Issued: March 21, 2006

Southwest Climate Outlook

Published by the Climate Assessment for the Southwest project and the University of Arizona Cooperative Extension

March Climate Summary

Drought – Recent rain and snow brought some short-term relief to the Southwest, but most of the region is in severe or extreme drought.

- The extremely low snowpack in most of the basins in Arizona and New Mexico has led to a streamflow forecast of well below average for 2006.
- Reservoirs have improved since last year, but many remain below average.

Fire Danger – The rain and snow received in mdi-March may delay the start of the fire season, but the abundant fine dry fuels still point to a very active fire season.

Temperature – Since the start of the water year on October 1, temperatures over most of the Southwest have been above average.

Precipitation – Almost all of the Southwest has been drier than average since the start of the water year, especially during the last four months.

Climate Forecasts – Forecasts show increased chances of warmer-than-average temperatures through September and equal chances of precipitation through June.

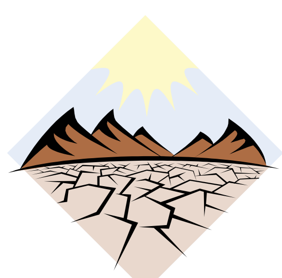
El **Niño –** Ongoing La Niña conditions are expected to continue over the next three to six months.

The Bottom Line – Drought is likely to persist throughout most of the Southwest following some temporary improvement in Arizona and northwestern New Mexico. Hydrological drought continues to affect some large reservoir levels, and agricultural drought conditions have persisted throughout most of the region.

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

ISPE drought article series

From bare ski slopes in the mountains to parched prickly pear in the deserts, extreme dry conditions took hold of much of the Southwest this winter. Rain and snow blew through Arizona and New Mexico in mid-March ending a record-breaking dry spell in areas and providing some relief, but the seasonal drought outlooks still show drought conditions through June. The Institute for the Study of Planet Earth (ISPE) has launched an article series that explores how an extreme dry spell in the Southwest influences the region's economy, wild fire season, and ecology, and what influence the monsoon may have on the drought. The first two articles are now available online.



See http://www.ispe.arizona.edu for more information...

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CLIMAS
ARIZONA COOPERATIVE EXTENSION
THE UNIVERSITY OF ARIZONA • COLLEGE OF AGRICULTURE AND LIFE SCIENCES
The University of Arizona

Experts discuss early start to Southwest fire season

The Southwest's fire season started in February, a month earlier than usual. Dry conditions throughout the state led Arizona Governor Janet Napolitano to declare a state of emergency regarding the wildfire season on February 22. New Mexico's conditions are just as bad as Arizona's, if not worse(Figure 1). With this in mind, CLIMAS invited several people with expertise in fire management, behavior, and history to share some of their insight during a March 1 roundtable discussion.

During March 10-12, heavy precipitation visited our region, including substantial snow throughout eastern Arizona's high elevations. While this precipitation undoubtedly temporarily decreased fire potential, the concerns expressed by our fire roundtable experts are likely to be important factors when temperatures rise and relative humidities decrease during the arid foresummer in May and June.

Roundtable Participants

Rich Naden
Fire meteorologist,
Southwest Coordination Center, Predictive Services

Stephen Campbell
Natural resource specialist, and director
UA Cooperative Extension, Navajo County

Thomas Swetnam
Fire ecologist, and director
UA Laboratory of Tree-Ring Research

Melanie Lenart
Roundtable moderator and research associate,
Climate Assessment for the Southwest (CLIMAS)

Lenart: Thank you all for participating today. Maybe a good start would be for Rich to give us some background on the region as a whole, and what we're facing right now. Phoenix hasn't had rain since October 18 and the rest of the state isn't much better. I don't know if New Mexico is getting any rain today [as predicted] or in the same situation, so why don't you tell us about it?

Naden: Albuquerque had the driest November through February in city history. The whole region—Arizona, New Mexico, and West Texas—is the same way. Things are very dry and we've had almost no winter precipitation. The storm track has been further north. It appears to be related to the La Niña pattern, which is pretty typical. So that's where we stand right now, and we've already had some fires. We have our sleeves rolled up for quite a season.

Lenart: Can you tell us about the fires? One started in Arizona yesterday. Is it under control yet?

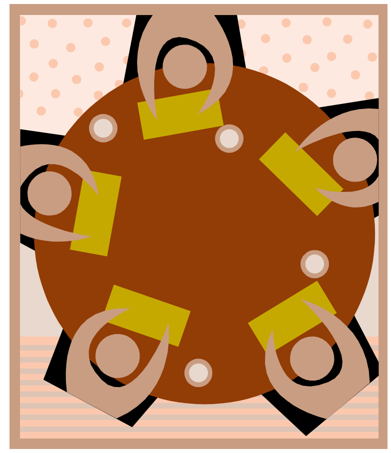
Naden: They're getting it under control. Control hasn't been a big problem so far but this type of activity this early in the year is indicative of what's to come. That's our concern right now—there are no huge indications of large storms except possibly during next week. It's probably too little, too late because the snowfall has been so low throughout the region.

Lenart: This year we're more concerned about forests than grasslands, right?

Naden: Last year, the snow we had geared the focus toward lowland grass and finer fuels. It's difficult to say that there won't be problems with finer fuels this year since it's been so dry. More of them developed last year and they're still around, and the timber areas are dry and vulnerable. We're preparing for a major season for all fuel types.

Lenart: Steve, you're in the White Mountains of Northern Arizona. How are conditions there?

Campbell: Well, we're doing better than everyone else—we've had 0.17 of an inch of moisture since October. We're worried about everything from the tamarisk corridors in the Little Colorado basin to the PJ [pinyon-juniper] grasslands that extend back toward the conifer and spruce. As of March 1, we're at



4 percent of our normal snowfall in the mixed conifer and spruce areas and at less than 1 percent of what it should be for the juniper and ponderosa pine. We have a tremendous amount of standing grasses and wildflowers—which everyone enjoyed so much during the summer and are now dry weeds—across almost the entire pinyon and juniper area. I guess we could just call it juniper now because almost all of our pinyons are dead [from drought and bark beetles]. There is also a lot of buildup of finer fuels which could carry a fire through the woodland juniper and, in fact, that kind of fire could happen any minute. The right set of conditions could be very ugly for that area.

Lenart: Tom, could you tell us how the El Niño and La Niña conditions affect this?

Swetnam: We first started looking at this about 15 years ago when everyone became interested in looking at El Niño relationships to precipitation. Almost immediately, we saw that in the statistics of area-burned in the Southwest, you have larger areas burned during La Niña years with lower rainfall. During El Niño, things are wetter and the area burned is usually smaller. There's a lot of variability, though—every year is different. In the long-term record from tree rings going back 300 to 500 years, we see the same relationships. Drought

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Fire roundtable, continued

years are well correlated with fire years. In the pine forests, not only is there a relationship between drought and fire, there (also are correlations with) wet conditions one to three years prior. So when dry years follow wet years, that combination tends to result in large areas burned in forest landscapes.

Lenart: That's what we're facing this year?

Swetnam: Last winter was extremely wet with an impressive wildflower season, as Steve pointed out. Last year we had a very healthy production of vegetation in the lowlands and then it got really hot and dry and, as you know, a lot of the lower elevation areas burned last year. But these fine fuels have built up over time and weren't all burned last year.

Lenart: Rich, how do you manage for a season like this?

Naden: As far as management is concerned, we don't have any additional staff yet. That may change quickly. We're bringing in a fire behavior analyst next week and are gearing up our outlooks several weeks to a month early—the seasonal outlook should be ready by the end of March. We don't have any other significant staffing changes because we're a resource maneuvering type of outfit. We're expecting some serious problems throughout the elevation types and in all fuel types—the stage is set since there are lots of fine fuels out there, the snowpack is almost nonexistent, and the trees are ready to go. We need to get the message out to homeowners.

Lenart: I know the Southwest fire season tends to start earlier than others in the country, so are you able to get resources from outside the region to help out?

Naden: We're definitely hoping so. Since the season does start earlier than almost all others except the Southeast, and we've been loaning some of our resources to the Texas-Oklahoma-Arkansas area, we should be able to bring people in. We're hoping that our season will end earlier, too, but that's just a nice thought. We're praying that the monsoons come early. Some research suggests that when we have a season like this [with such low snowpack], the monsoon tends to come a bit earlier and be more robust.

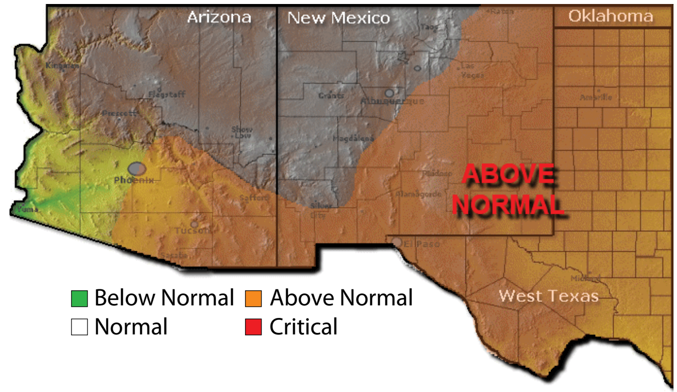

Figure 1. The current Southwest Coordination Center significant fire potential outlook shows above-normal fire potential for much of the Southwest. This outlook is valid March 1–31, 2006. Source: http://gacc.nifc.gov/swcc/predictive/outlooks/outlooks.htm.

Swetnam: Some studies have shown a slight tendency for early monsoonal moisture in a season like this but it's a weaker relationship than the El Niño/La Niña relationship to winter precipitation. Rich, do you know of any management initiatives with regard to prescribed burning in a situation like this? I'm wondering if the land management agencies move into a different mode in a season like this, or if prescribed burning is still on a forest-by-forest case.

Naden: The weather this year has allowed us to meet prescribed burning targets throughout the winter because of the lack of snow and other precipitation. We can start pulling back now as the windy season approaches. Any further burns will be very tightly regulated.

Campbell: In the Apache Sitgreaves area, we have two concepts in use. There's the natural fire, e.g. lightning fire, which happens in an area where we can let it do its thing. Generally that is associated with the regular fire season into the monsoon season. The other side of the coin is our prescribed fire which we use in conjunction with thinning from below. Our prescribed burning throughout the winter has also been very aggressive, even within communities, but as we're getting into the season, the community gets more worried about burning. I don't know that the public knows how important low-intensity prescribed fire is to us in terms of thinning so that we can better manage the wildfire later. Even the Rodeo-Chediski fire demonstrated that in the areas where managed fire, thinning, and extraction had preceded it, the fire went to ground and there wasn't a lot of [tree] mortality. Teaching the public that all fire is not bad is something that takes a long time.

Lenart: What about property owners who live in or near the forests—is there anything they can do at this point?

Campbell: There's a lot they can do. In six weeks, any owner could clean up a property of less than two acres. They need to start at their house regardless of what the neighbor has done. They should start at the wall of their house and work outward, making sure there aren't any paths—e.g. strips of grass, dead leaves, or branches on highly flammable plants—through which fire can directly contact the structure. The next thing to do is clean up the ground of all the fuels up to the property boundary so that ground fire isn't a possibility and all the fire ladders are off the trees. Then they can look at the aerial portion of their trees. They don't have to have every tree standing alone but there has to

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Fire roundtable, continued

be no way for fire to bridge from tree to tree or group. They should try to get to a point where there are 25- to 30-foot separations between canopy edges and 75 percent of what they see above them is empty sky. Once they've done all of that, they can worry about what the neighbor has done.

Lenart: We've been talking about the role of precipitation in increasing the fire risk. Does anyone want to comment on the role of the rising temperatures on this season and seasons in the future?

Swetnam: Drought is, of course, related to warmer temperatures as well as moisture deficits. We've been seeing trends of warmer temperatures in the Southwest which leads to reduced snowpack and earlier runoff, giving the soil and fuels more time to dry out. We don't know as much about the long-term temperature relationships with fire as we do with precipitation, but we're beginning to identify some patterns. Tony Westerling, at Scripps Institution in San Diego, has found a relationship between increased temperatures and fire occurrence over the last 50 years in the western US. [For more information, see the *Bulletin of the American Meteorological Society*, May 2003, page 595.] Large fires have been occurring in recent years in middle elevation pine forests, but if temperatures continue to increase and the drought worsens, we may begin to see more fires occurring at the highest elevations in spruce and fir forests.

Naden: Temperature also affects fuel moisture. In general, the warmer the temperatures are, the lower the fuel moisture is. This leads to longer burning times in winter which continues into the spring and summer. As long as we have this warming, which I believe will continue through the foreseeable future, this will be a problem. The snow totals will probably continue decreasing and occurring only at higher elevations, so runoff will decrease, and eventually we will have groundwater problems as well. If we don't have colder nights, the trees—which are already drought-stressed—will become more vulnerable to insects.

Campbell: Temperature can be a component of fire behavior which spills over into intensity and severity of the burn. In the Rodeo-Chediski fire [of 2002] we had nighttime fire behaviors—connected to higher nighttime temperatures—[leading to fires] that never really abated the way they should have. In Mount Baldy, Paradise, and some other areas, we've completed almost 170 years without a major fire. Tree stands are degraded, so there are high amounts of dead and downed trees, which gives us many tons of fuel. If we have a fire start that misses the initial attack [of firefighters], we could potentially burn off that entire area.

Lenart: I think we're all properly scared now. Are there any final comments?

Campbell: There are a lot of other things we can do and are doing to reduce the fear level. All of our fire districts and local governments have developed fire restriction ordinances so we're taking a coordinated approach with the agencies to keep from restricting people's activities so we don't drive them deeper into the forests and canyons. Every major fire in the White Mountains has come at a time when we had forest restrictions and closures. For example, the Three Forks fire [of 2004] was caused by campers who had moved back into hidden areas because of restrictions in other areas.

Lenart: So are you trying to leave fringes of forests open so people can get in without having to hide out?

Campbell: Yes. We're looking at keeping campgrounds and other improved areas open and at modifying the restrictions which would outlaw, for example, charcoal grills. You couldn't go out on your back patio and grill a steak if the restrictions were in effect on the edge of a forest. The effect of that grill on the community is minor compared to the effect if someone takes it deeper into the forest and dumps their charcoal remnants. We're trying not to push people out of the areas where we can have a fast response time.

Naden: I'd like to say a bit more about weather. We're significantly concerned with regard to the overly dry November through February. The storm predicted for the week of the tenth here should help us out a bit but there's no doubt that by late March to early April the [fire] season will be upon us. We hope for a strong monsoon for our water resources and reservoir levels as well as for fire management. Arizona is always above normal in terms of temperatures except when we have extensive cloud cover and even then we don't get below normal. We'll have to see how the forests deal with extended warm temperatures over time.

Swetnam: A combination of forest changes have occurred because of past land-uses and management. Some forests have become very dense because of past logging that was not followed up with thinning of the many trees that regenerated after the logging. Intensive livestock grazing and fire suppression also led to reduced wildfires, and this allowed many trees to establish and forest fuels to accumulate. Invasive species have now become a huge problem, as was evident last summer when large areas of the Sonoran Desert burned. Invasive species that burn very readily, like buffelgrass and red brome, have moved into the desert, where fires rarely if ever burned before. Now, add to all of these problems climate change and increasing human populations, and you can see what a mess we're in! Our challenge is to get the message out, not to scare people as much as to move them to action... Community involvement is the key.

Lenart: Thank you all for your insights.

Temperature (through 3/15/06)

Source: High Plains Regional Climate Center

Temperatures in the Southwest have moderated somewhat from the record-breaking warmth of January. Since the start of the water year on October 1, 2005, temperatures across most of the Southwest have been 0–4 degrees Fahrenheit above average (Figure 1a–b). Some localized areas in north-western New Mexico and western Arizona have been cooler than average by 2–4 degrees F. Average temperatures have ranged from the middle 60 degrees F in southwest Arizona to the mid 20 degrees in north-central New Mexico. Temperatures over the last 30 days have been generally 0–4 degrees F above average throughout most of New Mexico and parts of southeastern Arizona (Figure 1c–d). Most of Arizona and parts of northwest New Mexico experienced temperatures from 0–4 degrees cooler than average, with some areas in western Arizona ranging to 6 degrees below average.

Figure 1a. Water year '05–'06 (through March 15, 2006) average temperature.

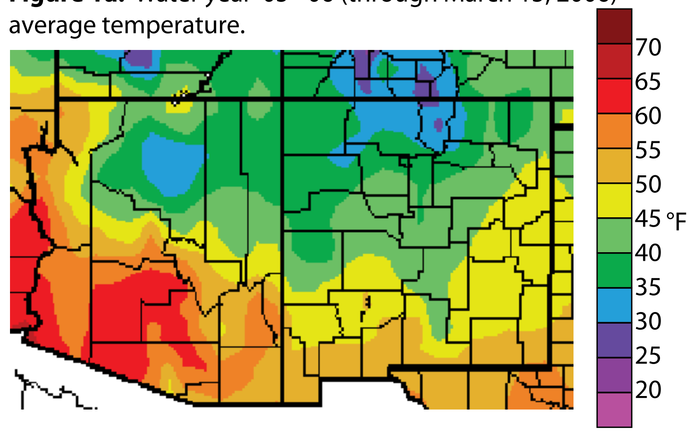


Figure 1b. Water year '05–'06 (through March 15, 2006) departure from average temperature.

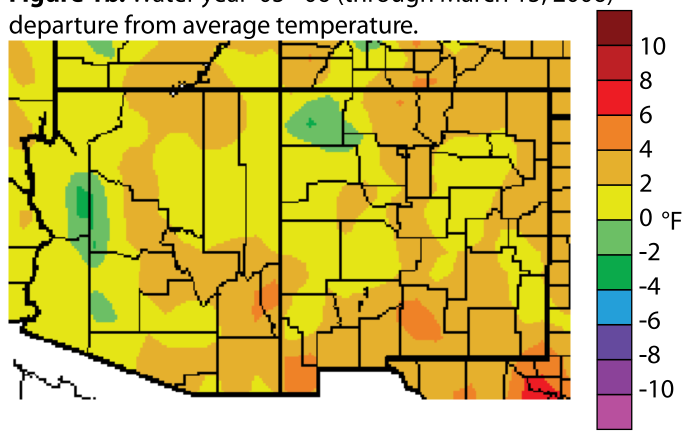


Figure 1c. Previous 30 days (February 14–March 15, 2006) departure from average temperature (interpolated).

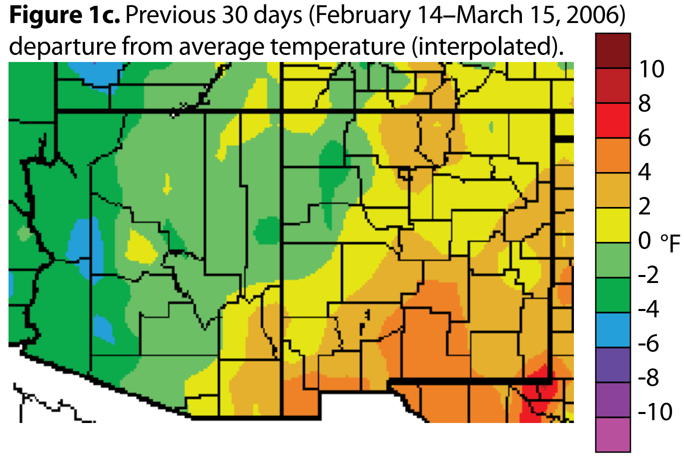
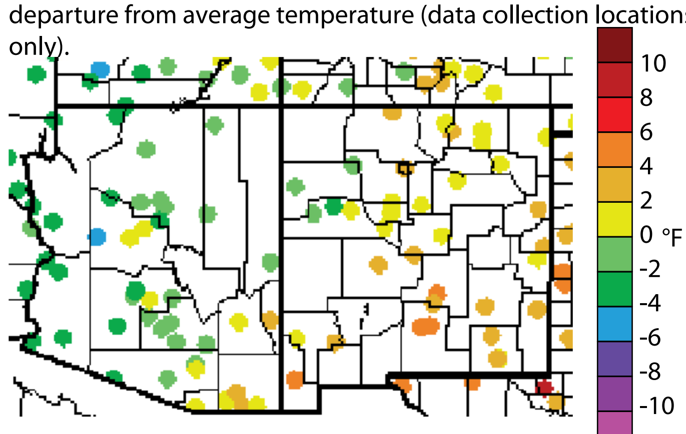


Figure 1d. Previous 30 days (February 14–March 15, 2006) departure from average temperature (data collection locations only).



Notes:

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

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

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

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

On the Web:

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

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

Precipitation (through 3/15/06)

Source: High Plains Regional Climate Center

A major storm system brought some much-needed rain and snow to the Southwest over the weekend of March 11–12, although not nearly enough to bring precipitation totals up to average since the start of the water year on October 1, 2005 (Figures 2a–d). More than an inch of precipitation fell in many areas during the storm, including central Arizona and north-central New Mexico. More than an inch of precipitation fell in Phoenix, ending a 143-day stretch without measurable precipitation. Despite the rain and snow delivered by the storm system, precipitation in the Southwest remains far below average for the water year. Precipitation has been less than 50 percent of average for virtually all of the Southwest since October 1, and much of the area is still below 25 percent of average. Precipitation totals for the last 30 days are also below average for most of the region. About half of the Southwest, particularly eastern New Mexico and much of Arizona, has received less than 50 percent of average precipitation. The rain and snow could delay the start of the wildland fire season, but fire officials say the abundant fine dry fuels produced by last year's wet winter still point to a very active fire season.

Notes:

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2005 we are in the 2006 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 '05–'06 through March 15, 2006 percent of average precipitation (interpolated).

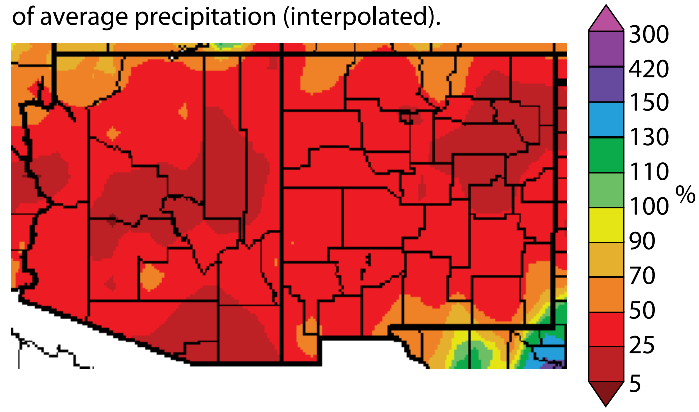


Figure 2b. Water year '05–'06 through March 15, 2006 percent of average precipitation (data collection locations only).

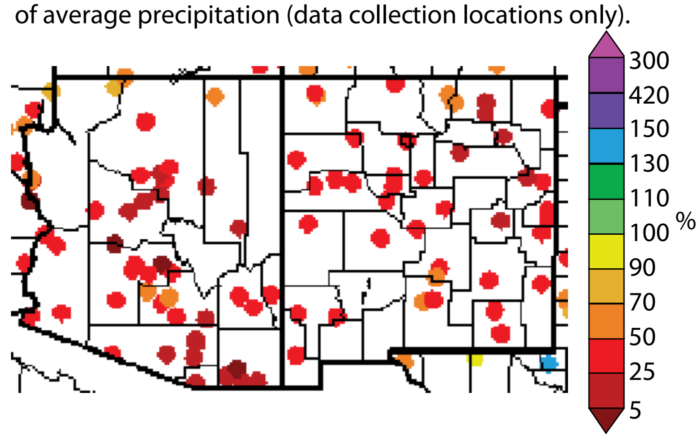


Figure 2c. Previous 30 days (February 14–March 15, 2006) percent of average precipitation (interpolated).

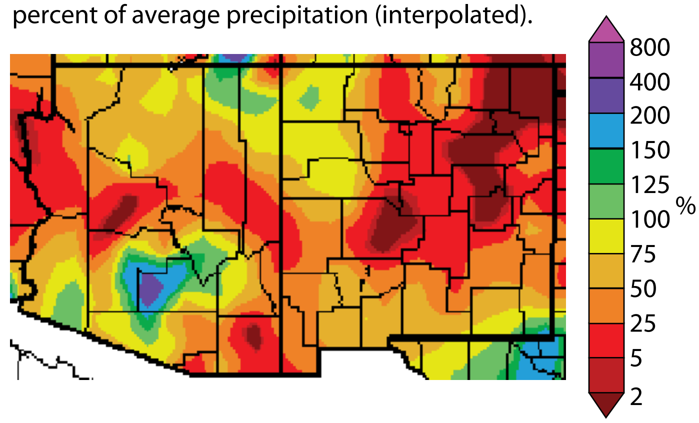
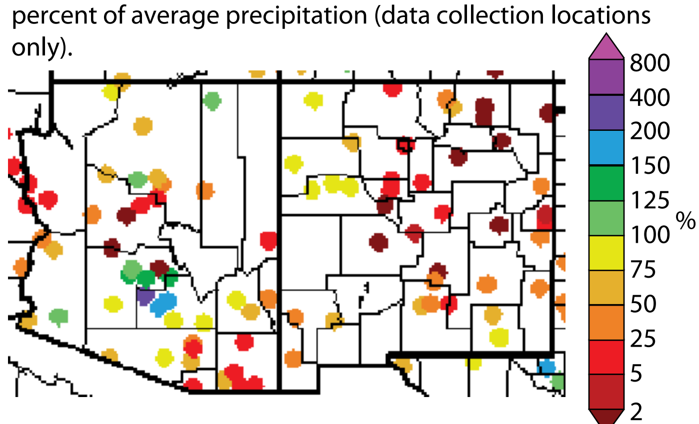


Figure 2d. Previous 30 days (February 14–March 15, 2006) percent of average precipitation (data collection locations only).



U.S. Drought Monitor

(released 3/16/06)

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

Drought conditions in much of the Southwest have continued to deteriorate since this time last month, although parts of central Arizona received some short-term relief from a storm system that brought an inch or more of rain and snow to parts of Arizona and northern New Mexico on March 11–12 (Figure 3). The area of extreme drought conditions in southeastern and east-central Arizona has expanded eastward into southwestern, north-central, and south-central New Mexico. In New Mexico severe drought conditions have expanded to the east and north. Now much of the state is experiencing severe or extreme drought with pockets of moderate drought in in the north, central, and far southern areas of the state. Severe and moderate drought areas have also expanded in western and northern Arizona, so that other than small areas of abnormally dry conditions along the western border of Arizona, the entire Southwest is now experiencing some level of drought.

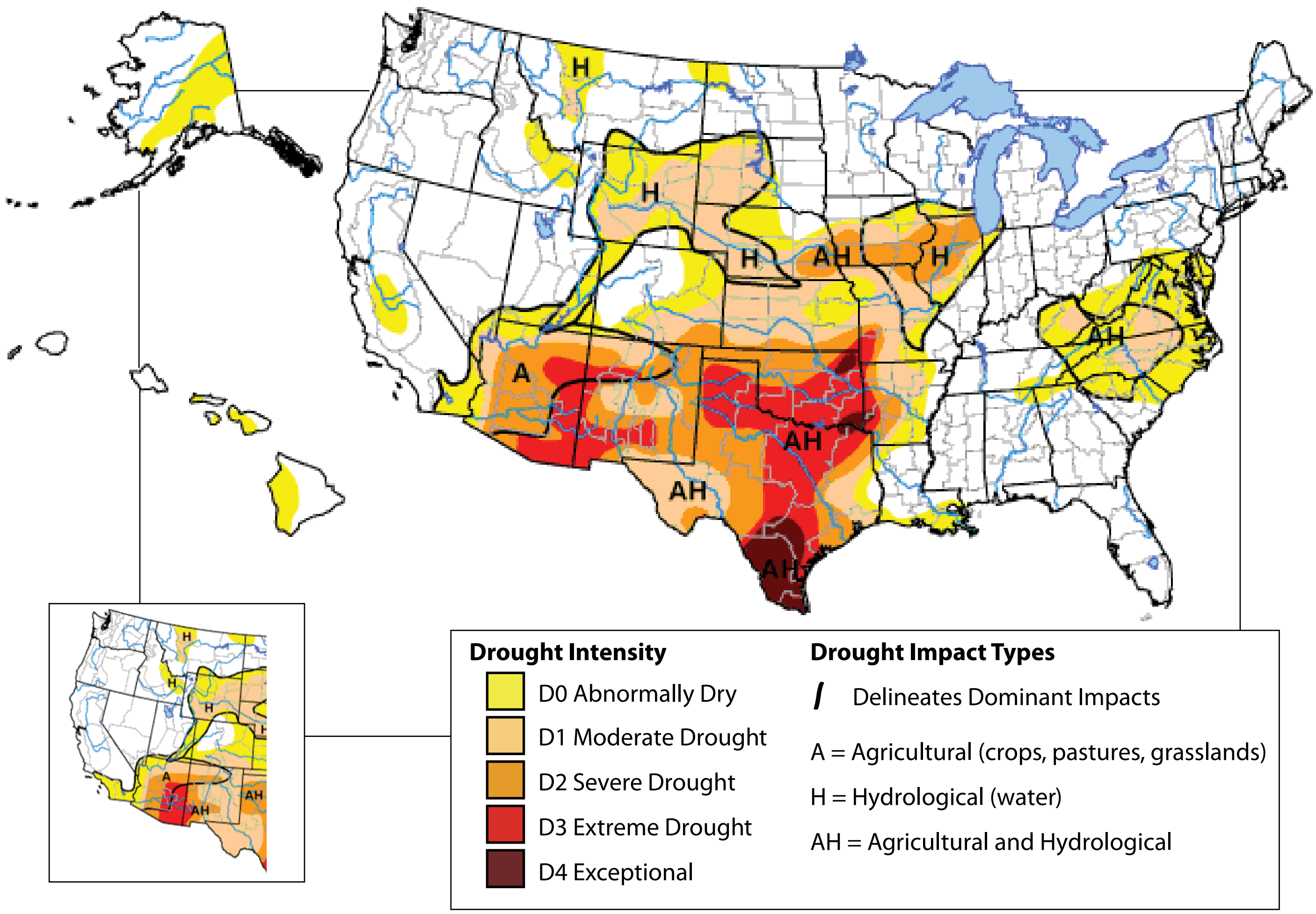
The Southwest has experienced below-average precipitation since the water year began on October 1, 2005 (see Figures 2a–b).

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, CPC/NCEP/NWS/NOAA.

Figure 3. Drought Monitor released March 16, 2006 (full size) and February 16, 2006 (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 3/16/06)

Source: New Mexico Natural Resources Conservation Service

Drought conditions in New Mexico have continued to deteriorate since last month. All of the state is in some level of short-term meteorological drought as of February 17, and most of the state is also experiencing long-term hydrological drought (Figures 4a–b). New Mexico Governor Bill Richardson declared a drought on March 15. Conditions are somewhat better in the eastern half of the state, where most of the area is in alert status. The western half of the state is generally in worse condition, with most of the area in warning status. The most severe conditions are in parts of northwestern New Mexico, where emergency drought conditions exist along the Arizona border in the Zuni-Gallup-Grants area, and farther east in the Los Alamos-Santa Fe-Las Vegas area. Advisory conditions exist along parts of the Colorado border. Some much-needed rain and snow fell over the weekend of March 11–12, but the precipitation from that storm put only a small dent in the long-term drought throughout western New Mexico, according to the National Weather Service. Since the start of the water year on October 1, 2005, New Mexico has received less than 50 percent of average precipitation. The November through February period was the second-driest on record, and the driest since the winter of 1903–1904. Reservoir storage in New Mexico is better than it was a year ago because of the wet winter and spring of 2004–05. Storage in most of the reservoir systems near the Colorado border is above average, but systems in the central and southern portions of the state remain below average.

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.

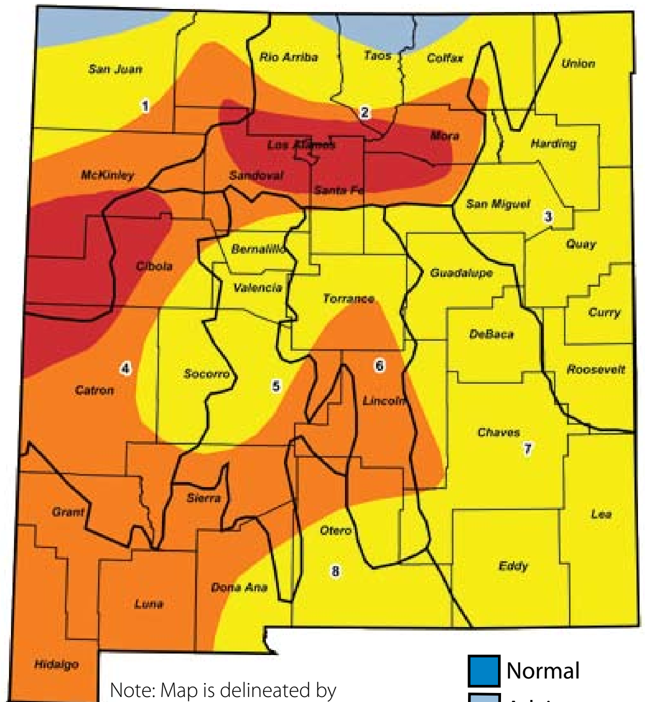
Figure 4a shows short-term or *meteorological* drought conditions. Meteorological drought is defined usually on the basis of the degree of dryness (in comparison to some "normal" or average amount) over a relatively short duration (e.g., months). Figure 4b refers to long-term drought, sometimes known 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.azwater.gov/dwr/default.htm

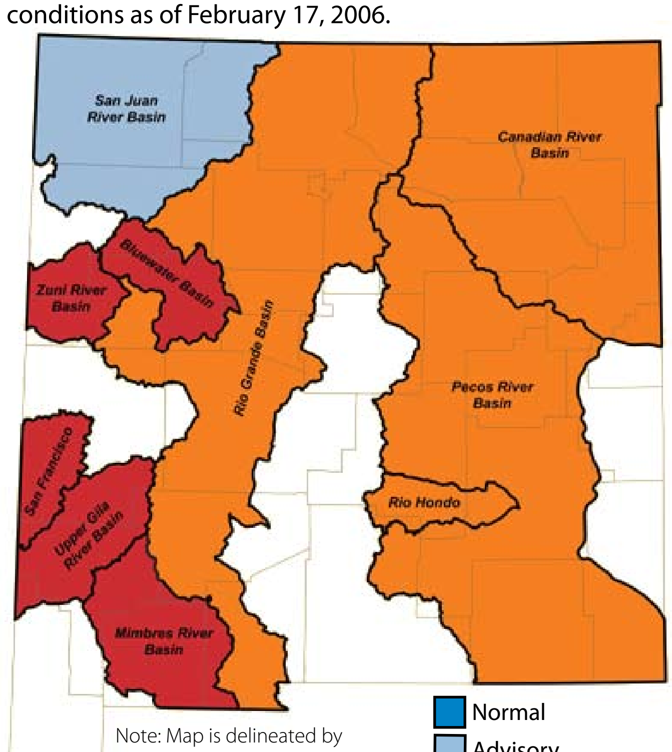
Figure 4a. Short-term drought map based on meteorological conditions as of February 17, 2006.



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 February 17, 2006.



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

Normal
Advisory
Alert
Warning
Emergency

Arizona Reservoir Levels

(through 2/28/06)

Source: National Water and Climate Center

Storage in most Arizona reservoirs has declined slightly since this time last month. The largest drop was on the Verde River system, which declined by 10 percent of capacity. Most other declines were in the range of 1–2 percent of capacity. The Salt River system in central Arizona and Lake Mead on the Colorado River both rose very slightly, by less than one percent of capacity. Lyman Reservoir remained steady at 27 percent of capacity. Note that the cup that represents Show Low Lake in Figure 5 is colored gray because no data were reported at that site in February.

Storage on the three largest reservoirs within the state has declined since this time last year because of the continuing severe drought conditions since those reservoirs were replenished during the wet winter and spring of 2004–05. The Salt River system has declined by 4 percent of capacity since a year ago, but remains well above its average level. Compared to this time last year, the Verde River system and the San Carlos reservoir have declined by 56 percent and 24 percent of capacity, respectively, and are now below long-term average levels. The two large reservoirs on the Colorado River, Lake Powell and Lake Mead, remain below-average levels due to long-term precipitation deficits in the Upper Colorado River Basin, even though Lake Powell has risen by 10 percent of capacity relative to last year.

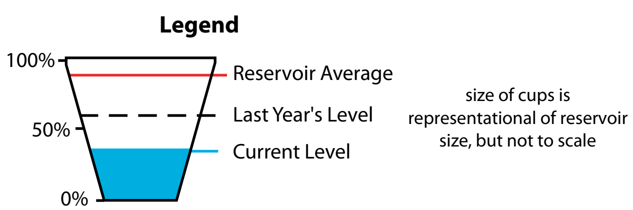
Notes:

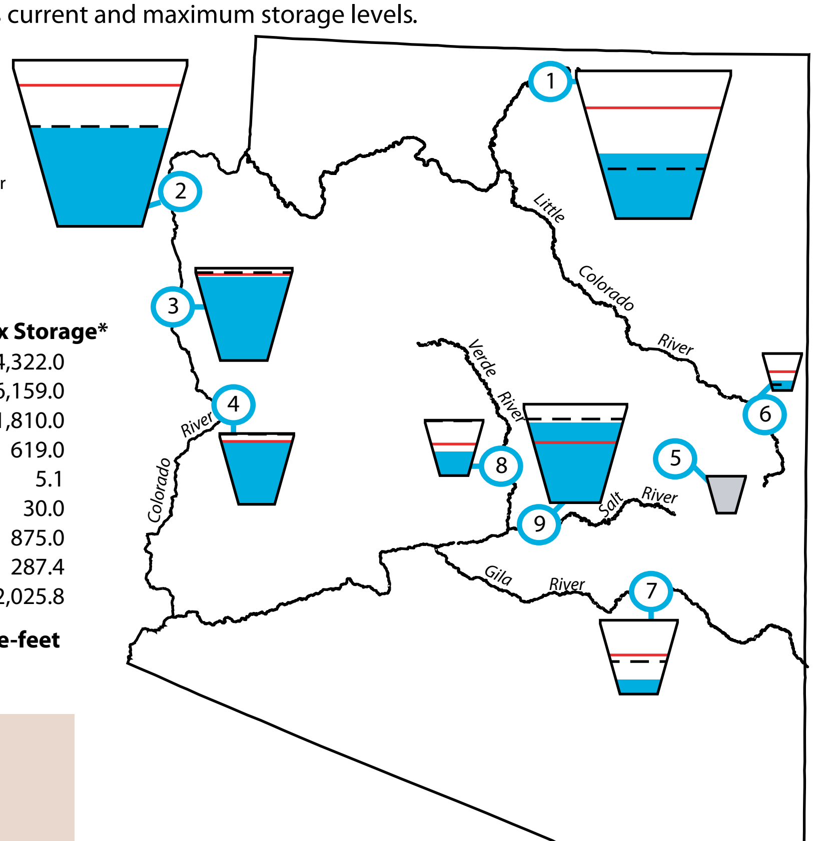
The map gives a representation of current storage levels for reservoirs in Arizona. Reservoir locations are numbered within the blue circles on the map, corresponding to the reservoirs listed in the table. The cup next to each reservoir shows the current storage level (blue fill) as a percent of total 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 February 2006 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	44%	10,793.0	24,322.0
2. Lake Mead	59%	15,520.0	26,159.0
3. Lake Mohave	90%	1,626.1	1,810.0
4. Lake Havasu	88%	546.7	619.0
5. Show Low Lake	NO DATA REPORTED FOR FEBRUARY		5.1
6. Lyman Reservoir	27%	8.0	30.0
7. San Carlos	20%	173.5	875.0
8. Verde River System	43%	124.9	287.4
9. Salt River System	81%	1,649.0	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 2/28/06)

Source: National Water and Climate Center

New Mexico reservoir storage changed only slightly since last month. Statewide storage held steady at 41 percent of capacity. Most of the reservoirs on the Rio Grande rose slightly, from less than 1 percent to 3 percent, except for Heron, which declined by 3 percent of capacity. On the Pecos River, Lake Avalon and Brantley Reservoir rose by 8 percent and 7 percent of capacity, respectively, while Santa Rosa and Sumner fell by 4 percent and 7 percent of capacity, respectively. Navajo Reservoir on the San Juan River declined slightly, by 0.6 percent of capacity, while Conchas on the Canadian River held steady at 39 percent of capacity.

New Mexico's reservoir storage continues to be substantially better throughout most of the state than it was at this time last year, thanks to the abundant moisture and snowpack received during the wet winter and spring of 2004–05. The total reservoir storage is currently 78 percent of the long-term average, compared with only 55 percent of average a year ago. Like last month, most of the systems near the Colorado border are currently above average, including Navajo on the San Juan River, and El Vado, Abiquiu, and Costilla on the Rio Grande. On the Pecos River, Santa Rosa is also higher than average. In central and southern New Mexico the major storage systems all remain below the long-term average. Caballo and Elephant Butte on the lower Rio Grande are at 16 and 38 percent of average, respectively. Elephant Butte, the largest reservoir in the state with a total storage capacity of slightly more than two million acre-feet, is at only 24 percent of capacity.

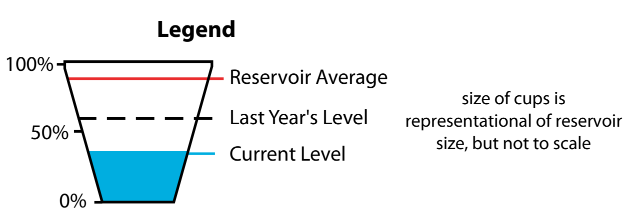
Notes:

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.

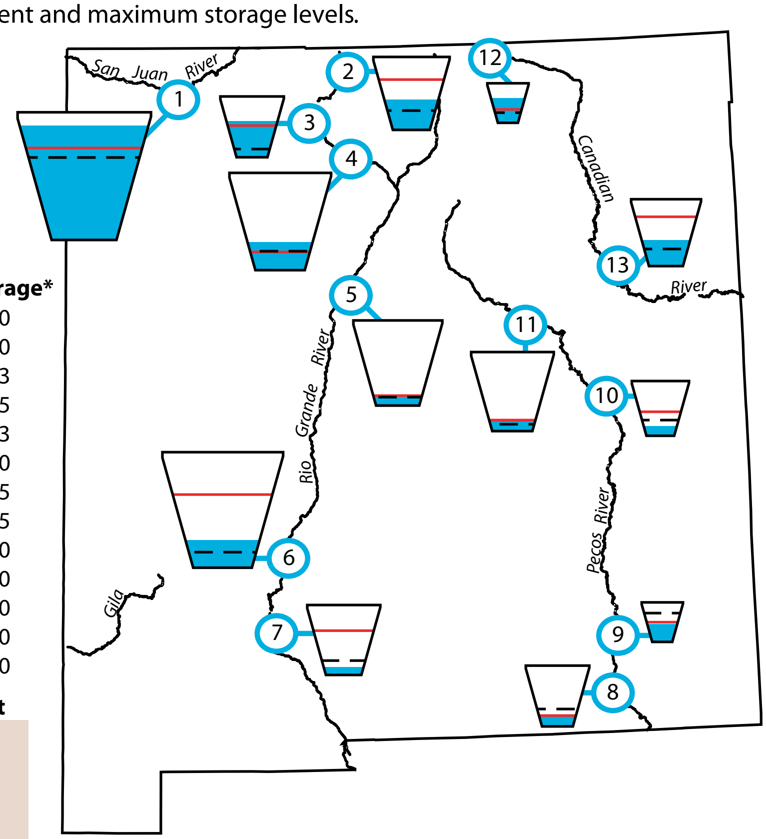
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resource Conservation Service. For additional information, contact Tom Pagano at the National Water Climate Center (tpagano@wcc.nrcs.usda.gov; 503-414-3010) 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 February 2006 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	89%	1,511.4	1,696.0
2. Heron	42%	167.0	400.0
3. El Vado	59%	109.8	186.3
4. Abiquiu	29%	159.2	554.5
5. Cochiti	10%	50.9	502.3
6. Elephant Butte	24%	492.2	2,065.0
7. Caballo	5%	18.0	331.5
8. Brantley	17%	25.2	147.5
9. Lake Avalon	45%	2.7	6.0
10. Sumner	17%	17.1	102.0
11. Santa Rosa	15%	66.2	447.0
12. Costilla	62%	9.9	16.0
13. Conchas	39%	99.2	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

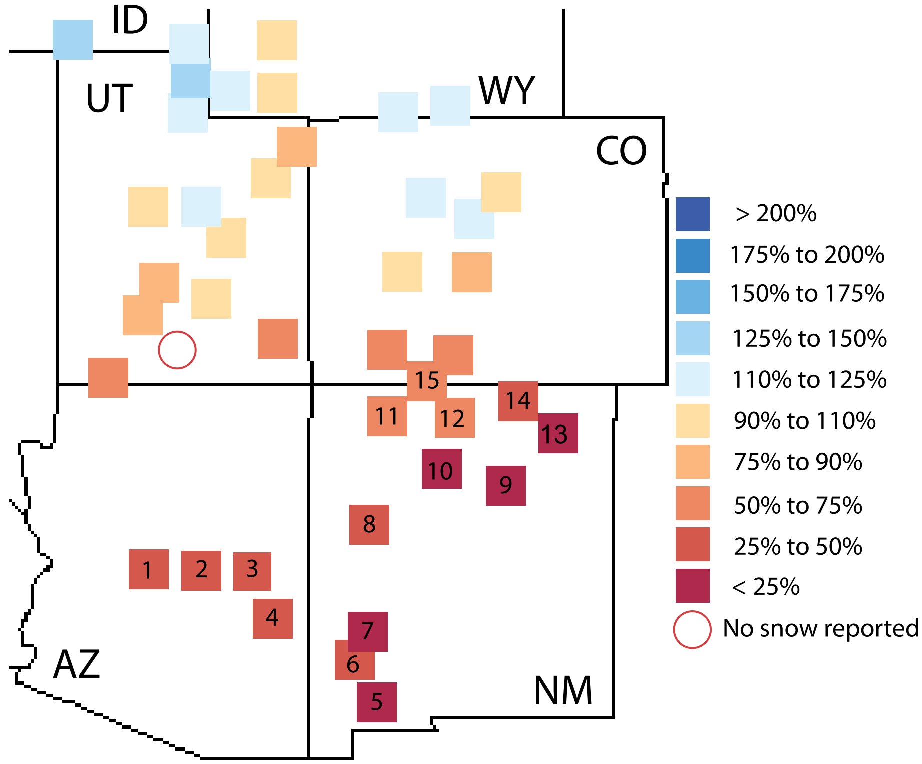
(updated 3/16/06)

Sources: National Water and Climate Center, Western Regional Climate Center

A winter storm system finally brought some much-needed snowfall to the Southwest on March 11–12. Moderate to heavy snowfall amounts covered parts of the Mogollon Rim and the high country of eastern Arizona and the western and northern mountains of New Mexico. Snow levels were as low as 2,000 feet in some areas, including some of the surrounding higher terrain in the Phoenix metro area, where crowds thronged to frolic in the rare event. The snowfall brought good news to Arizona and New Mexico ski resorts, which have been struggling with the lack of snow. Sunrise Park Resort in the White Mountains of Arizona and Arizona Snowbowl near Flagstaff both finally opened following the storm.

Despite the welcome precipitation, snowpack in the Southwest continues to be well below average throughout the region, with most SNOTEL sites in Arizona and New Mexico reporting less than 50 percent of average snow water content (SWC) as of March 16 (Figure 7). Some sites in northern New Mexico near the Colorado border are reporting 50–75 percent of average. The snow and rain from the weekend storm will likely delay the onset of the wildland fire season by a few weeks. But because of the ongoing La Niña conditions, which are historically associated with low snowfall in the Southwest from November through March, it is unlikely that snowpack levels will improve much more this late in the season.

Figure 7. Average snow water content (SWC) in percent of average for available monitoring sites as of March 16, 2006.



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) or snow water equivalent (SWE) 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 7 shows the SWC for selected river basins, based on SNOTEL sites in or near the basins, compared to the 1971–2000 average values. 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 color maps of SNOTEL basin snow water content, visit: http://www.wrcc.dri.edu/snotelanom/basinswe.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

Temperature Outlook

(April–September 2006)

Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC temperature outlook calls for above-average temperatures for the Southwest through September 2006 (Figures 8a–8d). The April–June outlook indicates an increased chance of warmer-than-average temperatures throughout the southern tier of states from California through the Southeast to the southern East Coast, and for increased chances for cooler-than-average temperatures in the Canadian border states from Washington into Minnesota (Figure 8a). The area with highest probabilities for above-average temperatures (greater than 50 percent) is centered over Arizona, New Mexico, and West Texas. As the outlook period progresses through late spring and summer into September, the area of greatest likelihood for warm temperatures (greater than 50 percent) shifts westward into western Arizona, Nevada, southern Utah, and parts of southeastern California.

Notes:

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

The NOAA-CPC outlooks are a 3-category forecast. As a starting point, the 1971–2000 climate record is divided into 3 categories, each with a 33.3 percent chance of occurring (i.e., equal chances, EC). The forecast indicates the likelihood of one of the extremes—above-average (A) or below-average (B)—with a corresponding adjustment to the other extreme category; the "average" category is preserved at 33.3 likelihood, unless the forecast is very strong.

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

Equal Chances (EC) indicates areas where the reliability (i.e., 'skill') of the forecast is poor; areas labeled EC suggest an equal likelihood of above-average, average, and below-average conditions, as a "default option" when forecast skill is poor.

Figure 8a. Long-lead national temperature forecast for April–June 2006.

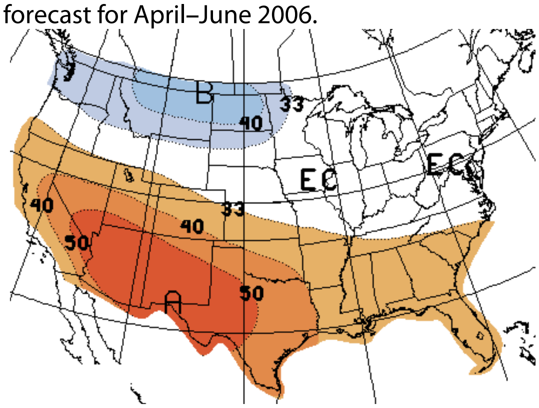


Figure 8b. Long-lead national temperature forecast for May–July 2006 .

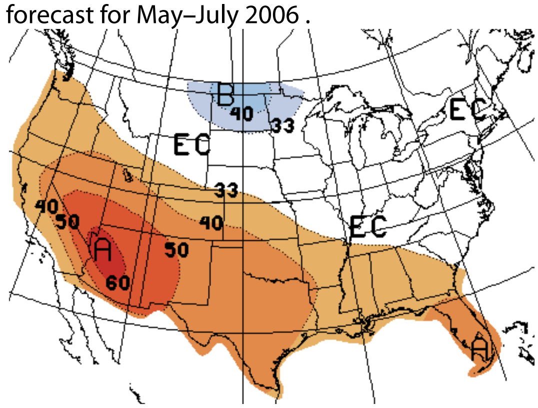


Figure 8c. Long-lead national temperature forecast for June–August 2006.

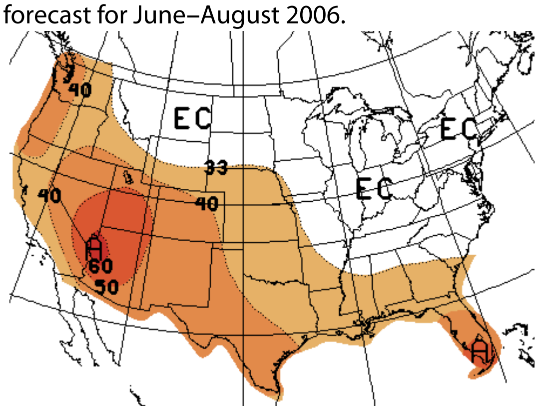
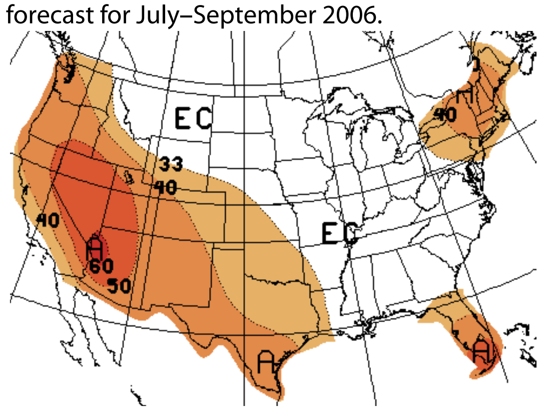


Figure 8d. Long-lead national temperature forecast for July–September 2006.



A= Above

- 60.0–69.9%
- 50.0–59.9%
- 40.0–49.9%
- 33.3–39.9%

B= Below

- 40.0–49.9%
- 33.3–39.9%

EC= Equal chances. No forecasted anomalies.

On the Web:

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

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

Precipitation Outlook
(April–September 2006)
Source: NOAA Climate Prediction Center (CPC)

The NOAA-CPC precipitation outlook for April–June 2006 is for below-average precipitation for much of the southern tier of states from New Mexico to the East Coast (Figure 9a). The areas of highest probability are centered over western Oklahoma and North Carolina. Wetter-than-average conditions are in the outlook for the northern states along the Canadian border from eastern Montana to Michigan. In the Southwest, most of New Mexico except for the far western part of the state is predicted to receive below-average precipitation. The outlook forecasts no anomolies (equal chances) for precipitation in Arizona and western New Mexico. The longer-lead forecasts, from May into September, call for increased chances of above-average precipitation for much of Arizona, and parts of southwestern New 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 9a. Long-lead national precipitation forecast for April–June 2006.

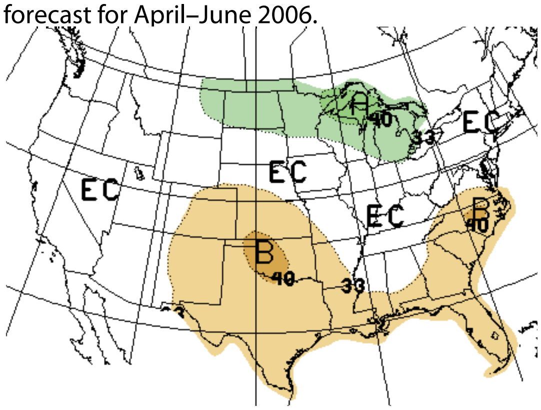


Figure 9b. Long-lead national precipitation forecast for May–July 2006.

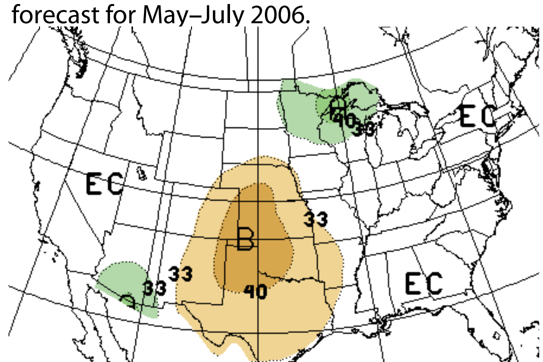


Figure 9c. Long-lead national precipitation forecast for June–August 2006.

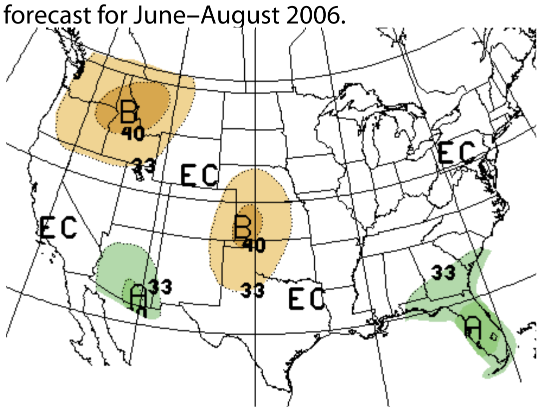
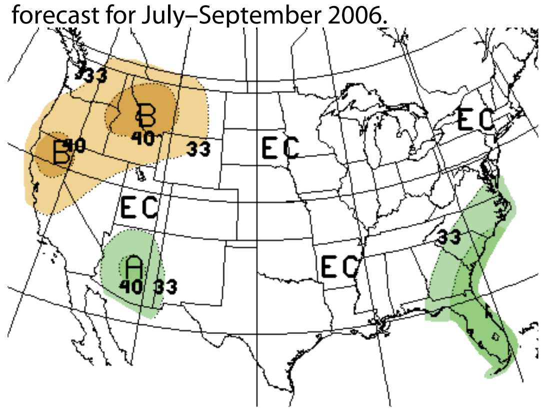


Figure 9d. Long-lead national precipitation forecast for July–September 2006.



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 June 2006)

Source: NOAA Climate Prediction Center (CPC)

The U.S. drought outlook through June 2006 calls for drought conditions to persist in most of New Mexico and Texas northward into Nebraska. The outlook calls for temporary improvement in drought conditions in Arizona and northwest New Mexico, followed by drought persistence (Figure 10).

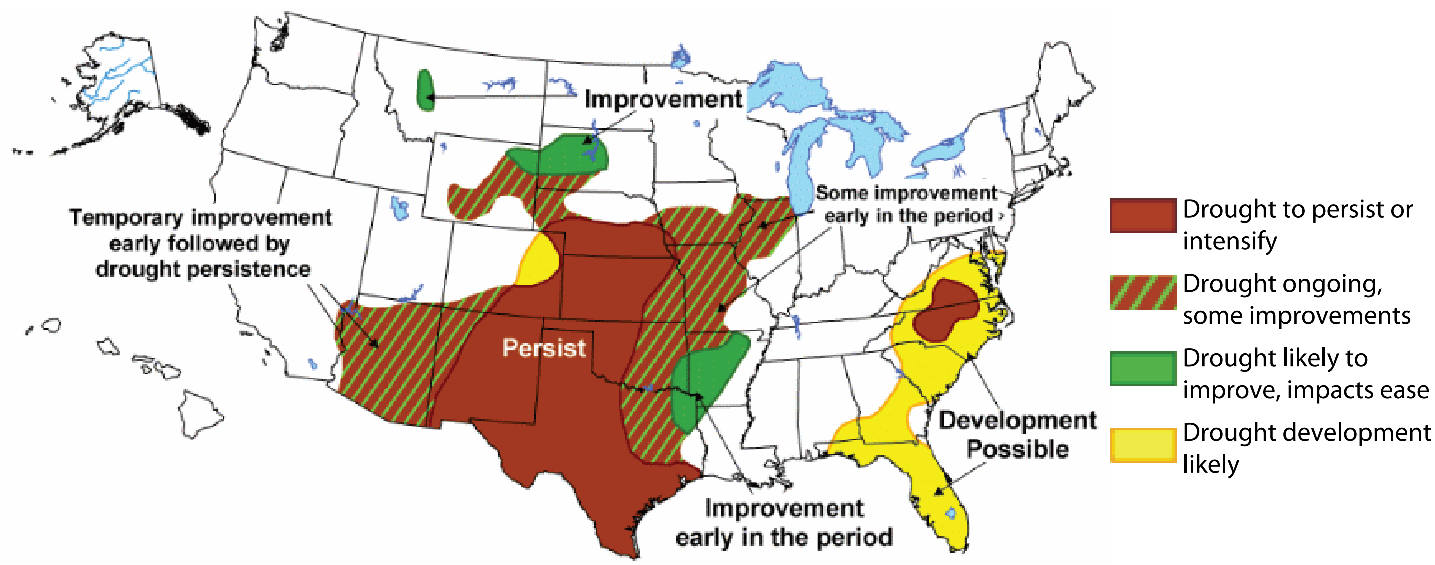
Rain and snow that fell in Arizona and northwest New Mexico in mid-March provided some temporary drought relief, but concurrent predictions for above-average temperatures in the Southwest and below-average precipitation in New Mexico spell the likelihood of continuing drought (see Figures 8–9). Elsewhere, drought is expected to persist from the Texas Gulf Coast northward through the Midwest into northern Illinois, following some improvement from east Texas into Illinois. Drought is likely to continue following some improvement in western Nebraska, and parts of Wyoming and southwestern South Dakota. Drought improvement is expected in western South Dakota and northeastern Wyoming, as well as in western Arkansas and adjacent parts of Oklahoma and Texas. Drought is likely to persist in North Carolina and southern Virginia, and drought development is possible along the Atlantic Coast states from Florida into Virginia and Maryland.

The persistence or intensification of drought conditions will likely contribute to elevated fire risks across the Southwest through the spring and into the summer season. According to the Southwest Coordination Center, fire danger through March is higher than average throughout the Southwest, particularly across southeast Arizona and the southeast half of New Mexico. There is an abundance of fine dead fuels across the region, mostly the result of the bumper grass crop produced by the wet winter and spring of 2004–05. Those grasses have since dried into a carpet of fine fuel that can carry fire easily and rapidly into the larger timber fuels.

Notes:

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

Figure 10. Seasonal drought outlook through June 2006 (release date March 16, 2006).



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 streamflow forecast for rivers in the Southwest is generally unchanged since last month. Well-below- average flows are forecast for the spring and summer in Arizona and New Mexico rivers (Figure 11), while flow on the Colorado River is expected to be near average. Despite snow and rain that fell in mid-March, snowpack levels continued to be well below average in all of the basins in New Mexico and Arizona, leading to streamflow forecasts of less than 50 percent of average for all of the Southwest's rivers. Many of the basins in Arizona and New Mexico are expected to produce only 16 to 40 percent of average streamflow. Streamflow is expected to be somewhat better but still well below average in the northern mountains of New Mexico (Figure 7), where there is slightly more snowpack. The situation is somewhat better along the Colorado River in Arizona. The snowpack in the Upper Colorado River Basin is generally near to above average for this time of year, and the inflow to Lake Powell is expected to be about 93 percent of average.

The continuing La Niña conditions in the Pacific makes it unlikely that Arizona or New Mexico will receive much more snow or rain over the next few months, increasing the probability of a very poor runoff season for the Southwest.

Much of the water in western rivers is from snowmelt, and because the snow season is just about finished for this year in Arizona and New Mexico, the two states are unlikely to see a change in the streamflow forecast. Also tied to the streamflow forecast are temperature and precipitation forecasts. The long-lead outlook for the Southwest is for continued above-average temperatures over the next few months. Subsequent measurement of these factors that influence runoff leads to improved streamflow forecasts later in the season. Therefore the Natural Resources Conservation Service, which produces the forecasts, cautions that early forecasts generally undergo greater changes than late-season forecasts.

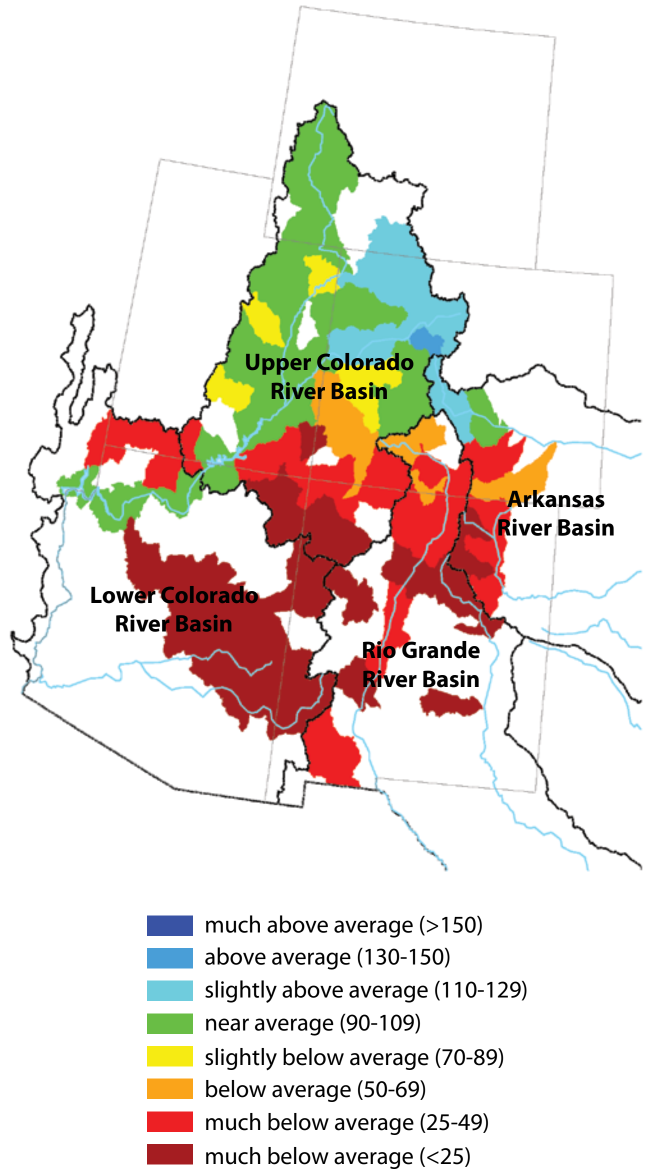
On the Web:

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

Figure 11. Spring and summer streamflow forecast as of March 1, 2006 (percent of average).



Notes:

The forecast information provided in Figure 11 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 11..

El Niño Status and Forecast

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

La Niña conditions are ongoing in the equatorial Pacific Ocean, according to the NOAA-CPC, and are expected to continue for the next three to six months. Sea surface temperatures are cooler than average by more than 0.5 degrees Celsius across most of the central equatorial Pacific Ocean, and persistent stronger-than-average low-level equatorial easterly winds continue to be observed over the central Pacific. The Southern Oscillation Index has shown a generally steady increase since last spring, and is now in the La Niña range (Figure 12a). According to experts at CPC and IRI, these and other conditions in the Pacific Ocean support the continuation of weak La Niña conditions in the tropical Pacific during the next few months. Probabilistic forecasts issued by the IRI predict that there is a 53 percent chance that La Niña conditions will continue through May 2006, after which there is an increasing probability of returning to ENSO-neutral conditions (Figure 12b). There is some variation among different ENSO model forecasts (not shown), but experts think that most of the evidence supports the continuation of La Niña conditions through May.

Historically, La Niña conditions tend to favor a northward shift of the jet stream over the eastern Pacific during the wintertime, with the mean jet position entering North America near the United States-Canadian border, rather than over California. As a result, the Southwest experiences less storminess and precipitation, and warmer-than-normal temperatures. Snowfall during La Niña winters from November through March in Arizona and New Mexico averages several inches less than during ENSO-neutral winters.

Notes:

Figure 12a shows the standardized three month running average values of the Southern Oscillation Index (SOI) from January 1980 through February 2006. 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 12b 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 12a. The standardized values of the Southern Oscillation Index from January 1980–February 2006. 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).

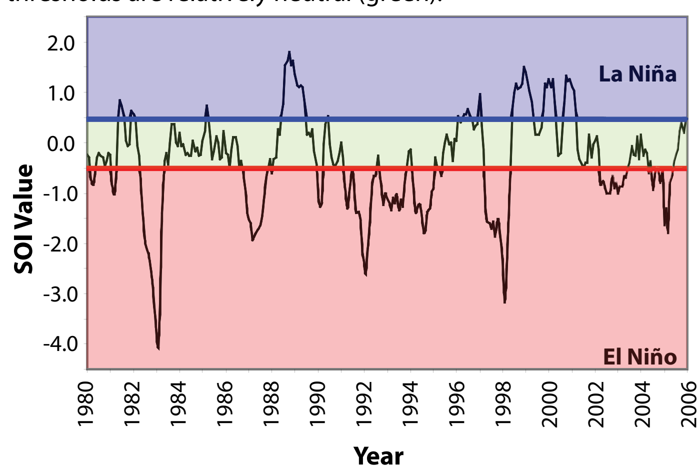
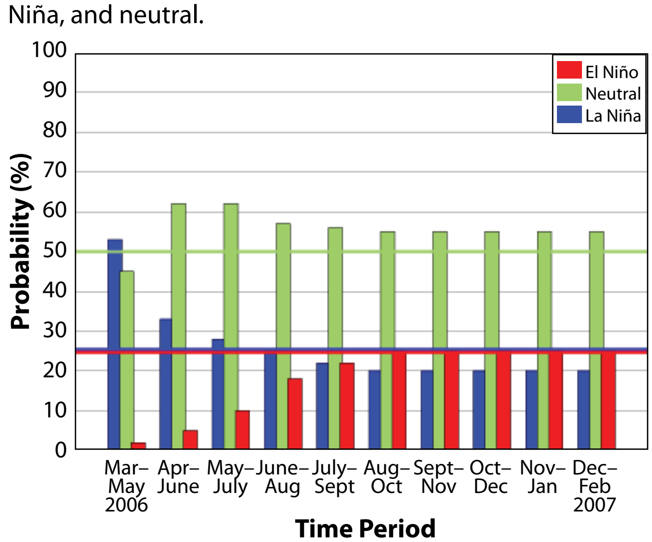


Figure 12b. IRI probabilistic ENSO forecast for El Niño 3.4 monitoring region (released March 16, 2006). Colored lines represent average historical probability of El Niño, La Niña, and neutral.



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/

Temperature Verification

(December 2005–February 2006)

Source: NOAA Climate Prediction Center (CPC)

The long-range outlook for December 2005–February 2006 from the NOAA-CPC predicted increased chances of above-average temperatures throughout the West and Midwest, from Texas to Canada. The areas of highest probability were over the Southwest, from Arizona through New Mexico to West Texas, and in a smaller area in the Midwest (Figure 13a). No temperature outlook was made for the rest of the country. Observed temperatures across most of the nation ranged from 0–8 degrees Fahrenheit above average, except for some scattered areas of 0–4 degrees F below average in the northwestern states and in the Florida peninsula. The warmest temperatures were in the Upper Midwest and West near the Canadian border, centered over the Dakotas. Temperatures in the Southwest ranged generally from 0–6 degrees F above average, with a few small areas of 0–2 degrees F below average. The forecast performed quite well in predicting the above-average temperatures across the West, although the placement of the major anomalies did not quite match the observed temperatures.

Figure 13a. Long-lead U.S. temperature forecast for December 2005–February 2006 (issued November 2005).

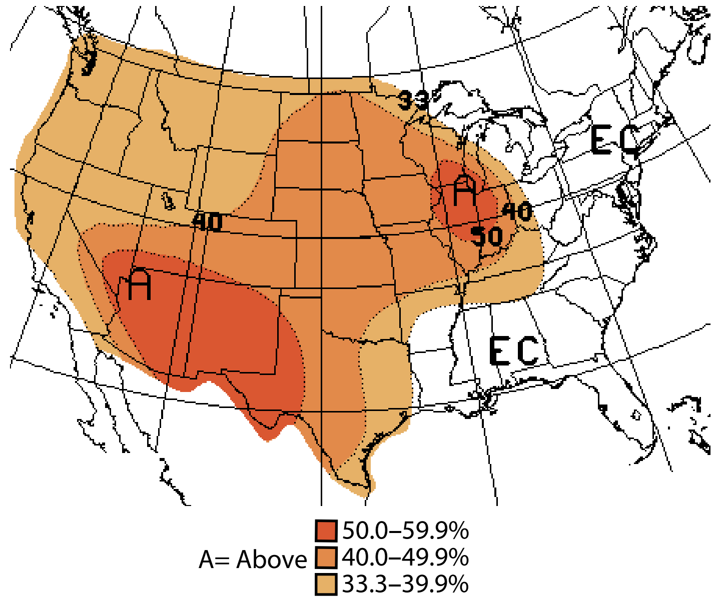
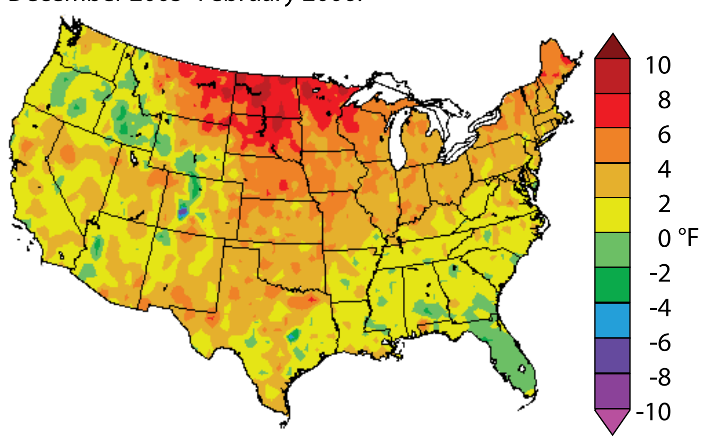


Figure 13b. Average temperature departure (in degrees F) for December 2005–February 2006.



Notes:

Figure 13a shows the NOAA Climate Prediction Center (CPC) temperature outlook for the months December 2005–February 2006. This forecast was made in November 2005.

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 13b shows the observed departure of temperature (degrees F) from the average for the December 2005–February 2006 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

(December 2005–February 2006)

Source: NOAA Climate Prediction Center (CPC)

The long-range outlook from the NOAA-CPC for December 2005–February 2006 predicted equal chances for above-average, near-average, or below-average precipitation across almost the entire nation except for parts of the far Southeast. Increased chances for below-average precipitation were predicted for the Florida peninsula and a narrow band along the eastern Gulf Coast and the southern Atlantic Coast. The highest probability was centered over central and northern Florida and southern Georgia (Figure 14a).

Observed precipitation all across the Southwest was much below average, particularly in central and southwestern Arizona, ranging generally from 0 to less than 25 percent of average. Precipitation across the country was generally below average in most of the southern tier, but generally above average in the Northwest, northern Florida, southern Georgia, and sections of Mississippi and Alabama (Figure 14b). The forecast performed fairly well in predicting dry conditions in the far Southeast, but did poorly in predicting dryness in northern Florida and southern Georgia, where the opposite conditions occurred.

Figure 14a. Long-lead U.S. precipitation forecast for December 2005–February 2006 (issued November 2005).

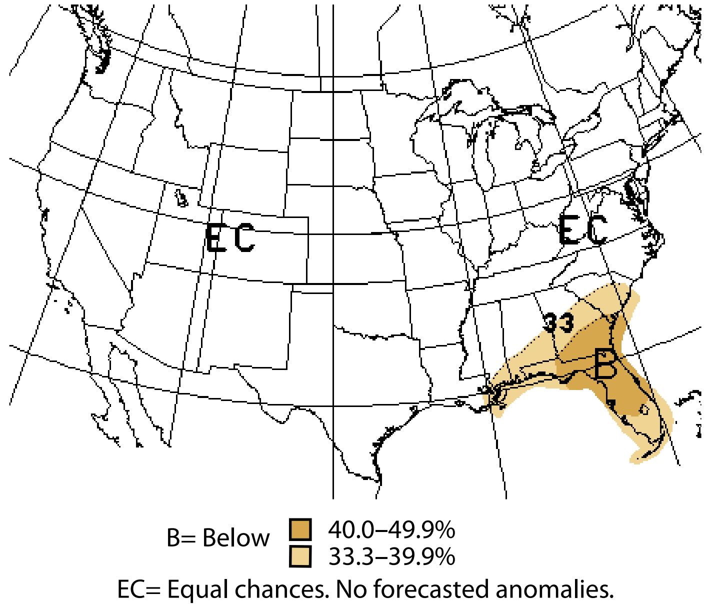
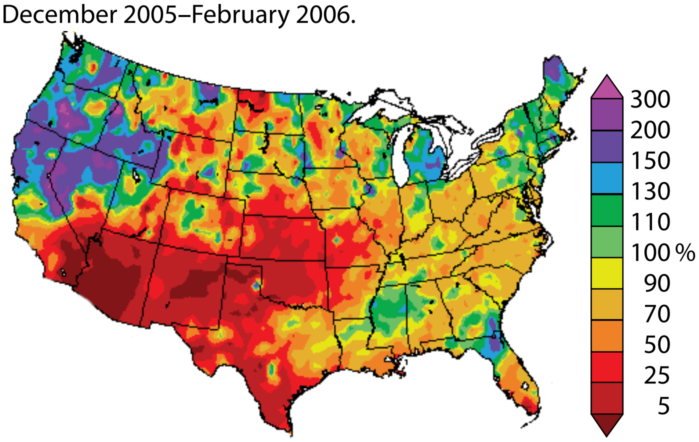


Figure 14b. Percent of average precipitation observed from December 2005–February 2006.



Notes:

Figure 14a shows the NOAA Climate Prediction Center (CPC) precipitation outlook for the months December 2005–February 2006. This forecast was made in November 2005.

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 14b shows the observed percent of average precipitation for December 2005–February 2006. 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