

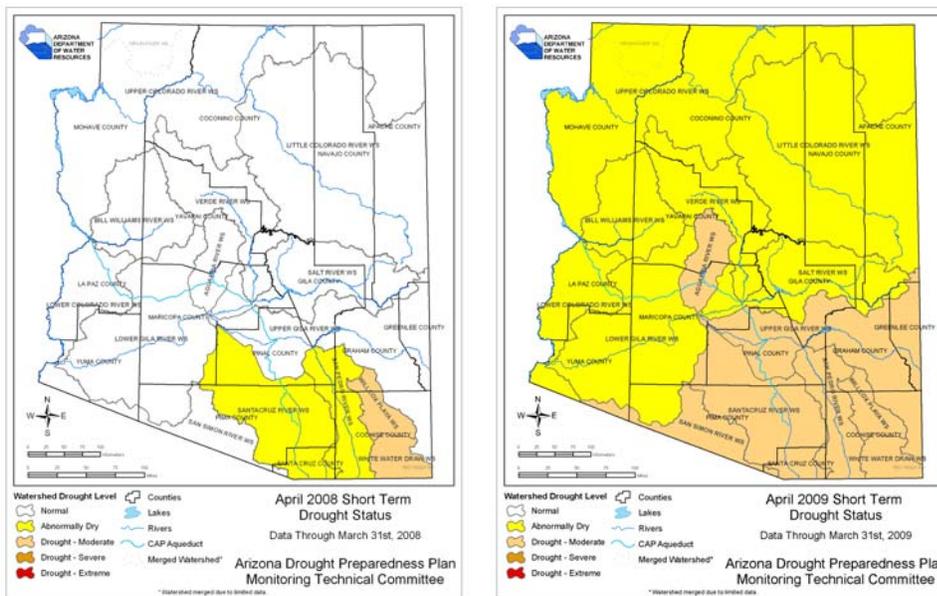
# 2009 ARIZONA DROUGHT PREPAREDNESS ANNUAL REPORT

## Drought Status Summary

### Winter Precipitation

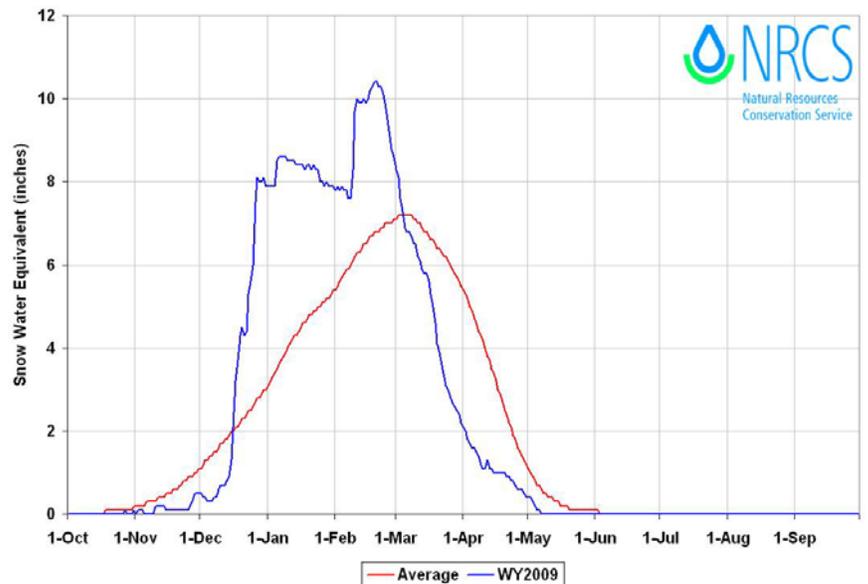
Unlike the winter of 2008, when Arizona experienced the wettest La Niña ever, the winter of 2009 fell in line with the forecast for a dry La Niña. December started as a wetter than average month, but the storm tracks quickly shifted northward, leaving Arizona out the path of most of the winter storms. Warmer than average conditions statewide exacerbated the problem by increasing water demand; all fifteen watersheds were in drought this year, compared to the winter of 2008 when only four watersheds had drought (Figure 1).

**Figure 1. Less precipitation this winter than last year caused short-term drought conditions to be much worse than they were in 2008.**



At nearly all USDA-Natural Resources Conservation Service (NRCS) automated snow telemetry (SNOTEL) sites, precipitation catch was close to normal during the “peak” snow season from December 1 through March 1. Two major storm systems, one in late December and one in mid-February, produced the majority of the snowpack and precipitation accumulations (Figure 2). Below normal precipitation and above normal temperatures during April caused the snowpack to melt about a month early. Unseasonal precipitation in late May helped to

**Figure 2. Snow water equivalent at high-elevation gages compared to long-term average.**



alleviate increasing drought status during this normally dry period.

### Summer Precipitation

The summer monsoon proved to be one of the driest on record, with well below normal precipitation received during July and August, ranging from only 30 to 70 percent of average. Unlike last year when the monsoon focused on the southeastern watersheds, this year's monsoon merely scraped the southern and eastern borders of the state, with most of the impacts felt to the east of Arizona. A number of isolated thunderstorms brought very heavy rain to a few locations, causing local flooding through the summer. A severe storm dumped 2.50" of rain on Sedona in a very short time, causing massive damage as a flash flood moved through town sweeping away cars and large boulders. But large swaths of the state were well below their average monthly and summer totals.

Streamflow during the summer months (Figure 3) was below average due to a weak monsoon season, which resulted in gradually worsening drought conditions. Late August and early September precipitation helped to alleviate drought conditions but quantities were far less than needed to have any significant impact on drought.

Short-term drought status declined significantly over the summer as eight watersheds dropped one category, and six watersheds dropped two categories. At the end of the summer, all but one watershed was at moderate drought or worse. Short-term drought status as of September 30 shows nine watersheds in severe drought and one in extreme drought as a result of a dry winter followed by a very dry monsoon (Figure 4).

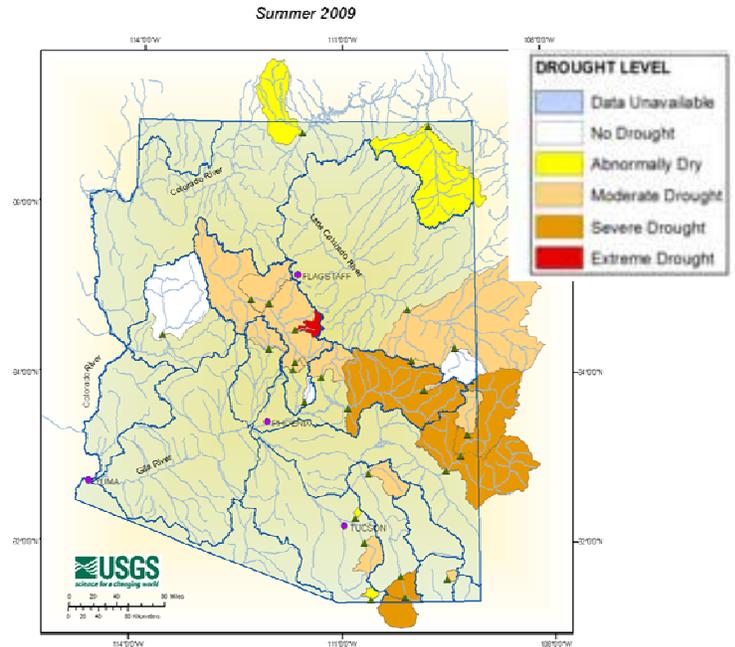
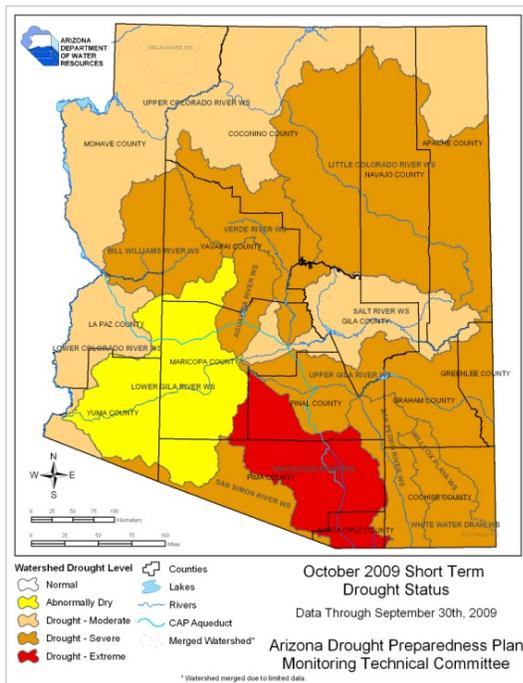


Figure 3. Summer drought status as indicated by streamflow conditions.



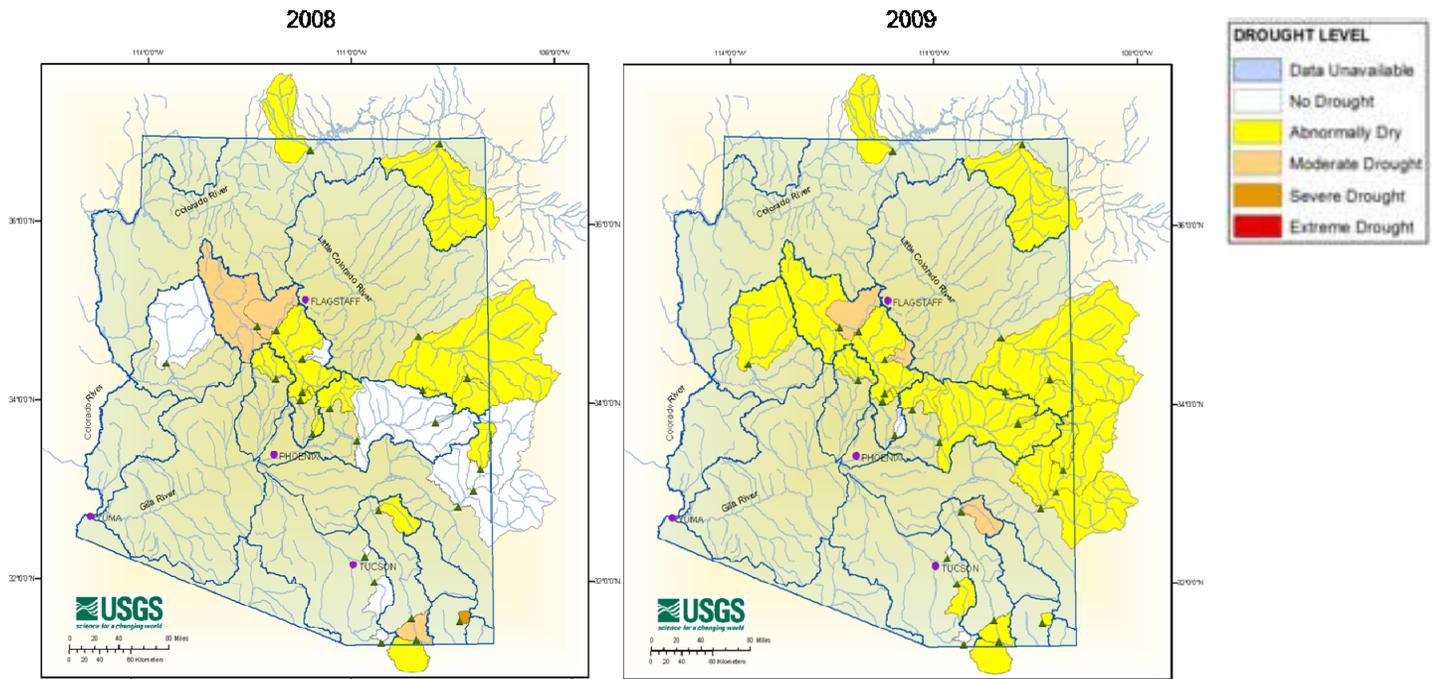
**Water Year Summary**

At SNOTEL and other mountain gages, cumulative precipitation for the water year ending September 30 was below normal in all of the state's major river basins, ranging from 79 to 89 percent of the 30-year average (Table 1).

River Basin	Percent of 30-yr. average Precipitation at NRCS high elevation gages	
	2009	2008
Salt River Basin	89%	121%
Verde River Basin	81%	109%
Little Colorado River Basin	79%	124%
San Francisco-Upper Gila River Basin	88%	104%

**Table 1. Mountain precipitation for water year 2009 and 2008.**

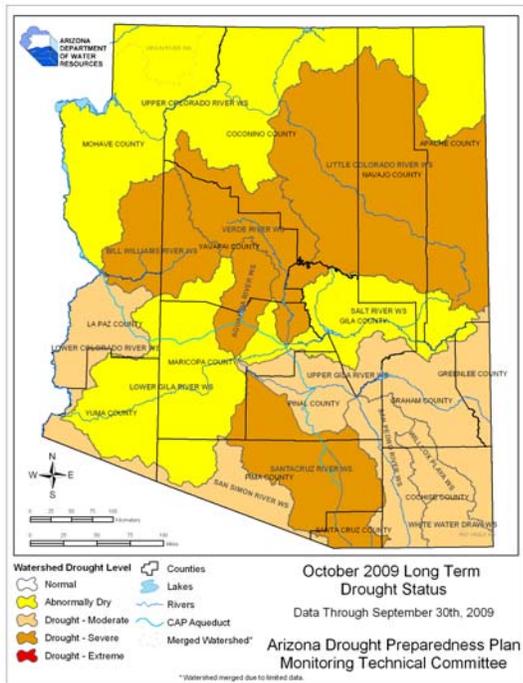
Considering drought status as indicated by streamflow, average drought values based on USGS streamflow measurements for the 2009 water year show that drought severity has slightly worsened from 2008 (Figure 5). Overall, streamflow conditions remain abnormally dry.



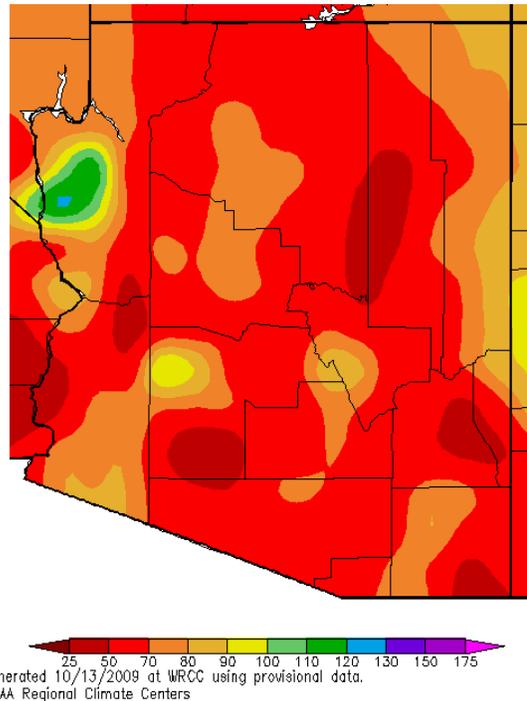
**Figure 5. As determined by USGS stream gages, drought conditions have worsened slightly from 2008 to 2009.**

Long-term drought conditions are much worse than they have been in recent years. Since April, seven watersheds dropped one category and two dropped two categories (Figure 6). During the water year, precipitation was below 70% of average for most of the state (Figure 7). While the reservoir system is in good shape, the groundwater aquifers are not as quick to recharge, so this

dry year has been especially hard on those water resources. Table 2 shows the number of watersheds in each drought category during 2008 and 2009. The table clearly demonstrates that short- and long-term drought conditions are much worse this year than in 2008.



**Figure 6. Long-term drought status as of September 30, 2009, as determined by Arizona’s State Drought Monitoring Technical Committee.**



**Figure 7. Percent of average precipitation for water year 2009.**

Drought category	Short-term		Long-term	
	Oct 08	Oct 09	Oct 08	Oct 09
	<b>Number of watersheds</b>			
<b>No drought</b>	9	0	0	0
<b>Abnormally dry</b>	6	1	7	4
<b>Moderate</b>	0	4	8	6
<b>Severe</b>	0	9	0	5
<b>Extreme</b>	0	1	0	0

**Table 2. Changes in short and long-term drought status 2008 to 2009.**

**Outlook for 2010**  
*Winter 2009/2010*

Recent data show that El Niño is present and continues to intensify across the equatorial Pacific Ocean. Based on observational and model data, El Niño is expected to strengthen and persist through Winter 2009-2010 with this being an episode of moderate strength. There will be an increased chance for above normal rainfall this winter. Based on climate data from the past century, when an El Niño develops during the summer months, there is a high (~83%) probability that Arizona will experience above median rainfall during the following winter. The official January-

February-March Outlook from the NOAA Climate Prediction Center (Figure 8) calls for equal chances for the average three month temperature to be above, near, or below normal. There will be an increased chance for the three month total precipitation to be above normal (Figure 9).

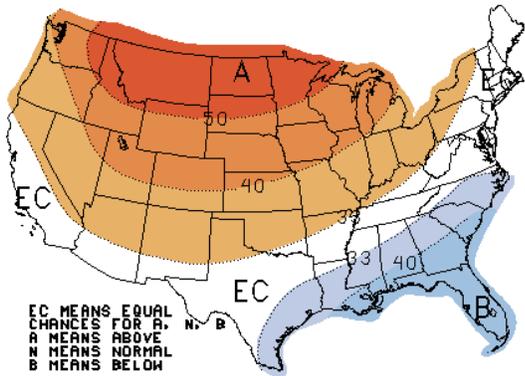


Figure 8. Probability the average temperature during Jan-Feb-Mar 2010 will be above/near/below normal.

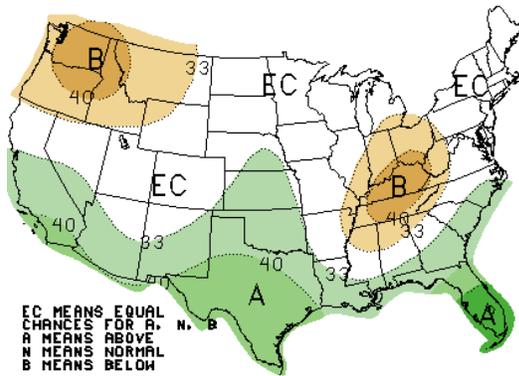


Figure 9. Probability precipitation during Jan-Feb-Mar 2010 will be above/near/below normal.

*Summer 2010*

Based primarily on long-term trends, there will be a heightened probability for the average temperature during June-July-August to be above normal (Figure 10). There will be an equal chance for precipitation during Monsoon Season 2010 to be above, near, or below normal as no clear climatic signals are currently present to alter typical expectations (Figure 11).

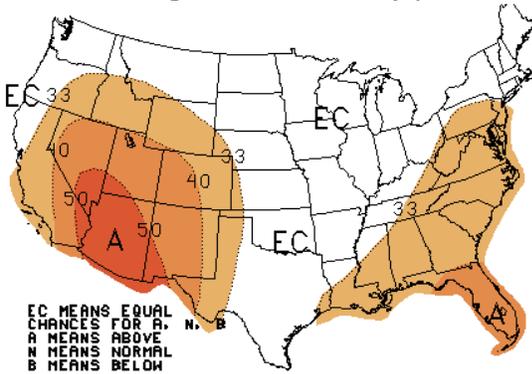


Figure 10. Probability the average temperature during Jun-Jul-Aug 2010 will be above/near/below normal.

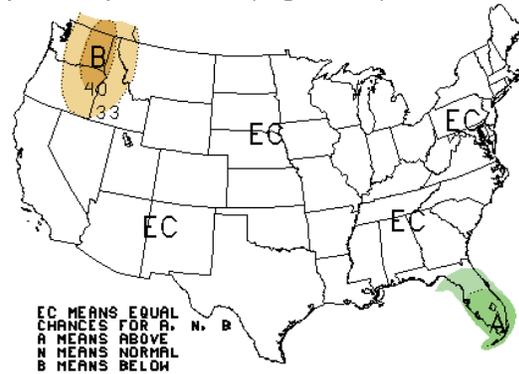


Figure 11. Probability precipitation during Jun-Jul-Aug 2010 will be above/near/below normal.

## **Drought Preparedness Plan Implementation Highlights**

### **Drought Planning for Community Water Systems**

The Community Water Planning – Drought and Water Conservation Programs worked this year to implement drought planning and water use reporting regulations established by the state legislature in 2005 and provide assistance to water providers in meeting these requirements.

*System Water Plans* - Approximately 670 system water plans have been received to date (from 2007 to 2009). Of those, approximately 65% meet statutory requirements.

It is clear from ADWR's review that many small water providers may lack the training and/or resources necessary to develop a good water planning document. It is also evident that water providers need assistance in securing emergency supplies and preparing for potential water shortage conditions. This will continue to be a primary focus for ADWR in 2010.

*Annual Water Use Reports* - In 2009, 367 community water systems, representing 92% of the total population served, reported 2008 annual water demand data. This and other information is provided in the statewide *2008 Annual Water Use Reporting Summary* (see **Appendix A**), which contains information on population served, water demand, sources of water and effluent. In November, 2009, ADWR will produce a water use summary statistics report tailored to each community water system. Among other pertinent information, this document will include water demand and gallons per capita per day data for 2006-2008 for each individual system as well as for other systems in their groundwater basin.

From reporting year 2006 to 2008, the number of online reporters increased by 21%, and the number continues to increase. This year, 52% reported online, a 7% increase from last year. The biggest challenge to overcome with regard to water use reporting continues to be the lack of water meters among the state's small water providers. These providers are still required to report their water use, but must indicate that it is estimated. Many did not have any good method of estimating, and were forced to use a very general, and potentially inaccurate, average per capita use. Of those water providers that reported, approximately 24% were not metered. However, approximately 113 providers did not file a report, so the total number of un-metered systems is unknown. (Note: annual reporting information is limited to water providers who are not regulated by active management area programs.)

ADWR will send a notice at the end of the year to local governing bodies of those providers that have still not submitted a system water plan or submitted a plan that does not meet statutory requirements (35% currently). The notice will also include those providers that have not submitted an annual water use report (22% currently). ADWR will continue making efforts to assist these systems.

### **Local Drought Impact Group Efforts**

To date, Community Water Planning – Drought Program staff, in cooperation with county extension agents, county emergency managers, and other local coordinators, have established or begun planning efforts for ten local drought impact groups in Arizona. Due to resource constraints, only two groups are currently active. Throughout the year, ADWR provided coordination and technical assistance to the Mohave and Pima County groups.

These local stakeholder groups were created to address drought preparedness and response at the regional level. The *Arizona Drought Preparedness Plan* established three objectives for local drought impact groups:

- Drought impact monitoring

- Drought education and outreach
- Drought mitigation and response

In 2008, however, after two challenging years, county coordinators and ADWR staff agreed that drought impact monitoring, or the collection of information on drought impacts, should be the main focus for local drought impact groups. Drought outreach activities and the development of county drought preparedness and response measures will be longer-term goals for the groups.

To assist the local drought groups in meeting their goals, ADWR focused their efforts on establishing a drought impact monitoring program. In partnership with the University of Arizona Cooperative Extension, ADWR worked to get agencies and individuals interested in drought impact monitoring, mainly by promoting the use of AZ DroughtWatch (<http://azdroughtwatch.org/>). This interactive web tool is designed to collect and display qualitative reports of drought impacts across Arizona. Impact information will be used in conjunction with meteorological and hydrological data to characterize drought conditions, and perhaps more importantly, to help determine the environmental, social and economic impacts of drought on our state. Establishing an effective drought impact monitoring program will continue to be the main focus for ADWR in 2010.

To help further monitoring efforts, ADWR worked in partnership with the University of Arizona Cooperative Extension and the Arizona State University School of Sustainability on a semester-long collaborative drought monitoring applied project. The students analyzed DroughtWatch and the state's drought program, and will be proposing solutions to some of the challenges that these programs face (i.e. public awareness and involvement).

Once a sufficient number of reporters are established, ADWR will assist county groups by compiling monthly summaries of impacts in their region. This information will also go to the State Drought Monitoring Technical Committee to consider when updating the monthly drought status maps. On an annual basis, ADWR plans to provide impact summaries in future annual reports to the Interagency Coordinating Group and the Governor, as well as local coordinators and county boards of supervisors to aid in planning education, mitigation and response.

#### *Local Highlights*

Five counties provided 2009 highlights – Graham and Greenlee (combined), Mohave, Pima and Yavapai. These reports are included in **Appendix B**. Despite the new approach to focus entirely on drought impact reporting, which was designed to require less resources, Mohave and Pima County are the only groups that continue to meet regularly. Graham and Greenlee counties are in discussion about reactivating their local group due to perceived intensifying drought conditions. The other local drought impact groups that have been established or planned for have remained inactive during 2009. Resources, both at the state and local level, continue to be a problem.

As the reports indicate, the counties are suffering from long-term precipitation deficits that affect vegetation health, wildlife and livestock, as well as local springs, surface water flows and well production. It is clear that short- and long-term drought conditions remain a concern.

- In Mohave County, the Monitoring Workgroup developed a form for impact monitoring for those who cannot or choose not to report online – those impacts are then entered online by a designated person. They are also identifying and reaching out to potential reporters to fill geographical gaps in the county reporting network.
- Greenlee and Graham reported on other drought-related activities that they are involved in, such as: Master Watershed Steward classes, conservation efforts, etc.

- Pima County reported that despite the warm, dry summer weather patterns, water utilities have reported reduced water demands and a later than normal peak use day. All of the water providers in the region are at a stage one drought response level.
- In Yavapai County, a Drought Tolerant Landscape Plant List for the Verde Valley was created and distributed. The list is a resource for residents and includes low water-use native and non-native plant species suitable for the greater Verde Valley area.

### **State Drought Monitoring Technical Committee Efforts**

The Monitoring Technical Committee is responsible for gathering drought, climate, and weather data and disseminating that information to land managers, policy-makers, and the public. This past year, one of the co-chairs, Tony Haffer of the National Weather Service, retired. Tony's replacement at the National Weather Service, Gary Woodall, agreed to serve as the co-chair in late October.

The Monitoring Technical Committee monitors and assesses drought conditions on a monthly basis. Each month, drought status is calculated for each watershed in the state using precipitation and streamflow data. Drought status maps are developed to display statewide drought status – both short term and long term. To provide a “reality check” for the calculated drought status, the Committee also consults vegetation indices, snowpack, temperature, reservoir levels, and drought impacts information before approving the final drought status map. The Community Water Planning – Drought Program compiles this information and produces a monthly Drought Status Update (<http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/DroughtStatus.htm>). On a quarterly basis, the Drought Program produces a more comprehensive Drought Monitor Report, which includes information on climate, precipitation, streamflow, reservoir levels, vegetation health, and a weather outlook. 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.

With funding from the Arizona Water Institute, the Monitoring Technical Committee completed a sensitivity analysis of the SPI (Standardized Precipitation Index) drought determination method. The results are not yet operational, as there is no objective dataset to use for weighting the various SPI periods used to determine drought status. Also, the gridded precipitation dataset, which has a period of record back to the 1930s and available in near real-time from National Climate Data Center, is not yet ready. Therefore, a technical sub-group still needs to convene and evaluate several options for weighting the SPI. Once a decision is made, the gridded data will be incorporated into the SPI program and the drought status products. As a result of the project, the Committee anticipates moving to a higher resolution precipitation dataset with a longer period of record to compare current with historic conditions.

The Committee has identified the following two funding and resource needs, as stated in both the 2007 and 2008 annual reports:

1. *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 Committee 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 Committee 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*

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

ADWR staff has 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. When the state budget allows, the Committee recommends funding for ADWR staff salaries to conduct groundwater analyses.

*Total cost: \$38,000 per year*

**Interagency Coordinating Group Efforts**

The Interagency Coordinating Group met two times during the past year to review and consider statewide monitoring efforts and drought status, water supply updates, rangeland conditions, forest health and wildlife. As a result, the group recommended to the Governor that both 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 ADWR's web site at

<http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/ICG.htm>.

### **Conservation Program Highlights**

Using water more efficiently is a critical element in Arizona's long-range plan for securing a sufficient water supply. This year, ADWR Conservation Program staff worked toward the following goals:

- Work with communities to provide them with the tools and resources necessary to implement strong, effective conservation programs.
- Develop a web-based water conservation toolkit for communities.
- Develop a best management practices matrix for water providers based on service area characteristics.
- Inventory and evaluate water provider plans and provide assistance to high priority communities.

### **Work With Communities**

Throughout the year, ADWR Conservation Program staff worked to promote and encourage the wise and efficient use of water by providing assistance and resources to communities throughout Arizona. In doing so, the Conservation Program targeted work with eight communities – Safford, Ehrenberg, Cottonwood, Show Low, Kingman, Wickenburg, Nogales and Eloy. Information on each of the following components was provided to help communities in Arizona build strong, effective conservation programs:

- Community Assessment
- EPA WaterSense Partnership
- Conservation Measures
- Conservation Incentives
- Water Rate Structures
- Water-use Audits
- Metering and Sub-metering
- Conservation Plan

### **Water Conservation Toolkit**

Development of ADWR's Conservation Toolkit continues to be the focus for staff. The toolkit is an assembly of tools developed to assist communities and water providers in the design and implementation of comprehensive, customized and proven conservation strategies. These tools provide residents, businesses and the agricultural community with information on sector-specific water-efficient measures.

The major categories of the toolkit are:

- Water Planners & Providers
- Residential
- Commercial, Industrial & Institutional
- Agriculture
- Education & Outreach
- Landscape Professionals
- Water-efficient Technologies

The ADWR Conservation Program web site is organized to reflect the toolkit categories and each section contains sector-specific tools. In 2009, the following tools were developed:

- *Guidelines on Conservation-based Water Rate Structures* were developed for water providers to assist them in understanding the importance of and choosing the appropriate rate structure to communicate the value of water and encourage efficient use.

- *Guidelines on Metering Water* were developed to educate water providers regarding the importance and benefit of metering water use (supply and demand). The information stresses the value of metering in evaluating actual volume used, associated costs, infrastructural soundness and advising customers of their individual costs and water use – knowledge that generally leads to increased water use efficiency.
- Low-water-use drought-tolerant plant lists were developed for the Verde Valley and Santa Cruz Active Management Areas. These lists are important in providing planners, residents and landscape professionals with information on regionally-appropriate plant choices.
- A significant amount of information on water efficiency and management practices for the agriculture sector has been added to the toolkit. This information was compiled to help growers stretch water supplies, increase productivity and profits, manage situations of water supply scarcity, reduce energy costs and meet the conservation requirements of Arizona's 1980 Groundwater Code.

Work in 2010 will focus on developing a needs assessment to determine priority of tool development; after which, tools will be created to meet those needs.

### **Best Management Practices Matrix**

In 2008, a matrix of recommended best management practices based on service area characteristics was developed. The matrix was developed to support water providers participating in the AMA Modified Non-Per Capita Conservation Program; however, the information contained in the matrix is beneficial to all water providers and its use is encouraged statewide. The matrix serves as a tool to help water providers across the state evaluate the specific water uses in their water service areas and design their water conservation programs to be comprehensive in scope and to achieve maximum effectiveness. By publicizing the growing number of water providers with successful water conservation programs, ADWR hopes to encourage providers statewide to implement these best management practices.

To enable providers to meet the requirements of the AMA Modified Non-Per Capita Conservation Program, the department held a series of educational workshops. Workshops were open to water providers around the state (not just the AMAs) and topics were selected based on provider interest determined from surveys. The following topics were covered by ADWR and several partners from around the state during the workshops:

- Overview of the Modified Non-Per Capita Conservation Program Requirements
- Tips for communicating conservation messages to customers
- Tips on where to get written water conservation materials for customers
- How to select BMPs that match service area characteristics
- Water system audits and supply-side water loss management
- Importance of water measurement and quantification -- metering
- Importance of water meters
- Automated meter reading
- Leak detection programs
- Identifying lost and unaccounted for water

In 2010, ADWR will focus on developing new tools and/or improving existing tools that assist providers in selecting and implementing best management practices appropriate to their service areas or water use patterns.

## **Conservation Plan Evaluation**

Throughout the year, Conservation Program staff developed the following in support of inventorying and evaluating water provider conservation plans: criteria for evaluation, inventory spreadsheet, scoring system to rank and prioritize providers needing assistance and timeline for completion. During this planning phase, Conservation Program staff decided that a more comprehensive approach should be taken to determine high priority water systems in the state. In addition to the conservation plan evaluation that will be conducted by Conservation Program staff, ADWR Drought Program staff will review and evaluate water supply and drought preparedness plans. A coordinated effort will help ADWR develop a more comprehensive strategy to assist water providers in Arizona. Upon completion of the evaluation, Conservation Program staff will begin to work with high priority systems to help them develop and improve their water conservation plans.

## **Additional Accomplishments**

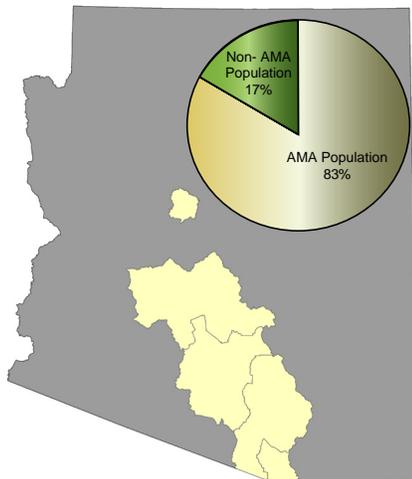
*WaterSense State Challenge* - The EPA recognized the state of Arizona's commitment to water efficiency by naming Arizona the winner of the EPA's WaterSense State Challenge. Arizona was chosen over all other competing states due in part to ADWR's efforts in signing up the most local agencies—representing the greatest increase in percentage of population—as WaterSense members. As the winning state, Arizona is currently collaborating with the EPA on a media outreach campaign, including social marketing training for water planners and providers.

*Water Awareness Month* - The Conservation Program developed an Executive Order designating April as water awareness month. Executive Order 2008-19 was issued by the Governor in April 2008 to remind all Arizonans of the fragile nature of our arid environment and the importance of creating a culture of conservation. During the month of April, ADWR's Conservation Program staff developed a Water Awareness Month webpage and hosted a series of water-conservation and efficiency webinar presentations. During the month, ADWR had 1,855 hits to the Water Awareness Month webpage. A Call to Action (see **Appendix C**) for Water Awareness Month, encouraging all Arizonans to educate, celebrate and take action to save water was also issued and several media sources, company websites and newsletters advertised the Call to Action and Water Awareness Month webpage. Lastly, ADWR offered and participated in many water-related activities around the state during April, including:

- *Patch the Pipe* leak detection
- Arizona Project WET (Water Education for Teachers) classroom activities
- Water resources and conservation displays at festivals and events
- HOA presentation on water wise landscaping
- Project WET workshops
- Xeriscape Contest
- Project WET water festivals for kids
- Earth day celebration
- Creek clean-up
- School-water Audits

**APPENDIX A**  
**2008 ANNUAL WATER USE REPORTING SUMMARY**

# 2008 ANNUAL WATER USE REPORTING SUMMARY



Arizona Active Management Areas (yellow) and Population Served

## Scope of water use represented

These summary statistics include data reported by community water systems located outside the state's active management areas.\* Community water systems are drinking water providers that serve 15 or more connections, or 25 or more people. Many of these providers also serve non-residential water users, in addition to their residential customers.

Community water systems located within the active management areas (AMAs) report to their respective AMA programs, and are not included in these filing statistics. Most of the state's larger metropolitan areas lie within the AMAs. In 2008, inside the AMAs, there were approximately 5,079,800 people served by community water systems. Outside the AMAs there were approximately 1,014,700 people served by community water systems.

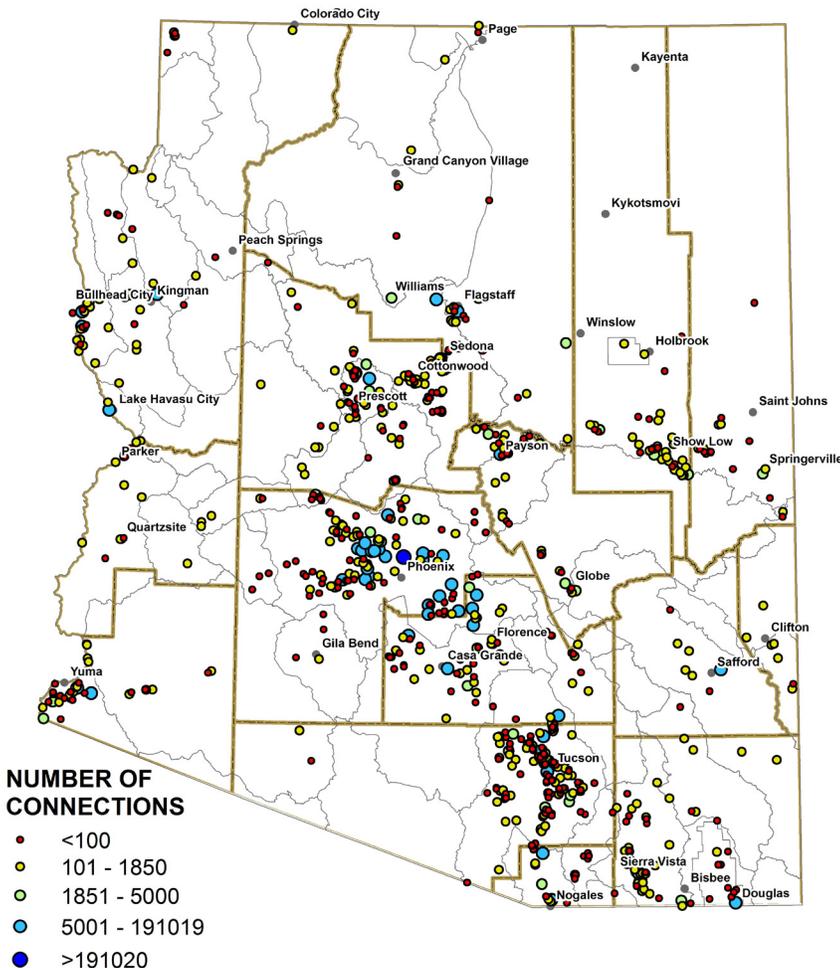
Although the population served outside the AMAs is smaller than within, there are a greater number of community water systems outside the AMAs. Therefore, each provider outside the AMAs serves a much smaller population, on average, than those within.

Population Served and Community Water Systems in Arizona

	Outside AMAs	Inside AMAs
Community Water Systems	507	293
Population Served	1,014,700	5,079,800

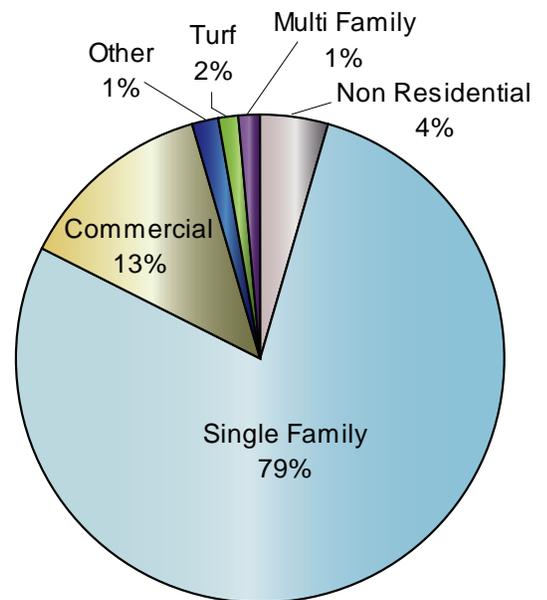
## Community Water Systems by Number of Connections in Arizona in 2008

(Includes all systems in Arizona - those inside and outside AMAs)



Statewide in 2008, 367 community water systems not regulated by the AMAs, representing **92% of the total population served**, reported annual water demand. Of the systems that reported demand **94% meter** their water use.

In 2008, 79% of all water use for systems not regulated by the AMAs was for single-family residences.



\*There are a handful of small systems within the AMAs that use exempt wells and therefore do not have a service area right. These systems, although in an AMA, fall under the purview of ADWR's Community Water System Program.

**2008 Water Demand by Basin for Community Water Systems Not Regulated  
by the AMAs in acre-feet**

(in order of total demand from highest to lowest)<sup>1</sup>

Basin	Population Served	Groundwater Demand	Surface Water Demand	Water Received from Other Water Systems	Total Demand	Effluent Generated	Effluent Reused
Yuma	174,042	12,589	15,826	5,169	33,584	1,795	509
Lake Mohave	122,991	29,212	1,514	49	30,775	3,371	3,214
Little Colorado River	178,295	17,914	6,844	30	24,788	10,163	9,982
Verde River	89,636	11,863	444	74	12,381	178	177
Sacramento Valley	54,161	10,380	NR	3	10,383	NR	NR
Upper San Pedro	91,225	10,971	NR	4	10,978	1,416	947
Active Management Areas <sup>2</sup>	37,421	3,152	5,125	86	8,363	32	32
Safford	23,652	1,861	3,261	7	5,129	1,123	1,123
Lower San Pedro <sup>3</sup>	5,276	4,038	NR	204	4,038	188	182
Douglas	18,284	3,949	NR	NR	3,949	2,072	2,072
Salt River	28,920	2,813	NR	571	3,384	NR	NR
Parker	7,654	2,224	1,013	4	3,240	894	290
Upper Hassayampa	11,162	2,141	NR	NR	2,141	527	527
Agua Fria	19,631	2,049	NR	NR	2,049	NR	NR
Lake Havasu	13,219	1,398	154	260	1,812	NR	NR
Kanab Plateau	6,700	242	NR	1,459	1,701	NR	NR
Lower Gila	7,201	590	455	198	1,244	NR	NR
Willcox	7,103	1,125	NR	NR	1,125	422	241
Gila Bend	2,092	983	NR	NR	983	NR	NR
Big Sandy	2,300	874	NR	NR	874	NR	NR
Morenci	4,821	282	588	NR	869	NR	NR
Coconino Plateau	8,970	492	314	8	814	478	NR
Hualapai Valley	3,754	441	NR	10	451	NR	NR
Detrital Valley	5,445	262	40	NR	302	NR	NR
Duncan Valley	1,515	250	NR	NR	250	NR	NR
Virgin River	1,587	232	NR	NR	232	NR	NR
Tonto Creek	2,764	164	NR	NR	164	NR	NR
Cienega Creek	1,219	157	NR	NR	157	NR	NR
McMullen Valley	1,800	138	NR	NR	138	NR	NR
Meadview	1,976	131	NR	NR	131	NR	NR
Bill Williams	1,250	112	NR	NR	112	NR	NR
Peach Springs	185	28	NR	NR	28	NR	NR
Aravaipa Canyon	60	10	NR	NR	10	NR	NR
Paria	4,076	1	NR	NR	1	NR	NR

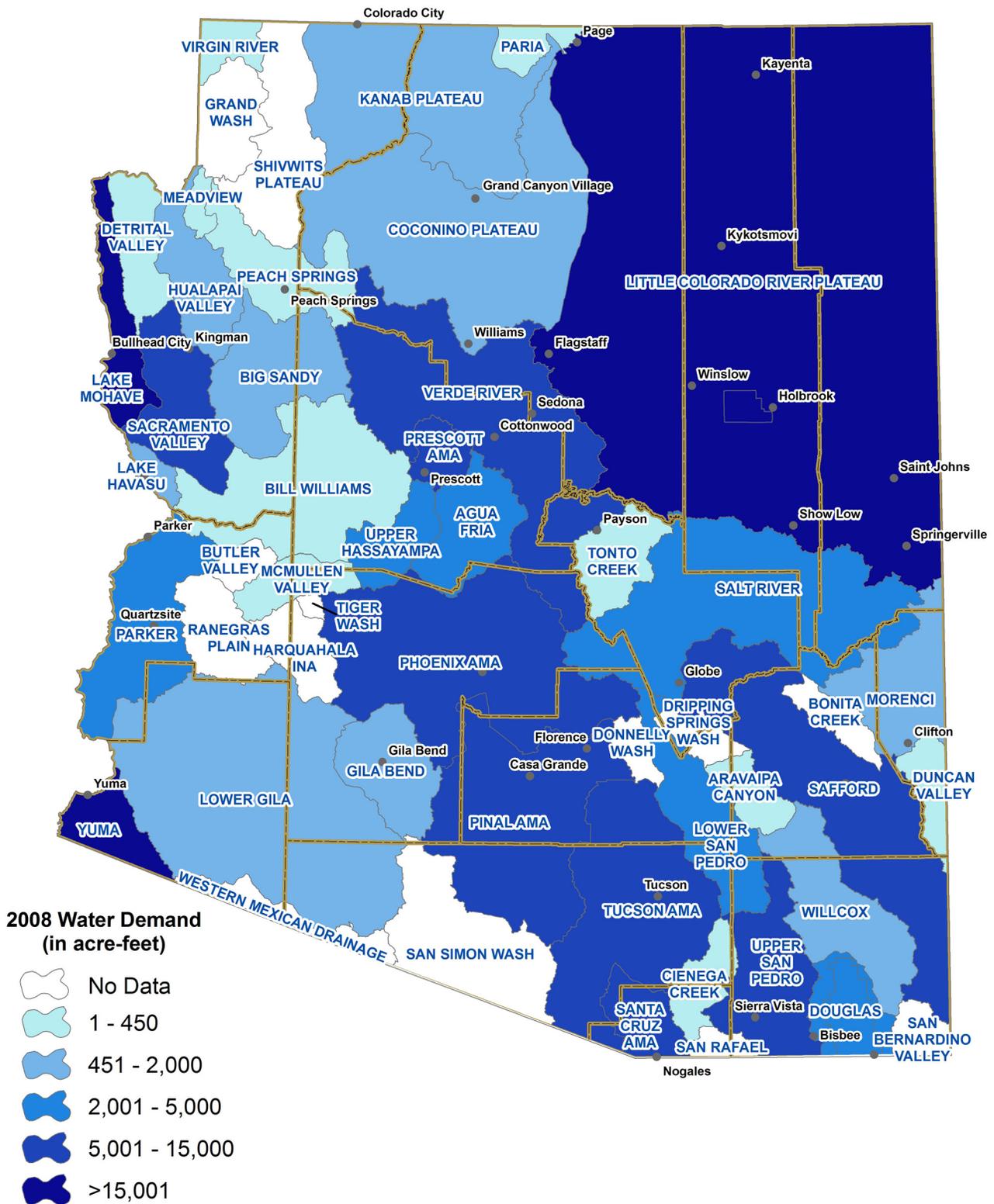
<sup>1</sup> Data shown here are exactly as reported by community water systems and may contain inaccuracies.

<sup>2</sup> Shown here are community water systems located within the AMAs that are regulated by the Community Water System Program.

<sup>3</sup> An additional 13,324 acre-feet of demand was reported in this basin for use by the ASARCO mining company.

NR = Not Reported

## 2008 Water Demand by Basin for Community Water Systems Regulated by the CWS Program\*



\* This map excludes those systems regulated by the AMA program.

**APPENDIX B**  
**LOCAL DROUGHT IMPACT GROUP UPDATES**

## LOCAL DROUGHT IMPACT GROUP UPDATES

*(as submitted by group coordinators with minor edits)*

### Graham/Greenlee Counties

#### **LDIG Status**

The local group has been inactive this year due to other pressing issues for both counties. However both counties are in discussion about reactivation of the LDIG due to perceived intensifying drought conditions.

#### **Drought Status**

Precipitation was generally poor throughout both the counties for both winter and summer. The monsoon was spotty. There are areas in both counties that did receive summer moisture but they are limited. It was reported to be the eleventh lowest monsoon on record. Drought conditions in both counties persist and may be intensifying.

#### **Drought Impacts**

The impacts of the sustained drought can be seen in several sectors. Irrigation this year was primarily with pumps as the river flow was well below average. Reduced well water production was reported. Rangelands for the most part received little summer moisture and green up was the exception rather than the rule.

#### **Drought Related Actions**

In the coming months the LDIG will be discussing restarting. A collaborative water conservation effort is starting in both Graham and Greenlee Counties. All domestic water providers, local governments, Gila Watershed Partnership, Eastern Arizona College and Cooperative Extension are working together to develop the program. The program is called Water Counts and includes four parts 1. youth education in schools, 2. adult education and awareness provided through a traveling display called the Leaky House (Figure 12), 3. free water audit program for home and institutional water users, 4. xeriscape program for home owners. The program is funded through grants from Bureau of Reclamation and Arizona Water Protection Fund. Two master watershed steward programs were also taught, in partnership with the Eastern Arizona College, the Gila Water Partnership, and University of Arizona Cooperative Extension.



Figure 12. Interactive leaky house display to demonstrate in-home water use.

### Mohave County

**Introduction.** This report summarizes the Local Drought Impact Group Activities conducted in Mohave County in 2009. Quarterly LDIG meetings were held in January, April, July, and October. Drought status reports and informational presentations were provided at the meetings by various

agencies and groups, including the State Forester's Office, Arizona Game and Fish, the Bureau of Land Management, the University of Arizona, water providers, local ranchers, and others. In March, 2009, the Monitoring Workgroup started meeting on a regular basis. This workgroup has developed variations of the standard Drought Impact Reporting System report form aimed at specific population segments to provide an option for those who cannot or do not want to provide impact information online. Although the LDIG is actively encouraging online reporting, reporters can also provide information to the Monitoring Workgroup via hard copy forms so the info can be reported online by the Workgroup or LDIG Secretary. The Monitoring Workgroup is identifying and reaching out to potential reporters to fill geographical gaps in the county reporting network.

**Status of Drought.** Drought conditions continue and have significantly worsened since the failure of the monsoon to produce significant rainfall after June, 2009. Due to the spotty nature of the earlier rainfall, some isolated areas' conditions are not as severe as in other areas, but the great bulk of the county's land area is seeing severe drought conditions. Precipitation amounts reported from various agencies and reporting stations are indicating annual precipitation amounts ranging from one third to two thirds of normal, with 50% of normal being an estimated average. Since much of this rainfall occurred in the first three months of the year and not during the spring or summer, the averages do not adequately reflect the recent lack of rainfall.

**Drought Impacts.** Current reporting from ranchers, the BLM, and others has indicated severe impacts on vegetation in areas throughout the county. Water tanks in all areas have dried up, and ranchers in the Arizona Strip area (northern Mohave County) are hauling water. Lack of tank water will severely impact wildlife as well as livestock. Livestock forage loss is estimated at over 50% throughout the county, and livestock population numbers in the Strip area are running at 50-75% of normal. Some local springs have been drying up, and Lake Mead's water elevation has fallen 19', with only 18' remaining prior to the automatic initiation of cutbacks in water supply outtakes from the Colorado River. The necessity for a declaration of drought emergency in this area of the state is already becoming apparent.

**Drought Related Actions.** Currently, none of the cities have implemented any of their drought plan stages. The cities, NRCS and BLM offices, State Forestry, Game and Fish, and other agencies will be contacted regularly by the LDIG for drought impact reports, drought stage implementation, and actual or proposed mitigation measures. This information will be utilized by the Mitigation Working Group, which will continue to recruit additional impact reporters and develop a more extensive system of monitoring with regular reports into the Drought Impact Reporting System. Discussions will be initiated on the need to establish Mitigation and Public Outreach Planning Workgroups in view of the worsening drought situation. Efforts to date have been focused exclusively on establishing and building the Monitoring Workgroup.

### **Pima County**

Pima County's Local Drought Impact Group (LDIG) consists of water providers and local, state and federal agencies; and meets regularly to monitor drought conditions, discuss drought impacts and coordinate drought declarations and responses. During the year presentations were made on the drought impact reporting system DroughtWatch, climate change in the Colorado River basin along with Central Arizona Water Conservation District's response actions and USGS methods for estimating flood magnitude and frequency using stream gage data.

**Status of Drought.** Drought Conditions continue to persist in Pima County. For the eighth straight year Tucson recorded below average precipitation. The 2009 monsoon season was atypical and produced below average precipitation, particularly in August. According to the National Weather Service, 2009 saw the coolest June since 1998, the 3<sup>rd</sup> warmest July and the 2<sup>nd</sup> warmest August. The 2009 monsoon season was the 8<sup>th</sup> warmest and 13<sup>th</sup> driest since the National Weather Service

has been recording temperature and precipitation. The consensus of Pima County's LDIG is that the drought is not over.

**Drought Impacts.** Impacts of sustained drought are being observed in several sectors.

- For ranchers, impacts to stock ponds and grasses indicate the drought is worsening.
- Stream flow at Cienega Creek was one tenth of the flow seen in pre-drought years (1992-2002). Groundwater levels measured adjacent to the creek were four to six feet lower than at the same time the previous year and stream flow length in September was two miles, or about half the average September flow, as measured since 2001.
- The lack of spring flow at Agua Caliente Park required supplementing flow with groundwater; however, pumping was limited due to falling groundwater levels.
- Stormwater harvesting at the Kino Environmental Restoration Project was below previous years resulting in the need to purchase reclaimed water to supplement irrigation.
- Despite the warm, dry summer weather patterns, water utilities have reported reduced water demands and a later than normal peak use day.

**Comparison of Different Areas.** The short-term and long-term drought status in the far western area of Pima County has fared slightly better than the remaining areas of the county. The Lower Gila River Watershed has ranged from normal to abnormally dry, whereas the San Simon River and Santa Cruz River watersheds have ranged from abnormally dry to severe drought.

**Drought-Related Actions.** The City of Tucson and Pima County are conducting a multi-year study of water and wastewater infrastructure, supply and planning issues. As part of this effort a technical paper on drought management was prepared. It recommends continued coordination of drought response actions for the region and an adaptive planning approach. Additionally, the Study Oversight Committee prepared a primer on drought and drought preparedness. The technical report and drought primer are available on the study's website at:  
<http://www.tucsonpimawaterstudy.com>

The City of Tucson published its 2009 Annual Drought Monitoring Report, which recommends continuation of the Stage 1 Drought Response. The report is available at:  
<http://www.tucsonaz.gov/water/pubs-gi.htm>

Tucson also approved a rainwater harvesting ordinance that mandates commercial properties to meet 50 percent of their landscaping water requirements by capturing rainwater. The ordinance is effective June 1, 2010.

Each of the water providers has prepared a drought response plan on file with ADWR. As of September 2009 the status of regional drought declarations had not changed from 2008. The status of drought declarations is:

<b>Entity</b>	<b>Drought Declaration</b>
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

## Yavapai County

The structure of the Yavapai County LDIG is a steering committee that provides leadership and direction for the working groups. The steering committee works under the oversight of the Yavapai County Water Advisory Committee (a large group with representation from Yavapai County government, ADWR, all cities, towns, and tribes). The Yavapai County LDIG has been meeting since September 2006.

The LDIG steering committee consists of the following individuals:

Nick Angiolillo, Co-chair, Yavapai County Emergency Management  
Jeff Schalau, Co-chair, University of Arizona Cooperative Extension, Yavapai County  
Tom Thurman, Yavapai County Supervisor, District 2  
Crystal Frost, Arizona Department of Water Resources, Prescott Active Management Area  
John Rasmussen, Yavapai County Water Advisory Committee Coordinator  
Bob Adams, Natural Resources Conservation Service  
Kresta Faaborg, Natural Resources Conservation Service  
Bob Arambula, Cocopai Resource Conservation and Development

### **Activities**

The Yavapai County LDIG had limited activity in 2009 due to staff changes within ADWR, lack of financial support, and other ongoing commitments of LDIG members. However, drought conditions were increasingly apparent following the minimal amount of precipitation received during the 2009 monsoon. Below are activities provided by the Yavapai County LDIG in 2009.

- Creation and dissemination of a Drought Tolerant Landscape Plant List for the Verde Valley. The list included native and non-native plant species suitable for the greater Verde Valley area (Cottonwood, Camp Verde, and Sedona) and was publicized through the Backyard Gardener newspaper column that was published on June 17, 2009. Below is a link to the list.  
(<http://cals.arizona.edu/yavapai/publications/yavcobulletins/droughttolerantplantsfortheverdevalley.pdf>)
- An article on Arizona DroughtWatch was published in the September 2009 Prescott Active Management Newsletter. Arizona DroughtWatch is a monitoring program designed to collect, summarize and display timely observations of drought impacts. These observations are provided by on-the-ground observers of drought impacts and reported through an easy-to-use, web-based application (azdroughtwatch.org). Promotional materials and refrigerator magnets were also distributed to promote Arizona DroughtWatch.

**APPENDIX C**  
**WATER AWARENESS MONTH CALL TO ACTION**



# April is Water Awareness Month!

It's as easy as  
1, 2, 3...

Everyone should become aware of their water use habits and determine where they can reasonably cut back. Wise water use has the added benefit of saving money.

A majority of Arizona's water is used outdoors; please *act now* and *implement* these tips to enhance your water-efficient lifestyle:

Choose low-water-use plants.

Water landscapes only when necessary and do so in the early morning to minimize evaporation.

Group plants by their water needs into separate irrigation zones.

Design grades for water retention and collect rain-water for irrigation.

Install and maintain a water-efficient drip-irrigation system.

[www.azwater.gov/conservation](http://www.azwater.gov/conservation)

April 2009

Water Awareness Month is a great time to focus on ways we can be better water stewards.

The Arizona Department of Water Resources asks you to do your part in educating, celebrating and taking action to save water.

What can you do to help? Implement *three* of these suggestions during April and show your commitment to living water wise!

## Share Information

Share your water-wise knowledge with other residents, businesses, communities, planners, educators, landscape professionals and the agriculture sector.

Link to [www.azwater.gov/conservation](http://www.azwater.gov/conservation) for more information and help spread the word.

## Webinars

View and participate in online presentations about conservation and water efficiency.

For schedule, instructions, topics and to learn more: [www.azwater.gov/dwr/Conservation/WaterAwarenessMonth.html](http://www.azwater.gov/dwr/Conservation/WaterAwarenessMonth.html)

## Water-Energy Nexus

Implement an energy-efficient change.

Water is often used to create energy and energy is used to extract, deliver and treat water.

Make the connection!

For ideas: [www.energystar.gov/homeimprovement](http://www.energystar.gov/homeimprovement)

## RinseSmart Valves

Encourage local restaurants and cafeterias to replace high-flow pre-rinse spray valves with water-efficient valves.

ADWR has valves available and may be able to help with installation.

Learn more: [www.azwater.gov/dwr/Conservation/CommercialIndustrial.html](http://www.azwater.gov/dwr/Conservation/CommercialIndustrial.html)



Education. Action. Celebration.

# Get involved & celebrate our most precious natural resource – water.

## Workshops

Attend a FREE Arizona Project WET workshop that includes teacher-tested, water-related, hands-on curriculum.

Learn more or register:

[http://cals.arizona.edu/arizonawet/workshops/current\\_workshops.html](http://cals.arizona.edu/arizonawet/workshops/current_workshops.html)

## Water Festivals

Volunteer at a Make a Splash with Arizona Project WET Water Festival designed especially for 4<sup>th</sup> graders.

Learn more and find a festival:

[http://cals.arizona.edu/arizonawet/water\\_festival/waterfestival.html](http://cals.arizona.edu/arizonawet/water_festival/waterfestival.html)

## School Water-use Audits

Work with a teacher to conduct a water-use audit at a local school. The audit will teach students about water efficiency and may result in water savings as schools opt to install water-efficient retrofits.

To learn more or find other information on school-based water activities:

<http://cals.arizona.edu/arizonawet/curriculum>

## Water-efficient Devices

Install water-efficient devices, such as faucet aerators, showerheads and spray nozzles.

Many water providers and municipalities provide these to customers for little or no charge. Contact your water company for more information.

Locate a regional water conservation office near you:

[www.azwater.gov/DWR/Conservation/Regional%20Offices/](http://www.azwater.gov/DWR/Conservation/Regional%20Offices/)

## Water Wise Landscapes

Employ the principles of Xeriscape and see beautiful landscapes that require a lot less water. Remember, when it comes to lawns, less is more!

Learn more about Xeriscape and find low-water-use plant lists:

[www.azwater.gov/DWR/Conservation/landscapePros/default.html](http://www.azwater.gov/DWR/Conservation/landscapePros/default.html)

## Lose the Leaks

Check faucets, connectors, spigots and pipes for leaks. Fix leaks immediately.

Many water providers and municipalities provide dye tablets and instructions to customers for detecting leaks at little to no charge. Contact your water company for more information.

Locate a regional water conservation office near you:

[www.azwater.gov/DWR/Conservation/Regional%20Offices/](http://www.azwater.gov/DWR/Conservation/Regional%20Offices/)

Learn more:

[www.epa.gov/watersense/fixaleak/howto.htm](http://www.epa.gov/watersense/fixaleak/howto.htm)

---

## ADWR Conservation Offices

Statewide  
(602) 771-8534

Prescott AMA  
(928) 778-7202

Phoenix AMA  
(602) 771-8585

Santa Cruz AMA  
(520) 761-1814

Pinal AMA  
(520) 836-4857

Tucson AMA  
(520) 770-3800