



**REGIONAL WASTEWATER RECLAMATION DEPARTMENT**  
201 NORTH STONE AVENUE  
TUCSON, ARIZONA 85701-1207

**JACKSON JENKINS**  
DIRECTOR

PH: (520) 724-6500  
FAX: (520) 724-9635

April 21, 2015

**TO:** Jackson Jenkins, Director  
**FROM:** Kathleen Chavez, Water Policy Manager  
**SUBJECT:** Quarterly Drought Update – April 2015

As requested by the Board last summer, attached is a report on the status of drought in Pima County. The previous report prepared in November 2014 is also included. Several key points are noted since the November report.

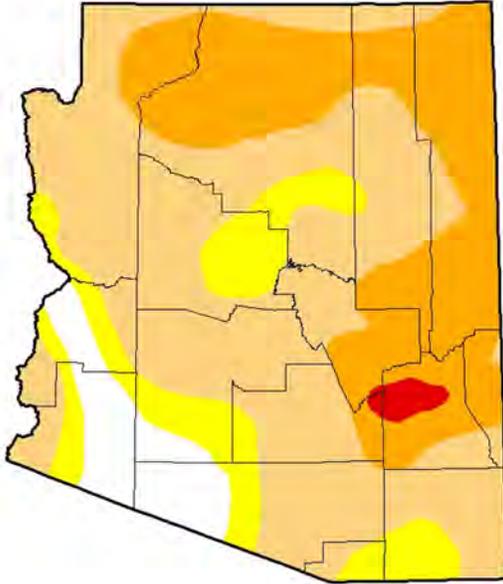
- Most of Pima County continues to be in drought according to the US Drought Monitor.
- Early winter precipitation had its greatest impact on southeast Arizona. Winter ranked well above normal for rainfall
- The National Weather Service reported 10.19 inches of precipitation in 2014 at its official recording station in Tucson which is 1.40 inches below normal. This is the thirteenth year since 2000 that below normal rainfall has been recorded
- In 2014 there were 47 consecutive days with no rain between March 3 and April 18 and 43 consecutive days with no rain between October 20 and December 1
- As Pima County enters its wildfire season, the U.S Forest Service forecasts a high fire danger
- Drought conditions in the Colorado River Basin continue to be of concern; the April snow-water equivalent across the Upper Colorado Basin is 51 percent of median. Snowpack for much of the Colorado River Basin is below average resulting in below average runoff and decreased stream flow. These impact water storage levels in Lake Powell and Lake Mead
- Lake Powell is 45 percent full and Lake Mead is 39 percent full. A Colorado River shortage is declared when the elevation of Lake Mead falls below 1075 feet; the elevation as of April 21 is 1081.1 feet. The probability of a shortage declaration in 2016 is low, but rises to 54 percent in 2017. The Arizona Department of Water Resources is holding a Colorado River Shortage Preparedness Workshop on April 22 to discuss the shortage declaration process and shortage impacts to CAP customers
- The elevation of Lake Mead continues to decline. Arizona is working with other Basin states to reverse the trend
- While there is an El Niño advisory, it has been a weaker event compared to past cycles. The National Oceanic and Atmospheric Administration's three-month outlook forecasts equal changes for wetter than normal, dryer than normal or normal precipitation in Pima County.

Should you have any questions, please feel free to let me know.

Attachment

**DROUGHT: US Drought Monitor (USDM) Mapping**

**U.S. Drought Monitor  
 Arizona**



**April 7, 2015**

(Released Thursday, Apr. 9, 2015)  
 Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	7.07	92.93	80.21	29.49	0.07	0.00
<b>Last Week</b> 30/2015	7.07	92.93	80.21	29.49	0.97	0.00
<b>3 Months Ago</b> 1/9/2015	0.00	100.00	82.71	34.92	2.77	0.00
<b>Start of Calendar Year</b> 12/02/2014	0.00	100.00	83.05	35.34	3.84	0.00
<b>Start of Water Year</b> 9/08/2014	0.00	100.00	84.58	37.92	3.76	0.00
<b>One Year Ago</b> 4/9/2014	0.00	100.00	88.56	57.06	5.18	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

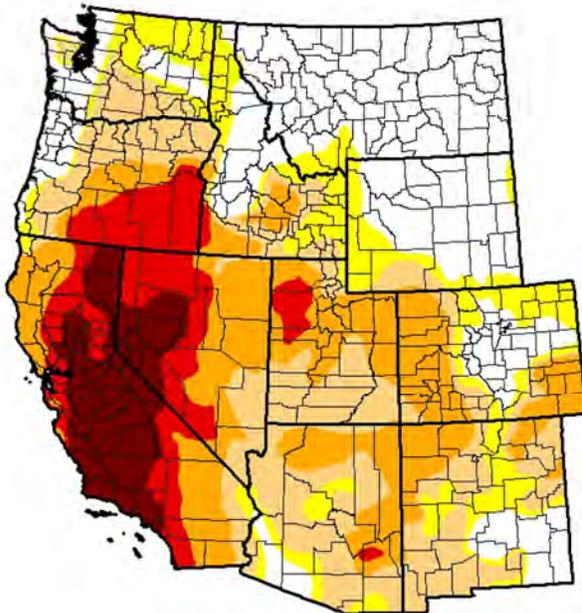
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:  
 Michael Brewer  
 NCDC/NOAA



<http://droughtmonitor.unl.edu/>

**U.S. Drought Monitor  
 West**



**April 7, 2015**

(Released Thursday, Apr. 9, 2015)  
 Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	27.70	72.30	59.80	37.72	17.04	7.63
<b>Last Week</b> 30/2015	28.49	71.51	59.80	36.89	17.04	7.23
<b>3 Months Ago</b> 1/9/2015	34.82	65.18	54.24	33.31	18.57	5.40
<b>Start of Calendar Year</b> 12/02/2014	34.76	65.24	54.48	33.50	18.68	5.40
<b>Start of Water Year</b> 9/08/2014	31.48	68.52	55.57	35.65	19.95	8.90
<b>One Year Ago</b> 4/9/2014	28.62	71.38	60.61	42.40	16.03	4.03

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

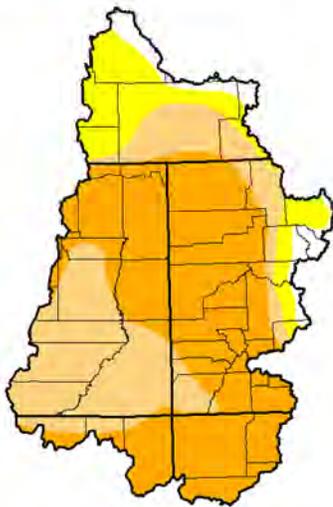
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:  
 Michael Brewer  
 NCDC/NOAA



<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor  
 Upper Colorado Watershed



April 7, 2015  
 (Released Thursday, Apr. 9, 2015)  
 Valid 7 a.m. EST

Drought Conditions (Percent Area)

	D0	D1	D2	D3	D4
Current	4.39	12.67	31.13	59.81	0.00
Last Week 3/31/2015	4.39	12.67	31.13	59.81	0.00
3 Months Ago 1/07/15	50.43	13.17	12.64	13.02	4.14
Start of Calendar Year 1/01/15	50.43	13.17	12.24	14.02	4.14
Start of Water Year 10/01/14	56.35	12.64	12.84	9.21	8.95
One Year Ago 04/07/14	15.06	49.69	23.93	11.31	0.00

Intensity

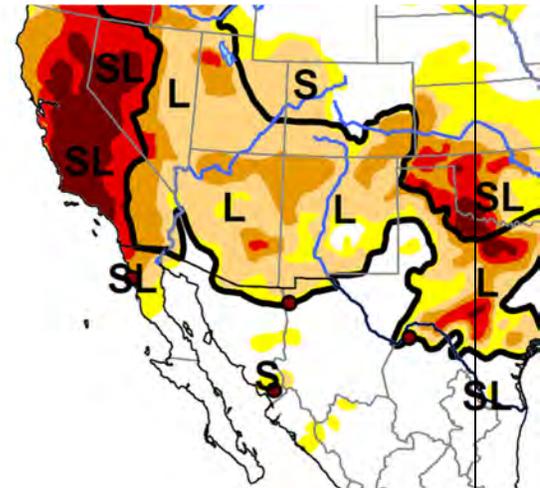
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
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The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

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 Michael Brewer  
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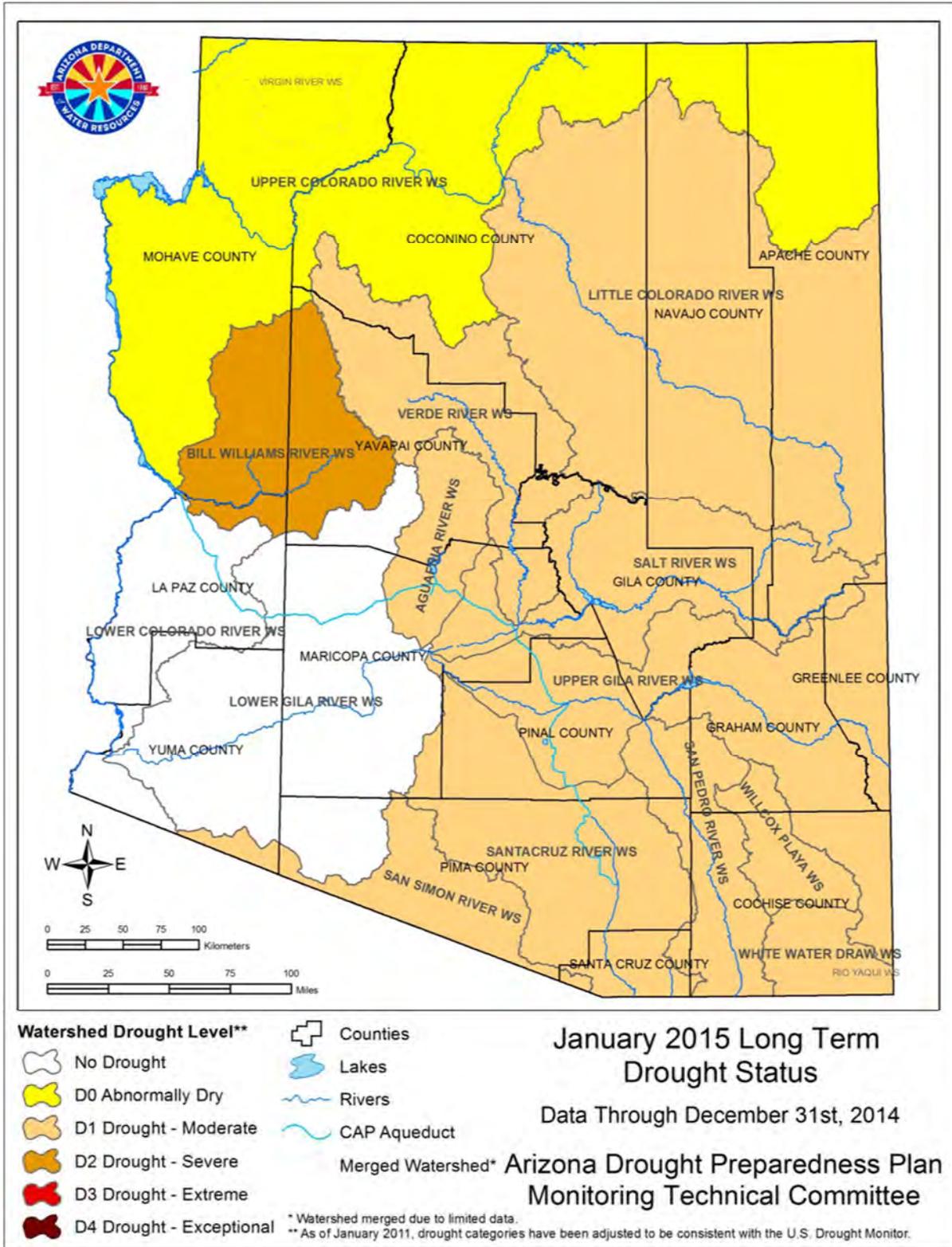
<http://droughtmonitor.unl.edu/>



Arizona Drought Monitoring Technical Committee (MTC)  
 Drought Status Summary

**USDM Arizona Short Term Map-** Significant precipitation across northern Arizona in late February and early March led to improvement from extreme drought (D3) to severe drought (D2) in the Chuska Mountains of Apache County, and improvement from severe drought (D2) to moderate drought (D1) in northern Navajo, Coconino and Mohave counties. Further south, near Flagstaff in southern Coconino County, and in central and southern Yavapai County, relatively warm and dry conditions in February have led to some worsening drought with an increase in moderate drought (D1) during the past month. Central and southern Arizona have had no changes in drought conditions since the end of January.

**MTC Arizona Long Term Map-** The early winter precipitation in December and January had its greatest impact on southern Arizona, with most of the southern watersheds improving by one category. This followed heavy precipitation in these watersheds during the monsoon, and the combination has led to their improvement in this seasonal update. In northern Arizona, the fall and early winter precipitation in most cases is near average, however much of the precipitation has been falling as rain rather than snow below 9,000 feet. As a result, the outlook for spring run-off and water supply is not showing much improvement.



**PRECIPITATION AND TEMPERATURE: NOAA Regional Climate Center SPI**

**Rain**

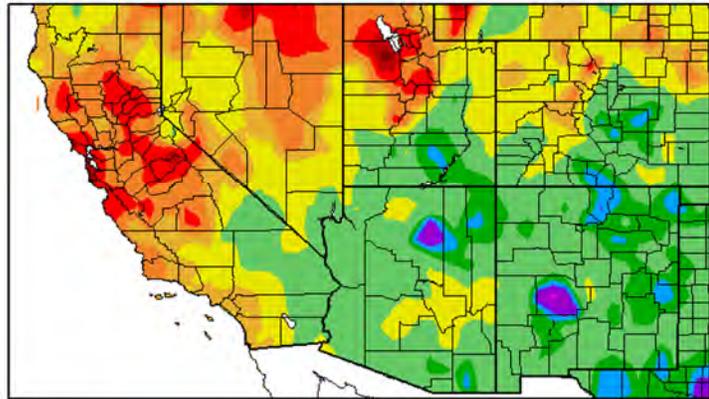
Rainfall was 1.40" below average last year though totals ranged widely depending on the region (official recording conducted at the airport). Below normal rainfall has occurred almost every year since 2000. However, September, October and December were wetter than average, with new records set for single day precipitation on September 8<sup>th</sup> (1.84") and October 8<sup>th</sup> (0.67")- the result of tropical storms brought on by a weak El Nino system expected to bring more moisture leading up to the monsoon season.

Winter ranked well above normal for rainfall with more than 5" of rain (+ 2.39") and the first quarter of 2015 is a continuation of wetter than average conditions, recording 3.45" or 0.92" above normal.

For the Water Year (measured October – September), 6.95" of rain has been recorded, the wettest since 2000-2001 and perhaps the first above normal water calendar year in 14 years.

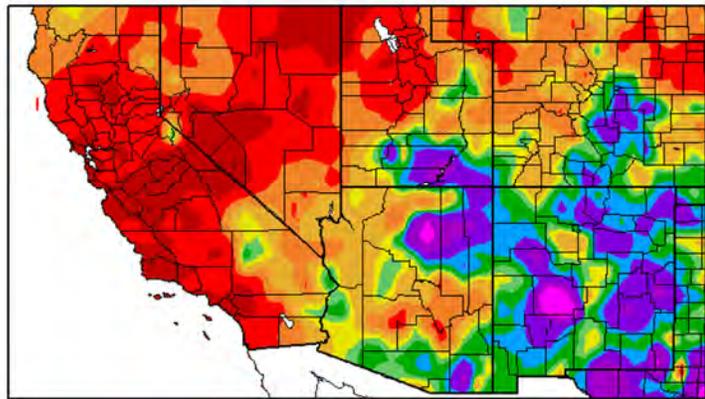
The next three months have potential for above normal rain though the period before monsoon season leading into June is typically dry and the most stressful for riparian habitat.

3-Month SPI  
1/1/2015 – 3/31/2015



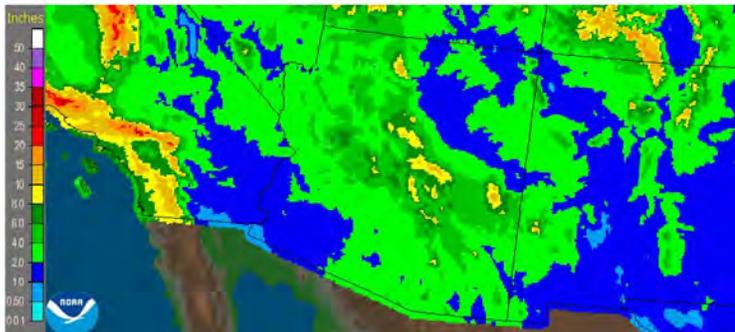
Generated 4/5/2015 at HPRCC using provisional data. Regional Climate Centers

Percent of Normal Precipitation (%)  
1/1/2015 – 3/31/2015



Generated 4/5/2015 at HPRCC using provisional data. Regional Climate Centers

Arizona: Current 90-Day Normal Precipitation  
Valid at 4/15/2015 1200 UTC- Created 4/15/15 16:32 UTC



**Pima County Local Drought Impact Group (LDIG)  
Quarterly Drought Update April 2015**

The Arizona MTC reports "March was not a wet month, but sufficient precipitation fell in most parts of the state to prevent dryness from increasing. However, the White Mountains of eastern Arizona were very dry in March leading to a worsening drought condition. As a result, southern Navajo and Apache counties, as well as northeastern Gila and northern Greenlee counties, were downgraded from moderate drought (D1) to severe drought (D2)."

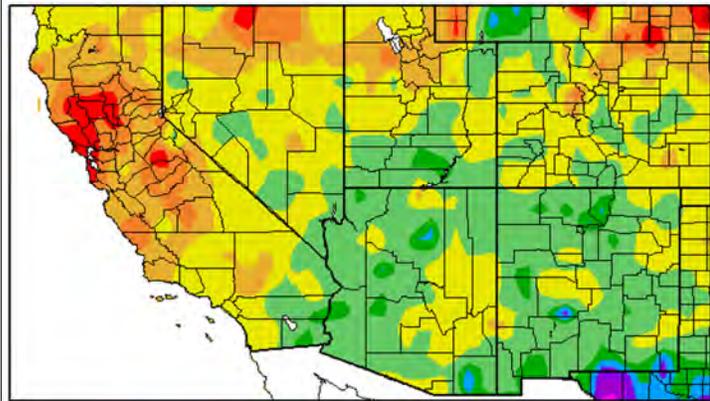
**Temperature**

2014 was the warmest year on record, surpassing significantly warm years of 2013 and 2012. The first quarter of 2015 also ranks as the warmest recorded with February 6.8° above average. Continuing warm and wetter than average weather is expected. The additional heat increases evaporation and evapotranspiration of riparian habitat while decreasing snowpack and runoff in mountain elevations, the source of surface water feeding the Colorado River and Salt/Verde Basins.

Low soil moisture, a result of high temperatures, curtailed runoff into the Colorado River this past winter, reducing inflow into Lake Mead.

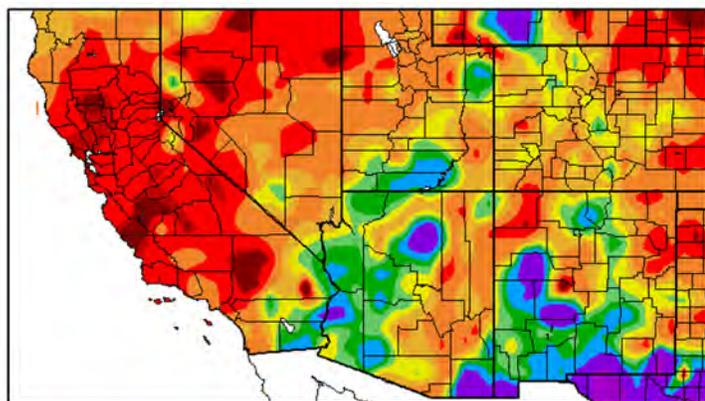
	<b>Rain</b>	<b>+/-</b>	<b>Avg°</b>
January	2.54"	+1.60"	+ 2.8°
February	0.41"	- 0.45"	+ 6.8°
March	0.50"	- 0.23"	+ 6.2°

Monthly SPI  
3/1/2015 - 3/31/2015



Generated 4/5/2015 at HPRCC using provisional data. Regional Climate Centers

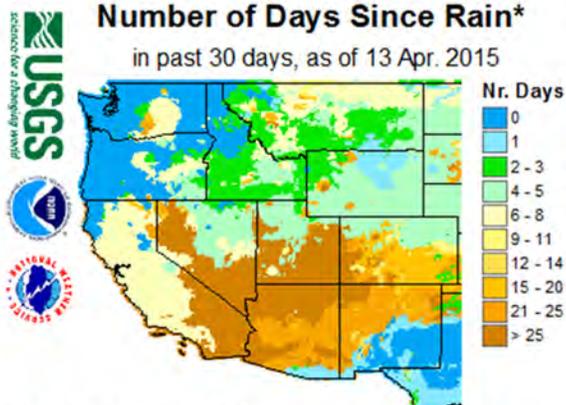
Percent of Normal Precipitation (%)  
3/1/2015 - 3/31/2015



Generated 4/5/2015 at HPRCC using provisional data. Regional Climate Centers

**Number of Days Since Rain\***

in past 30 days, as of 13 Apr. 2015

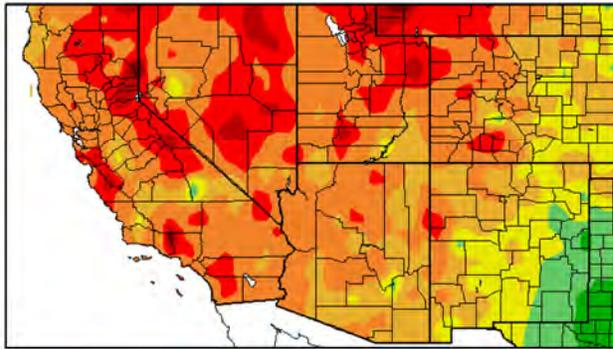


\* Rain Day is rainfall >= 0.04 in.

Map produced by USGS/EROS

**Pima County Local Drought Impact Group (LDIG)  
Quarterly Drought Update April 2015**

Departure from Normal Temperature (F)  
1/1/2015 - 3/31/2015



Generated 4/11/2015 at HPRCC using provisional data.

Regional Climate Centers



**THREE-MONTH OUTLOOK  
TEMPERATURE PROBABILITY  
0.5 MONTH LEAD  
VALID AMJ 2015  
MADE 19 MAR 2015**

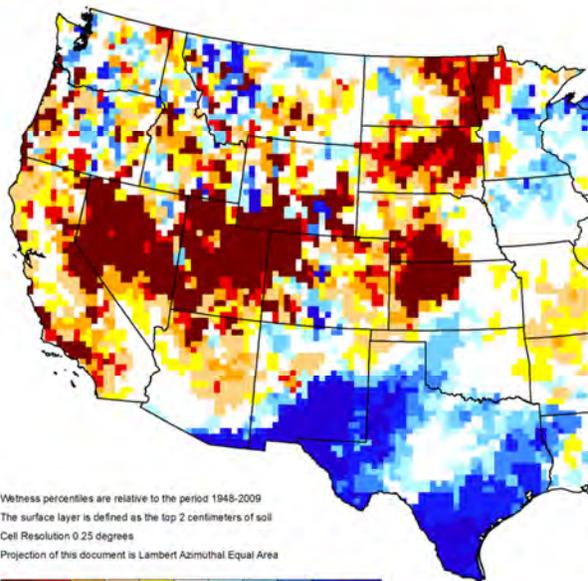


**SOIL MOISTURE: NASA GRACE**

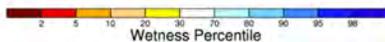


**GRACE-Based Surface Soil Moisture**

April 13, 2015



Wetness percentiles are relative to the period 1948-2009  
The surface layer is defined as the top 2 centimeters of soil  
Cell Resolution 0.25 degrees  
Projection of this document is Lambert Azimuthal Equal Area

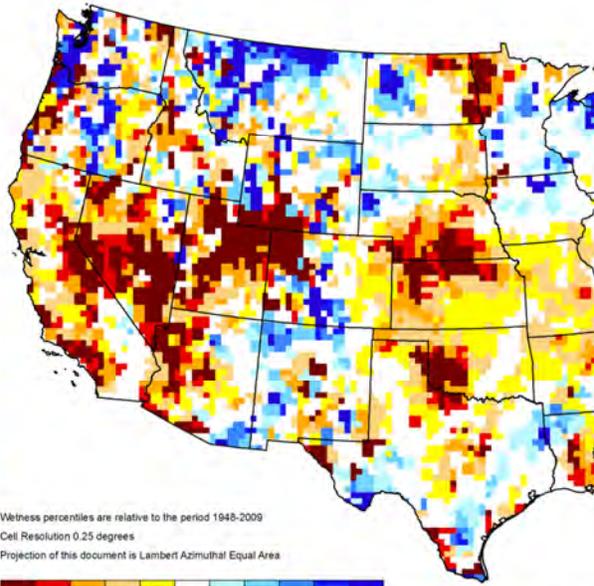


<http://drought.unl.edu/>

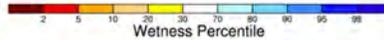


**GRACE-Based Shallow Groundwater**

April 13, 2015

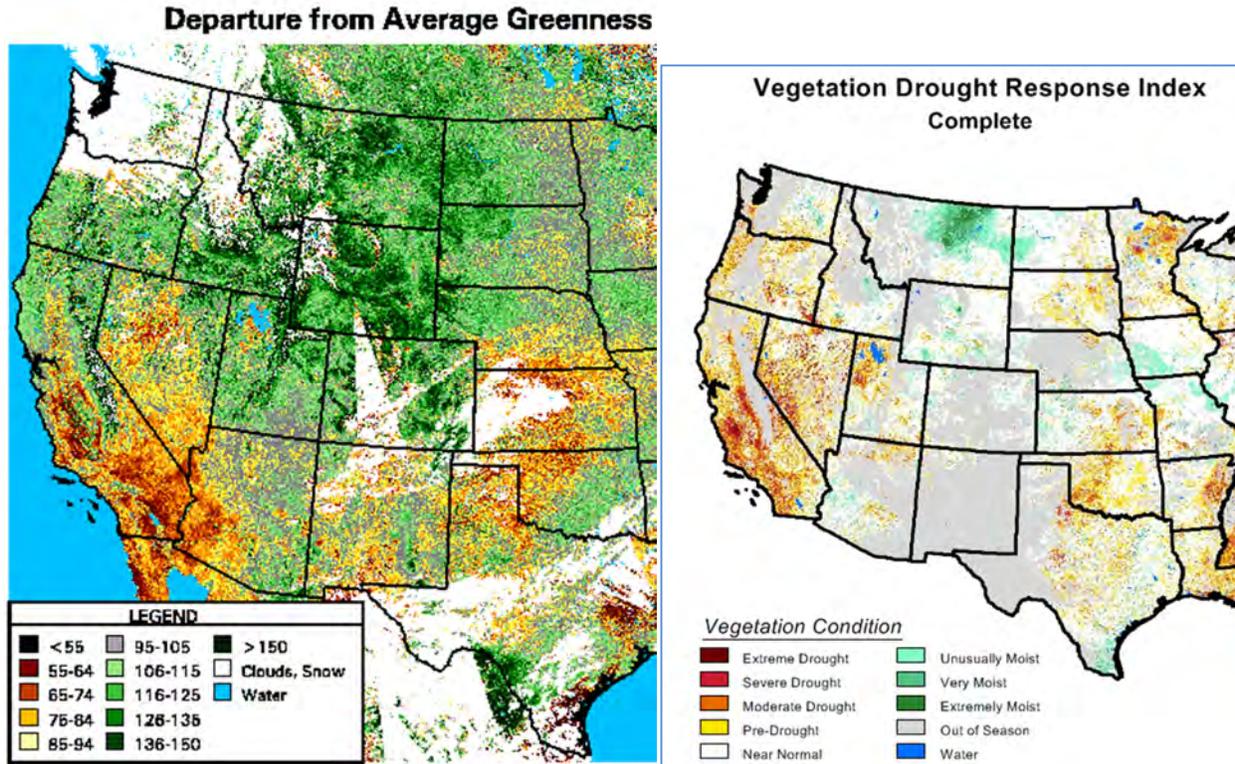


Wetness percentiles are relative to the period 1948-2009  
Cell Resolution 0.25 degrees  
Projection of this document is Lambert Azimuthal Equal Area



<http://drought.unl.edu/>

VEGETATION STRESS: NDMC VegDRI

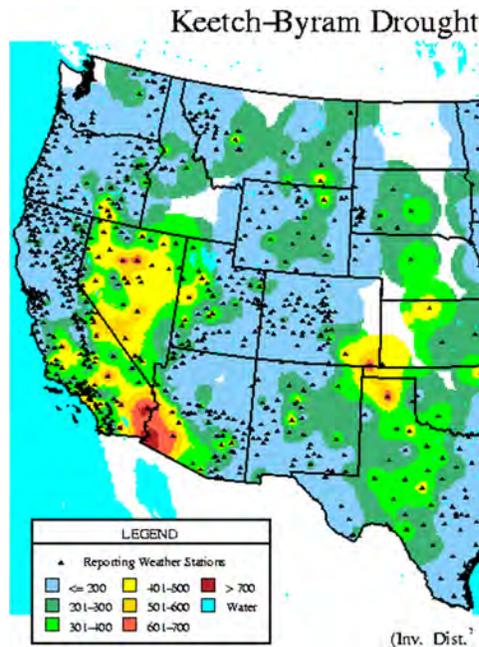


Ending last year, the state was at roughly 80% of historical greenness (visual indication of moisture based on VegDRI maps) for that time of year, with most of the state below 50%.

USDA's Crop Bulletin reports the Pima County region's crop moisture index as abnormally dry for shallow soil (a different index, separate from the drought monitor). At this time, **Pima County is designated a primary county for drought disaster** by the USDA Farm Service Agency, enabling assistance for county farms. The entirety of Arizona, California and Nevada are designated drought disaster areas. Despite this, a large majority of pasture and range condition is reported in fair to good condition (75%), an improvement from a year ago when 52% was deemed very poor to poor. Crop progress reports indicate adequate soil moisture to keep crops in fair to good condition; green-leaf vegetables have been harvested and shipped while wheat and cotton have been planted.

Arizona farm and range condition is in contrast to California's deterioration, where up to 500,000 acres are expected to be out of production and cotton acreage will be at its lowest since the 1920's. California ranchers are moving cattle out of degraded rangeland; only 15% of surveyed acreage reported adequate soil moisture (compared to 70-80% in Arizona).

### WILDFIRE: USFS Fire Behavior Index



Pima County current conditions indicative of an early growing season with lower litter and duff layers beginning to have potential to contribute to fire intensity but lacking active burning potential present in southwest corner of state. Blue area has high soil moisture and does not contribute fire intensity. The region is in a green-up and green plant canopy growing season. Precipitation triggering growth then followed by drying period creates dead fuel for wildfire. Forecasted fire danger class is high.

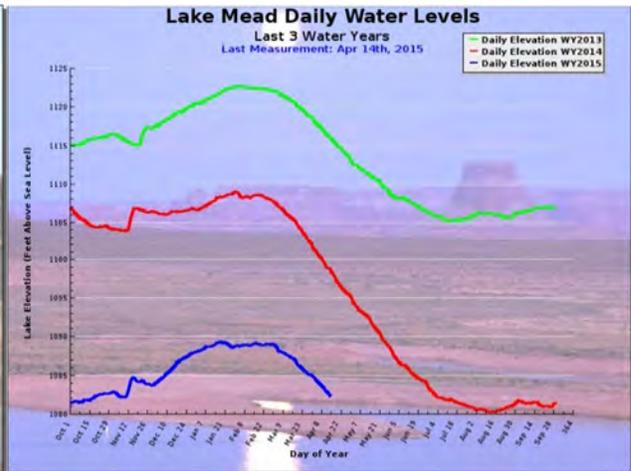
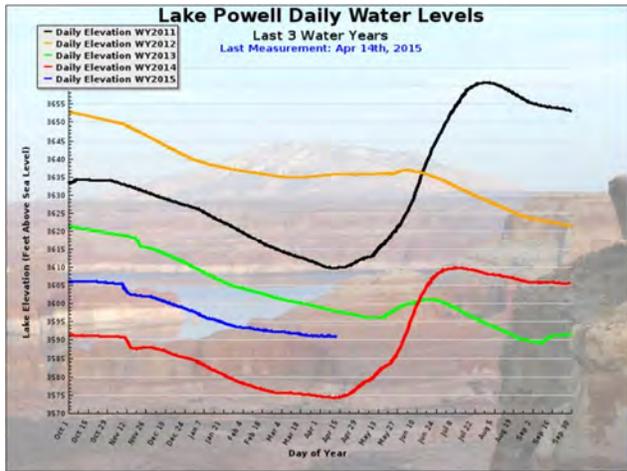
### CAP WATER SUPPLY: Colorado River Basin

Drought conditions within the Colorado River Basin impact the water supply available to southern Arizona through the CAP canal. The snow water equivalent (SWE), volume of water present in snowpack, within the Upper Colorado Basin was below average in March, at 76% of historical median. One month later, in April, **SWE is 51%** of median. Less snow and SWE will reduce unregulated inflow to Lake Powell. Lower soil moisture reduces runoff when snowpack melts; ending last year, soil moisture in areas of the Basin was below average. Total current Upper Basin snowpack is at 56%. Inflow into Lake Powell from now through July will be half of normal supply.

**Lake Powell is 45%** full, with 10.9 million acre feet (maf) of storage; elevation is 3,590'. Content in reservoirs above Powell ranges from 90%-58% of capacity. Total system content in the Colorado Basin is 28.6 maf. A release from Powell will supply the Lower Colorado and Lake Mead; still unknown, and vital to Mead, is the volume- 9 maf is probable but a slim chance exists that deteriorating hydrology above Powell will force a reduced release and, in turn, a shortage. **Lake Mead is 39%** full, 10.2 maf stored; elevation is 1,082'. A Colorado River shortage is declared when Mead falls below 1,075', then again at subsequent elevation triggers. The **probability of a shortage in 2016 is low but rises to 54% in 2017- or 90% in 2017 as a result of a reduced release from Powell.**

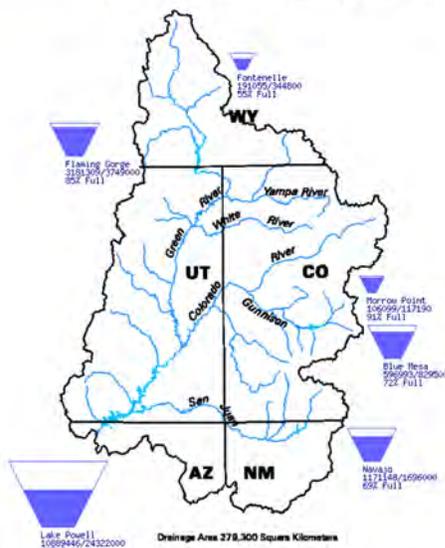
Should it be called, a shortage would remove 320,000 af from CAP supply, impacting agricultural users mostly. California would continue to receive its entire allocation, having senior rights. Municipal water is safeguarded, to be impacted only in more dire circumstances, if Lake Mead falls below 1,000'. Troubling, though, is Lake Mead's continuing decline, a structural deficit CAP has identified and is working with other Basin states to reverse.

**Pima County Local Drought Impact Group (LDIG)  
Quarterly Drought Update April 2015**

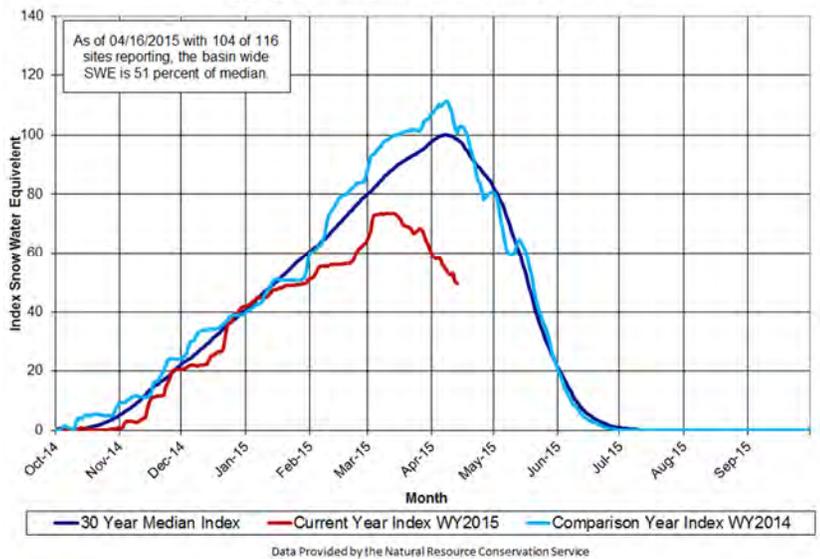


Data Current as of:  
04/14/2015

**Upper Colorado River Drainage Basin**



**Upper Colorado River Basin Snotel Tracking  
Aggregate of 116 Snotel Sites above Lake Powell**

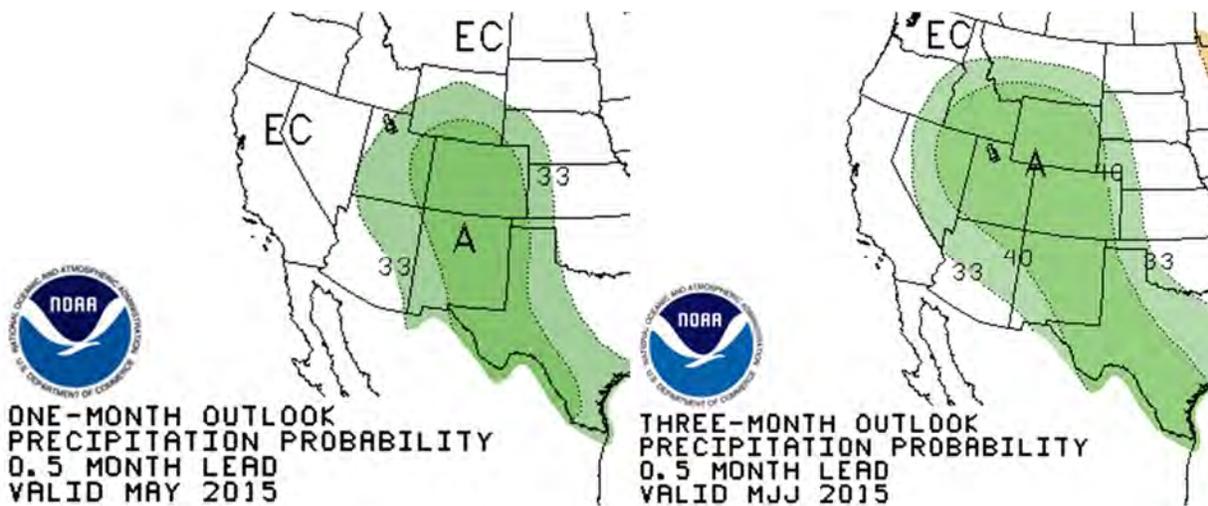


The Colorado Basin River Forecast Center's April report downgraded runoff volume; snowpack is much below average across the Basin ranking near the lowest of the historical record for numerous sites- a result of below average precipitation combined with higher temperatures. Snow melt has occurred at lower and middle elevations and is continuing at higher elevations; sites are reporting the earliest melt date on record. Soil moisture conditions have been mixed, where dry it has reduced runoff.

Latest inflow forecast for Lake Powell has decreased 350,000 acre feet, dropping from 52% to 47% of average inflow, or 3.40 million acre feet. The trend in streamflow is continual decrease- "much below average runoff volumes will be widespread this year".

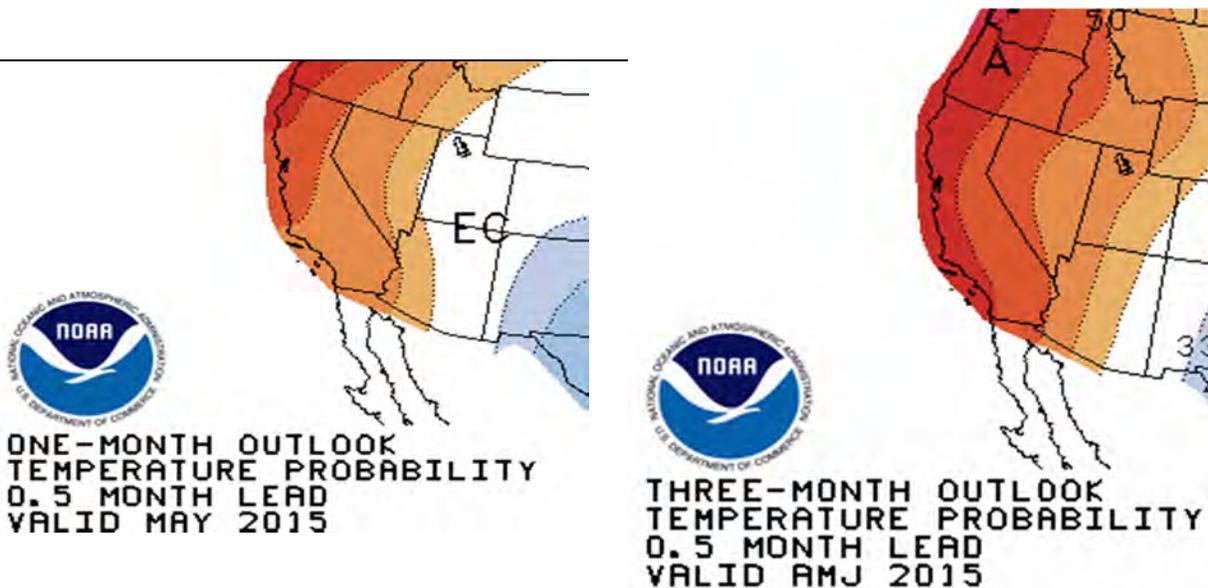
Precipitation for the near term in the Basin is not expected to impact water supply forecasts; active weather is expected but from a weak El Nino event, amount of precipitation is unknown with lowering confidence in any significant volume.

FORECAST: NWS One/Three Month Outlook



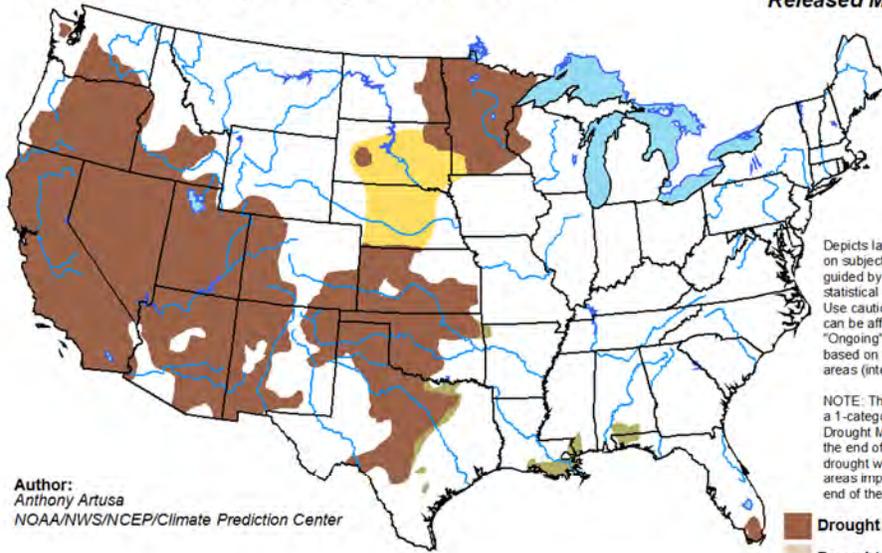
**Rain-** Projected for the central and northeastern part of the state, chances for above average precipitation skirt the southern region though there is higher probability for the Colorado Basin. **El Nino Advisory-** a weak El Nino signal continues, producing a 70% chance it will continue through summer and a greater than 60% probability it will last through fall. NWS denotes “combined oceanic and atmospheric conditions taken together indicate El Nino conditions remain in place and are likely strengthening.” Should models hold, generally, the southwest is expected to be wetter than normal leading into and following the monsoon season.

**Temperature-** Higher temperatures will impact some areas of the state not experiencing drought at the moment though half the state will be affected in the next three months. Areas of snowpack in the Colorado Basin are not expected to see higher temperatures, which is a positive development as increased evaporation decreases runoff.



### U.S. Monthly Drought Outlook Drought Tendency During the Valid Period

Valid for April 2015  
 Released March 31, 2015



Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:  
 Anthony Artusa  
 NOAA/NWS/NCEP/Climate Prediction Center

- Drought persists/intensifies
- Drought remains but improves
- Drought removal likely
- Drought development likely

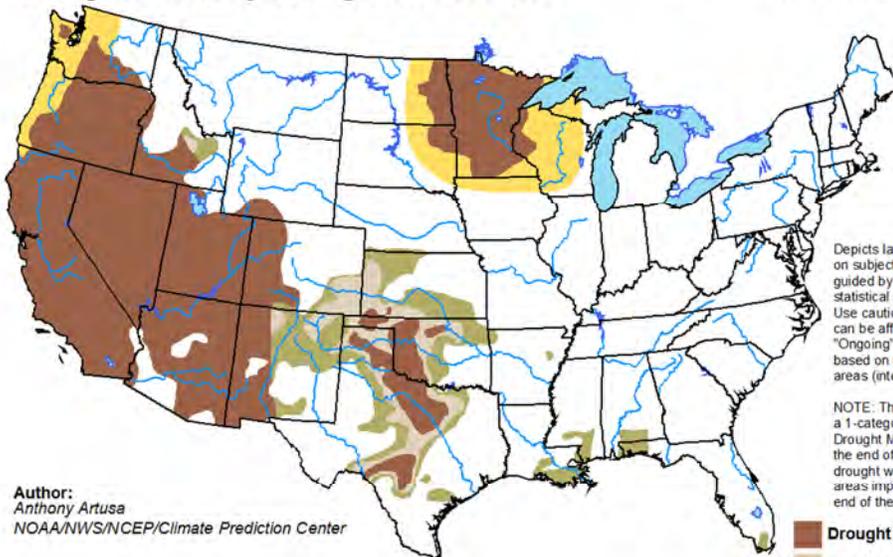


<http://go.usa.gov/h6jh>



### U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for March 19 - June 30, 2015  
 Released March 19, 2015



Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

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- Drought persists/intensifies
- Drought remains but improves
- Drought removal likely
- Drought development likely



<http://go.usa.gov/hHTe>





**PIMA COUNTY**

**REGIONAL WASTEWATER RECLAMATION DEPARTMENT**

201 NORTH STONE AVENUE  
TUCSON, ARIZONA 85701-1207

**JACKSON JENKINS**  
DIRECTOR

PH: (520) 724-6500  
FAX: (520) 724-9635

December 9, 2014

**TO:** Jackson Jenkins, Director  
**FROM:** Kathleen Chavez, Water Policy Manager  
**SUBJECT:** Quarterly Drought Update – November 2014

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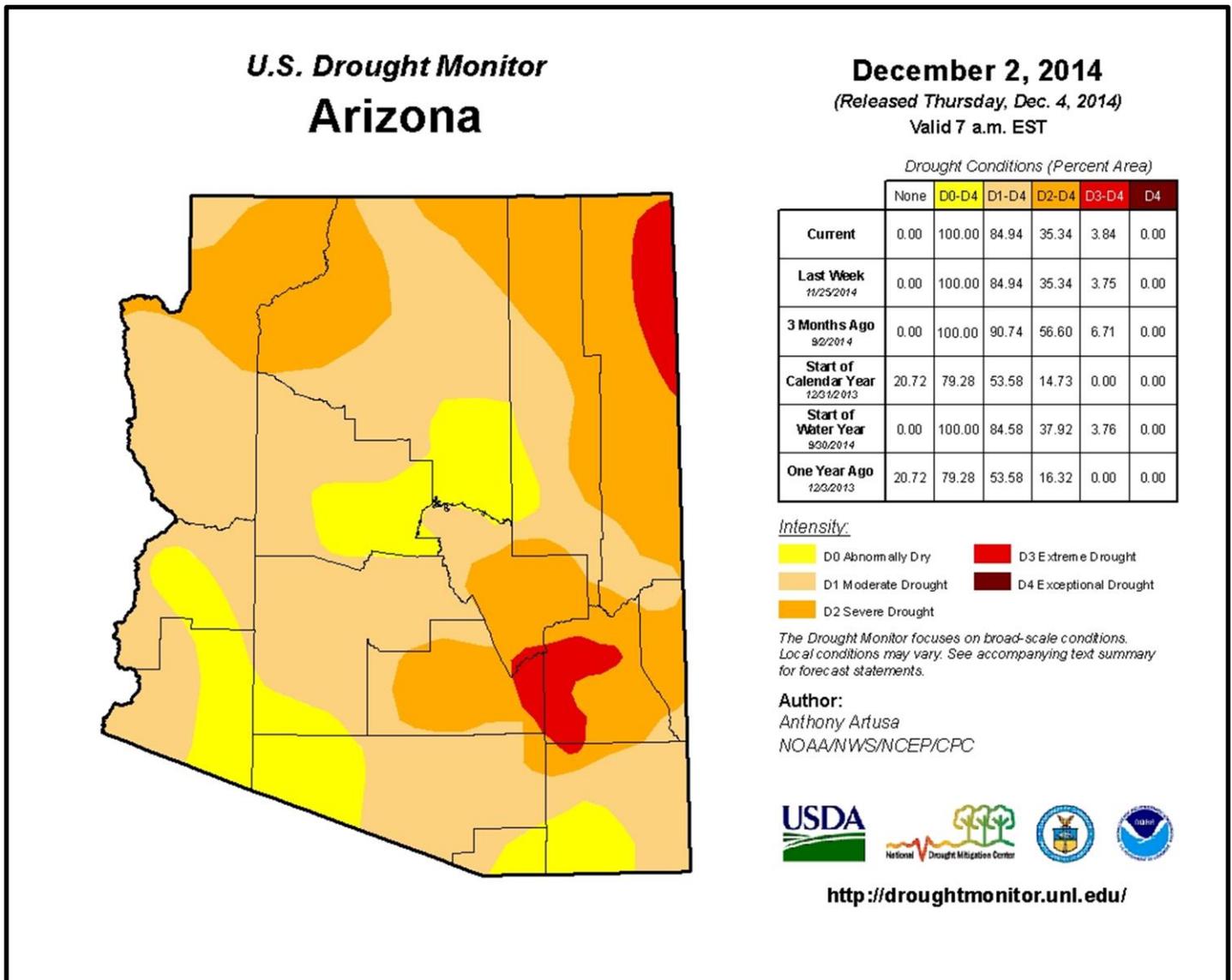
In consideration of a recent amendment to the County's Drought Response Plan and Water Wasting Ordinance, the Board of Supervisors requested periodic updates of drought status and Central Arizona Project (CAP) water supply. A report was provided to the Board September 5, 2014 expanding upon and further defining these two topics. It was noted additional updates would be presented, given the seasonal changes of drought status and the increasingly prominent issues of water policy and drought mitigation during Colorado River System storage decline.

Attached is a Quarterly Drought Update; additional quarterly updates will be timed to appropriately inform the Board of important water supply and drought management actions.

Should you have any questions, please feel free to let me know.

Attachments

Short-Term Drought Status (NDMC)

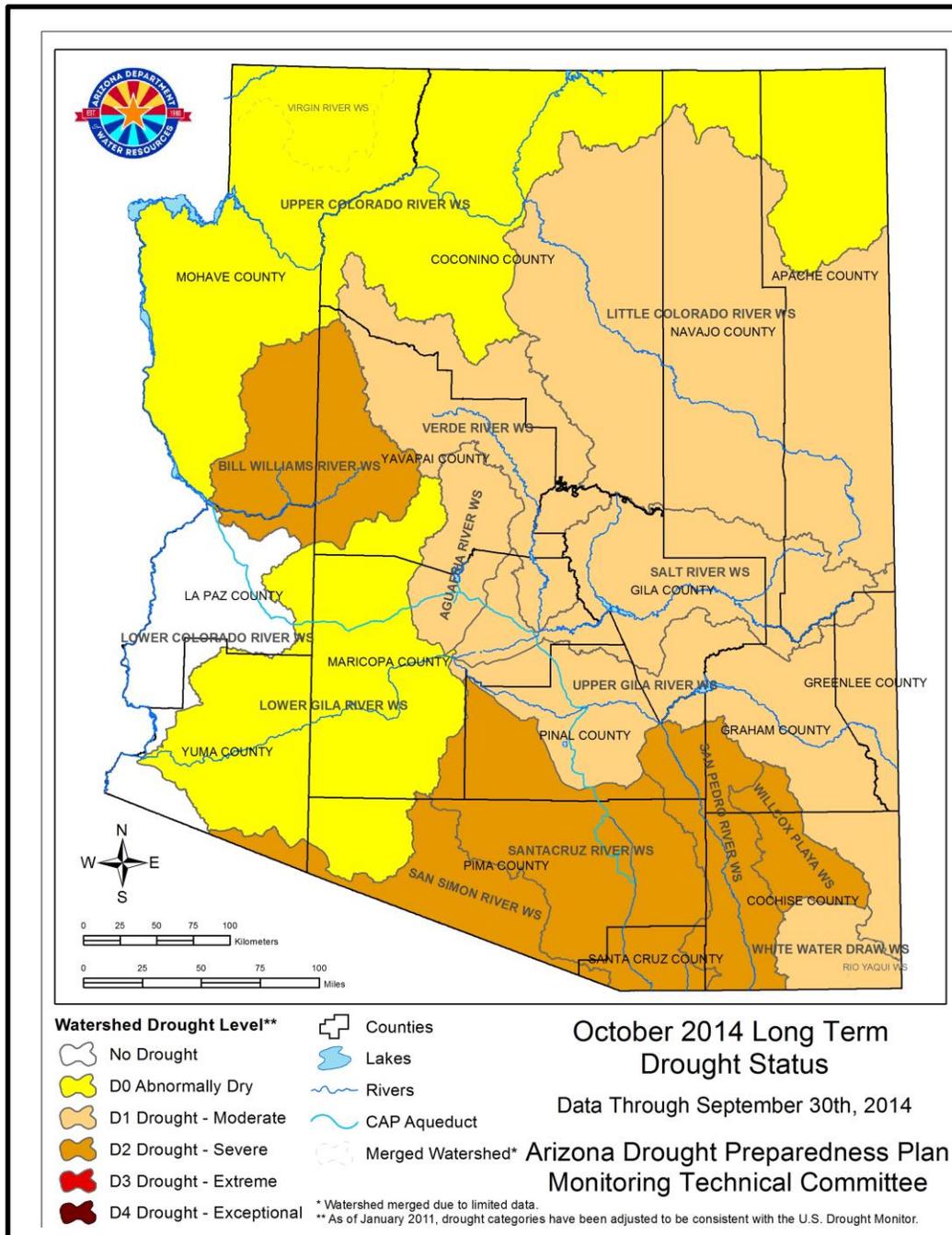


**Short-Term Drought Summary (ADWR-MTC)**

October's short-term drought status remains the same as September's, reflecting significant short-term drought relief brought by the monsoon to most parts of the state. The area of the state in extreme drought dropped from 16.8% at the end of June to 3.75% at the end of October, and the area in severe drought decreased from 76% to 38% over the summer.

The improvement was largely due to a series of tropical storms that brought moisture northward from the Gulf of California, resulting in heavy rainfall through much of the state in August and September. The only part of the state that did not benefit from monsoon rainfall was the northeast.

Long-Term Drought Status (ADWR-MTC)

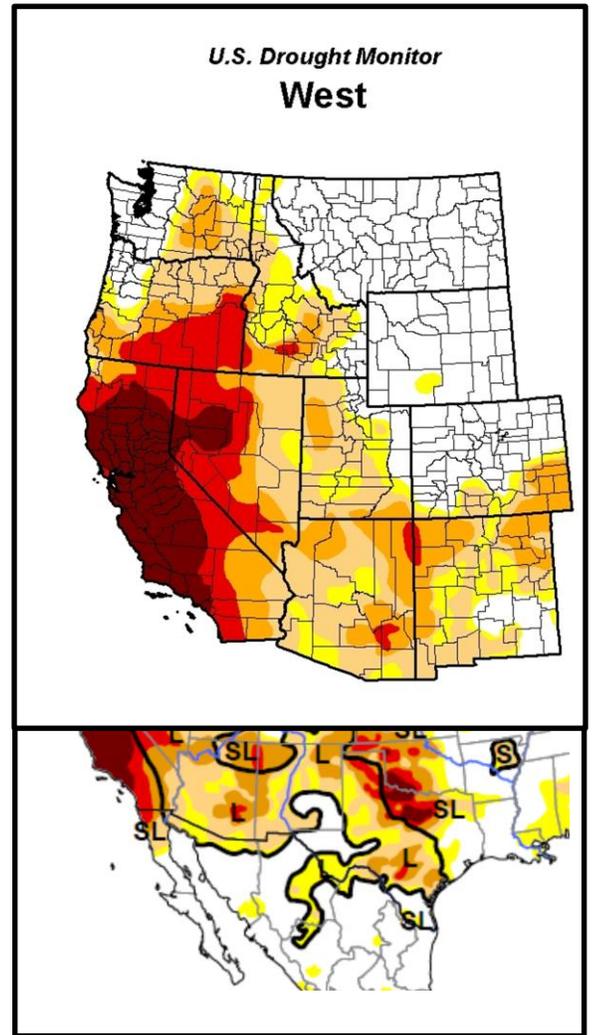
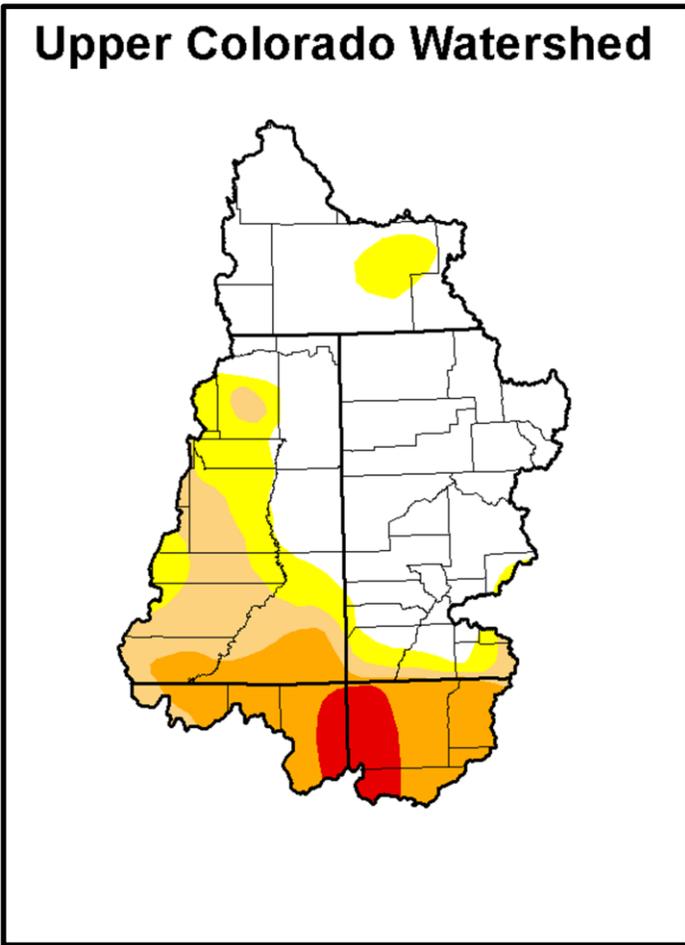


Long-term Drought Status Update (ADWR-MTC)

Long-term Drought Status Update: July - September 2014

Monsoon precipitation brought improvements to long-term drought, most notably in the Verde, Agua Fria, and Lower Colorado River watersheds. These three watersheds all improved by one category, and one watershed (Lower Colorado) has no drought. The very wet monsoon likely caused some improvement on many other watersheds in central and southern Arizona (such as the San Pedro), but not enough to compensate for longer term drought conditions over the entire watershed. The next update in early February will reflect the conditions of October, November and December.

Regional Drought Status (NDMC, NADM)



#### Upper Colorado Region Drought

*Drought Conditions (Percent Area)*

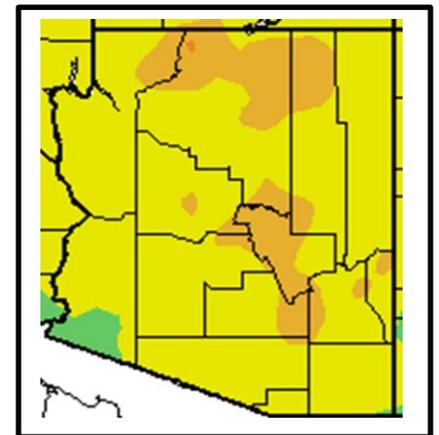
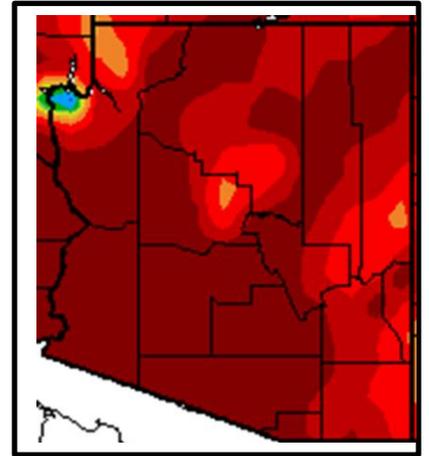
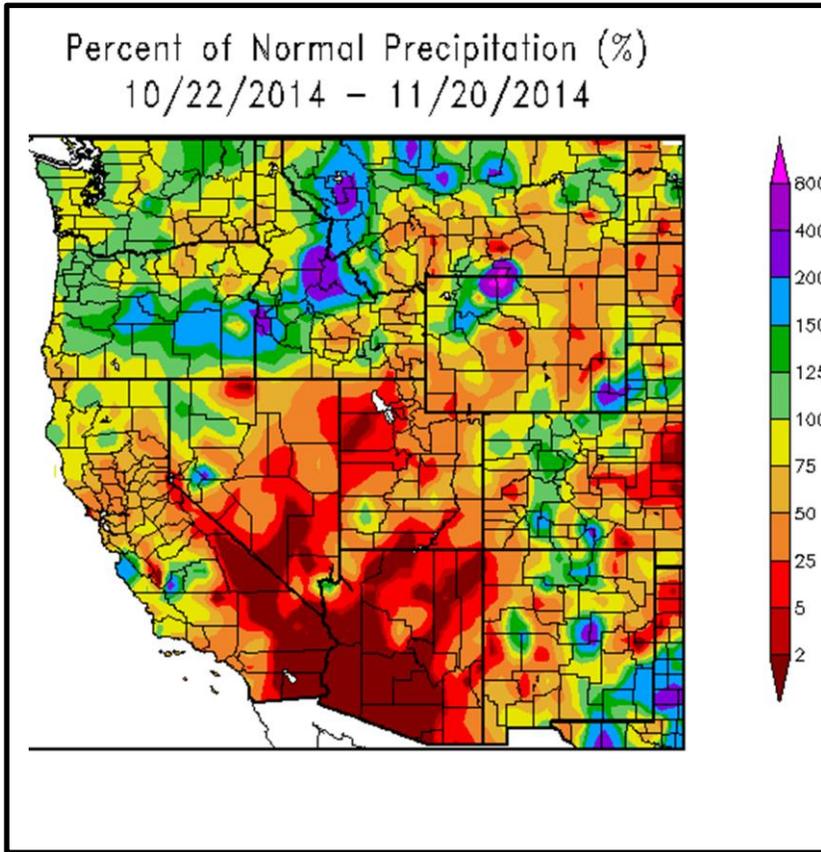
	None	D0	D1	D2	D3	D4
<b>Current</b>	56.43	13.17	12.24	14.02	4.14	0.00
<b>Last Week</b> <i>11/25/2014</i>	56.43	13.17	12.24	15.74	2.42	0.00
<b>3 Months Ago</b> <i>9/2/2014</i>	44.16	17.78	17.61	13.07	7.37	0.00
<b>Start of Calendar Year</b> <i>12/31/2013</i>	8.05	71.50	19.44	1.01	0.00	0.00
<b>Start of Water Year</b> <i>9/30/2014</i>	56.35	12.64	12.84	9.21	8.95	0.00
<b>One Year Ago</b> <i>12/3/2013</i>	8.05	66.33	18.37	7.25	0.00	0.00

#### Western Region Drought

*Drought Conditions (Percent Area)*

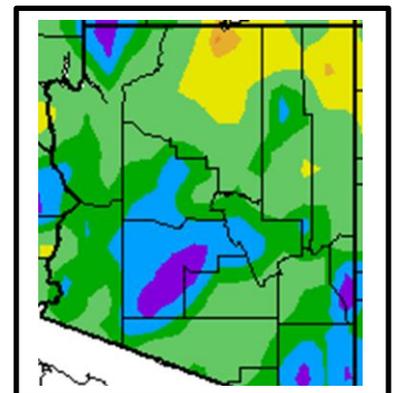
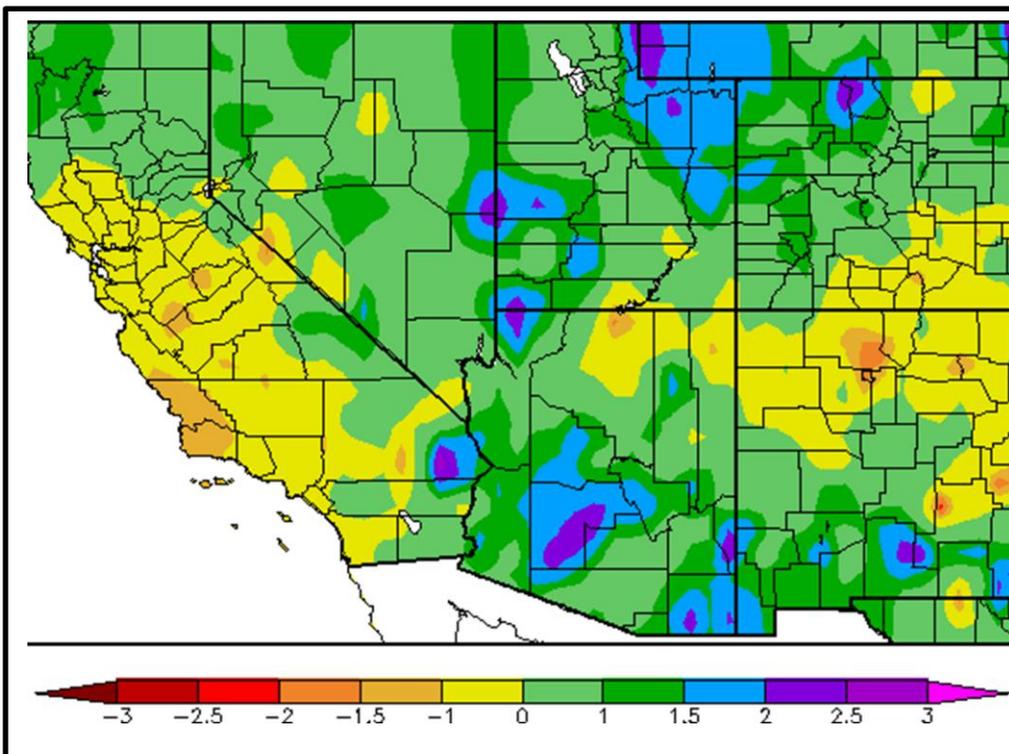
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	34.66	65.34	54.99	33.88	18.75	8.45
<b>Last Week</b> <i>11/11/2014</i>	34.62	65.38	54.45	34.16	18.75	8.45
<b>3 Months Ago</b> <i>8/19/2014</i>	27.21	72.79	59.27	42.84	20.97	8.90
<b>Start of Calendar Year</b> <i>12/31/2013</i>	22.20	77.80	51.44	31.11	7.75	0.63
<b>Start of Water Year</b> <i>9/30/2014</i>	31.48	68.52	55.57	35.65	19.95	8.90
<b>One Year Ago</b> <i>11/19/2013</i>	27.36	72.64	53.20	32.23	7.56	0.63

ACIS Map-Percent of Normal Precipitation & SPI 30 Day (NDMC)



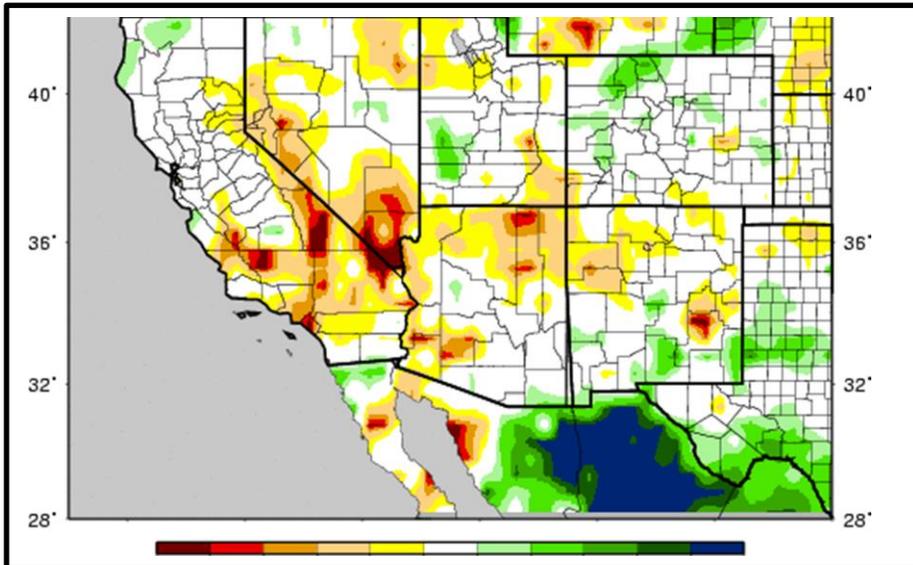
3 Month Western SPI (NDMC)

1 Month SPI

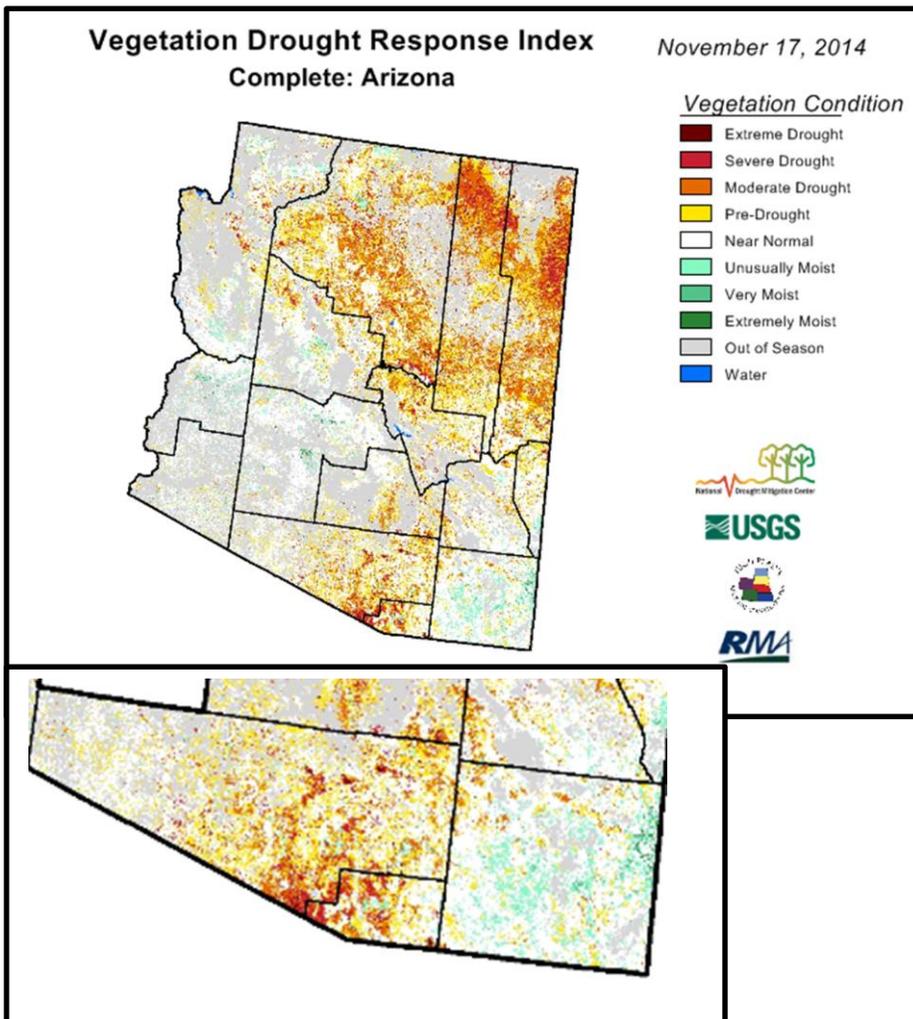


3 Month SPI

Soil Moisture VIC Map



Vegetation Drought Index



**Precipitation Summary**

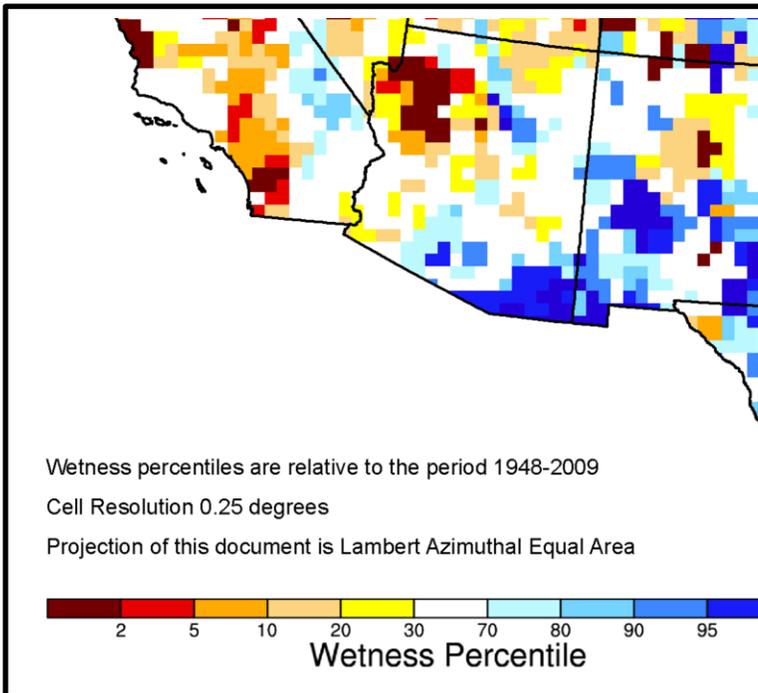
The maps above reflect the tropical monsoon activity activated by rising sea surface temperatures and forecasted weak El Nino effect. Storms Norbert and Odile provided drought relief which is mirrored in soil and groundwater indicators. While monsoon precipitation was average, calendar year rainfall remains below average.

At the time of this update, lack of any precipitation in November is adding to the calendar year deficit of the Tucson region. Normal November rainfall is 0.57" and average year to date precipitation through November is 10.66". Tucson has recorded a **deficit of 2.64"** this year. Absent any rainfall events, the state Monitoring Technical Committee may downgrade watersheds into a worsening drought condition within the next month.

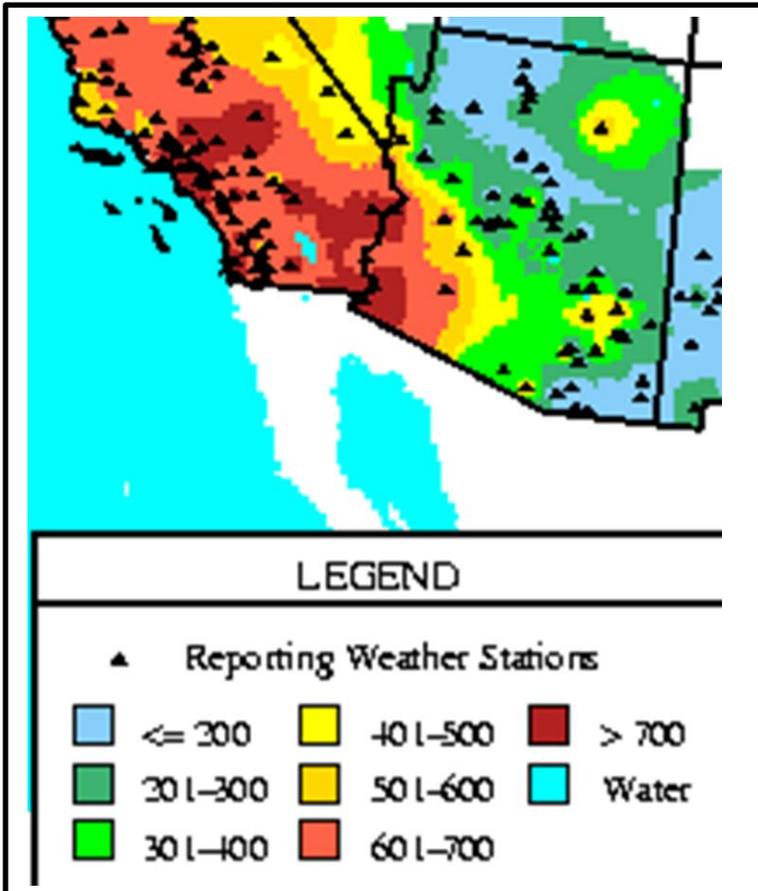
Temperatures have continued to be above average though a brief mid-November disturbance brought cool temperatures. 2014 will be the warmest year on record for the Tucson region. Higher temperatures negatively impact water supply by causing earlier snow melt and higher evaporation and evapotranspiration rates.

	<u>Rain</u>	<u>+/- Norm</u>
July	1.43"	- 0.82"
August	1.89"	- 0.50"
September	6.08"	0.00"
October	1.33"	+ 0.44"
November	0.00"	- 0.57"

**NASA GRACE Shallow Groundwater Indicator**



**Keetch-Byram Drought Index (Fire)**

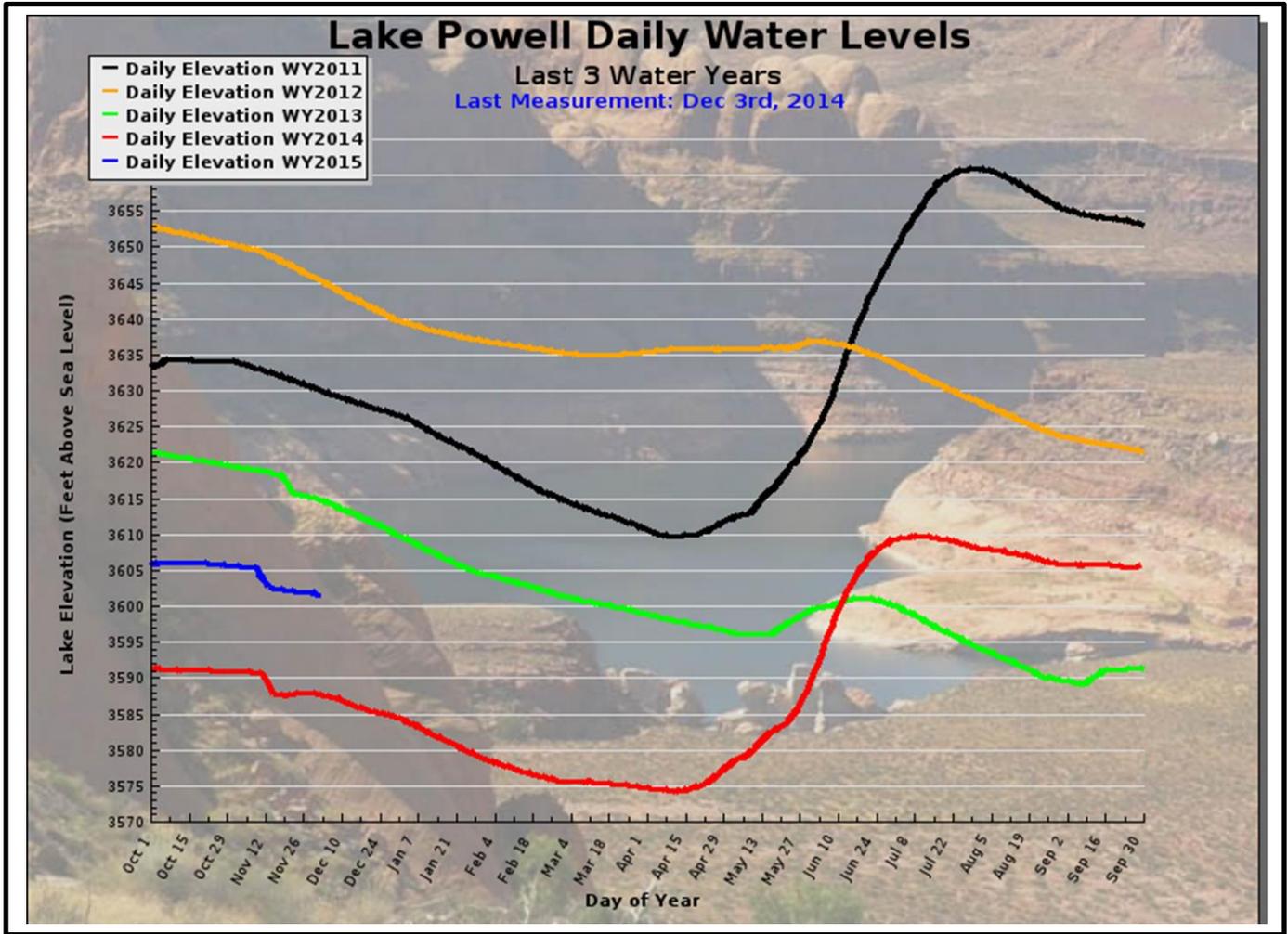


**Precipitation Impact Summary**

Looking ahead to fire season potential, the Keetch-Byram Index examines the net effect of evapotranspiration and precipitation for cumulative moisture deficits that result in flammability of organic material in the ground. Measurements indicate lower classes of fire potential; either soil moisture and large class fuel moistures are high and do not contribute much to fire intensity or conditions are typical of a late spring, early growing season where lower litter and duff layers are drying and beginning to contribute to fire intensity though not actively contributing to fire intensity nor presenting increased wildfire occurrence.

All Arizona counties are currently designated USDA Primary Counties for Secretarial Drought Designation as a Disaster Incident. The USDA reported above average temperatures began drying out soil moisture at the end of October and moisture was rapidly depleting by November, despite earlier precipitation. Range and pasture conditions varied from very poor to excellent.

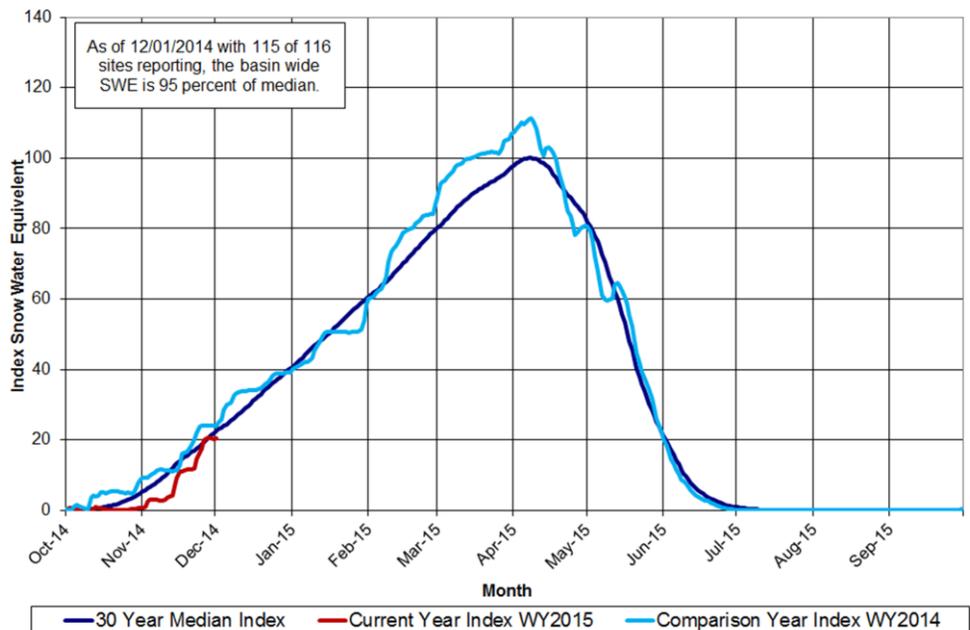
Of significance in local reports, long-term impacts include more loss of domestic groundwater wells. Residents along the periphery, Tortolita, the Santa Ritas and Tanque Verde, are hauling water after their wells have exhausted local aquifers; without sufficient natural recharge, water tables are dropping more than 40 feet in some areas. With it harder and more expensive to secure reliable water from wells, some have relocated or cannot relocate because of loss of property value. ADWR is surveying well owners in the southeast region and prompted online reporting of dry wells.



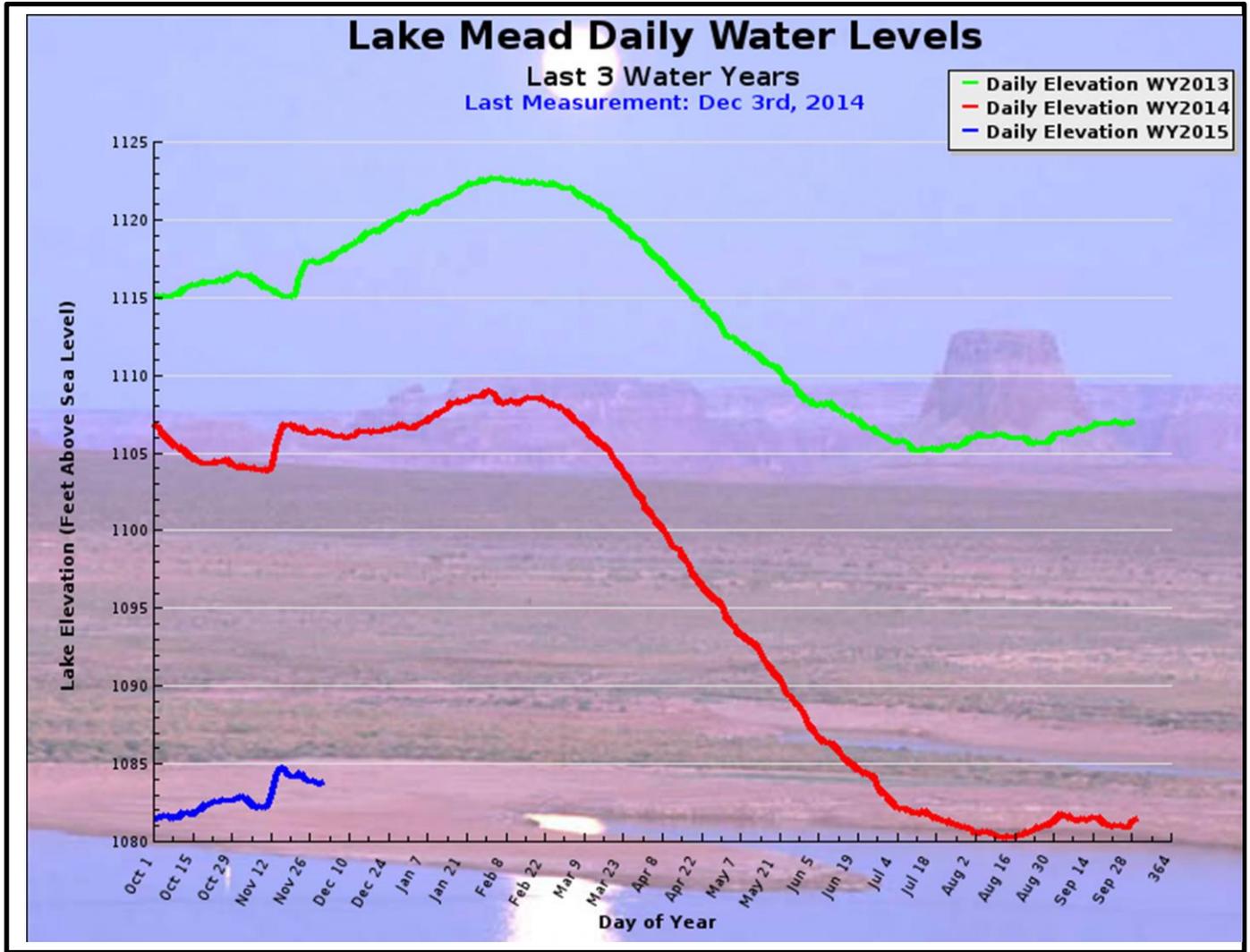
#### Lake Powell Current Status

The unregulated inflow volume to Lake Powell in October was 716 thousand acre-feet (kaf) (140% of average). The end of October elevation and storage of Lake Powell were **3,605.6'** (94 feet from full pool) and 12.29 million acre-feet (maf) (**51%** of full capacity), respectively. The reservoir elevation is now declining and is expected to continue to decline until spring 2015.

#### Upper Colorado River Basin Snotel Tracking Aggregate of 116 Snotel Sites above Lake Powell

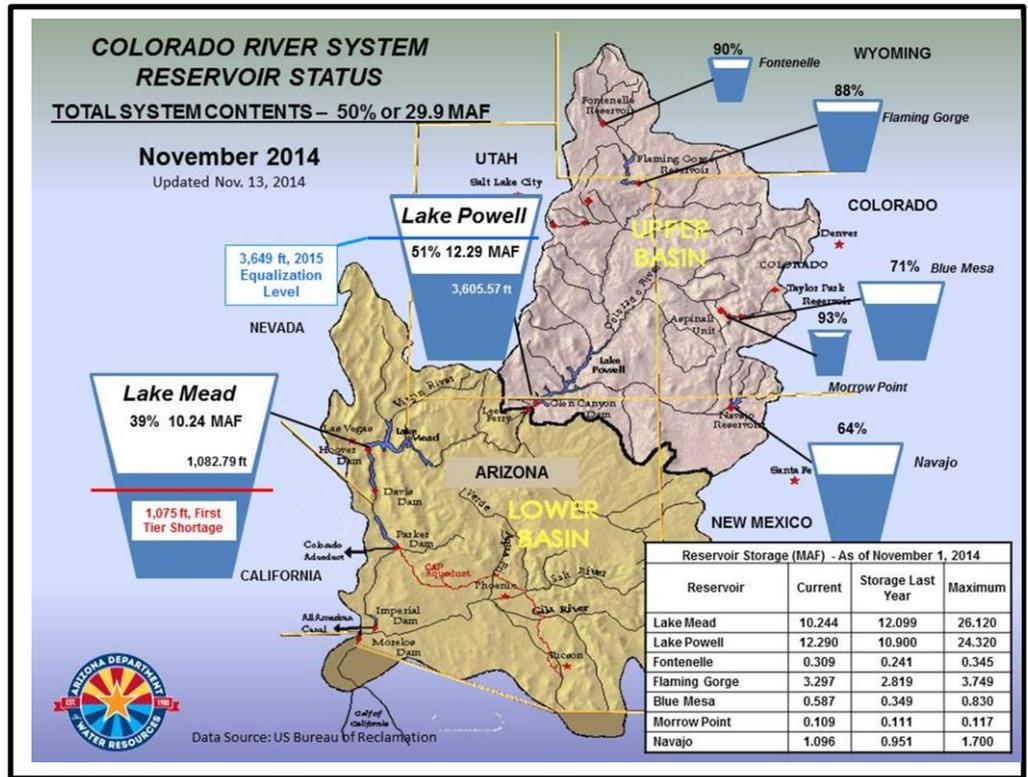


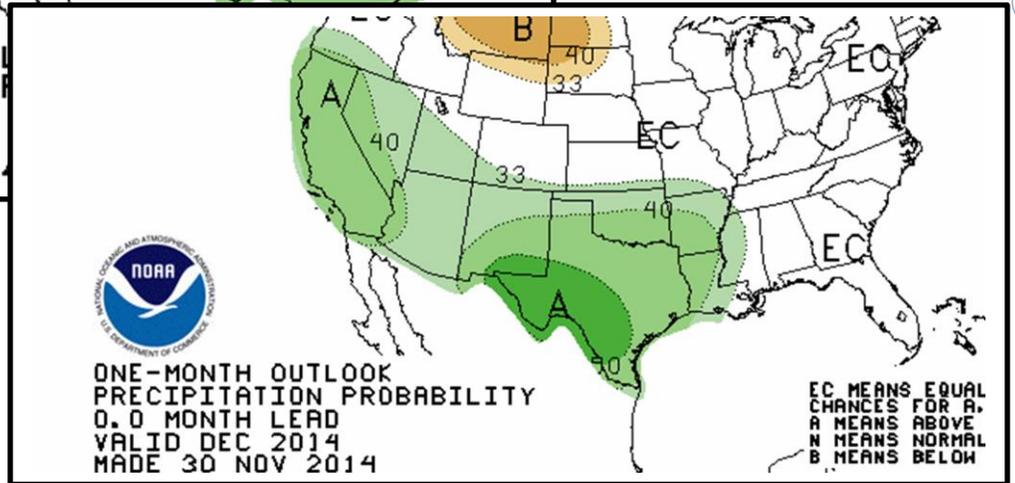
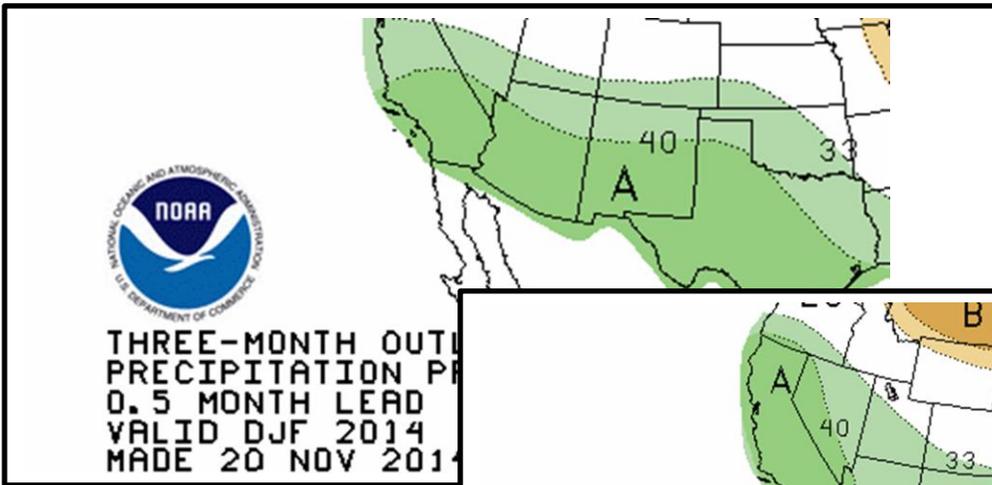
Data Provided by the Natural Resource Conservation Service



**Lake Mead Current Status**

Elevation measured December 3<sup>rd</sup> was **1,083'**, Mead is 135.83 feet below Full Pool (1219.60') and by content, Mead is **39.9%** of Full Pool (25 maf). Inflow rivers are flowing 52% of average and outflow has exceeded inflow by 1 maf for current water year. This year's release from Lake Powell is expected to be a minimum of 9 maf, an increase from last year's reduced release.



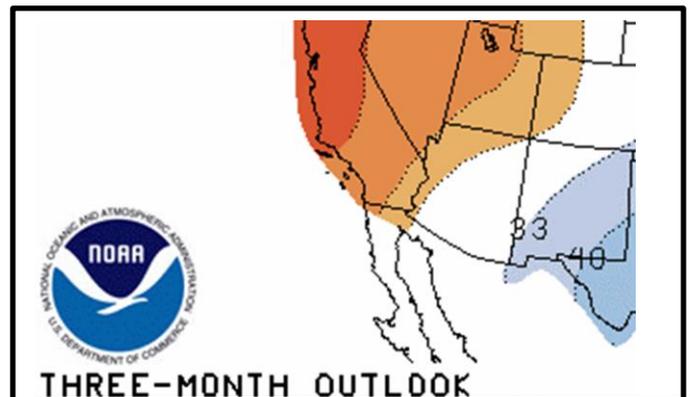


**Winter Outlook**

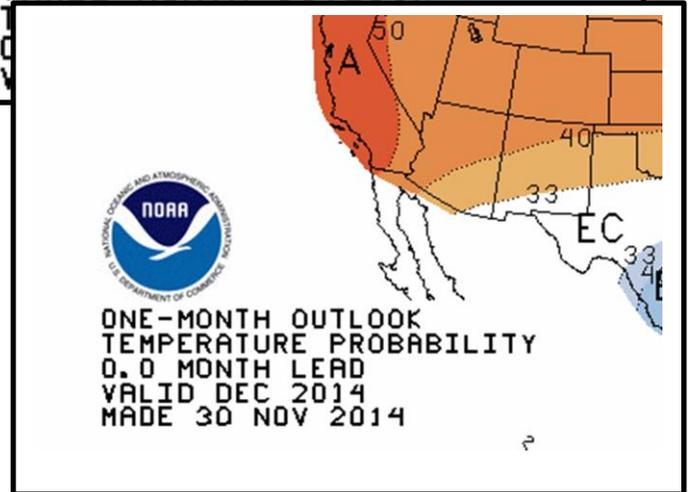
The impact of El Nino has been questioned and it is thought that while a 58% chance of development through winter remains, it will be a weak El Nino system, which generally produces little rain. Another climate feature, the Pacific Decadal Oscillation (PDO), more recently signaled an increasing chance for robust precipitation, thereby compensating for El Nino's weakness. Despite the interplay of variables, the Climate Prediction Center (CPC) expects above average precipitation through February.

Solid average to above average snowpack is needed in the Upper Colorado Basin and along Arizona's Verde and Salt basins- multiple agencies and experts have stressed the deleterious situation should the region experience four consecutive dry years.

Within this timeframe, CPC has forecast below average temperatures then revised to the current even chance for above, normal or below average temperatures. High temperatures would increase evaporation and cause earlier snowmelt, curtailing optimum collection of runoff into the reservoir systems.

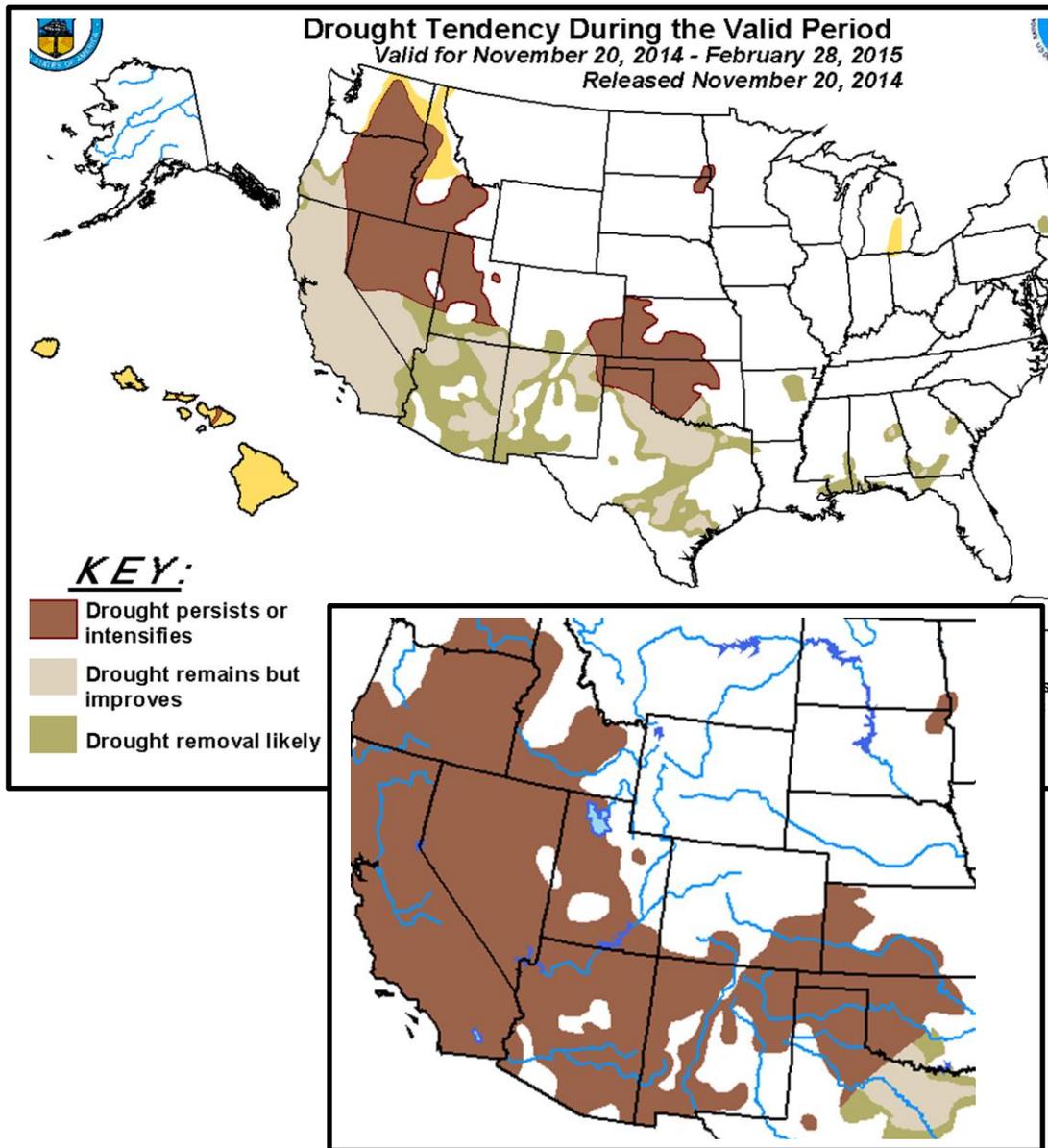


**THREE-MONTH OUTLOOK**



ONE-MONTH OUTLOOK TEMPERATURE PROBABILITY 0.0 MONTH LEAD VALID DEC 2014 MADE 30 NOV 2014

Seasonal (3 Month) Drought Outlook



**Impacts and Efforts Ahead**

The maps above are indicative of the dry November and probability of El Nino/PDO rainfall. Optimistically, CPC foresees improvement and even removal of drought conditions throughout the state over the next three months. This may alleviate short-term impacts though cumulative effects will remain. Rapid growth of fine fuels ahead of the very dry pre-monsoon season could increase wildfire probability.

Of great importance to the CAP water sector is the Colorado River Basin water supply forecast. NOAA's Colorado Basin Forecast Center hypothesizes a near average/slightly above average water year for 2015. More information will be available in December as NOAA reconvenes water supply reporting.

### State and Local Update

The Governor's Drought Interagency Coordinating Group (ICG) met this November and unanimously recommended that two drought declarations be kept in place; Drought Emergency Declaration (PCA 99006) has been in effect since June 1999 and maintains the state's ability to provide emergency response to farmers and ranchers needing funding assistance through the Farm Service Agency if they experience production losses due to drought; Drought Declaration for the State (Executive Order 2007-10) was issued in May 2007 to raise awareness of Arizona's continuing long-term drought and encourage conservation.

ICG heard presentation of current conditions and projections: "Most of the state continues in moderate to severe drought conditions, and the winter of 2014 was the state's fourth consecutive dry winter. The entire state received less than 70% of normal precipitation, and streamflow was below normal due to lack of snowmelt. As a result of a wetter than normal 2014 monsoon season, long-term drought conditions have improved somewhat compared to last year at this time. The current Colorado River reservoir system storage stands at 50% of total system capacity. The US Bureau of Reclamation's October 2014 projections indicate a 0% probability for a Tier 1 shortage in the Lower Basin for 2015, 25% probability for a Tier 1 shortage for 2016 and 53% probability for 2017." Please refer to ICG's website for presentation supporting the Group's finding- <http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/ICG.htm>

CAP is working with its customers to reduce sector use, having agreements with nine irrigation districts while finding non-CAP replacement sources for municipal customers. The water saved will remain in Lake Mead to stall the declining elevation, a CAP initiative part of a larger Basin effort.

Pima County staff are drafting the Year End Progress Report for the Water and Wastewater Infrastructure, Supply and Planning (WISP) Action Plan for 2014, a compilation of County efforts to advance water sustainability goals over the last year. Additionally, the County's Local Drought Impact Group (LDIG) has been active in documenting the latest climate and drought data as well as monitoring procedures in place. For a complete list of LDIG meetings and associated presentations and data, please refer to LDIG's website- [http://webcms.pima.gov/government/drought\\_management/](http://webcms.pima.gov/government/drought_management/)

The next Quarterly Drought Update to inform the Board and County Administrator will occur in February/March to coincide with the state's Monitoring Technical Committee (MTC) long-term drought update and will include information from NOAA's Water Supply Forecast. Other updates will coincide to report on the historically driest conditions and impacts after June and the Bureau of Reclamation's August Report, which determines the declaration of shortage for the Colorado River Basin.

### Basin-wide Update

Central Arizona Water Conservation District (CAWCD or CAP) alerted the federal government, Basin states and associated stakeholders to a “structural deficit” within Colorado River operation. More water is taken out of Lake Mead than is replenished by source watersheds or released from Lake Powell. Withdrawing more than one million acre feet a year than is sustainable, CAWCD cautioned potentially drastic elevation at Lake Mead (below 1,000’) within the next decade if the structural deficit was not addressed. CAWCD has advocated a “protection volume” to be safeguarded, a volume of water kept in Mead to sustain lake level above trigger elevations that would enact curtailment of CAP water. Water saved through conservation by the Lower Basin states will constitute the protection volume and the goal is storage of 1.5 to 3 million acre feet by 2020, if cooperation can be realized.

ADWR and CAP have agreed to sign a Memorandum of Understanding (MOU) with the US Bureau of Reclamation and other Lower Basin states (California and Nevada) providing for the storage of 345,000 acre feet by 2017, safeguarding four feet of elevation. Reclamation is expected to sign the MOU in December. Considered an initial step consisting of voluntary pilot initiatives, the MOU most importantly, signals a commitment to mitigate the structural deficit with a protection volume. More collaboration is needed to firm the remaining larger volume (which would elevate Mead ten feet) and develop a complementary conservation agreement with the Upper Basin states but agreement on the nature and severity of the deficit is a notable step in an arduous process.

The protection volume effort complements the Colorado River System Conservation Program (CRSC) initiated earlier this year by Reclamation, the Lower Basin and Colorado. CRSC pilot programs will demonstrate viability of voluntary compensated measures that reduce demand. CAP has contributed to this \$11 million fund.