Issued: April 26, 2005

CLIMAS
Southwest Climate Outlook

April Climate Summary

Hydrological Drought – Drought impacts continue to ease in much of the Southwest.

- Much of western Arizona and a large portion of New Mexico are free of drought.
- Portions of northeastern Arizona and northwestern New Mexico remain in severe drought.
- Arizona statewide reservoir storage is up 5 percent since last month. Storage in New Mexico is much above last year, but many reservoirs remain below 35 percent of maximum capacity.

Temperature – Water year temperatures have been up to 3 degrees Fahrenheit above average in some areas, but the past 30 days were generally cooler than average.

Precipitation – The water year precipitation remains above average, but the past 30 days have been generally drier than average. Snow water content in northern New Mexico is above average, while it continues a rapid decrease farther south.

Climate Forecasts – Long-lead forecasts call for increased chances of above-average temperatures in the Southwest. There are no forecasted precipitation anomalies in Arizona or New Mexico through October. Streamflow forecasts show near to above-average conditions for much of the Southwest and Colorado River Basin.

El Niño – Neutral conditions have the highest probability of occurrence in the tropical Pacific Ocean, although El Niño chances remains above average.

The Bottom Line – Spring snowmelt will lead to increased runoff, above-average streamflow, increasing reservoir storage, and a further alleviation of hydrologic drought in the Southwest.

The climate products in this packet are available on the web:
http://www.ispe.arizona.edu/climas/forecasts/swoutlook.html

From Wildflowers to Wildfires

Above-average winter rainfall across the Southwest has alleviated short-term drought conditions, but enhanced the risk of a different resource management concern—wildfire. The lush vegetation that now covers lower elevation areas across Arizona and New Mexico will turn into a potential fuel source after drying out later this

spring. Winter rains promote the growth of annual plants that fill in otherwise bare low-desert areas, which provides fuel continuity across the landscape. Spring wildfires can then spread quickly and grow to large sizes. Upper elevation locations are expected to see below-normal wildfire activity because of the wet winter conditions.

In this issue:

The Southwest Climate Outlook is jointly published each month by the Climate Assessment for the Southwest project and the University of Arizona Cooperative Extension.

Mike Crimmins, *Extension Specialist*
Gregg Garfin, *CLIMAS Program Manager*
Shoshana Mayden, *Editor*
Kristen Nelson, *Assistant Editor*
Rick Brandt, *Graduate Research Assistant*
Melanie Lenart, *Research Associate*

THE UNIVERSITY OF ARIZONA.

Will April rains bring May flames?

Lush grass cover sets stage for big fire season in Southwest

BY MELANIE LENART

Lush ground cover is blurring the distinction between southwestern deserts and grasslands, sparking concern that big fires will spread through both ecosystems after the herbaceous growth dries out.

"Herbaceous fuel loading is the highest it's been in about 12 years," noted Chuck Maxwell, fire weather program manager for the Southwest Coordination Center, based in Albuquerque. "We expect more fire in the desert than in the timber this year, for a change."

The abundance of herbaceous or fine fuels—aka native grasses and weeds for those outside the fire community—in the nation's southwestern quadrant was the topic of many conversations during a March/April fire meeting. The National Seasonal Assessment Workshop for the Western States and Alaska drew 50 western fire managers, fuel specialists, climatologists, and fire meteorologists to hammer out predictions of fire potential for the 2005 season.

"It looks like Ireland to us. In places where we don't have grass growing, there's moss on the rocks," reported workshop participant Cindy Sidles, a fuels specialist based in Utah. Her words captured the sentiments of many southwestern resource managers and go far in explaining the region's swath of above-average fire potential on the outlook map (Figure 1). Meanwhile, forests are the main concern in the northwestern United States.

Participants at the workshop produced the outlook map after spending three days evaluating existing fuels conditions along with climate forecasts for the coming spring and summer. Input from climate experts included those based at the National Oceanic and Atmospheric Administration (NOAA) facility in Boulder, Colorado, where the workshop was held.

Ironically, the Southwest's near-record autumn and winter precipitation have increased fire risk in low-elevation deserts and grasslands even as the moisture reduced the risk in regional high-elevation forests.

May and June are usually the driest months for the Southwest and, not coincidentally, its peak fire season. Even monthly rainfall values 150 percent of average may tally less than an inch at many low-elevation Arizona and New Mexico sites during late spring. Because of this, many fuels specialists expect the knee-high, continuous grasslands now thriving in the Southwest to dry out soon and act as fine fuels able to carry fire for long distances.

This puts people in the lowest elevations in the Southwest at the highest risk this year, observed Rick Ochoa, vice chairman of the National Predictive Services Group. The group co-organized the fire workshop along with the Program for Climate, Ecosystem, and Fire Applications and the Climate Assessment for the Southwest (CLIMAS).

The forecast for deserts and grasslands fits in well with an analysis for southeastern Arizona's Climate Division 7 (which includes Tucson, Sierra Vista, and Safford) done by Michael Crimmins and Andrew Comrie of the University of Arizona and reported in the *International Journal of Wildland Fire* in 2004.

They found large low-elevation fires were more likely to occur in years of above-average precipitation in winter (December–March) and above-average temperature in spring (April–June). Together, these two factors explained

continued on page 3

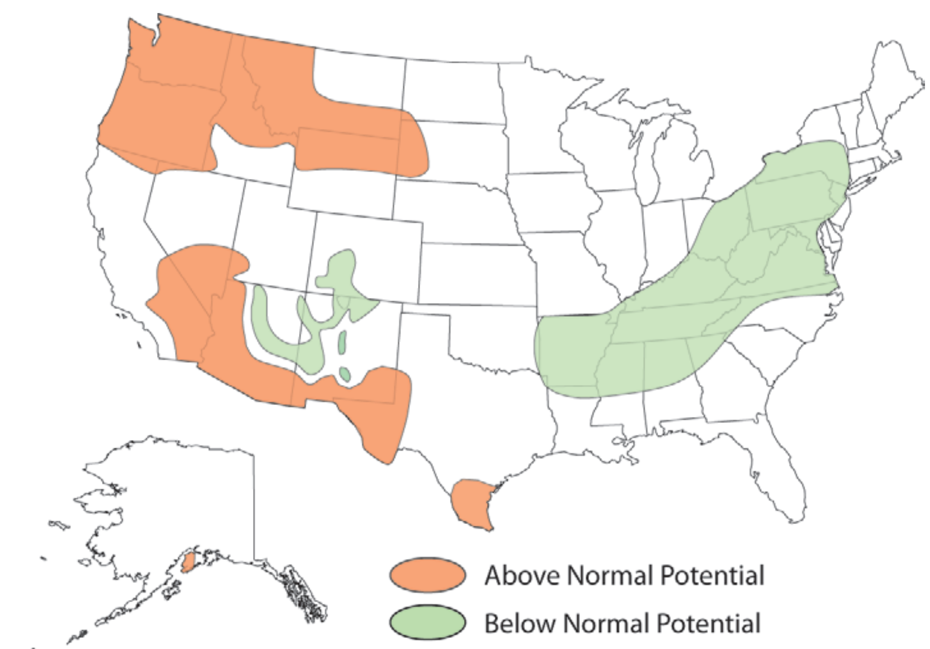


Figure 1. The western portion of the seasonal wildland fire potential map (April–August 2005) was produced during a workshop that ended on April 1. It highlights areas that fire specialists from a variety of geographic areas in the West consider to have either above-average or below-average fire potential during the coming season based on climate conditions and forecasts.

Fire season, continued

about half the division's variation in fire size for grasslands and oak scrub at low elevations (below roughly 5,000 feet).

Meanwhile, winter precipitation falling as snow in higher elevations can provide moisture for months, depending on temperatures. As of mid-April, it seemed likely that most southwestern forests would have enough moisture to limit fire potential until the monsoon arrived, Maxwell said.

"Timber fuels are already very wet. It would take an act of God to melt the snow off in time to have an above-average season in the Southwest," said Maxwell, calling the period that began on October 1 an "epic water year" for Arizona and New Mexico. "Not that it couldn't happen—but it just doesn't seem likely that it would happen."

Southwest Coordination Center fire specialists will be keeping their eyes on forested areas that have succumbed to bug kill in recent years, however, especially in places where continuous grasses around the stands could import flames, he said. Although the bark beetle epidemic tapered off in much of Arizona last year compared to 2003, the bugs continued to wreak havoc on several national forests in New Mexico in 2004, especially around Santa Fe and Albuquerque. Given recent moisture, the downward trend for beetle mortality seems likely to continue during the 2005 season, which begins about now.

Maxwell reiterated that the workshop forecast relates specifically to "fire potential," with a myriad of other factors also affecting the total number of fires, the numbers of acres burned and the demand for firefighting resources.

The highest forest fire potential in the West lies within the northwestern quadrant of the country, fire specialists agreed. Ongoing long-term drought deepened its hold over the winter, particularly in Oregon, Washington, and Montana. Some mountains in the region set new record lows for snowpack. Oregon's Mt. Hood, for instance, had collected only 12 inches of its usual 52 inches of snow by mid-March. A heavy snowpack tends to melt gradually, keeping forests moist long after winter has ended.

"It has the same effect as raining every day," noted workshop participant Paul Werth, a consultant for the Northwest Interagency Coordination Center. "We won't have that this year."

Concerns about an early northern start have been allayed somewhat by April rains, at least.

"We've had some decent rain this spring west of the Cascades in the Pacific Northwest," Ochoa said last week, referring to this past month. "The rains that we're getting right now may help push back the start of fire season. I'm thinking right now that the Southwest fire season will begin to wane in July as the Pacific Northwest fire season starts to heat up."

Maxwell expressed similar sentiments, saying he hoped the Southwest Area Coordination Center could share resources with the Northwest by sometime in July. Resources include firefighting personnel and equipment.

Precipitation patterns since about autumn fit in well with expectations for El Niño years. However, this year's El Niño was weak enough that the strength of the signature surprised some climate experts, who attributed many of the details to other causes. (For more on this, see last month's *Southwest Climate Outlook* feature story).

In El Niño years, the southwestern United States tends to be wetter than average during autumn and winter, typically at the expense of the northwestern United States—at least until about spring. In April, even some northwestern states tend to have above-average precipitation, based on a workshop comparison to other weak El Niño years. This pattern holds during strong El Niño years, based on a comparison posted on the National Weather Service's Climate Prediction Center website (see web links box).

Temperatures during strong El Niño years, meanwhile, tend to be warmer across the northern half to two-thirds of the West, particularly from December through June. Climate Prediction Center forecasts generally called for an increased likelihood of above-average temperatures for spring and summer, with some of this expectation based on the ongoing trend toward warming temperatures in the West since about the mid-1970s.

Warm temperatures this past winter may have contributed to the herbaceous growth that is increasing the Southwest's fire risk. Without cooler temperatures to keep Sahara mustard populations at bay, it can shade out natives, explained Mark Dimmitt, the natural history director at the Arizona-Sonora Desert Museum.

New Mexico's average temperature from January–March was 41.6 degrees Fahrenheit, several degrees higher than the mean of 38.8 for this three-month time frame, according to a National Climate Data Center website tool that uses pro-

continued on page 4

Fire season, continued

visional data for comparisons to instrumental records going back to 1895.

Similarly, Arizona's average temperature during this time frame was 48.1 degrees, compared to the long-term average of 45.7 degrees.

Land managers worry about the ubiquitous spread of invasives like Sahara mustard and red brome into desert ecosystems. The fire they import can be lethal to saguaros, especially young ones.

Sahara mustard *(Brassica tournefortii)* has invaded many southwestern deserts this spring, such as the Bouse Dunes in western Arizona (left) where wildflowers used to bloom. The yellow-flowered plant is most common in wind-blown sand deposits and in disturbed sites such as roadsides. Sahara mustard grows faster and larger than native annuals and shades out most of them, such as the sand verbena (right, *Abronia villosa*). Photos by Mark Dimmit.

Besides influencing plant distribution, high temperatures can influence fire regimes by increasing evaporation rates. Higher rates speed up the desiccation of plants and logs, making them more flammable. Managers often measure moisture levels of logs to gauge fire risk.

On a positive note, the high temperatures and sparse rainfall of May and June create a temperature gradient that helps pull the North American Monsoon system into the Southwest. While some research links abundant southwestern snowpack to weaker monsoons, other research links low Pacific Northwest snowpack to stronger monsoons. Combining the two studies would create a mixed signal for this year. There's also a slight correlation between El Niño years and somewhat weak monsoons.

Still, summer precipitation patterns—including the timing and strength of the monsoon—remain notoriously difficult to predict. Many climatologists call this the "spring barrier," referring to the challenge of making a skillful summer climate forecast in spring.

The main problem stems from the importance of El Niño to skillful forecasting, and the unpredictability of what this system will do after the transition season of spring, explained Kelly Redmond, a climatologist with the Western Regional Climate Center in Reno, Nevada.

"It's a little bit like a clock getting reset, where the memory of what happened before tends to get lost," Redmond said. "Each year you've got to go through it again. So it's least possible to predict periods where the spring is one of the intervening seasons."

At any rate, fire managers will be updating outlooks on fire potential throughout the season to take into account evolving climate and weather conditions. Updates and the complete fire potential outlook for the Southwest can be accessed at the Southwest Coordination Center website, and the National Predictive Services Group website provides national updates and links to regional reports (see box for addresses).

The annual National Seasonal Assessment Workshop was co-hosted by the NOAA-CIRES Climate Diagnostics Center and the Western Water Association (WWA). The California Applications Program (CAP) also contributed to the workshop. The WWA, CAP, and CLIMAS all operate under NOAA's Regional Integrated Sciences and Assessments program, designed to improve the link between climate sciences and society.

Melanie Lenart is a postdoctoral research associate with the Climate Assessment for the Southwest.

Resources on the Web

- Arizona-Sonora Desert Museum photos and information on Sahara mustard: http://www.desertmuseum.org/programs/flora_bratou-gallery.htm
- National Climatic Data Center web-based tool for climate comparisons: http://www.ncdc.noaa.gov/oa/climate/research/cag3/state.html
- National Predictive Services Group website: http://www.nifc.gov/news/pred_services/Main_page.htm
- Climate Prediction Center comparison of El Niño and La Niña years in the West: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/states/AZ.html
- National Seasonal Assessment Workshop website (proceedings from the workshop should be available as a pdf by the end of May): http://www.ispe.arizona.edu/climas/conferences/NSAW/details.html
- Southwest Climate Outlook feature article archive: http://www.ispe.arizona.edu/climas/forecasts/swarticles.html
- For Southwest Coordination Center full report of 2005 fire potential: http://www.fs.fed.us/r3/fire/swapredictive/swaoutlooks/swaoutlooks.htm

Temperature (through 4/21/05)

Sources: Western Regional Climate Center, High Plains Regional Climate Center

Water year temperatures have ranged from slightly below average to approximately 3 degrees Fahrenheit above average throughout the Southwest (Figure 1a). Areas with the warmest departures (northeastern Arizona and north-central New Mexico) correspond to the areas of severe drought (see Figure 3). Although precipitation has been above average in this area (see Figure 2), anomalously warm temperatures can lead to more liquid than frozen precipitation, earlier runoff, and more rapid evaporation. Despite these warmer than average conditions, water year temperatures in north-central New Mexico have generally been cool enough to maintain snowpack (Figure 1b). Over the past 30 days temperatures were cooler than average across much of the Southwest, especially western Arizona and portions of central New Mexico (Figures 1c-d).

March was a cool month in New Mexico, as the average temperature at Albuquerque was 2.2 degrees Fahrenheit cooler than average (Albuquerque National Weather Service [NWS]). Warmth has returned in April with the temperature 1.8 degrees above average. According to the Tucson NWS, the temperature was exactly average during March, but April has been 3.8 degrees warmer than average.

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.

Figures 1c and 1d are experimental products from the High Plains Regional Climate Center.

On the Web:

For these and other temperature maps, visit:
http://www.wrcc.dri.edu/recent_climate.html and
http://www.hprcc.unl.edu/products/current.html

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

Figure 1a. Water year '04–'05 (through April 20, 2005) departure from average temperature.

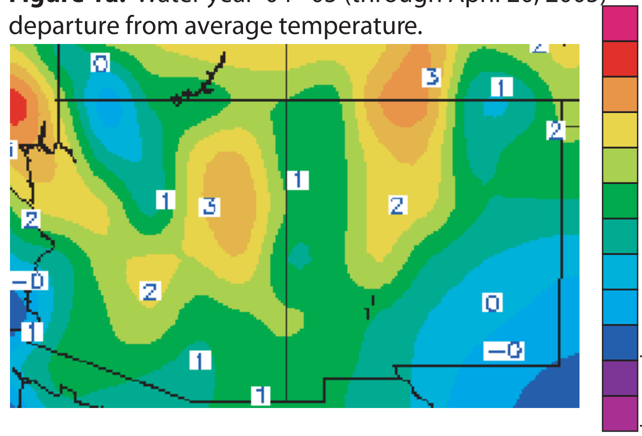


Figure 1b. Water year '04–'05 (through April 20, 2005) average temperature.

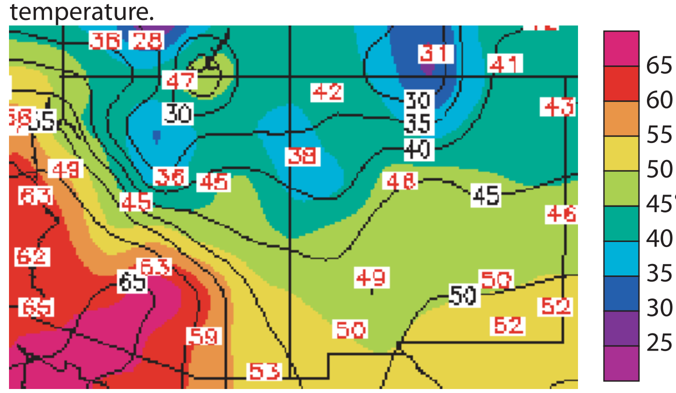


Figure 1c. Previous 30 days (March 23–April 21, 2005) departure from average temperature (interpolated).

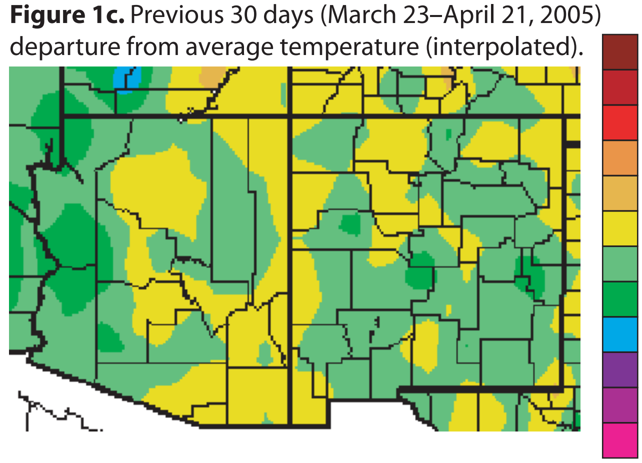
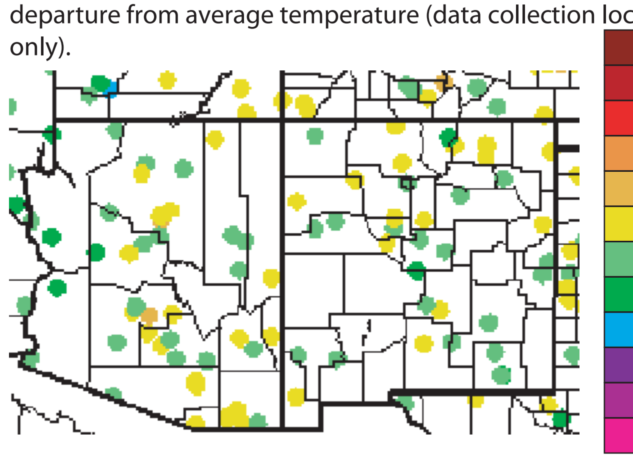


Figure 1d. Previous 30 days (March 23–April 21, 2005) departure from average temperature (data collection locations only).



Precipitation (through 4/21/05)

Source: High Plains Regional Climate Center

Precipitation during the water year has been much above average for the entire Southwest, except in portions of southeastern Arizona (Figures 2a-b). Some areas received more than twice their average precipitation since October 1, 2004 due to a very wet winter in the region. The largest anomalies were in west-central Arizona and around Lake Mead. According to the Albuquerque National Weather Service, statewide average water year precipitation in New Mexico was 181 percent of average. In addition, January–March was the wettest start of the year on record at Albuquerque. The past 30 days have been a different story for most of Arizona and New Mexico, with the region generally less than 70 percent of average (Figures 2c-d). A large section of southern Arizona received 5 percent or less of the period's average precipitation. Northeastern and central New Mexico, where wetter-than-average conditions dominated, are the outliers. The moisture in northeastern New Mexico helped ease long-term drought impacts.

A Phoenix City Council subcommittee recently decided to end the Stage 1 drought regulations that have been in effect since 2003 (*Arizona Republic,* April 14). Officials plan to make permanent the obligatory 5 percent water use reductions by city departments under this status. Most neighboring cities remain in Stage 1 restrictions.

Notes:

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2004 we are in the 2005 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 '04–'05 through April 21, 2005 percent of average precipitation (interpolated).

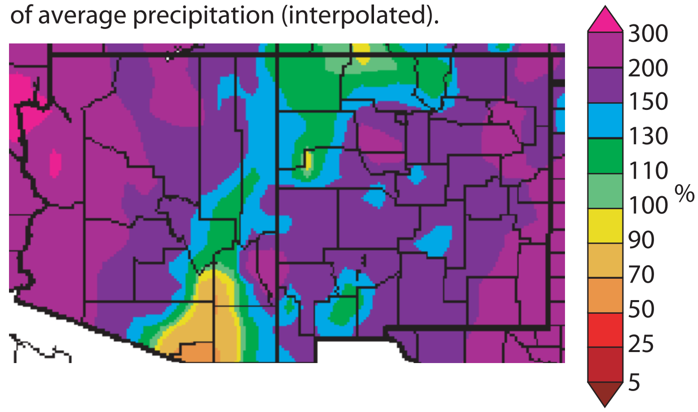


Figure 2b. Water year '04–'05 through April 21, 2005 percent of average precipitation (data collection locations only).

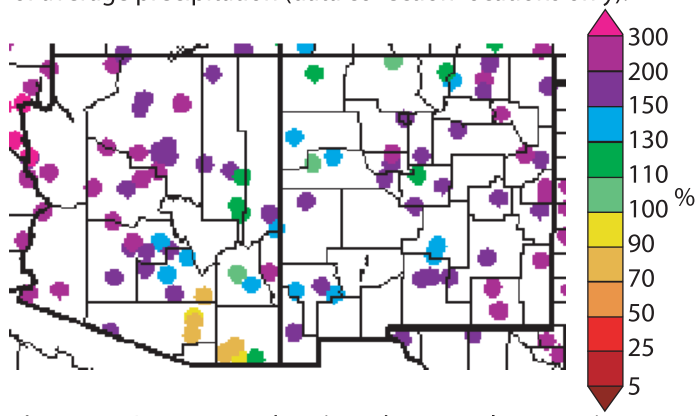


Figure 2c. Previous 30 days (March 23–April 21, 2005) percent of average precipitation (interpolated).

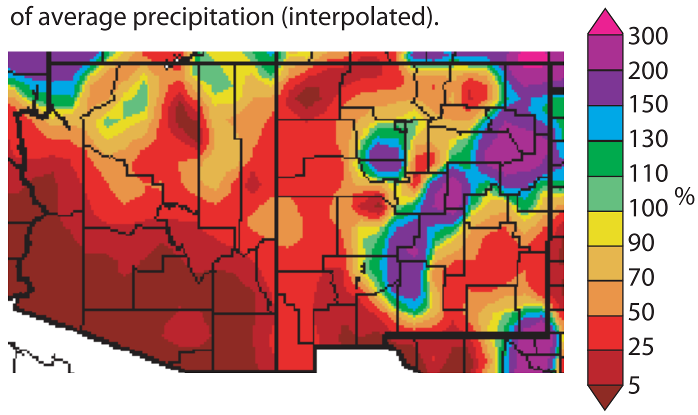
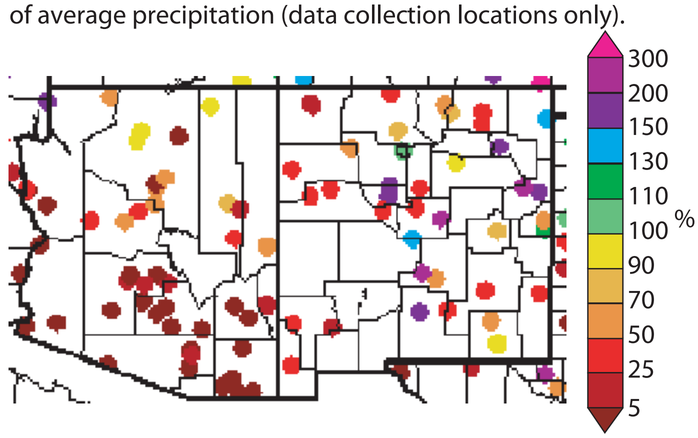


Figure 2d. Previous 30 days (March 23–April 21, 2005) percent of average precipitation (data collection locations only).



U.S. Drought Monitor

(released 4/21/05)

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

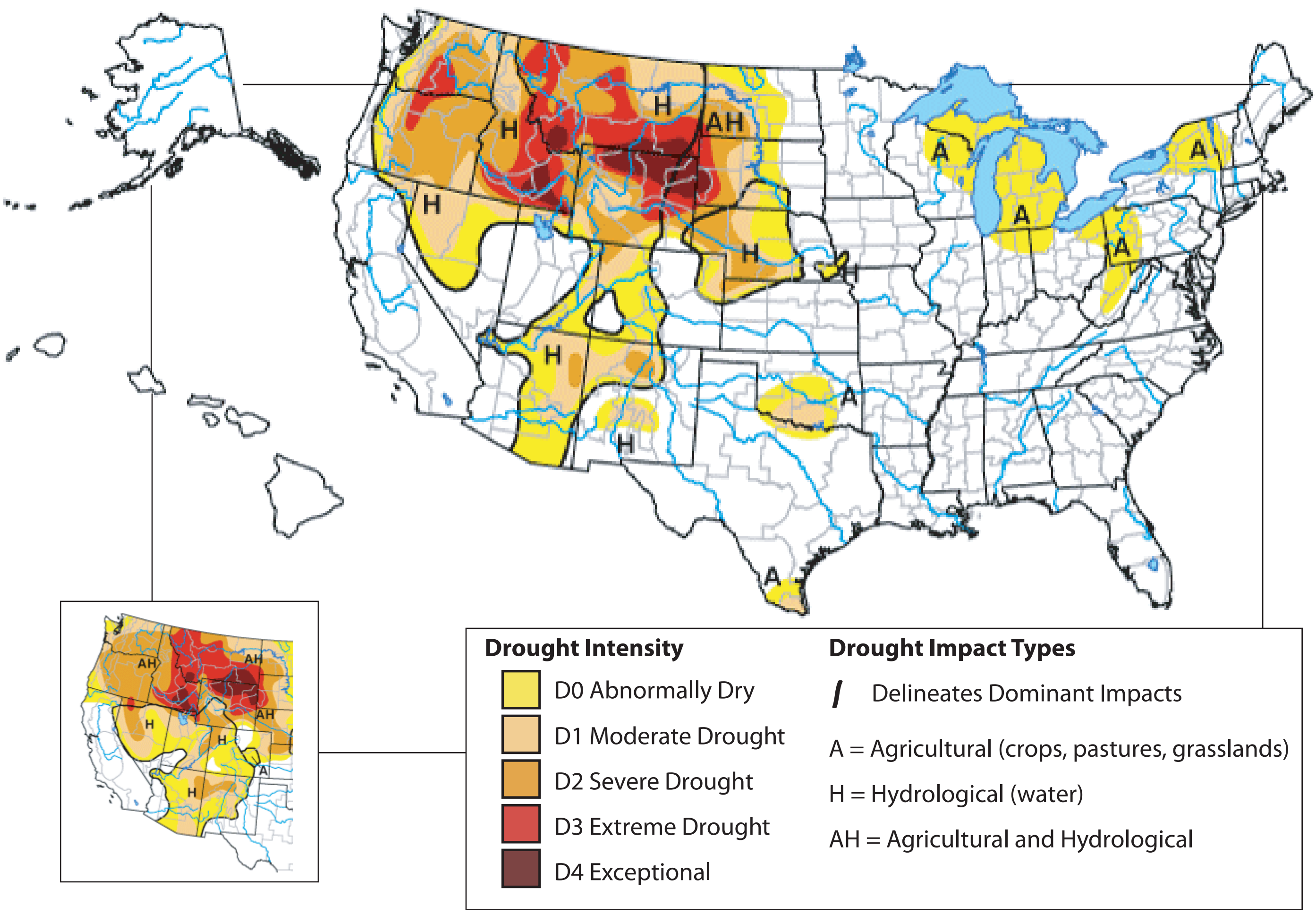
Much of the Southwest once again saw a reduction in drought impacts during the past month, but severe drought persists in parts of northeastern Arizona and north-central New Mexico (Figure 3). Although the past 1–2 weeks have been dry in the region, year-to-date precipitation and melting snowpack have increased many reservoir levels, which led to the improvement depicted in Figure 3. Reservoir levels remain low in parts of Arizona and across most of New Mexico, so hydrological drought persists. For example, the portion of the Colorado River from Lake Powell to Lake Mead remained in abnormally dry to moderate drought classifications due to the lakes' depleted storage. Western water managers are investigating some controversial ideas for easing drought impacts and addressing future water needs, such as increased logging of mountainsides to promote more runoff, weather modification, reactivating a desalination plant near Yuma, and adding new storage basins in southern California (*Los Angeles Times*, April 17). Critics call for more conservation and more efficient allocation before implementing such tactics and encourage further consideration of the negative environmental effects.

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 Richard Tinker, NOAA/NWS/NCEP/CPC.

Figure 3. Drought Monitor released April 21, 2005 (full size) and March 17, 2005 (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

New Mexico Drought Status

(through 4/15/05)

Source: New Mexico Natural Resources Conservation Service

The short-term drought map shows normal conditions over much of New Mexico with warning or moderate status in south-central Lincoln, Los Alamos, and Santa Fe counties (Figure 4a). While these regions have improved over the past several months, they have consistently been the most critical parts of New Mexico. The change in the Los Alamos-Santa Fe area is due to much above-average precipitation (130–300 percent) over the past 1–2 months. Lincoln County and other areas have not been as fortunate, with drier-than-average conditions over the same period. Long-term drought has changed very little. The worst drought conditions remain in the Zuni and Bluewater basins (Figure 4b). Reservoir levels are indicative of long-term drought. Many of the lakes in New Mexico are below average storage, and all are below maximum capacity (see Figure 6).

The Albuquerque National Weather Service reports that statewide precipitation in 2005 is more than 200 percent of average. In early April New Mexico senators Pete Domenici and Jeff Bingaman hosted a water conference in Washington, D.C., to educate water managers and federal officials about numerous water resource issues (*Carlsbad Current-Argus,* April 7). According to engineers, ground water pumping from the Ogallala Aquifer has been so excessive that they fear it will never be replenished (*Portales News-Tribune,* April 18). They are promoting increased conservation and construction of the Ute Reservoir pipeline to alleviate water availability problems.

Notes:

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

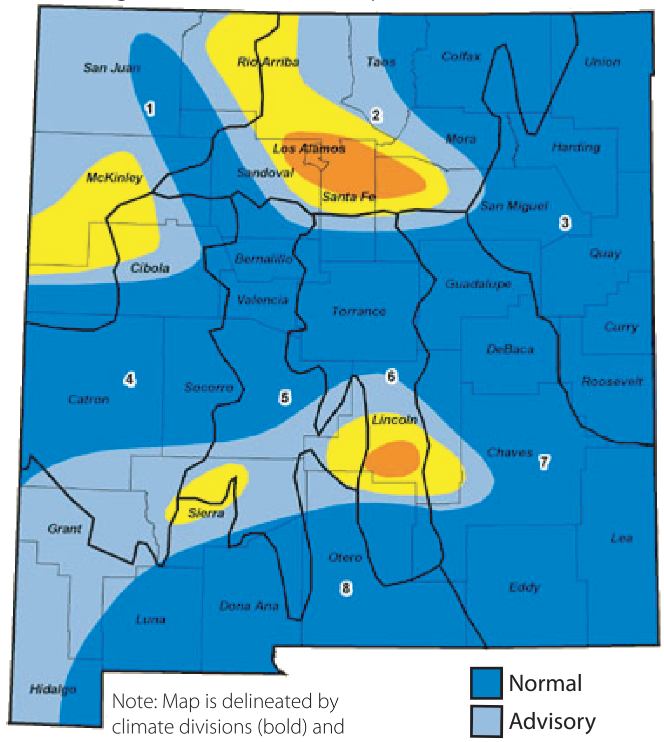
Figure 4a shows short-term or *meteorological* drought conditions. Meteorological drought is defined usually on the basis of the degree of dryness (in comparison to some "normal" or average amount) over a relatively short duration (e.g., months). Figure 4b refers to long-term drought, sometimes known as *hydrological* drought. Hydrological drought is associated with the effects of relatively long periods of precipitation shortfalls (e.g., many months to years) on water supplies (i.e., streamflow, reservoir, and lake levels, groundwater). This map is organized by river basins—the white regions are areas where no major river system is found.

On the Web:

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

Information on Arizona drought can be found at:
http://www.water.az.gov/gdtf/

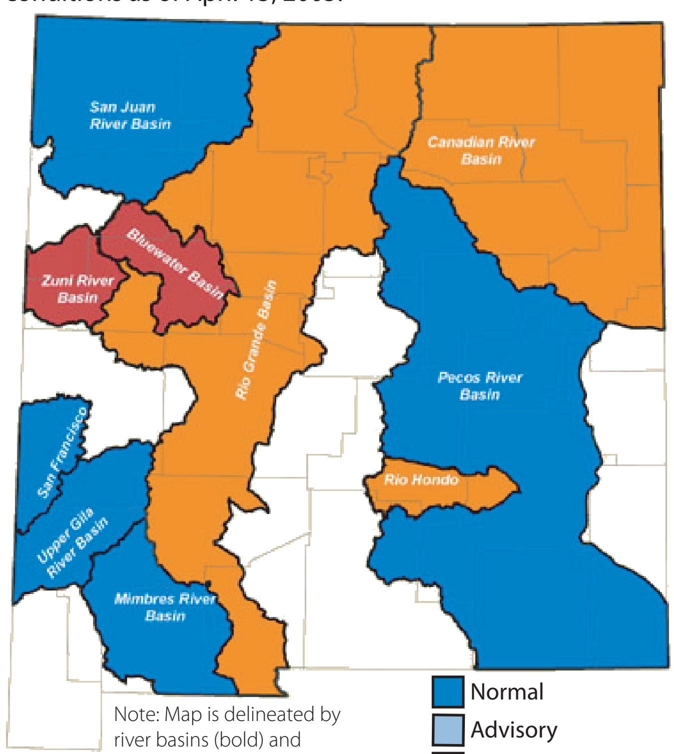
Figure 4a. Short-term drought map based on meteorological conditions as of April 15, 2005.



Note: Map is delineated by climate divisions (bold) and county lines.

Normal
Advisory
Alert
Warning
Emergency

Figure 4b. Long-term drought map based on hydrological conditions as of April 15, 2005.



Note: Map is delineated by river basins (bold) and county lines.

Normal
Advisory
Alert
Warning
Emergency

Arizona Reservoir Levels

(through 3/31/05)

Source: National Water and Climate Center

Arizona statewide reservoir storage is approximately 80 percent of maximum capacity, up 5 percent since February. This value is 15 percent above average and two times higher than March 2004. Of the nine reservoirs in Figure 5, four increased in storage, one remained steady, and four decreased. The greatest increase (8 percent) occurred in the Salt River System. Show Low Lake is at maximum capacity despite a 22 percent drop. A double-digit decrease also occurred at Lake Havasu (10 percent). Lake Mead continued to increase but is well below maximum capacity. Lake Powell fell another 1 percent to 33 percent of maximum capacity; its storage is now at the lowest value since May 1, 1969.

Marana and Tucson continue to debate over Central Arizona Project (CAP) and effluent water supplies (*Northwest Explorer,* March 23). Marana, which currently has rights to 47 acre-feet of CAP water and 200 acre-feet of effluent water, wants to ensure adequate water resources to support its expected growth. According to the Arizona Department of Water Resources (ADWR), 18 city and rural dams in the state are labeled "unsafe" (*Arizona Republic,* April 8). Some of these dams are considered "high risk," meaning that loss of human life could occur if the dams break. ADWR estimates the total price tag at $75 million, which includes engineering, design, supplies, and labor. The city of Globe recently received a $5 million loan from Governor Janet Napolitano and representatives from the Water Infrastructure Finance Authority (*Arizona Silver Belt,* April 12). The money will go toward phase one of the city's master plan to ensure water resources in emergency situations.

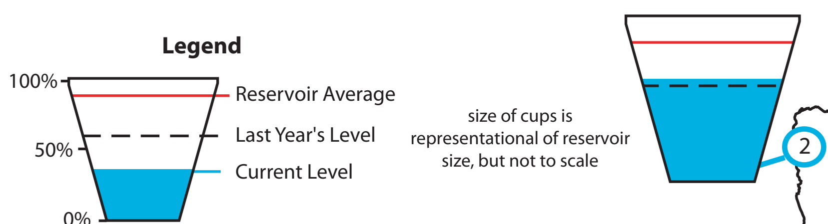
Notes:

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.

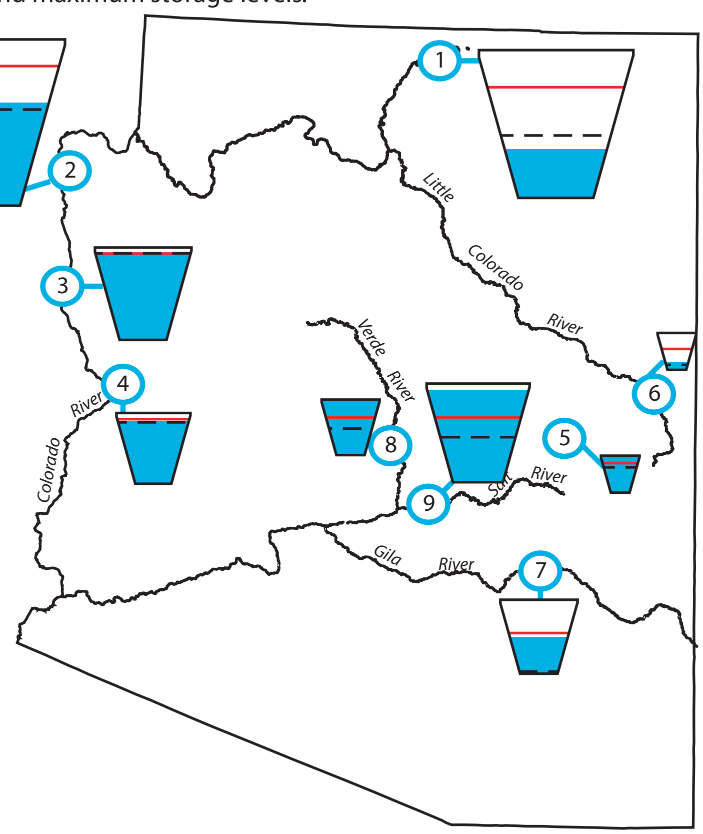
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service. For additional information, contact Tom Pagano at the National Water Climate Center (tpagano@wcc.nrcs.usda.gov; 503-414-3010) 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 5. Arizona reservoir levels for March 2005 as a percent of capacity, the map also depicts the average level and last year's storage for each reservoir, while the table also lists current and maximum storage levels.



Reservoir Name	Capacity Level	Current Storage*	Max Storage*
1. Lake Powell	33%	8,015.0	24,322.0
2. Lake Mead	62%	16,220.0	26,159.0
3. Lake Mohave	93%	1,688.9	1,810.0
4. Lake Havasu	89%	551.0	619.0
5. Show Low Lake	100%	5.1	5.1
6. Lyman Reservoir	21%	6.4	30.0
7. San Carlos	50%	440.4	875.0
8. Verde River System	99%	285.2	287.4
9. Salt River System	93%	1,879.7	2,025.8

*** thousands of acre-feet**



On the Web:

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

New Mexico Reservoir Levels

(through 3/31/05)

Source: National Water and Climate Center

Most New Mexico reservoirs remained below 33 percent of maximum capacity (Figure 6). The most notable exception was Navajo Reservoir, which was 70 percent full. Storage increased by 1–5 percent or was steady from February to March at 11 of the 13 lakes. Of the two locations that experienced drops, Lake Avalon capacity decreased by 48 percent of maximum capacity, and Brantley Lake fell 5 percent. Many reservoirs were significantly higher than in March 2004, with Santa Rosa and Sumner lakes more than ten-fold. The statewide reservoir storage remained below average, but it was nearly 10 percent higher than in March 2004.

With water levels in Conchas Lake 13 feet higher than in 2004, officials expect more visitors this year (*Quay County Sun,* March 25). Gary Cordova of the Corps of Engineers believes that the lake could reach its average capacity during the summer. In late March, New Mexico completed its release of water to meet the state's water sharing requirements with Texas as outlined in the Pecos River Compact (*Carlsbad Current-Argus,* March 25). The final 5,000 of 30,000 total acre-feet released will count toward New Mexico's obligation for 2005. State officials and representatives of the Navajo Nation signed a settlement regarding water rights in the San Juan River Basin on April 19 (*Santa Fe New Mexican,* April 20). The agreement, which still must be approved by Congress and signed by the secretary of the interior, will cost nearly $800 million over a 10–15 year period. Among other stipulations in the settlement, the Navajo Nation will be granted rights to approximately 56 percent of the projected water in New Mexico's share of the San Juan River Basin.

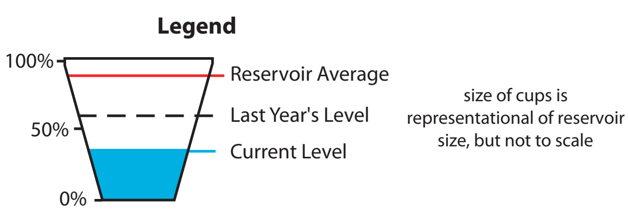
Notes:

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.

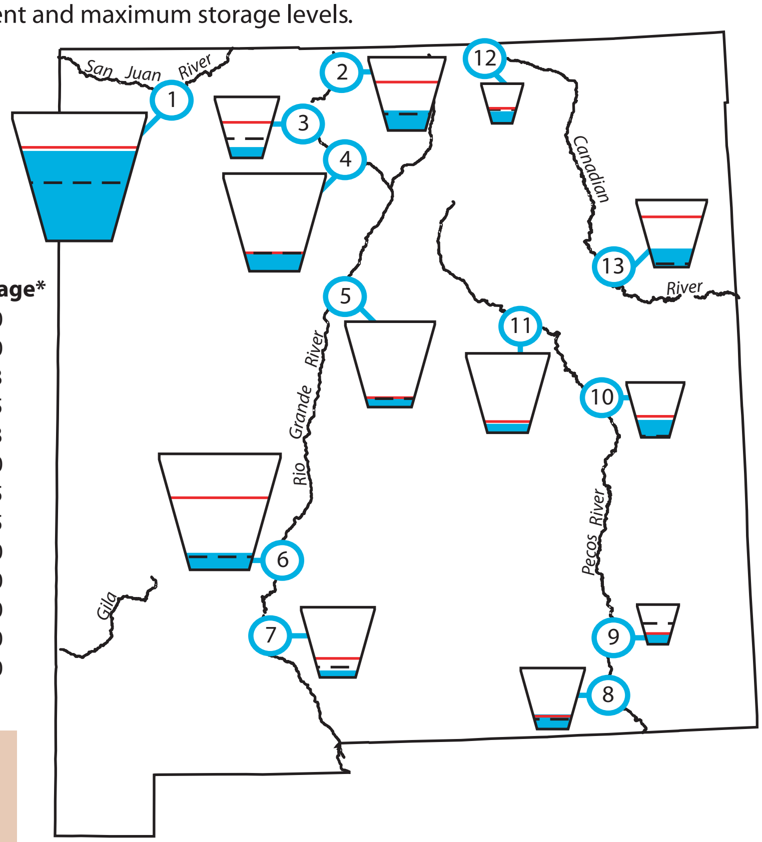
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service. For additional information, contact Tom Pagano at the National Water Climate Center (tpagano@wcc.nrcs.usda.gov; 503-414-3010)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

Figure 6. New Mexico reservoir levels for March 2005 as a percent of capacity, the map also depicts the average level and last year's storage for each reservoir, while the table also lists current and maximum storage levels.



Reservoir Name	Capacity Level	Current Storage*	Max Storage*
1. Navajo	70%	1,182.0	1,696.0
2. Heron	27%	107.9	400.0
3. El Vado	18%	33.0	186.3
4. Abiquiu	20%	112.1	554.5
5. Cochiti	10%	50.2	502.3
6. Elephant Butte	15%	313.3	2,065.0
7. Caballo	10%	32.1	331.5
8. Brantley	24%	34.7	147.5
9. Lake Avalon	25%	1.5	6.0
10. Sumner	32%	33.0	102.0
11. Santa Rosa	11%	48.0	447.0
12. Costilla	31%	5.0	16.0
13. Conchas	28%	72.2	254.0

*** 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

Southwest Snowpack

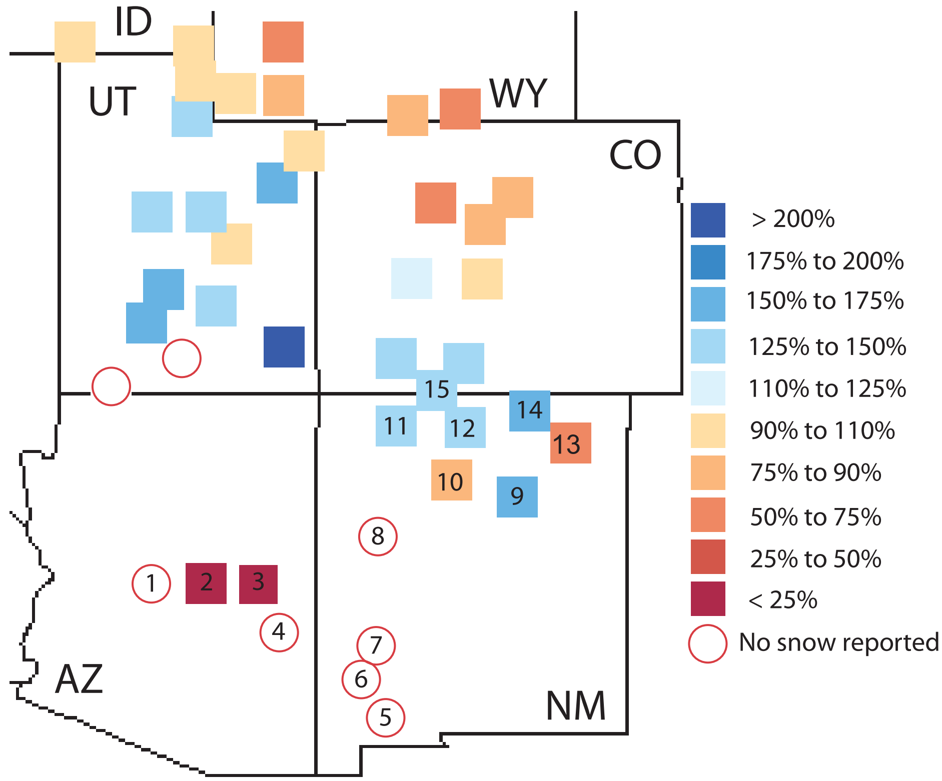
(updated 4/26/05)

Source: National Water and Climate Center

Snow water content (SWC) remains near to above average in much of the Colorado River Basin (Figure 7). SWC in many areas was steady or increased since mid-March. An early April storm contributed to snowpack in Utah and Colorado, with counties around the Denver area receiving more than one foot of snow (Denver-Boulder National Weather Service). SWC in the Verde River, Central Mogollon Rim, and Little Colorado – Southern Headwaters basins of Arizona decreased dramatically since last month, now ranging from 4-31 percent of average.

The Natural Resources Conservation Service reports that snowpack in New Mexico is the best in 10 years (*New Mexico Water Supply Outlook Report,* April 1). New Mexico officials forecast an excellent summer recreation season as snowmelt leads to more runoff and higher streamflow and reservoir levels (*Santa Fe New Mexican,* March 25). Ski resorts in the state reported more visitors in the latter portion of the ski season, but only a good season overall (*Santa Fe New Mexican,* April 11). Fire managers in New Mexico expect a delay in the onset of the fire season due to the winter precipitation. Officials have already let several fires burn themselves out due to high fuel moisture and no threat of the blazes spreading (*Santa Fe New Mexican,* April 19). Bureau of Reclamation officials predict that winter snow and spring rain will increase Lake Powell levels by 45–50 feet throughout the spring and summer (*Salt Lake Tribune,* March 26). Even if this forecast is realized, the lake will still be approximately 100 feet below its high water mark.

Figure 7. Average snow water content (SWC) in percent of average for available monitoring sites as of April 26, 2005.



Arizona Basins
1 Verde River Basin
2 Central Mogollon Rim
3 Little Colorado - Southern Headwaters
4 Salt River Basin

New Mexico Basins
5 Mimbres River Basin
6 San Francisco River Basin
7 Gila River Basin
8 Zuni/Bluewater River Basin
9 Pecos River
10 Jemez River Basin
11 San Miguel, Dolores, Animas, and San Juan River Basins
12 Rio Chama River Basin
13 Cimarron River Basin
14 Sangre de Cristo Mountain Range Basin
15 San Juan River Headwaters

Notes:

Snowpack telemetry (SNOTEL) sites are automated stations that measure snowpack depth, temperature, precipitation, soil moisture content, and soil saturation. A parameter called snow water content (SWC) is calculated from this information. SWC refers to the depth of water that would result by melting the snowpack at the SNOTEL site and is important in estimating runoff and streamflow. It depends mainly on the density of the snow. Given two snow samples of the same depth, heavy, wet snow will yield a greater SWC than light, powdery snow.

Figure 8 shows the SWC for selected river basins in Arizona and New Mexico, based on SNOTEL sites in or near the basins, compared to the 1971–2000 average values. Data for Utah, Colorado, and parts of Wyoming and Utah are also shown, since these states contribute to runoff and streamflow in the Colorado River basin. The number of SNOTEL sites varies by basin. Basins with more than one site are represented as an average of the sites. Individual sites do not always report data due to lack of snow or instrument error.

On the Web:

For a table of snowpack data, visit:
http://www.wcc.nrcs.usda.gov/snow/update.html

For a numeric version of the map, visit:
http://www.wrcc.dri.edu/snotelanom/basinswen.html

For a list of river basin snow water content and precipitation, visit: http://www.wrcc.dri.edu/snotelanom/snotelbasin

Southwest Fire Summary
(updated 4/26/05)

Source: Southwest Coordination Center

The Southwest Coordination Center (SWCC) reports that 261 fires have burned 23,962 acres of land in the Southwest as of April 26 (Figure 8a). Over half of the fires occurred in Arizona, although New Mexico accounts for 62 percent of the acreage burned. Nearly all the blazes and acreage burned have resulted from human-caused fires. These numbers do not include prescribed fires, which are set to prevent larger fire potential or for ecosystem health, nor wildland fire use, in which natural fires are allowed to burn as long as they pose no threats. Agencies have reported 193 prescribed fires to burn 71,957 acres and no wildland fire use to date according to SWCC.

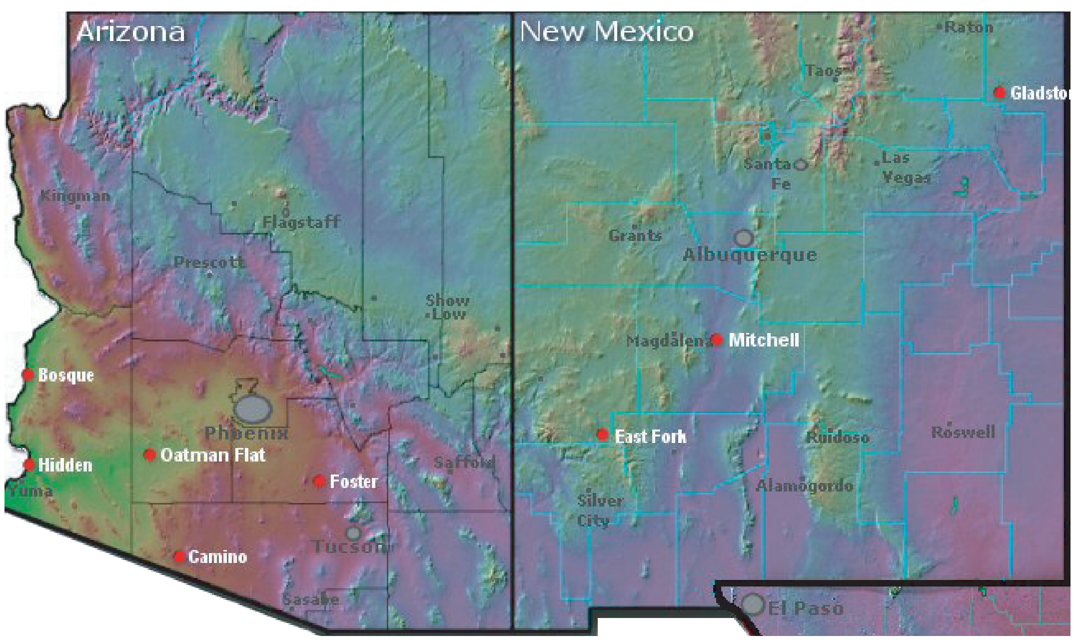
Eight large fires (> 100 acres) have ignited in the Southwest this year (Figure 8b). Arizona has had five large fires that have burned 7,371 acres. A human-caused blaze known as the Bosque fire was suppressed after charring 4,421 acres (SWCC). In New Mexico three large fires have burned 13,563 acres. The Gladstone fire was a fast-moving grass blaze that burned 12,350 acres of grassland in northeastern New Mexico on April 13 according to officials in the Cimarron District of New Mexico State Forestry.

Notes:
The fires discussed here have been reported by federal, state, or tribal agencies during 2004. 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. Figure 8b indicates the approximate location of past and present "large" fires (defined as those covering 100 acres or more), both wildfires and prescribed burns. The red symbols indicate wildfires ignited by humans or lightning. The green symbols are prescribed fires started by fire management officials. The name of each fire is provided next to the symbol.

Figure 8a. Year-to-date fire information for Arizona and New Mexico as of April 26, 2005.

Location	Human Caused Fires	Human caused acres	Lightning caused fires	Lightning caused acres	Total Fires	Total Acres
Arizona	156	8,722	3	345	159	9,067
New Mexico	92	14,716	10	179	102	14,895
Total	248	23,438	13	524	261	23,962

Figure 8b. Year-to-date wildland fire location. Map depicts large fires of greater than 100 acres burned as of April 26, 2005.



Wildland Fire
Wildland Fire Use

On the Web:
These data are obtained from the Southwest Area Wildland Fire Operations website:

http://www.fs.fed.us/r3/fire/swapredictive/swaintel/daily/ytd-daily-state.htm
http://www.fs.fed.us/r3/fire/swapredictive/swaintel/daily/ytd-large-map.jpg

Temperature Outlook

(May–October 2005)

Source: NOAA Climate Prediction Center

Long-lead temperature outlooks from the NOAA-CPC indicate increased chances of warmer-than-average conditions in the Northwest, Southwest, and along the southern tier of the United States for May–August 2005 (Figure 9a-b). Increased chances of below-average temperatures are expected in the northern Great Plains during the same period. July–October forecasts continue the trend of increased chances of above average-temperatures in much of the West and the South (Figures 9c-d). Arizona consistently has the highest probabilities of warmer-than-average conditions, with the likelihood increasing from 40 percent for May–July (Figure 9a) to 60–70 percent for August–October (Figure 9d). The forecasts are based on strong agreement throughout the entire period by various dynamical and statistical tools. The greatest consistency and strongest trends appear in the Southwest.

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 May–July 2005.

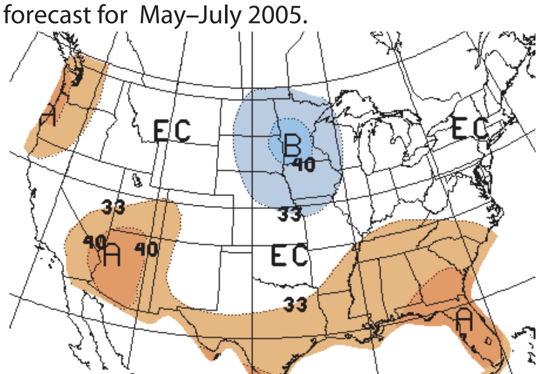


Figure 9b. Long-lead national temperature forecast for June–August 2005.

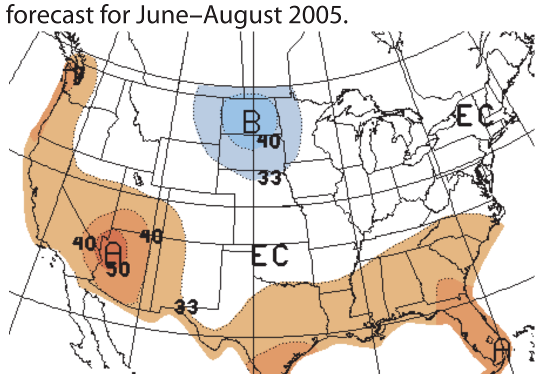


Figure 9c. Long-lead national temperature forecast for July–September 2005.

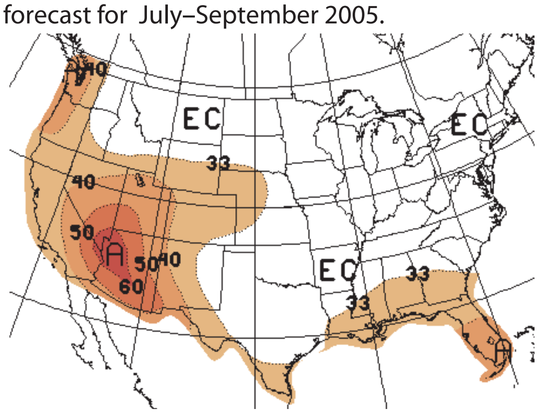
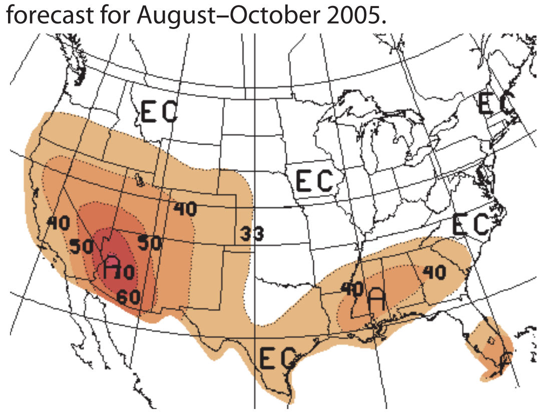


Figure 9d. Long-lead national temperature forecast for August–October 2005.



A= Above
60.0–69.9%
50.0–59.9%
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/

Precipitation Outlook
(May–October 2005)
Source: NOAA Climate Prediction Center

The NOAA-CPC long-lead temperature forecasts for May–October show no forecasted anomalies in the Southwest (Figures 10a-d). The increased chances of above-average precipitation in the western Great Lakes and northern Great Plains and increased chances of below-average precipitation in the Southeast both shift westward in the first two periods (Figures 10a-b). From July–October models indicate increased chances of drier-than-average conditions in the Great Basin and other portions of the West, with increased chances of wetter-than-average conditions in the Southeast (Figures 10c-d). The early periods (Figures 10a-b) are based on strong agreement in the models. According to the CPC, the wet anomalies in the southeastern United States are part of a trend in amplified tropical activity.

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 May–July 2005.

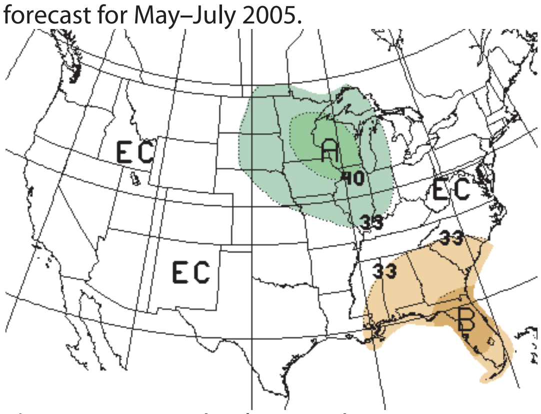


Figure 10b. Long-lead national precipitation forecast for June–August 2005.

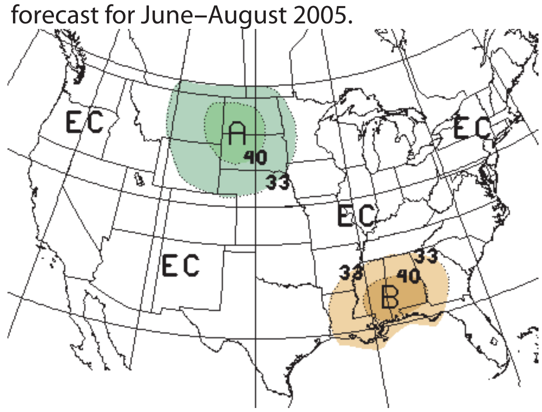


Figure 10c. Long-lead national precipitation forecast for July–September 2005.

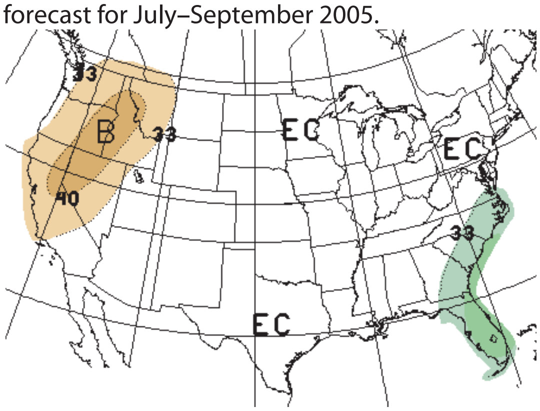
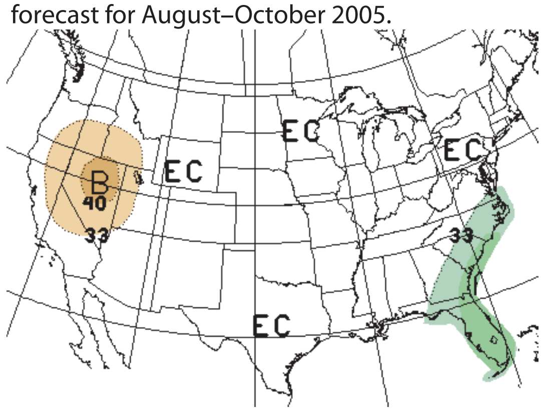


Figure 10d. Long-lead national precipitation forecast for August–October 2005.



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 July 2005)

Sources: NOAA Climate Prediction Center

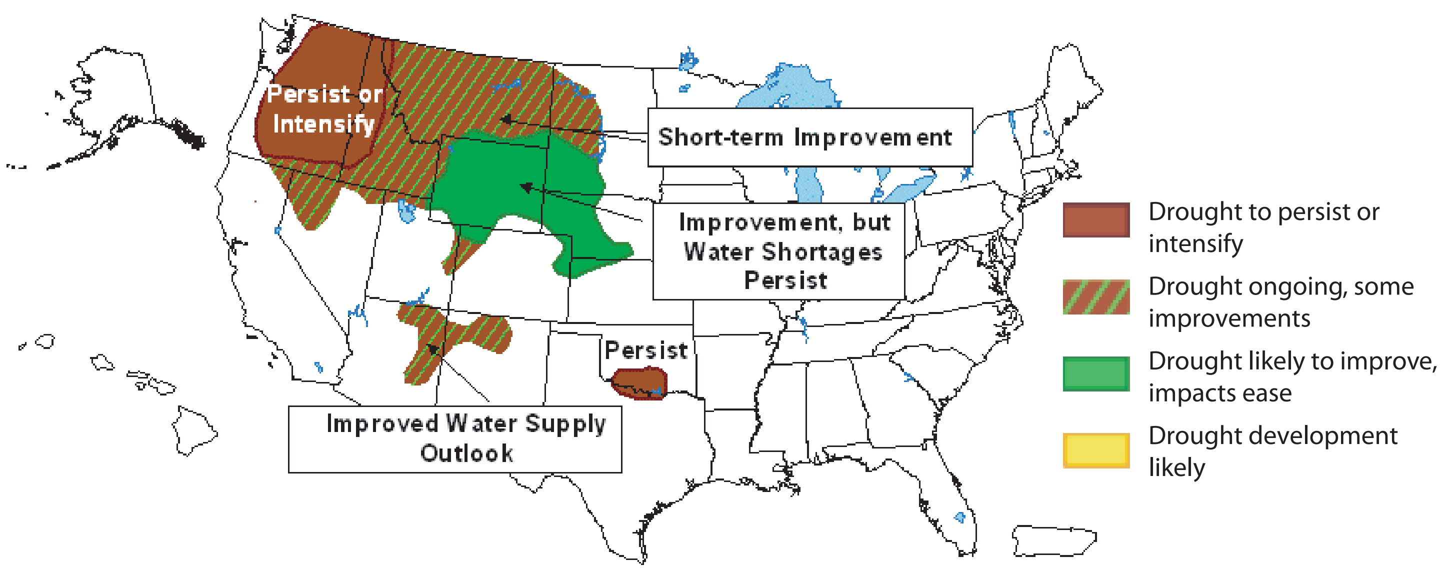
The NOAA-Climate Prediction Center (CPC) seasonal drought outlook through July is once again good news for the Southwest. Improved water supply is expected in northeastern Arizona and northwestern New Mexico (Figure 11). The high snowpack and overall wet winter has already contributed to a significant improvement in drought conditions across the region. As the snow melts with warmer spring temperatures, the runoff will increase streamflow and storage in regional reservoirs. Lakes in New Mexico, most of which are less than 35 percent of maximum capacity (see page 10), will benefit from the above-average snowpack in the northern portions of the state (see page 11). The CPC cautions that snowmelt in some areas may produce major flooding in the Southwest. Other western states should see at least short-term improvement, except most of Washington and Oregon, western Idaho, and far western Montana.

Even as drought impacts wane in the Southwest, water conservation should remain a practice and goal of residents. Several groups in Arizona continue to investigate and promote water conservation. Tucson Water plans to increase the number of officers to watch both commercial and residential customers (*Tucson Citizen,* April 11). Citations up to $1000 can be issued if sprinklers spray more than 10 percent of their output on pavement, if irrigation systems leak, and if water from an irrigation system runs into the street. The Arizona Public Interest Research Group reports that increased use of renewable energy sources could help the state conserve water (*Arizona Republic,* April 14). The group proposes that the Arizona Corporation Commission increases the current requirement to reach a 10 percent renewable energy supply by 2015 and a 20 percent supply by 2020.

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 July 2005 (release date April 21, 2005).



On the Web:

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

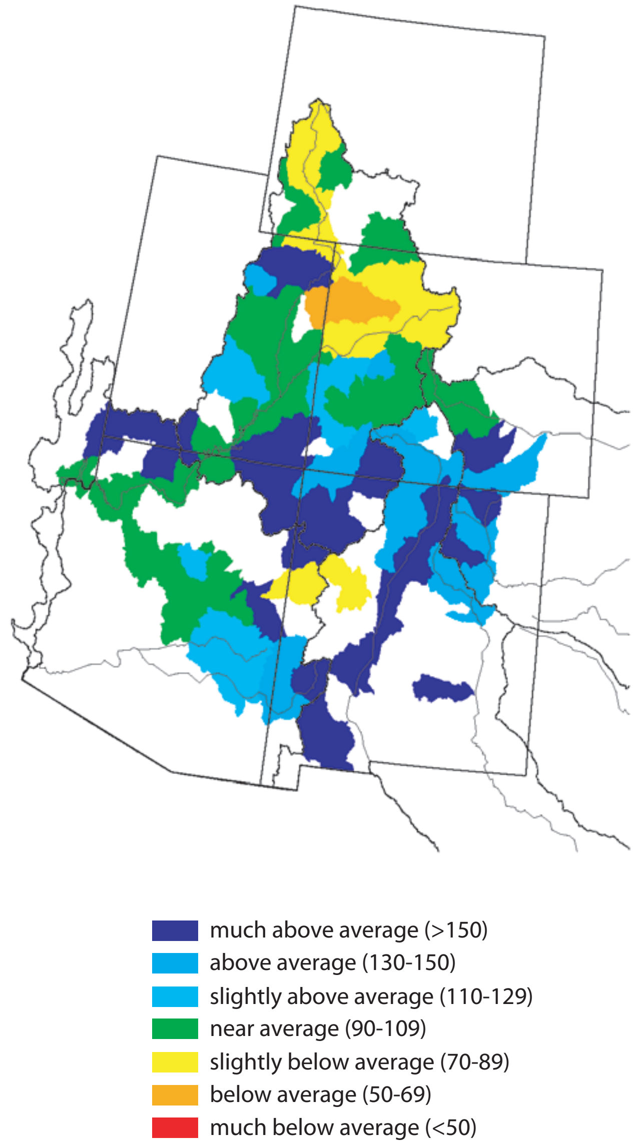
Streamflow Forecast
(for spring and summer)

Source: National Water and Climate Center

The Natural Resources Conservation Service (NRCS) forecast calls for near to above-average spring and summer streamflow for much of the Southwest and the Colorado River Basin (Figure 12). The highest percentages correspond to regions where snowpack and snow water content (SWC) are greatest, namely northern New Mexico, southern Colorado, and much of Utah. Predictions in far west-central New Mexico show below-average streamflow where above-average conditions were expected last month. Forecasts in central Arizona have also decreased due to diminished SWC (only 5–30 percent of average) in the area. Predictions are considerably better than April 2004 (not shown) when the Southwest and Colorado River Basin were forecasted to have below to much below-average streamflow.

In a joint news release from the Albuquerque National Weather Service and the NRCS, experts forecast flow into at least 5 reservoirs in New Mexico to range from 137–174 percent of average (Water Supply Forecast News Release for New Mexico, April 6). These predictions bode well for summer recreational opportunities in the state. State parks personnel are working to upgrade access to lakes for boaters (New Mexico State Parks Media Release, March 25). The rafting industry also expects to benefit. Some business owners believe that their season could be extended through June (*Santa Fe New Mexican,* March 25). High streamflow is not all positive however. Officials in Colorado are concerned about flooding as the snowpack melts. They have begun increasing water releases to accommodate for the expected streamflow, and 18 counties have been placed under watch for flooding (The DenverChannel.com, April 15). Other threats include West Nile virus from mosquitoes hatching in standing water, rapid spread of wildfires once the new grasses dry out, and swarms of bees (*New York Times,* April 11).

Figure 12. Spring and summer streamflow forecast as of April 1, 2005 (percent of average).



On the Web:

For state river basin streamflow probability charts, visit:
http://www.wcc.nrcs.usda.gov/cgibin/strm_cht.pl

For information on interpreting streamflow forecasts, visit:
http://www.wcc.nrcs.usda.gov/factpub/intrpret.html

For western U.S. water supply outlooks, visit:
http://www.wcc.nrcs.usda.gov/water/quantity/westwide.html

Notes:

The forecast information provided in Figure 12 is updated monthly by the National Water and Climate Center, part of the U.S. Department of Agriculture's Natural Resources Conservation Service. Unless otherwise specified, all streamflow forecasts are for streamflow volumes that would occur naturally without any upstream influences, such as reservoirs and diversions. The USDA-NRCS only produces streamflow forecasts for Arizona between January and April, and for New Mexico between January and May.

The NWCC provides a range of forecasts expressed in terms of percent of average streamflow for various statistical exceedance levels. The streamflow forecast presented here is for the 50 percent exceedance level, and is referred to as the most probable streamflow. This means there is at least a 50 percent chance that streamflow will occur at the percent of average shown in Figure 12.

Wildland Fire Outlook

Sources: National Interagency Coordination Center, Southwest Coordination Center

The outlook issued by the National Interagency Coordination Center (NICC) shows below-average to average potential for wildland fire in Arizona and New Mexico, as well as across a majority of the country throughout April (Figure 13a). Although the past 30 days have been dry across much of the Southwest (see Figure 6), much above average precipitation throughout the winter months resulted in high fuel moisture. Conditions in fine fuels, such as grasses, vary from green to cured across the region (Figure 13b). According to the NICC, these fine fuels will continue to "green up" in western and southern Arizona before drying by late April. Fire potential will then increase unless significant precipitation falls in the area. Fine fuels across much of New Mexico recently began to green up, so the fuel will not be highly flammable throughout April. Moisture in large live and dead fuels is near to above-average region-wide (Figure 13b). Fire potential will therefore remain low for these fuel types throughout the month. Due to higher precipitation amounts at high elevation and across much of the northern section of the Southwest, well below-average fire probabilities will persist.

Figure 13a. National wildland fire potential for fires greater than 100 acres (valid April 1–30, 2005).

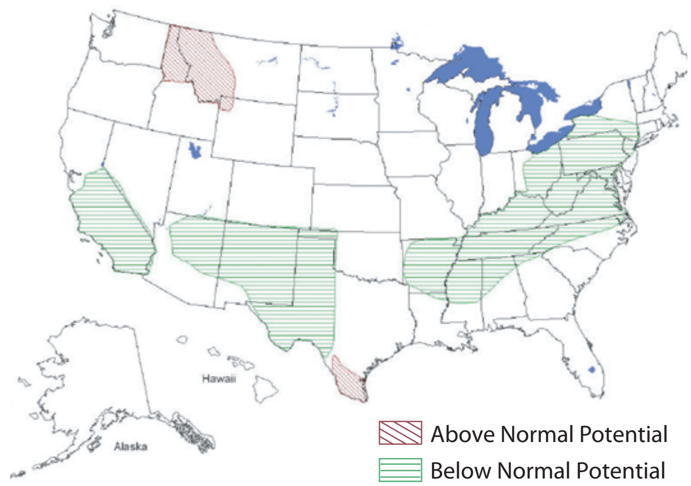


Figure 13b. Current fine fuel condition and live fuel moisture status in the Southwest.

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

Live Fuel Moisture	
	Percent of Average
Ponderosa Pine	110–120
Douglas Fir	107–122
Piñon	80–90
Juniper	100–110
Sagebrush	110–120
1000-hour dead fuel moisture	**20–30**
Average 1000-hour fuel moisture for this time of year	**18–24**

Notes:

The National Interagency Coordination Center at the National Interagency Fire Center produces monthly wildland fire outlooks. The forecasts (Figure 13a) 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 13b 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 Area Wildland Fire Operations (SWCC) web page:
http://www.fs.fed.us/r3/fire/

El Niño Status and Forecast

Sources: NOAA Climate Prediction Center, International Research Institute for Climate Prediction

Atmospheric pressure and sea surface temperature (SST) patterns in the tropical Pacific Ocean continue to indicate a weak El Niño (Figure 14b). The Southern Oscillation Index (SOI), which measures the atmospheric response to changes in SST's, increased during the past month. It has been fluctuating for most of the past year, making forecasts of El Niño and the climate impacts difficult. Although the winter was anomalously wet in the Southwest, climate signals typical of a strong event were generally absent elsewhere. The International Research Institute for Climate Research (IRI) believes that the weakening El Niño may still influence climate patterns in the tropical Pacific, but remote teleconnections, such as impacts in the Southwest, are not anticipated.

The probabilistic forecast from IRI indicates that neutral conditions have the highest likelihood of occurrence through early 2006 (Figure 14a). The probability remains above the historical average for neutral conditions, despite a slight decrease from 65 to 55 percent in the coming months. El Niño probabilities increase slightly and continue above historical averages over the next 12 months, but they remain lower than the chances of neutral conditions. The likelihood for La Niña does not exceed 5 percent during the forecast period. The IRI reports that their models show substantial variation in predicted conditions in the near future (*Technical ENSO Update,* April 19). Despite the models' disparities, neutral conditions remain the most likely occurrence.

Notes:

Figure 14a 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.

Figure 14b shows the standardized three month running average values of the Southern Oscillation Index (SOI) from January 1980 through January 2005. 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.

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 14a. IRI probabilistic ENSO forecast for El Niño 3.4 monitoring region (released April 22, 2005). Colored lines represent average historical probability of El Niño, La Niña, and neutral.

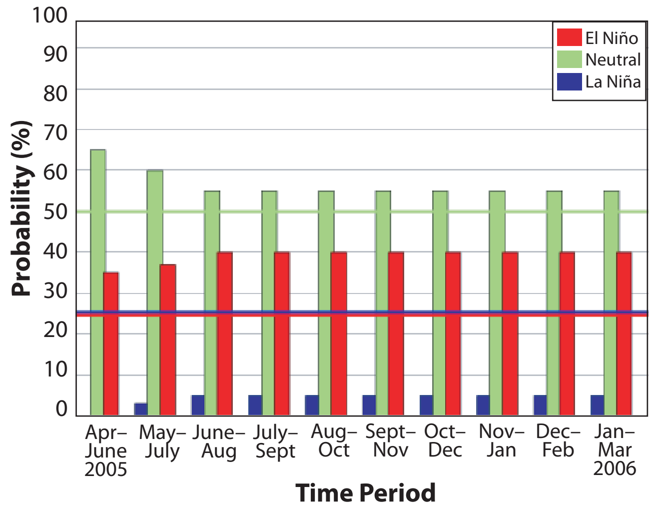
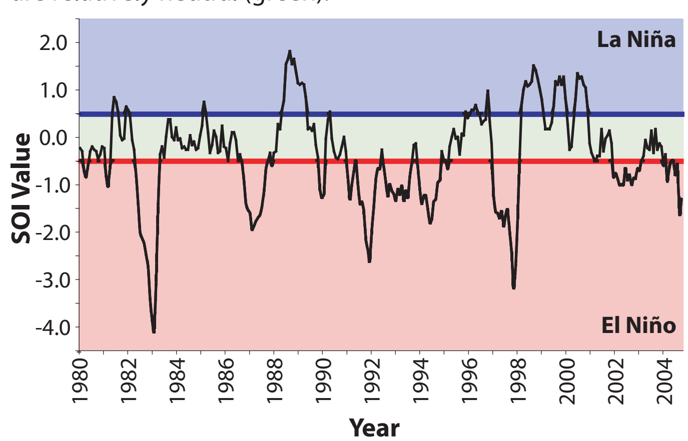


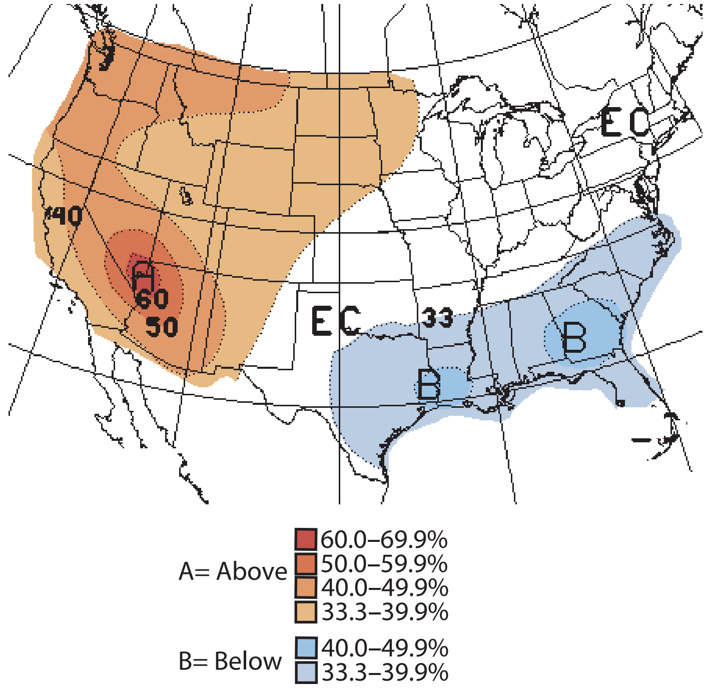
Figure 14b. The standardized values of the Southern Oscillation Index from January 1980–March 2005. La Niña/El Niño occurs when values are greater than 0.5 (blue) or less than -0.5 (red) respectively. Values between these thresholds are relatively neutral (green).



Temperature Verification
(January–March 2005)
Source: NOAA Climate Prediction Center

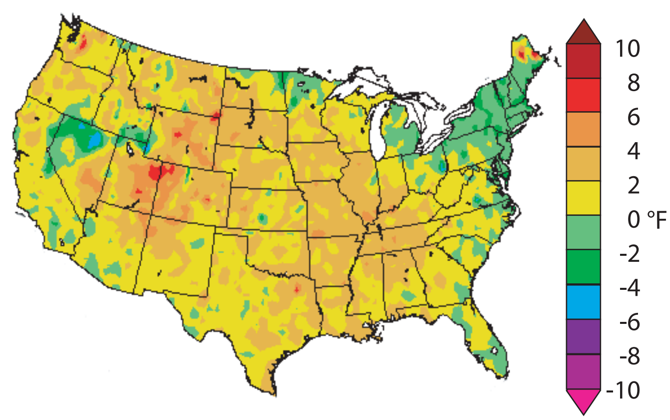
The NOAA-Climate Prediction Center long-lead temperature forecast for January–March 2005 indicated increased chances of warmer-than-average conditions in the West and northern Great Plains and increased chances of cooler-than-average conditions along the Gulf Coast and Southeast (Figure 15a). Observed temperatures during the period were generally above average in the Southwest and across much of the country (Figure 15b). Northeastern Arizona and northwestern New Mexico recorded the highest positive anomalies in the Southwest. The coolest anomalies were in northern portions of Nevada and Utah, while much of the Northeast was warmer than average. The forecast performed well in the western United States, except for the cooler-than-average conditions in Nevada and Utah. The increased chances of below-average temperatures in the Southeast did not verify, although a few areas of Florida and the southeastern Atlantic Coast were slightly cooler than average.

Figure 15a. Long-lead U.S. temperature forecast for January–March 2005 (issued December 2004).



EC= Equal chances. No forecasted anomalies.

Figure 15b. Average temperature departure (in degrees F) for January–March 2005.



Notes:
Figure 15a shows the NOAA Climate Prediction Center (CPC) temperature outlook for the months January–March 2005. This forecast was made in December 2004.

The January–March 2005 NOAA CPC 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. Care should be exercised when comparing the forecast (probability) map with the observed temperature maps described below.

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 15b shows the observed departure of temperature (°F) from the average for January–March 2005 period.

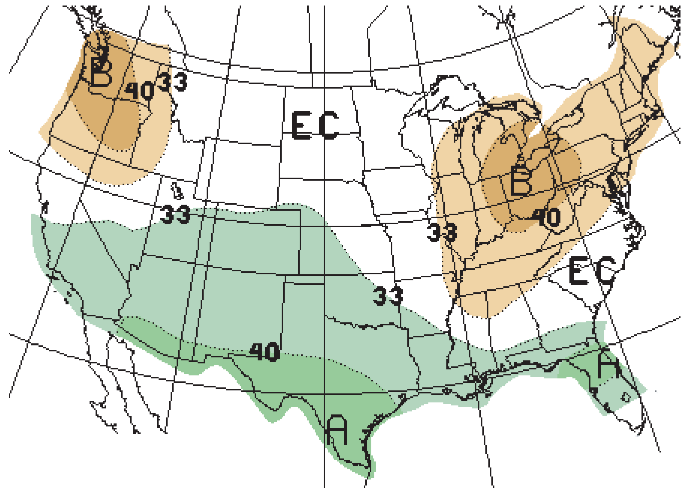
In all of the figures on this page, the term average refers to the 1971–2000 average. This practice is standard in the field of climatology.

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
(January–March 2005)
Source: NOAA Climate Prediction Center

The NOAA-CPC long-lead forecast for January–March showed increased chances of above-average precipitation along the southern tier of the United States and increased chances of below-average precipitation in the Northwest and from the Mississippi River Valley into New England (Figure 16a). Some of the highest probabilities were in extreme southern Arizona and New Mexico. Observed precipitation was much above average in the southwestern United States with most areas receiving more than 200 percent of the average January–March precipitation (Figure 16b). Wetter-than-average conditions also extended from the southern Great Plains to Pennsylvania. Precipitation in the remainder of the country was generally below average, with the driest anomalies from the Pacific Northwest to the northern Great Plains. The CPC forecast performed very well in the Southwest, where drought conditions continued to ease, and in the Northwest, where drought is becoming worse. The Ohio River Valley was once again a problem area that did not verify with the forecast.

Figure 16a. Long-lead U.S. precipitation forecast for January–March 2005 (issued December 2004).

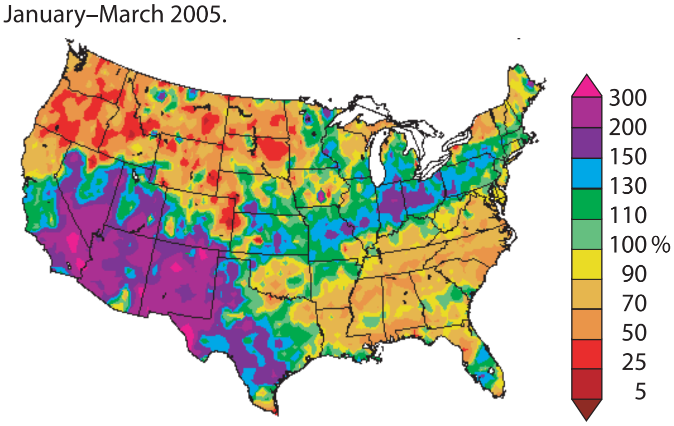


A= Above: 40.0–49.9%; 33.3–39.9%

B= Below: 40.0–49.9%; 33.3–39.9%

EC= Equal chances. No forecasted anomalies.

Figure 16b. Percent of average precipitation observed from January–March 2005.



Notes:

Figure 16a shows the NOAA Climate Prediction Center (CPC) precipitation outlook for the months January–March 2005. This forecast was made in December 2004.

The January–March 2005 NOAA CPC 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. Care should be exercised when comparing the forecast (probability) map with the observed precipitation maps described below.

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 16b shows the observed percent of average precipitation for January–March 2005.

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