Issued: June 27, 2007

Southwest Climate Outlook

The University of Arizona.

Photo Source: Gregg Garfin, ISPE

Photo Description: A Navajo Nation technician examines data recording instruments at the Lukachukai Creek streamgage in northeastern Arizona.

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In this issue...

June Climate Summary

Drought – Severe to extreme drought conditions continue across Arizona while most of New Mexico remains drought-free this month. Western portions of Arizona along the Colorado River are experiencing the worst in drought conditions, with decreasing intensity eastward across the state.

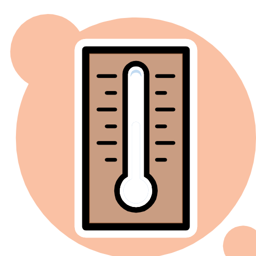
Temperature – The same story continues this month with New Mexico experiencing below-average temperatures, and Arizona experiencing above-average temperatures in the short-term. North-central and south-eastern Arizona had the greatest positive departures from average, with temperatures 2–3 degrees F above-average over the past thirty days.

Precipitation – New Mexico continued to experience above-average precipitation this past month with many locations reporting 100–400 percent of normal precipitation. Several low pressure systems produced thunderstorms across central and eastern portions of New Mexico late in May and again in mid-June. Arizona saw some of this weather activity in southeastern and north-central portions of the state.

Climate Forecasts – Temperature forecasts remain confident that much of Arizona and eastern New Mexico will see above-average temperatures throughout the summer. No precipitation forecasts have been made for the Southwest, indicating equal chances of above-average, average, or below-average precipitation for the region.

The Bottom Line – Little has changed since last month, with severe to extreme drought conditions remaining over most of Arizona, while New Mexico holds on to generally drought-free conditions. Patterns of monsoon precipitation across the Southwest will be critical in determining where short-term drought conditions either improve or worsen over the summer.

Monsoon soon?



This is the time of year when citizens of Arizona and New Mexico anxiously look to the North American Monsoon System to shift into high gear, bringing thunderstorms and precipitation to the region. Activity has started to ramp up in New Mexico, but Arizonans are still waiting for the telltale increase in dew point temperatures across the state that signals the monsoon's approach. The average start date for the monsoon in Tucson is July 3, but this seasonal shift in wind direction has come as early as June 17 (in 2000) and as late as July 25 (in 1985). The official start of the monsoon in Tucson occurs after the average daily dewpoint is equal to or exceeds 54 degrees Fahrenheit for three consecutive days as determined by the National Weather Service. In Phoenix, the monsoon is considered to have started when the daily dew point averages 55 degrees or higher for three consecutive days. The average start date in Phoenix is July 7.

To monitor monsoon season, visit http://www.wrh.noaa.gov/twc/monsoon/dewpoint_tracker.php...

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Arizona drought coming back into focus

By Gregg Garfin

Arizona Governor Janet Napolitano declared a continued drought emergency for Arizona on May 22, 2007, extending an executive order that has been in place since annual rainfall totals plunged sharply nine years ago.

The order continues emergency drought status to improve access for federal aid to farmers and livestock producers. The dry 2006–2007 winter diminished soil moisture, and years of drought have eroded the overall health of Arizona rangelands, reducing healthy soil to dust and withering the root systems of perennial grasses which hold the soil together.

But Napolitano's recent drought declaration is more than a relief measure. It is a continued call to arms designed to mobilize a network of scientists and citizens who monitor the drought as part of the Arizona Drought Preparedness Plan (ADPP). Meshing scientific data with observations of livestock, rangelands, forests, vegetation, and agriculture, drought monitoring can help citizens and management agencies better anticipate drought and take steps to reduce rangeland erosion, human-caused wildfire, depletion of vulnerable—and vital—water resources.

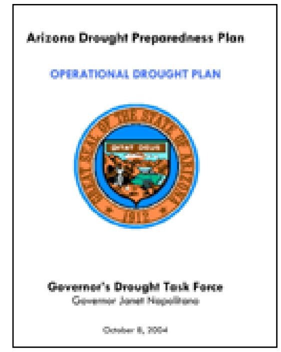
Some bad news

It is undeniable that drought has dominated the state's climatic conditions for at least a decade. For evidence, one need only look at the steadily declining levels of lakes Powell and Mead or the drought-decimated forests of northern Arizona.

Conditions could be worse. Recent research by University of Arizona (UA) scientists suggests the region could be in for megadroughts, covering areas as large as western North America, as the region warms. A reconstruction of Colorado River Basin streamflow at Lees Ferry, the dividing point between the upper and lower Colorado River basins, indicates periods of drought lasting as long as 62 years (1118–1179), including 13 consecutive years of below-normal flow on the Colorado. This hair-raising result, from UA investigators David Meko and Connie Woodhouse, confirms other megadrought studies that show that droughts in western North America during the Medieval Climate Anomaly (around 900–1300 A.D.) were more severe, lasted longer, and covered more area than more recent droughts. Given the combination of rapid population growth and acknowledged over-allocation of Colorado River water supplies, these results imply that sustaining Arizona's economy through continued growth may require substantial innovations, such as large-scale ocean water desalination; trade-offs among agricultural, riparian, municipal, and industrial water uses; and greater water conservation.

CLIMAS paleoclimate reconstructions of winter precipitation for Arizona and New Mexico climate divisions for 1000–1988 A.D., developed by Fenbiao Ni, Malcolm Hughes, and their UA colleagues, show that the 1200s saw the driest conditions statewide—that is, that century had the greatest proportion of years in the lower third of winter precipitation estimates, but the 1500s had the lowest proportion of wet years (years in the upper third of all values).

Across all of Arizona, except Mohave County, the 1662–1671 drought consistently had the most consecutive years below 85 percent of average winter precipitation and the greatest cumulative winter precipitation deficits. The 1100s drought mentioned by Meko and Woodhouse also figures prominently in the winter precipitation record, especially in central Arizona. Persistent droughts, like the 1100s drought, tend to extend over large areas. The fact that the long 1100s megadrought apparently stretched across the entire Colorado River Basin implies that the surface waters that supply Arizona may be at greater risk than previously thought.


Arizona Drought Preparedness Plan

OPERATIONAL DROUGHT PLAN

Governor's Drought Task Force
Governor Janet Napolitano

October 8, 2004

Good News!

With the drought strengthening its grip on the state, Governor Napolitano approved a drought task force to develop Arizona's first drought plan in 2003. The task force, a group of state, federal, private sector, and university researchers, experts, and consultants, developed the ADPP in October 2004. Now Arizona boasts the largest state-funded drought program in the country. Its three-fold mission is to provide:

- Timely and reliable monitoring of drought and water supply conditions in the state and an assessment of potential impacts;
- An assessment of the vulnerability of key sectors, regions, and population groups in the state and potential actions to mitigate those impacts;
- Assistance to stakeholders in preparing for and responding to drought impacts, including development of a statewide water conservation strategy and public awareness program.

Critics note that the plan has no teeth because it merely advises Arizonans on drought and water conservation. However, the plan established a foundation for legislative action and spurred municipal and regional preparedness planning. For example, in 2005 the Arizona Legislature approved a bill that requires all community water systems to develop plans for water supply, drought preparedness, and water conservation. The bill requires water providers to submit

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Drought, continued

an annual water use report; such monitoring is a step toward ensuring adequate water supplies throughout the state.

Drought plan implementation is making headway through the efforts of the Arizona Department of Water Resources (ADWR) and other agencies, such as County Emergency Management, University of Arizona Cooperative Extension (UACE), and other state, federal, private sector, and university partners.

Monitoring Drought in Arizona

Drought monitoring is the front line of drought mitigation and response. Monitoring drought and clearly conveying drought status are conceptually simple; in practice, however, they are surprisingly difficult. In Arizona, monitoring is complicated by several factors, including the state's highly diverse terrain, measurement systems that were designed to track short-term phenomena like weather and floods, a lack of soil moisture monitoring throughout the West, a groundwater monitoring system that was not designed to distinguish between drought and other depletions, such as over-pumping by residents and businesses, and a lack of resources to deploy gauges in mountainous areas. Records that have the potential to fill these gaps, such as spatially continuous records from satellites, date back fewer than thirty years or currently lack the detailed spatial resolution required by managers. The Arizona Drought Monitoring Technical Committee (MTC), in coordination with partners, is in the process of resolving some monitoring issues through funding requests for equipment, coordination with federal efforts to deploy new sensors, improvements to ADWR's groundwater monitoring system, and input from Arizona citizens through volunteer drought impact and precipitation reporting efforts.

Established by the drought plan, the MTC monitors precipitation, temperature, snowpack, vegetation health, and drought impacts, but it calculates drought status using only long continuous records of precipitation, streamflow, and reservoir levels. Drought status maps and assessments of other indicators monitored by the MTC are reported at the watershed scale on a monthly basis. These reports inform agency officials and the Governor about drought status and impacts to Arizona's water resources and ecosystems.

Table 1. Arizona drought trigger levels.

Status	Description	Preparedness and Mitigation in a Nutshell	Indicator Percentiles
0	No Drought	Reduce vulnerabilities before the situation escalates to crisis	40.1–100.0%
1	Abnormally Dry	Raise awareness about impending drought	25.1–40.0%
2	Moderate Drought	Voluntary actions to reduce water use	15.1–25.0%
3	Severe Drought	Curtailments in water deliveries	5.1–15.0%
4	Extreme Drought	Eliminate all non-essential water uses	0.0–5.0%

Drought indicator levels are linked to recommended steps for drought mitigation and response through a set of drought triggers, or levels of drought severity (Table 1), which were developed in consultation with the National Drought Mitigation Center. Arizona drought triggers differ from the U.S. Drought Monitor (see page 8) due to concerns about over-complexity from drought task force members. MTC partners, including the National Weather Service, USDA-Natural Resources Conservation Service, the U.S. Geological Survey, and the State Climate Office, have developed substantial online drought monitoring data and information resources that add geographic detail to the broad overview of state drought status provided in official monthly MTC reports.

Better Monitoring and Preparedness

One aspect of Arizona's drought plan and monitoring that is unique in the nation and viewed as a potential model for other states is the use of Local Drought Impact Groups (LDIGs). LDIGs are voluntary, county-level citizens groups that communicate drought impact information to the MTC and develop and coordinate local drought preparedness, mitigation, and response efforts.

The ADWR Statewide Drought Program began convening LDIGs in 2005, with a pilot project in southeastern Arizona's Cochise County. Cochise County was selected because it did not emerge from moderate to severe drought status during the 2004–2005 winter, which was relatively wet throughout most of the state.

The drought plan recommends that LDIGs collect drought impact information for the MTC, particularly on the economic and societal impacts of drought. This information, coming straight from the front lines, is critical for calibrating calculated drought status with the ways that drought affects people and their activities.

Organized drought impact monitoring is in its initial phases in the United States, and Arizona is one of the few states engaged in systematic collection of drought impact information. Based on input from the Cochise County LDIG, a UA team, led by UACE Climate Extension Specialist Mike Crimmins, has started an online drought impacts reporting system (DIRS), and several counties now report monthly to the MTC. An improved DIRS, using a Google Earth© interface developed by the NSF Science and Technology Center for Sustainability of semi-Arid

continued on page 5

Drought, continued

Hydrology and Riparian Areas at UA (SAHRA), is scheduled for release later this year. Through DIRS, volunteers can report qualitative assessments of range, agriculture, ecosystem, and water impacts. The new system will allow them to map drought impacts to help improve preparedness and emergency response efforts.

A separate effort by Crimmins and SAHRA's Gary Woodard has helped spur interest in citizen drought monitoring. These partners developed a citizen weather monitoring project called RainLog to capture precipitation and drought observations. Such observations can assist the MTC in interpreting geographic variations in precipitation by filling in critical gaps in the official network of rain gauge stations.

Crimmins also leads an Arizona Water Institute project to develop a drought trigger and indicator tool to help water providers submit their drought plans to ADWR. The trigger points are an essential part of drought planning, and solid planning and monitoring at the water provider level will help insure that all Arizona communities do not suffer the extensive shortages that some rural communities experienced in 2002. Crimmins's tool, developed in conjunction with ADWR and in consultation with CLIMAS, the state climatologist (Arizona State University), and stakeholders, will aid water providers in determining a combination of water supply and climatological trigger points for drought actions, such as water conservation, and augmenting water supplies.

Plans for the Future

Since the ADPP's inception, drought monitoring and monthly drought status reporting is proceeding apace. The statewide water conservation program has established a variety of programs for water use efficiency, technological innovation, outreach, and assistance. Moreover, the statewide drought program is in the process of implementing the innovative LDIGs and guidance to water providers on drought planning. So what lies ahead for Arizona drought monitoring and preparedness?

The Arizona Water Institute (AWI), a consortium of Arizona's three universities, is developing the Arizona Hydrologic Information System (AHIS) to improve the flow of data and information to agencies, planners, communities, and citizens. The AHIS will combine hydrologic information from state and federal sources, such as the Arizona Flood Warning and Drought Monitoring initiative, with the monthly drought status report, DIRS, RainLog, and other statewide drought program tools. This kind of data and information clearinghouse was the highest priority listed by stakeholders responding to an AWI survey. AHIS software developers and others, including CLIMAS, are working to link AHIS to the federally funded National Integrated Drought Information System.

Other ongoing projects to improve Arizona drought monitoring include an effort by ADWR to develop and equip a network of groundwater monitoring wells. This drought monitoring data will supplement the MTC's current drought indicators for determining drought status. This effort is significant because many Arizona communities are dependent on groundwater for drinking water supplies.

The efforts mentioned here, as well as others by ADWR's Statewide Drought Program, MTC member organizations, and Arizona's three state universities are on track to improve drought monitoring and preparedness. Research and outreach are underway to examine the economic impacts of drought, improved drought status indices, enhancements to monitoring networks, and more effective connections to Arizona communities. Most important of all are the continued interactions between citizens, scientists, and agency officials to improve drought preparedness, monitoring and planning. These interactions will insure that the drought plan is responsive to citizen needs and advances in science and policy designed to protect the state's water supplies.

This article, the first in a series on drought monitoring and planning in the Southwest, looks at what Arizona is doing to improve drought monitoring and preparedness. Gregg Garfin is co-chair of Arizona's drought monitoring technical committee.

Related links

Arizona Drought Preparedness Plan
http://www.azwater.gov/dwr/drought/DroughtHome.html

Arizona Drought Monitoring Technical Committee
http://www.azwater.gov/dwr/drought/MTC.html

Paleoclimate Reconstructions
http://www.ispe.arizona.edu/climas/research/paleoclimate/product.html

NWS Phoenix Drought Monitoring
http://www.wrh.noaa.gov/psr/DroughtPage.php?wfo=psr&data=ALLDATA

NWS Tucson Drought Monitoring
http://www.wrh.noaa.gov/twc/climate/seazDM.php

USGS Drought Monitoring
http://az.water.usgs.gov/droughtmaps/droughtmaps.htm

USDA-NRCS Drought Monitoring
http://www.az.nrcs.usda.gov/snow/watersupply/outlookreports/index.html

Arizona Flood Warning and Drought Monitoring initiative
http://data.afws.org/sui/frontPage.aspx

Temperature (through 6/20/07)

Source: High Plains Regional Climate Center

The Arizona-New Mexico state line defined temperature patterns again this month. Temperatures have been generally below average across New Mexico since the beginning of the water year on October 1, 2006 (Figures 1a–b). Temperatures have been 1–2 degrees Fahrenheit below average for the period, with some locations in the center of the state reporting as much as 5 or more degrees below average. Arizona, on the other hand, has experienced temperatures generally 1–2 degrees F above average. The temperature discontinuity is likely due to the distribution of winter snowfall across the two states. A number of strong cold fronts brought cold air and snowfall to New Mexico, while much of the moisture and the cold air bypassed Arizona. Spring snowmelt replenished soil moisture and, along with clouds and precipitation, helped to suppress temperatures across New Mexico.

The same pattern held true over the past thirty days, with most stations in New Mexico reporting temperatures 1–3 degrees F below average, and stations in much of Arizona reporting temperatures 1–3 degrees F above average (Figures 1c–d). The pattern of below-average temperatures in New Mexico and above-average temperatures in Arizona is strongly tied to where precipitation fell. Several cold fronts and small disturbances to the upper air flow (known as short waves) crossed the Southwest in late May and early June, bringing clouds and precipitation to New Mexico and eastern Arizona, but not to the remainder of the state. Arizona has not had sufficient moisture for the disturbances to trigger precipitation. The National Weather Service reported that Phoenix experienced its sixth warmest May on record.

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

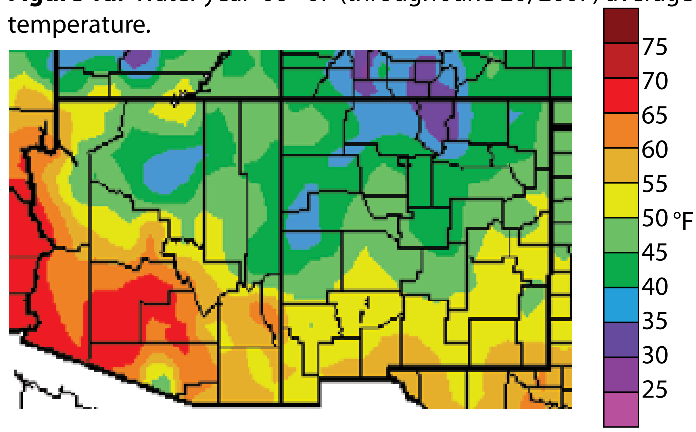


Figure 1a. Water year '06–'07 (through June 20, 2007) average temperature.

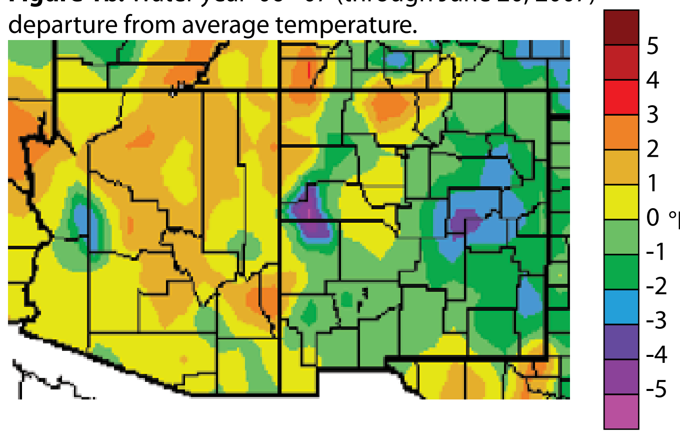


Figure 1b. Water year '06–'07 (through June 20, 2007) departure from average temperature.

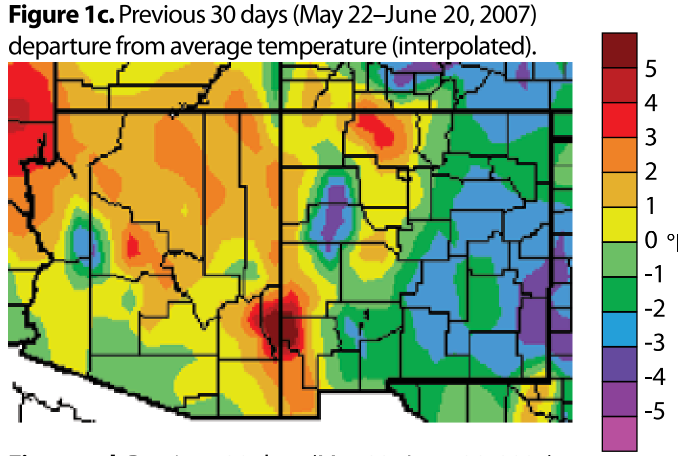


Figure 1c. Previous 30 days (May 22–June 20, 2007) departure from average temperature (interpolated).

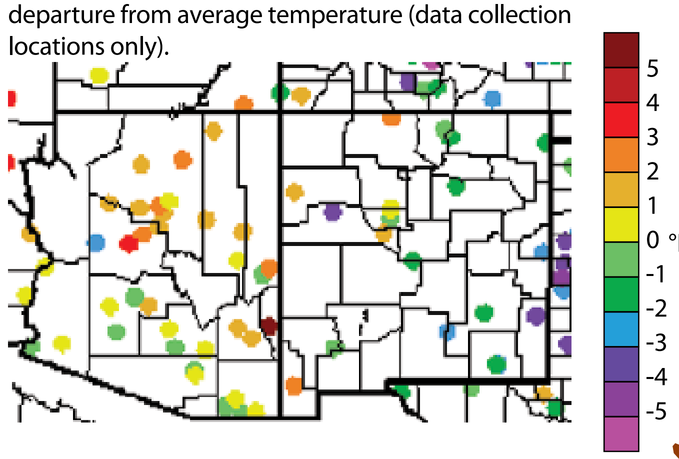


Figure 1d. Previous 30 days (May 22–June 20, 2007) departure from average temperature (data collection locations only).

Precipitation (through 6/20/07)

Source: High Plains Regional Climate Center

In New Mexico, precipitation observations are up to 300 percent of average since the beginning of the water year on October 1, 2006 (Figure 2a–b). Arizona has not fared as well, with only 25–50 percent of average precipitation across most of the state. Conditions have been relatively dry in Arizona and New Mexico since May. A series of low pressure systems, some bringing very strong winds, have punctuated the high pressure that has dominated conditions over the region. While southeast and north-central Arizona and western New Mexico have seen some precipitation during the past thirty days (Figure 2c–d), none fell over the western deserts of Arizona.

The flow and sources of moisture for the two states is responsible for precipitation disparities. Arizona has received scant Pacific moisture, whereas New Mexico has received substantial moisture moving northward from Mexico and northwest from Texas. The track of these systems again favored precipitation in New Mexico, but only dry wind in Arizona. In the past thirty days, rain fell in Arizona on only eight days, while rain fell on twenty-three days in New Mexico. The shortwave disturbances and low pressure systems that produced rain in New Mexico barely produced clouds in Arizona.

Severe weather across eastern New Mexico in late-May produced 0.75-inch hail in Roswell and high winds in Tucumcari, according to National Weather Service reports.

Notes:

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2006, we are in the 2007 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 '06–'07 (through June 20, 2007) percent of average precipitation (interpolated).

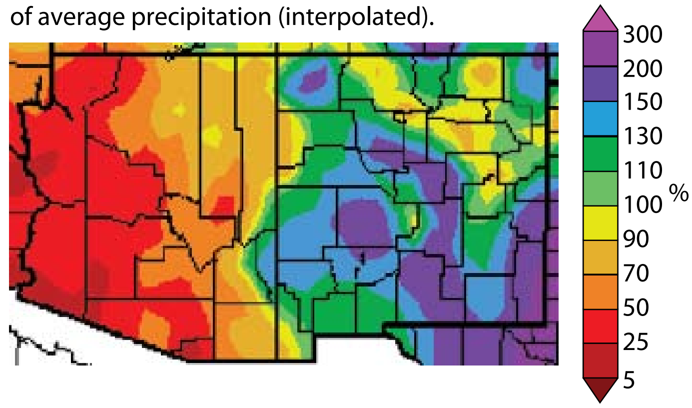


Figure 2b. Water year '06–'07 (through June 20, 2007) percent of average precipitation (data collection locations only).

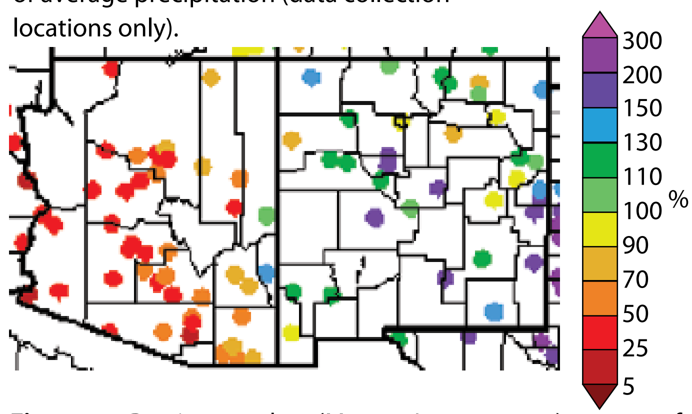


Figure 2c. Previous 30 days (May 22–June 20, 2007) percent of average precipitation (interpolated).

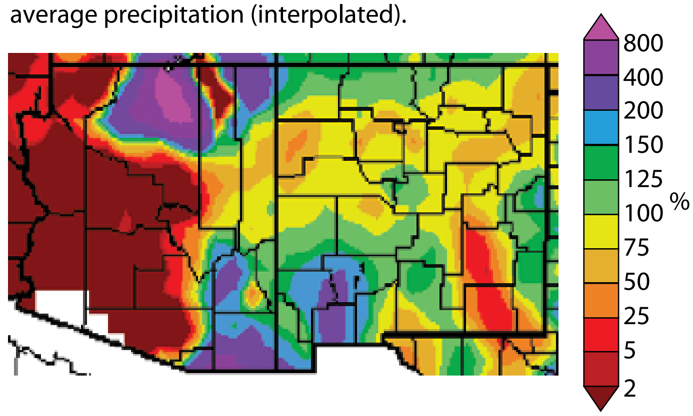
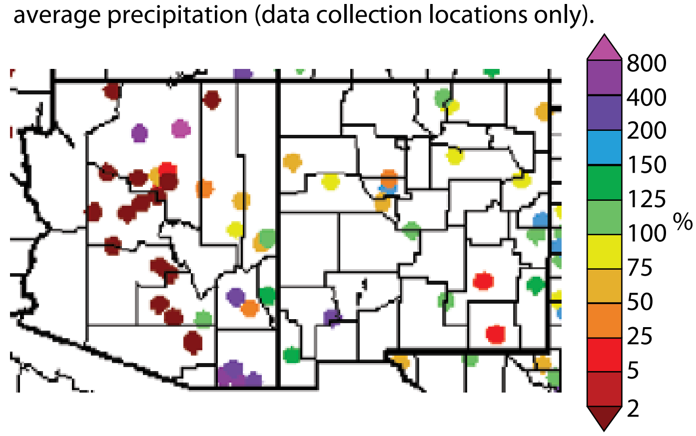


Figure 2d. Previous 30 days (May 22–June 20, 2007) percent of average precipitation (data collection locations only).



U.S. Drought Monitor

(released 6/21/07)

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

The U.S. Drought Monitor remains unchanged for the Southwest since last month, and continues to depict severe to extreme drought across most of Arizona, with much of New Mexico remaining drought free (Figure 3). Abnormally dry conditions have crept into far northeastern New Mexico, but only 10 percent of the state is classified as experiencing moderate or severe drought conditions (San Juan and McKinley counties). More than 90 percent of Arizona is experiencing moderate to extreme drought conditions; of that area, more than 20 percent is classified as extreme (La Paz, Yuma, and portions of Mohave, Maricopa and western Pima counties). The continuation of recent patterns in precipitation over Arizona and New Mexico has held drought conditions steady.

Above-average precipitation across New Mexico has kept most of the state drought free, while below-average spring precipitation in Arizona has done little to alleviate short-term drought conditions, especially in the low elevation western deserts.

Arizona Governor Janet Napolitano recently issued a new drought declaration for the state. For more information, visit http://azgovernor.gov/dms/upload/E0_052207_SDOC7352.pdf.

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 Rich Tinker, Climate Prediction Center, NCEP/NWS/NOAA.

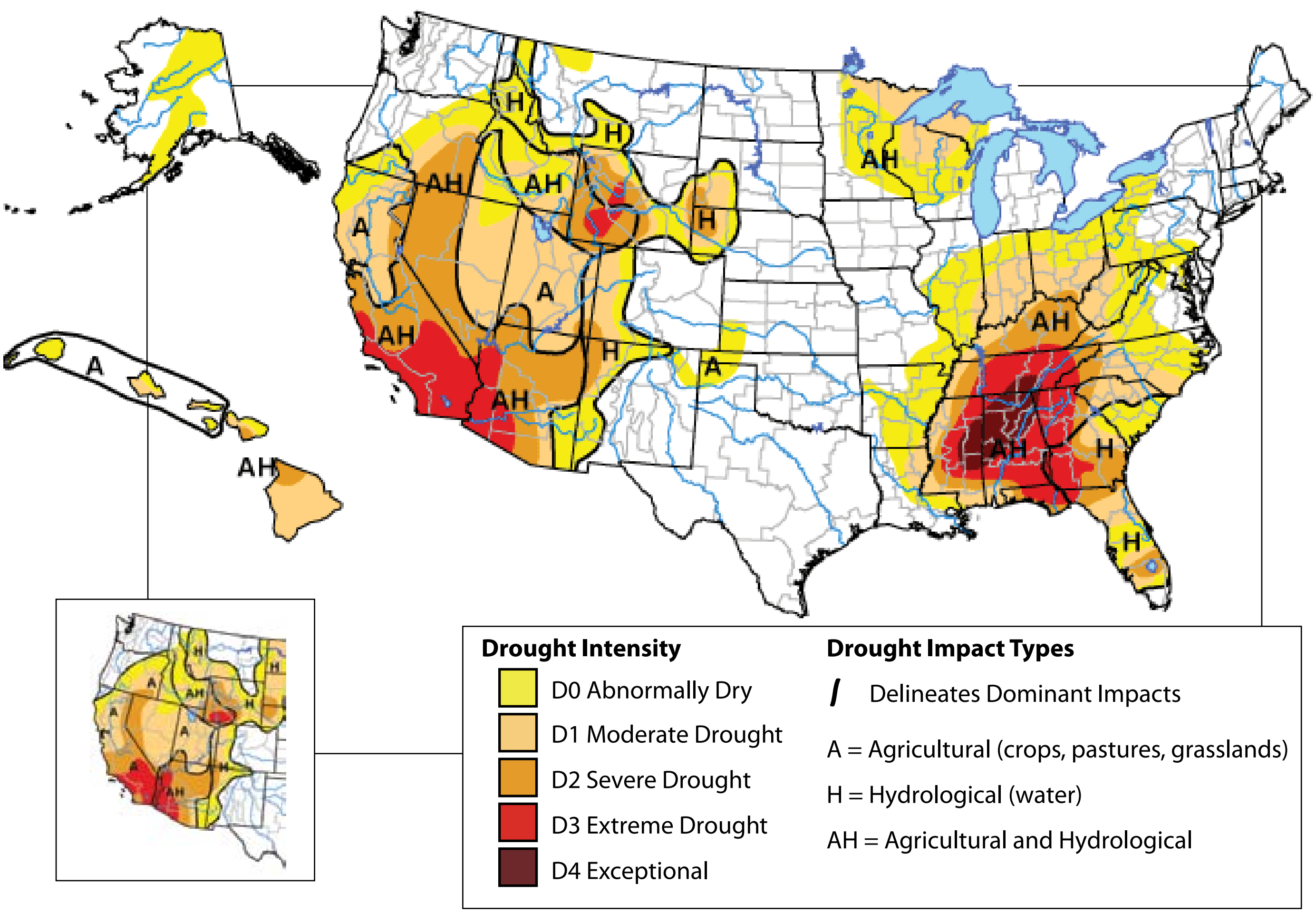


Figure 3. Drought Monitor released June 21, 2007 (full size) and May 17, 2007 (inset, lower left).

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 4/30/07)

Source: Arizona Department of Water Resources

Drought conditions have worsened over much of northern and western Arizona this spring due to below-average winter and spring precipitation. The most recent Arizona Drought Monitor Report (May 2007) depicts all watersheds in Arizona under some form of drought on the long-term status map, with the Lower Colorado, Verde, Agua Fria, Santa Cruz, and San Simon watersheds designated as severe (Figure 4a). This reflects a one-category change, from moderate to severe, for the Lower Colorado, Agua Fria, and Verde watersheds. Short-term conditions are not much better, with all watersheds except White Water Draw in the southeastern corner of the state exhibiting drought conditions (Figure 4b). The biggest short-term changes from April to May were again in the northern watersheds; the Little Colorado moved from abnormally dry to moderate, and the Verde moved from moderate to severe.

The Yavapai County Local Drought Impacts Group continues to report on worsening conditions in the area. Many dirt tanks for livestock watering have dried up due to recent hot and dry conditions, forcing some ranchers to haul water. Ranchers also are concerned about poor range conditions from lack of winter rainfall. The growth of springtime annual plants, which are used by livestock in the spring, was limited because of lack of precipitation. Perennial grasses have also been sluggish to put on new growth with the dry conditions. The amount of precipitation received during the summer monsoon season will determine range conditions over the next several months.

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/Content/Hot_Topics/Agency-Wide/Drought_Planning/

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

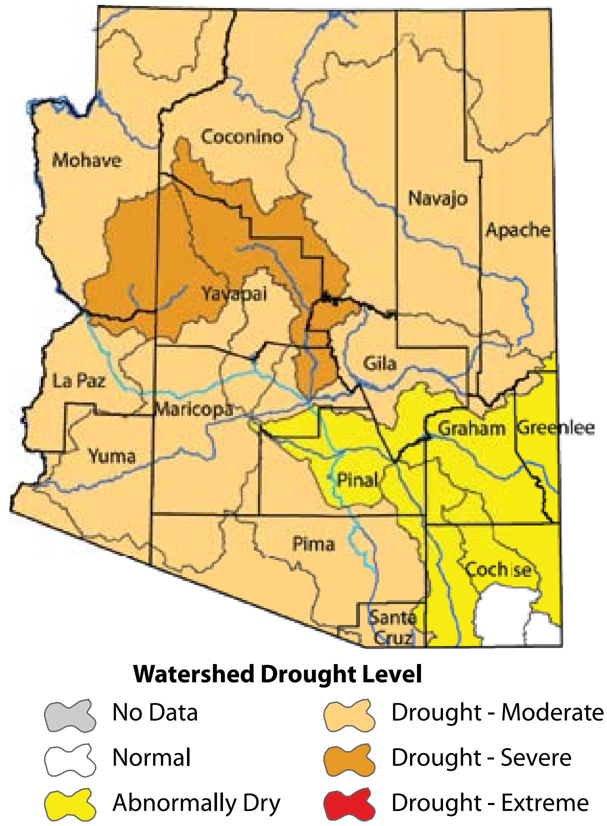
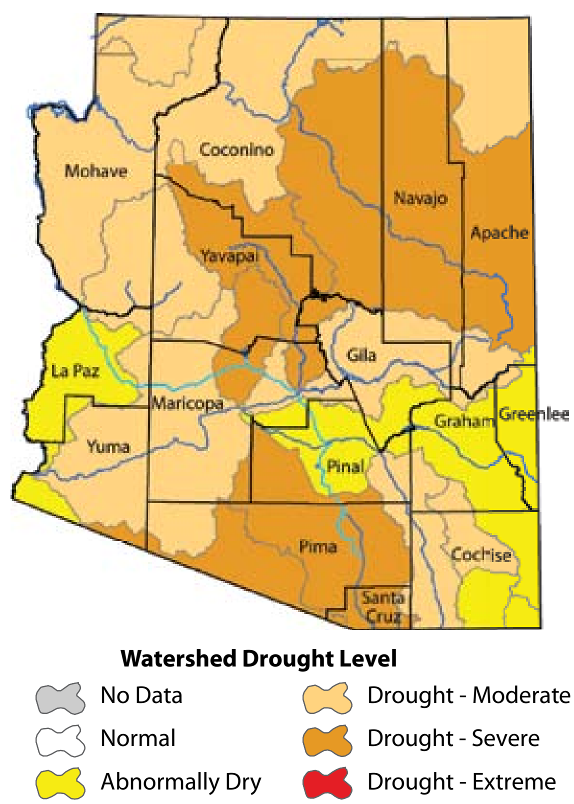


Figure 4b. Arizona long-term drought status for May 2007.



New Mexico Drought Status
(through 6/30/07)

Source: New Mexico Natural Resources Conservation Service

The June 2007 New Mexico Drought Status report noted that drought intensity and area extent diminished during April and May. Most of New Mexico is drought free at this time, due to above-average precipitation throughout last winter and spring (Figure 5). The Albuquerque National Weather Service Office reports that preliminary estimates put May 2007 as the eighth wettest May on record statewide, while the December through May six-month period was the twelfth wettest on record. Long-term drought conditions that plagued the southwestern corner of the state were alleviated by the recent above-average precipitation. Mild drought conditions classified as alert remain in a small portion of Sierra County in southwestern New Mexico. Drought conditions in Arizona have crept into far western portions of New Mexico but have been held at bay by continued rounds of precipitation through May and early June.

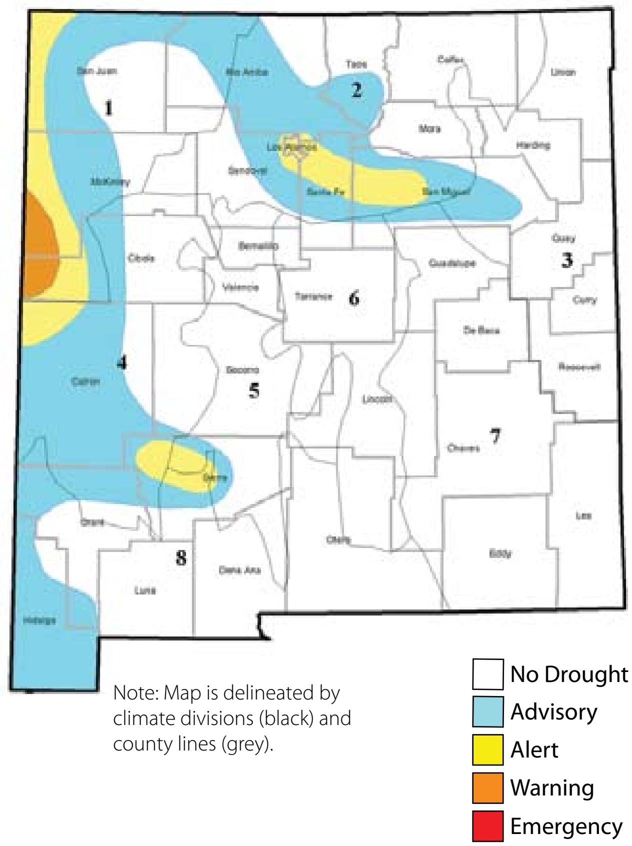
There is a downside to the recent above-average precipitation occurring in New Mexico: rodents. Recent rainfall has created a lush environment, encouraging a boost in the rat, squirrel, and rabbit populations (*Albuquerque Tribune*, June 20). This also means an increase in the diseases they carry, including the plague. Four cases of the plague have been reported in New Mexico since May. Health experts looking ahead for short-term changes in climatic conditions say the return of drought or a very cold winter could help control populations. New Mexico State Climatologist Ted Sammis noted that dry or cold conditions were not probable in the short-term, with monsoon activity already ramping up and the trend towards warmer winter temperatures most likely continuing across New Mexico. For more information, visit http://www.abqtrib.com/news/2007/jun/20/.

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).

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



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 5/31/07)

Source: National Water and Climate Center

Despite a dry spring across most of the state, May brought little change in the status of Arizona reservoir levels (Figure 6). On the Colorado River, levels at Lake Mead decreased very slightly while those at Lake Powell increased by about 4 percent of capacity level. According to Tom Ryan of the Bureau of Reclamation, the current level at Lake Powell is likely near its peak for the year, as there is very little remaining snowpack in the upper Colorado River Basin. The end of month level of 3,610.1 feet is slightly above the predicted seasonal peak of 3,606 feet. However, June inflow to Lake Powell is predicted to be much lower than average. In-state reservoir levels also remain more or less the same overall, although storage at the San Carlos Reservoir continues to fall. At 26 percent of capacity, however, the current storage level at San Carlos remains well above its lowest levels in the ongoing drought.

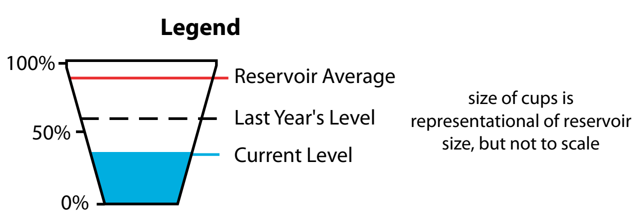
Notes:

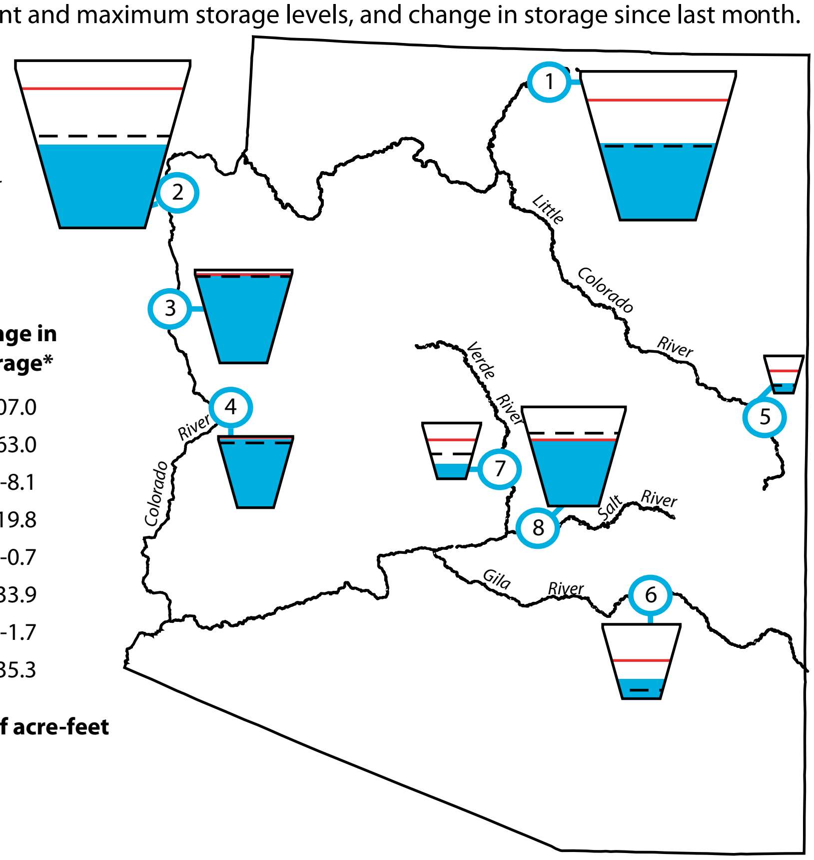
The map gives a representation of current storage levels for reservoirs in Arizona. Reservoir locations are numbered within the blue circles on the map, corresponding to the reservoirs listed in the table. The cup next to each reservoir shows the current storage level (blue fill) as a percent of total 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 May 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	52%	12,691.0	24,322.0	907.0
2. Lake Mead	50%	12,963.0	26,159.0	-463.0
3. Lake Mohave	96%	1,734.2	1,810.0	-8.1
4. Lake Havasu	95%	590.9	619.0	19.8
5. Lyman Reservoir	26%	7.7	30.0	-0.7
6. San Carlos	26%	227.7	875.0	-33.9
7. Verde River System	27%	78.1	287.4	-1.7
8. Salt River System	66%	1,341.1	2,025.8	-35.3

*** 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 5/31/07)

Source: National Water and Climate Center

Most New Mexico reservoirs continue to benefit from above-average precipitation throughout the month of May, as unusual monsoon-like patterns brought moisture to the entire state (*Los Alamos Monitor*, June 22). Reservoir levels continued to increase throughout much of northern New Mexico this month, with the Costilla and El Vado reservoirs experiencing substantial increases that have left them at 90 percent or more of capacity (Figure 7). Conversely, the storage level at Navajo Reservoir decreased slightly and Abiquiu remained the same. The picture in central and southern New Mexico was more mixed, with storage levels either increasing or decreasing but remaining within a few percentage points of April levels.

Overall, New Mexico continued to benefit from an abnormally wet spring, including a few systems that brought rain and snow late in the season. Unusually low temperatures have slowed snowpack melt (*New Mexican*, May 28).

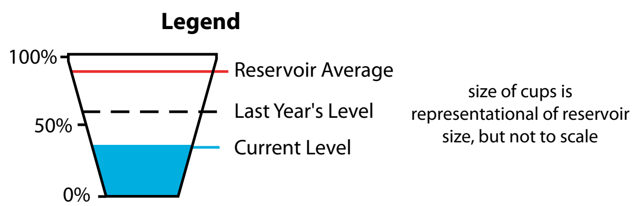
Notes:

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.

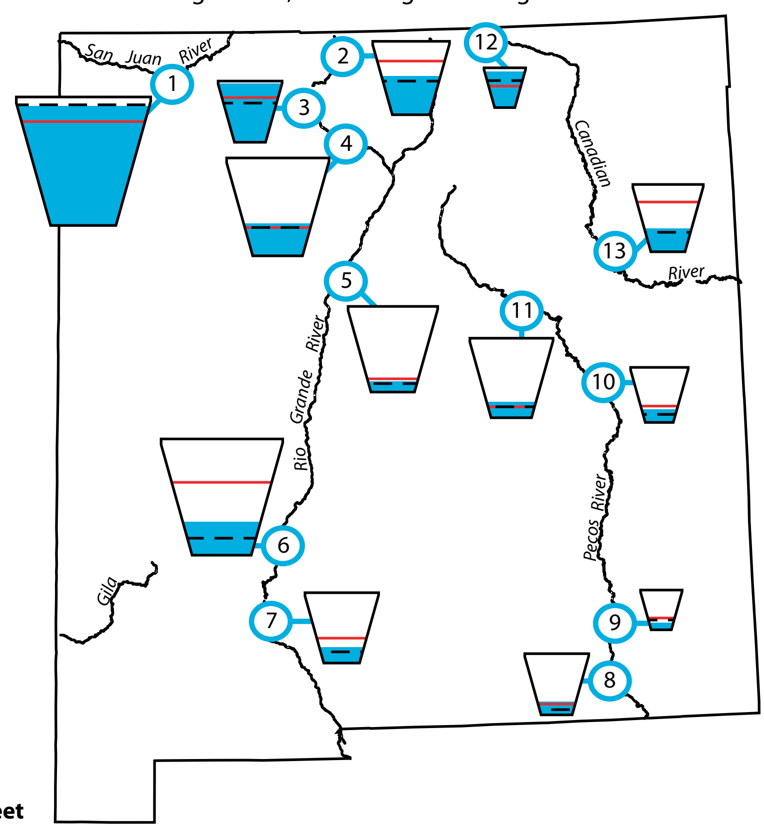
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service. For additional information, contact Tom Pagano at the National Water Climate Center (tom.pagano@por.usda.gov; 503-414-3010) 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 May 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	93%	1,579.0	1,696.0	-43.0
2. Heron	53%	213.9	400.0	31.6
3. El Vado	96%	179.6	186.3	16.2
4. Abiquiu	33%	182.1	554.5	-0.2
5. Cochiti	12%	59.2	502.3	6.7
6. Elephant Butte	29%	596.8	2,065.0	38.9
7. Caballo	23%	75.9	331.5	15.0
8. Brantley	21%	31.7	147.5	-0.3
9. Lake Avalon	17%	1.0	6.0	-0.2
10. Sumner	24%	24.6	102.0	-1.3
11. Santa Rosa	20%	90.3	447.0	15.3
12. Costilla	90%	14.4	16.0	5.2
13. Conchas	34%	87.5	254.0	2.7

*** thousands of acre-feet**



On the Web:

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

Southwest Fire Summary
(updated 6/20/07)

Source: Southwest Coordination Center

The 2007 fire season has produced fewer large fires and fewer acres burned than average (Figure 8a). In fact, the greatest number of acres burned to date has been in prescribed fire activity. The low fire activity thus far is due to a combination of astute pre-placement of firefighting resources west of the Continental Divide (where early predictions showed high fire potential), excellent "first attack" fire suppression efforts, an overall lack of ignitions, and sufficient rainfall accompanying lightning-based ignitions (Figures 8b–8c).

Nevertheless, fuel conditions in Arizona are exceedingly dry, and land use restrictions are in place. USDA-Forest Service observed fire danger classes (not shown) range from very high to extreme across virtually all of Arizona and parts of western New Mexico. Large fuel moisture is within the average range for most of our region, but the average for this time of year is very dry, at about 10 percent fuel moisture. In western Arizona large fuel moisture is well below the average for this time of year.

The Southwest Coordination Center has a special advisory in effect for areas of south-central Arizona characterized by a high density of buffelgrass. The loading of this fine herbaceous fuel is so high that, given an ignition and some wind, it can generate high fire intensities and extreme or unpredictable fire behavior. For more information, visit http://gacc.nifc.gov/swcc/predictive/fuels_fire-danger/hot_topics/fuels_fb_advisory_buffelgrass_042707.pdf.

Notes:
The fires discussed here have been reported by federal, state, or tribal agencies during 2007. The figures include information both for current fires and for fires that have been suppressed. Figure 8a shows a table of year-to-date fire information for Arizona and New Mexico. Prescribed burns are not included in these numbers. Figures 8b and 8c indicate the approximate locations of past and present "large" wildland fires and prescribed burns in Arizona and in New Mexico. A "large" fire is defined as a blaze covering 100 acres or more in timber or 300 acres or more in grass or brush. The name of each fire is provided next to the symbol.

On the Web:
These data are obtained from the Southwest Coordination Center website:

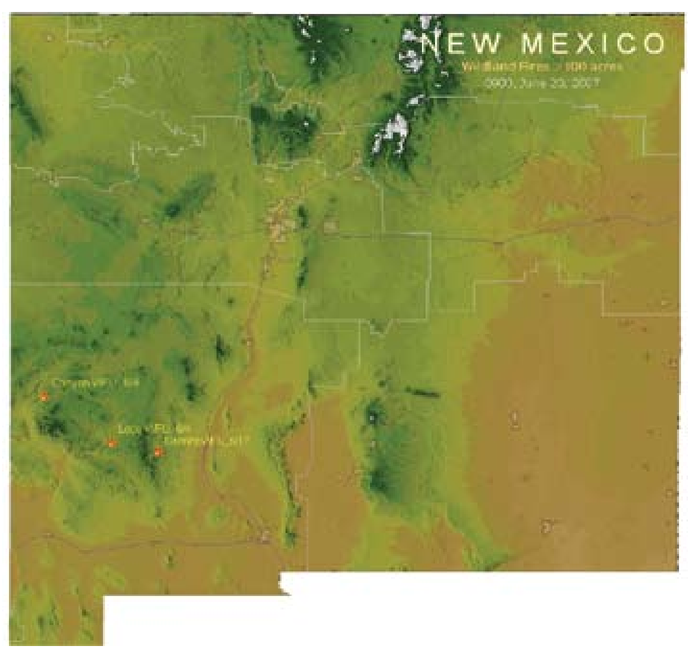
http://gacc.nifc.gov/swcc/predictive/intelligence/situation/swa_fire.htm
http://gacc.nifc.gov/swcc/predictive/intelligence/daily/ytd_large.htm

Figure 8a. Year-to-date fire information for Arizona and New Mexico as of June 20, 2007.

State	Human Caused Fires	Human caused acres	Lightning caused fires	Lightning caused acres	Total Fires	Total Acres
AZ	743	20,729	109	1,045	852	21,774
NM	340	21,908	172	3,796	512	25,704
Total	1,083	42,637	281	4,841	1,364	47,478

Figure 8b. Arizona large fire incidents as of June 20, 2007.

Figure 8c. New Mexico large fire incidents as of June 20, 2007.



Temperature Outlook
(July–December 2007)
Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC long-lead forecast predicts an increased chance of above-average temperatures in the Southwest through December (Figures 9a–d). According to Klaus Wolter, of the NOAA-CIRES Climate Diagnostics Center, this forecast reflects both long-term trends and below-average soil moisture levels in the region. The greatest chances of above-average temperatures are predicted for July–September (Figure 9a). Areas with the highest chances of above-average temperatures include major urban areas, such as Las Vegas, Phoenix, and Tucson, where urban heat island effects exacerbate temperature trends.

Predictions for September–December show an increased chance of above-average temperatures remaining in the Southwest and then expanding to include much of the South and Great Plains regions (Figures 9c–d).

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 9a. Long-lead national temperature forecast for July–September 2007.

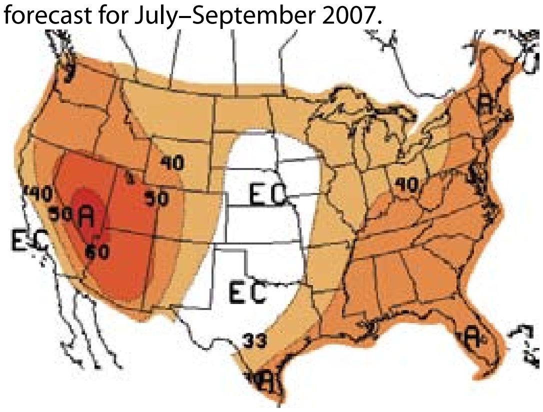
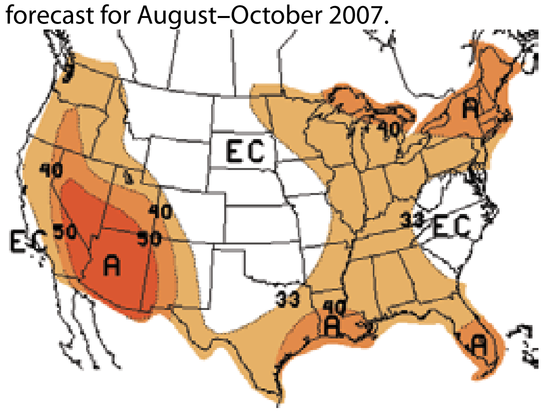
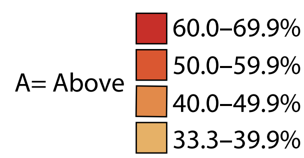


Figure 9b. Long-lead national temperature forecast for August–October 2007.





EC= Equal chances. No forecasted anomalies.

Figure 9c. Long-lead national temperature forecast for September–November 2007.

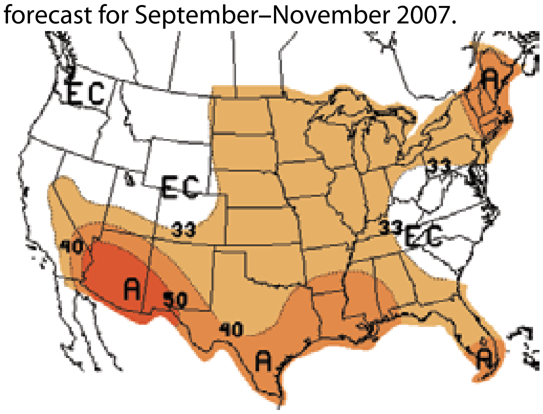
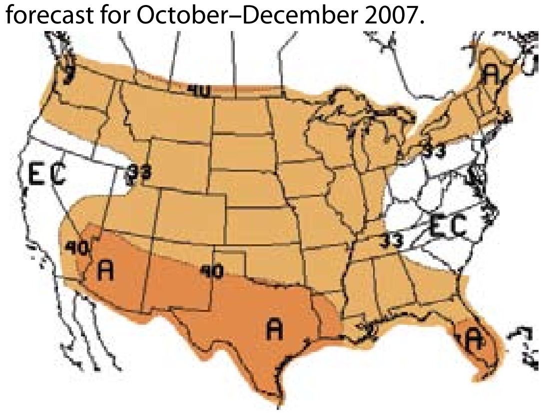


Figure 9d. Long-lead national temperature forecast for October–December 2007.



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
(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

(July–December 2007)

Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC long-lead precipitation outlook continues to reserve judgment, defaulting to equal chances of near-, below-, and above-average precipitation for the southwestern states through the end of 2007 (Figures 10a–d). In much of the Pacific Northwest and northern Great Basin, a slightly increased chance of below-average precipitation is predicted through the summer and early fall (Figures 10a–c). Both NOAA and the IRI predict increased chances of above-average precipitation along the East Coast related to predictions of greater tropical storm activity in the Atlantic. The IRI predicts higher chances of below-average tropical storm activity in the East Pacific, due primarily to stronger east-to-west (easterly) winds in the tropics. Easterly tropical winds favor Atlantic tropical storms, but inhibit the development of tropical storms off the west coast of Mexico.

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 10a. Long-lead national precipitation forecast for July–September 2007.

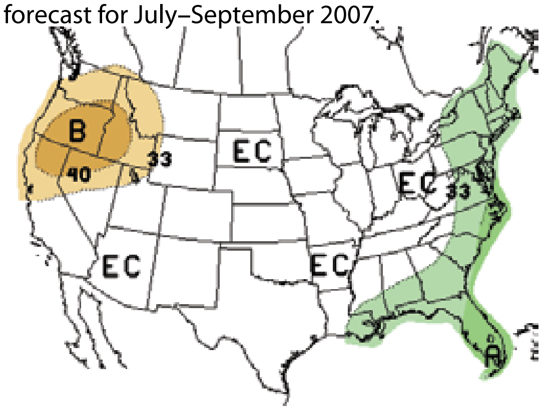


Figure 10b. Long-lead national precipitation forecast for August–October 2007.

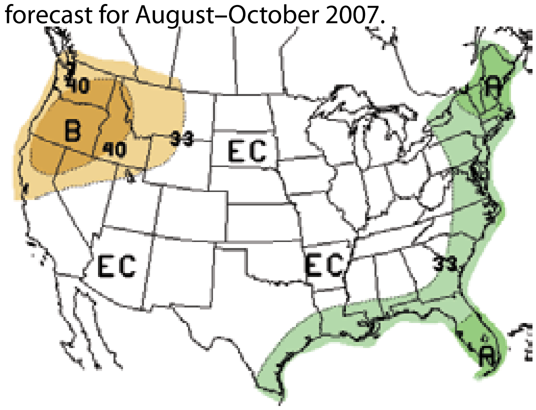


Figure 10c. Long-lead national precipitation forecast for September–November 2007.

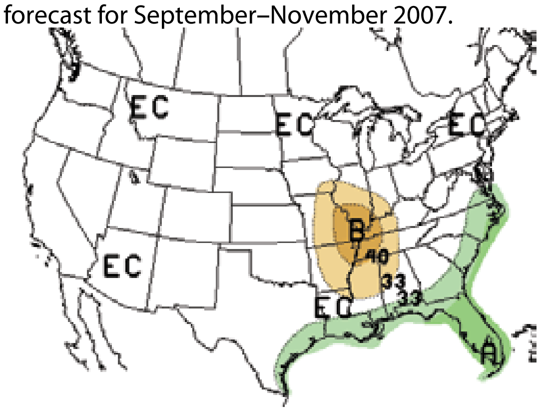
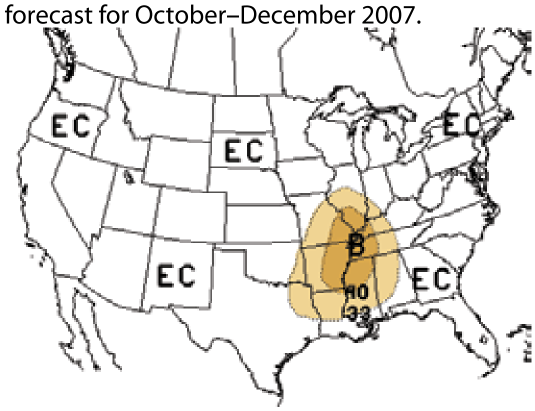


Figure 10d. Long-lead national precipitation forecast for October–December 2007.



A= Above: 40.0–49.9%, 33.3–39.9%

B= Below: 33.3–39.9%, 40.0–49.9%

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 September 2007)

Source: NOAA Climate Prediction Center (CPC)

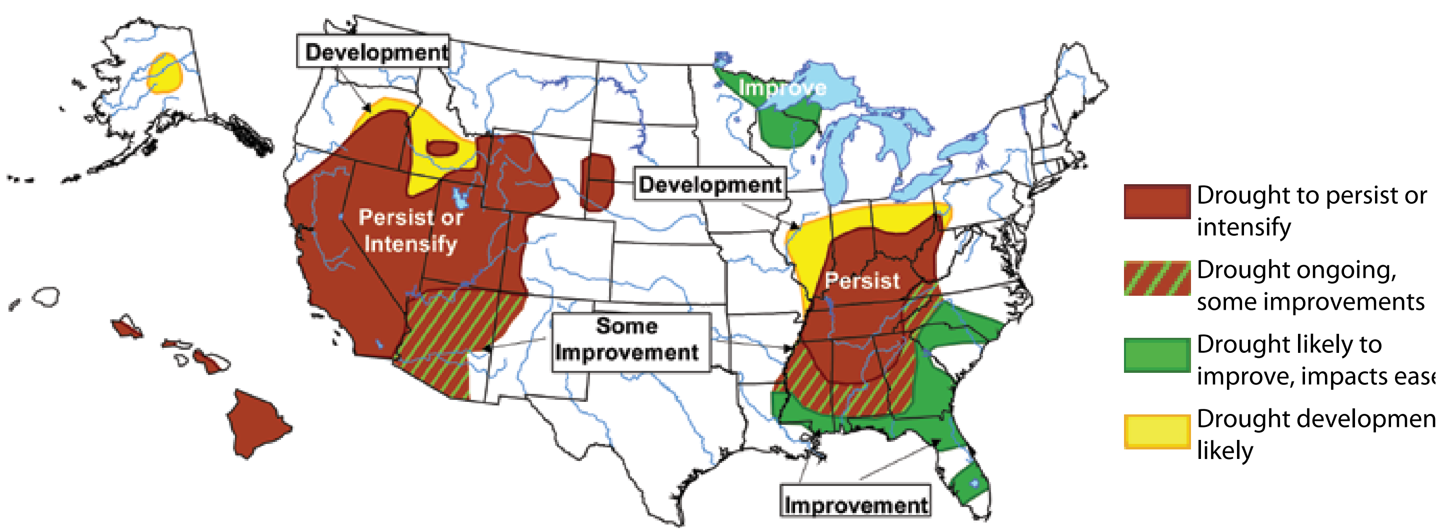
The NOAA-CPC seasonal drought outlook indicates a potential reduction of drought status across much of Arizona, primarily due to expected summer monsoon activity (Figure 11). The seasonal drought outlook, however, does not specify whether monsoon strength or summer total precipitation will be greater than average. This year, forecasters see no strong indicator of early monsoon onset or enhanced monsoon strength. Klaus Wolter of the NOAA Earth System Research Laboratory notes that, unlike last year, there is little indication of early monsoon onset. He also notes that if La Niña ramps up during the upcoming weeks, Arizona would be slightly likely to benefit from a strengthened monsoon, whereas the chances of increased precipitation would diminish in the other Four Corners states.

In drought and water-related news from the region, Arizona Governor Janet Napolitano signed a bill enabling the creation of a water replenishment district in the Upper San Pedro River subwatershed of southern Arizona. (*Sierra Vista Herald Review*, June 21). The district, if approved by area voters, would establish local political authority over the watershed and potentially allow water supply augmentation from the Central Arizona Project or desalination plants. In New Mexico, irrigators in the Elephant Butte Irrigation District will receive a two acre-feet per acre allotment, which is more than was allotted earlier this year, but less than the three acre-feet hoped for when early winter snows promised higher runoff (Associated Press, June 19).

Notes:

The delineated areas in the Seasonal Drought Outlook (Figure 11) are defined subjectively and are based on expert assessment of numerous indicators, including outputs of short- and long-term forecasting models.

Figure 11. Seasonal drought outlook through September 2007 (released June 21, 2007).



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

Wildland Fire Outlook

Sources: National Interagency Coordination Center, Southwest Coordination Center

Above-normal significant fire potential is forecast across most of Arizona into far southwestern New Mexico, while below-normal fire potential is expected from central New Mexico into West Texas (Figure 12a). Normal fire potential is expected elsewhere in the Southwest.

The western part of the Southwest is characterized by exceedingly low fuel moistures and high herbaceous fine fuel loads (Figure 12b). Fine fuels across most of Arizona have already cured. According to the Southwest Coordination Center (SWCC), a steady increase in fire potential is expected generally west of the Continental Divide, due to periods of anomalously strong and dry westerly winds interspersed with periods of hot, dry weather. These conditions hasten the curing of the abundant fine herbaceous fuels and grasses and dry out mid-to-upper elevation timber fuels. Across eastern New Mexico and West Texas, periodic moisture has kept fuels moist enough to lower fire potential.

The SWCC expects moderate-to-high demand for firefighting resources in the western portion of the region, as the period of dry lightning and increased ignitions approaches. The SWCC notes that prescribed fire projects planned for eastern New Mexico and West Texas may run into fuel conditions that change rapidly from green to cured to green, due to late-spring and early summer rains.

Notes:

The National Interagency Coordination Center at the National Interagency Fire Center produces monthly wildland fire outlooks. The forecasts (Figure 12a) consider climate forecasts and surface-fuels conditions in order to assess fire potential for fires greater than 100 acres. They are subjective assessments, based on synthesis of regional fire danger outlooks.

The Southwest Area Wildland Fire Operations produces monthly fuel conditions and outlooks. Fuels are any live or dead vegetation that are capable of burning during a fire. Fuels are assigned rates for the length of time necessary to dry. Small, thin vegetation, such as grasses and weeds, are 1-hour and 10-hour fuels , while 1000-hour fuels are large-diameter trees. The top portion of Figure 12b indicates the current condition and amount of growth of fine (small) fuels. The lower section of the figure shows the moisture level of various live fuels as percent of average conditions.

On the Web:

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

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

Figure 12a. National wildland fire potential for fires greater than 100 acres (valid June 1–30, 2007).

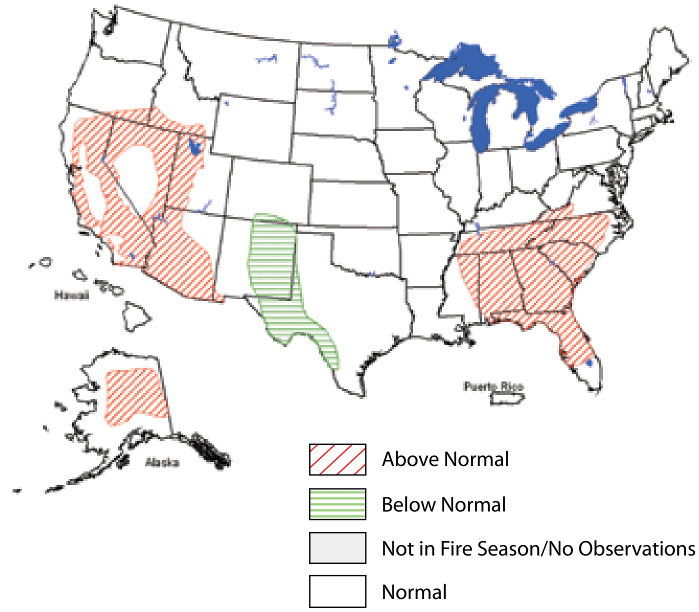


Figure 12b. Current fine fuel condition and live fuel moisture status in the Southwest.

Current Fine Fuels						
Grass Stage	Green	X	Cured	X		
New Growth	Sparse		Normal	X	Above Normal	X

Live Fuel Moisture	
	Percent of Average
Douglas Fir	83
Juniper	78
Piñon	83
Ponderosa Pine	88
Sagebrush	125
1000-hour dead fuel moisture — AZ	**11**
1000-hour dead fuel moisture — NM	**12**
Average 1000-hour fuel moisture for this time of year	**8–14**

El Niño Status and Forecast

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

ENSO-neutral conditions continue across the equatorial Pacific Ocean again this month with hints of a developing La Niña event (Figure 13a). Cooler-than-average sea surface temperatures (SSTs) are again present this month along the equator from 120W longitude to along the South American coast with temperatures departing up to 2 degrees Celsius from the long-term average. This pattern in cooler-than-average temperatures has actually diminished slightly from last month, with several weeks of weaker-than-average easterly winds in May that promoted the movement of warmer water back into the eastern Pacific. This switch from rapid cooling to recent weak warming in eastern Pacific Ocean SSTs has caused the NOAA Climate Prediction Center to question the likelihood of La Niña conditions developing rapidly this summer.

Forecast discussions from the International Research Institute (IRI) have noted that the easterly winds at the equator have strengthened over the past several weeks, enhancing the cooling in SSTs that began this past spring. They contend that a transition to La Niña conditions is still possible over this summer (Figure 13b). Both NOAA-CPC and IRI agree that the verdict is still out on this event and that La Niña conditions could still develop through the fall later in the forecast period. Official forecasts from the IRI maintain a slightly greater chance of La Niña conditions (55 percent) through the fall versus neutral conditions (44 percent). The development of an El Niño event is very unlikely through the fall, with a forecast probability of 3 percent or less.

Stay tuned to monitor developments associated with this potential La Niña event. If a moderate to strong La Niña develops later this summer into the fall, winter precipitation forecasts for Arizona and New Mexico will be strongly impacted. La Niña events are historically associated with below-average precipitation across the Southwest.

Notes:

Figure 13a shows the standardized three month running average values of the Southern Oscillation Index (SOI) from January 1980 through May 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 13b 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 13a. The standardized values of the Southern Oscillation Index from January 1980–May 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).

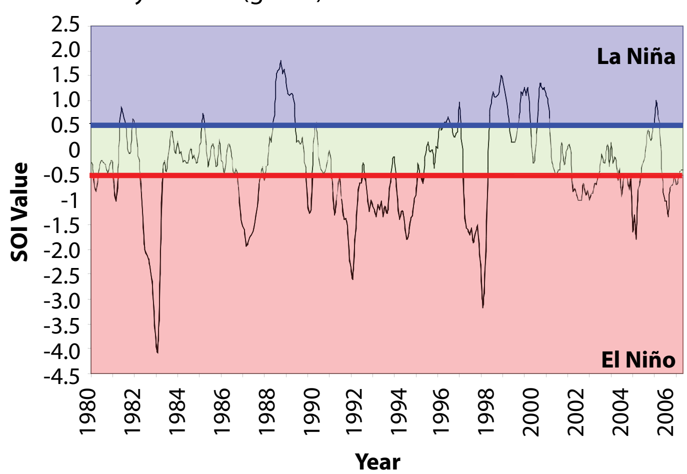
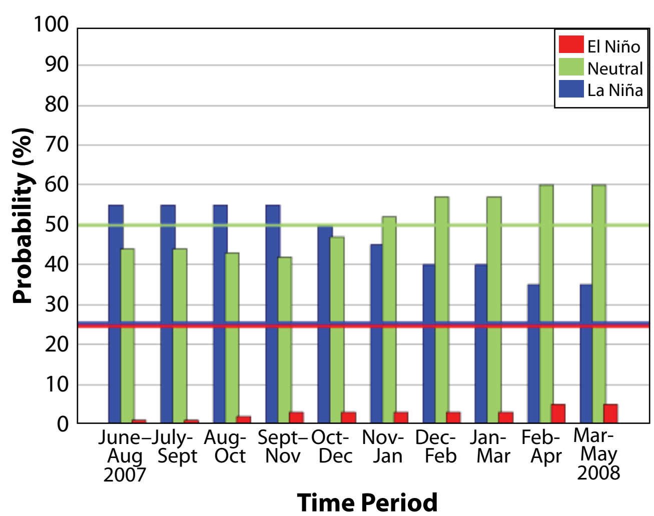


Figure 13b. IRI probabilistic ENSO forecast for El Niño 3.4 monitoring region (released June 20, 2007). Colored lines represent average historical probability of El Niño, La Niña, and neutral.



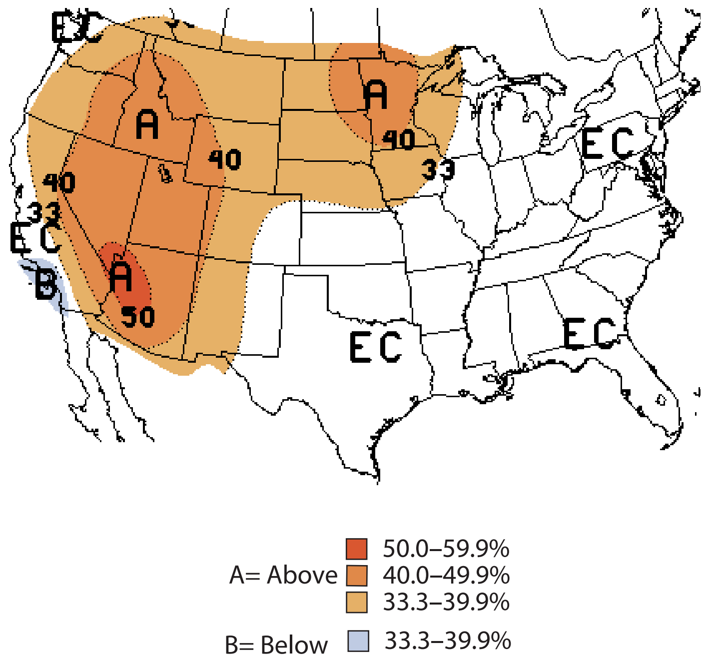
Temperature Verification

(March–May 2007)

Source: NOAA Climate Prediction Center (CPC)

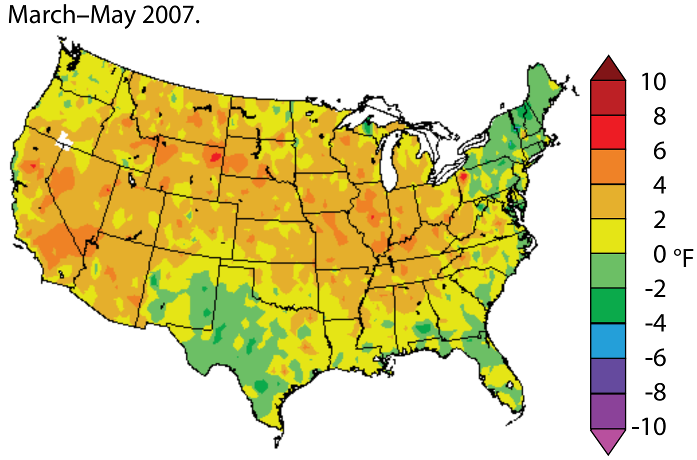
The NOAA-CPC seasonal temperature outlook for March–May 2007 predicted increased chances of above-average temperatures across much of the West, including the Rockies, the Intermountain West, the Southwest, and the northern Plains states (Figure 14a). A slightly increased probability of below-average temperatures was predicted for a small area of coastal southern California. Elsewhere, forecasters reserved judgment. The forecast matched observations across much of the northwestern two-thirds of the country, where above-average temperatures were predicted and observed temperatures were 0–8 F above average (Figure 14b). The prediction of below-average temperatures along the southern California coast did not match observations of 0–4 F above average. Temperatures across most of the rest of the country were at or slightly above the average, except for parts of Texas, the Southeast, and New England, where observed temperatures were 0–4 F below average. Arizona temperatures were generally a few degrees above average, while New Mexico saw temperatures at or a few degrees below average and cooler than predicted.

Figure 14a. Long-lead U.S. temperature forecast for March –May 2007 (issued February 2007).



EC= Equal chances. No forecasted anomalies.

Figure 14b. Average temperature departure (in degrees F) for March–May 2007.



Notes:

Figure 14a shows the NOAA Climate Prediction Center (CPC) temperature outlook for the months March–May 2007. This forecast was made in February 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 14b shows the observed departure of temperature (degrees F) from the average for the March–May 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.

On the Web:

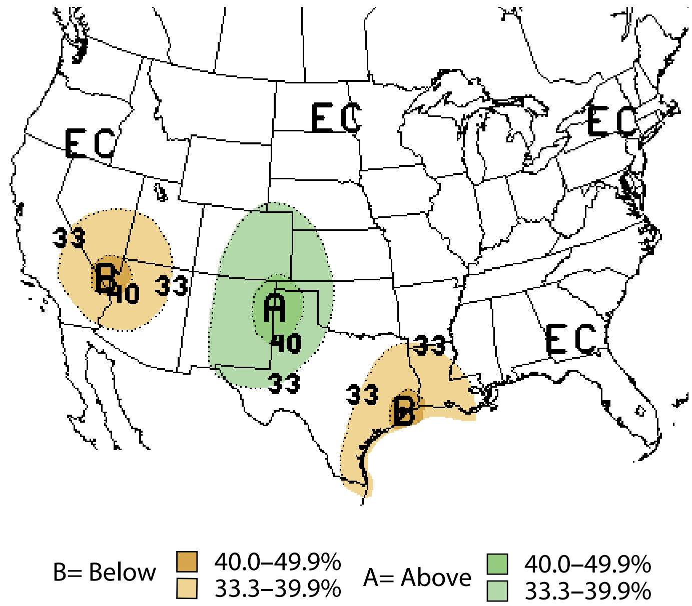
For more information on CPC forecasts, visit: http://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.html

Precipitation Verification
(March–May 2007)

Source: NOAA Climate Prediction Center (CPC)

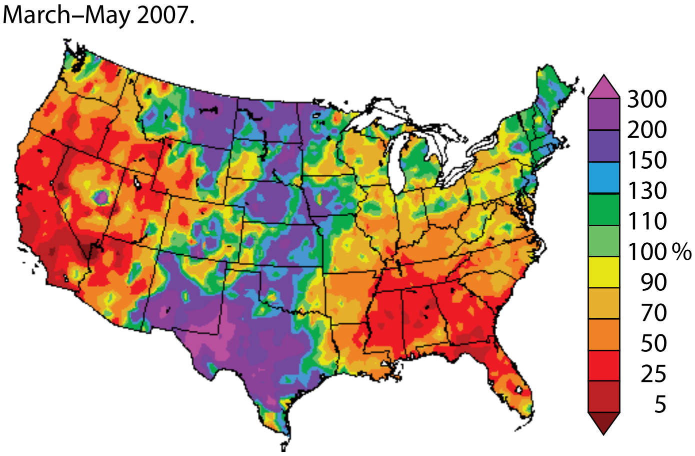
The NOAA-CPC seasonal precipitation outlook for March–May 2007 indicated equal chances of below-average, average, or above-average precipitation across much of the nation (Figure 15a). An increased chance of below-average precipitation was predicted for an area centered over the Intermountain West, as well as eastern Texas and Louisiana. An increased chance of above-average precipitation was predicted for an area centered on the Texas Panhandle and into New Mexico and the Central Plains. Much of the western and southeastern United States did in fact experience below-average precipitation during this period (Figure 15b). In much of California and parts of surrounding states, observed precipitation was less than 50 percent of average, with some isolated areas experiencing less than 5 percent of average precipitation. Also as predicted, much of the Central Plains region experienced above-average precipitation, with an area centered around the Texas Panhandle experiencing greater than 300 percent of average. The Southwest saw the continuation of a trend that goes back to November 2006 in which New Mexico has experienced much wetter-than-average conditions and Arizona has seen drier-than-average conditions. New Mexico's rainy weather continued into May, despite a spring return to ENSO-neutral conditions (Figure 13a). This pattern was consistent with forecast predictions.

Figure 15a. Long-lead U.S. precipitation forecast for March –May 2007 (issued February 2007).



EC= Equal chances. No forecasted anomalies.

Figure 15b. Percent of average precipitation observed from March–May 2007.



Notes:

Figure 15a shows the NOAA Climate Prediction Center (CPC) precipitation outlook for the months March–May 2007. This forecast was made in February 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 15b shows the observed percent of average precipitation for March–May 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