Issued: October 24, 2007

Southwest Climate Outlook

THE UNIVERSITY OF ARIZONA.

Source: *Philip Greenspun, http://philip.greenspun.com/*

Photo Description: A photograph of the Rio Grande. One of the top five headlines for Water Year 2007 is that the World Wildlife Fund (WWF) named the Rio Grande among the top ten rivers at risk in the world. You can read the WWF press release and link to the full report at: http://www.worldwildlife.org/news/displayPR.cfm?prID=363.

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CLIMAS

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THE UNIVERSITY OF ARIZONA • COLLEGE OF AGRICULTURE AND LIFE SCIENCES

SAHRA

Water Sustainability
THE UNIVERSITY OF ARIZONA.

In this issue...

October Climate Summary

Drought – Short-term drought conditions have improved slightly across Arizona due to some precipitation from frontal storms in September, while conditions across northeastern New Mexico have worsened. The National Drought Monitor continues to show moderate to severe drought across much of Arizona with some expansion into New Mexico due to persistent below-average precipitation levels over the past several months.

Temperature – Temperatures were generally below-average across most of Arizona. New Mexico saw the opposite pattern, with temperatures above-average over the past thirty days.

Precipitation – Both Arizona and New Mexico observed below-average precipitation across most areas over the past thirty days. Many locations in central Arizona and central New Mexico saw precipitation amounts of less than 25 percent of average for the period.

Climate Forecasts – Seasonal climate forecasts indicate above-average temperatures and below-average precipitation in the Southwest through the fall and into the winter season. Developing La Niña conditions are responsible for the below-average precipitation forecast while long-term trends in increasing temperatures strongly influence the temperature forecast.

The Bottom Line – La Niña is the big story this month with the prospect of below-average precipitation amounts plaguing the Southwest this upcoming winter. Recent below-average precipitation amounts across Arizona and New Mexico as well as the development of new drought impacts across New Mexico may continue to expand and increase through the late fall into the winter season.

New CLIMAS program manager

At the beginning of October 2007 Daniel Ferguson took over as the Climate Assessment for the Southwest (CLIMAS) program manager. Since 2005 Dan has been working at the Institute for the Study of Planet Earth (ISPE) as a staff social science researcher. Before coming to ISPE Dan spent four years working as a project manager at the Arctic Research Consortium of the US in Fairbanks, Alaska, where he was responsible for coordinating the science management offices for the National Science Foundation's Arctic System Science and Human Dimensions of the Arctic System programs.

As the CLIMAS program manager, Dan will be responsible for the day-to-day operations of the core office, coordination of the research team, and coordination and implementation of new and existing core office work with our stakeholder network.

For more info visit http://www.ispe.arizona.edu/climas/...

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SWCO Staff:

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2007 SWCO water year in review

Introduction

The 2007 Water Year in Review offers a summary of the information presented in each month's outlook during the 2007 water year. This review provides an overview of precipitation, temperature, reservoir and streamflow levels, drought, wildfire, and El Niño conditions.

The water year begins on October 1 and ends on September 30 of the following year, so this review covers October 1, 2006 through September 30, 2007. As of October 1, 2007, we are in the 2008 water year. The water year is a more hydrologically sound measure of climate and hydrological activity than the calendar year.

The 2007 water year was an interesting twelve months with respect to the El Niño-Southern Oscillation, as a weak El Niño at the beginning of the water year gave way to a La Niña event by year's end. The disappearing El Niño generally shortchanged Arizona in terms of precipitation, but benefited New Mexico. The transition to La Niña conditions could bring below-average winter precipitation to the region in the upcoming months.

Echoing precipitation totals, statewide reservoir storage fell in Arizona for the second consecutive water year but increased in New Mexico by about 2 percent. The dry Arizona winter contributed to worsening drought conditions in the state through the year, although the summer monsoon season brought some relief. New Mexico remained mostly drought-free.

Timely spring precipitation, however, helped temper this year's high fire potential, resulting in a mild fire season compared to the last five years. The water year was warmer-than-average in Arizona and New Mexico but cooler than the previous two years, with some record-setting freezing temperatures.

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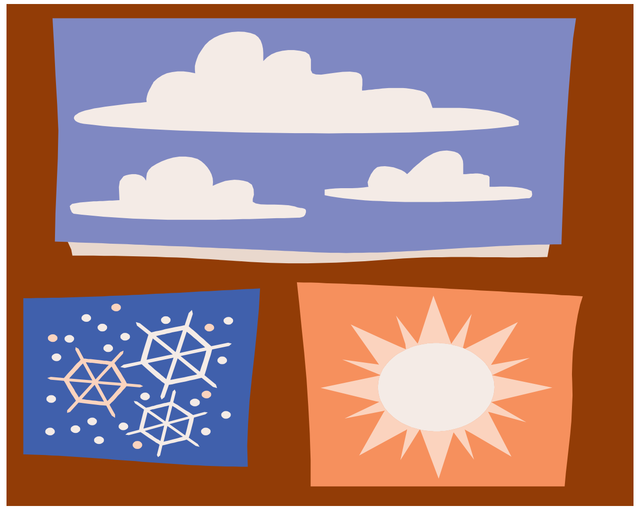

Top 5 headlines of the water year

1) **El Niño 2006–07:** A weak El Niño episode steered winter storms around Arizona, often to the south, leaving the state high and dry while delivering above-average winter precipitation to New Mexico. Statewide, New Mexico had the 35th wettest winter half-year (November–April) in 113 years of records. Arizona, meanwhile, had the eleventh driest.

2) **Endangered Rio Grande:** The World Wildlife Fund named the Rio Grande among the top ten rivers at risk in the world. The organization cited water diversions, water pollution, and side effects of dam operations, such as siltation, as the major causes endangering the river's unique ecosystem and undermining economic growth of communities along the United States-Mexico border.

3) **Desalting Plant Fired-Up Again:** The U.S. Bureau of Reclamation's Colorado River desalting plant at Yuma was tested for a three-month period during spring 2007. The plant was run at 10 percent of capacity to evaluate new treatment technologies and the cost-effectiveness of running the facility, given concerns about ongoing drought in the Colorado River Basin. It was the first time the plant was operated for almost fifteen years.

4) **Southwest Wildland Fire Season Fizzles:** Despite a high potential for wildland fire across the southern half of Arizona and New Mexico, acres burned across the region were well below the historic average. Regional acres burned reached their lowest levels since the 2001 wildland fire season. Timely late spring precipitation, high preparedness, and rapid fire fighting responses helped diminish fire threats.

5) **Climate Models Predict Dry Southwest:** Studies by the Intergovernmental Panel on Climate Change and by researchers at Columbia University showed an increasing likelihood that the Southwest will dry during the twenty-first century. Model predictions indicate that a combination of increasing temperatures—with impacts on spring snowmelt—and northward movement of storms will diminish winter moisture and lessen the reliability of snow-fed surface water supplies.

WYIR, continued

Precipitation

In terms of precipitation, the 2007 water year was disappointing for most of Arizona and better than average for much of New Mexico (Figures 1a–1b). Expectations of precipitation had been high last fall as a moderate El Niño was developing. However, the warm eastern Pacific sea surface temperatures that drive the El Niño circulation quickly cooled in December and January, shifting the winter storm tracks north of Arizona.

New Mexico benefited from moisture moving westward through Texas, coupled with the tail end of a number of cold fronts that triggered winter storms. Taos County in the north, Socorro County in central New Mexico, and the southeastern corner of New Mexico received 130 to above 175 percent of average precipitation, mostly during the winter and spring months.

Most of Arizona had less than 80 percent of average precipitation for the water year, and the lion's share fell during the monsoon. Phoenix recorded 3.23 inches of rain for the water year, 5 inches below normal (Table 1). The monsoon season was the fourth driest on record in Phoenix, with 0.74 inches of rain falling at Sky Harbor International Airport, where the normal is 2.77 inches.

The wettest conditions for the year were found in counties bordering New Mexico. The winners in terms of monsoon moisture were around Williams, Arizona, and Taos, New Mexico, with 3–6 inches above-average rainfall. The driest conditions were in southwestern Arizona and southeastern California where less than 50 percent of average precipitation fell. Through September 1, 0.26 inches of rain had fallen in Yuma. But on September 2, flash flooding occurred as a thunderstorm pushed through the area, dropping two inches of rain on the area.

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Figure 1a. Water year 2006–2007 through September 30, 2007 departure from normal precipitation.*

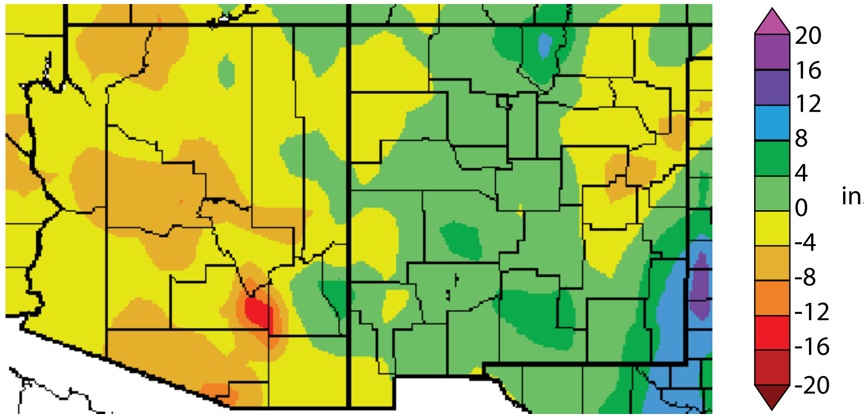
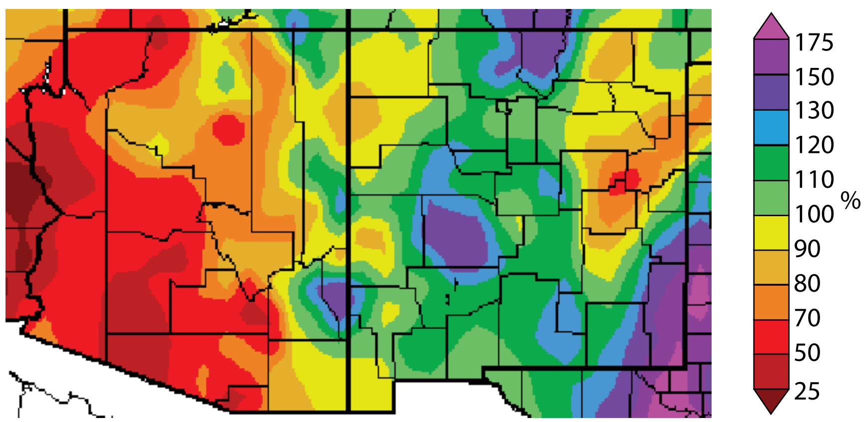


Figure 1b. Water year 2006–2007 through September 30, 2007 percent of average precipitation.*



** See "Notes" section on page 11 for more information on interpreting these figures.*

Table 1. Water Year 2007 precipitaion values (in inches) for select cities.

City	Water Year 2007 Precipitaion	Normal Water Year Precipitaion	Departure from Normal
Phoenix, AZ	3.23	8.29	-5.06
Tucson, AZ	9.09	12.17	-3.08
Douglas, AZ	12.48	13.76	-1.28
Albuquerque, NM	11.31	8.98	2.33
Winslow, NM	6.00	8.03	-2.03

WYIR, continued

Temperature

Temperatures over the 2007 water year generally were higher than average across most of Arizona and New Mexico, due to an extremely warm summer (Figures 2a–2b). The June through August period was 1–2 degrees F above average in the southern half of Arizona and 2–4 degrees F above average in northern Arizona and northwestern New Mexico. Southeast and southwest New Mexico were up to 2 degrees F above average.

High pressure systems dominated over the West, keeping frontal systems well to the north of Arizona for most of the year, resulting in clear skies and warm temperatures. Phoenix saw its third warmest November, sixth warmest May, and eighth warmest June on record. May had a record 27 days of the minimum temperature measuring at or above 70 degrees in the city, and Phoenix's summer had a record 32 days at or above 110 degrees F. But the heat wasn't everywhere, as Flagstaff had only six days at or above 90 degrees F.

Winter was not as hot as it has been the past two years. There was an extremely cold system that moved across Arizona in late December, bring freezing temperatures to central Phoenix for the first time since 1990. Frost warnings were issued, but thousands of residents lost plants to the cold temperatures. The other major cold episode was a cold front in January that set a new low maximum temperature of 46 degrees F.

Tucson also set three new records for low maximum temperatures, three new records for high maximums, and eight new records for high minimum temperatures. Overall, December through February was 0.5–4 degrees F below average across both states, with few exceptions.

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Figure 2a. Water year 2006–2007 through September 30, 2007 average temperature.*

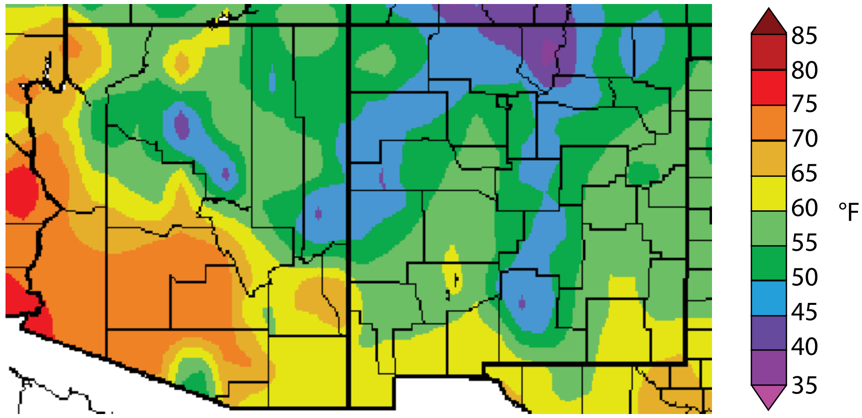
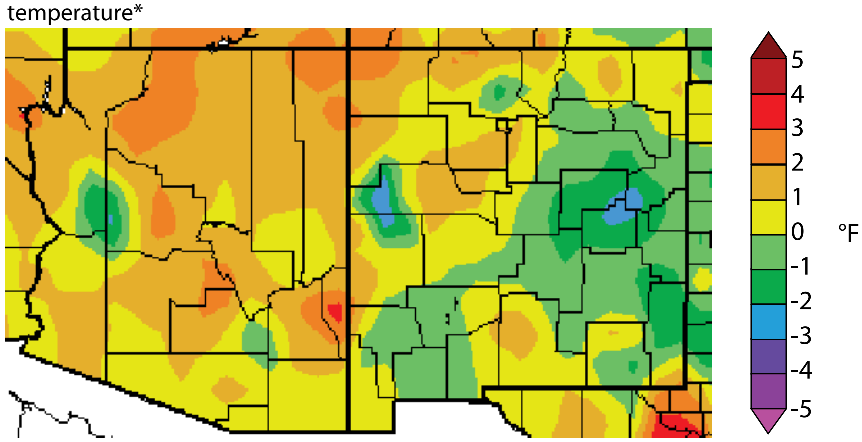


Figure 2b. Water year 2006–2007 through September 30, 2007 departure from normal temperature*



** See "Notes" section on page 10 for more information on interpreting these figures.*

WYIR, continued

Reservoirs & Streamflow

Arizona

Overall Arizona reservoir storage declined for the second consecutive water year. Total storage in the large in-state reservoirs in the Salt, Verde, and Gila River basins declined by 404,800 acre-feet, or 12.7 percent. At the end of Water Year 2007, combined storage in the Salt, Verde, and Gila River basins was at 42 percent of average.

Total storage in lakes Mead and Powell, which provide more than 90 percent of the storage on the Colorado River, declined by 1.37 million acre-feet during water year 2007 (Figure 3a). Lake Mead hit its high point in January 2007 and its low point in September 2007; Lake Powell hit its low point in February 2007 and its high point in June 2007, following spring runoff. Unregulated inflow to Lake Powell, a common measure of Colorado River streamflow, was 68 percent of average; inflow to Lake Powell has been below average in seven of the last eight water years. At the end of Water Year 2007, Lake Mead was at 48 percent of average and Lake Powell was at 49 percent of average.

The dry 2006–07 winter, relatively poor snowpack in the Colorado River Basin, and high spring temperatures in parts of the basin contributed to decreases in surface water storage.

Figure 3a. Water year 2007 storage at Lakes Mead (pink) and Powell (brown) in Arizona.

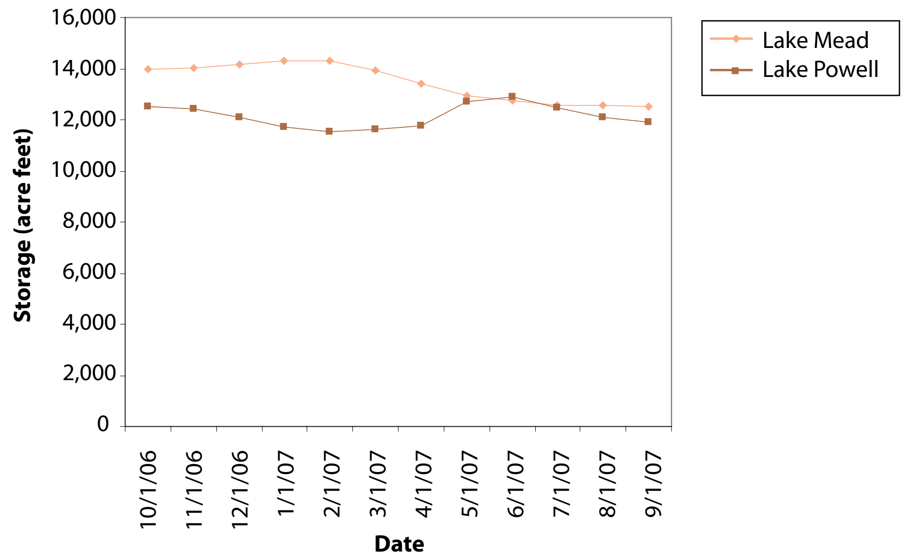
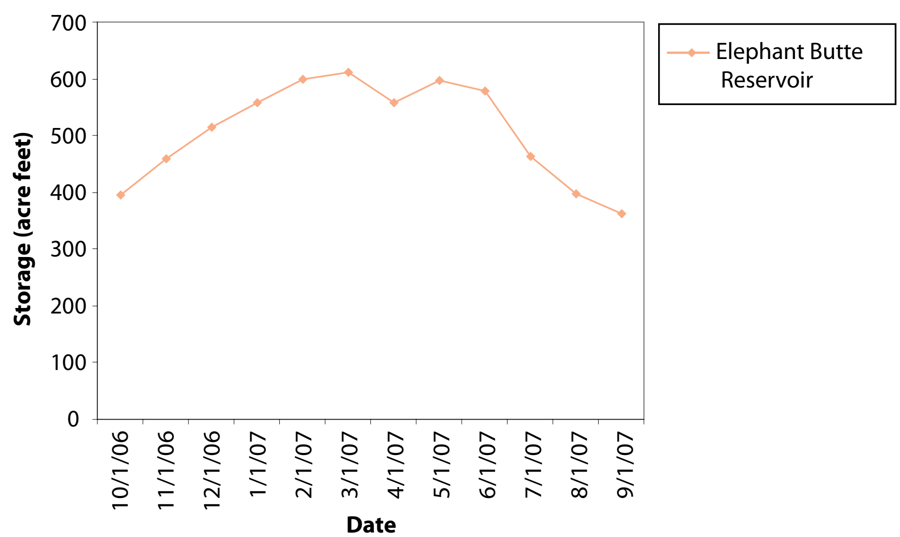


Figure 3b. Water year 2007 storage at Elephant Butte in New Mexico.



New Mexico

After declining during the last water year, New Mexico total reservoir storage increased by approximately 2 percent (135,800 acre-feet) during water year 2007. The greatest increases were at El Vado, Heron, and Navajo reservoirs. Storage increased in the Rio Grande and San Juan River basins but declined in the Canadian and Pecos River basins. Storage-loss leaders (as measured by changes in percent of capacity) were Conchas, Caballo, and Santa Rosa reservoirs.

Precipitation in New Mexico during the 2006–07 winter was well above average. That factor, combined with below-average temperatures and near-average snowfall, contributed to increases in reservoir storage. Nevertheless, Rio Grande runoff did not meet early 2007 predictions due to a slowdown in snowpack accumulation in February and early snow melt.

Despite a drop in storage since the end of October 2006, Elephant Butte reservoir storage remained above critical levels for meeting interstate compact obligations (Figure 3b). At the end of the 2007 water year Elephant Butte storage was only 17 percent of capacity.

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WYIR, continued

Drought

The beginning and end of the 2006–07 water year looked more or less the same with respect to drought across Arizona and New Mexico. Arizona experienced worsening conditions through the year while New Mexico remained mostly drought free. The November 16, 2006, drought monitor (Figure 4a) shows the pattern at the beginning of the water year with moderate to severe drought across much of Arizona and only into the extreme northwest corner of New Mexico.

Drought conditions continued to deteriorate in Arizona through the winter season with the expansion of severe drought to more than two-thirds of the state (Figure 4b). A dramatic gradient in winter precipitation along the Arizona-New Mexico border was responsible for the split in drought conditions between the two states. In New Mexico, above-average precipitation through most of the winter helped keep the state drought free into the spring. Arizona wasn't so lucky, with many locations in central and western regions of the state only experiencing 10–50 percent of average winter precipitation.

This lack of winter precipitation put western Arizona into a drought free-fall, with severe conditions covering much of the state by May (Figure 4c); extreme conditions existed along the lower Colorado River. Some of Arizona's drought spilled back into extreme northwestern New Mexico through the spring due to below-average precipitation. The dominant winter and early spring storm track brought low pressure systems and accompanying precipitation persistently up through central New Mexico. This pattern brought precipitation to much of southern, central, and northeastern New Mexico. Arizona and the far northwestern portion of New Mexico were on the cool, dry side of these passing storm systems well into the spring.

Figure 4a. Drought Monitor released November 16, 2006.

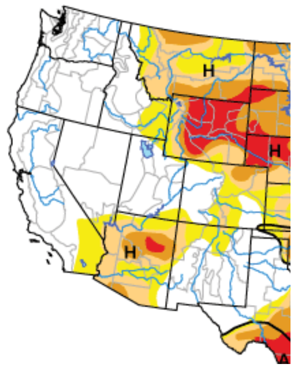


Figure 4b. Drought Monitor released February 15, 2007.

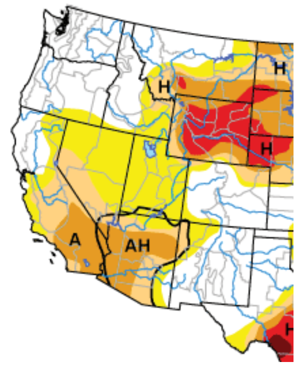


Figure 4c. Drought Monitor released May 15, 2007.

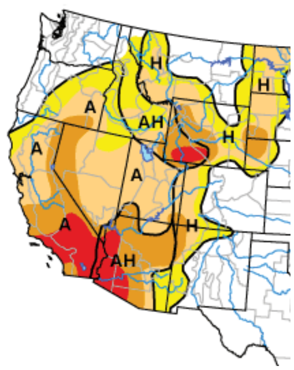
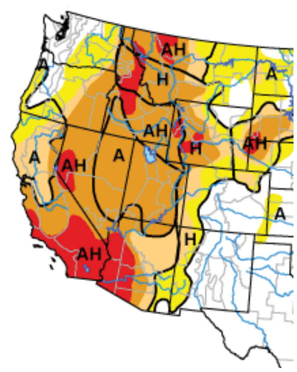


Figure 4d. Drought Monitor released August 16, 2007.



Drought Intensity

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

Drought Impact Types

/ Delineates Dominant Impacts

A = Agricultural (crops, pastures, grasslands)

H = Hydrological (water)

AH = Agricultural and Hydrological

The summer monsoon season brought some relief to Arizona and helped New Mexico hold on to drought-free conditions. Overall, summer rainfall amounts were near average across eastern Arizona and southern New Mexico. Summer precipitation across eastern Arizona helped ease drought conditions from severe to moderate levels, as shown in the August 16 Drought Monitor (Figure 4d). Western Arizona didn't see the same improvements. Summer precipitation was generally below-average across much of central and western Arizona. Drought conditions remained at the severe level in those areas at the close of the water year.

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WYIR, continued

Wildfire

High fire potential, due to a fine fuel (e.g., grass) crop carried over from the 2006 monsoon season and a dry Arizona winter, prevailed throughout much of the 2007 fire season. Nevertheless, this year's fire season was mild compared to the last five years (Figure 5a). Excellent "first attack" to suppress fires, campfire restrictions, good fire danger awareness, and timely late spring precipitation helped keep the number of acres burned to the lowest level since 2001.

During the 2007 fire season (through September 11, 2007), a mere 115,600 acres burned in Arizona and New Mexico. In contrast, more than 600,000 acres burned in the same period in 2006. Actively suppressed fires accounted for 69 percent of the total burned acres; wildland fire use, the practice of allowing fire to burn to accomplish management objectives, such as understory thinning, accounted for 27 percent.

Of the top ten largest actively suppressed fires, seven were in Arizona. The region's largest fire was the 14,200-acre Chitty fire in east-central Arizona. Southern Arizona's 7,267-acre Alambre fire burned in July on the Tohono O'odham reservation; the fire briefly threatened the Kitt Peak National Astronomical Observatory.

New Mexico's largest fire was the 10,300-acre HL Wildland Fire Use blaze in western New Mexico's Gila National Forest (Figure 5b). The largest actively suppressed fire was the 3,000-acre Highway fire in eastern New Mexico.

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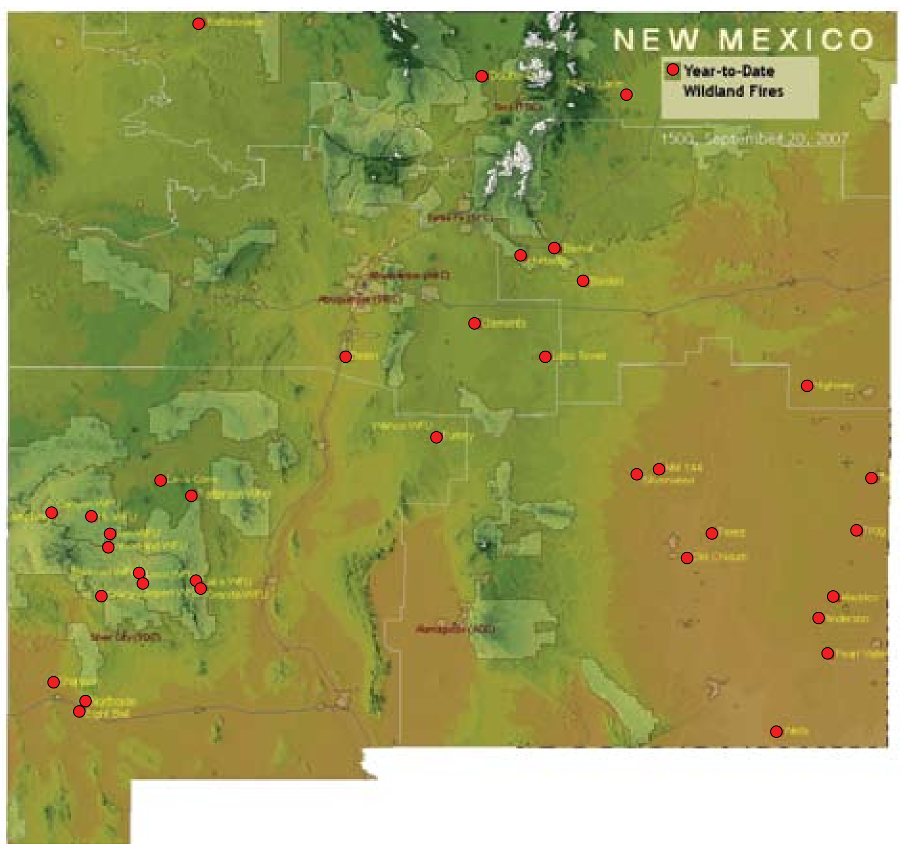
Figure 5a. Locations of Arizona fires larger than 50 acres as of September 20, 2007.

Figure 5b. Locations of New Mexico fires larger than 50 acres as of September 20, 2007.



WYIR, continued

El Niño

Sea Surface Temperatures

The 2007 water year was an interesting twelve months with respect to the El Niño-Southern Oscillation. A weak El Niño underway at the beginning of the water year gave way to a La Niña event by year's end. Sea-surface temperature (SST) departures from average in the Niño 3.4 monitoring region (Figure 6a) help tell the story.

Temperatures were more than 1 degree Celsius above average through the winter season, which indicates the presence of weak El Niño conditions. This El Niño event quickly weakened with falling SSTs in February and March. Neutral conditions, with SST departures from average near zero (Figure 6b) persisted through the spring into early summer. Several dips in SSTs suggested in spring 2007 that a La Niña event (below-average SSTs) may be on the horizon. By July, SSTs in the Niño 3.4 region had shifted to persistently below-average and continued to drop through the end of the water year. In October, that pattern met the Climate Prediction Center's definition of a La Niña event, with three months of SSTs measuring below -0.5 degrees C.

Figure 6a. Map of the El Niño 3.4 region. Yellow box outlines the region. Graphic credit: International Research Institute for Climate and Society.

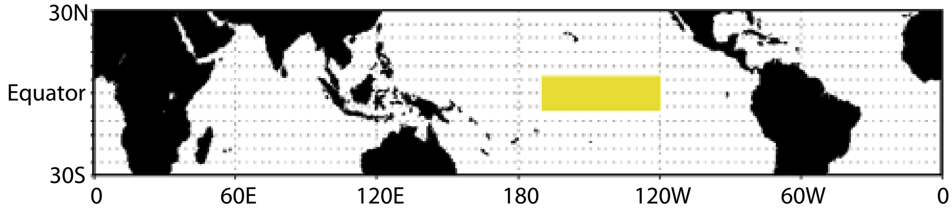
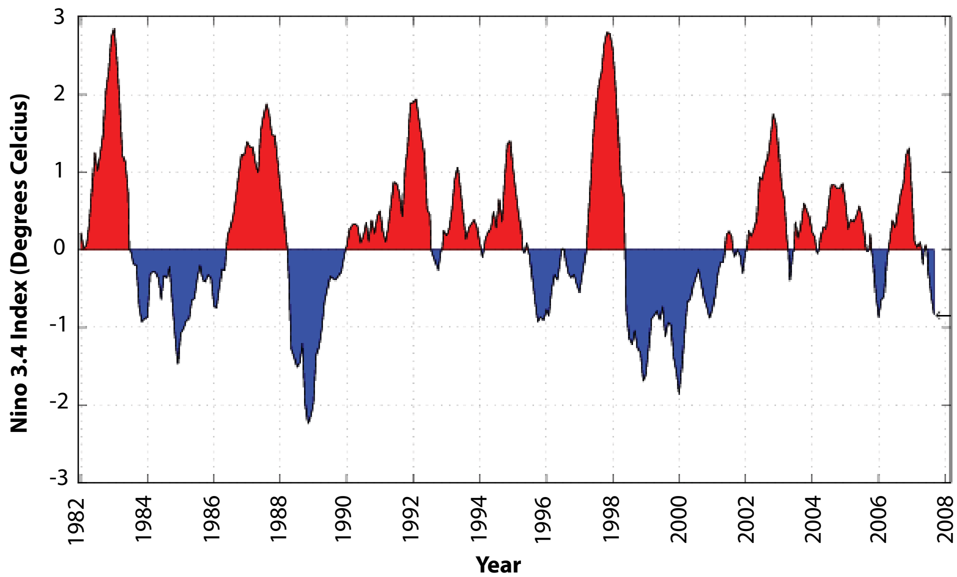


Figure 6b. Sea surface temperature anomaly index from Niño 3.4 region. Red areas indicate positive or warm SST anomalies while blue indicates negative or cool anomalies. Graphic credit: International Research Institute for Climate and Society.



Southern Oscillation Index

Monthly values of the Southern Oscillation Index (SOI), an index of the atmospheric component of El Niño and La Niña activity, were rather muted this past water year compared to recent years. The largest changes in SOI occurred from December to January when values shifted from -0.8 to -1.8, possibly indicating a weak atmospheric response to the above-average SSTs present across the Pacific Ocean and weak El Niño conditions. This was short lived, as the SOI value retreated to a value of -0.7 in February. SOI values held steady near -0.5 (neutral conditions) through the spring until a sharp increase in June and sharp drop in July disrupted the pattern. These dramatic shifts were blamed on intra-seasonal variability and were not necessarily connected to changes in Pacific SST patterns. A shift back towards positive SOI values occurred in August and persisted into September, possibly indicating a strengthening connection between the atmosphere and below-average SSTs across the eastern Pacific.

El Niño events, as the one experienced early in Water Year 2007, often force circulation patterns that bring above-average winter precipitation to the southwest U.S. This past event did not deliver the typical pattern. A persistent storm track brought above-average precipitation to much of New Mexico and left Arizona on the dry, cool side of passing storms, cut-off from moisture and precipitation. It is not clear whether or not this weak El Niño event was responsible for the persistent storm track. SOI values were not exceptionally low or persistent through the winter, which would indicate a larger-scale atmospheric response to the above-average Pacific SSTs present early in the year. The transition to La Niña conditions through fall 2007 may, on the other hand, be a bigger player in dictating the Southwest's weather in winter of 2007–08. La Niña events often bring below-average winter precipitation to the region.

Temperature (through 10/17/07)

Source: High Plains Regional Climate Center

The 2008 water year began October 1, so the water year temperature summary only includes about three weeks. Temperatures for the water year generally have ranged from the mid 60s in the northern half of Arizona and New Mexico to the upper 70s in the southern half of the two states, with colder temperatures at the higher elevations (Figures 1a–b). The departures from average temperature have a west-east temperature gradient across the two states. Western Arizona was the coolest, with temperatures from 4–6 degrees F below average. Eastern Arizona was warmer, with temperatures from 2 degrees below to 6 degrees above average. Western New Mexico was between 4 degrees below average and 4 degrees above average, and eastern New Mexico was the warmest, at 2–8 degrees F above average.

In the last couple of weeks several low pressure systems have parked off the coast of southern California, bringing cloudiness into Arizona but no significant precipitation. The clouds have kept daytime temperatures low in western Arizona. Several cold fronts have moved through, bringing cooler air to the lower deserts, but they have not been strong enough to push the cold air up over the mountains into New Mexico. New Mexico has been mostly clear, allowing daytime temperatures to rise to average or above-average values. Temperatures during the past thirty days generally show the same west-east gradient pattern as the new water year (Figures 1c–d).

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/products/current.html

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

Figure 1a. Water year '07–'08 (through October 17, 2007) average temperature.

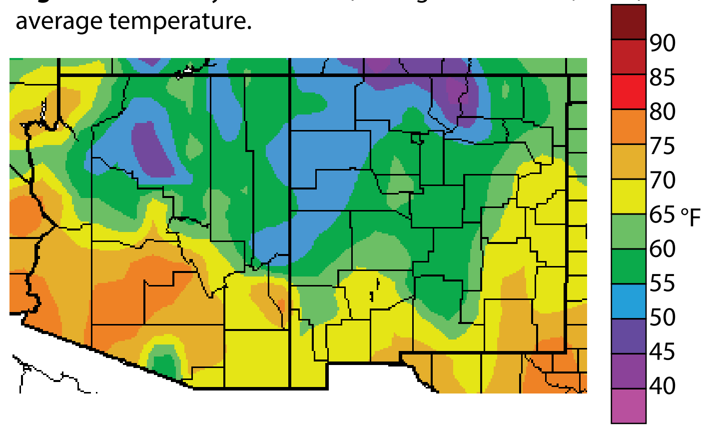


Figure 1b. Water year '07–'08 (through October 17, 2007) departure from average temperature.

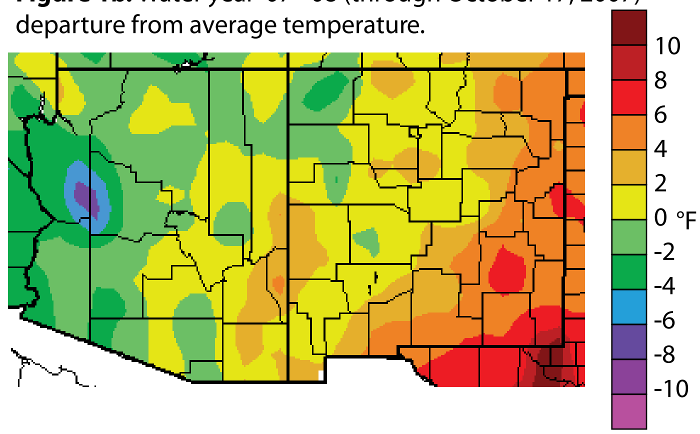


Figure 1c. Previous 30 days (September 18–October 17, 2007) departure from average temperature (interpolated).

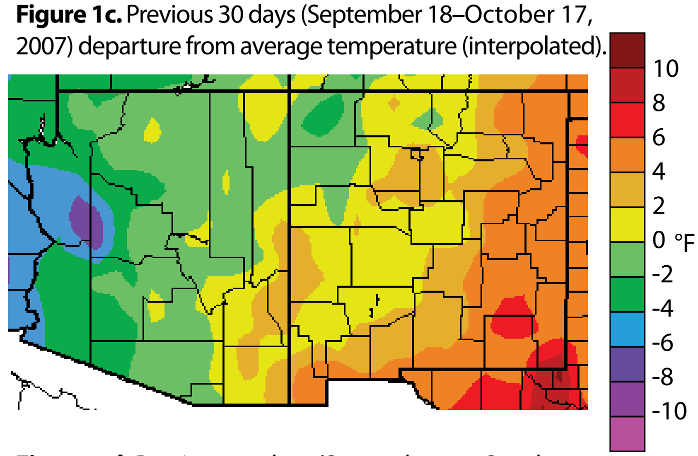
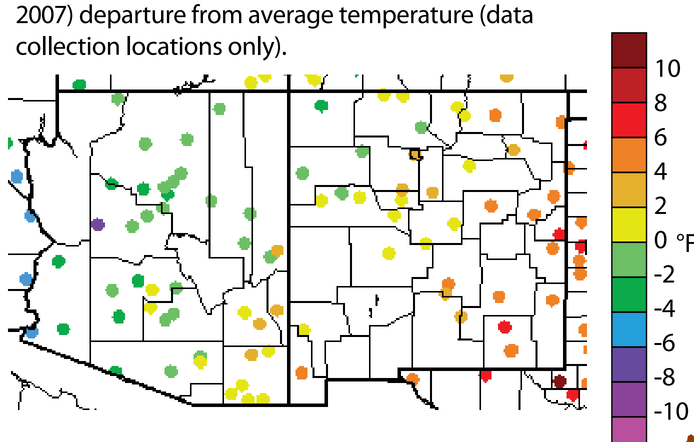


Figure 1d. Previous 30 days (September 18–October 17, 2007) departure from average temperature (data collection locations only).



Precipitation (through 10/17/07)

Source: High Plains Regional Climate Center

The water year, which began October 1, is starting out very dry for Arizona and New Mexico (Figures 2a–b). Only a few isolated locations have received average or above-average rainfall. Southwestern Arizona and southeastern New Mexico are both at 25 to les than 2 percent of average, and most other locations in both states have received 75 percent or less of average rainfall this month. Precipitation for the past thirty days has been near to slightly above average at the higher elevations across the northern third of both states, and well below average for the southern two-thirds of the states (Figures 2c–d). One exception is in southeastern New Mexico, where close to 200 percent of average precipitation has fallen due to a late September subtropical system that moved northward through Mexico. In contrast, much of southwestern Arizona is still experiencing less than 25 percent of average rainfall. Since the end of the monsoon in the second week of September, a series of cold fronts have moved across the West, staying just north of Arizona and New Mexico. There has been enough moisture and instability over the higher elevations of the northern Colorado Plateau to trigger thunderstorms, but not over the lower elevations. The pattern of winter storms passing north of Arizona and New Mexico may remain through much of the winter if the La Niña strengthens (Figure 11a–b).

Notes:

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2007, we are in the 2008 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/products/current.html

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 '07–'08 (through October 17, 2007) percent of average precipitation (interpolated).

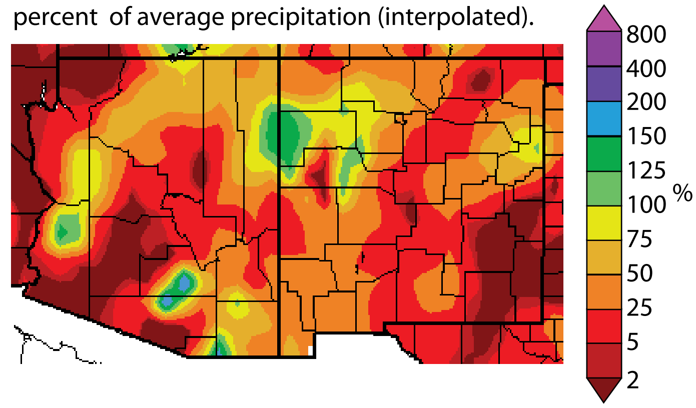


Figure 2b. Water year '07–'08 (through October 17, 2007) percent of average precipitation (data collection locations only).

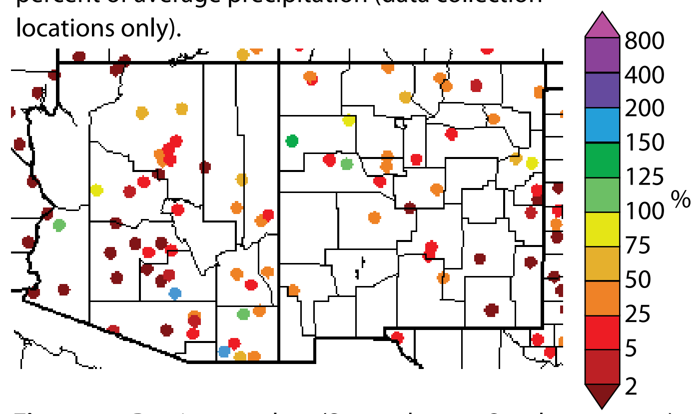


Figure 2c. Previous 30 days (September 18–October 17, 2007) percent of average precipitation (interpolated).

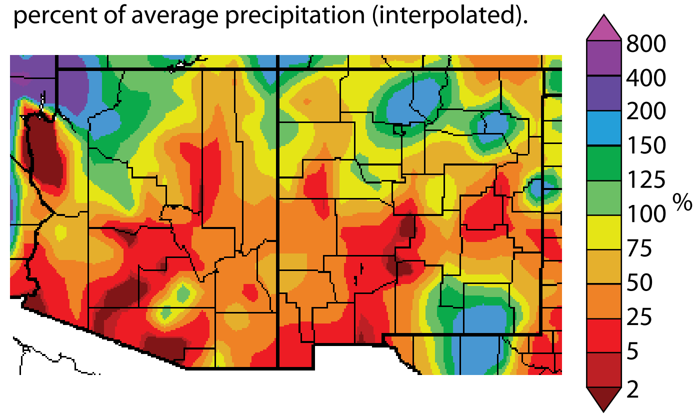
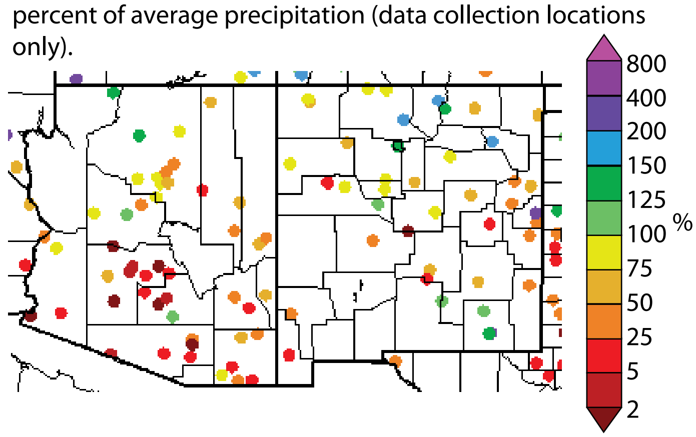


Figure 2d. Previous 30 days (September 18–October 17, 2007) percent of average precipitation (data collection locations only).



U.S. Drought Monitor

(released 10/18/07)

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

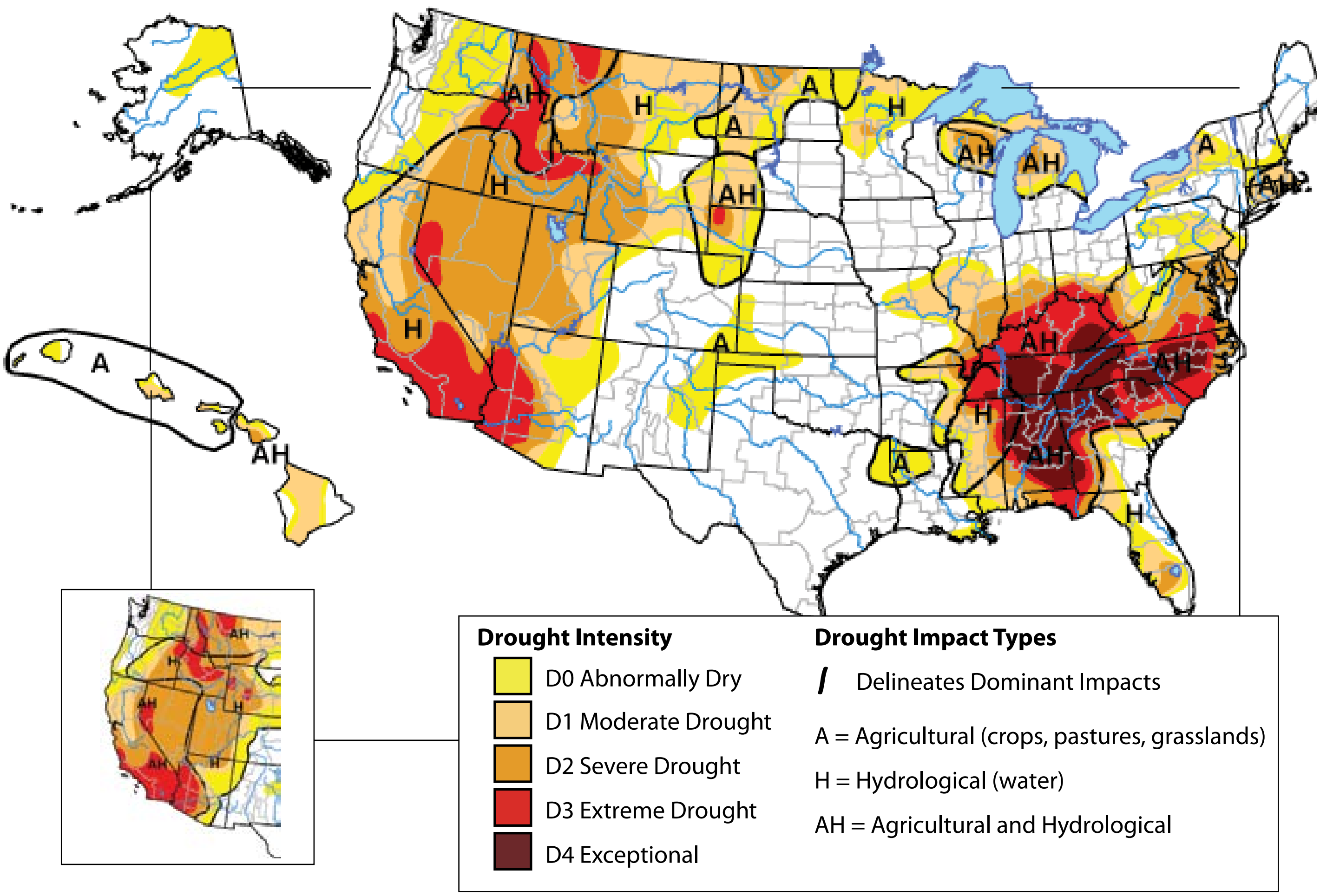
There was little change in drought conditions across Arizona and New Mexico since last month. The National Drought Monitor continues to depict severe to extreme drought conditions across much of western Arizona and moderate drought to abnormally dry conditions over much of the remainder of the state (Figure 3). New Mexico is mostly drought-free again this month with a slight increase in abnormally dry conditions over northeastern portions of the state. Precipitation has been generally below-average across Arizona and New Mexico over the past thirty days. This has done nothing to help improve drought conditions in Arizona but may hasten the return of drought to parts of New Mexico. The return of La Niña is an ominous sign for the Southwest. The current La Niña event may bring below-average winter precipitation to the region. This may promote the expansion of drought conditions from Arizona back into New Mexico through the spring season.

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 the several agencies; the author of this monitor is Mark Svoboda, National Drought Mitigation Center.

Figure 3. Drought Monitor released October 18, 2007 (full size) and September 20, 2007 (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.unl.edu/dm/monitor.html

Arizona Drought Status
(through 8/31/07)

Source: Arizona Department of Water Resources

Summer rainfall helped improve drought conditions across much of Arizona between August and September. The September update of the Arizona Drought Monitor Report shows improvements in both short and long-term drought status across much of the state. Short-term maps depict some level of drought in all watersheds except the Upper Gila, Willcox Playa, and Whitewater Draw (Figure 4a). The Bill Williams watershed, listed under severe drought, is still experiencing the worst short-term conditions. The remaining watersheds are experiencing abnormally dry to moderate drought conditions. Precipitation occurring in late August and with several frontal systems in September helped improve conditions across the state, with all watersheds improving at least one category on the short-term status maps. No improvements were seen in the long-term maps (Figure 4b). Almost all watersheds are now in moderate to severe drought, with the upper Gila watershed slipping from abnormally dry to moderate in the September update.

Observations on mountain precipitation reported in the September Arizona Drought Monitor Report indicate that August precipitation was close to average for many of Arizona's large basins, but longer-term deficits still persist. Data from the USDA-Natural Resources Conservation Service Snow Telemetry (SNOTEL) network indicate that precipitation was more than 100 percent of average for the Salt and Upper Gila River basins, while the Verde River Basin was close to 90 percent of average. Long-term deficits show up when examining the total precipitation observed during most of the last water year (October 1, 2006–September 30, 2007). The Verde River Basin observed only 61 percent of average and the Salt River Basin only 79 percent of average due to dry conditions last winter.

Notes:

The Arizona drought status maps are produced monthly by the Arizona Drought Preparedness Plan Monitoring Technical Committee. The maps are based on expert assessment of variables including, but not limited to, precipitation, drought indices, reservoir levels, and streamflow.

Figure 4a shows short-term or meteorological drought conditions. Meteorological drought is defined usually on the basis of the degree of dryness (in comparison to some "normal" or average amount) over a relatively short duration (e.g., months). Figure 4b refers to long-term drought, sometimes known as hydrological drought. Hydrological drought is associated with the effects of relatively long periods of precipitation shortfall (e.g., many months to years) on water supplies (i.e., streamflow, reservoir and lake levels, and groundwater). These maps are delineated by river basins (wavy gray lines) and counties (straight black lines).

On the Web:

For the most current Arizona drought status maps, visit:
http://www.azwater.gov/dwr/drought/DroughtStatus.html

Figure 4a. Arizona short-term drought status for September 2007.

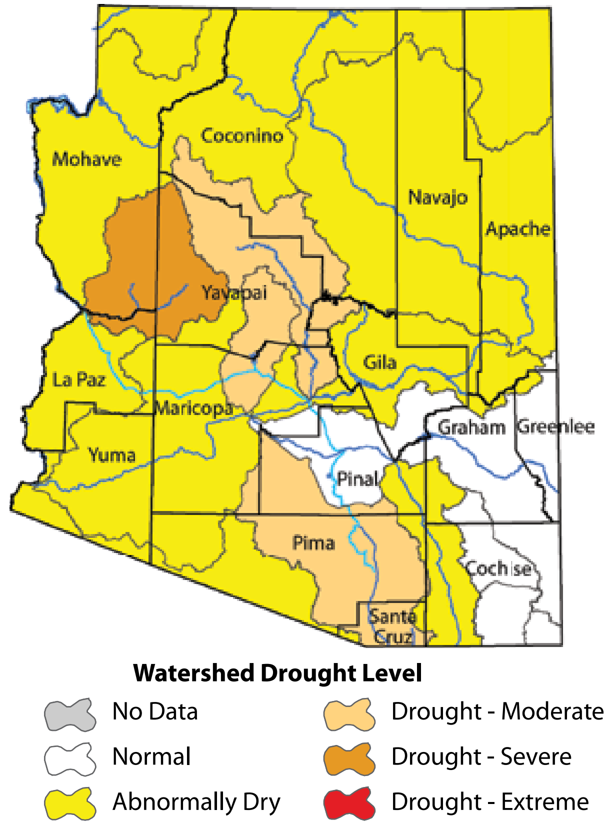
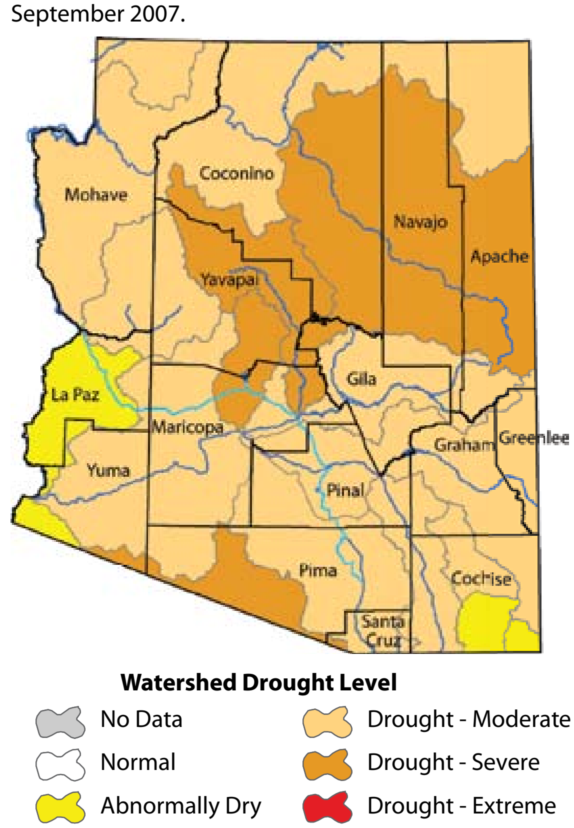


Figure 4b. Arizona long-term drought status for September 2007.



New Mexico Drought Status

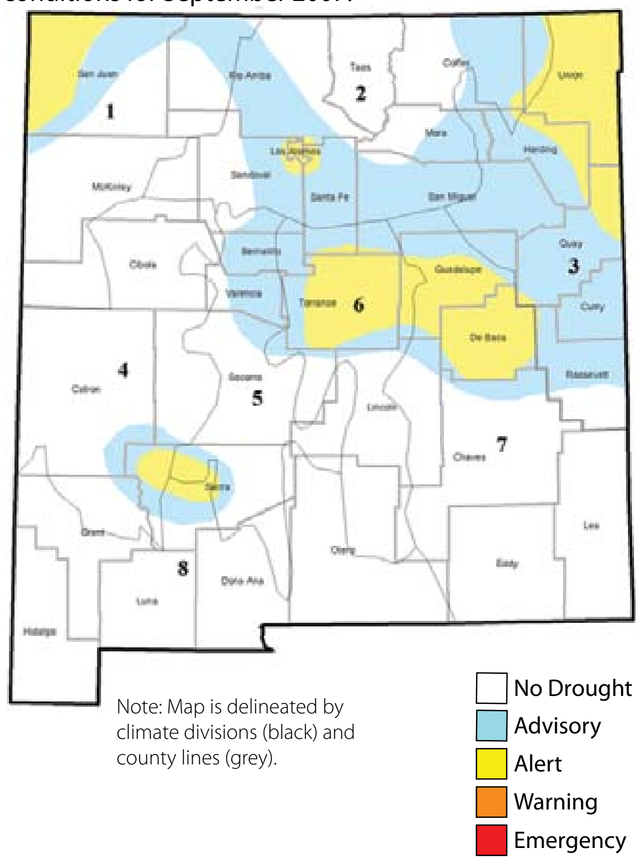
(through 9/30/07)

Source: New Mexico State Drought Monitoring Committee

The September New Mexico Drought Status Report discusses some significant changes in drought conditions across the state since the last update in August. Advisory to alert drought conditions have expanded across much of the north-central and northeastern parts of the state. The report notes that alert and advisory conditions along western counties have been reduced due to abundant late summer rainfall. The expansion of drought conditions elsewhere in the state is tied to the persistence of recent below-average precipitation for the past several months and above-average temperatures that have exacerbated drought impacts. The report also notes that conditions depicted on the latest map are a mix of short and long drought conditions. Drought in north-central and northwestern areas is connected to lingering long-term precipitation deficits, while northeastern areas are experiencing more recent drought development due to shorter-term (three to six months) precipitation deficits.

Developing drought conditions across the northeastern part of New Mexico appear to be impacting agricultural operations, according to the September New Mexico Drought Status Report. The report notes that adequate soil moisture conditions fell from 51 percent to 21 percent across northeast Arizona, leaving much of the area in the short to very short soil moisture category. These levels indicate a significant lack of soil water necessary to support the normal development of agricultural crops in this region. For more information, visit http://www.seo.state.nm.us/DroughtTaskForce/Monitoring-WorkGroup/2007-09-xx-dmwg-rpt.pdf.

Figure 5. Short-term drought map based on meteorological conditions for September 2007.



Notes:

The New Mexico drought status map is produced monthly by the New Mexico State Drought Monitoring Committee. When near-normal conditions exist, they are updated quarterly. The map is based on expert assessment of variables including, but not limited to, precipitation, drought indices, reservoir levels, and streamflow.

Figure 5 shows short-term or *meteorological* drought conditions. Meteorological drought is defined usually on the basis of the degree of dryness (in comparison to some "normal" or average amount) over a relatively short duration (e.g., months).

On the Web:

For the most current meteorological drought status map, visit: http://www.srh.noaa.gov/abq/feature/droughtinfo.htm

For the most current hydrological drought status map, visit: http://www.nm.nrcs.usda.gov/snow/drought/drought.html

Arizona Reservoir Levels

(through 9/30/07)

Source: National Water and Climate Center

With the exception of the Verde River Basin, reservoir storage declined throughout Arizona and the adjacent Colorado River reservoirs (Figure 6). Colorado River reservoirs lost more than 300,000 acre-feet of storage since the end of August. Total reservoir storage in the state declined by more than 60,000 acre-feet during this period. Surface water storage is expected to continue to decrease until the spring 2008 snowmelt season. Water Year 2007 inflow to Lake Powell was 69 percent of average, which is consistent with prolonged drought in the Colorado River Basin.

Utah's Kane County Water Conservancy District wants to erect a 42-foot-high earthen dam to impound water piped from Kanab Creek (*Salt Lake Tribune*, October 10). The proposed reservoir would inundate 212 acres of pastureland and store 3,900 acre-feet of water. The Kaibab Band of Paiute, a tribe with land in Arizona, warned that they would not endorse the project because it would eliminate important archaeological sites.

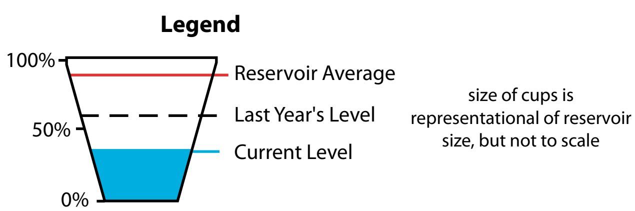
Notes:

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. The last column of the table list an increase or decrease in storage since last month. A line indicates no change.

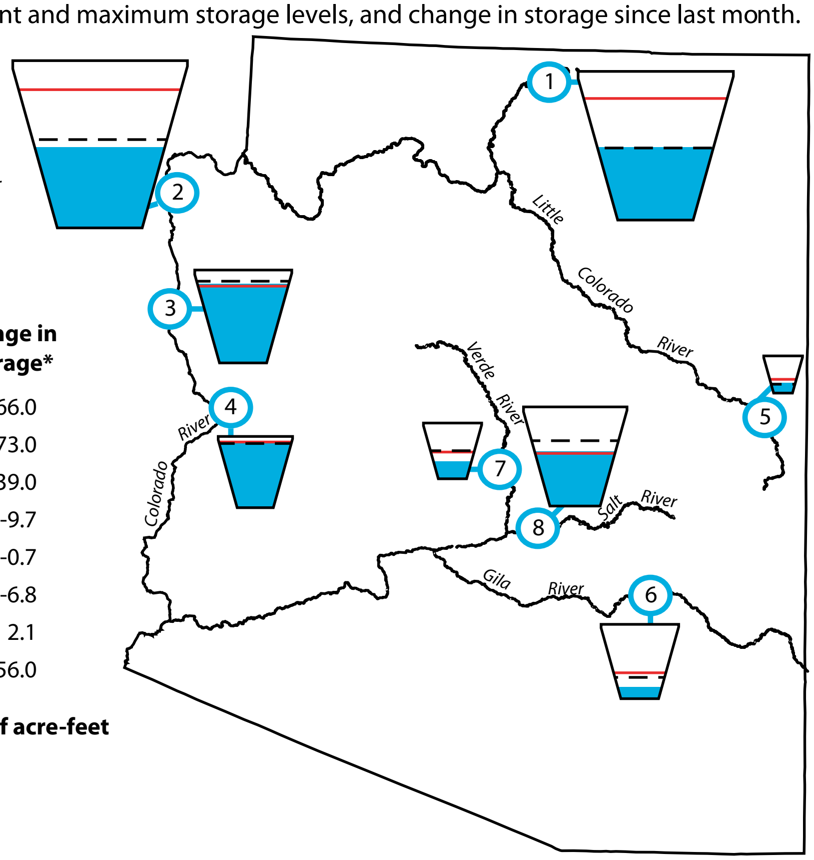
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service. For additional information, contact Tom Pagano at the National Water Climate Center (tom.pagano@por.usda.gov; 503-414-3010) or Larry Martinez, Natural Resource Conservation Service, 3003 N. Central Ave, Suite 800, Phoenix, Arizona 85012-2945; 602-280-8841; Larry.Martinez@az.usda.gov).

Figure 6. Arizona reservoir levels for September 2007 as a percent of capacity. The map also 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	49%	11,929.0	24,322.0	-166.0
2. Lake Mead	48%	12,505.0	26,159.0	-73.0
3. Lake Mohave	85%	1,544.7	1,810.0	-139.0
4. Lake Havasu	93%	575.7	619.0	-9.7
5. Lyman Reservoir	28%	8.5	30.0	-0.7
6. San Carlos	16%	140.2	875.0	-6.8
7. Verde River System	31%	89.0	287.4	2.1
8. Salt River System	55%	1,106.4	2,025.8	-56.0

*** 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

New Mexico Reservoir Levels

(through 9/30/07)

Source: National Water and Climate Center

Storage in most New Mexico reservoirs declined since last month (Figure 7). New Mexico's large reservoirs lost more than 125,000 acre-feet since the end of August, including a more than 70,000 acre-foot decline in the Rio Grande Basin.

In related news, New Mexico's Sandia Pueblo has joined backers of a bill to revise waterway protection under the Clean Water Act (*Albuquerque Tribune*, September 27). The Clean Water Restoration Act seeks further protection for water supplies and sensitive environments in the West's unique playas and intermittent stream environments; the Clean Water Act was developed with perennial eastern U.S. streams in mind. Of particular interest to the Sandia Pueblo is the reduced flow of the Rio Grande, which runs through Pueblo lands. Also, Navajo Nation and the city of Gallup, New Mexico, developed a memorandum of understanding on regional water (*Gallup Independent*, September 20), partially clearing the way for Congress to approve the Navajo-Gallup pipline project.

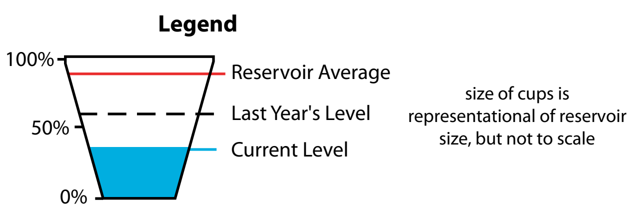
Notes:

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. The last column of the table list an increase or decrease in storage since last month. A line indicates no change.

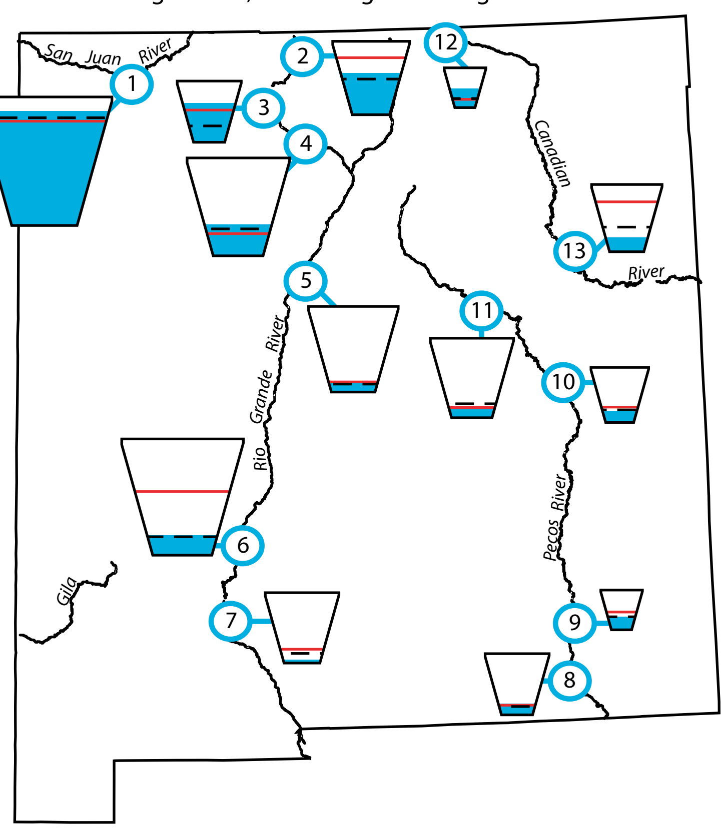
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service. For additional information, contact Tom Pagano at the National Water Climate Center (tom.pagano@por.usda.gov; 503-414-3010) or Dan Murray, NRCS, USDA, 6200 Jefferson NE, Albuquerque, NM 87109; 505-761-4436; Dan.Murray@nm.usda.gov).

Figure 7. New Mexico reservoir levels for September 2007 as a percent of capacity. The map also 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	89%	1,509.9	1,696.0	-41.0
2. Heron	56%	224.7	400.0	-10.7
3. El Vado	64%	124.9	195.0	-4.4
4. Abiquiu	32%	176.0	554.5	0.7
5. Cochiti	10%	49.9	491.0	-4.5
6. Elephant Butte	17%	362.2	2,195.0	-34.4
7. Caballo	5%	16.4	332.0	-16.6
8. Brantley	18%	27.0	147.5	8.5
9. Lake Avalon	33%	1.3	4.0	0.1
10. Sumner	21%	21.2	102.0	-2.5
11. Santa Rosa	11%	49.5	438.3	-10.6
12. Costilla	48%	7.7	16.0	-2.4
13. Conchas	21%	52.5	254.2	-9.6

*** 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

Temperature Outlook
(November 2007–April 2008)
Source: NOAA Climate Prediction Center (CPC)

This month's NOAA-CPC long-lead temperature forecasts predict an increased likelihood of above-average temperatures across most of the country through at least April 2008 (Figures 8a–d). The signal is strongest in the southwestern and southern plains states and especially Texas's Gulf Coast, where a 60–69.9 percent likelihood of above-average temperatures is forecast (Figure 8c). This pattern reflects a combination of observed temperature trends and a continued strengthening of La Niña conditions. There is an expectation that these conditions will predominate throughout the winter months. The exceptions to these warm forecasts are the Pacific Northwest, coastal California, and the Northern Rockies, where forecasts indicate equal chances of below-average, average, and above-average temperatures.

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 1971–2000 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 the reliability (i.e., 'skill') of the forecast is poor; 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 8a. Long-lead national temperature forecast for November 2007–January 2008.

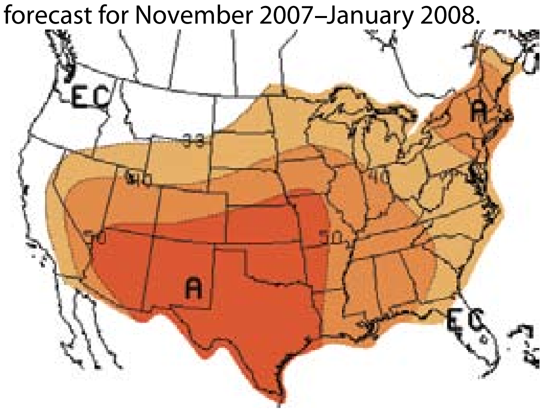


Figure 8b. Long-lead national temperature forecast for December 2007–February 2008.

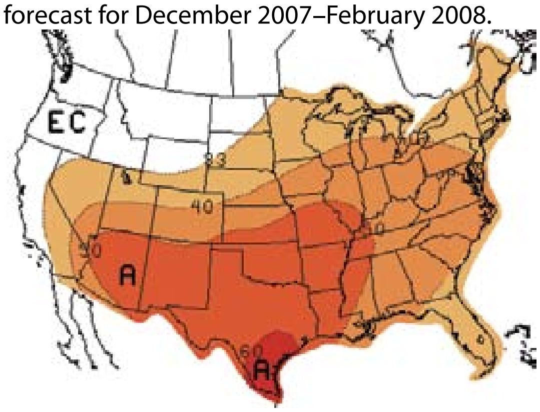


Figure 8c. Long-lead national temperature forecast for January–March 2008.

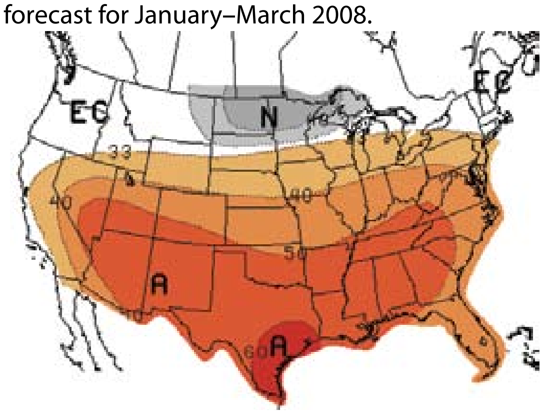
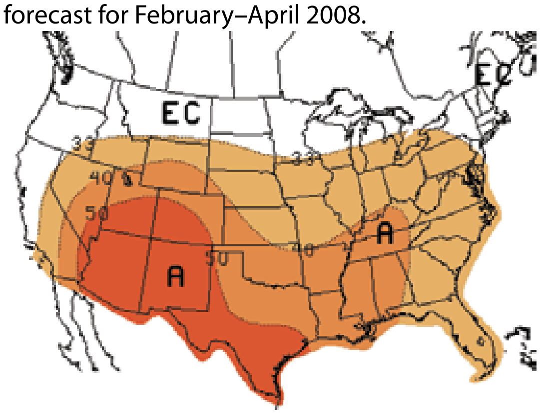


Figure 8d. Long-lead national temperature forecast for February–April 2008.



N=Near Normal: 40.0–49.9%; 33.3–39.9%

A= Above: 60.0–69.9%; 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.html
(note that this website has many graphics and may load slowly on your computer)

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

Precipitation Outlook

(November 2007–April 2008)

Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC forecasts for November 2007 through April 2008 continue to indicate an increased probability of below-average precipitation in the southwestern and southeastern states (Figures 9a–d). This signal is particularly strong for southeastern Arizona, extreme southwestern New Mexico, and northern and central Florida between December 2007 and March 2008 (Figures 9b9c. An increased chance of above-average precipitation is indicated for the Pacific Northwest and Northern Rockies through most of this period and for portions of the Great Lakes region between December 2007 and March 2008. According to NOAA forecasters, previously observed La Niña conditions continue to strengthen in the equatorial Pacific. Moderate to weak La Niña conditions are therefore predicted through the next few months and should favor above-normal precipitation in the Pacific Northwest and below-average precipitation in the Southwest.

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 1971–2000 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 the reliability (i.e., 'skill') of the forecast is poor; 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 precipitation forecast for November 2007–January 2008.

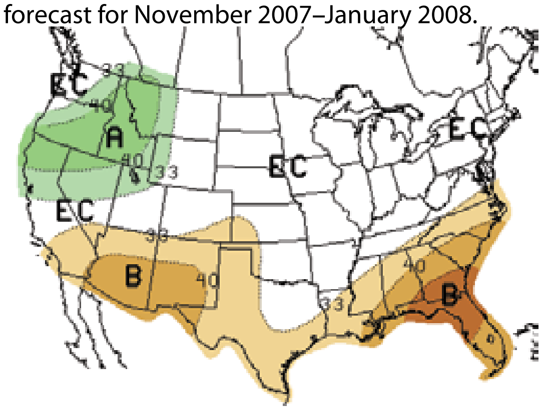


Figure 9b. Long-lead national precipitation forecast for December 2007–February 2008.

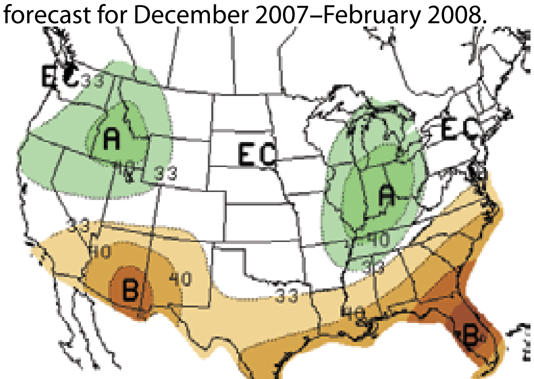


Figure 9c. Long-lead national precipitation forecast for January–March 2008.

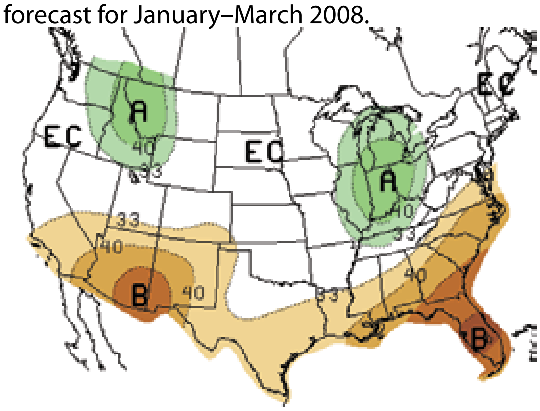
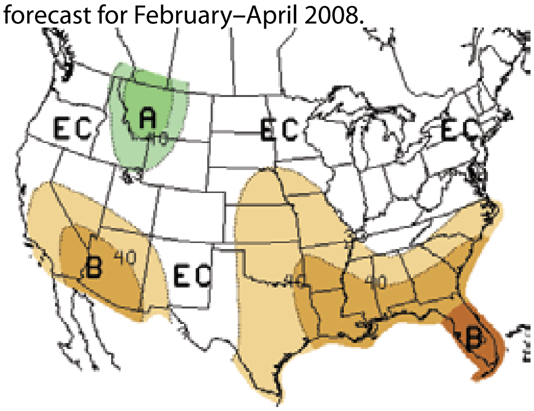


Figure 9d. Long-lead national precipitation forecast for February–April 2008.



A= Above: 40.0–49.9%, 33.3–39.9%

B= Below: 33.3–39.9%, 40.0–49.9%, 50.0–59.9%, 60.0–69.9%

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.html
(note that this website has many graphics and may load slowly on your computer)

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

Seasonal Drought Outlook

(through January 2008)

Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC projects drought conditions to persist throughout much of western Arizona through January 2008 (Figure 10). Drought conditions are expected to develop across eastern Arizona and most of New Mexico during the late fall and early winter. The assessment by NOAA forecasters takes into account the entrenched drought conditions in western Arizona and the expected persistence of La Niña conditions this winter (see Figure 11b). La Niña episodes typically bring dry conditions to the Southwest.

Given the dry winter conditions associated with La Niña in the Southwest, and abundant grass fuel loadings, the Southwest Coordination Center predicts above-average fire potential for New Mexico's eastern plains through January 2008. Information on Southwest fall and winter fire potential is available on the National Interagency Fire Center's predictive services website (http://www.nifc.gov/nicc/predictive/outlooks/outlooks.htm).

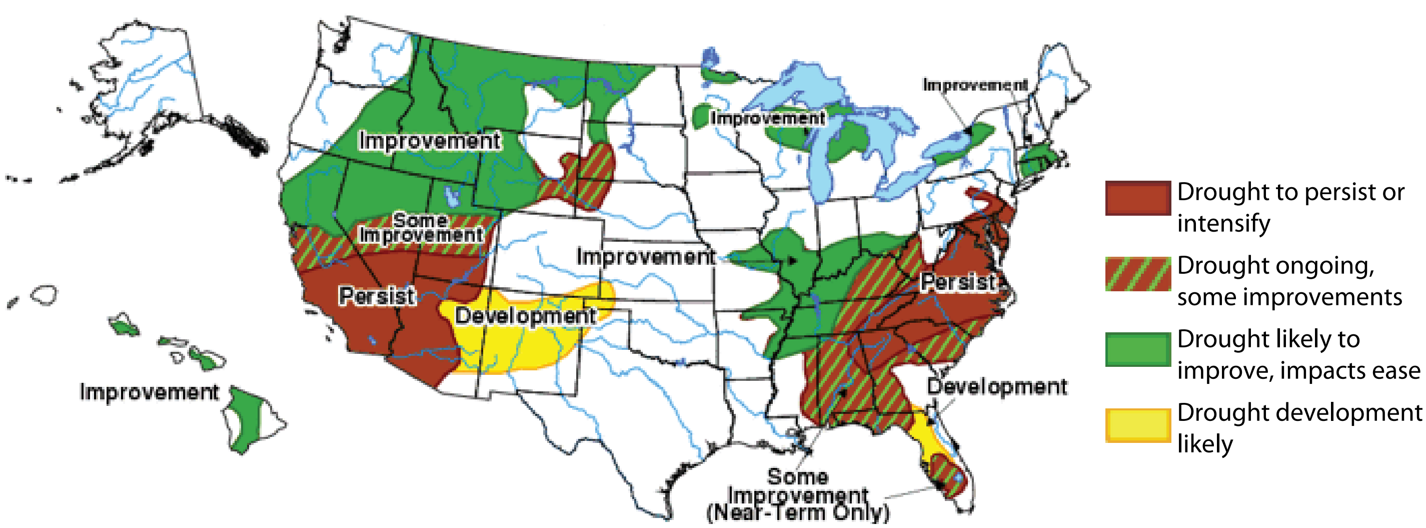
In water-related news, Pinal County, Arizona, residents are upset about laws pertaining to earth fissures due to excess groundwater pumping (*Independent Newspapers*, October 2). Differential land subsidence around the fissures can cause structural damage to property. When new residents develop properties, they often reroute water, which flows through and expands these dangerous fissures. Illegal dumping and the area's use of septic systems add to groundwater woes in areas with fissures and exceptional subsidence. Residents' frustration is due to a lack of regulation in this rapidly growing area.

A $12 million pipeline project near Carlsbad, New Mexico, is about half finished (*Santa Fe New Mexican*, October 3). The Seven Rivers pipeline will augment Pecos River flows by about 15,750 acre-feet of water a year from 13 deep artesian wells to help the state resolve its Pecos River water debt with Texas under the 1947 Pecos River Compact. The New Mexico Interstate Stream Commission is buying water rights along the Lower Pecos River and leaving farms fallow as part of the plan for Mexico to pay back its water debt.

Notes:

The delineated areas in the Seasonal Drought Outlook (Figure 10) are defined subjectively and are based on expert assessment of numerous indicators, including outputs of short- and long-term forecasting models.

Figure 10. Seasonal drought outlook through January 2008 (released October 18, 2007).



On the Web:
For more information, visit:
http://www.drought.noaa.gov/

El Niño Status and Forecast

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

La Niña conditions are gaining a stronger hold on the Pacific Ocean. The IRI noted that La Niña conditions are fully established across the eastern and central Pacific Ocean and are continuing to strengthen. Sea surface temperatures (SSTs) across the eastern Pacific continued to fall again this month. SSTs along the coast of South America were as low as 2–3 degrees Celsius below average in early October, indicating the strengthening La Niña conditions. Observations across the eastern Pacific also indicate that abundant cooler-than-average water exists below the surface to depths of 150 meters, which will continue to support and potentially enhance the current La Niña event in the near future. The Climate Prediction Center reports that atmospheric patterns are consistent with current La Niña conditions. Stronger-than-average easterly winds continue to persist across the equatorial Pacific along with a large area of suppressed convection over the eastern and central Pacific.

Models have converged on the continuation and possible strengthening of La Niña conditions through the fall and winter seasons. IRI indicates that there is a 90 percent probability of La Niña persisting through the fall with chances falling to 70 percent through early spring (Figure 11b). Models also suggest that the current weak event may strengthen to moderate levels through the late fall, potentially enhancing typical La Niña teleconnections with the United States. This fact has heavily influenced seasonal precipitation forecasts for the southwestern United States. La Niña events typically disrupt the winter storm track across the western U.S., bringing persistent precipitation to the Northwest and dry conditions to the Southwest. The winter season precipitation forecast indicates a greater than 50 percent chance that precipitation will be below-average for portions of southern Arizona and New Mexico.

Notes:

Figure 11a shows the standardized three month running average values of the Southern Oscillation Index (SOI) from January 1980 through September 2007. 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.

Figure 11b shows the International Research Institute for Climate Prediction (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, the 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 11a. The standardized values of the Southern Oscillation Index from January 1980–October 2007. 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).

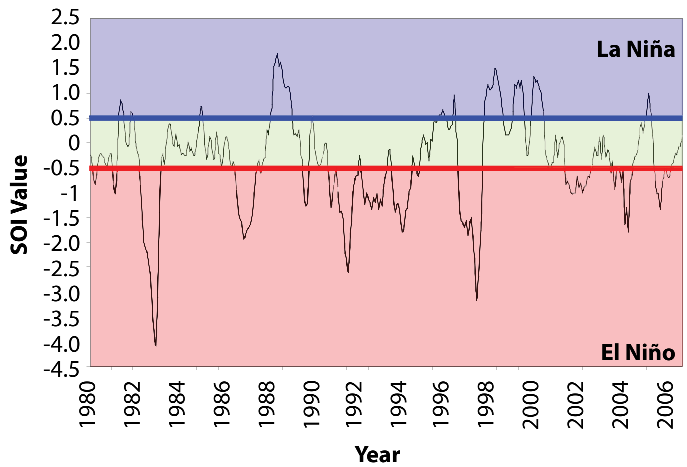
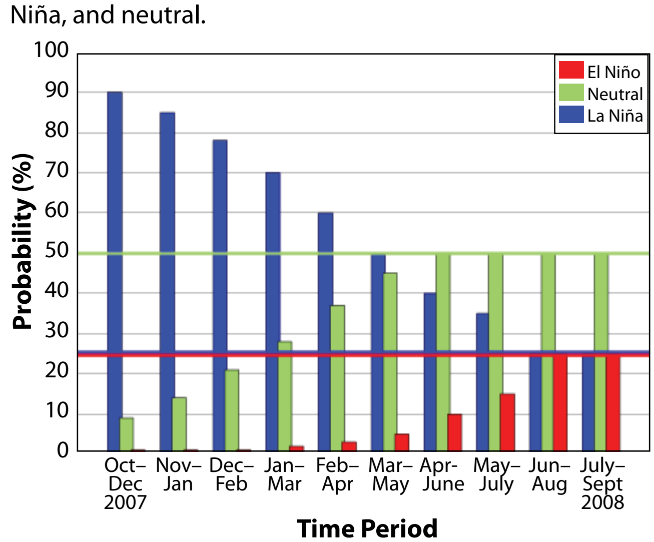


Figure 11b. IRI probabilistic ENSO forecast for El Niño 3.4 monitoring region (released October 18, 2007). Colored lines represent average historical probability of El Niño, La Niña, and neutral.



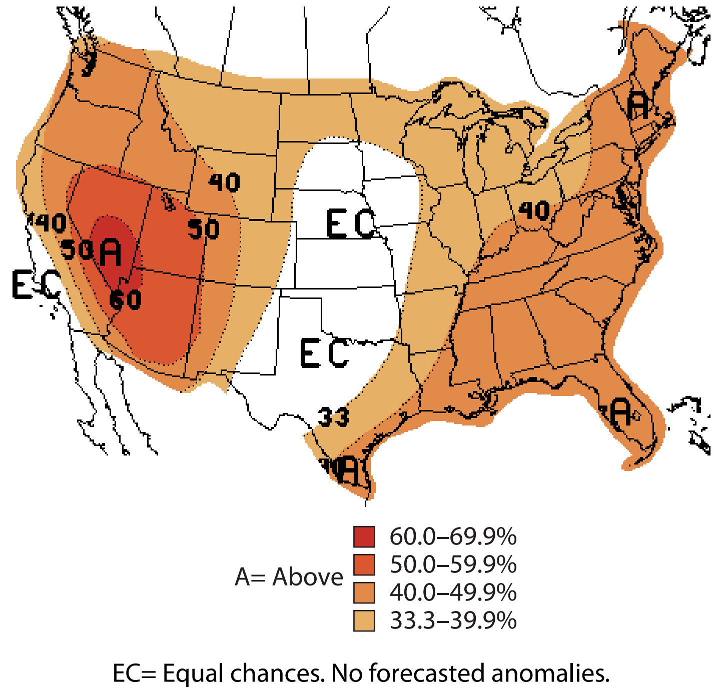
Temperature Verification

(July–September 2007)

Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC seasonal temperature outlook for July–September 2007 predicted an increased likelihood of above-average temperatures across most of the nation, especially over Nevada, Utah, and Arizona (Figure 12a). The exception was most of the Great Plains region, where equal changes of below-average, average, and above-average precipitation were indicated. Observed conditions were similar to predicted conditions, with temperatures for this period generally measured 0–4 degrees F above normal throughout most of the western and eastern states (Figure 12b). Temperatures of 4–8 degrees F above normal were observed in isolated areas of the Northern Rockies, while those in most of the Plains states were within 2 degrees F of normal. Texas was the cool spot, where most areas saw temperatures that were 0–4 degrees F below the long-term average.

Figure 12a. Long-lead U.S. temperature forecast for July–September 2007 (issued June 2007).



Notes:

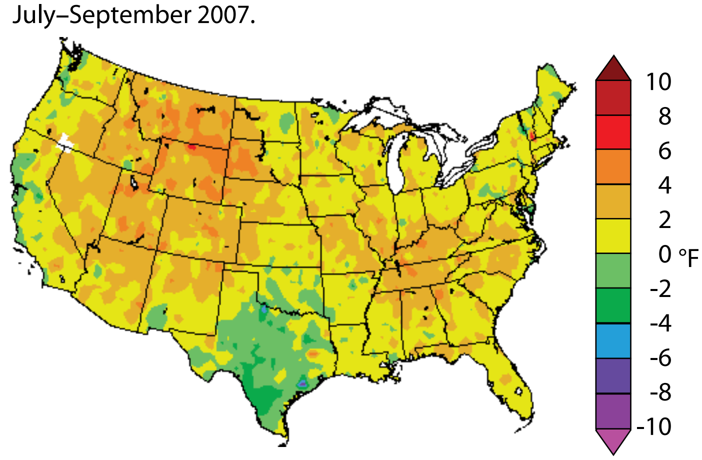
Figure 12a shows the NOAA Climate Prediction Center (CPC) temperature outlook for the months July–September 2007. This forecast was made in June 2007.

The outlook predicts 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.

Using past climate as a guide to average conditions and dividing the past record into 3 categories, there is a 33.3 percent chance of above-average, a 33.3 percent chance of average, and a 33.3 percent chance of below-average temperature. Thus, using the NOAA CPC likelihood forecast, in areas with light brown shading there is 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. Equal Chances (EC) indicates areas where reliability (i.e., the skill) of the forecast is poor and no prediction is offered.

Figure 12b shows the observed departure of temperature (degrees F) from the average for the July–September 2007 period. Care should be exercised when comparing the forecast (probability) map with the observed temperature maps. The temperature departures do not represent probability classes as in the forecast maps, so they are not strictly comparable. They do provide us with some idea of how well the forecast performed. In all of the figures on this page, the term average refers to the 1971–2000 average. This practice is standard in the field of climatology.

Figure 12b. Average temperature departure (in degrees F) for July–September 2007.



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.html

Precipitation Verification

(July–September 2007)

Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC seasonal precipitation outlook for July–September 2007 indicated an increased probability of below-average precipitation in the Pacific Northwest and an increased probability of above-average precipitation along the Atlantic and Gulf coasts (Figure 13a). Across the rest of the country, including the southwestern states, equal chances of below-average, average, and above-average precipitation were indicated. The pattern of observed precipitation over this period was spotty (Figure 13b). Most of the Pacific Northwest received 50–90 percent of normal precipitation, but isolated areas received less than 50 percent or more than 150 percent. Contrary to predictions, much of the Atlantic Coast received lower-than-normal precipitation, but southern and eastern Texas and some other parts of the Gulf Coast received 130 percent to more than 300 percent of normal precipitation. Parts of the Southwest saw near-normal to above-normal precipitation during this monsoon season, but parts of southwestern Arizona and eastern New Mexico received only 25–50 percent of the long-term average.

Figure 13a. Long-lead U.S. precipitation forecast for July–September 2007 (issued June 2007).

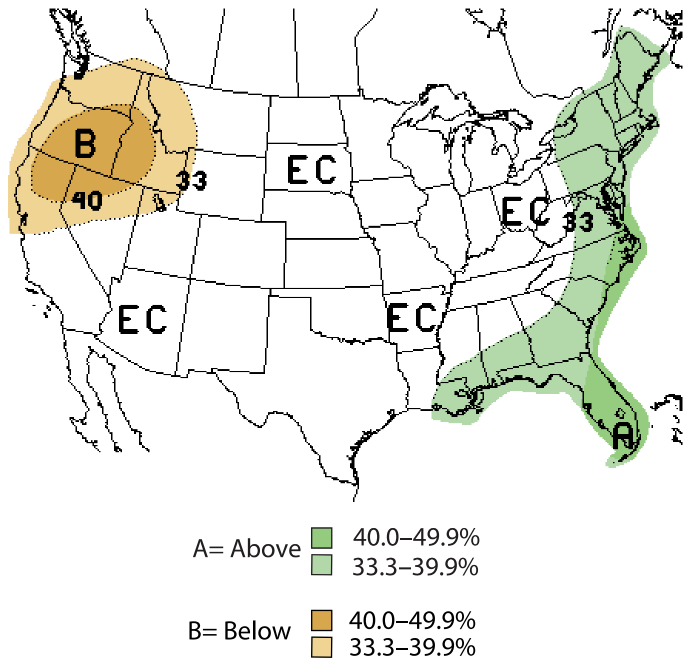
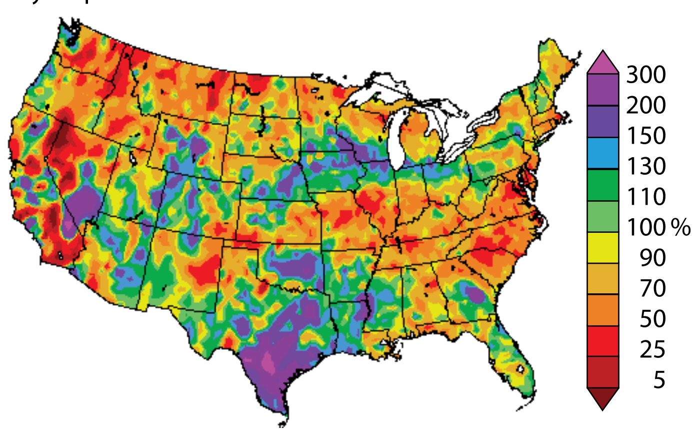


Figure 13b. Percent of average precipitation observed from July–September 2007.



Notes:

Figure 13a shows the NOAA Climate Prediction Center (CPC) precipitation outlook for the months July–September 2007. This forecast was made in June 2007.

The outlook predicts 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. Using past climate as a guide to average conditions and dividing the past record into 3 categories, there is a 33.3 percent chance of above-average, a 33.3 percent chance of average, and a 33.3 percent chance of below-average precipitation. Thus, using the NOAA CPC likelihood forecast, in areas with light brown shading there is 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. Equal Chances (EC) indicates areas where reliability (i.e., the skill) of the forecast is poor and no prediction is offered.

Figure 13b shows the observed percent of average precipitation for July–September 2007. Care should be exercised when comparing the forecast (probability) map with the observed precipitation maps. The observed precipitation amounts do not represent probability classes as in the forecast maps, so they are not strictly comparable, but they do provide us with some idea of how well the forecast performed.

In all of the figures on this page, the term average refers to the 1971–2000 average. This practice is standard in the field of climatology.

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.html