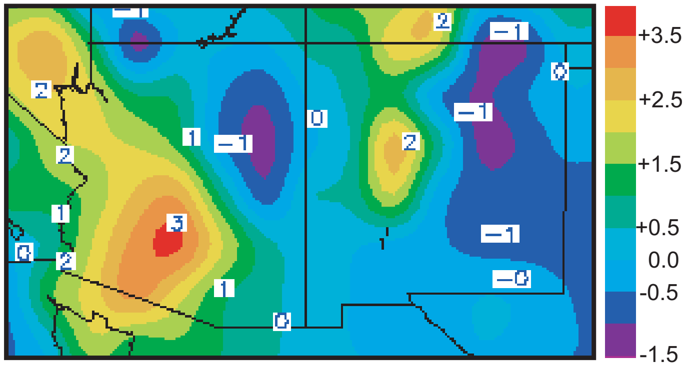
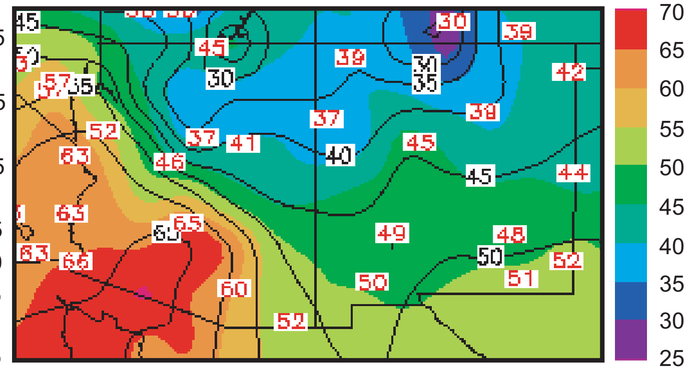
1. Recent Conditions: Temperature (up to 01/20/03) ♦ Source: Western Regional Climate Center

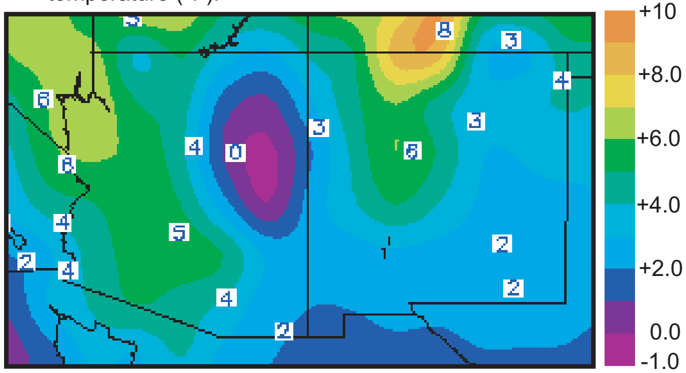
1a. Water year '02-'03 (through 01/20) departure from average temperature (°F).



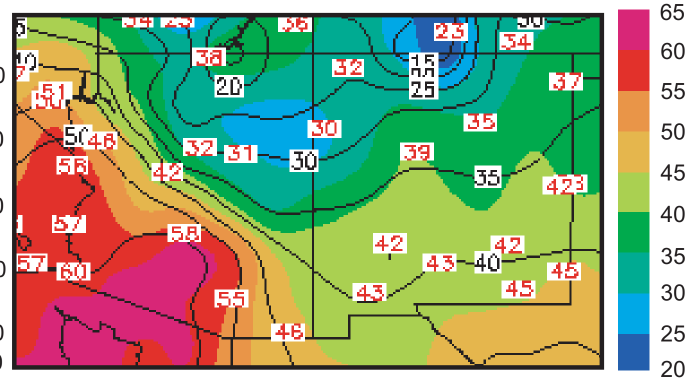
1b. Water year '02-'03 (through 01/20) average temperature (°F).



1c. Previous 28 days (12/24 - 01/20) departure from average temperature (°F).



1d. Previous 28 days (12/24 - 01/20) average temperature (°F).



Highlights: Temperatures since October 1, 2002 (Figures 1a and 1b) have been above the 1971-2000 average for western Arizona and central New Mexico, but average-to-below average elsewhere in our region. Eastern New Mexico temperatures have been below average, due chiefly to lower than average maximum temperatures.With the exception of northeastern Arizona and northeastern New Mexico, minimum temperatures have been above average throughout our region since October 1. The previous 28 days (Figures 1c and 1d) have exhibited mostly above-average temperatures across the Southwest. During the previous 28 days, minimum temperatures have mostly been above average, especially in western Arizona and north-central New Mexico.

For these and other temperature maps, visit: http://www.wrcc.dri.edu/recent_climate.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. As of October 1, we are in the 2003 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 arithmetic mean of annual data from 1971-2000.

The data are in degrees Fahrenheit (°F).

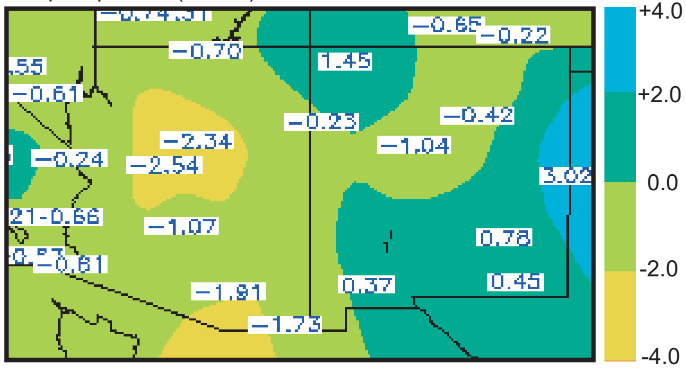
Departure from average temperature is calculated by subtracting current data from the average and can be positive or negative.

These maps are derived by taking measurements at meteorological stations (at airports) and estimating a continuous map surface based on the values of the measurements and a mathematical algorithm. This process of estimation is also called spatial interpolation.

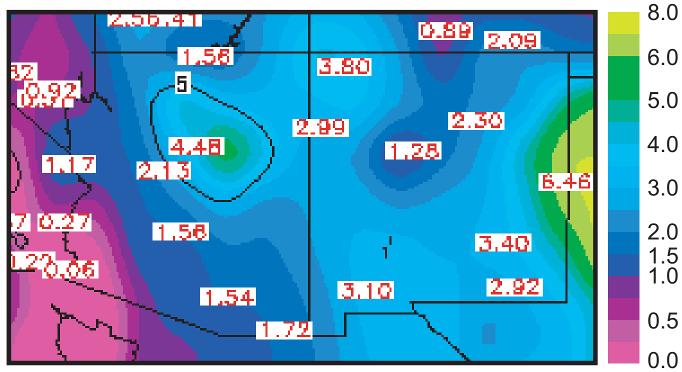
The red and blue numbers shown on the maps represent individual stations. The contour lines and black numbers show average temperatures.

2. Recent Conditions: Precipitation (up to 01/20/03) ♦ Source: Western Regional Climate Center

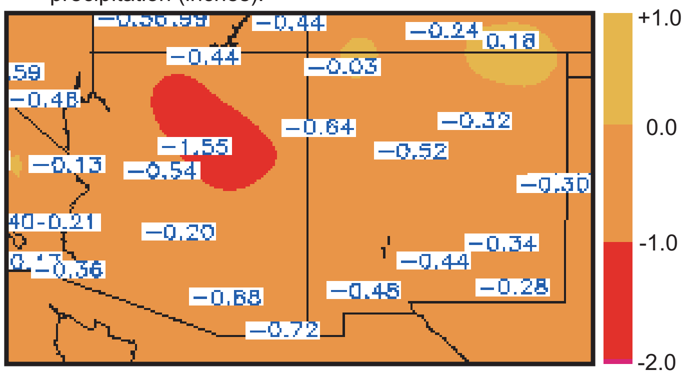
2a. Water year '02-'03 (through 01/20) departure from average precipitation (inches).



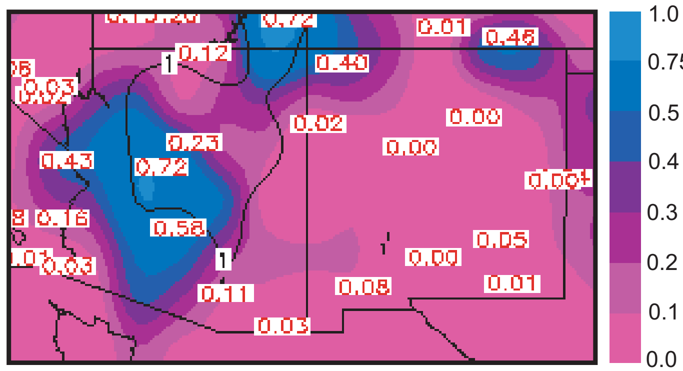
2b. Water year '02-'03 (through 01/20) total precipitation (inches).



2c. Previous 28 days (12/24 - 01/20) departure from average precipitation (inches).



2d. Previous 28 days (12/24 - 01/20) total precipitation (inches).



Highlights: Eastern New Mexico and the Four Corners area have received above average precipitation since October 1, 2002. Water year precipitation for most of our region, however, has been below average – notably so during the past 28 days. High-elevation locations in Arizona and New Mexico have received some snow. Some locations in northeastern New Mexico have received above average snow for this time of year. Historical El Niño precipitation patterns show generally below-average January precipitation in the Southwest; however, weak El Niño events have brought above-average January precipitation to Arizona. The present, moderate, El Niño has clearly left much of our region *high and dry* this January.

For these and other precipitation maps, visit: http://www.wrcc.dri.edu/recent_climate.html

For National Climatic Data Center monthly and weekly precipitation and drought reports for Arizona, New Mexico and the Southwest region, visit: http://lwf.ncdc.noaa.gov/oa/climate/research/2002/perspectives.html

Notes:

The Water Year begins on October 1 and ends on September 30 of the following year. As of October 1, we are in the 2003 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.

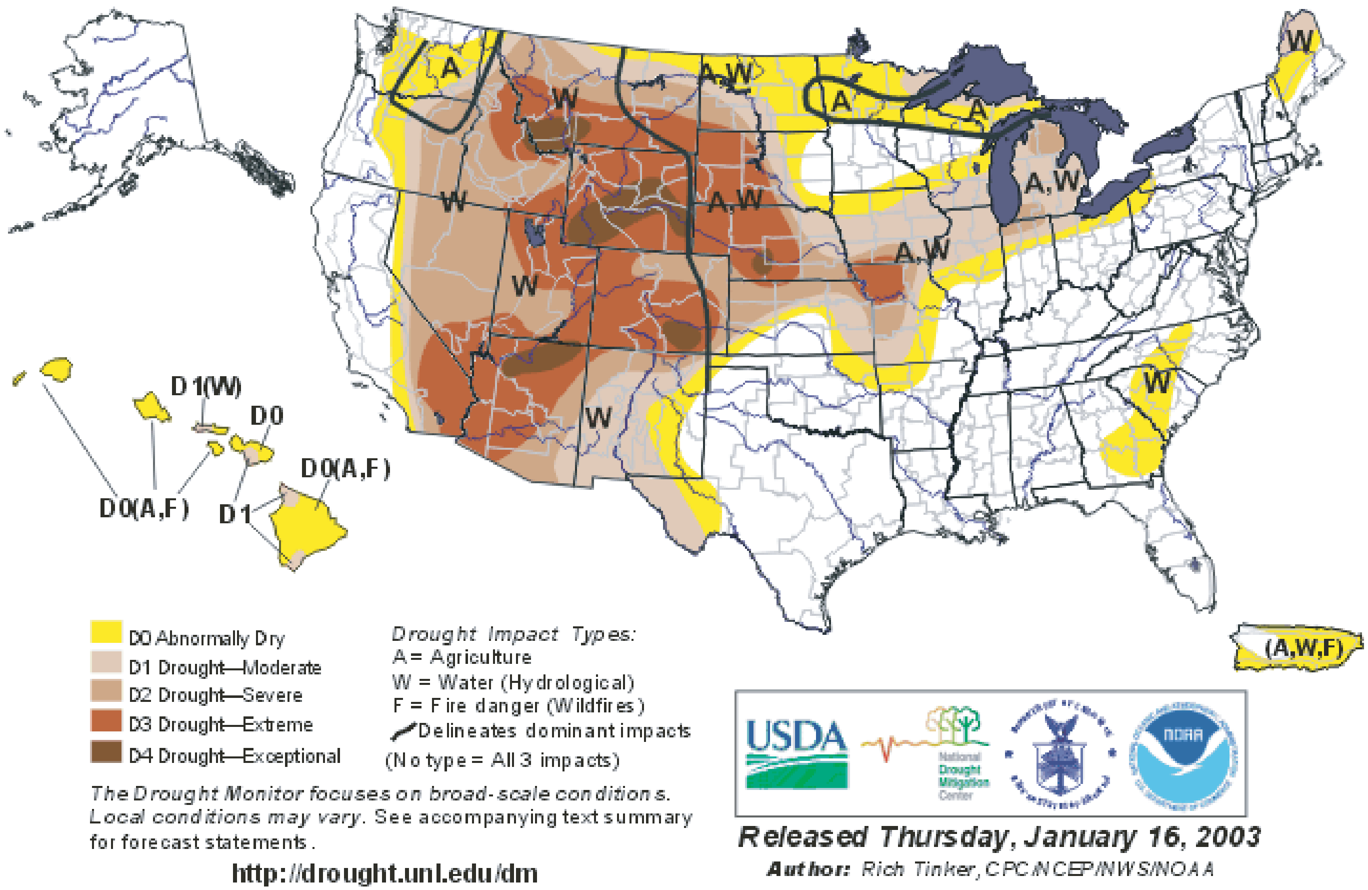
The data are in inches of precipitation. **Note: The scales for Figures 2b & 2d are non-linear.**

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

These maps are derived by taking measurements at meteorological stations (at airports) and estimating a continuous map surface based on the values of the measurements and a mathematical algorithm. This process of estimation is also called spatial interpolation.

The red and blue numbers shown on the maps represent individual stations. The contour lines and black numbers show average precipitation.

3. U.S. Drought Monitor (updated 01/14/03) 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 01/16 and is based on data collected through 01/14 (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, streamflow, precipitation, and measures of vegetation stress, as well as reports of drought impacts.

Highlights: Extended extreme drought in the Northern Rockies and northern Great Plains has been the focus of recent national news. Dry conditions there, which are likely to be exacerbated by ongoing El Niño conditions, have raised concerns about serious water shortages in those regions. During the past month, drought conditions have eased somewhat for northern and eastern New Mexico, and they have intensified slightly in Arizona. Most of Arizona remains in drought conditions ranging from severe to exceptional. Short-term drought conditions, especially in New Mexico, have eased with cool temperatures, winter rain and snowfall. However, winter precipitation has been below average at many mountain locations in both states. Thus, long-term (hydrological) drought remains the chief concern of land and water resource managers in both states. During the past month the mountain snowpack water content has decreased to the point where most snow gauges in the Southwest are reporting below average amounts (see page 8). This dryness has drawn down reservoirs throughout the region. In addition, the impact of winter 2002-2003 precipitation on spring 2003 streamflow is likely to be tempered, due to deficits in soil moisture accumulated over the past several years of drought.

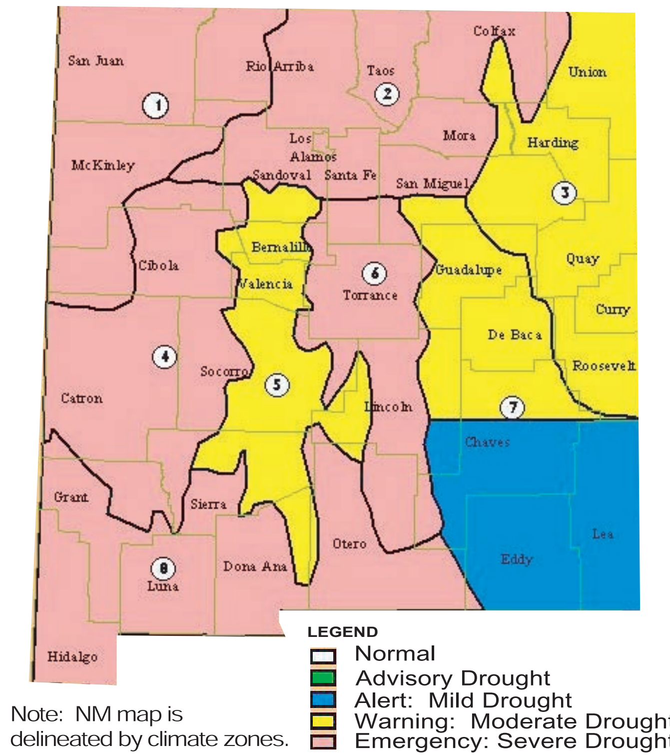
Animations of the current and past weekly drought monitor maps can be viewed at: http://www.drought.unl.edu/dm/monitor.html

4. Drought: Recent Drought Status for New Mexico (updated 01/14/03)

Source: New Mexico NRCS

New Mexico Drought Map

Drought Status as of January 14, 2003



Source: NM Natural Resources Conservation Service (2002)

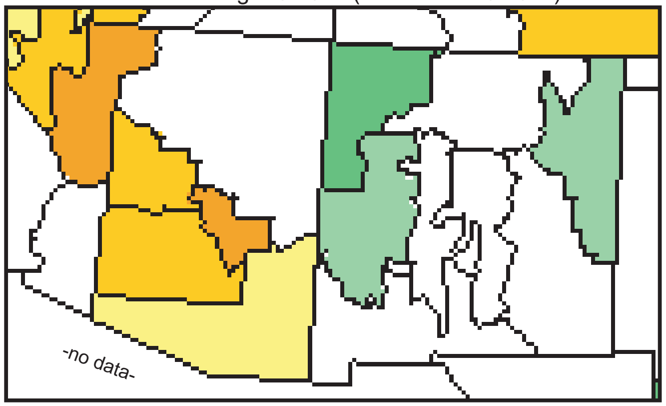
Notes: The New Mexico drought map above, provided by the New Mexico Natural Resource Conservation Service, indicates current drought status. Drought status has remained the same since September, 2002, due chiefly to concerns about water supply and streamflow. Short-term drought conditions have improved; however, streamflow forecasts and reservoir levels give cause for concern about long-term (hydrological) drought. River basin snowpack and precipitation are mostly below average across New Mexico and in southern Colorado basins that feed the Rio Grande; above average totals are located chiefly in north-central New Mexico. No changes will be made in the New Mexico drought status map until winter precipitation and projected water supply for 2003 is assessed (New Mexico Drought Planning Team).

On January 13, 2003 the Arizona Department of Emergency Management (ADEM) released a drought situation report. Among the report highlights are the following: the overall drought situation in Arizona has only improved slightly since last year; some reservoir levels are at all-time lows; dry winter conditions mean that the possibility of a severe wildland fire season in 2003 is still a major concern. The report does not contain a detailed map for Arizona.

The New Mexico map (http://www.nm.nrcs.usda.gov/drought/drought.htm), currently is produced monthly, but when near-normal conditions exist, it is updated quarterly. Contact Matt Parks at ADEM at (602) 392-7510 for more information on Arizona regional drought declarations and situation reports.

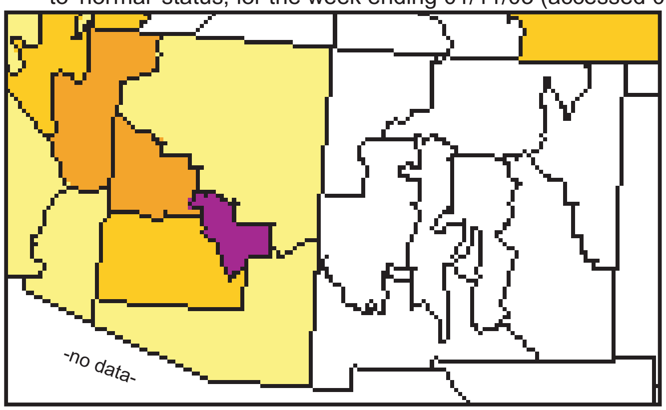
5. PDSI Measures of Recent Conditions (up to 01/11/03) ♦ Source: NOAA Climate Prediction Center

5a. Current weekly Palmer Drought Severity Index (PDSI), for the week ending 01/11/03 (accessed 01/16/03).



- -4.0 to -4.9 (extreme drought)
- -3.0 to -3.9 (severe drought)
- -2.0 to -2.9 (moderate drought)
- -1.9 to +1.9 (near normal)
- +2.0 to +2.9 (unusual moist spell)
- +3.0 to +3.9 (very moist spell)

5b. Precipitation needed to bring current weekly PDSI assessment to 'normal' status, for the week ending 01/11/03 (accessed 01/16).



- Zero inches
- Trace to 3 inches
- 3 to 6 inches
- 6 to 9 inches
- 9 to 12 inches
- 12 to 15 inches
- Over 15 inches

Notes:
The PDSI (Palmer Drought Severity Index) attempts to measure the duration and intensity of long-term conditions that underlie drought.

'Normal' on the PDSI scale is defined as amounts of moisture that reflect long-term climate expectations.

Arizona and New Mexico are divided into *climate divisions.* Climate data are aggregated and averaged for each division within each state. Note that climate division calculations stop at state boundaries.

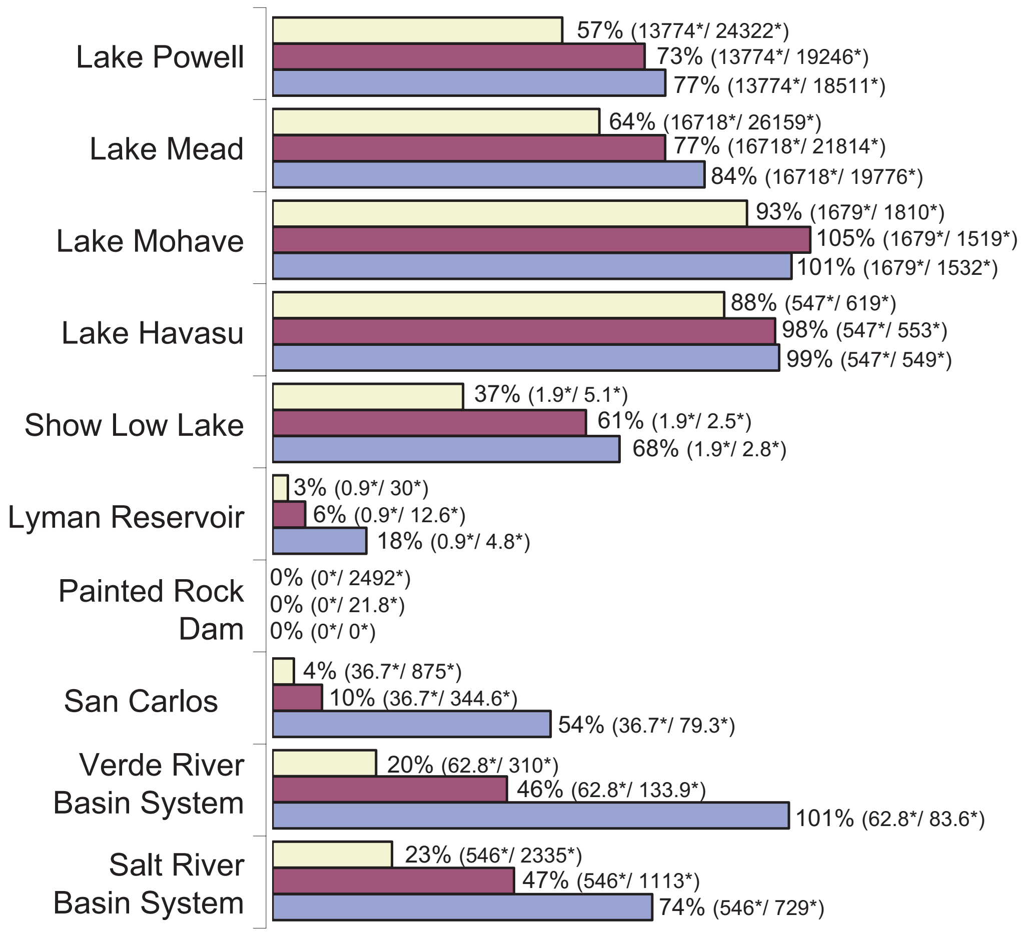
These maps are issued weekly by the NOAA CPC.

Highlights: Late December and January precipitation and seasonally cooler temperatures have reduced PDSI values for most of Arizona (Figure 5a). New Mexico PDSI values have pretty much held steady since December 2002, with slight increases in dry conditions in central and eastern New Mexico (from *unusual moisture* to *near normal* PDSI). Drought conditions, as expressed by weekly PDSI, have ameliorated in the Four Corners region due to winter precipitation there. Substantial precipitation and cool temperatures are necessary to relieve hydrologic drought. Figure 5b shows that, while in New Mexico meteorological drought has ameliorated, some Arizona climate divisions (notably, northwestern and east-central Arizona) require more precipitation to relieve drought than they did one month ago.

For a more technical description of PDSI, visit: http://www.cpc.noaa.gov/products/analysis_monitoring/cdus/palmer_drought/ppdanote.html

For information on drought termination and amelioration, visit: http://lwf.ncdc.noaa.gov/oa/climate/research/drought/background.html

6. Arizona Reservoir Levels (through the end of December 2002) ♦ Source: USDA NRCS



*Units are in thousands of acre-feet

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/water/reservoir/resv_rpt.html).

As of 01/16/03, Arizona's report had been updated through the end of December.

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)

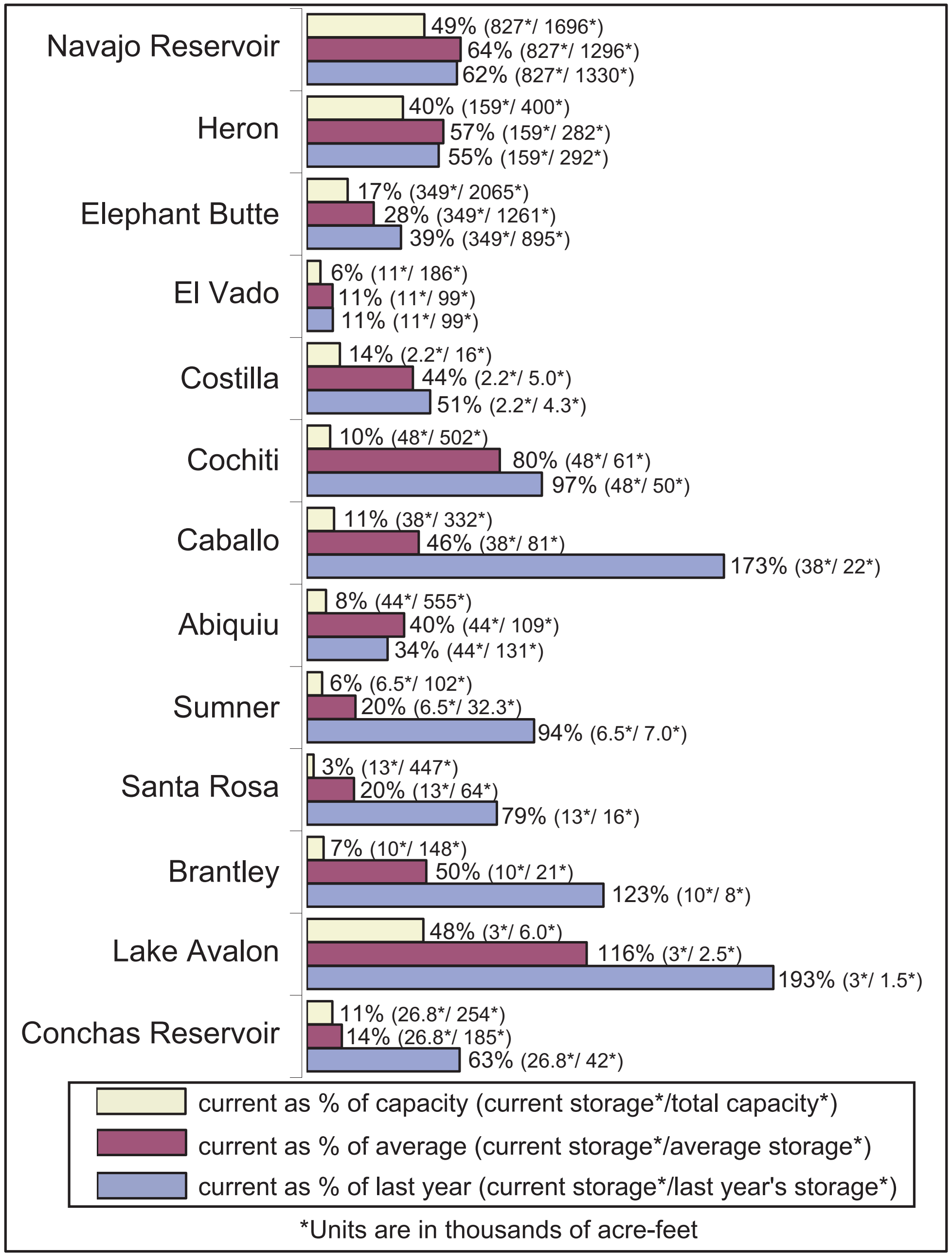
Highlights: Levels in most Arizona reservoirs have mostly held steady or decreased slightly since last month and continue to be below average and lower than last year at this time. Reservoirs on the Verde River Basin are at approximately the same level as last year at this time. Reservoirs on the lower Colorado River are near average, due to water transfers from Upper to the Lower Colorado River Basin reservoirs.

In early January, in response to exceedingly low reservoir levels in the Salt and Verde River basins, the Salt River Project reduced its deliveries to Phoenix-area water users by one-third (as promised).

Arizona water experts, however, believe that the state's urban areas are not in any immediate crisis, due to Colorado River reserves available through the Central Arizona Project (Arizona Daily Star, January 11, 2003).

Phoenix has asked area residents to voluntarily cut water use by 5%.

7. New Mexico Reservoir Levels (through the end of December 2002) Source: USDA NRCS



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

As of 01/16/03, New Mexico's report has been updated through the end of December.

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: During the past month, New Mexico reservoir levels have mostly held steady at a level far below average. A few reservoirs in the Rio Grande Basin are higher than last year at this time (i.e., Caballo, Brantley, Lake Avalon).

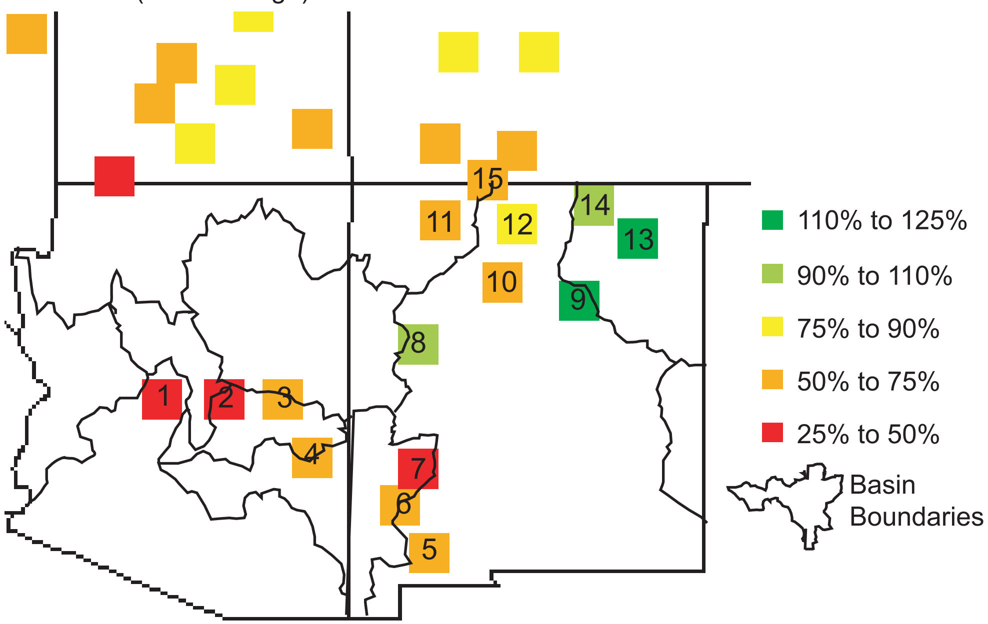
New Mexico snowpack has mostly diminished during the past month, and southern Colorado basins that feed the Rio Grande River are currently at around 65% of the 1971-2000 average.

A January 21, 2003 drought update from NOAA suggests that some forecasting tools are predicting improvement in drought indices by April. However, the NOAA update cautions that "some areas will continue to see low water supplies, even if normal or slightly above-normal precipitation occurs." According to projections by the New Mexico Drought Planning Team, even normal-level spring runoff will still result in further lowering of Elephant Butte reservoir by July, 2003.

A January 19, 2003 report in the New York Times highlighted the plight of the Albuquerque surface water supply, which is stored behind Heron Dam. This supply constitutes the city's safeguard against drought. During drought, at the same time, a stretch of the Rio Grande downstream from the city provides critical habitat for the endangered silvery minnow and depends on releases of water stored in that same source.

8. Snowpack in the Southwest U.S. (updated 01/21/03) ♦ Source: USDA NRCS, WRCC

8. Basin average snow water content (SWC) for available monitoring sites as of 01/21/02 (% of average).



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

Highlights: As of January 21, 2003, snow water content (SWC) is largely below the 1971-2000 average for Arizona and New Mexico. SWC in Arizona river basins is *far below average* for this time of year. The highest SWC is in the Salt River Basin, which is at 61% of average (as compared to 97% last month). SWC is at average to above-average in northeastern New Mexico basins, whereas southwestern New Mexico basins are below average for this time of year (between 45-71%). A major concern following last year's devastating drought in the West and Plains States is that all basins throughout the intermountain West and Pacific Northwest are currently below average. Basins contributing runoff to the Colorado River Basin are at between 45-80% of average SWC. Klaus Wolter of NOAA-CDC notes, however, that weakening El Niño conditions may let more storms penetrate into Utah and Colorado.

For color maps of SNOTEL basin SWC, visit: http://www.wrcc.dri.edu/snotelanom/basinswe.html
For a numeric version of the SWC map, visit: http://www.wrcc.dri.edu/snotelanom/basinswen.html
For a list of river basin SWC and precipitation, visit http://www.wrcc.dri.edu/snotelanom/snotelbasin

Notes:

The data shown on this page are from snowpack telemetry (SNOTEL) stations grouped according to river basin. These remote stations sample snow, temperature, precipitation and other information at individual sites.

Snow water content (SWC) and snow water equivalent (SWE) are different terms for the *same* parameter.

The SWC in Figure 8 refers to the snow water content found at selected SNOTEL sites in or near the basin compared to the *average* value for those sites on this day. *Average* refers to the arithmetic mean of annual data from 1971-2000. SWC is the amount of water currently in snow. It depends on the density and consistency of the snow. Wet, heavy snow will produce greater SWC than light, powdery snow.

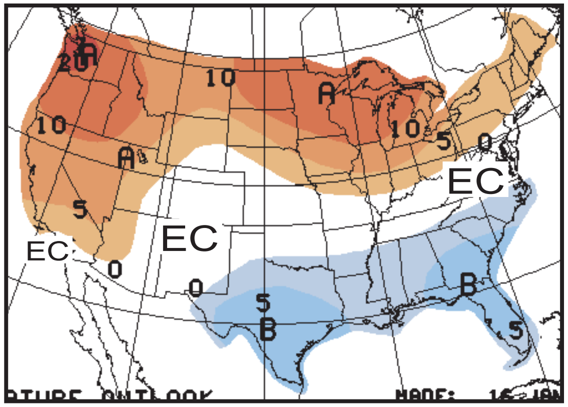
Each box on the map represents a river basin for which SWC data from individual SNOTEL sites have been averaged. Arizona and New Mexico river basins for which SNOTEL SWC estimates are available are numbered in Figure 8. The colors of the boxes correspond to the % of average SWC in the river basins.

The dark lines within state boundaries delineate large river basins in the Southwest.

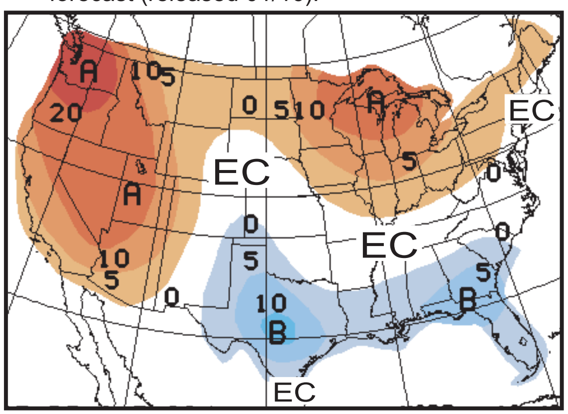
These data are provisional and subject to revision. They have not been processed for quality assurance. However, they provide the best available land-based estimates during the snow measurement season.

9. Temperature: Monthly and 3-Month Outlooks ♦ Source: NOAA Climate Prediction Center

9a. February 2003 U.S. temperature forecast (released 01/16).



9b. February - April 2003 U.S. temperature forecast (released 01/16).



Percent Likelihood of Above/ Below Average Temperatures*

30% - 40%
20% - 30%
10% - 20%
5% - 10%
0% - 5%

0% - 5%
5% - 10%
10% - 20%

*EC indicates no forecast due to lack of model skill

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 prediction is offered.

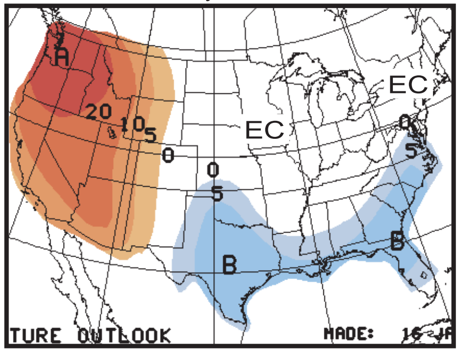
These forecasts are based on a combination of factors, including the results of statistical models, moderate El Niño conditions, and long-term trends.

Highlights: The CPC temperature outlook for February (Figure 9a) and for the next three months (February-April; Figure 9b) indicates increased probabilities of above-average temperatures for most of the western United States. For February, no forecast ("EC") has been made for most of Arizona and New Mexico, with only a slight shift in the chances of above-average temperatures (shifted from 33% to 38%) in northwestern Arizona. The chances of above-average temperatures in Arizona and western New Mexico increase during the late winter and early spring. The International Research Institute (IRI) for Climate Prediction also indicates a only slight shift in the chances of above-average temperatures in western Arizona and the northern tier of New Mexico for February-April (40% chance of above-average temperatures). The CPC predictions are based chiefly on historical El Niño temperature patterns reinforced by long-term temperature trends. NOAA CPC climate outlooks are released on the 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.

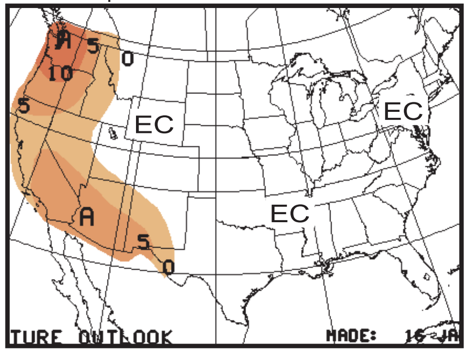
10. Temperature: Multi-season Outlooks ♦ Source: NOAA Climate Prediction Center

Overlapping 3-month long-lead temperature forecasts (released 01/16/03).

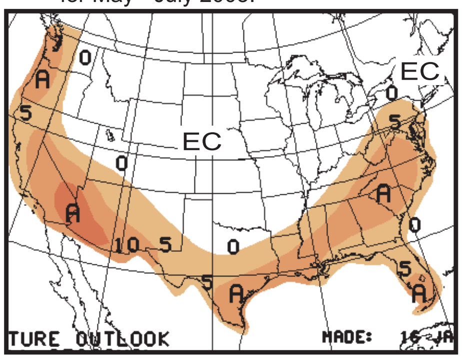
10a. Long-lead national temperature forecast for March - May 2003.



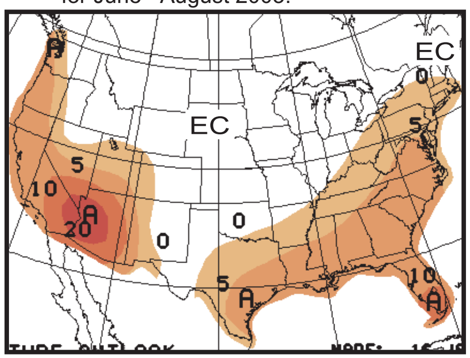
10b. Long-lead national temperature forecast for April - June 2003.



10c. Long-lead national temperature forecast for May - July 2003.



10d. Long-lead national temperature forecast for June - August 2003.



Percent Likelihood of Above/ Below Average Temperatures*

- 30% - 40%
- 20% - 30%
- 10% - 20%
- 5% - 10%
- 0% - 5%

- 0% - 5%
- 5% - 10%
- 10% - 20%

*EC indicates no forecast due to lack of model skill

Highlights: The CPC temperature outlooks for March-August 2003 show increased probabilities of above-average temperatures for most of the western United States in the winter and spring (Figures 9a-d), with maximum forecast confidence shifted to the Southwest by summer. There is a fairly high probability of above-average temperatures across Arizona during the spring, with the greatest forecast confidence for the Southwest centered over northwestern Arizona. Forecasts for late spring and summer are based chiefly on long-term trends toward above-average temperatures; these forecasts highlight high chances of above-average temperatures in the lower Coloado River Basin region. Forecasts from the International Research Institute (IRI) for Climate Prediction indicate much lower chances of above-average temperatures in the Southwest (around 40% chance of above-average temperatures) during the upcoming seasons.

NOAA CPC climate outlooks are released on Thursday, between the 15th and 21st of each month.

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.

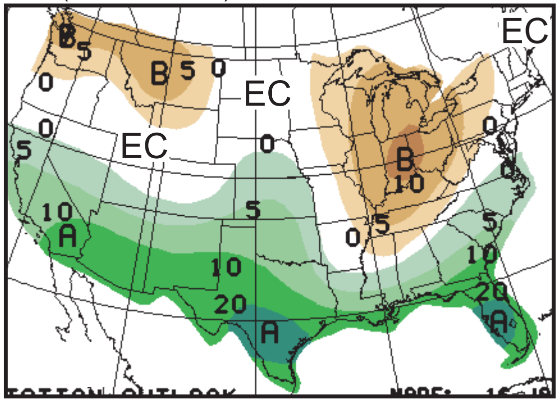
Thus, using the NOAA CPC excess likelihood forecast, in areas with light brown shading (0-5% excess likelihood of above average) there is a 33.3-38.3% chance of above average, a 33.3% chance of average, and a 28.3-33.3% chance of below average temperature.

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

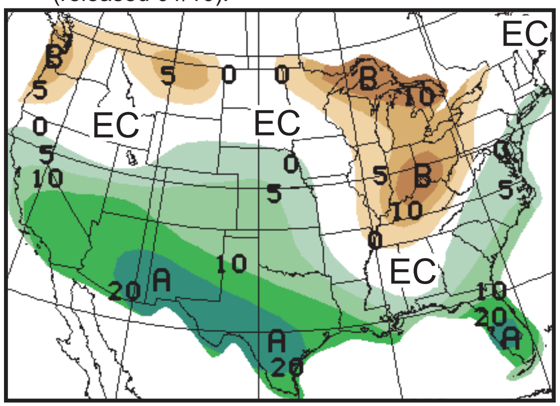
Equal Chances (EC) indicates areas where reliability (i.e., the 'skill') of the forecast is poor and no prediction is offered.

11. Precipitation: Monthly and 3-Month Outlooks ♦ Source: NOAA Climate Prediction Center

11a. February 2003 U.S. precipitation forecast (released 01/16).



11b. February - April 2003 U.S. precipitation forecast (released 01/16).



Percent Likelihood of Above or Below Average Precipitation*

Above:
- 20% - 30%
- 10% - 20%
- 5% - 10%
- 0% - 5%

Below:
- 0% - 5%
- 5% - 10%
- 10% - 20%
- 10% - 20%

*EC indicates no forecast due to lack of model skill

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 prediction is offered.

These forecasts are based on a combination of factors, including the results of statistical models, moderate El Niño conditions, and long-term trends.

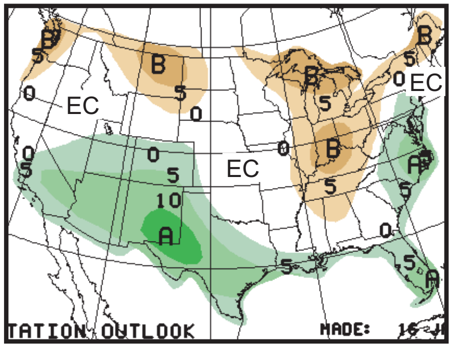
Highlights: The official NOAA-CPC precipitation outlook for February shows a fairly high probability of average to above-average precipitation across the Southwest, with the greatest forecast confidence centered over southern Arizona and New Mexico. The forecast shows greater chances of above-average precipitation across the Southwest for February-April (Figure 11b), with the greatest forecast confidence (53-63% chance of above-average precipitation) centered over southeastern Arizona and southern New Mexico. The February-April precipitation forecast from the International Research Institute (IRI) for Climate Prediction, shows a 50% chance of above-average precipitation across central Arizona, with smaller shifts in the chances of above-average precipitation for the rest of the Southwest during this season. The CPC bases most of their forecast on historical analyses of El Niño effects on Southwest precipitation. NOAA CPC climate outlooks are released on the Thursday, between the 15th and 21st of each month.

For more information about NOAA-CPC seasonal outlooks, 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 seasonal forecasts, visit: http://iri.columbia.edu/climate/forecast/net_asmt/

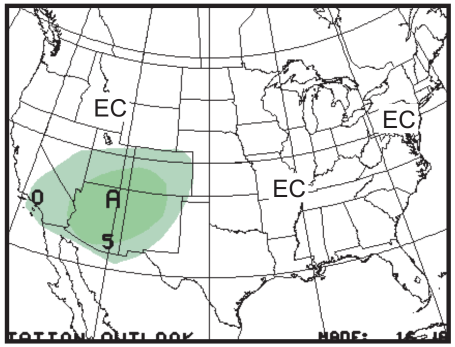
12. Precipitation: Multi-season Outlooks ♦ Source: NOAA Climate Prediction Center

Overlapping 3-month long-lead precipitation forcasts (released 01/16/03).

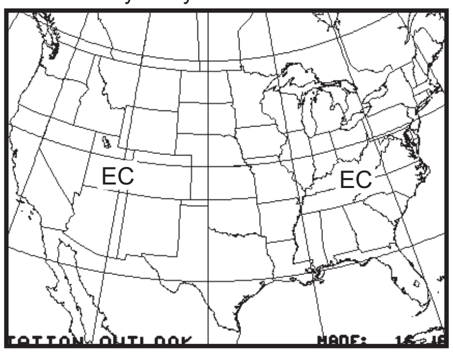
12a. Long-lead U.S. precipitation forecast for March - May 2003.



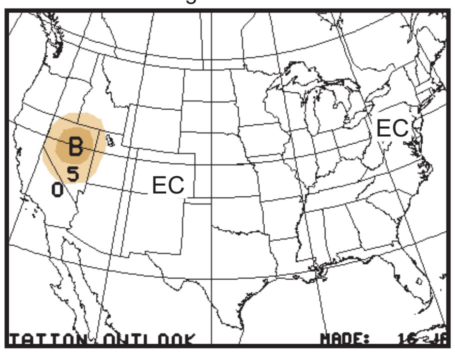
12b. Long-lead U.S. precipitation forecast for April - June 2003.



12c. Long-lead U.S. precipitation forecast for May - July 2003.



12d. Long-lead U.S. precipitation forecast for June - August 2003.



Percent Likelihood of Above or Below Average Precipitation*

20% - 30%	Above
10% - 20%	Above
5% - 10%	Above
0% - 5%	Above
0% - 5%	Below
5% - 10%	Below
10% - 20%	Below
20% - 30%	Below

*EC indicates no forecast due to lack of model skill

Highlights: The expected weakening of El Niño conditions and its impacts on the Southwest are reflected by the decreased probabilities of above-average precipitation for spring (Figures 12a-b) as compared to winter (page 11). The large-scale atmospheric circulation patterns for the spring are expected to reflect moderate El Niño conditions. For the Southwest, the greatest confidence in these predictions is centered over southeastern New Mexico during March-May 2003, with probabilities of above-average precipitation reaching 43.3-53.3%. For the late-spring and summer months (Figures 12c-d), CPC forecasters have withheld judgment (“EC”). Forecasts for March-July from the International Research Institute (IRI) for Climate Prediction, corroborate the basic patterns of shifts in the chances of above-average precipitation for the Southwest. 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.

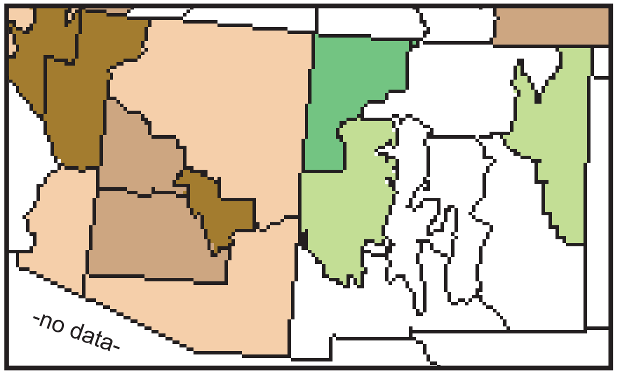
Thus, using the NOAA CPC excess likelihood forecast, in areas with light green shading (0-5% excess likelihood of above-average) there is a 33.3-38.3% chance of above-average, a 33.3% chance of average, and a 28.3-33.3% chance of below-average precipitation.

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 prediction is offered.

13. Drought: PDSI forecast and U.S. Seasonal Outlook ♦ Source: NOAA Climate Prediction Center

13a. Short-term Palmer Drought Severity Index (PDSI) forecast through 01/18/03 (accessed 01/16).



- -4.0 or less (extreme drought)
- -3.0 to -3.9 (severe drought)
- -2.0 to -2.9 (moderate drought)
- -1.9 to +1.9 (near normal)
- +2.0 to +2.9 (unusual moist spell)
- +2.0 to +2.9 (very moist spell)

13b. Seasonal drought outlook through April 2003 (accessed 01/16).

- drought ongoing, some improvement
- Drought likely to improve, impacts ease

Notes:

The PDSI (Palmer Drought Severity Index) attempts to measure the duration and intensity of the long-term drought.

'Normal' on the PDSI scale is defined as amounts of moisture that reflect long-term climate expectations.

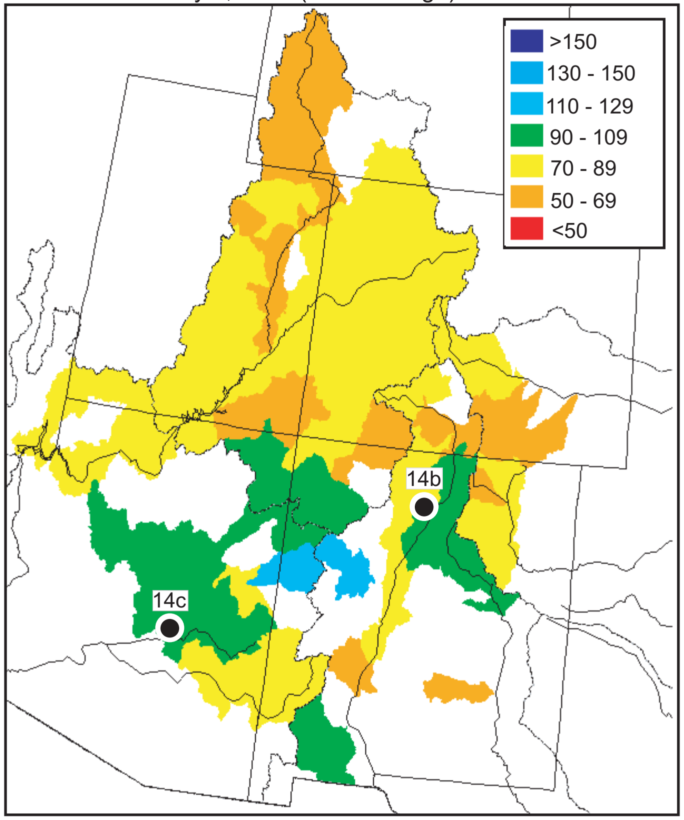
The delineated areas in the Seasonal Drought Outlook are defined subjectively and are based on expert assessment of numerous indicators including outputs of short- and long-term forecast models.

Highlights: The short-term PDSI forecast (Figure 13a) indicates at least moderate drought conditions for all of Arizona, and severe-to-extreme drought for central and northwestern Arizona. In contrast, the forecast for New Mexico is for near-normal or moist conditions compared to the average for this time of year. As indicated in the CPC climate outlooks, the probability of El Niño-related above-average precipitation is fairly high for February-April for much of the Southwest; therefore, the seasonal drought outlook (Figure 13b) is for short-term drought to ease. However, hydrological drought conditions are likely to persist, unless the Southwest receives *substantially* above-average precipitation, especially snow, which recharges reservoirs and streams.

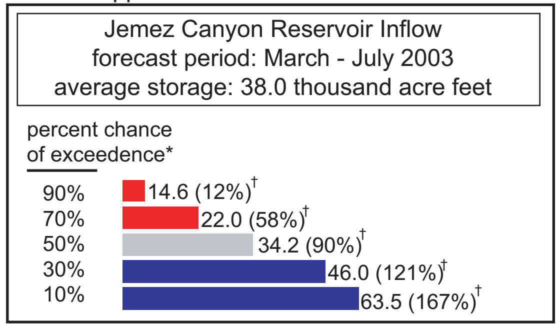
For more information, visit: http://www.drought.noaa.gov/

14. Streamflow Forecast for Spring and Summer ♦ Source: USDA NRCS National Water and Climate Center

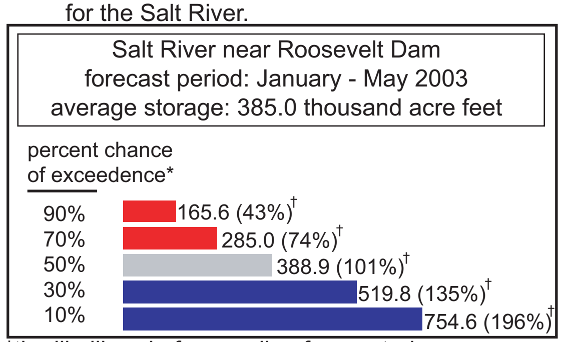
14a. NRCS spring and summer streamflow forecasts as of January 1, 2003 (% of average).



14b. NRCS percent exceedence forecast chart for upper Rio Grande River.



14c. NRCS percent exceedence forecast chart for the Salt River.



*the likelihood of exceeding forecasted streamflow volume.

†associated forecasted streamflow volume (thousands of acre feet) and percent of average volume.

Highlights: January 1, 2003, streamflow forecasts for Arizona and New Mexico river basins indicate that average to below-average streamflow is most likely this spring and summer for many gauged basins in both states. Figure 14a shows that streamflow in large basins in the Upper Colorado River Basin states (WY, UT, CO) is forecasted to be below average. The best estimate of streamflow volume given current conditions and based on past outcome of similar situations is that inflow to Lake Powell will be 72% of average. However, there is a 50% likelihood that this forecasted flow will be exceeded. Inflow to the Salt River Basin in Arizona is forecasted to be approximately average (101%), with a 30% chance that inflow will be as high as 135% of average. The forecast is based partly on the fact that only 3 of the past 16 El Niño events have produced less than 100% of average March 1st snowpack, whereas 9 of the last 16 El Niño events had more than 150% of average snowpack (USDA-NRCS news release #03-02).

For state river basin streamflow probability charts, visit: http://www.wcc.nrcs.usda.gov/water/strm_cht.pl
For information on interpreting streamflow forecasts, visit: http://www.wcc.nrcs.usda.gov/factpub/intrpret.html
For western U.S. water supply outlooks, visit http://www.wcc.nrcs.usda.gov/water/quantity/westwide.html

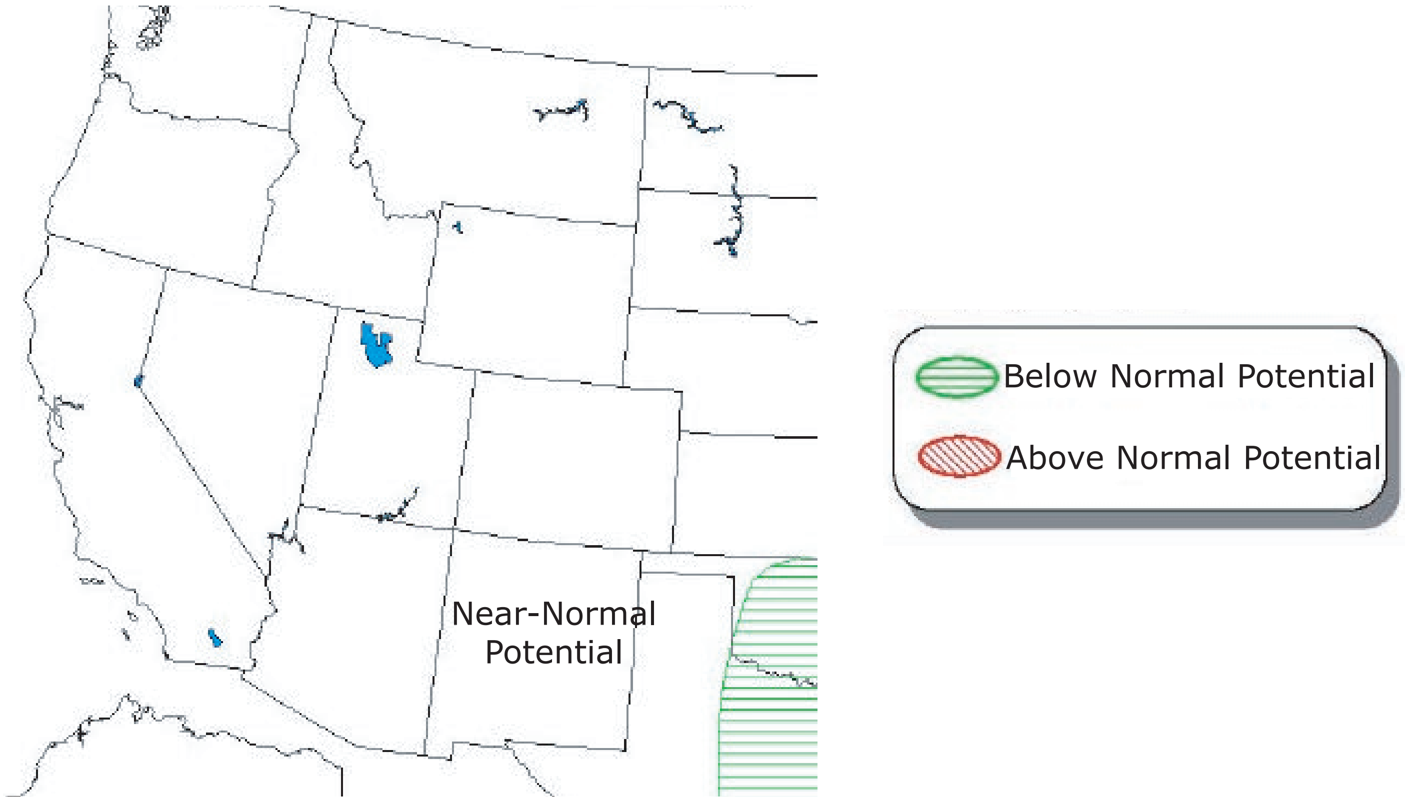
Notes:
The forecast information provided in Figures 14a-c is updated monthly and is provided by the National Resources Conservation Service (NRCS). Unless otherwise specified, all streamflow forecasts are for streamflow volumes that would occur naturally without any upstream influences.

Each month, five streamflow volume forecasts are made by the NRCS for several river basins in the U.S. These five forecasts correspond to standard *exceedence* percentages, which can be used as approximations for varying 'risk' thresholds when planning for short-term future water availability.

90%, 70%, 50%, 30%, and 10% exceedence percentage streamflow volumes are provided by the NRCS. Each exceedence percentage level corresponds to the following statement: "There is an (X) percent chance that the streamflow volume will ***exceed*** the forecast volume value for that exceedence percentage." Conversely, the forecast also implies that there is a (100-X) percent chance the volume will be ***less than*** this forecasted volume. In figure 14b for example, there is a 30% chance that Jemez Canyon Reservoir will exceed 46,000 acre-feet of water (121% of average) between March and July, and a 70% chance that it will not exceed that volume. Note that for an individual location, as the exceedance percentage declines, forecasted streamflow volume increases.

In addition to monthly graphical forecasts for individual points along rivers (Figures 14b and 14c), the NRCS provides a forecast map (Figure 14a) of basin-wide streamflow volume averages based on the forecasted 50% exceedence percentage threshold.

15. National Wildland Fire Outlook (valid Jan. 1–31, 2003) Source: National Interagency Fire Center

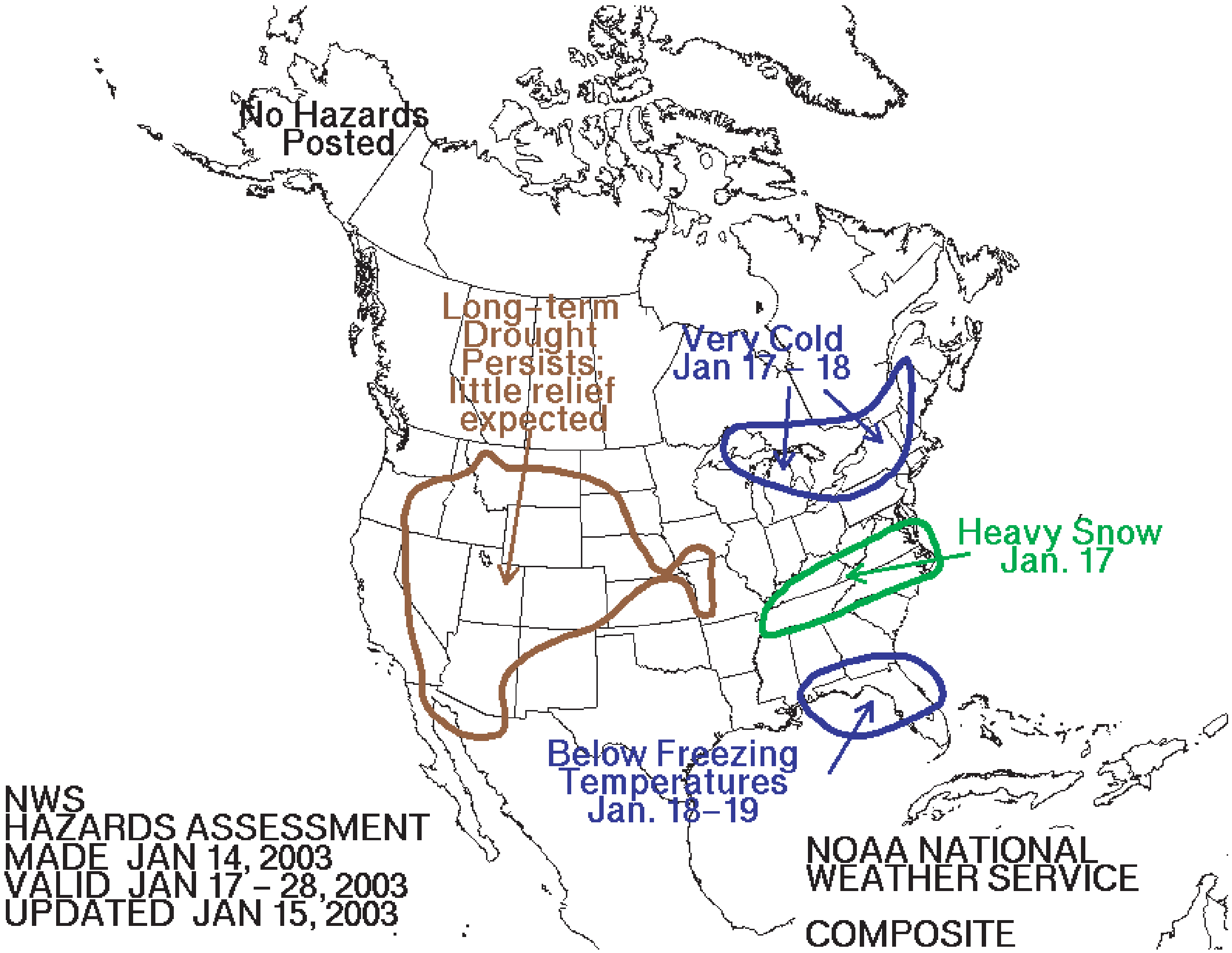


Notes: The National Wildland Fire Outlook (Figure 15) considers climate forecasts and surface-fuels conditions to assess fire potential. It is a subjective assessment, based on a synthesis of monthly regional fire danger outlooks. It is issued monthly by the National Interagency Coordination Center (NICC) at the National Interagency Fire Center (NIFC).

Highlights: The forecast map for January 2003 indicates near-normal fire potential for all of the western U.S. The Southwest Coordination Center (SWCC; one of 11 regional multiagency wildland fire operations centers in the U.S.) concurs with this analysis for January 2003. SWCC recently released a preliminary assessment for the 2003 fire season, in which they predict average to above-average large fire activity in the Southwest. They expect the fire season to start later and be shorter than in 2002; however they caution that 2003 fire activity may briefly reach similar peak severity. They expect peak severity and peak timber fire activity in May-June. They expect that long-term (hydrological) drought will continue, but they expect seasonal drought to be mitigated by winter and spring moisture from El Niño. Due to the confluence of a great amount of dead standing timber (especially from insect kills across northern Arizona and New Mexico) and the effects of long-term drought on large fuels, the SWCC forecasters expect that fire danger has the potential to increase much more rapidly than usual during dry periods (e.g., the arid foresummer). The Southwest is currently at fire preparedness level 1, which means that conditions are optimal for normal prescribed fire operations and that wildfire activity within the Southwest will require little or no commitment of Southwest Area and/or national 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 web page: http://www.fs.fed.us/r3/fire/ (click on Predictive Services > Outlooks Products)

16. U.S. Hazards Assessment Forecast (valid Jan. 17 – 28th, 2003) ♦ Source: NOAA CPC



Notes:

The hazards assessment incorporates outputs of National Weather Service medium- (3-5 day), extended- (6-10 day) and long-range (monthly and seasonal) forecasts and hydrological analyses and forecasts.

Influences such as complex topography may warrant modified local interpretations of hazards assessments.

Please consult local National Weather Service offices for short-range forecasts and region-specific information.

Individual maps of each type of hazard are available at the following websites:

Temperature and wind:
http://www.cpc.ncep.noaa.gov/products/predictions/threats/t_threats.gif

Precipitation:
http://www.cpc.ncep.noaa.gov/products/predictions/threats/p_threats.gif

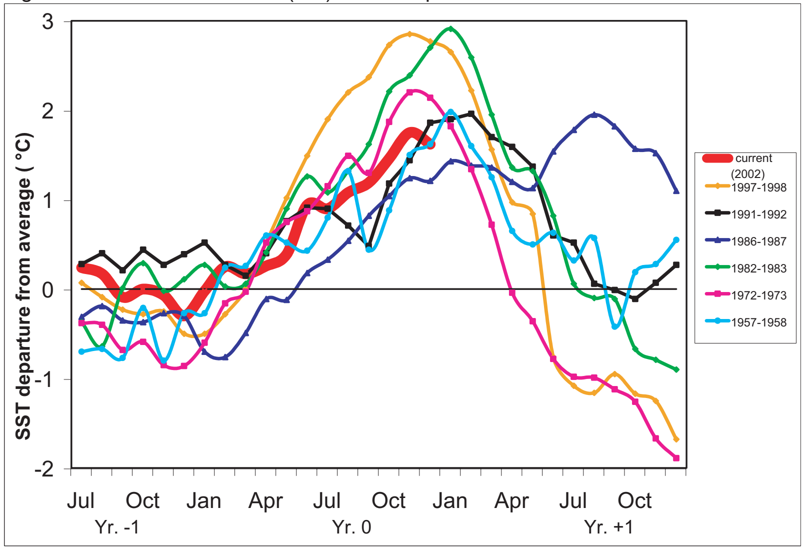
Soil and/or Fire:
http://www.cpc.ncep.noaa.gov/products/predictions/threats/s_threats.gif

Highlights: The U.S. Hazards Assessment indicates long-term, persistent drought for Arizona and for northwestern New Mexico.

For more information, visit: http://www.cpc.ncep.noaa.gov/products/predictions/threats

17. Tropical Pacific SST and El Niño Forecasts ♦ Sources: NOAA CPC, IRI

Figure 17a. Past and current (red) El Niño episodes.

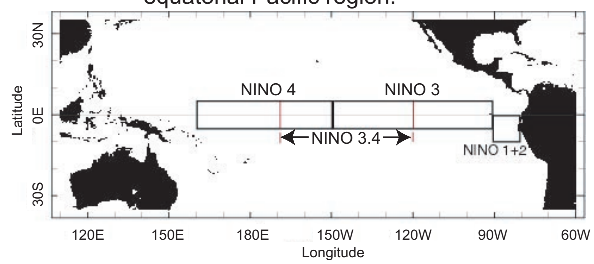


Notes:

The graph (Figure 17a) shows sea-surface temperature (SST) departures from the long-term average for the Niño 3.4 region (Figure 17b). This is a sensitive indicator of ENSO conditions.

Each line on the graph represents SST departures for previous El Niño 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).

Figure 17b. ENSO observation areas in the equatorial Pacific region.



This year's SST departures are plotted as a red line (Figure 17a). 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.

Figure 17c. 7-day averaged equatorial Pacific sea surface temperature anomalies (ºC) for January 12th - 18th, 2003.

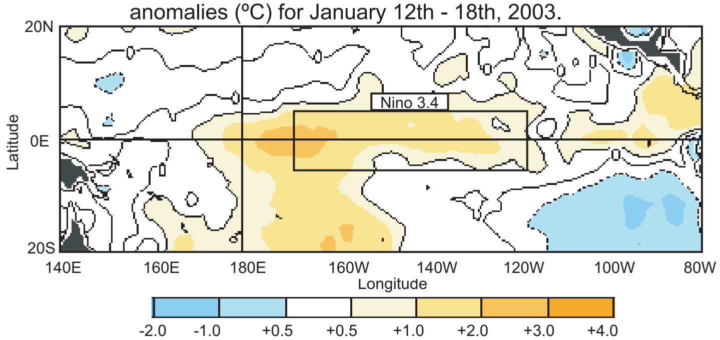
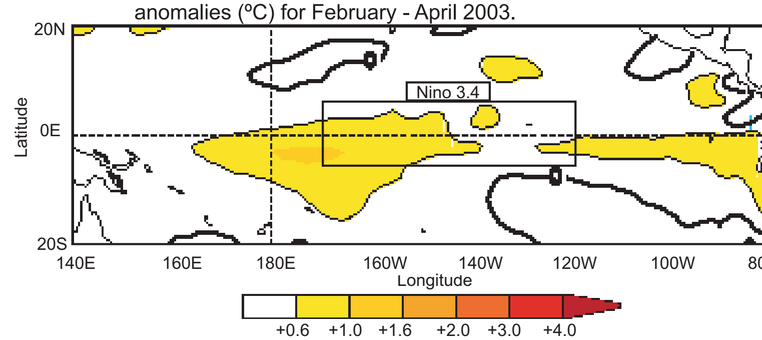


Figure 17d. Forecasted equatorial Pacific sea surface temperature anomalies (ºC) for February - April 2003.



Highlights: Sea surface temperature (SST) anomalies associated with El Niño have begun to diminish since late 2002 (Figure 17a) in all of the Niño SST monitoring regions. SST anomalies continue to exceed 1°C throughout much of the tropical Pacific between 180° and the west coast of South America. Most forecast models expect El Niño conditions to continue at least through spring. The International Research Institute for Climate Prediction (IRI) expects El Niño conditions to significantly weaken or dissipate between March and June – a pattern corroborated by recent NOAA SST forecasts (Figure 17d). Forecast skill decreases as the year transitions through spring and into summer. The NOAA Climate Prediction Center (CPC) notes that the persistence of this El Niño event will depend upon subsurface ocean temperatures and associated westerly winds over the central and eastern Pacific Ocean. The IRI's latest ENSO outlook indicates a 25% chance of La Niña conditions developing by the end of 2003. Both the IRI and the CPC note that El Niño-related climate effects in most regions are likely to be weaker than during 1997–98, though substantial climate effects are possible in some areas.

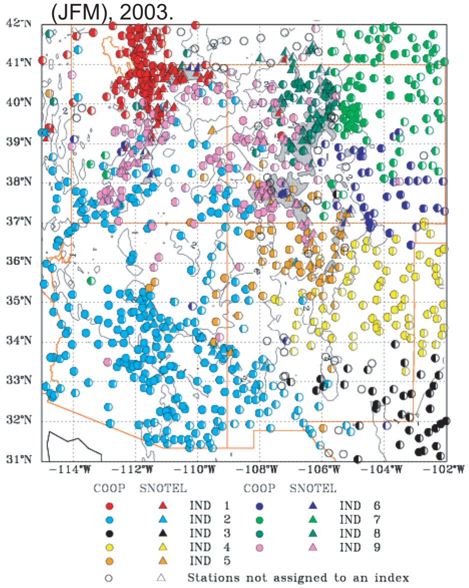
For a technical discussion of current El Niño conditions, visit: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

For more information about El Niño and to access the graphics found on this page, visit: http://iri.columbia.edu/climate/ENSO/

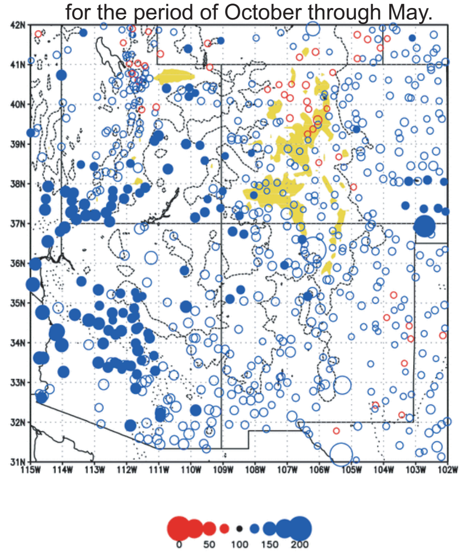
18. Experimental Colorado (and Interior Southwest) Forecasts

Source: Klaus Wolter, NOAA-CIRES Climate Diagnostics Center (CDC)

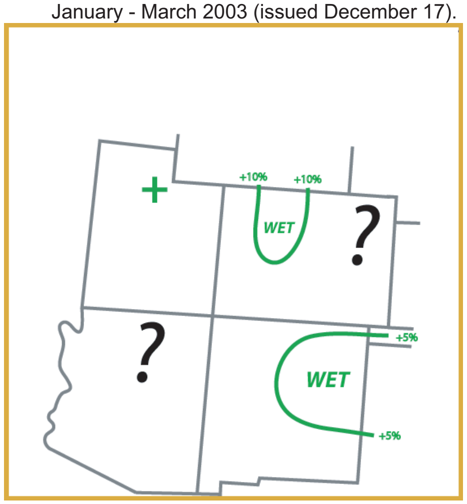
18a. Seasonal core regions for January - March (JFM), 2003.



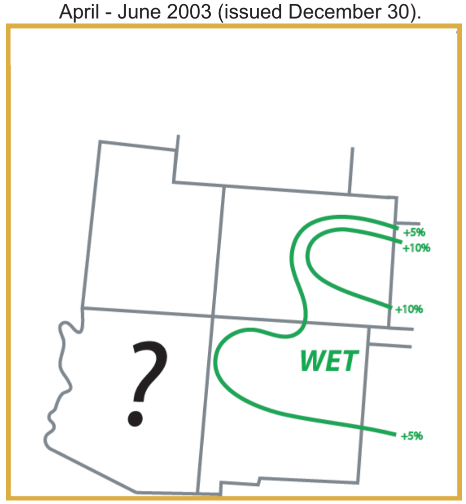
18b. Historical El Niño precipitation impacts for the period of October through May.



18c. CDC experimental precipitation forecast for January - March 2003 (issued December 17).



18d. CDC experimental precipitation forecast for April - June 2003 (issued December 30).



Notes: The images shown on this page are excerpted from a comprehensive experimental forecast web page created by Klaus Wolter of NOAA's Climate Diagnostics Center (CDC) -- http://www.cdc.noaa.gov/~kew/SWcasts/. The web page, which is updated monthly, includes the following background and forecast information: (1) current status of ENSO and prospects for the next 6-9 months; (2) regional climate variability of the interior western U.S. and typical precipitation impacts during El Niño episodes; (3) most recent official NOAA-CPC forecasts for the next 4 months; (4) most recent experimental forecasts; (5) discussion of experimental forecasts; (6) executive summary.

Figure 18a. Seasonal core regions map for January-March (JFM). This map shows index regions (IND) where the timing, amount and year-to-year variation of seasonal precipitation are similar. Each region is represented by one of nine different colors. The circular symbols represent National Weather Service weather stations (COOP) and the triangular symbols represent snowpack telemetry (SNOTEL) stations. The degree to which each symbol is filled in reflects the degree of similarity with other stations in the same core region.

Figure 18b. Historical *mild* El Niño precipitation impacts for October-May. The symbols on the map are scaled to reflect the percent of average precipitation received during selected *mild* El Niño years. Red symbols indicate below average precipitation and blue symbols indicate above average precipitation. Filled-in symbols indicate that the precipitation is statistically different from average. Contour lines indicate 1 km and 2 km elevations. Yellow-ochre colored areas are greater than 3 km in elevation.

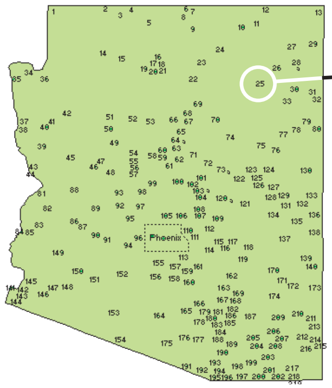
Figures 18c-d. CDC experimental precipitation forecasts. As with the NOAA-CPC forecasts (pages 11-12), these forecasts are expressed as a change in the probability of above or below average precipitation. Question marks indicate areas of forecast uncertainty. The "+" over northwestern Utah represents a small (less than 5%) positive shift in the probability of above average precipitation for that area. The forecasts are a based on a subjective blend of several historical, statistical, and climate model analyses.

Highlights: Moderate El Niño conditions are expected to persist through the winter months, but there is uncertainty in the outlook beyond spring 2003. Recent El Niño conditions are have not been strong enough to overwhelm other climatic influences. During the spring (March-May), weakening El Niño conditions may allow more storms to penetrate into Colorado and northern-most New Mexico, increasing the odds for wet conditions in those areas from March onward.

19. Heating Degree Days: Estimating energy expenditure from climate data

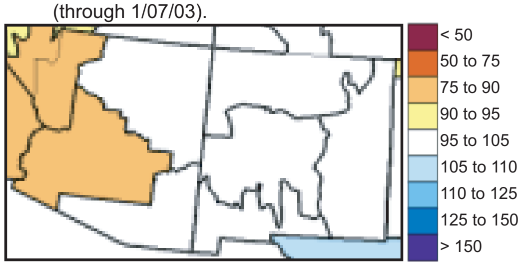
Sources: The Western Regional Climate Center (WRCC), Climate Prediction Center (CPC)

20a. WRCC heating degree day (HDD) data for individual stations in Arizona.

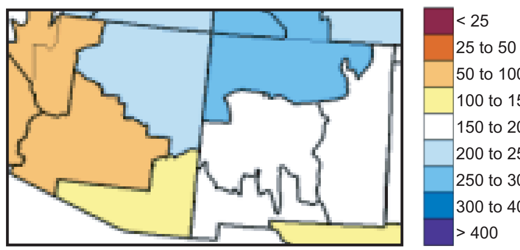


Station:(024586) KEAMS CANYON													
From Year=1948 To Year=2000													
Heating Degree Days for Selected Base Temperature (F)													
Base	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
65	1099	850	767	517	284	60	1	4	99	401	752	1063	5898
60	944	709	612	368	154	16	0	0	33	253	602	908	4600
57	851	624	519	283	98	6	0	0	15	176	512	815	3900
55	789	568	458	230	70	3	0	0	8	134	453	753	3465
50	634	427	308	120	25	0	0	0	1	58	307	598	2480

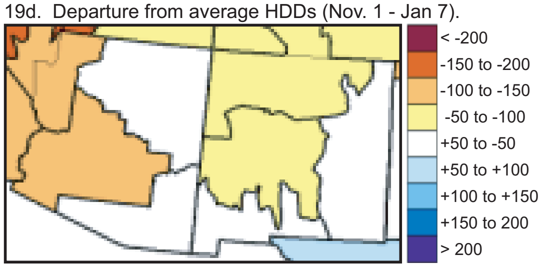
19b. Season-to-date percent of normal (%) HDDs (through 1/07/03).



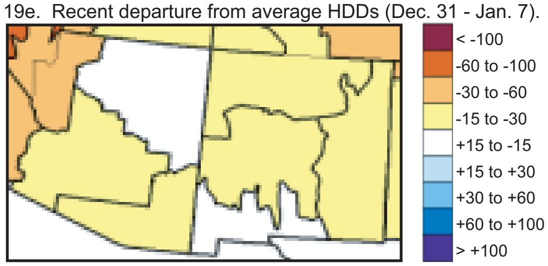
19c. Recent Observed HDDs (Dec. 31 - Jan. 7).



19d. Departure from average HDDs (Nov. 1 - Jan 7).



19e. Recent departure from average HDDs (Dec. 31 - Jan. 7).



Notes: Degree day is a quantitative index, where the the daily differences between the average daily temperature and a standard temperature (typically 65°F) are accumulated over a period of time. Heating (cooling) degree days are the sums of negative (positive) differences. For example, for an individual day, using a 65°F standard, a station with a daily average temperature of 61°F would have 4 heating degree days (HDDs). If the station reported the following temperatures over the course of a seven-day period: 61, 62, 70, 74, 78, 64, 60, the corresponding HDDs would be 4, 3, 0, 0, 0, 1, 5. The total HDDs for the week would be 13. The *heating year*, during which HDDs are accumulated, extends from July 1 to June 30. The *cooling year* extends from January 1 to December 31.

Using this approach, heating degree days can be calculated for individual meteorological stations and used to represent local energy consumption based on the frequency and duration of temperatures below the 65°F standard.

In addition to calculating degree days for individual stations, degree days are estimated for individual cities and state climate divisions. As area-wide estimates, HDDs are weighted with 1990 census population data to more accurately reflect temperature-related energy consumption at the metropolitan, state, regional, and national levels.

At the climate division level, CPC provides heating and cooling degree day maps for the last seven days and for entire seasons. The WRCC provides degree-day information for individual stations in 13 western states (including Alaska and Hawaii).

Highlights: Available from the WRCC, Figure 19a shows the sites in Arizona for which HDD information is available. By selecting an individual site, you can view a table of historical average HDDs for individual months (Figure 20a, right). Other degree-day information, such as cooling degree days and growing degree days, is also available on the WRCC website. CPC maps of HDD information (Figures 19b-e) incorporate 1990 census data and thus represent estimates of energy consumption based on deviations from a standard temperature of 65°F. Although July 1 is the standard beginning of the HDD year, CPC operational products use November 1, because cold weather energy consumption is more closely associated with the November 1 start date. Figures 20b-e show that HDDs have generally been lower than average (i.e., they reveal relatively low energy consumption and warmer than average temperatures) over large portions of Arizona and New Mexico.

For more on HDD for western U.S. stations, visit: http://www.wrcc.dri.edu/

For more on HDD for the entire U.S., visit: http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/DD_monitoring_and_data.html