Forecast

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

The El Niño-Southern Oscillation (ENSO) remains neutral, as sea surface temperatures (SSTs) have been close to average across the tropical Pacific Ocean. The upper and lower atmospheric winds also have been close to average for this time of year, an additional indication that the neutral conditions are firmly entrenched in the Pacific region. The Southern Oscillation Index (SOI), a measure of the atmospheric circulation patterns, remains neutral (*Figure 14a*). These signs suggest that the development of either an El Niño or La Niña event is not imminent.

Official SST outlooks issued jointly by the NOAA-Climate Prediction Center (CPC) and International Research Institute for Climate and Society (IRI) support neutral conditions persisting into spring 2014. The outlook for the August–October period indicates more than a 73 percent chance that neutral conditions will continue, less than a 19 percent chance that a La Niña event will develop, and about an 8 percent chance that an El Niño event will emerge (*Figure 14b*). The outlook for neutral conditions is at or above 55 percent through May 2014. However, the CPC notes that the variability in ENSO models is unusually high for this time of the year, indicating uncertainty in these outlooks, especially in those periods farther in the future. Statistical models generally show a progression towards cooler SSTs, which would characterize a borderline La Niña event, while dynamical models are showing warmer SSTs, reflecting a borderline El Niño event. The consensus forecast, therefore, falls in the middle with neutral conditions. The uncertainty, however, bears monitoring over the next several months. The temperature and precipitation outlooks are in part based on the expectation of ENSO-neutral conditions. If ENSO changes direction in coming months, these forecasts also will likely change.

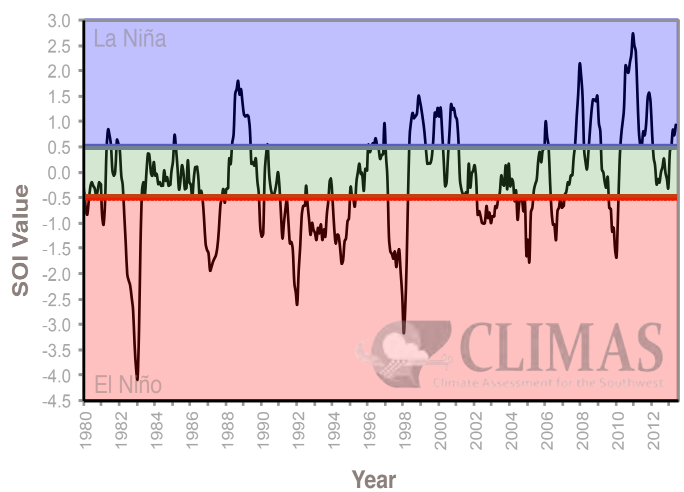


Figure 14a. The standardized values of the Southern Oscillation Index from January 1980–July 2013. La Niña/El Niño occurs when values are greater than 0.5 (blue) or less than -0.5 (red), respectively. Values between these thresholds are relatively neutral (green).

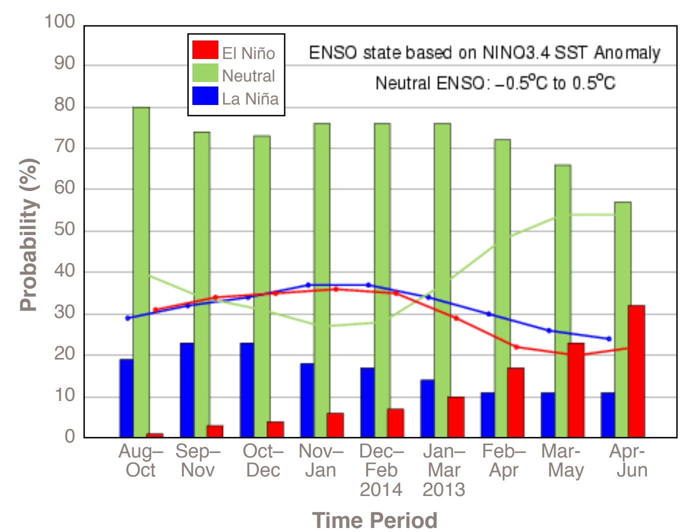


Figure 14b. IRI probabilistic ENSO forecast for the Niño 3.4 monitoring region (released August 15). Colored lines represent average historical probability of El Niño, La Niña, and neutral conditions.

Online Resources

Technical discussion of current El Niño conditions
www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

Information about El Niño and graphics similar to these figures
iri.columbia.edu/climate/ENSO/

Notes

The first figure shows the standardized three-month running average values of the Southern Oscillation Index (SOI) from January 1980 through June 2013. 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.