

2012

Arizona Drought Preparedness Annual Report

Arizona Department of Water Resources
State Drought Monitoring Technical Committee

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2012 Arizona Drought Preparedness Annual Report

Acknowledgements

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Introduction

Realizing the need for drought preparedness in Arizona, a Governor's Drought Task Force was created in 2003 and the *Arizona Drought Preparedness Plan* (ADPP) developed. The ADPP was adopted in 2004 and its continued implementation ordered in 2007 (EO 2007-10). The ADPP established a framework to monitor drought, improve understanding of drought impacts, and determine mechanisms for limiting future vulnerability. The Arizona Department of Water Resources coordinates these activities and prepares the *Arizona Drought Preparedness Annual Report* each year. The *2012 Arizona Drought Preparedness Annual Report* covers the drought conditions and preparedness activities for the 2012 water year, from October 1, 2011 through September 30, 2012.

1. Drought Status Summary

Winter Precipitation

The winter of 2012 (Figure 1) was extremely dry across all of Arizona as well as the entire Colorado River Basin. This was the second consecutive year of a La Niña where winter storm tracks tend to remain well north of the southern tier of states. However, this was much worse than a typical La Niña because the storms also remained well north of the upper Colorado River basin. The entire Colorado River basin received between 50 and 69% of average winter precipitation. This was much worse than last year, for two reasons. The winter of 2011 was only below 70% of average in the Salt-Gila basins, while the northern watersheds received more than 70% of average (Figure 2). Also, the winter of 2011 saw above average precipitation across the entire upper Colorado River basin. The near-record snowpack increased levels in our two largest reservoirs by 40 feet or more. This past winter was dry in all basins. Temperatures this past winter were slightly warmer than average across most of the state, and well above average in the southern counties.

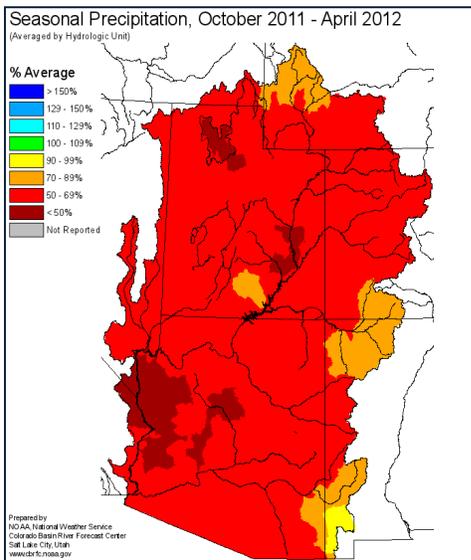


Figure 1. Winter 2012 precipitation

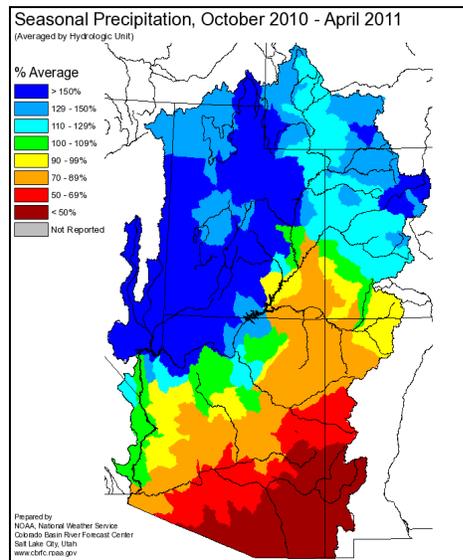


Figure 2. Winter 2011 precipitation

Snow and rain accumulation in the mountains of northern and eastern Arizona was well below normal. As of March 1, the state-wide peak snow water equivalent was only 54% of the 30-year average. All USDA-Natural Resources Conservation Service (NRCS) automated snow telemetry (SNOTEL) sites in the state were completely melted out by May 1, about a month earlier than normal. (Figure 3.)

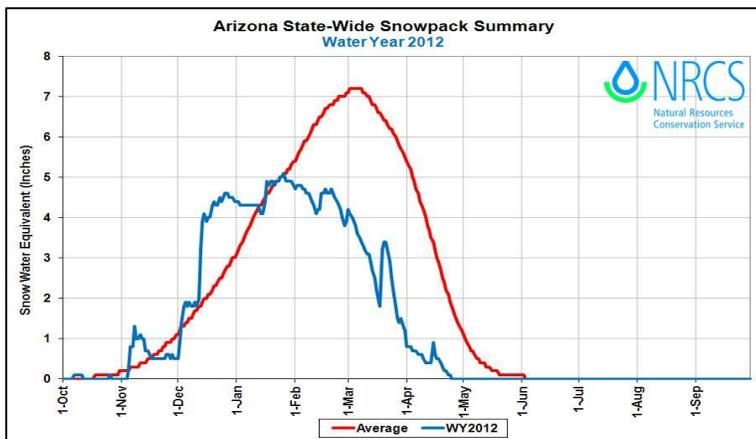


Figure 3. Snow water equivalent at high-elevation gages compared to long-term average

Summer Precipitation

The 2012 monsoon (Figure 4) was wetter than average in the lower Gila, Agua Fria, Verde, and lower Colorado watersheds, and generally near or slightly wetter than average across the rest of the state. This year the monsoon began with a central track, moving north through the center of Arizona. The second half of the monsoon took a westerly track, up the lower Colorado River valley into the Las Vegas area. This left southeastern Arizona a bit drier than normal for the monsoon, and much below average for the water year. Similar to last summer, this monsoon was characterized by highly localized precipitation, but this year the storm activity was more evenly distributed through the state.

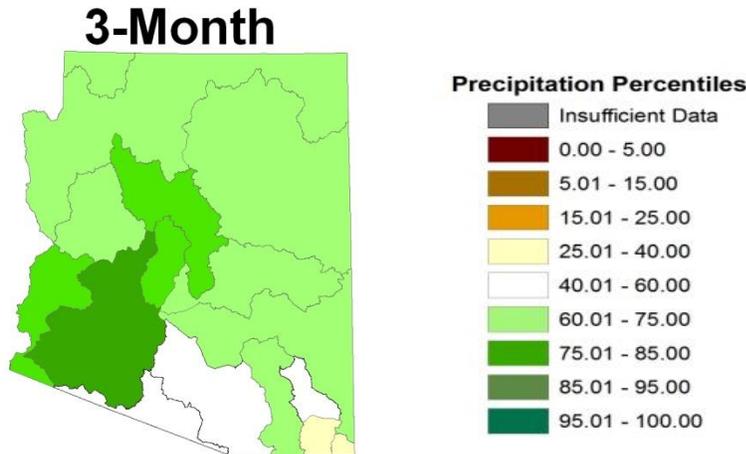


Figure 4. Precipitation Jul - Sep, 2012

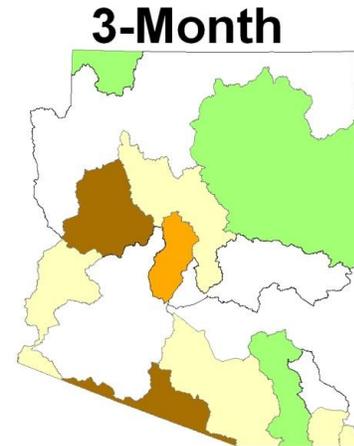


Figure 5. Precipitation Jul - Sep, 2011

Drought Index Wells

Two of the ADWR groundwater index wells in the southeastern part of the state have been identified as meeting the criteria for measuring the effects of climate for the purpose of providing a qualitative indication of drought status. These wells are located within the Lower San Pedro and Whitewater Draw watersheds. Groundwater levels for these wells show an overall decline during the 2012 water year, that correlated with long-term drought conditions, as indicated by the hydrographs in Figures 6 -9.



Figure 6. Quarterly groundwater levels for drought index Well in the Lower San Pedro Watershed



Figure 7. Daily groundwater levels for drought index well in the Lower San Pedro Watershed

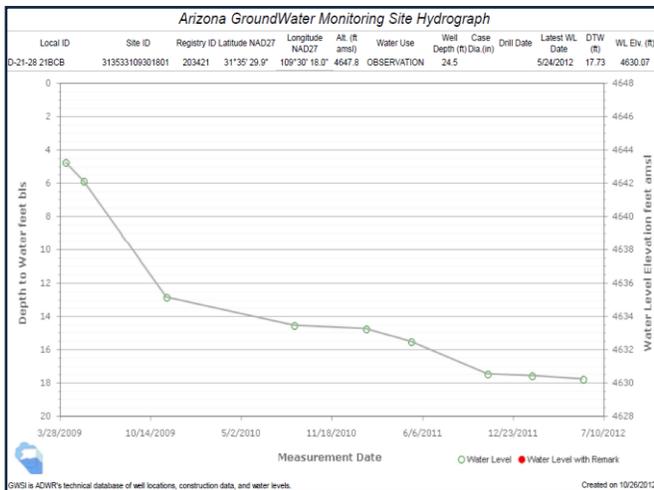


Figure 8. Quarterly groundwater levels for drought index well in the Whitewater Draw Watershed

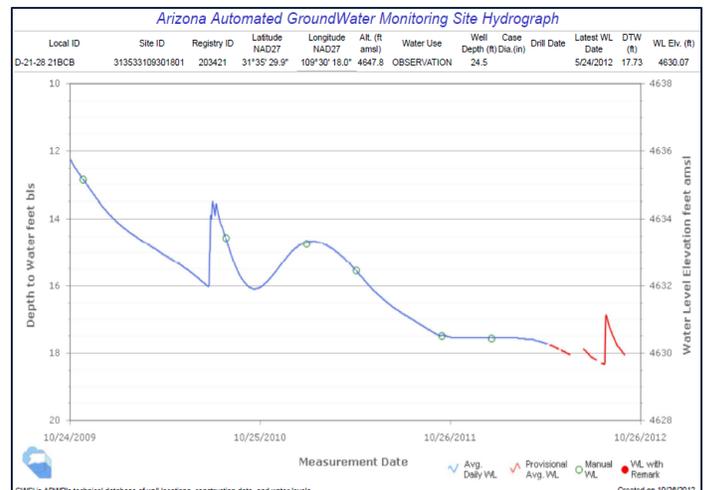


Figure 9. Daily groundwater levels for drought index well in the Whitewater Draw Watershed

Drought Status Changes

Arizona's drought status is updated at the end of each month (short-term drought status) and the end of each quarter (long-term drought status).

-Short-term Drought Status

In the short-term, conditions are much improved in the southeastern counties, while drought worsened in the western border counties (Figures 8 and 9). Last year the rangeland in the southeast was decimated by the drought, and this year the monsoon brought significant relief improving the southeastern counties by two categories from extreme to moderate drought. Apache County also experienced improvement from extreme or severe to moderate drought.

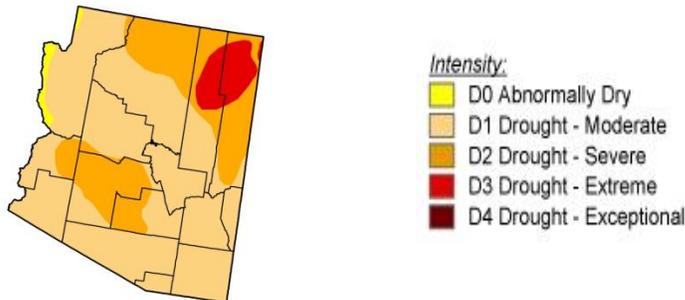


Figure 10. Short-term drought status Oct. 23, 2012

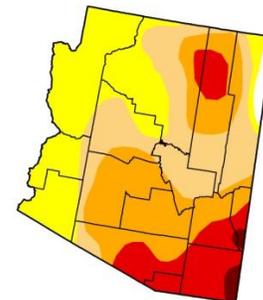
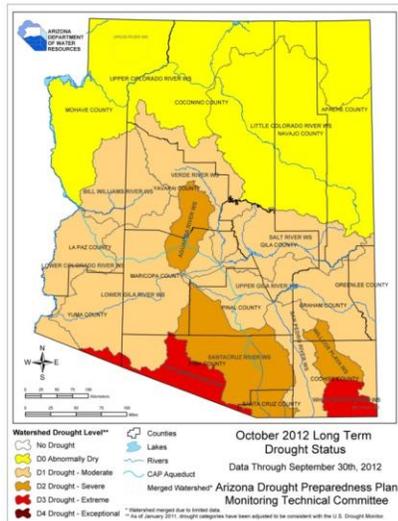


Figure 11. Short-term drought status Oct. 25, 2011

-Long-term Drought Status

In the long-term, there has been no change in most watersheds, but the four watersheds that did change saw worsening conditions (Figures 10 and 11). Two watersheds, San Simon and White Water Draw, deteriorated by one category from severe to extreme. Two watersheds dropped by two categories, the lower Gila and lower Colorado both moved from no drought to moderate drought. In these southern watersheds, the degradation is due to the extremely dry winter which followed an exceptionally dry winter in 2010-2011. The Drought Monitor shows short term conditions, which had some improvement due to the monsoon activity, but the long term condition reflects the fact that of the past four years, only one has been wetter than normal across the southern watersheds. With the current outlook indicating a neutral winter with regard to El Niño conditions, we are optimistic that conditions will not worsen this winter.



Category
No Drought
D0 - Abnormally Dry
D1 - Moderate Drought
D2 - Severe Drought
D3 - Extreme Drought
D4 - Exceptional Drought

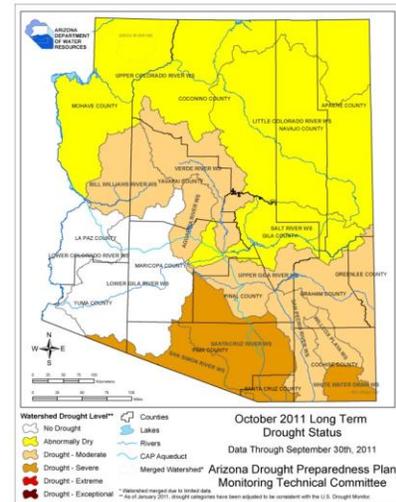


Figure 12. Long-term drought status Oct. 2012

Figure 13. Long-term drought status Oct. 2011

Table 1. Number of watersheds in each drought category

Category	2010	2011	2012
No Drought	4	2	0
D0 - Abnormally Dry	5	3	2
D1 - Moderate Drought	6	6	7
D2 - Severe Drought	0	3	3
D3 - Extreme Drought	0	0	2
D4 - Exceptional Drought	0	0	0

Water Year Summary

For the second water year in a row, cumulative precipitation at SNOTEL and other mountain gages was below normal to well below normal in all of the state's major river basins, ranging from 77% to 86% of the 30-year average (Table 2).

Table 2. Mountain precipitation for water year 2012

River Basin	Percent of 30-yr. average Precipitation at high elevation gages	
	2012	2011
Salt River Basin	83%	75%
Verde River Basin	86%	95%
Little Colorado River Basin	84%	85%
San Francisco-Upper Gila River Basin	77%	65%

Drought status as indicated by streamflow data shows a slight decrease in drought from 2011 to 2012. Basins that changed drought status did so by only one or two drought categories. Out of the 26 basins; eleven stayed the same, six increased by one drought level and nine decreased by one to two levels. Overall condition for the 2012 water year is moderate drought.

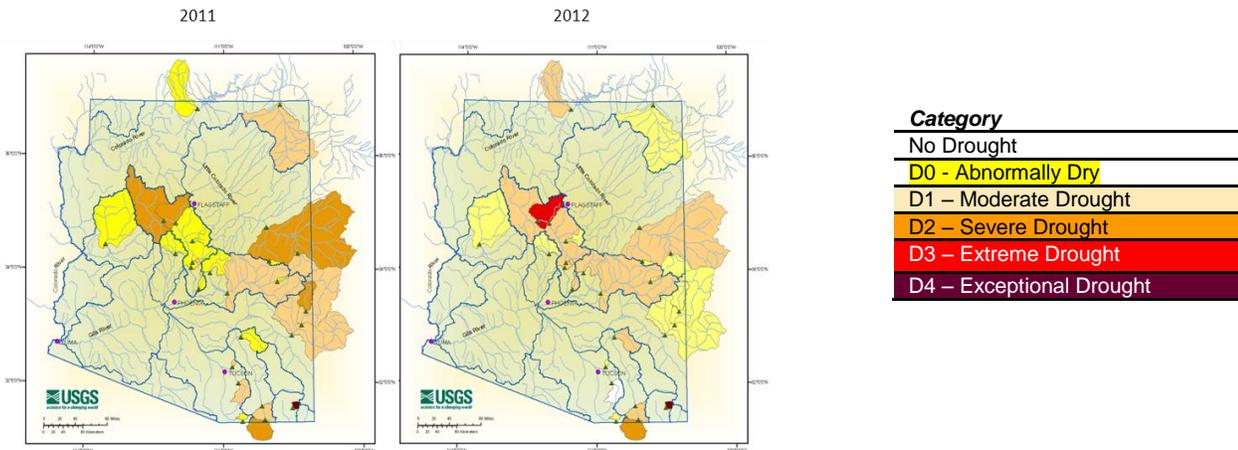


Figure 14. As determined by USGS stream gages, overall drought condition increased one category from 2011 to 2012.

Outlook for 2012- 2013

-Winter 2012-2013

The La Nina event which affected Arizona during the winter of 2011-2012 rapidly diminished during the spring of 2012. By the summer, a notable area of warmer-than-normal waters had appeared in the equatorial Pacific Ocean, suggesting the onset of an El Nino event. The warm water anomalies have persisted through the early fall; however, the strength of the anomalies has diminished in the eastern Pacific since August. Thus, there is some uncertainty regarding the strength and duration of the El Nino that is anticipated for the winter of 2012-2013. Indeed, most of the long-range prediction models indicate conditions ranging from neutral (sea surface temperature anomalies less than 0.5°C) to weak El Nino (anomalies between +0.5°C and +1.0°C).

Historically, neutral to weak El Nino conditions do not provide a strong signal regarding winter precipitation in Arizona. On a positive note, it can be said with a degree of certainty that Arizona will not experience La Nina conditions this winter.

The official outlooks from the NOAA Climate Prediction Center depict the chances of temperature and precipitation being in the above normal, near normal, or below normal categories. The outlook for January-March 2013 shows slightly better chances for above average temperatures during the three-month period, with the highest likelihood over the far northeast portion of the state. The precipitation outlook shows near equal chances for above, below, or near normal precipitation across the entire state.

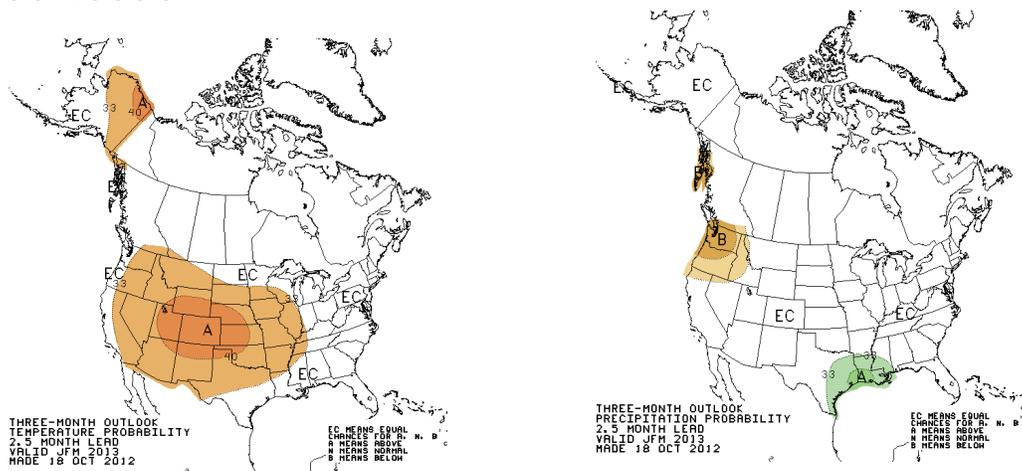


Figure 15. Climate Prediction Center outlooks for temperature (left) and precipitation (right) for January – March 2013. Shading indicates increased chances of being above or below normal.

-Summer 2013

The Climate Prediction Center's outlook for June-August 2013 shows increased chances that the average temperature during those three months will be above average statewide. The precipitation outlook shows no discernible signal during this period. That is, there are equal chances for the 2013 monsoon season to be above, below, or near normal.

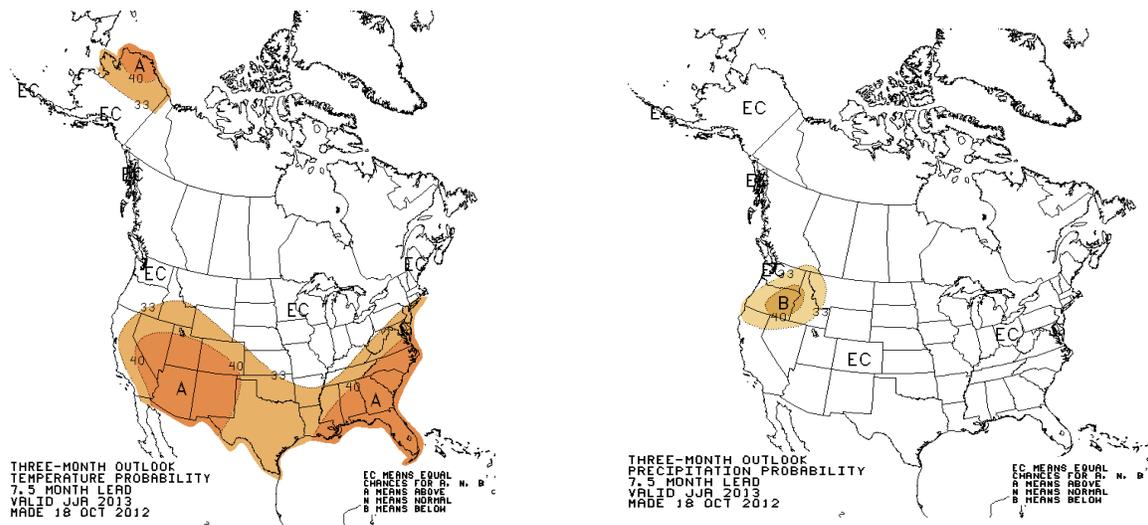


Figure 16. Climate Prediction Center outlooks for temperature (left) and precipitation (right) for June – August 2013. Shading indicates increased chances of being above or below normal.

2. Drought Declarations and Designations

The Arizona Department of Water Resources and the Drought Interagency Coordinating Group participate in the process for Drought Emergency Declarations and Disaster Designations for the state.

Disaster Designations

Two disaster designations by the U.S. Department of Agriculture occurred this year – one in April and one in July. In April, the following counties were designated: Coconino, Gila, Maricopa, Pima, Pinal and Yavapai. Contiguous counties included Cochise, Graham, La Paz, Mohave, Navajo, Santa Cruz and Yuma, leaving only Greenlee and Apache County unavailable for assistance. In July, all Arizona counties were designated due to losses caused by drought. A Secretarial disaster designation makes farm operators in both primary and contiguous disaster areas eligible to be considered for assistance from the Farm Service Agency.

Drought Emergency Declarations

A Drought Emergency Declaration has been in effect in Arizona since 1999. The current declaration, PCA 99006, issued by the Governor in June 1999 was continued by Executive Order 2007-10. The Drought Interagency Coordinating Group has been responsible for recommendations to the Governor about drought declarations. The declaration maintains the state's ability to provide emergency response if needed, and enables farmers and ranchers to obtain funding assistance through the Farm Service Agency if they experience significant production losses due to drought.

3. Drought Preparedness Plan Implementation Highlights

The shortage of ADWR staff available to implement and monitor these programs continued in 2012.

Drought Planning for Community Water Systems

Drought planning requirements and water use reporting regulations were recommended in the ADPP and established by the state legislature in 2005 for the purpose of reducing community water systems' drought vulnerability and providing a means for the state to gather water use data. ADWR provides assistance to water providers in meeting these requirements through web-based resources, online reporting tools and phone or in-person consultations.

-System Water Plans

Arizona's ~800 community water systems are required to submit a System Water Plan every five years. The System Water Plan includes a Water Supply Plan, Conservation Plan and Drought Plan. The first reporting years were 2007 for large systems and 2008 for small systems. 82% (125) of the 150 large community systems notified submitted their five-year updates due February 2012. The update forms included a new section where community water systems could request the following information to help them determine drought stages: weather data and forecasts, drought conditions, aquifer levels, and range and forage conditions. Nine systems requested information, with aquifer level data the most frequently requested. An information sheet with resources and links will be prepared and either emailed or mailed to those that requested additional information.

-Annual Water Use Reports

In 2012, 312 community water systems reported their 2011 annual water demand data. (322 reported their 2010 data and 358 reported 2009 data. ADWR will send a notice at the end of the year to local governing bodies of those providers that have not submitted an Annual Report.

Local Drought Impact Group Efforts

Local Drought Impact Groups (LDIGs) participate in monitoring, education and mitigation on a local level, mainly through cooperative extension and county emergency management programs. Initial planning efforts included ten LDIGs, and eight LDIGs have been active in the past. Since 2008, LDIG focus has been entirely on drought impact monitoring and reporting in an effort to reduce strain on resources, however, only Mohave County and Pima County are currently active.

-Mohave LDIG (see Appendix A for the full report.)

Mohave LDIG meetings were held in January and April 2012. The established drought monitoring network continued to provide impact information which is compiled by the County Emergency Management office and transmitted to Arizona DroughtWatch at the first of each month.

County drought conditions improved due to monsoon precipitation, which was heavy in some areas and moderate in others. In areas near Kingman, springs are not fully recovered, and dry conditions with an increasing fire danger are returning. Current drought conditions throughout the county are moderate. No drought response or mitigation measures are currently in effect.

The countywide Drought Mitigation Plan is under development and approximately 60% complete. Map and overlay corrections are in progress, and discussions were held in the Working Group meetings concerning the various drought stage trigger points to be established for each of the five zones, with final trigger point determinations awaiting additional stakeholder input on specific indicators. Variations in elevation, topography, vegetation, water sources, and population density were used to determine the zones.

-Pima LDIG (see Appendix B for the full report.)

The Pima County LDIG meets bimonthly to monitor short term and long term drought status, discuss drought impacts and coordinate drought declarations and responses. Short-term drought conditions in Pima County did not improve during 2012, with all of Pima County in some stage of

drought throughout the year. Approximately 80 percent of Pima County was consistently at D2-Severe while the remaining western 20 percent of the County remained at D1-Moderate. Pima County's long-term drought status, which worsened during 2012, is expected to improve slightly reflecting a near-normal summer monsoon season.

The following impacts of sustained drought continue to be observed in Pima County:

- Ranches are experiencing both drying stock ponds and a decrease in native grasses on pasture lands
- Stream flow length at the Cienega Creek Preserve was at its shortest since 1975 when record keeping started.
- Agua Caliente Park, a spring fed oasis located at the base of the Catalina Mountains, continued to receive groundwater to supplement spring flows to one of its ponds, although continuation of this practice is not sustainable in the long term.

Despite persistent drought conditions, LDIG recommends Pima County remain at Drought Stage One. The major water providers are also maintaining a Drought Stage One.

Water providers continue to promote water conservation and are focusing their message on water efficiency and reliability, rather than drought-specific messages. Some are implementing rebate programs, irrigation efficiency programs, use of low-water fixtures, drought tolerant landscapes and community education.

In 2010 Pima County and the City of Tucson completed a Water/Wastewater Study [Action Plan](#) and are in Year Two of its implementation. Actions underway during 2012 included an update to the City of Tucson's Drought Preparedness and Response Plan, increased reclaimed water system efficiencies, increased use of renewable sources of water including reclaimed water and Central Arizona Project water and model city/county building codes that reduce the water/energy footprint in new and renovated buildings.

State Drought Monitoring Technical Committee Efforts

The State Monitoring Technical Committee (MTC) is responsible for gathering drought, climate, and weather data and disseminating that information to land managers, policy-makers and the public. Specifically, the MTC prepares the short and long-term drought status reports, briefs the ICG on drought conditions and provides assistance to Local Drought Impact Groups (LDIGs). The two co-chairs are Nancy Selover, State Climatologist and Gary Woodall, Meteorologist-in-Charge of the National Weather Service Phoenix Office.

-Short-term Drought Status Reporting

The MTC confers weekly to advise the U.S. Drought Monitor authors on the current conditions in Arizona and makes recommendations about the position of the drought boundaries for Arizona, as the U.S. Drought Monitor is the official record of drought for Federal drought relief claims.

Information used by the MTC in advising the Drought Monitor authors includes numerous drought indices, precipitation and stream flow data, and impacts data.

-Arizona DroughtWatch

[Arizona DroughtWatch](#) is a pilot, volunteer drought impact monitoring program that has been developed to systematically collect qualitative observations of drought impacts to support drought status determination and local drought vulnerability assessments. Historically, drought monitoring and the calculation of drought status have been based solely on sparse networks of hydroclimatological data collected across the state. Qualitative observations of drought impacts in conjunction with these data offer the promise of a better and more nuanced characterization of drought, given Arizona's complex and highly variable climate. The web-based reporting system allows observers to create accounts and submit impact observations for multiple locations on a monthly basis. These observations are summarized and displayed anonymously in maps and tables on the open website. The beta system, launched in 2009, has collected several hundred individual drought impact observations that have been instrumental in both ground-truthing and

adjusting state and national drought status maps. The website was redesigned in 2011/12, is undergoing several user interface and database upgrades, and will be linked automatically to the National Drought Impacts Reporter.

-Community Collaborative Rain Hail and Snow (CoCoRaHS) Network

Arizona joined the CoCoRaHS network in 2009 so that our volunteer citizen precipitation observers could communicate their precipitation measurements to the National Weather Service along with over 10,000 observers from other states. The data collected are important in our drought monitoring as well as flood warning. This past year, CoCoRaHS has added drought impacts reporting to their website, enabling our 809 observers in Arizona to efficiently add their drought impact observations to their precipitation observations. The data go directly to the Drought Impacts Reporter. In addition to the urban centers in Maricopa County (359 observers) and Pima-Pinal counties (275 observers), there are 46 observers in Cochise County, 43 in Yavapai County, and at least one observer in every other county.

-ADWR Drought Index Wells

Drought index wells serve as a qualitative supplement to existing drought indicators and help establish drought status for watersheds where either precipitation or stream flow data are lacking. Index wells are chosen based upon the USGS Climate Response Network criteria:

- Open to a single, known hydrogeologic unit
- Known well construction that allows good water-level measurements
- Located in unconfined aquifers or near-surface confined aquifers that respond to climatic fluctuations
- Minimally affected by pumpage and likely to remain so
- Essentially unaffected by irrigation, canals, and other potential sources of artificial recharge
- Long-term accessibility
- Well has never gone dry (not susceptible to going dry)

USGS Climate Response Network observation well criteria can be found at <http://groundwaterwatch.usgs.gov/Net/OGWNetwork.asp?ncd=crn>.

We would like to use groundwater in a quantitative manner, perhaps by a modified Palmer index, though the groundwater level signature may include influences other than a climate response such as pumping or artificial recharge, and we have not had the time to research the specifics that would determine the suitability of each well site with regards to percentile analysis. The MTC plans on further assessment of statewide groundwater index wells to identify and incorporate data that meet the criteria for drought index wells.

-Communicating Drought Status

Improving the accessibility of drought information to resource managers, state decision-makers and the public is a primary goal of the MTC and ADWR. To further communication, information is updated on the ADWR Drought Status webpage on a weekly, monthly and quarterly basis:

Weekly - On a weekly basis, the ADWR Drought Status webpage (<http://www.azwater.gov/azdwr/StatewidePlanning/Drought/default.htm>) is updated with the latest version of the Arizona map produced by the U.S. Drought Monitor. The MTC analyzes local hydroclimatic conditions and impacts occurring in Arizona and provides this information to the U.S. Drought Monitor.

Monthly - At the end of each month, the MTC produces a web-based, short-term drought status update based on U.S. Drought Monitor's maps for the past four weeks. An e-mail with the latest map and summary is sent to interested parties.

Quarterly - On a quarterly basis, the MTC continues to meet and produce a long-term drought status map and summary report, which incorporates the 24-, 36- and 48-month precipitation and streamflow percentiles for major Arizona watersheds (i.e., 4-digit U.S. Geological Survey Hydrologic Unit Code). Vegetation indices, snowpack, temperature, reservoir levels, and county-scale drought impact information are used to verify or modify the result of the

calculations. The long-term drought status reports are posted on the ADWR website and disseminated via email in May (for January – March), August (for April – June), November (for July – September) and February for October – December.)

These monthly and quarterly reports serve as an information resource for the public and as a planning tool for resource managers developing mitigation and response strategies.

- Calculating the Standardized Precipitation Index

The State Climatologist is working on the use of gridded data for calculating the Standardized Precipitation Index and the drought status to improve the resolution and timeliness of the maps produced by the MTC. This is a resource issue as there have been cutbacks on the State Climate Office.

- Funding and Resource Needs

The MTC has identified the following three funding and resource needs, the second two previously stated in the 2007 through 2011 annual reports:

1. *Use gridded precipitation data to create gridded SPI maps and a gridded drought status map, using the same calculations for drought status currently used for watershed level mapping*

The gridded maps will provide smoother transitions across the state rather than the abrupt watershed boundaries. The results should be more reflective of the DM maps and will help with our internal decision making; even though drought declarations may be made at the county level, the higher resolution data will provide better information about which parts of the counties are having the worst drought problems.

Estimated cost: \$7500.

2. *Development of a strategic plan to identify data gaps and monitoring needs*

Arizona's current network of meteorological and hydrological observations for drought monitoring lacks sufficient spatial resolution to accurately characterize drought status at the local level requested by stakeholders throughout the state. Improving the spatial, temporal and altitudinal resolution of Arizona's drought monitoring network will improve the Committee's ability to serve the needs of Arizona stakeholders, including the local drought impact groups. In particular, Arizona faces the following conspicuous data gaps:

- Complete lack of soil moisture monitoring
- Few high elevation meteorological monitoring stations
- Constantly decreasing network of streamflow gages

Although the MTC has identified these data gaps in general terms, it is imperative to conduct a systematic evaluation in order to characterize and prioritize these numerous data and observation gaps. A strategic plan, with carefully considered criteria for prioritization, is essential for making state funding requests and for taking advantage of federal funding opportunities. The MTC recommends funding to develop a strategic plan, conduct data and observation gap analyses, and document priority locations using geographic information system technology.

Total cost: \$9,000

3. *Incorporation of groundwater data for drought status determination*

ADWR staff have evaluated groundwater level changes around the state. However, further analysis is needed to determine what role drought plays in these observed changes.

Incorporating groundwater level trend data will be critical in determining drought conditions and impacts on water supply. (See page 10, ADWR Drought Index Wells.)

Total cost: \$38,000 per year

Interagency Coordinating Group Efforts

The Interagency Coordinating Group (ICG) has met biannually since 2006 and advises the Governor on drought status, impacts and any necessary preparedness and response actions. The meetings include a review of statewide monitoring efforts and drought status, water supply

updates, rangeland conditions, forest health and the impacts of drought on wildlife. At both the November 2011 and May 2012 meetings, the ICG recommended to the Governor that the state's Drought Emergency Declaration (PCA 99006) and the Drought Declaration for the State of Arizona issued May 2007 (Executive Order 2007-10) be continued. The presentations and subsequent decisions are on the [ADWR web site](#).

4. Conservation Program Highlights

ADWR's Conservation Program has a history of providing an integrated approach to water conservation by combining regulations, assistance, outreach and education. ADWR has worked to promote and encourage the wise and efficient use of water throughout Arizona by developing conservation tools and resources, assisting Arizona communities and water providers, collaborating with regional and national partners, and participating in outreach activities. At the current time, one part-time staff member assists in these and other efforts, such as co-chairing the [Water Awareness Month](#) (WAM) campaign and new initiative to expand the WAM web site into a year-round resource, and participating in regional and statewide conservation collaborations.

5. Appendix

A. Mohave County Local Drought Impact Group 2012 Annual Report

Introduction. This report summarizes the Local Drought Impact Group activities conducted in Mohave County in 2012. LDIG meetings were held in January and April. The established drought monitoring network continued to function efficiently with monitors providing monthly impact information to the LDIG secretary, an employee of the County Emergency Management office, who compiles the report information for transmission to Arizona DroughtWatch at the first of each month. A countywide Drought Mitigation Plan is under development and approximately 60% complete.

Status of Drought. County drought conditions in late spring improved due to monsoon precipitation, which was heavy in some areas and moderate in others. Current (late October) drought conditions throughout the county are moderate. However, areas near Kingman that received low precipitation amounts from the monsoon are reporting that springs are not fully recovered, and dry conditions with an increasing fire danger are returning.

Drought Impacts. In late spring prior to monsoon onset, conditions were severe with much dying vegetation, high forage loss, and a severe wildfire threat in many areas. As late as early August, some ranchers near Kingman were hauling water and experiencing extensive forage loss. Reservoirs in central and northern Mohave were low, and many springs had ceased flowing. The monsoon rains provided relief to many areas of the county, although as usual heavy precipitation coverage was spotty, with some areas receiving only minimal amounts. The rainfall resulted in considerable greening and vegetative growth in many areas in August and September.

Drought Related Actions. No drought response or mitigation measures are currently in effect. The Mohave County Alert Flood Warning System, composed of 142 weather stations across the county, continues to provide near real time precipitation and stream flow information. Valuable impact information continues to be provided by the BLM, State Game and Fish, and other agencies, as well as ranchers. There are still some geographic gaps in the drought monitoring network for which additional volunteer monitors are needed.

As reported last year, the LDIG Mitigation Working Group is developing a countywide Drought Mitigation Plan. Due to the considerable variations in elevation, topography, vegetation, water sources, and population density throughout the county, it was decided that for planning purposes the county would be divided into zones based on some of these key factors. Distinct population density/elevation zones were established as starting points, and maps delineating these zones with vegetative overlays were prepared by the County's Development Services Department for LDIG use. Reviews by the Working Group and participating agency representatives have recently identified some vegetative overlay corrections. Map and overlay corrections are in progress, and discussions were held in the Working Group meetings concerning the various drought stage trigger points to be established for each zone, with final trigger point determinations awaiting additional stakeholder input on specific indicators.

B. Pima County Local Drought Impact Group 2012 Annual Report

Introduction: Pima County's Local Drought Impact Group (LDIG) has been active since 2006 when the Board of Supervisors adopted the Drought Response Plan and Water Wasting Ordinance (Chapter 8.70). LDIG consists of water providers and local, state and federal agencies that have an interest in drought conditions in Pima County. LDIG meets bimonthly to monitor the short term and long term drought status, discuss drought impacts and coordinate drought declarations and responses.

During 2012, LDIG explored the impacts of drought on various sectors in Pima County including agricultural water use, ranching, wildfire, hydrology, and flooding. Because many providers depend on Central Arizona Project water, LDIG also monitors the status of the Colorado River. The El Niño Southern Oscillation and other climate weather patterns were discussed in relation to their effect on drought conditions and climate variability in the Southwest. LDIG also monitored the status of the summer monsoon season and held a roundtable discussion of drought and water conservation outreach programs.

LDIG's meeting agendas, presentations and past meeting summaries can be found on Pima County's [LDIG website](#).

Status of Drought: Short-term drought conditions in Pima County did not improve during 2012. According to the U.S. Drought Monitor, all of Pima County was in some stage of drought throughout the year. Approximately 80 percent of Pima County was consistently at Stage D2-Severe while the remaining western 20 percent of the County remained at Stage D1-Moderate. Pima County's Long-term drought status worsened during 2012. The year began with Santa Cruz River watershed in moderate drought, the San Simon watershed in severe drought and the Lower Gila River watershed in no drought. By July, the Santa Cruz River watershed had worsened to severe drought, the San Simon watershed was at extreme drought and the Lower Gila River watershed was abnormally dry. Long-term drought status is expected to improve slightly reflecting a near-normal summer monsoon season.

For the second straight year, a La Niña weather pattern suppressed winter precipitation producing only 0.56 inches compared to a normal of 2.53 inches from January through March. Snowpack conditions in the Rocky Mountains generated lower than normal flows to the Colorado River and major reservoirs along the Colorado River were 57 percent full at Lake Powell and 50 percent full at Lake Mead. These reservoirs levels mean shortages on the Colorado River will not be declared anytime in the near future.

The summer monsoon season produced a near normal 6.02 inches of precipitation. Normal precipitation for June through September is 6.08 inches. Summer temperatures were warm. June recorded 20 consecutive days of triple digits. July was cooler with only ten days of triple digit temperatures and 1.3°F below normal. August, however, was warm with four days of high temperatures that set or tied previous records. September temperatures were closer to average with the monthly average temperature a one-half degree above normal.

Despite persistent drought conditions, LDIG recommends Pima County remain at Drought Stage One. The major water providers are also maintaining a Drought Stage One.

Drought Impacts: The impacts of sustained drought continue to be observed in Pima County:

- Ranches are experiencing both drying stock ponds and decreased pasture grasses. Low winter precipitation resulted in a decrease in native grasses on pasture lands requiring ranchers to move their herds, take them to market sooner or purchase supplemental feed. Dry stock ponds also mean herds must be moved or ranchers must haul water at considerable cost.
- This summer the stream flow length at the Cienega Creek Preserve was reported to be at its shortest since 1975 when record keeping started. The Pima Association of Governments reports that the

Creek flowed only 1.24 miles in total among the intermittent perennial segments in June 2012. By contrast, there were 9.5 miles of perennial stream flow during wetter years in the early 1980's. Decreased stream flow length has adverse impacts to the riparian habitat and wildlife that depends on perennial flow.

- Agua Caliente Park, a spring fed oasis located at the base of the Catalina Mountains continued to receive groundwater to supplement spring flows to one of its ponds. Of the three ponds on the property, one has been dry since 2003, the second is nearly dry and the third is being supplemented with groundwater to support the wetlands habitat. When Pima County acquired the park in 1984, spring flows were 150 gallons per minute. Last summer, measured flows were 1.5 gallons per minute. Pima County continues to supplement flow from groundwater wells, although continuation of this practice is not sustainable in the long term.

Drought Indicators: Pima County LDIG continues to use the U.S. Drought Monitor as an indicator of drought severity. The U.S. Drought Monitor is also used by the ADWR Drought Monitoring Technical Committee providing continued consistency and timely updates.

Drought-Related Actions: Water providers continue to promote water conservation and are focusing their message on water efficiency and reliability, rather than drought-specific messages. Some are implementing rebate programs, irrigation efficiency programs, use of low-water fixtures, drought tolerant landscapes and community education.

In 2010 Pima County and the City of Tucson completed a Water/Wastewater Study [Action Plan](#) and are in Year Two of its implementation. Actions underway during 2012 included an update to the City of Tucson's Drought Preparedness and Response Plan, increased reclaimed water system efficiencies, increased use of renewable sources of water including reclaimed water and Central Arizona Project water and model city/county building codes that reduce the water/energy footprint in new and renovated buildings. The status of local drought declarations remains unchanged from 2011. The status of the 2012 drought declarations in Pima County is:

Entity	Drought Declaration
Pima County	Stage One Alert
City of Tucson	Stage One
Town of Oro Valley	Stage One
Town of Marana	Stage One Alert
Metropolitan DWID	Stage One Alert
Community Water of Green Valley	Stage One Alert