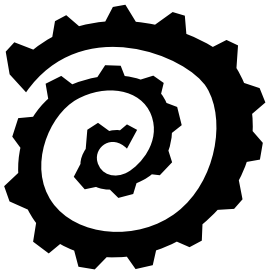

CLIMAS

# Southwest Climate Outlook

## Monthly Climate Packet
## July 2003

Climate Assessment for the Southwest
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# Section A

# BACKGROUND

CLIMAS
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The University of Arizona.

# Time of Transition for END InSight

We have renamed our monthly climate information packet; it is now called the CLIMAS Southwest Climate Outlook. This marks a change from the CLIMAS END InSight Initiative, a one-year experimental project that has been providing a monthly synthesis of climate information to decision makers in Arizona and New Mexico. This change reflects our long-term commitment to provide climate and drought information, interpretation of climate forecasts, and news about cutting edge research. During this transition, as we change personnel and incorporate insights and feedback from participants in the END InSight Initiative, the monthly climate information packets will contain less information, and for July and August will lack the newsletter and focus pages that accompanied the monthly END InSight packets.

We have made several changes to the monthly packets, based on feedback from users of the END InSight packets, as follows:

- *Recent Conditions: Temperature* – Figures 1c and 1d, previous 30 days departure from average temperature, are now being presented in both interpolated and individual station format (provided by the High Plains Regional Climate Center).

- *Recent Conditions: Precipitation* – Figures 2a-2d, water year and previous 30 days percent of average precipitation, are now being presented in both interpolated and individual station format (provided by the High Plains Regional Climate Center). We have discontinued the total precipitation maps.

- *Annual Precipitation Anomalies and Daily Event Totals* – Based on user requests, we have added these graphs (provided by NOAA) for individual locations in Arizona and New Mexico.

- We have discontinued the *PDSI Measures of Recent Conditions*. These maps were neither timely, nor did they provide important information to END InSight participants.

- We will resume the *Snowpack in the Southwestern United States* page following the first snowfall this autumn.

- We have condensed the *Multi-season Temperature and Precipitation Outlooks* by eliminating the monthly outlooks. Instead, we are including outlooks for the next four overlapping three-month seasons.

- We have eliminated the *Short-term Palmer Drought Severity Index Forecast.* We have retained the *U.S. Seasonal Drought Outlook,* and have added maps that portray the historical probability and amounts of precipitation necessary to end current drought conditions (provided by the National Climatic Data Center).

- We will resume the S*treamflow Forecast for Spring and Summer* in January 2004, when the USDA NRCS National Water and Climate Center begins forecasts for 2004.

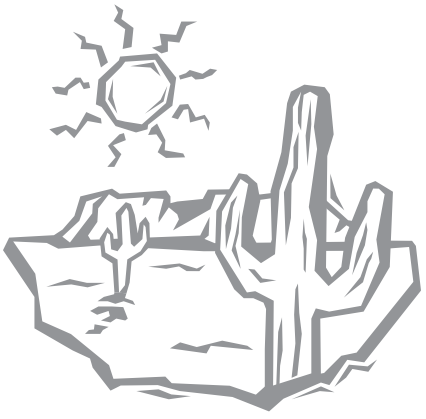
- In addition to the monthly *National Wildland Fire Outlook* from the National Interagency Coordination Center, we have added forecast information from the Southwest Coordination Center.

- We have eliminated the *U.S. Hazards Assessment Forecast.* END InSight participants found the assessment neither timely nor very valuable.

- We have changed the *Tropical Pacific Sea Surface Temperature Forecast* by eliminating Pacific Ocean sea surface temperature maps, which were seldom important for END InSight participants. In coming months, we plan to add other information about the state of El Niño-Southern Oscillation, which has such an important effect on Southwest winter climate.

In future months, we look forward to resuming our monthly newsletter articles and focus pages. We also look forward to continuing to receive your comments and suggestions, and to improving the information we provide.

– Gregg Garfin, Assistant
Staff Scientist, CLIMAS



# Monthly Climate Summary - July 2003

## Highlights

**Hydrological Drought –** Hydrological drought will continue to be a major concern for the Southwest during the upcoming months.

- Most New Mexico river basins remain in emergency drought status.
- Current storage has continued to decrease in many Arizona reservoirs.

**Precipitation** – Summer monsoon rainfall has arrived in parts of the Southwest. The monsoon arrived late, bringing lower than average precipitation thus far. On average, late monsoons bring lower than average summer total precipitation.

**Fire** – Fire danger is above average across all of Arizona and western New Mexico, especially at elevations lower than 8,500 feet. However, the arrival of summer monsoon rainfall will ease fire danger.

Range Conditions – New Mexico and Arizona continue to have the poorest range and pasture conditions (relative to state averages) in the United States.

**Temperature Forecasts** – Seasonal temperature forecasts indicate increased probabilities of above-average temperatures across Arizona and New Mexico until at least the end of 2003.

**ENSO** – Sea surface temperatures have increased in the central equatorial Pacific Ocean and ENSO conditions are now neutral. The chances of La Niña developing by the end of the year are less than 50%.



## The Bottom line

Hydrological drought will continue in the Southwest during the next several months.

- The **most likely scenario** is that summer rainfall will be near average. Summer rainfall tends to have minimal impact on reservoirs. Range and pasture conditions might benefit in some areas, most likely in the southern part of our region and in northern Mexico. Neutral-to-slightly cool (weak La Niña) equatorial Pacific Ocean temperatures will persist beyond the summer, resulting in slightly increased chances of below-average autumn precipitation. Enhanced erosion following fires is a concern during the summer.
- The **worst case scenario** is that summer monsoon precipitation is lower than average during a period when above-average temperatures persist. The aforementioned scenario will result in persistent extreme fire danger, high evaporation rates, and decreased reservoir and groundwater levels. CLIMAS research shows that summer rainfall has seldom ended severe sustained drought (see END InSight Newsletter, August 2002).
- The **best case scenario** is that in the short-term the Southwest will receive abundant and regular summer rainfall. Fire danger will ease, although the chances of severe erosion will be increased by monsoon storms. In the long-term, the best-case scenario is for neutral central and eastern Pacific Ocean temperature conditions to persist or for El Niño conditions to rebound later this year. The aforementioned scenario will increase the chances of above-average fall and winter precipitation. Reservoir and groundwater levels will be maintained at current levels or increase.

The climate products in this packet are available on the web as part of the Climate Assessment for the Southwest (CLIMAS) project's web site.

CLIMAS is the Southwest's one-stop resrource for climate information and forecasts.

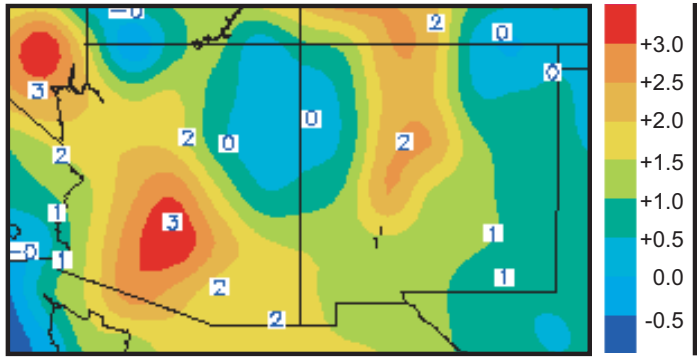
http://www.ispe.arizona.edu/climas/forecasts/swoutlook.html

# Section B

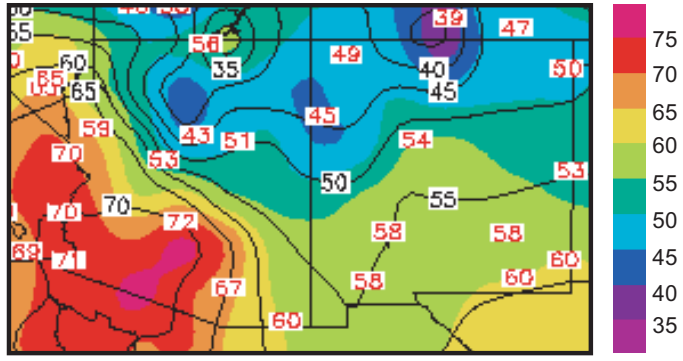
# RECENT CONDITIONS

# 1. Recent Conditions: Temperature (up to 07/20/03) ♦ Sources: WRCC, HPRCC

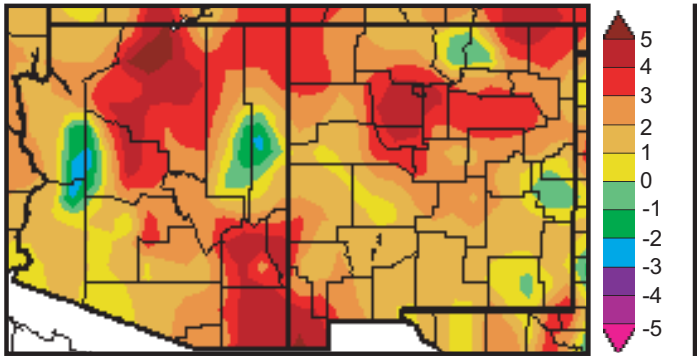
1a. Water year '02-'03 (through 7/19) departure from average temperature (ºF).



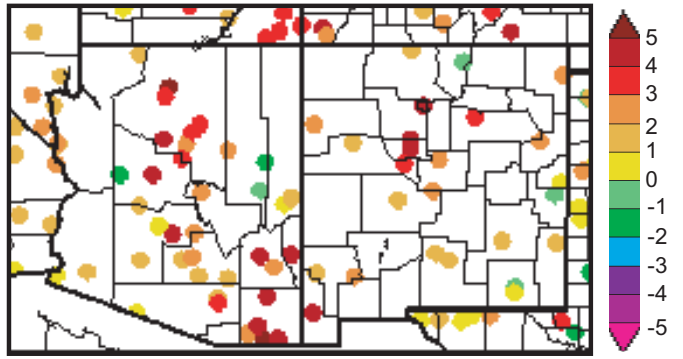

1b. Water year '02-'03 (through 7/19) average temperature (ºF).




1c. Previous 30 days (6/21-7/20) departure from average temperature (ºF, interpolated).




1d. Previous 30 days (6/21-7/20) departure from average temperature (ºF, data collection locations only).




**Highlights**: During the past month, temperatures have been above-average across much of Arizona and New Mexico. Eastern New Mexico has experienced slightly below-average temperatures (Figures 1c and 1d). Large parts of the region have been experiencing above-average temperatures since the water year began in October 2002 (Figures 1a and 1b). In particular, temperatures have been well above average in southern Arizona and central New Mexico. Analyses from the Western Regional Climate Center (not shown) indicate that above-average water year temperatures have been chiefly driven by high minimum (nighttime low) temperatures in southern Arizona and central New Mexico and high maximum (daytime high) temperatures in southeastern Arizona. The past 30 days have been characterized by very high minimum *and* maximum temperatures, especially in southern Arizona and southwestern and central New Mexico.

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

**Notes:**

The Water Year begins on October 1 and ends on September 30 of the following year. Water year more commonly is 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 arithmetic mean of annual data from 1971-2000. The data are in degrees Fahrenheit (°F).

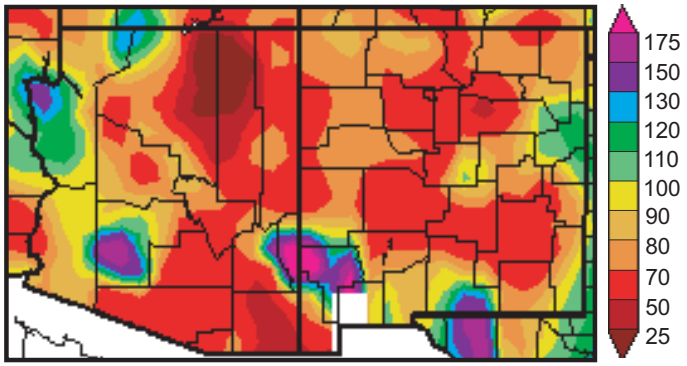
Departure from average temperature is calculated by subtracting current data from the average and can be positive or negative.

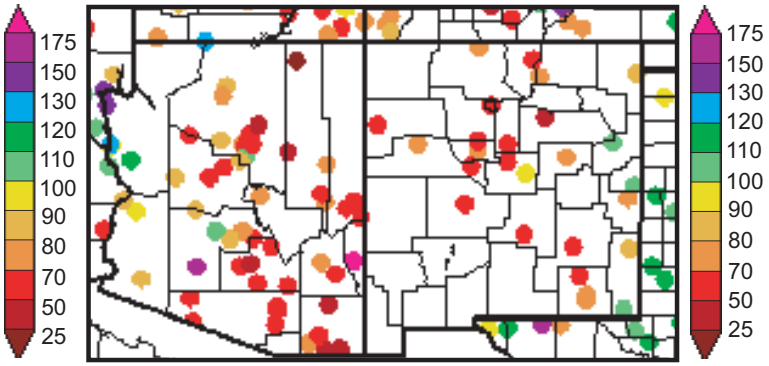
The continuous color maps (Figures 1a, 1b, 1c) are derived by taking measurements at individual meteorological stations and mathematically interpolating (estimating) values between known data points. The blue numbers in Figure 1a, the red numbers in Figure 1b, and the dots in Figure 1d show data values for individual stations.

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

# 2. Recent Conditions: Precipitation (up to 07/20/03) ♦ Source: High Plains Regional Climate Center

2a. Water year '02-'03 (through 7/20) percent of average precipitation (interpolated).



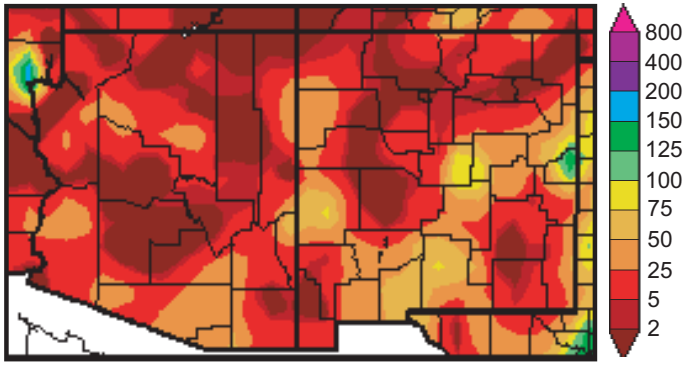


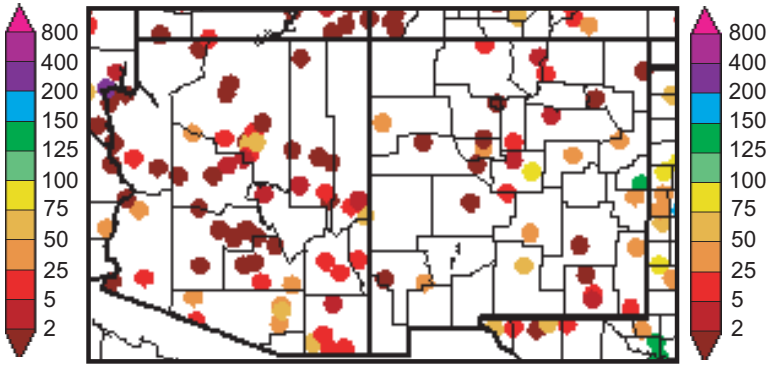

2b. Water year '02-'03 (through 7/20) percent of average precipitation (data collection locations only).






2c. Previous 30 days (6/21-7/20) percent of average precipitation (interpolated).






2d. Previous 30 days (6/21-7/20) percent of average precipitation (data collection locations only).






**Highlights**: Most of Arizona and New Mexico have received below-average precipitation since October 1, 2002 (Figures 2a and 2b). The east-central plains of New Mexico have received above-average precipitation, as have some individual stations in southern Arizona. Despite the arrival of summer *monsoon* precipitation, precipitation during the past 30 days has been below average for most of the Southwest. Warm and dry conditions have contributed to the increased number of wildfires occurring across the two states during the past month.

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

**Notes:**

The Water Year begins on October 1 and ends on September 30 of the following year. As of October 1, 2002 we are in the 2003 water year. The water year is a more hydro-logically 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.

These figures are experimental products from the High Plains Regional Climate Center (HPRCC).

# 3. Annual Precipitation Anomalies and Daily Event Totals ♦ Source: NOAA Climate Prediction Center

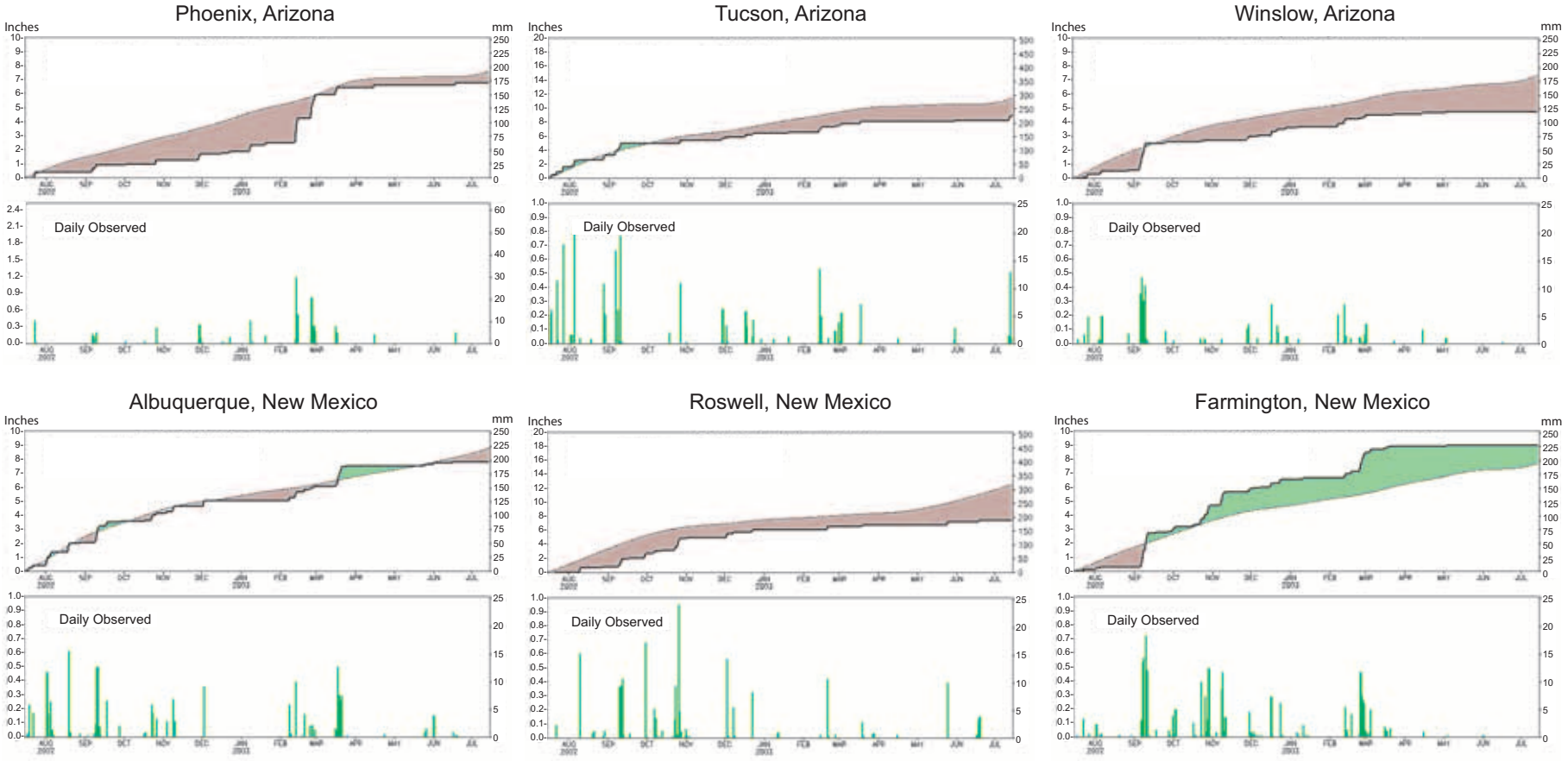
**Notes:** These graphs contrast how much precipitation actually has accumulated at each station over the past year (beginning on July 15, 2002) with how much precipitation typically is received, based on a long-term average (1971-2000) of daily precipitation.

The top of each of the pairs of graphs shows average (dotted line) and actual (solid line) accumulated precipitation (i.e., each day's precipitation total is added to the previous day's total for a 365-day period). If accumulated precipitation is below the long-term average, the region between the long-term average and the actual precipitation is shaded grey, and if accumulated precipitation is above the long-term average, the region between the actual precipitation and the long-term average precipitation is shaded green.

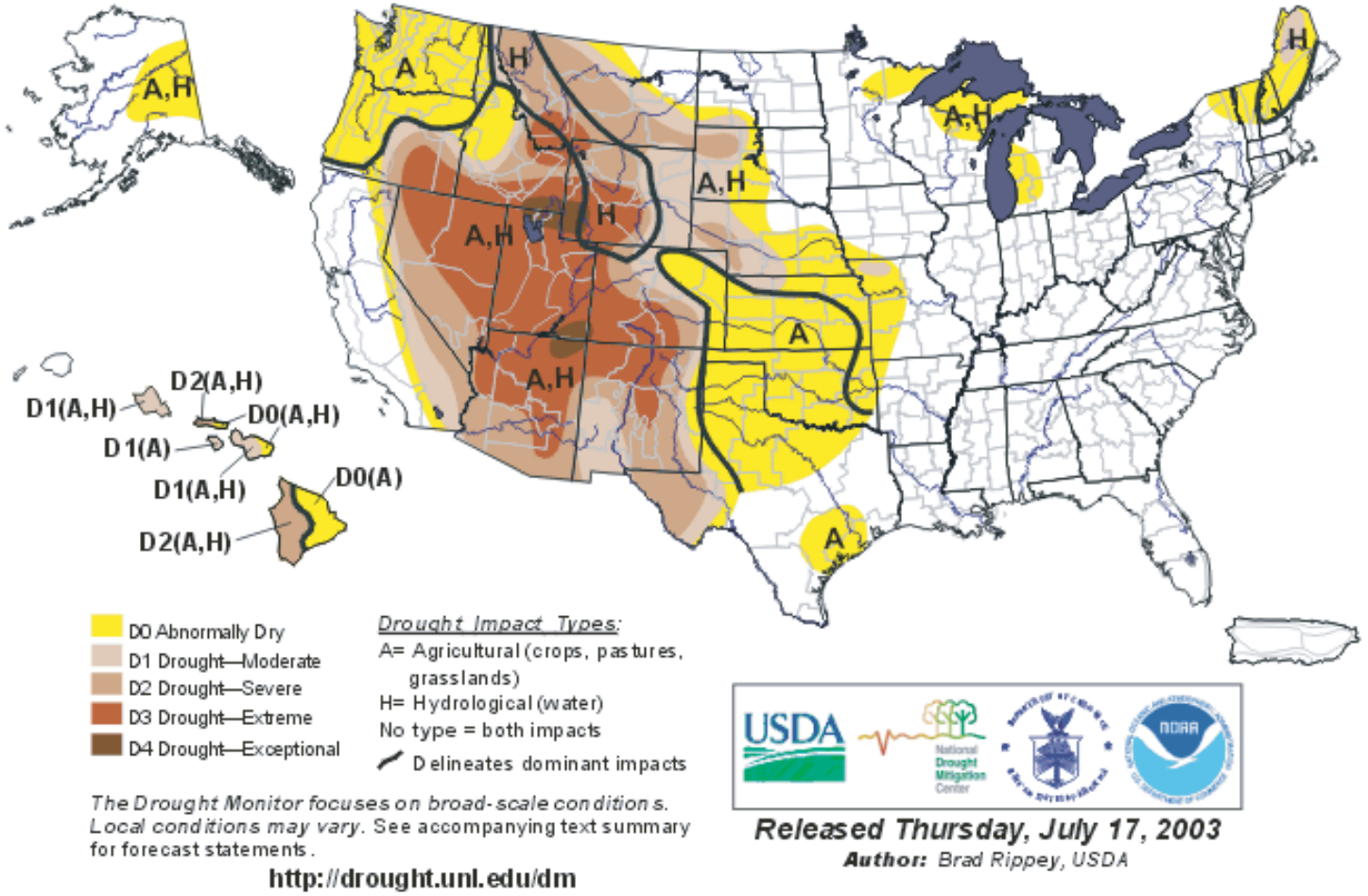
The green bars at the bottom of each of the pairs of graphs show the daily precipitation amounts (in both inches and millimeters) for the past year. Thus, one can get sense of how frequent and how intense individual precipitation *events* have been at the selected stations.

It is important to note that the scales for both the accumulated precipitation and the daily precipitation vary from station to station.

This type of graph is available for several other stations in Arizona and New Mexico as well as for many other places in the world. The graphs are updated daily by NOAA CPC at http://www.cpc.noaa.gov/products/global_monitoring/precipitation/global_precip_accum.html.



## 4. U.S. Drought Monitor (updated 07/15/03) ♦ Source: USDA, NDMC, NOAA




**Notes:**

The U.S. Drought Monitor is released weekly (every Thursday) and represents data collected through the previous Tuesday. This monitor was released on 07/17 and is based on data collected through 07/15 (as indicated in the title).

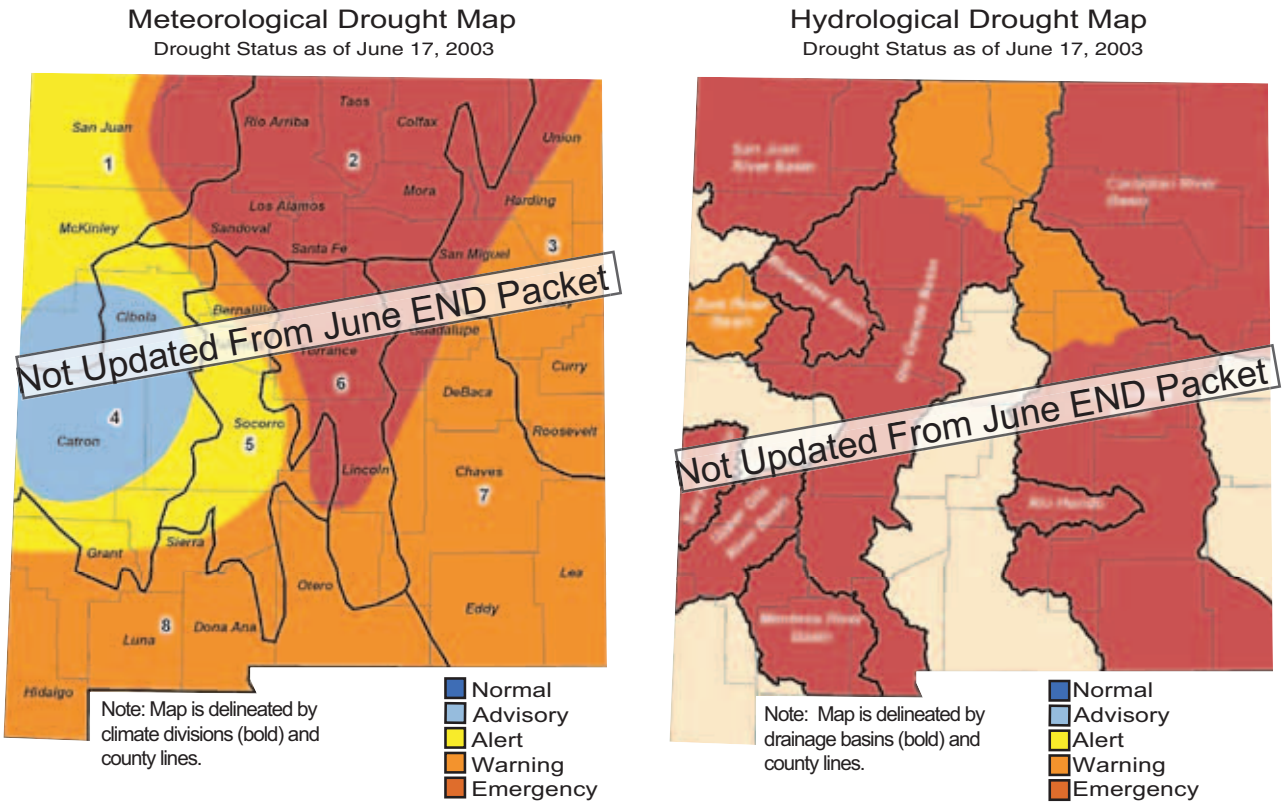
The best way to monitor drought trends is to pay a weekly visit to the U.S. Drought Monitor website (see left and below).

The U.S. Drought Monitor maps are based on expert assessment of variables including (but not limited to) PDSI, soil moisture, stream flow, precipitation, and measures of vegetation stress, as well as reports of drought impacts.

**Highlights**: Drought conditions have intensified over much of Arizona and New Mexico since late June 2003. Of particular note are the following: expansion of severe drought into southeastern Arizona and expansion of extreme drought throughout northern and central Arizona. Drought conditions have ameliorated somewhat in the eastern plains along the New Mexico-Texas border. Arizona and New Mexico continue to exhibit the poorest rangeland and pasture conditions in the United States. In Arizona, 57% of the state is in poor or very poor condition and only 16% is in good or excellent condition. In New Mexico, 68% is in poor or very poor condition and only 11% is in good or excellent condition. Irrigated crops, such as cotton and alfalfa, in both states were in mostly fair-to-good condition. Of special concern is the fact that 90% of New Mexico exhibits topsoil moisture that is *short to very short,* according to subjective reports from the USDA (NB – Similar information is not available for Arizona).

Animations of the current and past weekly drought monitor maps can be viewed at: http://www.drought.unl.edu/dm/monitor.html

# 5. Drought: Recent Drought Status for New Mexico (updated 06/17/03) ♦ Source: New Mexico NRCS

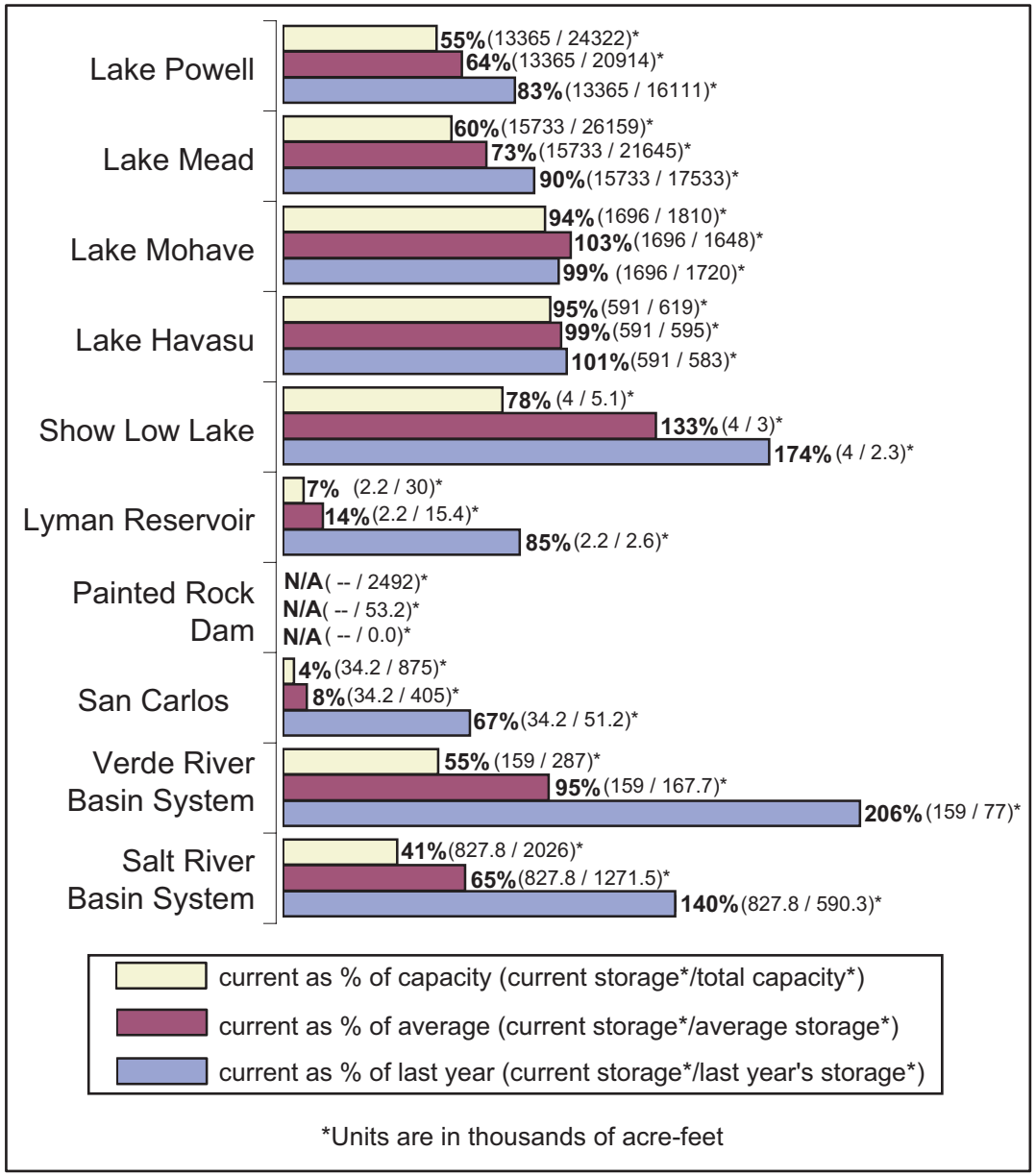



**Notes:** New Mexico drought status maps are updated by the New Mexico Natural Resource Conservation Service (NRCS) in conjunction with the New Mexico Drought Planning Team. As of April of 2003, drought status is mapped as short-term *meteorological* drought (left) and as long-term *hydrological* drought (right). In addition to the use of more than one map to represent drought conditions, the switch to two drought maps included changes in the *trigger mechanisms* used to determine drought status in New Mexico. These include a greater emphasis on hydrological drought measures. During the next year, expect the development of an Arizona drought status map from the recently created Arizona Drought Task Force.

**Highlights:** Although updated New Mexico drought status maps are not available at this time, the New Mexico Drought Monitoring Committee (NMDMC) reported slight improvement in drought status in the northeastern and central-eastern plains of New Mexico. The NMDMC expects summer thunderstorm activity to improve some aspects of drought between now and early September, but cautions that summer moisture is not likely to provide much help with replenishing large reservoir water supplies. The NMDMC notes that streamflow conditions (as of the end of June 2003) remained below average to significantly below average statewide.

The New Mexico maps (http://www.nm.nrcs.usda.gov/drought/drought.htm) are currently is produced monthly, but when near-normal conditions exist, they are updated quarterly. Information on Arizona drought can be found at: http://www.water.az.gov/gdtf/

# 6. Arizona Reservoir Levels (through the end of June 2003) ♦ Source: USDA NRCS




**Notes:** Reservoir reports are updated monthly and are provided by the National Water and Climate Center (NWCC) of the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS). 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

As of 07/14/03, Arizona's report had been updated through the end of June.

For additional information, contact Tom Pagano of the NWCC-NRCS-USDA (tpagano@wcc.nrcs.usda.gov; 503-414-3010) or Larry Martinez, NRCS, USDA, 3003 N. Central Ave, Suite 800, Phoenix, Arizona 85012-2945; 602-280-8841; Larry.Martinez@az.usda.gov)

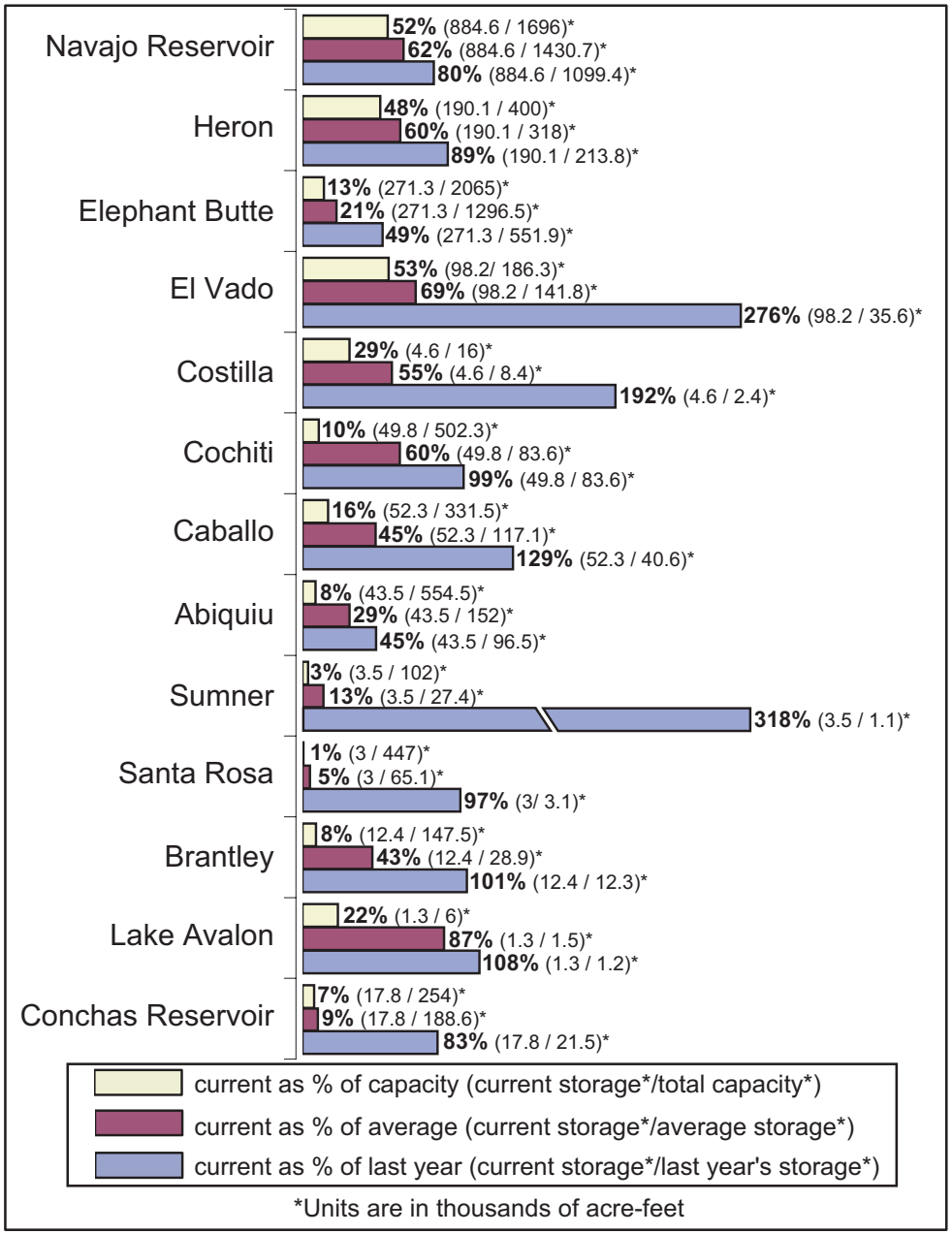
**Highlights**: Arizona reservoir levels held steady or decreased slightly since last month. Of particular note are decreases in current storage in the Verde and Salt River Basin Systems, San Carlos Reservoir, Show Low Lake, and Lyman Reservoir.

On July 8, 2003 Phoenix hosted the first of eight regional meetings to discuss issues raised by *Water 2025*, Interior Secretary Gale Norton's plan for preventing water crises and conflict (*Arizona Republic,* July 6, 2003). Issues of particular concern included growth demands on water supply, drought, agricultural water use, and legal issues.

The executive director of the Arizona Municipal Water Users Association said that rural Arizona towns such as Payson, Prescott, Sedona, and Williams were ripe for water conflict (*Albuquerque Journal,* July 8, 2003).

The U.S. Bureau of Reclamation stated that Imperial Valley, California farmers, who use most of the state's supply from the Colorado River, are wasting water and should have their allotment cut by 9% (275,900 acre-feet of water) (*New York Times,* July 4, 2003).

# 7. New Mexico Reservoir Levels (through the end of June 2003) ♦ Source: USDA NRCS




**Notes:** Reservoir reports are updated monthly and are provided by the National Water and Climate Center (NWCC) of the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS). Reports can be accessed at their website: (http://www.wcc.nrcs.usda.gov/wsf/reservoir/resv_rpt.html).

As of 07/14/03, New Mexico's report had been updated through the end of June.

For additional information, contact Tom Pagano of the NWCC-NRCS-USDA (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)

**Highlights**: Some New Mexico reservoir levels have declined since last month, while some northern New Mexico reservoir levels have increased. Of particular note are decreases in current storage at Caballo, Elephant Butte, Sumner, and Santa Rosa.

The New Mexico Drought Monitoring Committee reported that in most cases New Mexico streamflow volumes have decreased since May. The water year-to-date streamflow is *significantly* below average statewide, except for in the Rio Chama basin, which is merely below average.

The New Mexico Office of Emergency Management reported that the community of Alamo Navajo in Socorro County, New Mexico, experienced well failure in the community water system. The National Guard is currently hauling water to the community.

The New Mexico state engineer's office and the Interstate Stream Commission have initiated a series of public hearings to develop a state water plan. The statewide plan must be ready by November for New Mexico Governor Bill Richardson and state lawmakers (*Albuquerque Journal*, July 8, 2003).

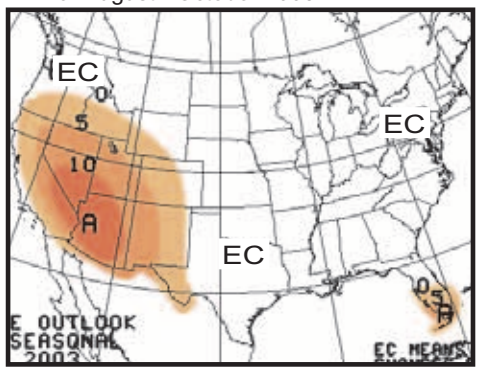
# Section C

# FORECASTS

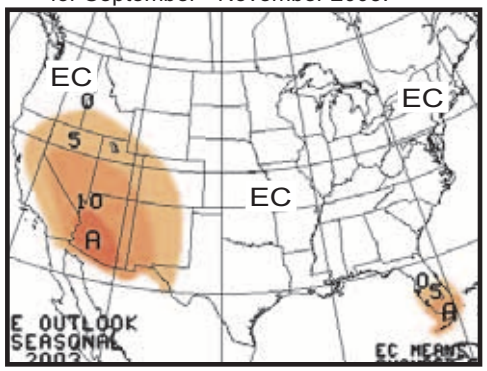
# 8. Temperature: Multi-season Outlooks ♦ Source: NOAA Climate Prediction Center

Overlapping 3-month long-lead temperature forecasts (released 07/17/03).

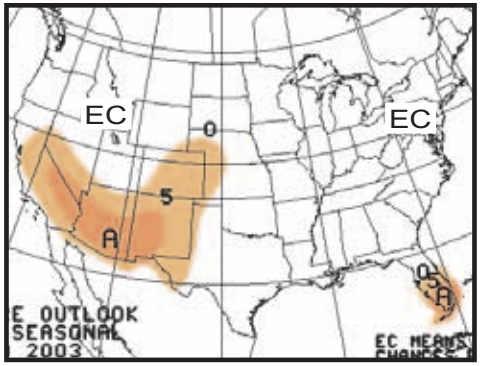
8a. Long-lead national temperature forecast for August - October 2003.



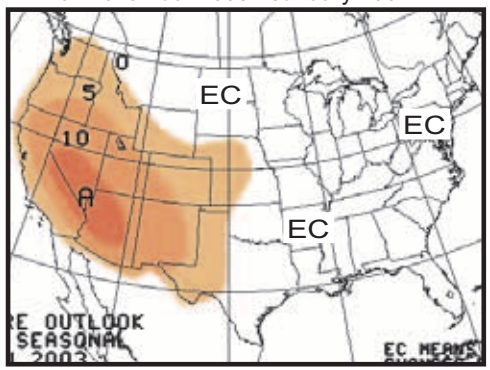

8b. Long-lead national temperature forecast for September - November 2003.




8c. Long-lead national temperature forecast for October - December 2003.




8d. Long-lead national temperature forecast for November 2003 - January 2004.




Percent Likelihood of Above and Below Average Temperatures*

10% - 20%
5% - 10%
0% - 5%
A = Above

*EC indicates no forecasted anomalies due to lack of model skill.

**Highlights**: The NOAA-CPC temperature outlooks for August 2003 through January 2004 forecast increased probabilities of above-average temperatures for most of the Southwest (Figures 10a-d). The maximum likelihood (43% to 53%) of above-average temperatures is centered over Arizona for most of the fall and early winter. The CPC predictions are based chiefly on indications from statistical models and historical impacts on the Southwest when equatorial Pacific Ocean temperatures are in either weak La Niña or ENSO-neutral conditions. Long-term temperature trends for the region also indicate continued above-average temperatures centered over the Southwest. IRI temperature forecasts (*not pictured)* also indicate increased probabilities of above-average temperature for parts of Mexico and the adjacent southwestern United States, especially southern New Mexico and eastern Arizona.

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

**Notes:**
The NOAA CPC (National Oceanic and Atmospheric Administration Climate Prediction Center) outlooks predict the "excess" 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.

In a situation where there is no forecast skill, one might look at *average* conditions in order to get an idea of what might happen. Using past climate as a guide to average conditions and dividing the past record into 3 categories, there is a 33.3% chance of above-average, a 33.3% chance of average, and a 33.3% chance of below-average temperature.

Thus, using the NOAA CPC excess likelihood forecast, in areas with light brown shading (0-5% excess likelihood of above average) there is a 33.3-38.3% chance of above-average, a 33.3% chance of average, and a 28.3-33.3% chance of below-average temperature.

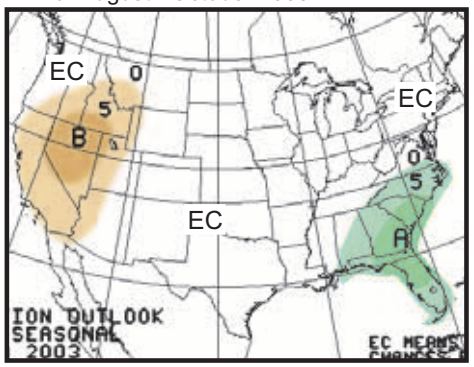
The term *average* refers to the 1971-2000 average. This practice is standard in the field of climatology.

Equal Chances (EC) indicates areas where reliability (i.e., the 'skill') of the forecast is poor and no anomaly prediction is offered.

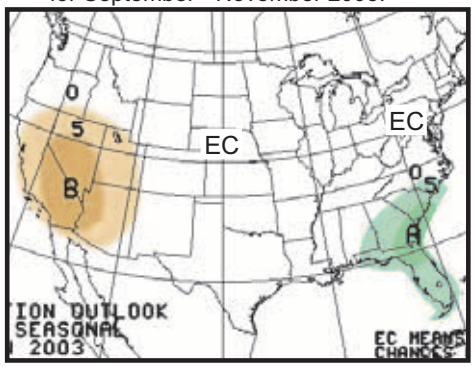
# 9. Precipitation: Multi-season Outlooks ♦ Source: NOAA Climate Prediction Center

Overlapping 3-month long-lead precipitation forcasts (released 07/17/03).

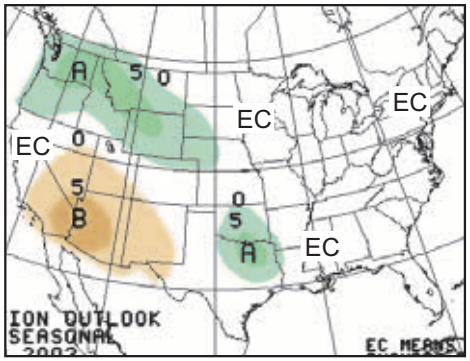
9a. Long-lead U.S. precipitation forecast for August - October 2003.



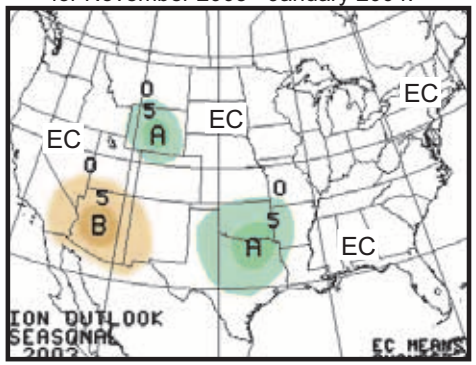

9b. Long-lead U.S. precipitation forecast for September - November 2003.




9c. Long-lead U.S. precipitation forecast for October - December 2003.




9d. Long-lead U.S. precipitation forecast for November 2003 - January 2004.




Percent Likelihood of Above or Below Average Precipitation*

5% - 10%
0% - 5%
A = Above

0% - 5%
5% - 10%
B = Below

*EC indicates no forecasted anomalies due to lack of model skill.

**Highlights**: NOAA-CPC forecasts for August 2003-January 2004 indicate slightly increased probabilities of below-average precipitation for the Southwest, centered over Arizona for the fall and early winter. Forecasters have withheld judgment with regard to late summer precipitation, due to conflicting indications about the summer monsoon, including the decreased likelihood of La Niña and the fact that the monsoon has started late. The August 2003-January 2004 IRI precipitation forecasts (*not pictured)* also indicate slightly increased probabilities of below-average precipitation for the Southwest, especially over western Arizona during the fall and southern Arizona and New Mexico during the early winter. NOAA CPC climate outlooks are released on Thursday, between the 15th and 21st of each month.

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

For more information about IRI experimental forecasts, visit:
http://iri.columbia.edu/climate/forecast/net_asmt/

**Notes:**
The NOAA CPC (National Oceanic and Atmospheric Administration Climate Prediction Center) outlooks predict the "excess" 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.

In a situation where there is no forecast skill, one might look at *average* conditions in order to get an idea of what might happen. Using past climate as a guide to average conditions and dividing the past record into 3 categories, there is a 33.3% chance of above-average, a 33.3% chance of average, and a 33.3% chance of below-average precipitation.

Thus, using the NOAA CPC excess likelihood forecast, in areas with light green shading (0-5% excess likelihood of above-average) there is a 33.3-38.3% chance of above-average, a 33.3% chance of average, and a 28.3-33.3% chance of below-average precipitation.

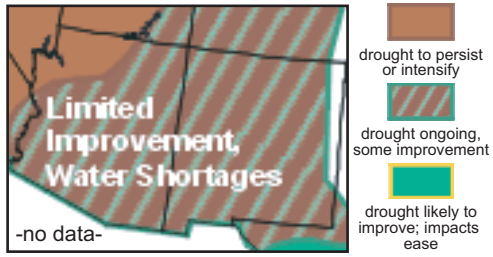
The term *average* refers to the 1971-2000 average. This practice is standard in the field of climatology.

Equal Chances (EC) indicates areas where reliability (i.e., the 'skill') of the forecast is poor and no anomaly prediction is offered.

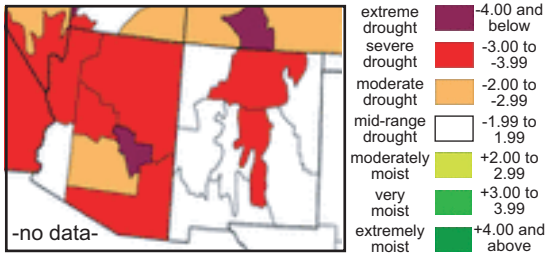
# 10. Drought: Seasonal Drought and PHDI Outlook Maps ♦ Sources: NOAA-CPC, NCDC

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

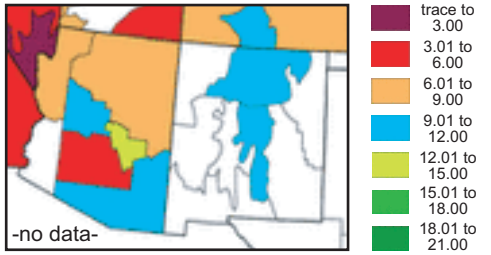
10a. Seasonal drought outlook through October 2003 (accessed 07/18).




10b. June 2003 PHDI conditions (accessed 07/18).



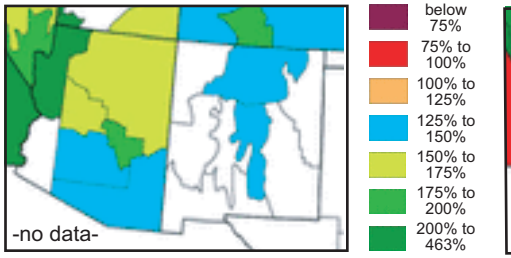

10c. Precipitation (in.) required to end current drought conditions in three months.



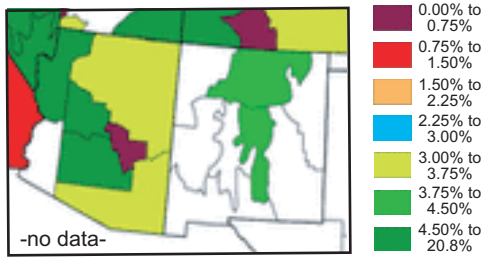

Figures 10b-e are based on the Palmer Hydrological Drought Index (PHDI), which reflects long-term precipitation deficits and is a measure of reservoir and groundwater level impacts, which take longer to develop and longer to recover. Figure 10b shows the current PHDI status for Arizona and New Mexico.

Figure 10c shows the amount of precipitation, in inches, needed over the next three months to change a region's PHDI status to -0.5 or greater—in other words, to end the drought. Regions shown in white have a current PHDI value greater than -0.5 (e.g., in Figure 10b, these regions are not in hydrological drought).

10d. Percent of average precipitation required to end current drought conditions in three months.




10e. Probability of receiving precipitation required to end current drought conditions in three months.



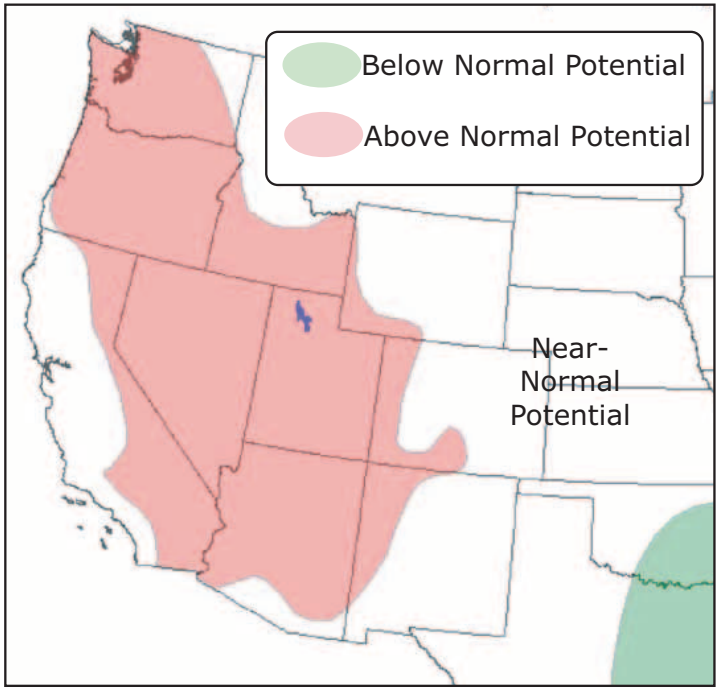

The season in which the precipitation falls greatly influences the amount of precipitation needed to end a drought. For example, during a typically wet season (such as the Southwest summer monsoon or the winter), more precipitation may be required to end a drought than during a typically dry season (such as the arid foresummer). Also, because soil moisture conditions generally are lower in the dry seasons, the precipitation needed to bring soil conditions back to normal may be less than that required to return soil moisture conditions to normal during a generally wetter season. Figure 10d shows the percent of average precipitation, based on regional precipitation records from 1961–1990, that is needed to end drought conditions in three months.

Figures 10c and 10d do not give an indication of the probability of receiving enough precipitation to end drought in three months. A region that typically experiences extreme precipitation events during the summer, for example, may be more likely to receive enough rain to end a drought than a region that typically is dry during the same season. The seasons with the greatest probability of receiving substantially more precipitation than average are those subject to more extreme precipitation events (such as hurricane-related rainfall), not necessarily those seasons that normally receive the greatest amounts of precipitation. Figure 10e shows the probability, based on historical precipitation patterns, of regions in Arizona and New Mexico receiving enough precipitation in the next three months to end the drought. Note that these probabilities **do not** take into account atmospheric and climatic variability (such as El Niño-Southern Oscillation), which also influence seasonal precipitation probabilities in the Southwest.

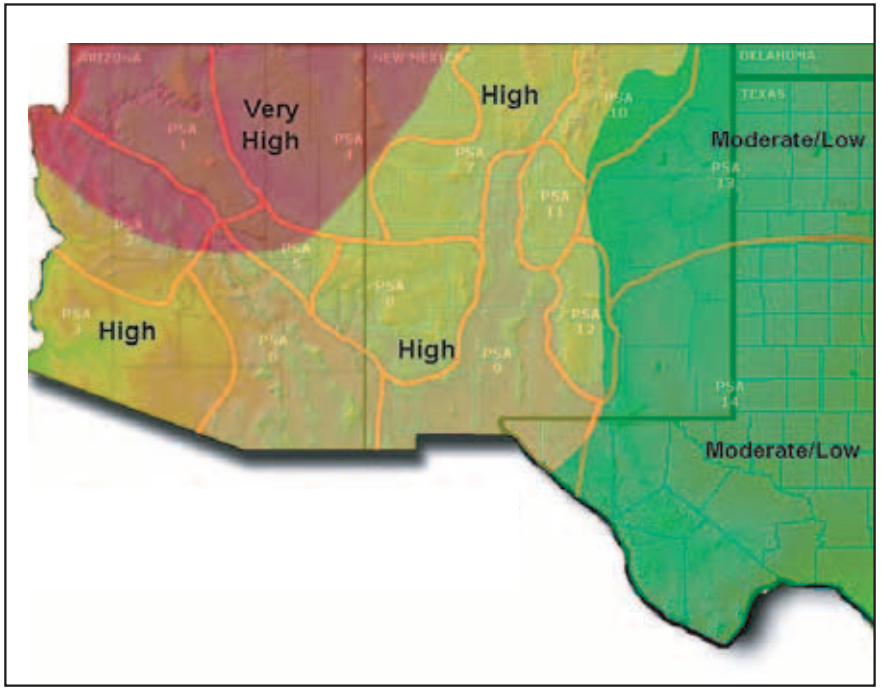
For more information, visit: http://www.drought.noaa.gov/ —and— http://www.ncdc.noaa.gov/oa/climate/research/drought/drought.html

# 11. National Wildland Fire Outlook ♦ Sources: NICC, SWCC

11a. Monthly Wildfire Outlook (valid July 1 - July 31)




11b. Weekly Fire Danger Outlook, July 18 - July 27, 2003



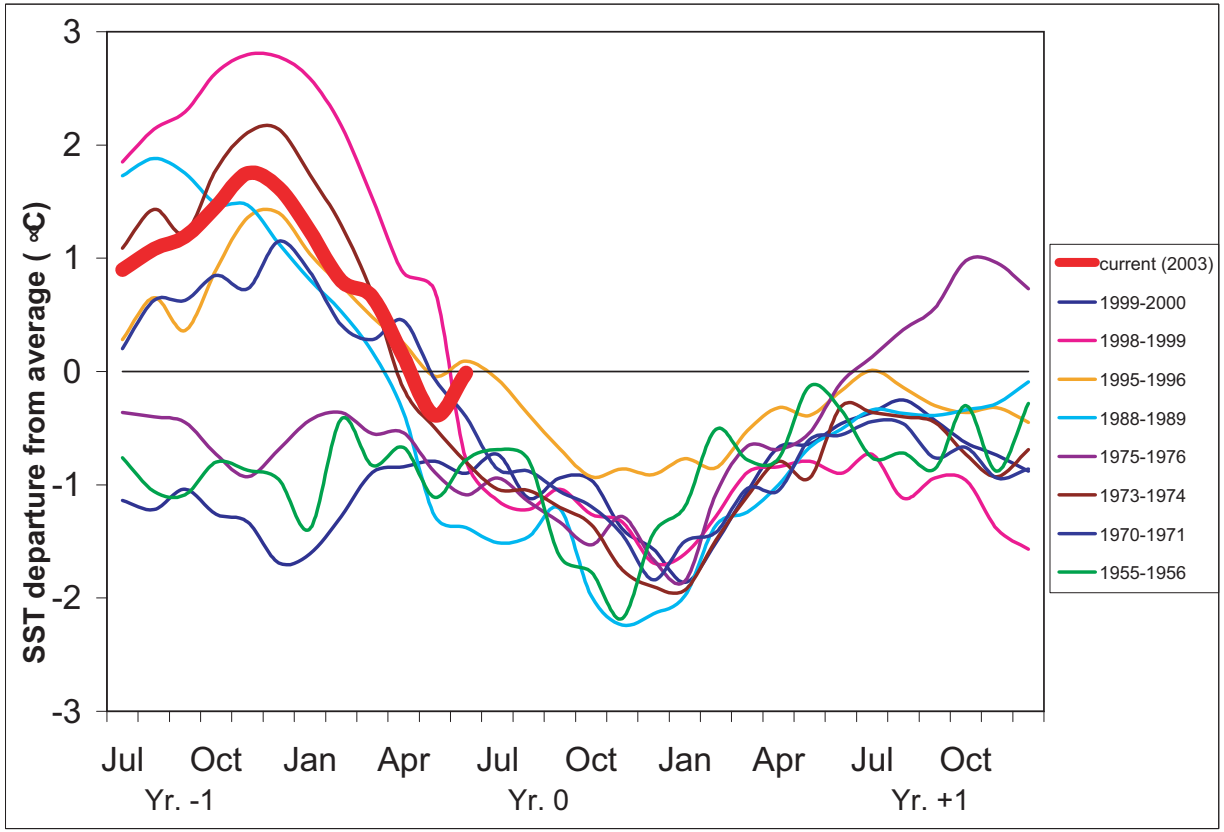

**Notes:** The National Interagency Coordination Center (NICC) at the National Interagency Fire Center (NIFC) produces seasonal and monthly (Figure 11a) wildland fire outlooks. These forecasts consider climate forecasts and surface-fuels conditions to assess fire potential. They are subjective assessments, based on synthesis of regional fire danger outlooks. The Southwest Coordination Center (SWCC) produces seasonal, monthly, weekly (Figure 11b), and daily fire danger outlooks for Arizona, New Mexico, and West Texas, based on climate and weather forecasts, comparisons with historical data, and surface fuels reports. The weekly fire danger outlook (Figure 11b) shows more specific information than the monthly outlook (Figure 11a). It is provided by CLIMAS for Southwest decision makers, in order to indicate the availability of this product at the SWCC website (below).

**Highlights**: The July 1-31, 2003 NICC wildfire outlook is for above normal fire potential for most of Arizona and western New Mexico. The July SWCC forecast (*not pictured*) attributed above-average fire potential to the increased likelihood of above-average temperatures (see page 8), combined with the effects of long-term drought. Above-average fire and firefighting resource use potential is expected mainly at elevations below 8,500 feet. As of July 23, 2003, more than 250,000 acres have burned in Arizona and New Mexico. On average, approximately 230,000 acres burn in Arizona, New Mexico, and West Texas by the end of June. According to the National Weather Service Albuquerque forecast office, summer monsoon precipitation is expected to ease fire danger in western New Mexico. The Southwest area is currently at Preparedness Level IV, with the potential for fire activity to place large demands on Southwest Area and National firefighting resources.

For more detailed discussions, visit the National Wildland Fire Outlook web page: http://www.nifc.gov/news/nicc.html
and the Southwest Area Wildland Fire Operations (SWCC) web page: http://www.fs.fed.us/r3/fire/ (click on Predictive Services > Outlooks)

# 12. Tropical Pacific Sea Surface Temperature Forecast ♦ Sources: CPC, IRI

12. Current (red) and past La Niña event sea surface temperature anomalies (ºC) for the Niño 3.4 monitoring region of the equatorial Pacific ocean.




**Notes:** The graph (Figure 17) shows sea-surface temperature (SST) departures from the long-term average for the Niño 3.4 region in the central-eastern equatorial Pacific Ocean. SSTs in this region are a sensitive indicator of ENSO conditions.

Each line on the graph represents SST departures for previous La Niña events, beginning with the year before the event began (Yr. –1), continuing through the event year (Yr. 0), and into the decay of the event during the subsequent year (Yr. +1).

The most recent SST departures are plotted as a thick red line. The magnitude of the SST departure, its timing during the seasonal cycle, and its exact location in the equatorial Pacific Ocean are some of the factors that determine the degree of impacts experienced in the Southwest.

**Highlights**: Central and eastern equatorial Pacific Ocean sea-surface (SST) and subsurface temperatures increased during June, *reversing* the strong SST trend toward a developing La Niña episode. Conditions are currently near-average. The return to near-average conditions is a result of a late-spring/early-summer westerly wind event (the type usually associated with El Niño) stretching across nearly the entire Pacific Ocean basin. The International Research Institute for Climate Prediction (IRI) estimates that there is a 30% likelihood that La Niña conditions will develop by the end of 2003. The IRI forecasts a 52% likelihood of ENSO-neutral conditions and an 18% likelihood of El Niño conditions. NOAA's Climate Prediction Center (CPC) notes that most forecast models project the development of weak La Niña or ENSO-neutral conditions. Near-neutral conditions in the equatorial and tropical Pacific Ocean introduce considerable uncertainty with regard to long-range climate forecasts.

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 the graphics found on this page, visit: http://iri.columbia.edu/climate/ENSO/