

Arizona

Drought Preparedness

2007

Annual Report



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Acknowledgements

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Chapter 3 - Statewide Water Conservation Office Annual Report
produced by the Statewide Water Conservation Office

Chapter 4 - Monitoring Technical Committee Annual Report
produced by the State Drought Monitoring Technical Committee

Chapter 5 - Local Drought Impact Group Annual Report
county updates provided by each county Local Drought Impact Group

The Statewide Drought Program wishes to thank these groups for their hard work throughout the past year and their contributions to this report.

Executive Summary

Drought is a reoccurring natural hazard in Arizona's desert climate, and population growth continues to increase the demand for a limited supply of water resources. The effects of drought on domestic water supplies, ranching and farming production, vegetation, forest health and wildlife populations can be devastating. The recommendations proposed in this report, if implemented and funded, can equip Arizona to deal with current and future drought and reduce its impacts. Governor Napolitano, elected officials and community leaders throughout Arizona are encouraged to consider the recommendations provided herein to improve drought monitoring and limit future vulnerability to drought.

2007 IMPLEMENTATION HIGHLIGHTS

Drought Planning for Community Water Systems

The Statewide Drought Program and Statewide Water Conservation Office worked hard this year to assist community water systems with the drought planning requirements established by the state legislature in 2005. The first system water plans were due from large community water systems in January and the first annual water use reports were due from all systems outside of active management areas in June.

System Water Plans – Ninety percent of all large systems submitted system water plans. Of these, 75% met the primary objectives, while 25% were missing crucial components, suggesting that they were not prepared for drought and potential water shortage conditions. It is clear from ADWR's review of the plans that systems need assistance in securing emergency supplies. To prepare for next year's submittals, staff spent a majority of the year developing improved forms, guidance, and an online drought planning tool to assist small systems who are required to submit their plans in January 2008.

Annual Water Use Reports – Seventy percent of Arizona's community water systems submitted a report. Fifty percent of those reporting filed their reports online. The development of the eCWS Online Reporting tool was a major multi-program, multi-agency effort, and ADWR was pleased with these results. 2007 was the first year that ADWR was able to obtain water use information outside of the active management areas. This information will allow the State to provide regional planning assistance to help communities prepare for, mitigate and respond to drought.

Education and Outreach

Another large component of the Statewide Drought Program's and Statewide Water Conservation Office's work this year focused on education and outreach to raise public awareness about drought preparedness and conservation in Arizona. Staff improved web site design, created fact sheets, and conducted workshops. In concert with ADWR's active management area conservation staff, the Statewide Water Conservation Office promoted water efficiency technology transfer to businesses statewide. With local partners around the state, the Statewide Drought Program is helping to establish

regional drought impact groups so that education and outreach can occur at the local level.

Using water more efficiently is a critical element in Arizona's long-range plan for securing a sufficient water supply. ADWR's Statewide Water Conservation Office and active management area conservation staff worked to create a culture of conservation and responded proactively to conservation needs around the state. ADWR focused on creating a more integrated approach to water conservation, which meets the mutual statewide goals of both the Statewide Water Conservation Office and active management area offices. In 2007, the efforts for the Statewide Water Conservation Office concentrated on the implementation of water efficiency programs, leak detection and education and outreach. Significant water savings were observed this year as programs that provide water efficiency technologies to businesses increased in popularity.

Monitoring Technical Committee

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. Throughout 2007, the Monitoring Technical Committee met monthly, closely monitoring and assessing drought conditions. This year, the Committee began involving local drought impact group representatives to obtain qualitative local drought impact reports in order to make more informed drought status decisions. In addition, a Drought Reporter page was added to the Drought Monitor Report that is produced monthly to communicate regional qualitative impacts and other important news. The Monitoring Technical Committee Co-chair presented two briefings on drought conditions to the Governor's Drought Task Force Interagency Coordinating Group on drought conditions, and several members of the Committee provided presentations and technical assistance to local drought impact groups.

Local Drought Impact Groups

The Statewide Drought Program has worked to establish local drought impact groups in three counties (Yavapai, Graham and Greenlee) this year. Another three counties (Apache, Navajo and Mohave) are in the planning stages and will have established groups by the end of 2007 or beginning of 2008. To date, the Statewide Drought Program, in cooperation with local coordinators, has ten local drought impact groups within Arizona that are either established or in planning stages. Included in this report are summaries from seven local drought impact groups on their progress on drought mitigation and response, education and outreach, and drought impact monitoring efforts.

In June, the Statewide Drought Program provided 1,200 rain gauges, divided among each of the county cooperative extension agents, for outreach to citizens on the importance of their involvement and encourage precipitation monitoring. Input from the local groups has been invaluable in the development of an online system for reporting drought impacts (Arizona Drought Impacts Reporting System).

Interagency Coordinating Group

The Interagency Coordinating Group met two times during the past year. During these meetings, the group considered presentations on statewide monitoring efforts and drought status, water supply updates, rangeland conditions, forest health and wildlife. The group recommended to the Governor that the current Drought Emergency Declaration be maintained. As a result, a Secretarial natural disaster designation was made for the state which allows producers to apply for low interest loans. In addition, based on the recommendation of the Interagency Coordinating Group, the Governor issued an Executive Order to declare drought and call upon citizens, businesses, schools, institutions of higher learning, local governments and federal agencies to increase water conservation efforts.

SUMMARY OF DROUGHT CONDITIONS

2006 to 2007 Comparison

In the short- and long-term, changes in drought conditions were varied – some watersheds deteriorated, several watersheds remained the same, and others in north central and southeastern Arizona actually improved due to winter storms and summer monsoon precipitation. However, in the long-term, all watersheds in Arizona are experiencing abnormally dry to severe drought conditions. Many parts of the state are still suffering from long-term precipitation deficits, which affect vegetation health, fire potential, water supplies, and range and pasture conditions. Long-term drought status is particularly significant as current research demonstrates that mega droughts have occurred historically in Arizona.

RECOMMENDATIONS AND RESOURCE NEEDS

To improve drought preparedness in Arizona, continued and increased funding will be necessary. In 2008, the Statewide Drought Program and the Statewide Water Conservation Office, in coordination with partners, will search for potential federal and private funding sources. Currently, additional resources and funding are estimated at \$500,000 and are summarized below.

Statewide Drought Program & Statewide Water Conservation Office (Community Water Planning)

For fiscal year 2009, ADWR has requested \$482,633 to hire five regional coordinators, a hydrologist, and a water resource specialist to establish a sustainable community water planning program and satisfy the Department's statutory conservation and drought planning responsibilities. Increased support for local drought impact groups, including improved guidance, financial and technical assistance, and better communication is a top priority.

Although the Department is not making any specific recommendations for community water system assistance this year, preliminary analysis suggests that some water providers may not be prepared for severe drought impacts or water shortage, either due to lack of information and data, or lack of resources. Analysis of the system water plans and annual water use data will help to inform the program's activities and recommendations for the future.

Monitoring Technical Committee

Although several projects were funded during 2007, the Monitoring Technical Committee estimates that \$122,000 is still needed for snow, soil and meteorological monitoring stations, expansion of the Arizona Meteorological Network (AZMET) and the development of a strategic plan. In addition, groundwater data should be studied so that the Committee can use groundwater level changes in their drought status determinations. The needs identified within the report are related directly to the goals of the plan to refine monitoring processes, understand drought impacts, and limit future vulnerability.

Local Drought Impact Groups

Several resource needs were identified by the local drought impact groups. To improve monitoring, the local groups identified training and equipment needs for monitors. Many of the groups stated that they need funding and assistance to establish a local education and outreach campaign. Pinal and Pima County stated that communication and coordination should be improved; Pinal County specifically suggested that ADWR host an open house to facilitate information sharing. With drought conditions worsening and potential water shortages on the horizon, ADWR and its partners will focus much of their efforts in 2008 on meeting these needs.

Chapter 1 - Introduction

Recognizing the urgent need for drought preparedness in Arizona, Governor Janet Napolitano issued an executive order and established the Governor's Drought Task Force in 2003. This Task Force developed the *Arizona Drought Preparedness Plan* (ADPP), establishing a flexible framework to refine drought monitoring processes, improve understanding of drought impacts, and determine mechanisms for limiting future vulnerability. The group also recommended funding for drought and conservation programs to be located at the Arizona Department of Water Resources (ADWR).

The Statewide Drought Program and Statewide Water Conservation Office were created at ADWR in 2005. The Statewide Drought Program provides statewide assistance for drought preparedness, mitigation and response. The mission of the Statewide Water Conservation Office is to promote and encourage the wise and efficient use of water by providing assistance and resources throughout Arizona. Together, these programs make up the Community Water Planning Program at ADWR.

This report is an overview of drought preparedness activities for water year 2007 (October 1, 2006 - September 30, 2007). As recommended in the ADPP, this report includes recommendations to the Governor for improving drought monitoring, implementation and response. The ADPP is intended to be a living document that can be updated and modified to ensure the state's strategies are appropriate and adequate in addressing drought challenges.

The *2007 Arizona Drought Preparedness Annual Report* consists of the following components:

- Report from the Statewide Drought Program
 - Program Development and Plan Implementation Highlights
 - Recommendations and Resource Needs
 - General Plan Modifications
- Report from the Statewide Water Conservation Office
 - Program Development and Plan Implementation Highlights
- Report from the Monitoring Technical Committee
 - Monitoring Committee Activities
 - Drought Monitoring Recap
 - Drought Outlook
 - Funding and Resource Needs
 - Recommendations for Revisions to the ADPP
- Report from Local Drought Impact Groups
 - Overview
 - Progress and Enhancements
 - County Local Drought Impact Group Updates
 - Drought Mitigation and Response efforts
 - Identification of Needs
 - Recommended Changes to the ADPP

ADWR's Statewide Drought Program, the Statewide Water Conservation Office, the State Drought Monitoring Technical Committee and Local Drought Impact Groups made significant progress toward meeting the goals identified in the ADPP. This report highlights the work these groups accomplished this year and makes recommendations for improving and expanding the program into the future.

Chapter 2 – Statewide Drought Program Annual Report

PROGRAM DEVELOPMENT AND PLAN IMPLEMENTATION HIGHLIGHTS

The Statewide Drought Program coordinates and implements drought preparedness activities and ensures that the state of Arizona is drought ready. Consisting of three full-time employees, the Statewide Drought Program is engaged in daily activities of coordination, outreach, and planning to implement the ADPP. Coordination with ADWR’s Statewide Water Conservation Office and the regional active management area conservation programs is important in this process. The Statewide Drought Program takes a three-pronged approach to ADPP implementation:

- 1. Coordination of three drought groups/committees**
- 2. Drought planning for community water systems**
- 3. Education and outreach**

Each of the approaches is explained in detail below.

1. Coordination of three drought groups/committees

The Statewide Drought Program coordinates three groups to implement the ADPP – Monitoring Technical Committee, Local Drought Impact Groups and Interagency Coordinating Group.

Monitoring Technical Committee

A scientific working group that assesses drought status and impact information provided by citizens, and disseminates information to the public and state leaders

During the year, the Statewide Drought Program met regularly with the Monitoring Technical Committee to produce monthly drought status maps and Drought Monitor Reports. The Monitoring Technical Committee is made up of hydrologists and climatologists representing local, state and federal agencies and organizations. This group is tasked with monitoring current drought conditions, forecasting future conditions, and communicating that information to resource managers, decision-makers and the public. ADWR relies on this group for their technical expertise in drought and climate science.

Several local drought impact group members have attended Committee meetings this year (see *Local Drought Impact Groups* below). Their input provides the group with valuable impact information, verification of drought status, and a continuous feedback loop between the state and local-level groups.

Committee work products:

- **Drought Status Maps**
Each month, the Monitoring Technical Committee calculates drought status for each surface 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.

- **Drought Monitor Report**

The Statewide Drought Program compiles the drought status maps, “reality check” data, and a weather outlook into monthly Drought Monitor Reports. These reports serve as an information resource for the public and as a planning tool for resource managers developing mitigation and response strategies.

Continually, the Statewide Drought Program makes improvements to the design of the monthly drought reports to improve communication and clarity. Most notably, a drought reporter page was added to communicate drought impacts from local drought groups and newsworthy updates from ADWR (see **Appendix A**).

For more detailed information, please refer to the *Monitoring Technical Committee Annual Report* (Chapter 4).

Local Drought Impact Groups

County-level citizen groups, coordinated by local representatives of Arizona Cooperative Extension and County Emergency Management, established to develop public awareness about drought, provide impact information, and develop local mitigation and response options

In 2007, the Statewide Drought Program began establishment of six local drought impact groups – Yavapai, Graham, Greenlee, Navajo, Apache and Mohave. For more detailed information, please refer to the *Local Drought Impact Group Annual Report* (Chapter 5). These citizen groups have three major roles:

- Reporting local, on-the-ground drought impacts to the Monitoring Technical Committee so that members can more accurately understand and report drought conditions throughout the state
- Developing drought mitigation and response strategies tailored to their region’s specific needs to reduce drought impacts on water users
- Educating the public on drought and wise water management

Throughout the year, the Statewide Drought Program and members of the Monitoring Technical Committee provided technical assistance by presenting information on the ADPP, drought preparedness and climate science. For more detailed information, please refer to the *Local Drought Impact Group Annual Report* (Chapter 5).

Interagency Coordinating Group

An advisory group, comprised of representatives of state, federal, tribal, and non-governmental organizations, that directs state mitigation and response actions and makes recommendations to the Governor regarding ADPP implementation and resource needs

The Statewide Drought Program provides direction and recommendations to the Interagency Coordinating Group. The Interagency Coordinating Group's roles are as follows:

- Direct state agency action
- Identify needs for additional resources with input from the Monitoring Technical Committee and Local Drought Impact Groups
- Advise the Governor on drought action
- Review the ADPP and make recommendations for improving monitoring, implementation and response

The Interagency Coordinating Group met two times during the past year (water year 2007), in October 2006 and April 2007. During these meetings, the group heard presentations on statewide monitoring efforts and drought status, water supply updates, rangeland conditions, forest health and wildlife. The group then considered the information and made the decision at both meetings to recommend that the Governor maintain the Drought Emergency Declaration, which has been in place since June 23, 1999.

Furthermore, based on the recommendation of the Interagency Coordinating Group, the Governor signed a Drought Declaration for the State of Arizona (see **Appendix B**) on May 22nd. The Statewide Drought Program drafted the declaration with input from the Interagency Coordinating Group. The Interagency Coordinating Group recommended this new declaration as a means of reflecting Arizona's current drought situation. Along with the emergency declaration still in place, the two declarations together maintain the state's ability to provide emergency response, while reflecting the state's current drought management strategy. Rather than simply responding to a drought emergency once it has already occurred, the state now has an innovative, proactive drought plan and drought planning program to reduce drought vulnerability and minimize the risk of a drought emergency situation. The drought declarations provide a mechanism for both preparedness and response to drought through the implementation of the ADPP and action of local drought impact groups.

The Interagency Coordinating Group's decision to recommend maintaining the emergency declaration twice a year is important in determining whether a natural disaster designation is issued due to drought. The Governor referenced both the 1999 Drought Emergency Declaration and the 2006 Drought Declaration in a letter requesting a Secretarial natural disaster designation. In September 2007, the US Department of Agriculture determined that there was sufficient production losses in 13 counties and designated all Arizona counties, except La Paz and Yuma Counties, as primary natural disaster areas. La Paz and Yuma were named contiguous drought disaster areas. Since all counties in Arizona were designated as primary or contiguous drought disaster areas, farmers and ranchers throughout Arizona who have suffered losses due to drought may apply for low-interest emergency loans.

2. Drought planning for community water systems

2007 was a big year for the Statewide Drought Program. It was the first year for community water systems to submit system water plans and annual water use reports. A significant portion of the Statewide Drought Program's time was spent working on products (detailed below) to assist community water systems with meeting these requirements.

System Water Plans Assistance

In preparation for the small community water systems' plan submittals due January 2, 2008, the Statewide Drought Program has spent a considerable amount of time improving its guidance and forms for submittal. After reviewing the plans from the large community water systems submitted in 2007, the Statewide Drought Program has a much better idea of the information that is needed and how to provide more valuable assistance. Nearly 630 plans will be submitted in January, and the fact sheet for developing a system water plan (the new guidance) (see **Appendix C**) and form (see **Appendix D**) should ensure a good compliance rate as well as improve efficiency of the review process.

Through funding provided by the Arizona Water Institute, the Statewide Drought Program, in partnership with the University of Arizona and Arizona State University, is near completion and release of a web-based drought planning tool (<http://droughtplan.arid.arizona.edu>). This tool will help water systems meet system water planning requirements by guiding them through an analysis of system vulnerabilities and helping them develop an action plan for conservation and drought planning.

Reporting results

On January 1, 2007, the first system water plans were due from large community water systems (systems serving greater than 1,850 people).

- Approximately 90% of the large community water systems submitted the required plans for water supply, conservation and drought. Mid-way through the year, the Statewide Drought Program completed an extensive review process of the plans and sent out letters to community water systems stating whether or not their system water plan met statutory requirements.
- Approximately 75% of the plans met the primary objectives, a great success rate for the first year. These systems received a compliance letter, which included a list of important guidelines for them to use as they revise and update future plans. These guidelines and recommendations for improvement are based on common components that may have been overlooked, or not given sufficient consideration.
- Approximately 25% of the systems received a letter stating that their plans did not meet requirements. These plans were missing crucial components, suggesting that the system was not prepared for drought and potential water shortage conditions. Throughout the year, the Statewide Drought Program

worked with these systems to help bring their plans into compliance to help ensure that they are prepared for potentially worsening drought conditions.

- For those that did not submit a system water plan, a notice will be sent to the system's governing bodies by the end of the year. ADWR will continue making efforts to assist these systems.

After reviewing this year's system water plans, it is evident that securing emergency sources of water supply is a common problem for community water systems throughout Arizona. To address this issue, ADWR has researched what resources are available for an emergency water shortage situation and drafted an information sheet, including contact information for each entity that may potentially provide assistance. However, many gaps remain in available resources, and ADWR will continue to seek out solutions.

Annual Water Use Reports

Assistance

Gearing up for the first year of annual water use report submittals, the Statewide Drought Program developed the 2006 annual water use report forms for community water systems located outside of the state's active management areas (see **Appendix E**). The Statewide Drought Program, along with the Information Technology Department, developed ADWR's first online reporting tool (see **Appendix F**), allowing systems to report easily from their computer without completing and mailing paper forms. Once the forms were sent out and the online reporting tool was released, program staff provided one-on-one assistance to many systems that had questions about the new reporting requirements.

Reporting results

On June 1st, annual water use reports were due from all community water systems located outside of active management areas. This represented the completion of over a year of intra- and inter-agency coordination, program development, form development, and online reporting tool development. The reports include the quantity of water pumped, diverted or received from another provider, and the number of customers who were delivered water. The annual reports represent two major accomplishments for ADWR and for the state:

1. It is the first time in Arizona history that water use information has been obtained from water providers outside of the active management areas. Access to this type of information will provide ADWR with a more comprehensive picture of water use in the state and will enable the Department to provide better drought and conservation planning assistance.
2. Approximately 50% of community water systems who filed reports did so using the new eCWS Online Reporting Tool. This is a terrific response for its first year of release.

As of October 2007, approximately 25% of water systems have not yet submitted a report. "Failure to file" notices were sent in June. ADWR anticipates that the compliance rate will only improve after the first year of implementation as more systems become familiar with the requirements. As required by statute, ADWR will notify the systems' local governing bodies of their noncompliance by the end of the year.

3. Education and outreach

The Statewide Drought Program focused its education and outreach efforts in two main areas this year. First, staff worked hard to establish the local drought impact groups. These groups should provide the foundation for a statewide education strategy to be implemented at the local level, with assistance, ideas and coordination provided by the state. The other primary focus was educating community water systems regarding new reporting and planning requirements.

Other Efforts

Late in the year, staff began revisions to its web pages that will make them more intuitive and user-friendly. The goal is to provide easy, understandable one-stop shopping on the internet for Arizona drought information and assistance. Current content includes information on the following:

- Drought status – short- and long-term drought status maps, Drought Monitor Reports and links to contributing agencies
- Local Drought Impact Groups – pages for each county to post meeting announcements, accomplishments and other information
- Community water systems – guidance documents and forms
- State level committees – information on the State Drought Monitoring Technical Committee and Interagency Coordinating Group
- Resources – links to materials on low water use plants and other valuable drought and conservation related information

Program staff also attended various conferences throughout the year to present information on the Statewide Drought Program and ADPP. During 2007, the Statewide Drought Program presented information at the following conferences:

- Drought Benchmarking Conference in Austin Texas
- American Society of Civil Engineers (ASCE) Arizona Section Board Meeting
- Arizona Water Update at the 7th Annual Arizona Municipal Utilities Leadership Institute
- Southwest Strategy Tribal-Federal Gathering – *Working Together to Create a Better Southwest: A Gathering of People and Governments* (Monitoring Technical Committee exhibit)
- Arizona Riparian Council – 2007 Annual Meeting (Drought Impacts Reporting System poster presentation)

RECOMMENDATIONS AND RESOURCE NEEDS

Monitoring

ADWR supports the recommendations of the Monitoring Technical Committee. Refer to the *Monitoring Technical Committee Annual Report* (Chapter 4) for detailed information regarding recommendations to improve monitoring. Recommendations from the Monitoring Technical Committee relate directly to the goals of the plan to refine monitoring processes, understand drought impacts, and limit future vulnerability.

Implementation and response

Now that the Statewide Drought Program has a good program foundation, there is opportunity and need for expansion, which will help with statewide implementation and response. In addition to the recommendations ADWR provided in the *2006 Arizona Drought Preparedness Annual Report*, there are two main areas where implementation and response should be improved:

- *Local drought impact group support* - The Statewide Drought Program supports the resource needs identified by the Local Drought Impact Groups in the *Local Drought Impact Groups Annual Report* (Chapter 5). Funding is needed for coordination efforts (University of Arizona Cooperative Extension, county emergency management, Natural Resources Conservation Districts, etc.) in establishing and maintaining the groups. ADWR has requested funding to provide the required level of coordination and technical and administrative support to communities for drought and conservation planning. With the continuing drought and potential for water shortage, the need for assistance is more urgent.
- *Community water system assistance* - Additional support for community water systems will be needed, but ADWR cannot yet provide specific recommendations. Nearly 200 large community water systems submitted their system water plans to ADWR in 2007; approximately 600 small systems will be submitting their plans in 2008. However, preliminary analysis suggests that some community water systems may not be prepared for severe drought impacts or water shortage, either due to lack of information and data, or lack of resources. Once the rest of the plans are submitted and reviewed, ADWR should be able to draw conclusions and make informed recommendations. Analysis of the annual water use data obtained this year will also help to inform the program's activities and recommendations for the future.

Current staffing and funding for the Department's Community Water Planning program is severely limited. As Arizona enters its second decade of drought, planning and preparedness is increasingly important, and it is necessary to increase staff and funding to meet the needs of Arizona's citizens. ADWR has recommended that additional funding be included in the Department's budget for Fiscal Year 2009 to hire five regional coordinators through the University of Arizona Cooperative Extension and two additional staff within ADWR (a hydrologist and water resource specialist) to establish a

sustainable Community Water Planning Program and satisfy the Department's statutory conservation and drought planning responsibilities.

GENERAL PLAN MODIFICATIONS

Several general plan modifications were recommended in the 2006 annual report. Those changes do need to be made; however, it was not identified as a top priority for the Statewide Drought Program. The plan has a flexible framework that has allowed the state to make minor adjustments needed for implementation, and it will be updated in the future to reflect these changes.

Chapter 3 - Statewide Water Conservation Office

PROGRAM DEVELOPMENT AND PLAN IMPLEMENTATION HIGHLIGHTS

In response to Governor Napolitano's call to develop a "culture of conservation" and in support of new legislation, ADWR is responding in a proactive way to conservation needs around the state. The efforts for the Statewide Water Conservation Office for 2007 focused on the implementation of water efficiency programs, leak detection and education and outreach. An effort began within ADWR to focus on comprehensive water conservation planning and identifying commonalities between the voluntary programs of the Statewide Water Conservation Office and the regulatory programs administered by the five active management areas of the state. This is an effort to make better use of the regional conservation efforts we support throughout the state; coordination of these efforts is key to the overall implementation of community water planning program and assistance provided to water providers. (Next year's report will highlight the success of the new group's, ADWR Conservation Program, efforts.) Currently, however, the Statewide Water Conservation Office takes a three pronged approach to implementing conservation programs around the state:

- 1. Technology transfer**
- 2. Education and outreach**
- 3. Financial assistance**

Each of these approaches is explained in detail below.

1. Technology transfer

Efforts at ADWR have shifted from providing standard conservation messages to developing and implementing on-the-ground programs with a goal of reporting project water savings. It is becoming more evident that many water efficiency programs also yield energy savings and the partnerships we have developed through working with Salt River Project (SRP) and Southwest Gas Corporation provide great opportunities. With the nationwide trend toward green building increasing at a fast pace, many are looking at the carbon "footprint" of programs, in addition to potential water and energy savings.

Water Efficiency Programs- Commercial Food Service

- Pre-Rinse Spray Valves - Water and energy efficient pre-rinse spray valves that operate at 1.6 gallons per minute as opposed to the previous industry standard of 2.5-3.0 gallons per minute or above, are being purchased through grant funding and distributed to commercial kitchens around the state. These newer efficient models provide greater velocity with a smaller amount of water which results in improved ability to clean.

The Statewide Water Conservation Office's greatest water conservation success, to date, has been in the commercial food service sector through this retrofit of water and energy efficient pre-rinse spray valves. Similar programs in other states have yielded 40% water savings. The SRP program that ADWR implemented in partnership with SRP has provided the results presented below. This program is currently implemented in rural areas of the state: Kingman, Lake Havasu, Yuma, Flagstaff, Payson, Prescott, Sedona and Springerville.

Cottonwood and Showlow are next on the implementation list. In addition, ADWR has a cooperative agreement with Southwest Gas Corporation as part of their Demand-side Management Program to install up to 5,000 pre-rinse spray valves over the next three years.

ANNUAL SAVINGS	
<i>Results based on installation of 1,777 pre-rinse spray valves</i>	
<hr/>	
Energy (% estimated in therms and kilowatt hours)	
	21% or 1,000,000 kWh - electric heating
	79% or 161,000 therms - natural gas heating
Water	
	15,839,000 gallons
Carbon:	
	~1,500,000 lbs or 750 tons

Based on information provided by SRP from the Phoenix area program

- Connectionless Food Steamers - Food Steamers are used to steam food in commercial food service facilities. Most models use a boiler to heat water to produce the steam. These boiler models typically discharge 40 gallons per hour down the sewer drain. Connectionless or Boilerless models do not discharge water and result in 100% savings.

ADWR is currently negotiating another water efficiency program with Southwest Gas Corporation to promote the offering of a rebate for “boilerless” food steamers that will result in both water and energy savings. In 2007, Southwest Gas Corporation received approval from the Arizona Corporation Commission to offer a rebate to commercial food service facilities to replace boiler-based models with the new water and energy efficient models. ADWR will help develop and implement this program within Arizona and serve as a promotional partner for this effort. In addition, ADWR will survey potential customers for this rebate program while conducting site visits for the retrofit of pre-rinse spray valves.

Satellite or “Smart” Irrigation Controllers

Satellite Controllers are linked to a satellite which downloads current weather information to the irrigation controllers. Controllers are then programmed to provide irrigation water to meet the evapotranspiration rates of the turf grass. Evapotranspiration is the amount of water loss from the plant through evaporation or transpiration, and replacement of this amount is necessary to prevent wilting.

ADWR has been approached by SRP to help fund and/or sponsor a program to provide a rebate for the purchase of satellite controllers. The greatest impact for this type of program may prove to be found in the commercial sector for use at large turf facilities such as golf courses, parks, schools and cemeteries.

EPA WaterSense Program (www.epa.gov/watersense)

WaterSense is a new voluntary public-private partnership program which is sponsored by the United States Environmental Protection Agency (EPA). The program provides a label to water efficient products which have received independent product testing and certification. This program includes professional certification programs for the landscape irrigation industry and products for the homeowner/consumer.

In 2007, ADWR has joined the EPA WaterSense Program as a governmental promotional partner. This partnership allows the ADWR to participate in national conference calls held quarterly to discuss water efficient projects and other relevant topics. This partnership will help ADWR stay current on new water efficient products and product specifications.

Leak Detection or Patch the Pipe

Most utilities nationwide report 10-20% loss and unaccounted for water in their distribution systems. While this could be due to theft, such losses are more likely due to leaks. A leak of one gallon per minute wastes approximately 1,000 gallons of water per day and 525,000 gallons per year. Even a slow, steady stream of water can waste more than 40 gallons per day.

In the Statewide Water Conservation Office's community outreach efforts throughout the state, one of the biggest concerns noted was that of aging infrastructure and losses due to system leaks. Many small water providers do not have access to or available funding to purchase leak detection equipment. ADWR applied for and received a grant from the Bureau of Reclamation to purchase leak detection equipment. ADWR developed and is implementing a leak detection program for the State of Arizona called "Patch the Pipe". The program will use state of the art digital leak detection equipment to detect leaks within a water utility's distribution system. Free of charge, ADWR will provide this equipment and will work with communities around the state to assist them with leak detection. These efforts support the Community Water System Planning legislation that requires all community water systems to implement water conservation plans to increase the system efficiency, reduce waste, and encourage consumer water conservation.

2. Education and outreach

ADWR's Statewide Water Conservation Office provides a great deal of water conservation information to the public; water education is vital in Arizona.

Web Site

The Statewide Water Conservation Program web site (www.azwater.gov/dwr/conservation/) was created to provide water conservation information for the general public and communities across the state. This site also provides information on specific water efficient technologies for various water use sectors. In 2008, the Statewide Water Conservation Office will take lead in revising the web site to reflect ADWR's coordinated statewide approach and efforts of the ADWR

Conservation Program created in 2007. The goal is to provide one-stop shopping on the internet for Arizona conservation information and assistance.

Arizona Project WET Water Education Program

With ADWR's support, Arizona Project WET (Water Education for Teachers), a University of Arizona Water Resources Research Center and Cooperative Extension program, delivers effective water education programs specific to Arizona audiences. The comprehensive water resource education program exhibits a twelve-year history of successful teacher training. The Arizona Project WET program uses nationally recognized educator guides to deliver water education programs that meet Arizona academic standards and add local relevancy. Arizona Project WET promotes responsible water stewardship through excellent and effective education.

- Educator Workshops - Professional development workshops (ranging from 6 – 16 hour sessions) are designed uniquely to meet the needs of specific audiences and range. In general, five educator guides are available to design specific workshops on the following topics: water, watersheds, water quality, wetlands and water conservation.

<p style="text-align: center;">**2007 RESULTS**</p> <hr/> <p style="text-align: center;">677 teachers and educators</p> <p style="text-align: center;">65,264 students</p>

The complexity and interconnection of water resource issues are conveyed through lessons that develop critical thinking skills and systems thinking. By facilitating an understanding of interrelated issues using a systems approach, students recognize that changes in one component affect the entire system.

Working with individual school districts, Arizona Project WET has integrated water education in to many districts' core curriculum. For example, Arizona Project WET worked with master teachers to integrate Arizona Project WET lessons and materials into the Full Option Science System (FOSS) Science Kits. Arizona Project WET lessons add concept-building teaching methods, local relevancy and improved adherence to the State standards to the FOSS Water Kits. This Arizona Project WET FOSS integration is being used at Tucson, Sunnyside, Flagstaff, Deer Valley, Madison and Murphy Unified School Districts, and interest across the state continues.

- Arizona Conserve Water Educators Guide – ADWR, in partnership with Arizona Project WET, the Bureau of Reclamation and the national Project WET, developed a state specific educators' guide published in May 2007. This new Arizona specific educational tool is focused on grades K-12 and includes real-life conservation case studies for students to evaluate. Already, Arizona Project WET

has provided instruction on this new guide to 137 educators. Arizona Conserve Water Workshops have been held in Phoenix, Prescott, Sedona, Tempe and Tucson. ADWR's workshop series and outreach efforts for this year have focused on promoting this new resource, including promotion at the annual Arizona Science Teachers Association Conference.

Fact Sheets

A printed conservation material for communities was another need that was recognized by the Statewide Water Conservation Office in a 20 city tour conducted in the summer of 2006. In an effort to provide resources to communities, staff developed a series of fact sheets for its various conservation programs. The following fact sheets (see **Appendix G**) have been developed and are currently available for use around the state:

- Statewide Water Conservation Office
- Pre-Rinse Spray Valve Program
- Arizona Leak Detection Program
- Water Saving Tips for Commercial Kitchens
- Water Saving Tips for Laundries
- Water Saving Tips For Vehicle Washing
- Water Saving Tips For Pools and Spas
- Arizona Project WET Educators Guide

Work with community water systems to develop comprehensive conservation plans will continue over the next few years. In 2008, the ADWR Conservation Program will work closely with five communities around the state to develop sound conservation programs through the development of conservation tools and measures that meet the specific needs of each community.

3. Financial assistance

ADWR has provided financial assistance to communities who have agreed to install the water and energy efficient pre-rinse spray valves. Cooperative agreements and grants to ADWR have provided critical resources for rural Arizona. Rural Arizona is very willing to conserve water; however, many of the smaller communities do not have the resources to implement programs on their own. In instances where small communities needed financial assistance to install the pre-rinse spray valves, ADWR provided funding through inter-governmental agreements.

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Chapter 4 – Monitoring Technical Committee Annual Report

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MONITORING COMMITTEE ACTIVITIES

The Arizona Drought Monitoring Technical Committee (Committee) continued its monthly drought reporting and made substantial progress on a number of fronts in 2007. The Committee's work, during worsening drought conditions in the winter of 2006-07, alerted Interagency Coordinating Group officials and the public to developing and potential drought impacts. The Committee also made significant inroads in developing drought decision tools for Arizonans, in cooperation with agency and university personnel and scientists. The following summarizes the Committee's main activities in 2007:

- Implemented a key recommendation of the *Arizona Drought Preparedness Plan* (ADPP) by coordinating with local drought impact groups (LDIGs) to incorporate drought impacts information in determining monthly drought status. LDIG members also now regularly participate in Committee meetings.
- Secured funding to develop an online drought impacts database and reporting system. When completed, this system will coordinate closely with National Drought Mitigation Center impacts reporting.
- Improved critical streamflow and snow monitoring by securing funding through Committee member agencies.
- Coordinated with the Arizona Flood Warning System (AFWS) to incorporate drought information into its website, now called Arizona Flood Warning and Drought Monitoring.
- Secured funding to implement a drought decision support tool, the Dynamic Drought Index Tool (DDIT), in Arizona. Committee members will work with Arizona stakeholders to customize the DDIT to meet Arizona needs.
- Presented information and provided technical assistance to local drought impact groups.
- Compiled data and information on key drought indicators, reported monthly to the Arizona Department of Water Resources, and made reports available through the Statewide Drought Program website.
- Briefed the Governor's Drought Task Force Interagency Coordinating Group on drought conditions.
- Presented the Committee's activities at technical conferences, workshops, newspaper editorials, and interviews with the media. Committee members presented public talks at key national conferences including the U.S. Drought Monitor Workshop, the North American Drought Monitor Workshop, and the National Oceanic and Atmospheric Administration (NOAA) Climate Prediction and Application Science Workshop.

- Strengthened connections with Natural Resources Conservation Districts and their education centers.

Innovations, Improvements, Changes

The Committee was pleased to obtain funding for several of the tools and projects identified as resource needs in last year's report; they are described below:

Streamflow gage network

Last year, the Committee identified three USGS streamflow-gaging stations that were going to lose funding (Sabino Creek near Tucson, Pantano Wash near Vail, and Show Low Creek near Show Low).. In 2007, the Committee obtained funding to continue operation and maintenance of these gages, used to determine long-term drought conditions in the Santa Cruz and Little Colorado River watersheds.

SNOTEL stations installed in Verde

In September 2007, the Natural Resources Conservation Service (NRCS) State Conservationist was able to secure funding to install three new snow telemetry (SNOTEL) sites. The new SNOTEL sites will support the streamflow forecasting mission of the NRCS. These new sites will have the added benefit of enhancing drought monitoring in the Verde watershed with the installation of soil moisture-soil temperature sensors.

Drought impacts database and reporting system

The ADPP recommended a "state drought impacts database and standardized system to collect regional and sectoral qualitative and quantitative impacts." Recognizing this as a high priority need, the University of Arizona, along with its federal, state and local partners, is developing an online drought impact reporting tool, which will serve the following purposes:

- allow LDIGs to easily report drought impact information
- store impact information in a database
- display impact information through online maps that are easy to access and interpret
- allow users to display drought impact history for particular locations
- enable easy evaluation and analysis of impact information through space and time

The Committee is working to connect this system with the Arizona Hydrologic Information System and National Drought Mitigation Center.

Dynamic drought index decision support web tool

The Committee, in collaboration ADWR, Salt River Project, National Weather Service Arizona Water Institute, has initiated a process to include drought information in a new and robust hydrologic web site to give Arizona's decision makers a seamless suite of comprehensive hydrometeorological information. The web site will integrate information from the Arizona Flood Warning and Drought Monitoring System and the Arizona Hydrologic Information System.

The plan for the system is to build on software called Dynamic Drought Index for Basins in North and South Carolina (<https://www.dnr.sc.gov/drought/index.php?pid=0>), developed by colleagues at the Carolinas Integrated Sciences and Assessments project. This web-based decision support tool has been successfully used in drought monitoring, and is featured in the National Integrated Drought Information System (NIDIS) implementation plan as an example of a user-oriented tool for improving drought preparedness and response. The dynamic drought index decision support tool (DDIT) allows users to easily examine a variety of drought indicator data (such as streamflow, precipitation, drought indices), at a range of spatial scales, based on user choice (county, HUC, climate division). Users can generate maps, statistics and graphs for both commonly accepted and user-defined drought indices tailored to their management needs.

Members of the Committee have secured funding to work with CISA and University of Arizona colleagues to implement the DDIT in Arizona. The research team's plan includes the following activities: (a) work with Arizona stakeholders to determine user needs and preferences for DDIT features for Arizona, (b) evaluate technical and data requirements for DDIT transfer (c) coordinate with AHIS and NIDIS Drought Portal technicians to implement experimental AZ DDIT, (d) work with Arizona stakeholders to evaluate experimental AZ DDIT and implement improvements, as necessary.

Other improvements:

Addition of impacts in the Drought Monitor Report

A Drought Reporter page was added to the monthly Drought Monitor Report to communicate drought impacts from the local drought groups that have begun a monitoring program and are reporting to ADWR. The additional page also provides an avenue for disseminating newsworthy updates from the local drought groups, ADWR and the Interagency Coordinating Group.

Local drought impact groups' participation in Committee meetings

LDIG representatives have begun participating in the State Drought Monitoring Technical Committee meetings. It is helpful for the Committee to hear local perspectives on drought conditions, and beneficial for LDIG representatives to understand and assist with the committee's process in determining drought status.

State Climate web site

The State Climate website (<http://geography.asu.edu/azclimate>) has added monthly climate updates with temperature and precipitation conditions around the state, daily temperature, dew point and wind conditions for Flagstaff, Phoenix and Tucson, and monthly climate calendars for six cities. The site also has a link to the monthly Drought Monitor Reports.

Drought incorporated into the Arizona Flood Warning System web site

ADWR's Statewide Drought Program and Flood Warning Program, and Salt River Project worked to incorporate drought information into the Arizona Flood Warning System web site (<http://data.afws.org/sui/frontPage.aspx>), now called Arizona Flood

Warning and Drought Monitoring. There are currently four main categories under the drought tab:

- Drought Status – provides current short- and long-term drought status maps and a historical perspective for the past year for both the short- and long-term drought status
- Data/Indicators (under construction) – will contain data and information regarding drought indicators (reservoir levels, vegetation health, snowpack monitoring sites, groundwater changes, and local drought impacts)
- Report Drought Impacts – provides information and a link to the Drought Impacts Reporting System to allow citizens across the state to easily report drought impacts in their area
- Weather Resources

The new drought link provides information for a more technical audience. The Statewide Drought Program will maintain its own web site with user friendly, less technical program information, but will also provide a link to the technical drought information on the Arizona Flood Warning and Drought Monitoring web site.

Outreach to Arizona Tribes

The Committee continued outreach efforts and made contacts with tribal nations. In August, the Committee developed a poster display for the Southwest Strategy Tribal-Federal Gathering – *Working Together to Create a Better Southwest: A Gathering of People and Governments*. Key contacts were made and the Committee will work with these individuals to identify drought planning constraints and opportunities with Arizona's tribes, including their participation at the Governor's Drought Task Force Interagency Coordinating Group meetings.

DROUGHT MONITORING RECAP

Overall Drought Status

During the 2007 water year, the short-term drought situation has deteriorated in one watershed in south central Arizona, while improving in four watersheds in north central Arizona and three watersheds in southeastern Arizona. The improvement in the southeast occurred both due to winter storms and summer monsoon precipitation. Seven watersheds in central and southwestern Arizona had no net change in status over the water year. There are no watersheds in either the severe or extreme category in the short term.

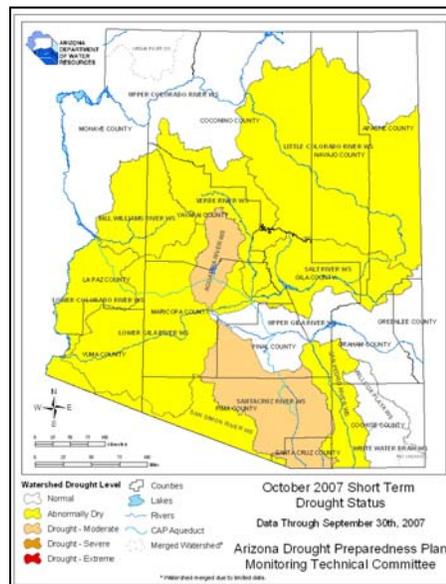
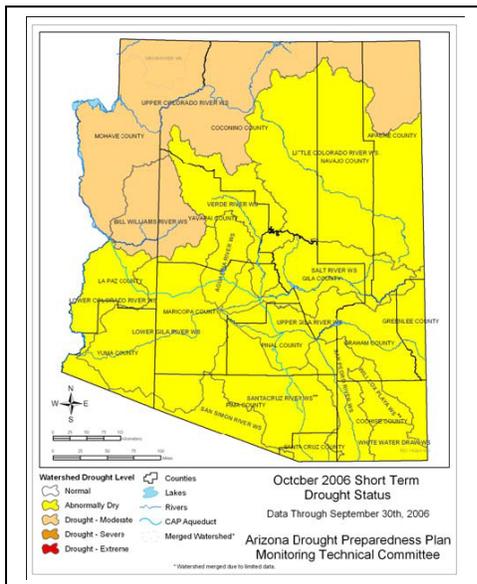
The long-term situation has improved incrementally from conditions a year ago, with all five watersheds in the southeast improving at least one category.

- The Salt, Santa Cruz, San Pedro, and Willcox all improved from severe drought to moderate
- The Upper Gila moved two categories up from severe drought to abnormally dry.
- Four watersheds in southwestern and west central Arizona moved to worse drought conditions in the past year, with three of them dropping two categories.
- The lower Colorado and lower Gila moved from no drought to abnormally dry and moderate drought, respectively.

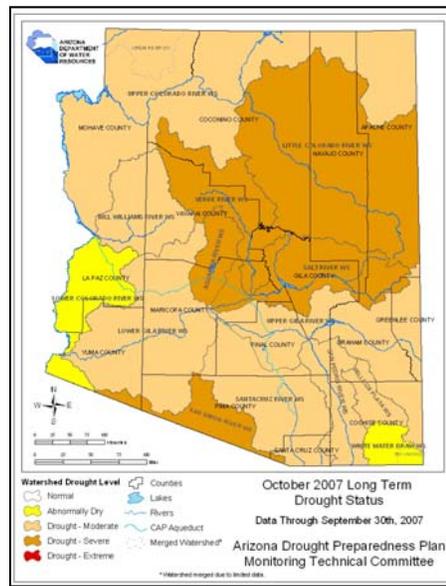
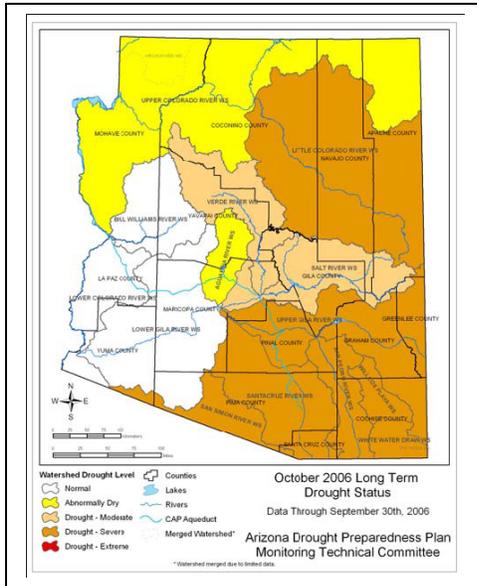
- The Bill Williams dropped from no drought to moderate drought, and the Agua Fria moved from abnormally dry to severe drought.
- The Salt and Verde watersheds, which supply surface water to the Phoenix metropolitan areas, are both in moderate drought in the long-term.
- The Little Colorado, which feeds the groundwater resources of Northern Arizona, is in severe drought.
- The San Simon on the south and the Agua Fria in central Arizona are also in severe drought for the long term.
- The Santa Cruz and San Pedro, which recharge the groundwater in southern Arizona, are both in moderate drought, up from severe drought a year ago.
- There are no longer any watersheds at “normal” status, but there are also no watersheds in Arizona experiencing extreme drought conditions.

Both the short-term and long-term improvements have been mainly due to a strong monsoon in the southeast and across northern Arizona, helping watersheds that receive no snow pack. The table below summarizes the number of watersheds in each category and the shifts in drought across the state over the water year.

Drought Category	Short Term		Long-Term	
	Sept 06	Sept 07	Sept 06	Sept 07
No Drought	0	5	3	0
Abnormally Dry	10	8	3	5
Moderate	5	2	2	7
Severe	0	0	7	3
Extreme	0	0	0	0



Short-term drought status comparisons – end of water year 2006 and 2007



Long-term drought status comparisons – end of water year 2006 and 2007

Urban-area Drought Summary

Dry conditions were extreme during the winter of 2006-2007. On April 24, 2007, Pima County declared a Drought Stage One. Stage One encourages the public to implement voluntary reductions in water use, restaurants to provide water upon request only, and hotels to conserve water. In addition, Pima County initiated a public education campaign to promote awareness about water conservation issues. However, there are no imminent threats to Tucson ground- and surface-water supplies.

Despite winter drought and low recharge to surface water supplies in the Salt and Verde River Basins and in the Colorado River Basin, water supply for metropolitan Phoenix is in reasonable condition. Salt and Verde Basins' total current storage as of the end of water year 2007 is at 51.7% of capacity (1,195,400 acre-feet). (Their lowest point in 8 years of drought occurred in June 2004, when they were at 44.4% of capacity). Both Lake Mead and Lake Powell, on the Colorado River, were at less than 50% of capacity – a drop of more than 4% since the end of water year 2006, but more than one million acre-feet above their lowest combined storage during the current drought.

The La Niña forecast for winter 2007-08 will likely mean low winter precipitation in Arizona; however, the Upper Colorado River Basin may fare well. La Niña is also likely to mean higher than average temperatures in Arizona. During water year 2007, Phoenix had a record number of days (32) at or above 110°F, and Tucson set three new records for high maximum and eight new records for high minimum temperatures.

Drought Indicators and Impacts in Detail

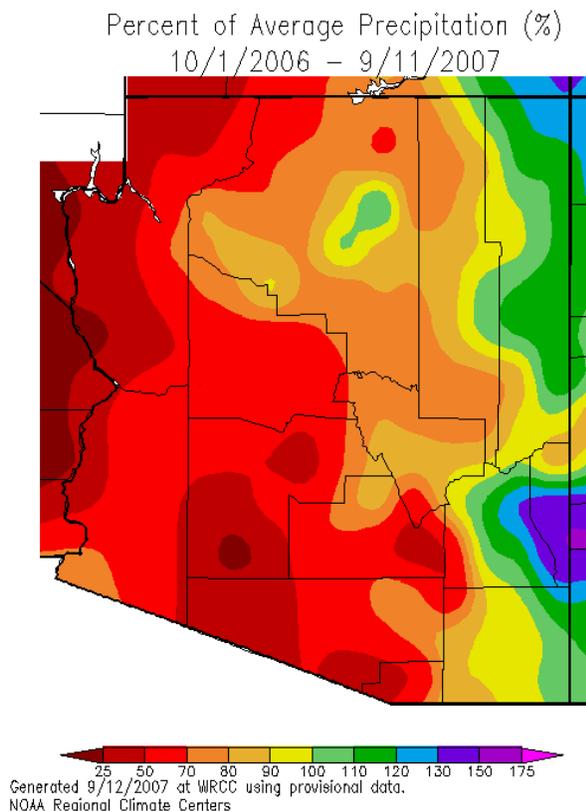
Overall Precipitation

The shift of drought conditions around the state is due to the spatial distribution of precipitation during the previous water year. Northern Arizona received less than

average snowfall in winter, but higher than average rainfall during the monsoon. Some locations, like Bill Williams and Agua Fria watersheds, were missed by both winter storms and summer monsoonal precipitation. The southeastern corner of the state received both summer and winter precipitation as moisture flows moved across southern New Mexico.

With the exception of the eastern quarter of the state, precipitation has been well below normal. The El Niño that had developed a year ago quickly deteriorated early in the winter, resulting in smaller than normal snowpack everywhere except the highest elevations in the White Mountains. Winter and spring moisture moving into the state from New Mexico also contributed to precipitation along the eastern edge of the Colorado Plateau and the White Mountains. Most of the monsoon moisture this year has moved northeastward from Mexico toward New Mexico, enhancing rainfall over our southeastern watersheds.

Over half the state experienced less than 70% of normal precipitation and another quarter of the state received 70 to 90% of normal. This winter is predicted to be a potentially strong La Niña, which typically brings below average precipitation to the southwestern United States.



Mountain Precipitation

Cumulative precipitation for the period October 1 through December 2006 was below normal over the Salt, Verde, Gila, San Francisco, and Little Colorado River basins,

ranging from 47 to 65 percent of the 30-year average. As such, October readings show significant precipitation catch at nearly all USDA-Natural Resources Conservation Service (NRCS) automated snow telemetry (SNOTEL) sites. In contrast, very little precipitation was recorded in November until a storm delivered two to eight inches of snowfall to the basins beginning November 28; still, precipitation amounts were less than 25 percent of average for the month. December brought some snow flurries to the mountains, though SNOTEL readings showed precipitation totals were below 50 percent of average at the end of the month.

January storms produced the first significant precipitation of the snow season and it seemed that the El Nino predicted for the winter would finally deliver heavy snowfall to the river basins; however, February turned dry with only marginal snow accumulations in the basins. The El Nino completely fizzled out in March, leaving the mountain basins very dry. This is especially significant since snowpacks in normal years are at their maximum level in March. April was relatively dry, and warm weather triggered the Arizona snowpack to melt out nearly a month and a half ahead of time.

May and June are traditionally dry and this year was no exception. The summer monsoon delivered well above average precipitation to nearly all mountain monitoring stations in July and August, while rainfall levels in September varied from below average in the Salt and San Francisco-Upper Gila River Basins to above average in the Verde and Little Colorado River Basins.

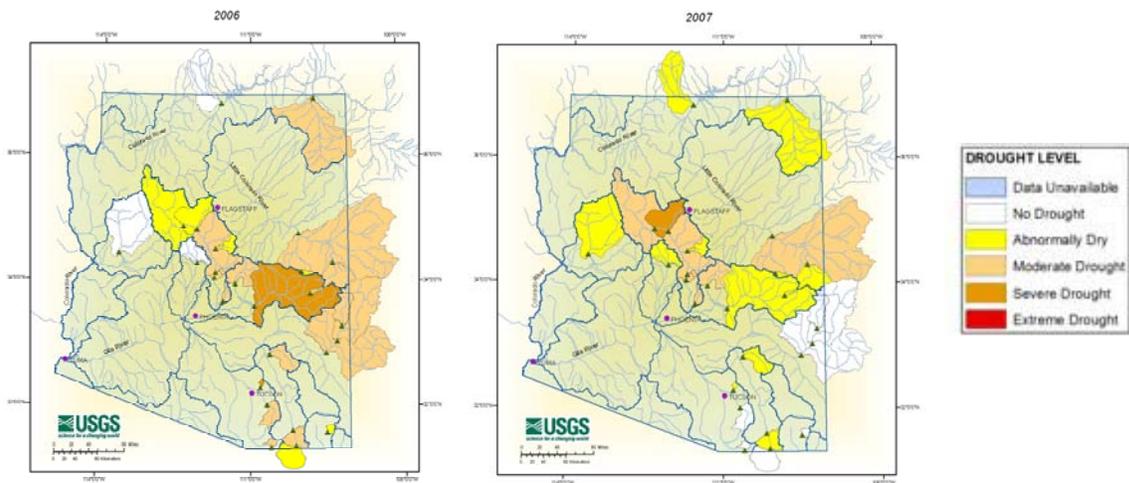
Cumulative precipitation for the water year ending September 30 remains below average in all basins, as monitored at SNOTEL and other mountain gauges:

2007 Water Year Precipitation (Source USDA-NRCS)

River Basin	Percent of 30-yr. average Precipitation at high elevation gauges
Salt River Basin	80%
Verde River Basin	67%
Little Colorado River Basin	78%
San Francisco-Upper Gila River Basin	85%

Overall Streamflow

For the 2007 water year (October 2006 through September 2007), conditions on average improved slightly from the 2006 water year. The maps showing a comparison of 2006 and 2007 were developed by averaging monthly drought levels. The Salt River, which is a significant contributor to water resources for Phoenix, improved from last year. On the other hand, some of the Verde River basins, which supply Phoenix, increased in drought severity. Overall there were only small incremental changes in drought status from 2006 to 2007. None of the basins increased or decreased in drought status more than two levels between years.



Comparison of drought conditions between water years 2006 and 2007

Monthly drought conditions at the beginning of the 2007 water year (October 2006) show that streamflow-gaging stations depicted favorable conditions showing little to no drought. The absence of drought conditions was due to significant monsoon precipitation. From November through December drought conditions increased with some basins becoming severe. Drought conditions for the month of January ranged from “No Drought” to “Extreme Drought”. Chinle Creek, Little Colorado River and a portion of the Verde River had increased in drought severity since October, becoming extreme in the month of January. Although some basins increased in drought severity, several basins in the east, south and west remained in “No Drought” from October through January. As a result of winter storm events drought conditions lessened for the month of February. “Extreme Drought” was absent and only three basins showed “Severe Drought”. This reprieve from drought conditions was short lived as lack of precipitation for the month of March brought “Extreme Drought” back to two of the basins. From March through June at least two basins were characterized as “Extreme Drought” during each month and several were in the “Severe Drought” category. Although these months had several basins with elevated drought levels some basins, in the south and southeast, were in the “No Drought” category. The shift to more extreme drought categories peaked in the month of June where five basins were showing “Extreme Drought”. Significant monsoon precipitation alleviated drought conditions from July through August with nearly all basins showing “No Drought”. In September, drought conditions in all categories except “Extreme Drought” were represented in the state. Nearly half the basins in September showed no drought.

Mountain Streamflow

October streamflow for the Salt, San Francisco, and Gila River basins were monitored at above to much above the 30-year median, while flows in the Verde and Little Colorado River basins were well below median. In November, only the Gila basin recorded flows above median. December brought dry weather to the region and flows were monitored at well below median for all basins. Observed streamflow levels for the

period January-May 2007 were also well below the 30-year median for key streams in Arizona, as shown in the table.

MOUNTAIN STREAMFLOW LEVELS JANUARY – MAY 2007	
<i>Stream/River</i>	<i>Percent of 30-year median streamflow</i>
Salt River near Roosevelt	37
Verde River above Horseshoe Dam	28
Tonto Creek above Gun Creek near Roosevelt	15
San Francisco River at Clifton	61
Gila River at Head of Safford Valley	58
Gila River at Calva	78
Little Colorado River at Lyman Lake	31 (Jan.-June)

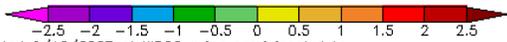
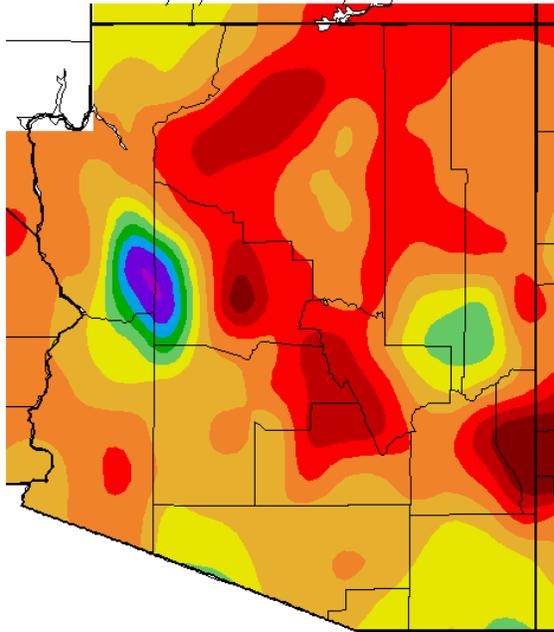
Monitored flows over these five months, typically the time of year when the greatest runoff occurs from snowmelt, are particularly important to water managers since in-state reservoirs are traditionally replenished during this period.

Streamflow readings in June reflected the dry pattern of precipitation, with flows ranging from 22 percent to 70 percent of median. The summer monsoon delivered significant rainfall in July and August, although amounts varied from one river basin to the next. As a result, basin streamflow levels were monitored at much above median in August, while flows receded to below median in September. Flows in July were below median.

Temperature

Average temperatures over the last year have been 1 to 2.5°F above average, increasing the evaporative demand and contributing to the worsening drought conditions. The extremely warm winter temperatures in the White Mountains reduced the potential snowpack by causing rainfall rather than snowfall at the mid-elevations, and by hastening the spring snowmelt. In the summer, the extremely high temperatures increased the evaporative demand and reduced run-off into the streams. This warm year follows three very warm years which had temperatures above the 85th percentile for most of the state, and above the 95th percentile for the southern half of the state, based on 112 years of data. To some extent the high temperatures and low precipitation amounts are symbiotic. High pressure systems are associated with sinking, warming air and clear skies, which tend to block low pressure storm systems. The atmospheric pattern during the past year has been dominated by strong high pressure systems over the southwestern U.S.

Ave. Temperature dep from Ave (deg F)
10/1/2006 - 9/11/2007



Generated 9/12/2007 at WRCC using provisional data.
NOAA Regional Climate Centers

Reservoir Storage

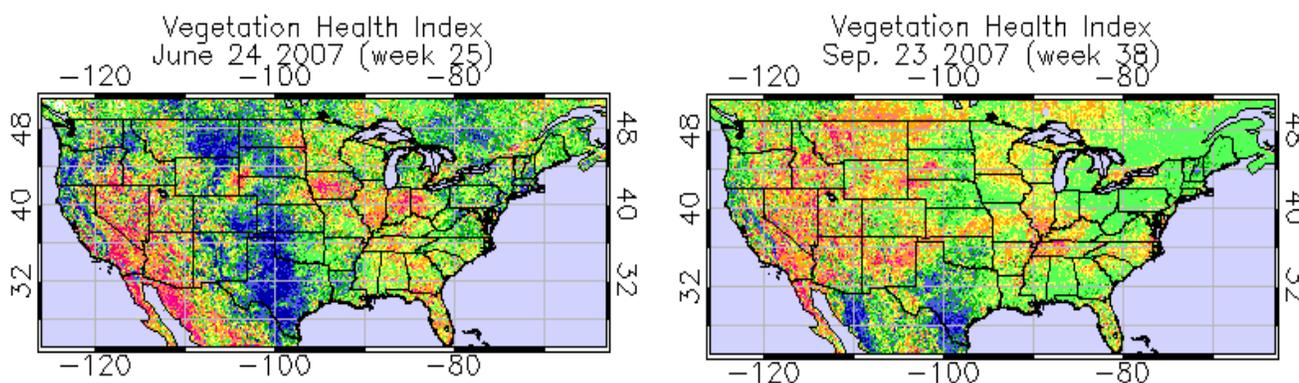
Overall Arizona reservoir storage declined for the second consecutive water year. Total storage in the large in-state reservoirs in the Salt, Verde, and Gila River basins declined by 404,800 acrefeet, or 12.7 percent. At the end of water year 2007, combined storage in the Salt, Verde, and Gila River basins was at 42 percent of average. Total storage in lakes Mead and Powell, which provide more than 90 percent of the storage on the Colorado River, declined by 1.37 million acre-feet during water year 2007. Lake Mead hit its high point in January 2007 and its low point in September 2007; Lake Powell hit its low point in February 2007 and its high point in June 2007, following spring runoff. Unregulated inflow to Lake Powell, a common measure of Colorado River streamflow, was 68 percent of average; inflow to Lake Powell has been below average in seven of the last eight water years. At the end of water year 2007, Lake Mead was at 48 percent of average and Lake Powell was at 49 percent of average. The dry 2006–07 winter, relatively poor snowpack in the Colorado River Basin, and high spring temperatures in parts of the basin contributed to decreases in surface water storage (Climate Assessment for the Southwest, 2007 SWCO Water Year in Review).

Reservoir		Low (Month)		High (Month)		Current
	Storage (1000 af)	Percent of Capacity	Storage (1000 af)	Percent of Capacity	Storage (1000 af)	Percent of Capacity
Powell	11,552	47% (2/07)	12,882	53% (6/07)	11,929	49% (9/30/07)

Reservoir		Low (Month)		High (Month)		Current
	Storage (1000 af)	Percent of Capacity	Storage (1000 af)	Percent of Capacity	Storage (1000 af)	Percent of Capacity
Mead	12,505	48% (9/07)	14,309	55% (1/07)	12,505	48% (9/30/07)
Salt River System	1,106	55% (9/07)	1,389	69% (3/07)	1,106	55% (9/30/07)
Verde River System	70	24% (2/07)	129	45% (10/06)	89	31% (9/30/07)
San Carlos	140	16% (9/07)	286	33% (2/07)	140	16% (9/30/07)
Lyman	6	19% (6/07)	9	31% (8/07)	9	28% (9/30/07)

Vegetation Health

During the first 10 months of water year 2007, vegetation health slowly deteriorated. During these months, stress on vegetation was worst in the southern and western two-thirds of Arizona. Spring rainfall brought some temporary relief, especially to northeastern Arizona, but by mid-July, levels of vegetation stress were as extreme as those seen during the exceedingly dry year of 2002. Summer monsoon rainfall, falling mostly from late July through late August, restored vegetation health in much of the state. Southwestern Arizona and parts of the Colorado Plateau did not recover well during the summer. Winter-adapted plant and tree species will undoubtedly require additional moisture to recover from exceedingly dry conditions during the winter of 2006-07.



Pre-monsoon vegetation (June 07) and post-monsoon vegetation recovery (Sept. 07)

The table below summarizes drought monitoring results for water year 2007.

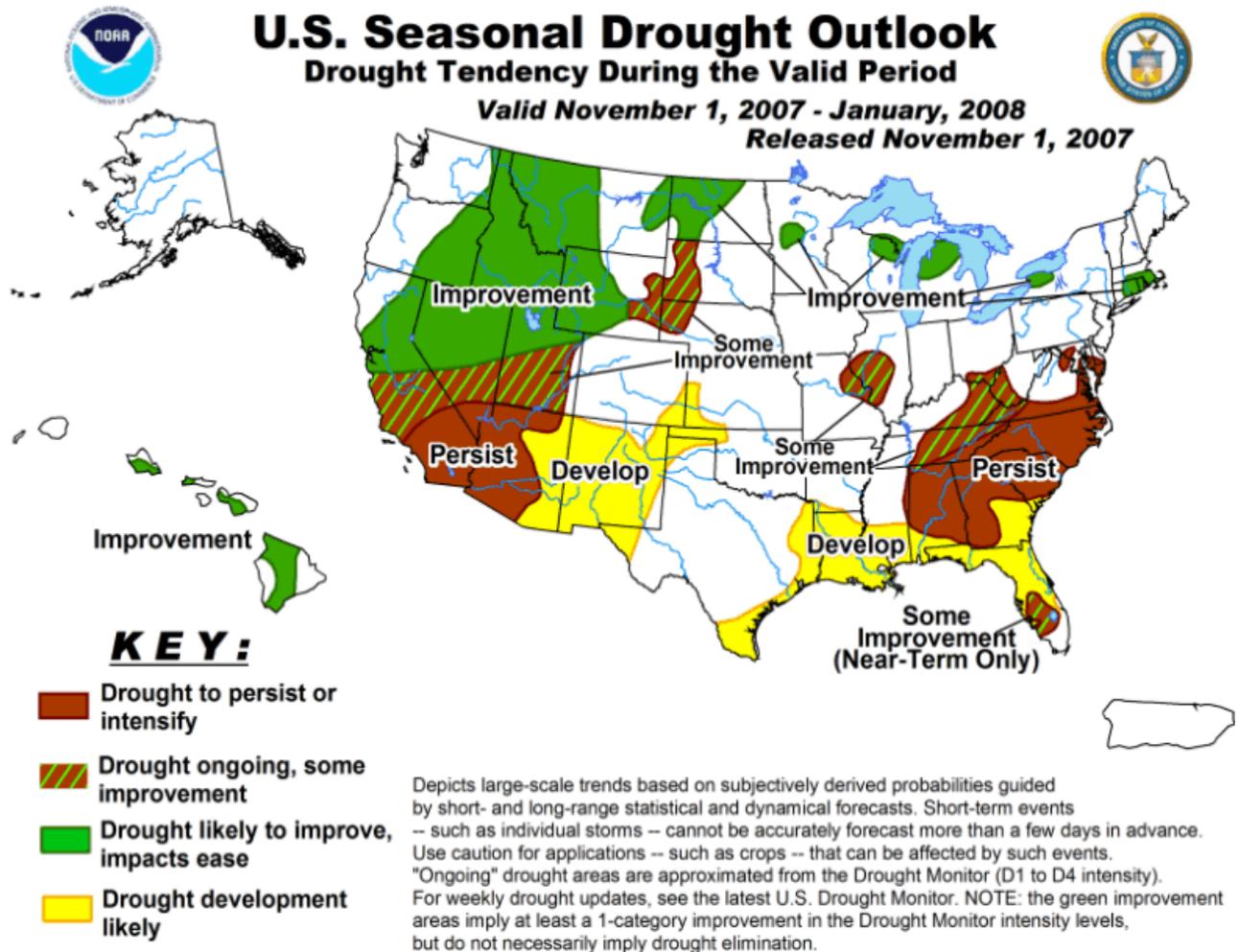
Indicator/Impact	Water Year 2007 Summary
Precipitation	Winter 2005-06 precipitation was disappointing. Most of Arizona had less than 80% of average precipitation for the water year, and the lion's share fell during the monsoon. Phoenix recorded 3.23 inches of rain for the water year, 5 inches below normal. The monsoon season was the fourth driest on record in Phoenix, with 0.74 inches of rain falling at Sky Harbor International Airport, where the normal is 2.77 inches.
Streamflow	Streamflow decline peaked in June. In most basins, significant monsoon precipitation alleviated drought conditions from July through August. On average, streamflow improved slightly and there were only small incremental changes in streamflow from the 2006 to 2007 water year.
Temperature	Temperatures over the 2007 water year generally were higher than average across most of Arizona due to an extremely warm summer (1 - 4 degrees F above average). Phoenix saw its third warmest November, sixth warmest May, and eighth warmest June on record. Conversely, an extremely cold system moved across Arizona in late December, bring freezing temperatures to central Phoenix for the first time since 1990 (0.5 –4 degrees F below average for the majority of the state). Frost warnings were issued, and thousands of residents lost plants to the cold temperatures. Tucson also set three new records for low maximum temperatures, three new records for high maximums, and eight new records for high minimum temperatures.
Reservoir Storage	Arizona reservoir storage declined in water year 2007. Reservoir storage in Lake Powell and Lake Mead has decreased during the past eight years. Surface water storage is expected to continue to decrease until the spring 2008 snowmelt season. Water year 2007 inflow to Lake Powell was 69 percent of average, which is consistent with prolonged drought in the Colorado River Basin.
Vegetation Health	Water year 2007 saw a decline in the health of vegetation that is dependent on winter precipitation. Winter 2006-2007 precipitation was exceedingly low, and vegetation health declined to low levels by late spring. Monsoon moisture revived vegetation, except in the southwestern Arizona and parts of the Colorado Plateau.

Resource – Climate Assessment for the Southwest

DROUGHT OUTLOOK

The Committee includes the National Drought Outlook and Seasonal (90-day) precipitation and temperature forecasts in each monthly Report. In mid October, NOAA's National Weather Service's Climate Prediction Center (CPC) announced a weak La Nina was in progress and expected it to continue to develop through the early part of 2008. La Nina events have a strong correlation to below average winter precipitation in the Southwest. Consequently, the CPC projections for this winter's weather across the Southwest indicate moderate confidence ***precipitation will be***

below average, and high confidence *temperatures will be above average*. It seems reasonable to assume those areas already experiencing drought conditions will see these conditions worsen during the winter of 2007-08. At the same time drought conditions will expand to other areas in the state, especially in the eastern third of Arizona. Projections beyond the upcoming winter are difficult; however, it is fair to expect above average temperatures will continue through next summer.



FUNDING AND RESOURCE NEEDS

The following funding and resource needs relate directly to the goals of the ADPP to refine monitoring processes, understand drought impacts, and limit future vulnerability:

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, as 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 LDIGs.

In particular, Arizona faces the following conspicuous data gaps:

- complete lack of soil moisture monitoring
- few high elevation meteorological monitoring stations
- a constantly decreasing network of streamflow gauges

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. Improved snow and soil moisture monitoring for Arizona

The Natural Resources Conservation Service can support the installation of 2-3 new SNOTEL sites per season with the full-time staff that are available to conduct the work. As such, approximately \$63,000 is needed per year.

3. Incorporation of groundwater data for drought status determination

Further analysis is needed to determine what role drought plays in groundwater level changes around the state. Incorporating groundwater level trend data will be critical in determining drought conditions and impacts on water supply.

4. AZMET Network Expansion

A key parameter lacking from most drought and climate monitoring reports is evapotranspiration (ET), which is critical information for agriculturalists, orchard and tree farm producers, forest managers, urban horticulturalists, and citizens maintaining lawns. Arizona's current network of meteorological and hydrological observations for drought monitoring lacks information on ET. However, one of the Committee's member organizations, the Arizona Meteorological Network (AZMET), provides meteorological data and weather-based information, including ET, to agricultural and horticultural interests operating in Arizona. Upgrading and expanding AZMET operations would add a valuable component to Arizona drought monitoring, especially with regard to urban areas, where there is often a negative public perception of state and city efforts to address drought. AZMET would benefit from four new stations, in order to upgrade two rural stations and to add two urban stations, in order to provide improved lawn watering and urban tree and shrub irrigation guidance for Phoenix and Tucson.

Total Cost: \$50,000

RECOMMENDATIONS FOR REVISIONS TO THE ADPP

Same recommendations as last year – nothing additional for 2007.

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Chapter 5 – Local Drought Impact Group Annual Report

OVERVIEW

As residents of the Southwest have seen during the last 10 years, drought can affect farms and ranches, forests and other vegetation, aquatic life and wildlife, and hydrology and water resources. In an effort to assess these and other drought impacts across the state, the Governor’s Drought Task Force recommended the formation of local drought impact groups (LDIGs). LDIGs are voluntary groups, coordinated by local representatives, created to raise drought public awareness, provide impact information to local and state leaders, and initiate local mitigation and response options. The LDIG structure established in the *Arizona Drought Preparedness Plan (ADPP)* empowers local leaders to collaborate on drought planning and preparedness efforts for their region. Statewide coordination and assistance is provided through the Statewide Drought Program. Across the state, through the creation of LDIGs, communities are sharing in the responsibility of planning for and mitigating drought.

LDIG Objectives

Assess and report local drought conditions and impacts - LDIGs will collect and report local drought impact information, including societal impacts and associated losses and costs. This reporting will be critical in demonstrating local needs to the State Drought Interagency Coordinating Group and other local and state decision-makers. It will also provide region-specific corroboration of drought indicator data used by the State Drought Monitoring Technical Committee, enabling more accurate assessments of drought conditions. Currently, emphasis in data collection is to identify drought impact reporters and encourage them to provide feedback on the new, online Drought Impacts Reporting System. This tool will allow professionals and citizens alike to provide monthly feedback on drought conditions throughout their county (see below for additional information regarding the Drought Impacts Reporting System).

Mitigate and respond to drought on a local level - LDIGs will recommend mitigation and response strategies appropriate for their region to reduce drought impacts on water users. The first step in mitigation and response will be the LDIG’s reporting and assessment of local drought impacts. From this information, LDIGs can help to recommend and implement water conservation strategies and other local mitigation measures.

Educate the public and improve awareness regarding drought - The LDIGs will communicate current drought conditions and reasons that mitigation and response measures are necessary and/or beneficial. They will also encourage wise water use habits and conservation practices.

Organizational Structure

As recommended in the *Arizona Drought Preparedness Plan (ADPP)*, each county’s local emergency manager and county extension agent are coordinating the formation of these local groups, along with assistance from ADWR. Because drought impacts vary

across landscapes and water use sectors, local involvement by all water users is key to the success of LDIGs.

LDIGs are encouraged to establish the organizational structure that will best serve their specific local needs. To date, most LDIGs have the following general structure:

- steering committee or co-chairs - note that steering committees are often appointed by the County Board of Supervisors.
- large group or LDIG (i.e. everyone involved)
- three or four workgroups to address drought and mitigation response planning, education and outreach, drought impact monitoring, and in some instances, funding

PROGRESS AND ENHANCEMENTS

Throughout 2007, the Statewide Drought Program worked hard to forge ahead in preparing Arizona for current and future drought. One of the challenges is engaging the public in drought planning even during wetter periods. The Statewide Drought Program, in coordination with local partners, is working to ensure that drought planning remains a high priority at all times.

Group Establishment Update

The Statewide Drought Program has facilitated LDIG establishment in ten of Arizona's 15 counties. The ten counties are in various stages of development.

Established in 2006:

- Cochise
- Pinal
- Santa Cruz
- Pima (note this group was established before ADWR's coordination efforts. ADWR began participating in the group in 2007.

Established in 2007:

- Yavapai
- Graham/Greenlee (these counties elected to form one combined group)

In process of establishment:

- Apache
- Navajo
- Mohave

The remaining counties (Yuma, Gila, Maricopa, La Paz and Coconino) will likely be contacted in 2008 to commence planning meetings.

LDIG Participation in the Monitoring Technical Committee Meetings

LDIG representatives have begun participating in the State Drought Monitoring Technical Committee meetings. It is helpful for the Committee to hear local perspectives on drought conditions, and beneficial for LDIG representatives to understand the committee's process in determining drought status.

Drought Reporter

The Statewide Drought Program now includes a Drought Reporter page in the monthly Drought Monitor Report to communicate drought impacts provided by the local groups. The additional page improves communication and provides an avenue for disseminating relevant information, not only from the LDIGs, but also from ADWR and the Interagency Coordinating Group.

Rain Gauges

The Statewide Drought Program identified available end of fiscal year 2007 funding and purchased 1200 rain gauges to assist the LDIGs with their monitoring efforts. In June, on behalf of ADWR, the University of Arizona distributed the rain gauges to the county extension directors of those counties with an established LDIG. The Statewide Drought Program and local coordinators are requesting that rain loggers record their data on the internet at www.rainlog.org. Collecting local precipitation data will help the State Drought Monitoring Technical Committee verify monthly drought status and fill in data gaps across Arizona by increasing the coverage for the rain gauge network.

Drought Impacts Database and Reporting System

Drought impact reporting is critical for assessing costs to the state, both economic and environmental, but is difficult to collect on a statewide basis. In support of county-level drought monitoring efforts, the University of Arizona, along with state and local partners, is developing an internet tool to collect and store drought impact information (wildlife, vegetation, agriculture, livestock and societal impacts). Uses and benefits of tool include:

- Customize reporting for a specific location or individual expertise
- Generate historical reports
- Corroborate drought status
- Analyze and plan appropriate drought mitigation
- Communicate impacts and needs to Interagency Coordinating Group
- Share impacts nationally for use by National Drought Mitigation Center

LDIGs are promoting this tool to acquire 'reporters', who can then record monthly or quarterly impact data. Overall, the new system will provide easier reporting and better data accessibility, allowing for improved data analysis by local drought impact groups, the State Drought Monitoring Technical Committee, and other users nationwide.

Although still in development, the reporting system can be located at <http://dirs.arid.arizona.edu/>.

COUNTY LDIG UPDATES

The Statewide Drought Program requested updates on drought mitigation and response efforts from each of the LDIGs. In an effort to assist the LDIGs with resource needs, the Statewide Drought Program also asked that the local groups identify unmet needs and any recommended changes to the ADPP. Seven of the ten counties provided annual updates and their reports are included below.

APACHE COUNTY

The Apache County LDIG is still in the development stage. A meeting was held on October 16, 2007, to discuss the continued formation and structure of a LDIG for Apache County. Mike Hauser, University of Arizona Cooperative Extension, has agreed to spearhead this group. He is on sabbatical until the first of the year and will get it all going upon his return in mid-February.

COCHISE COUNTY

The Cochise County LDIG has not met as a large group during the first three-quarters of 2007. Rather, the focus of the LDIG has been on workgroups.

Drought Mitigation and Response Efforts

Monitoring Workgroup

The monitoring work group met twice to develop a strategy for recruiting monitors across the county, especially in rural areas. The work group reviewed progress of the Arizona Drought Impacts Reporting System (DIRS) and gave input to the survey and website. The group reviewed the rainlog.org map to find areas where precipitation information is needed and identified individuals to approach in recruiting volunteers. They would like to put some effort into finding historical information (i.e., the 1950's drought) and having that information archived. A listserv was established so that all monitors in the county can be reminded when they are to submit surveys and precipitation.

Education and Outreach

The outreach/education workgroup began work on two ideas forwarded from the monitoring workgroup. One project that has been initiated is to work with the newspapers in the county to regularly include a small drought status map of the county along with a water conservation tip. The newspapers contacted are willing to do this, but there have been some difficulties with producing the map on a county and watershed scale usable for the newspaper. This continues to be worked on. The second project is to produce a calendar where monitors can enter weather information on a daily basis. Many people in rural areas still do not have effective internet capabilities and prefer to write information on a calendar. In addition to precipitation measurements, monitors can comment on humidity, plant growth, etc. Water facts and conservation tips would appear on the calendar.

Identification of Needs

- Funding for drought impact monitoring – The continued recruitment of drought monitors is needed to establish a network to provide reliable and accurate information. The group requests \$5,000 to equip and train monitors.
- Funding for outreach program – The group requests \$1,000 for calendar development, mailings, flyers, and newspaper advertisements.

Recommended Changes to the ADPP

None at this time

GRAHAM AND GREENLEE COUNTIES

An initial meeting was held on November 29, 2006 to discuss the formation of a Local Drought Impact Group for Graham and Greenlee counties. The group that met included representatives from ADWR Statewide Drought Program, Cooperative Extension, County Administrators, County Board of Supervisors, County Emergency Management, and the local Natural Resources Conservation District. The group consensus was that Graham and Greenlee Counties would join together to form a local LDIG, instead of having two separate groups. The Graham and Greenlee Counties LDIG held its first meeting on February 22, 2007. Following the first meeting, an interim steering committee was tasked with drafting an organizational structure and a process for identifying and appointing a steering committee. The group met several times and each County Board of Supervisors appointed steering committee members in April, 2007. The appointed steering committee met on May 14, 2007 and planned the next LDIG meeting, which was held on June 21, 2007. The draft organizational chart and duties were approved by the LDIG. Three working groups were established with volunteers: education/outreach, monitoring, and mitigation/response. A fourth working group, funding, is identified in the organizational chart, but currently has no members.

Drought mitigation and response efforts, county needs, and recommendations for changes to the ADPP have not yet been developed.

MOHAVE COUNTY

Mohave County approached ADWR earlier this year to discuss the formation of a county LDIG. Representatives of the Mohave County Extension Office and Mohave County Emergency Management attended a meeting of the Yavapai County LDIG to observe that group's structure and procedures. A meeting was held in Kingman on July 24, 2007, with representatives from ADWR, Mohave County Extension, Mohave County Planning and Zoning, Mohave County Emergency Management, and the local Natural Resource Conservation Service office to discuss the possible agency representation on a Steering Committee and the structure of a Mohave County LDIG. Ideas for Steering Committee representation and LDIG structure were formulated and will be presented to the Mohave County Manager in October for his review and approval. Following his approval, the next step will be to identify the specific individuals to serve on the Steering Committee and formally request that the county Board of Supervisors authorize establishment of a county LDIG and appoint the members of the Steering Committee.

PIMA COUNTY

In June 2006, the Board of Supervisors approved the Pima County Drought Management Plan establishing a Drought Task Force and Monitoring Committee. The Arizona Statewide Drought Program established county-level Local Area Drought Impact Groups (LDIGS). In Pima County, the Monitoring Committee functions as the Local Area Drought Impact Group (LDIG). LDIGs encourage regional cooperation for

drought and conservation planning and those goals are consistent with Pima County's Drought Management Plan.

The Pima County LDIG is the foundation for local-level drought planning needs. There are 26 representatives on the LDIG from scientific and academic communities, water providers and city, county, state and federal agencies. During the year, six public meetings of the LDIG were held.

During 2007 LDIG highlights were:

- Recommended revisions to the Pima County Drought Response Plan and Water Wasting Ordinance
- Reviewed drought indicator data for applicability
- Recommended the use of ADWR's Drought Monitoring Report as the drought indicator for Pima County
- Recommended to the County Administrator a Drought Level 1 – Response
- Provided a forum for sharing regional drought declarations and response actions and statewide drought activities
- Compared major metro water providers' Drought Preparedness Plans
- Monitored drought conditions using the ADWR Drought Monitoring Report
- Provided input to the Arizona Drought Impacts Reporting System (DIRS)
- Participated in monthly ADWR LDIGs Monitoring Technical Committee meetings

Drought Mitigation and Response Efforts

All major regional water providers have prepared drought response plans in accordance with the Arizona Drought Preparedness Plan established by the Governor's Drought Task Force. On April 24, 2007, a joint press conference was held to announce a Drought Level Stage 1 – Alert for Pima County, Tucson Water and Community Water of Green Valley. At that time, Metro Water also announced that a Stage 2 – Warning, was in effect for its service area. As of September 2007, following is the status of regional drought declarations:

Entity	Drought Declaration
Pima County	Stage 1 – Alert
City of Tucson	Stage 1
Metro Water	Stage 2 – Warning
Town of Oro Valley	Stage 2
Town of Marana	Stage 1 – Alert
Community Water of Green Valley	Stage 1 – Alert

The response associated with these declarations is voluntary water reduction efforts. Tucson and Pima County are conducting self audits and promoting increased public awareness. In unincorporated Pima County, restaurants are asked to serve water only on request and hotels and motels are urged to conserve water. If drought conditions persist, and more severe drought stages are declared, mandatory response actions may be necessary.

Education and Outreach

The following public education activities were initiated in 2007:

- A Joint Press Conference was held on April 24, 2007 with Pima County, the City of Tucson, Metro Water and Community Water of Green Valley. Pima County, Tucson and Community Water announced Stage 1 drought declarations, while Metro Water affirmed its Stage 2 declaration. The press conference was attended by the major televisions news affiliates.
- A County drought web page was developed: www.pima.gov/drought. The web page includes links to local water providers' drought response plans, the ADWR Water Conservation Office, the ADWR Monthly Drought Monitoring Reports, Pima County LDIG agendas and meeting summaries and Pima County's Drought Response Plan and Water Wasting Ordinance
- Water bill inserts were sent to customers reminding them of the drought conditions and the need to conserve. Sewer billing inserts were also sent to sewer customers describing the current drought declaration and promoting drought awareness.
- Interviews on local television stations (July 9 and July 16) were conducted regarding drought and water wasting
- Drought conditions are mentioned monthly on local television station's weather programs
- An article was published in the County's publication, *Leisure Times* (a Natural Resources, Park and Recreation publication) www.pima.gov/nrpr/lt/ltimes.pdf
- Pima County published a drought informational paper that will be provided at community events
- Each water provider has developed its own public outreach campaign using a consistent message
- Pima County Regional Flood Control District distributes rain gauges to interested parties to help monitor rainfall

Goals FY 2007/2008

During FY2007-08 the Pima County LDIG will develop a drought impact reporting system using the model provided by the University of Arizona Cooperative Extension. Information and will be linked with the Drought Impacts Reporting System (DIRS) <http://java.arid.arizona.edu/ccdis> and U of A Rain Log www.rainlog.org. Complimentary rain gauges will be provided to DIRS participants.

The Pima County LDIG will continue evaluating drought conditions throughout the year. The goal is to have two pronouncement periods: in April – prior to the wildfire season and in October – after the summer rains.

Identification of Needs

The following needs have been identified:

- On-line access to other LDIG meeting schedules and minutes
 - Meeting schedules in one place
 - Minutes on County page
- Regularly scheduled meetings with other county LDIGs to improve information sharing
- Coordination of drought response efforts and consistent public outreach and education

Recommended Changes to the ADPP

None are recommended at this time.

PINAL COUNTY

Steering Committee -

2 year terms (5 members):

1. Pinal County Government Alliance:
Mayor Tom Rankin, Florence
2. Zone 7 NRCD:
Mary Mercer, Winkleman Natural Resource Conservation District
3. Farm Bureau:
Oliver Anderson, Pinal County Groundwater Users Advisory Council
4. Water Provider:
William Garfield, President, Arizona Water Company
5. County Government:
Art Carlton, Pinal County Emergency Management Drought Planning

1-year term (4 At-Large Members):

1. Bruce L. Hallin, Manager Water Business Development, Salt River Project
2. Robert K. Burton, PhD, Lower San Pedro River Program Manager, The Nature Conservancy
3. Trevor T. Hill, President, Global Water Resources
4. Douglas D. Mason, General Manager, San Carlos Irrigation and Drainage District

Technical Advisors:

1. Susan Craig, State Drought Coordinator, Arizona Department of Water Resources
2. Randy Edmond, Area Director, Pinal Active Management Area, Arizona Department of Water Resources

Meetings -

11/2/2006 - Public Information Officer meeting at ADWR

11/13/2006 - Conference Call

1/11/2007 - LDIG Meeting, Central Arizona College

2/13/2007 - Pinal County Flood District begins process entering into Intergovernmental Agreement with ADWR to acquire InSAR data to track subsidence in the County

3/12/2007 - Steering Committee Mtg.
9/19/2007 - Monitoring Group Conference Call

Drought Mitigation and Response Efforts

Monitoring Workgroup

The Monitoring Workgroup is working toward participation from all three AMAs in Pinal County. The Workgroup has identified the need for a more interactive relationship between the Statewide Monitoring/Data group and local LDIGs

Mitigation and Response Workgroup

The Mitigation and Response Workgroup is looking for baseline data and proven techniques to minimize the affects of drought to life and property. Viable, long-term mitigation efforts cannot successfully proceed without intensive amounts of data -- which ADWR is apparently not able to provide due to the gargantuan challenge of doing so for all 15 counties without any new, commensurate resources. The Workgroup needs to identify realistic triggers and valid response mechanisms.

Education and Outreach Workgroup

The Education & Outreach Workgroup is working toward symmetry outreach comparable to State and other LDIGs. Education is lacking and addressed in needs below.

Identification of Needs

The ADWR Open House is primarily designed for legislators, agency staff, and water professionals to visit the Department and see what types of tools and technologies ADWR is developing and employing to enhance water management and water policy in Arizona.

The Pinal County LDIG is recommending that the Statewide Drought Program consider setting up at least two ADWR Open House venues that could accommodate LDIG participants and the public. This is a great educational opportunity for those individuals who may not be familiar with the Department and activities. This will also serve as a springboard for the LDIGs to see what is already available for their implementation, plagiarism and how to integrate into the larger picture with a sense of consistency.

A Phoenix area and Tucson area venue would be beneficial for travel considerations. If set up with advanced RSVP requirements, logistics would be much easier to accommodate. In the event this may not be conducive with ADWR outreach, economics or desire, we are requesting 1 venue in the Casa Grande area to forge the Pinal County LDIG ahead into the future.

Recommended Changes to the ADPP

None at this time

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, all cities towns, and tribes. The Yavapai County LDIG has been meeting since September 2006 and has held two public meetings with educational presentations (Cottonwood June 19, 2007 and Prescott August 27, 2007). At these meetings, the LDIG solicited volunteers to assist with the monitoring, outreach/education, and mitigation response plan efforts.

The LDIG steering committee consisting 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

Drought Mitigation and Response Efforts

Monitoring Participant Group

Monitoring efforts have been underway for almost a year, but additional reporters are being added to the group. Rainlog.org has been a focal point, but other drought impacts are being reported by some members. One formal meeting was held on August 27, 2007. Bob Adams is chairing these efforts and 38 people have expressed interest in being members of this participant group.

Mitigation and Response Participant Group

Draft Drought Mitigation and Preparedness Guidelines have been drafted and are being reviewed by members of this participant group. Nick Angiolillo is chairing this effort and 19 people have expressed interest in being members of this participant group.

Outreach/Education Participant Group

This participant group has not yet formally met, but the effort will be chaired by Jeff Schalau and 19 people have expressed interest in being members of this participant group.

2008 FOCUS

Resources

The Statewide Drought Program will continue to seek funding and resource opportunities to help support LDIGs. As identified in this report, funding is needed to train drought impact reporters to ensure reliable and quality data collection for the Drought Impacts Reporting System. In addition, education and outreach efforts will require funding assistance, as most of these efforts include printing materials which can be costly.

Improved Communication

In addition, the LDIGs have expressed the need for an “information share” among the various LDIGs. The Statewide Drought Program is in the process of discussing potential options to help facilitate communication among the LDIGs, such as a Google group. Another idea to improve communication and share information is to organize a conference/workshop to bring the LDIGs together to discuss stages of development, how organizational structures are working or not working, and current efforts in monitoring, mitigation and response, and education and outreach.

Guidance

The Statewide Drought Program is also considering the development of a toolkit or workbook that would provide information on developing and operating a local group. This information would be provided as a guidance tool to provide reasonable objectives and timelines. Although still in the discussion stages, it is likely that this guide will include:

- Guidance for each workgroup
- Evaluation tools
- Objectives with timelines
- Importance of drought planning
- How to identify monitors or drought impact reporters
- Watershed maps
- Resources

Climate Change and Adaptation

Climate change is now accepted as a reality by the majority of the world's climate scientists and Governments. Drought preparedness requires that we consider how local communities can adapt to a changing climate. The State Drought Monitoring Technical Committee continues to provide support to the LDIGs by presenting weather and climate outlooks and highlighting local conditions. Climate change forecasting will continue to be highlighted in these presentations to provide a foundation for local communities to determine adaptation measures necessary in planning for and mitigating drought.

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Conclusion

The Statewide Drought Program and Statewide Conservation Office, State Drought Monitoring Technical Committee and local drought impact groups made a lot of progress in 2007 in improving drought preparedness in Arizona. However, with the prospect of a multi-decadal drought on the horizon, there is an overwhelming responsibility and a more urgent need to do more. To limit the effects of drought on water supplies, ranching and farming production, vegetation, forest health and wildlife populations, funding for these programs must be continued and increased as we head into the future.

It is essential to provide more technical and financial assistance to local drought impact groups. For the past two years, the Statewide Drought Program has been working to establish these local groups, and it has become apparent that additional resources are needed if the groups are to meet the objectives envisioned in the ADPP - monitoring drought impacts, educating the public, and recommending mitigation and response measures. Recommendations range from providing funding and resources for essential education and training, to additional staff support to help local communities with their drought preparedness efforts.

Although ADWR made huge strides in 2007 building a foundation for the community water planning program to assist water providers in Arizona, it is already clear that more needs to be done to truly prepare the state for drought. Preliminary analysis suggests that some community water systems may not be prepared for severe drought impacts or water shortage, either due to lack of information and data, or lack of resources. Next year, after the system water plans and annual water use data have been analyzed, ADWR will provide specific recommendations for additional needed support for community water systems.

Like last year, ADWR will seek a variety of potential funding sources to implement the recommendations of the Statewide Drought Program, Monitoring Technical Committee and local drought impact groups. Ideally, ADWR's budget would be increased to allow the hiring of five regional coordinators to assist with the local drought impact effort, and a hydrologist and water resource specialist to assess water use statewide and provide communities with needed assistance.

Proper drought planning and preparedness, during wet years as well as dry years, can reduce the severity of impacts on Arizona and its citizens. ADWR encourages Governor Napolitano and other elected officials, community leaders, local stakeholders and concerned citizens throughout Arizona to consider the recommendations provided herein to improve drought monitoring and limit future vulnerability to drought.

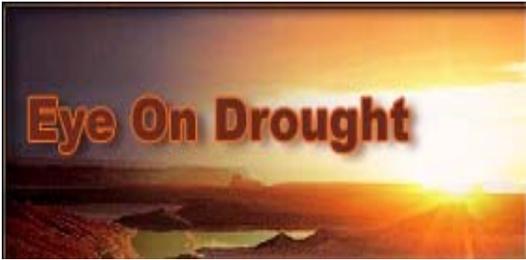
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Appendices

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Appendix A
Drought Monitor Report

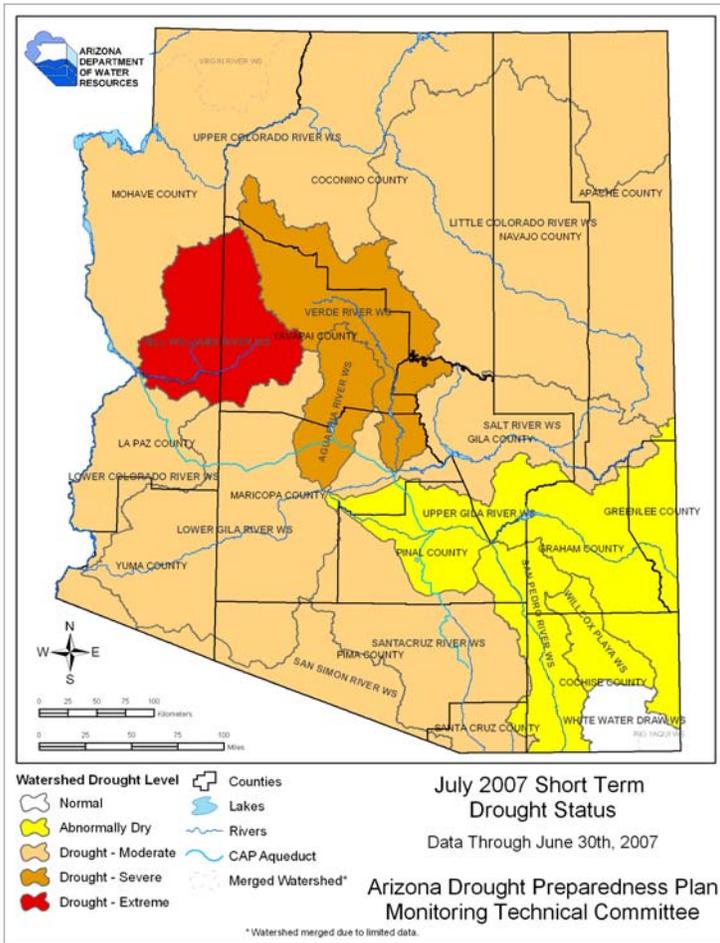
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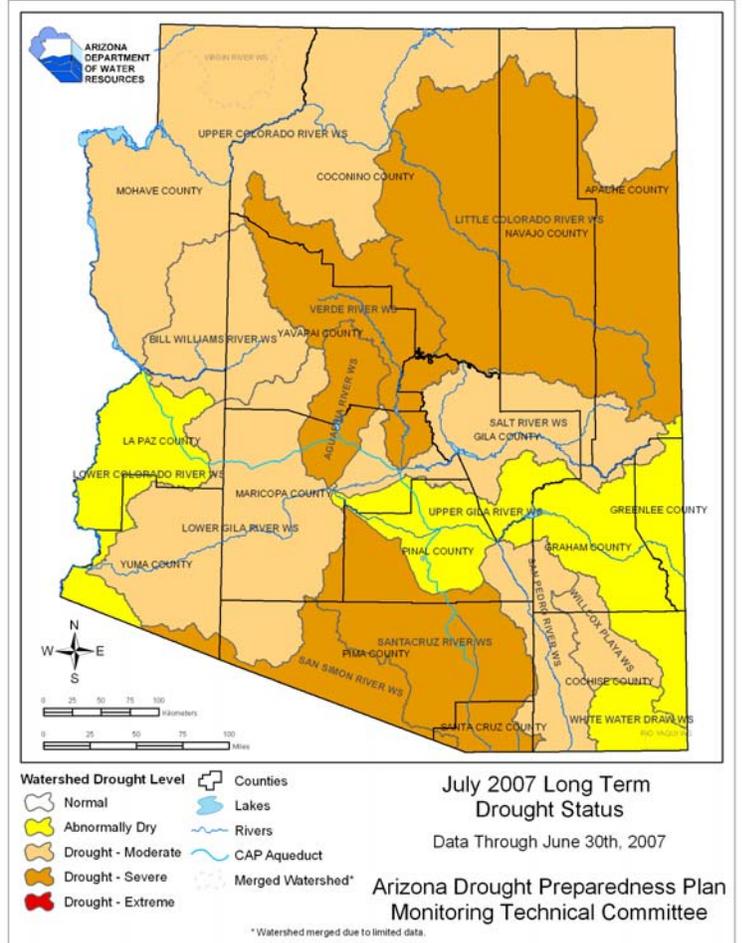
Arizona Drought Monitor Report

July 2007

Short-term Drought Status



Long-term Drought Status



Short-term Update

The short-term drought status has changed for the Bill Williams and Agua Fria watersheds, while the rest of the state is unchanged. Conditions in the Bill Williams and Agua Fria worsened by one drought category. This northwest part of the state had few winter or spring storms, and almost no moisture to generate precipitation. In the southeastern part of the state, some improvements occurred in the eastern portion of the Willcox Playa watershed due to moisture flows in from New Mexico, but not enough to warrant upgrading the watershed from abnormally dry.

Long-term Update

The long-term drought status is unchanged from last month. The past four years have had only two wet periods - the winter of 2004-05, and the summer monsoon of 2006, which mostly affected the southeastern quarter of the state. When combined with three very dry years, 2003-04, 2005-06, and 2006-07, the result is large soil moisture deficits and reduced streamflow. Local impacts include die-off of established trees and large bushes.



Drought Reporter



Impact Reports from Yavapai County

Drought monitors report that many dirt tanks are dry, and ranchers are hauling water from wells to temporary or permanent troughs throughout their ranches. Many springs are beginning to dry and flows in rivers are below normal or have no flow at all (e.g. Santa Maria River and Kirkland Creek).

Range vegetation is still adequate but is beginning to show stress from lack of moisture, especially brush and trees. Ranchers may have to reduce livestock numbers in the fall if the monsoon rains are late or below normal. A few ranchers have already started to reduce numbers.

Conditions are extremely dry in the Prescott National Forest. Many grasses are dried out, except adjacent to the streambed of Banning Creek, which is muddy in some spots and completely dry in others. The pond on Banning Creek is very low and stagnant. Drought monitors notice a marked absence of insects, as well as a scarcity of larger birds, such as Steller's jays, acorn woodpeckers and flickers.

Residents in downtown Prescott report that even their low water use, drought tolerant landscaping has needed supplemental watering this year and some has died off. They make comparisons to the very dry year of 2002. Under normal conditions, watering was rarely needed, but the reporters feel that they will need to supplement watering with a gray water system even during the winter months now. These Prescott residents have also noted that many deciduous trees in their neighborhood, from cottonwoods to maples, are showing signs of stress, and leaves are already starting to change colors.

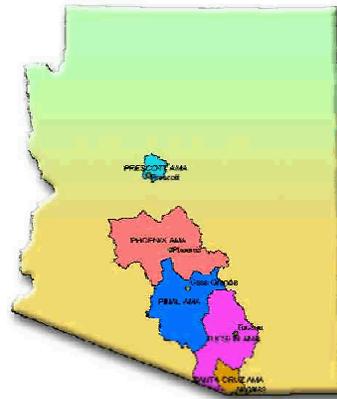
Governor Requests Disaster Designation

Governor Napolitano sent a request on July 24th to the US Department of Agriculture requesting a determination for a drought disaster designation. The disaster designation request will trigger a county-by-county review of the situation to determine which counties qualify. The Governor states in her letter that she has received consistent reports on adverse impacts to farms, ranches, wildlife, forests and rangeland, and points out that Arizona is entering its second decade of drought.

When a county is designated as a primary or contiguous drought disaster area, farmers and ranchers who have suffered losses due to drought may apply for low-interest emergency loans. Last year, the same request was made to the USDA and resulted in the designation of 14 of 15 counties. However, since contiguous counties to those designated are also included, agricultural producers in all counties were eligible for federal assistance last year.

Water adequacy bill

As Arizona enters its second decade of drought, more and more rural Arizonans have been questioning the ability of developers to build houses and provide water without a determination of adequate water supply.



Counties and municipalities outside of Arizona's active management areas have had no authority to deny subdivision developers lacking an adequate water supply.

Senate Bill 1575, passed by the Arizona legislature this year, helps to address those concerns. It will allow counties and municipalities outside of active management areas to adopt laws requiring new subdivision developers to obtain a determination of a 100-year adequate water supply from ADWR. Within the state's active management areas, developers are already required to demonstrate a 100-year water supply before building.

As an incentive for counties and municipalities to adopt the new water adequacy requirements, the bill makes water providers located in these areas eligible for grants and low-interest loans to fund water development projects. This funding will come from the Water Supply Development Revolving Fund, which was created in a companion bill (House Bill 2692).

ADWR Director Herb Guenther, in his June 14th column in *The Verde Independent*, issued a call to action for Arizona's rural citizens. "There is one step left in this process, and it requires action by rural citizens. I encourage you to tell county elected officials to embrace this new authority available to them. Ask them to enact the new adequacy authority to protect your water supply."

Conservation Tips of the Month

- ✦ Use a broom instead of a hose to clean driveways, sidewalks, streets and parking areas.
- ✦ Equip swimming pools, fountains, ponds and other ornamental water features with re-circulating pumps.
- ✦ Reduce evaporation by using covers on swimming pools and spas.

Reservoir Storage



USDA NRCS | Dr. Ken Dewey, High Plains Regional Climate Center

Vegetation Health



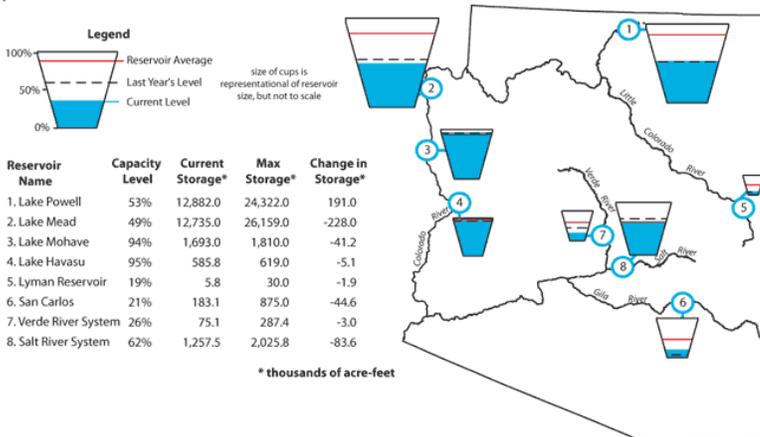
Jeff Severson

Arizona Reservoir Status

Reservoir conditions have changed very little since last month across Arizona. Signals are mixed with respect to changes in storage with large reservoirs on the Colorado River. Lake Mead is up to 53 percent from 52 percent from last month, while Lake Powell fell from 50 percent to 49 percent of total storage. Tom Ryan of the Bureau of Reclamation noted that inflow to Lake Powell was below-average over the past month but was slightly exceeding forecasted amounts.

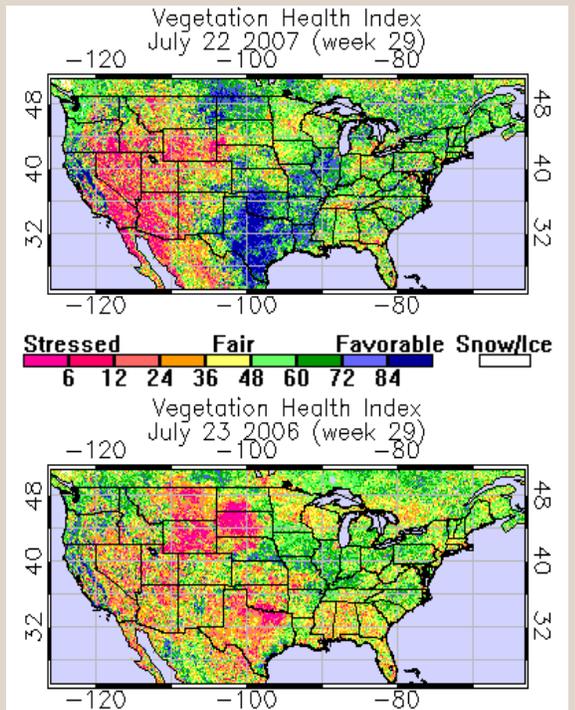
Total water year projections through September indicate that inflows will be about 70 percent of average for October 2006 through September 2007. Heavy localized storms in October 2006 boosted overall water year inflows to Lake Powell by raising the reservoir level by 6.2 feet, according to Ryan. Smaller reservoirs across the rest of Arizona saw declines from May to June. Both the Salt River System and the San Carlos Reservoir saw significant drops of 4 to 5 percent of total storage.

Arizona reservoir levels for June 2007 as a percent of capacity. The map depicts the average level and last year's storage for each reservoir, while the table also lists current and maximum storage levels.



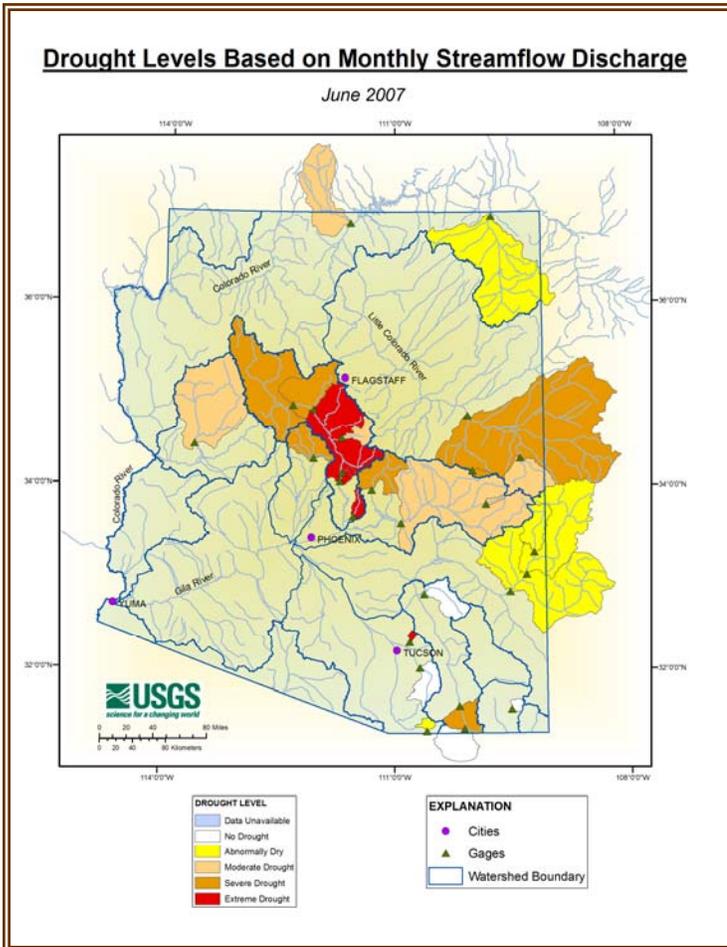
Photos by the National Park Service

The satellite-derived vegetation health index for July 22, 2007 (top) shows much of the state in very stressed condition, in comparison to a 20-year average. Contrasting this year with 2006 (bottom), shows the impact of multiple years of exceedingly low winter precipitation, little summer precipitation, and a late start to the 2007 monsoon season on western Arizona. The Mogollon Rim and parts of southeastern Arizona are faring a little better than the rest of the state. Fire potential is still above normal for Arizona, due to low fuel moisture – especially in grasses and shrubs; however, monsoon humidity and moisture is expected to reduce fire potential as the summer season progresses.



Images are obtained from the NOAA National Environmental Satellite, Data and Information Service (NESDIS).

Mountain Streamflow and Precipitation



June Streamflow

June streamflow volumes on major streams were well below the 30-year median. Representative streamflow is shown in the table below (NRCS from USGS data).

Water body	June Runoff in Acre Feet	% of Median
Salt River near Roosevelt	7,434	46%
Tonto Creek	36	5%
Verde River at Horseshoe Dam	4,083	52%
Combined Inflow to Salt River Project (SRP) reservoir system	11,553	46%
Little Colorado River above Lyman Lake	77	26%
Gila River to San Carlos Reservoir	1330	70%

Mountain Precipitation

Data from Natural Resources Conservation Service (NRCS) snow telemetry (SNOTEL) sites show that precipitation for June was 51 percent of average over the Salt River basin, 8 percent of average over the Verde River basin, and 43 percent of average over the San Francisco-Upper Gila River basin. The Little Colorado River basin received 32 percent of average precipitation in June.

Cumulative precipitation for the water year (Oct. 1-June 30) remains below average in all basins, ranging from 45 percent to 79 percent of average (see table at right).

Watershed	Percent (%) of 30-Yr. Average Water Year Precipitation October 1 – June 30
Salt River Basin	64%
Verde River Basin	45%
Little Colorado River Basin	61%
San Francisco-Upper Gila River Basin	79%
Other Points of Interest	
Central Mogollon Rim	61%
Grand Canyon	64%

Temperature and Precipitation



June - June was a dry month, as is normally the case, except for the southeast corner which received above-average rainfall due to moisture moving southwest from New Mexico. Temperatures across the state were well above average, with Gila county temperatures in the 95th percentile.

3-month period - Precipitation was well below average for April through June, as there was little moisture for the spring frontal systems to work on. The dry conditions contributed to higher temperatures during the three month period, with all climate divisions above the 79th percentile.

6-month period - The 6-month precipitation map reflects the dry winter and spring, with only the southeastern watersheds above the 28th percentile. Temperatures were below the 85th percentile in the north and west, and above the 88th percentile in the central and southeastern climate divisions.

12-month period - This period reflects both the past winter and last year's monsoon. For all areas of the state except the southeast, the entire 12-month period was exceptionally dry. The southeast watersheds received above-average rainfall during the 2006 monsoon season, bringing flooding to many locations, including Tucson. Temperatures were above the 79th percentile everywhere in the state.

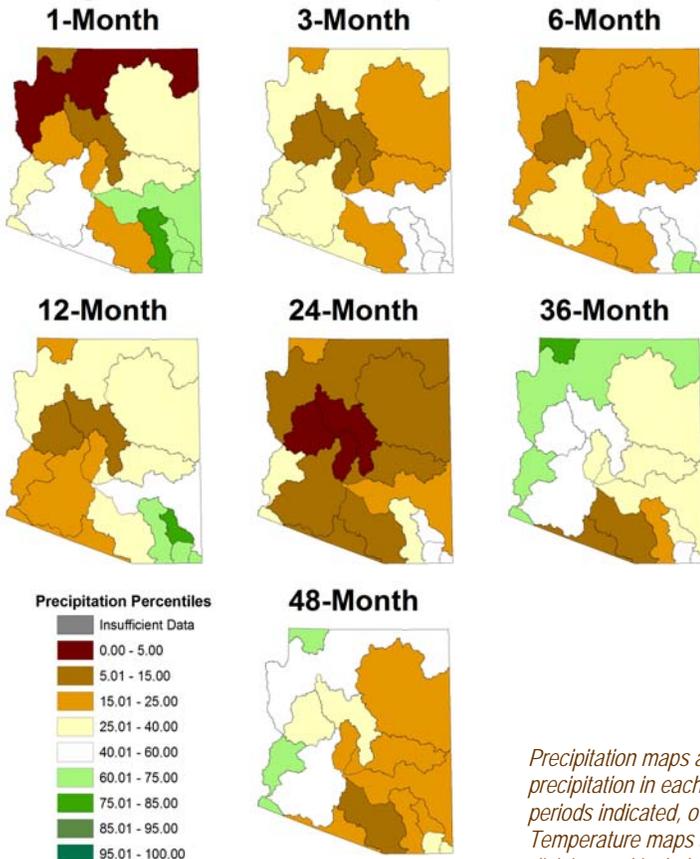
2-year period - The two consecutive years of extreme dryness are reflected in precipitation percentiles for this period. The only watersheds above the 29th percentile are Willcox Playa and White Water Draw, which received much needed rainfall during the 2006 monsoon. The entire state was very warm during the past 24 months, with the southeast and south central climate divisions having average temperatures above the 96th percentile.

3-year period - The 36-month precipitation pattern is very different from the 24-month period due to the wet 2004-2005 winter. The temperature pattern is hotter, with all watersheds above the 74th percentile, and six of the seven watersheds above the 86th percentile.

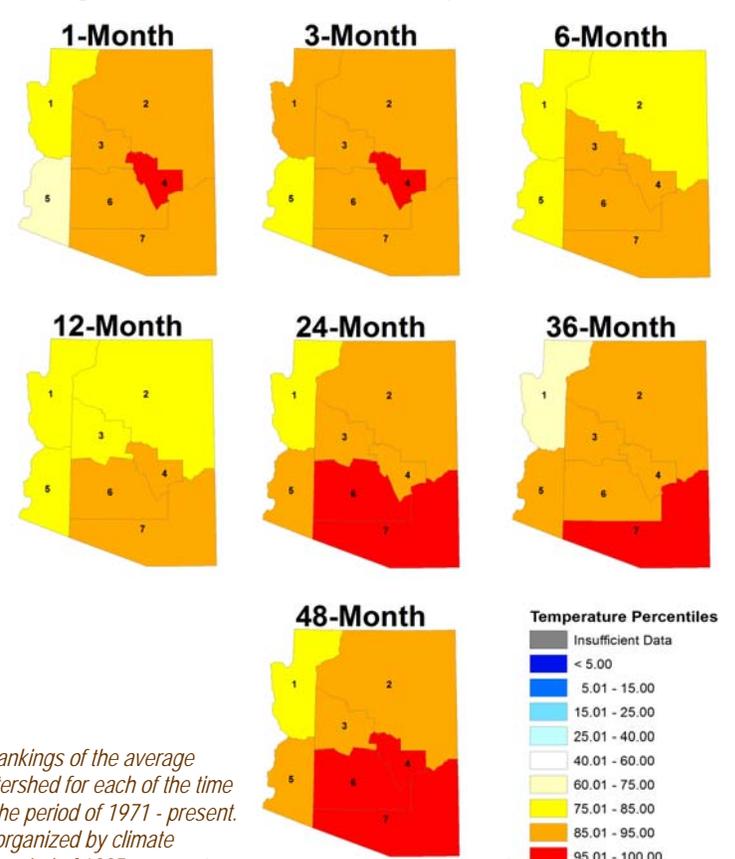
4-year period - The 48-month map shows that three of the past four years have been extremely dry throughout most of Arizona, with only the Virgin and Lower Colorado River watersheds above the 51st percentile. Most of the eastern watersheds are below the 24th percentile. Again, the 4-year dry period is accompanied by temperatures well above average across the state, with the southeast climate divisions above the 96th percentile. The combination of high temperatures and dry conditions has increased the evaporative demand for moisture, drying out the soil and stressing the vegetation.

For more information, visit <http://www.public.asu.edu/~aunj/Update.html>.

Precipitation Percentiles by Watershed



Temperature Percentiles by Climate Division



Precipitation maps are rankings of the average precipitation in each watershed for each of the time periods indicated, over the period of 1971 - present. Temperature maps are organized by climate division and include the period of 1895 - present.

Weather Outlook



Arizona Drought Monitor Report -
Produced by the Arizona State Drought
Monitoring Technical Committee

Co-chairs:
Gregg Garfin, University of Arizona –
Institute for the Study of Planet Earth
Tony Haffer, National Weather Service

Mike Crimmins, Extension Specialist,
University of Arizona Cooperative
Extension

Charlie Ester, Salt River Project

Larry Martinez, Natural Resources
Conservation Service

Ron Ridgway, Arizona Division of Emer-
gency Management

Nancy Selover, State Climatologist
Arizona State University

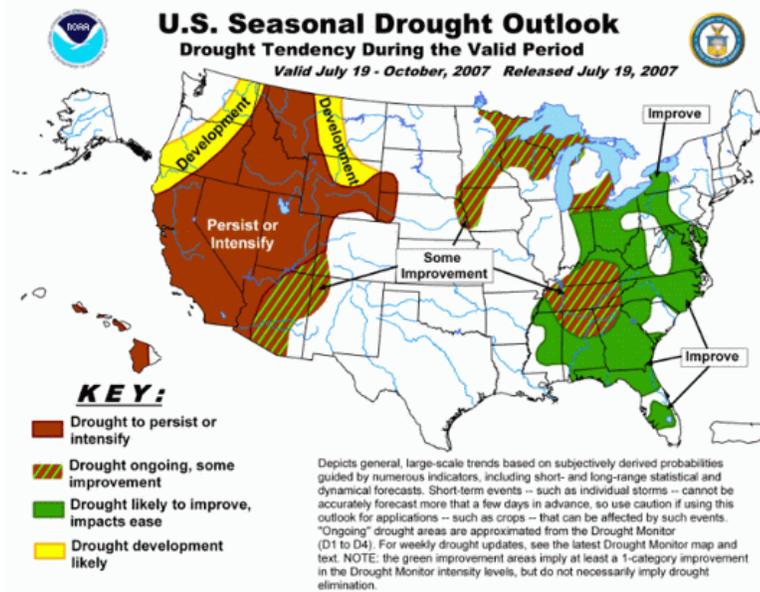
Chris Smith, U.S. Geological Survey

Coordinator: Susan Craig, Arizona
Department of Water Resources
Computer Support: Andy Fisher, Arizona
Department of Water Resources



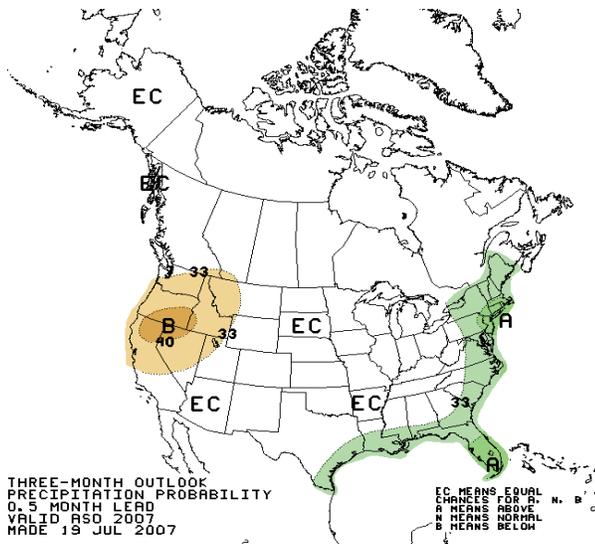
Drought Outlook

The NOAA Climate Prediction Center's Seasonal Drought Outlook indicates portions of the state may see some improvement in drought conditions resulting from rainfall in localized thunderstorms.



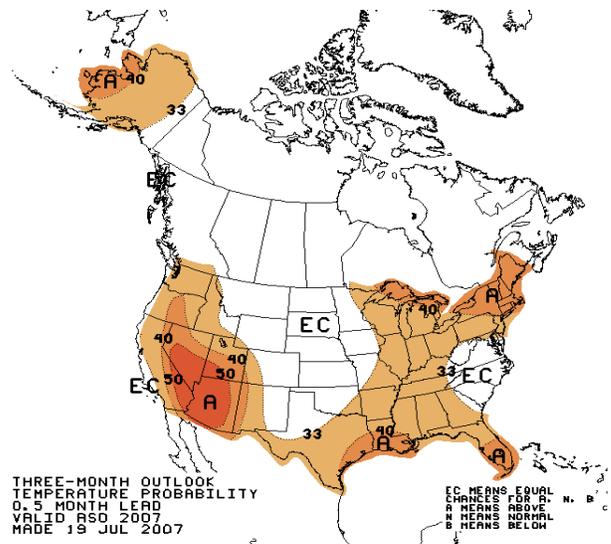
Also see the most current Southwest Climate Outlook - www.ispe.arizona.edu/climas/forecasts/swoutlook.html
For additional weather information from the Office of the State Climatologist for Arizona - <http://geography.asu.edu/azclimate>

August to October Weather Outlooks



Precipitation

Equal likelihood of above-average, average, or below-average conditions across the state during the 90-day period



Temperature

High level of confidence temperatures will be above average across the entire state

Appendix B

Drought Declaration for the State of Arizona

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Executive Order 2007-10
Drought Declaration For The State of Arizona

WHEREAS, Arizona is entering its second decade of a statewide drought due to long-term precipitation deficits and increased demand for water; and

WHEREAS, on June 23, 1999, Governor Hull declared a drought emergency (PCA 99006), which remains in effect today; and

WHEREAS, drought conditions continue to stress Arizona's resources and have had significant impacts on the citizens and commerce of the state, including increases in wild land fires, water supply shortages, vegetation and wildlife mortality, and economic losses in the ranching, agriculture and tourism sectors; and

WHEREAS, climate research has shown that although droughts lasting multiple decades are common in Arizona, they may be intensified by the effects of global climate change;

NOW, THEREFORE I, Governor Janet Napolitano, Governor of the State of Arizona, by virtue of the authority vested in me by the Constitution and laws of the state, do hereby determine that a continued declaration of drought is justified, and I hereby:

- A. Order continued implementation of the *Arizona Drought Preparedness Plan* and *State of Arizona Emergency Response and Recovery Plan*;
- B. Order the continued invocation of A.R.S. § 26-309 to provide mutual aid assistance to stricken areas of the state;
- C. Request assistance from the federal government for the appropriate federal disaster programs;
- D. Order state agencies to implement their water use reduction plans and assist in drought planning efforts across the state;
- E. Urge water facilities to develop and implement more aggressive drought and conservation plans and monitor water use; and
- F. Call upon citizens, businesses, schools, institutions of higher learning, local governments and federal agencies to increase water conservation efforts.

THIS ORDER supplements the directives in PCA 99006, which remains in effect. This Executive Order shall take effect immediately and shall remain in effect until such time as the Governor rescinds it.

IN WITNESS WHEREOF, I have hereunto set my hand and caused to be affixed the Great Seal of the State of Arizona.


GOVERNOR

DONE at the Capitol in Phoenix on this *21st* day of May in the Year Two Thousand and Seven and of the Independence of the United States of America the Two Hundred and Thirty-First.

ATTEST:


SECRETARY OF STATE



Appendix C

Fact Sheet for Developing a System Water Plan

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Conservation and Drought Planning for Community Water Systems

How do they work together?



The system water plan required from community water systems consists of three components:

- Water supply plan
- Water conservation plan
- Drought preparedness plan

This fact sheet is intended to assist community water systems in developing the **drought preparedness plan** and **conservation plan**.

Conservation Planning

A water conservation plan is a long-term plan designed to increase water use efficiency, reduce water waste, and help prevent water shortages. A conservation plan recognizes that we live in an arid environment where water supplies are limited, and promotes a low water use lifestyle. It can result in significant cost savings to the water system by extending the life of existing infrastructure and delaying costs associated with building new facilities or retrofitting old facilities to handle larger capacities.

You can think of your conservation plan as “Drought Stage Zero.” It is your standard operating procedure under normal conditions. If you manage your demand through conservation, you will be banking water for future use in times of drought.

The beginning of a conservation plan can be quite simple. *Some basic measures are listed on the back of this page under “Drought Stage 0.”* Consider a balance of both demand- and supply-side measures. Supply-side programs, such as leak detection and repair, increase the water supply, while demand-side programs, such as higher seasonal rates, reduce the demand for water.

Larger systems with more resources can implement more advanced programs:

- Market surveys to identify conservation needs
- Use of reclaimed water (to replace potable use, e.g. turf irrigation)
- Rebate and retrofit programs for water efficient devices
- Landscape and irrigation workshops
- Water waste ordinances, ordinances requiring low water use plants

Drought Planning

As drought conditions worsen, more water use reductions may be needed beyond your normal conservation programs. Drought stages and associated actions should be designed to incrementally scale back water use. The purpose of multiple drought stages is to prevent the final

“emergency” stage from occurring. Drought response actions requested from users can be voluntary or mandatory, depending on the severity of the situation, the amount of reduction needed, and the legal authority of the water provider.

The need to declare drought stages will depend on your system’s vulnerability to drought. Less vulnerable systems may never need to go beyond the “normal” or “precautionary” stage. More vulnerable providers may have to progress to intermediate or advanced stages to achieve necessary water use reductions.

In addition to determining your drought stages, you will also need to consider how to decide when a stage is “triggered,” and conversely, how it will be “removed.” Criteria can include things like well levels, climate conditions, water supply availability, amount of supply in relationship to demand, and the infrastructure of the system.

The ultimate goal should be to plan for future water needs so that there is never a need to declare an advanced stage of drought. Conservation, as well as augmenting supplies, are both important in achieving this goal.

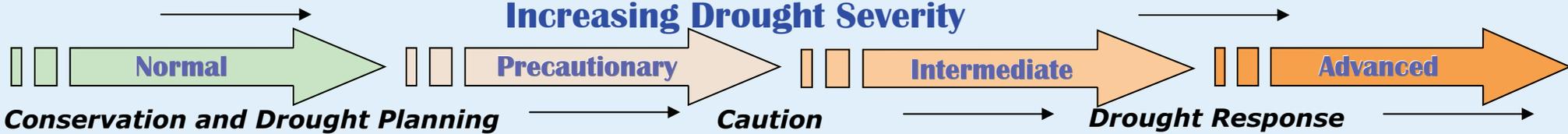
For examples of drought stages and management measures, **see reverse side**. Remember that the example measures are provided as guidance only. Each system is different, and some may require stricter measures in earlier drought stages. For example, a community may decide they want to prohibit turf requirements at all times, and not just during times of drought. This program then becomes a part of the community’s normal conservation measures.



For assistance, please contact the Statewide Drought Program at (602) 771-8442 or (602) 771-8533.

Example Conservation and Drought Management Measures

Increasing Drought Severity



Drought Stage 0

Normal management measures

Conservation measures and programs to be implemented on a continual basis

Examples -

- Provide conservation education and outreach (pamphlets, workshops, etc.)
- Meter water use at the source and all connections, ensure meters are working properly, perform water use audits
- Limit lost and unaccounted for water (e.g. implement leak detection and repair programs, control evaporation from storage tanks, eliminate illegal connections)
- Encourage low water use landscaping (e.g. create a low water use/drought tolerant plant list for your area, encourage installation of efficient irrigation systems)
- Evaluate population trends and projected growth to determine future water needs
- Develop water rate structures that encourage efficient water use
- Develop arrangements for alternative/back-up water supplies should they become necessary

The above programs are basic measures that should be considered by all providers. Systems with sufficient resources should develop more advanced programs.

Drought Stage 1

Precautionary management measures

Recommended when caution is needed to avoid stressing supplies

Examples -

- Communicate conditions, increase outreach
- Encourage further reductions or changes related to landscaping (e.g. turf removal, discourage winter overseeding)
- Promote use of commercial car washing facilities where water is recycled
- Increase system-wide leak detection efforts and expedite repairs
- Monitor water levels of wells, reservoirs more frequently
- Promote rainwater harvesting
- Discourage subdivisions from requiring turf
- Encourage restaurants to provide water only upon request
- Encourage hotel/motels to implement linen & towel replacement programs
- Update arrangements for alternative/back-up water supplies should they become necessary
- Continue actions from previous stage, if applicable

Drought Stage 2

Intermediate management measures

Recommended when there is a possibility that supplies may not meet demand

Examples -

- Implement time of day/day of week schedules
- Request a voluntary percent reduction from water users and offer tips on how to achieve it
- Prohibit subdivisions from requiring turf
- Implement increased conservation rate changes or surcharges
- Require restaurants to provide water only upon request
- Require hotel/motels to implement linen & towel replacement programs
- Require public facilities to reduce water use by community-determined percentage
- Impose restrictions on fire and fireworks
- Prohibit or reduce winter overseeding
- Confirm arrangements for alternative/back-up water supplies should they become necessary
- Continue actions from previous stages, if applicable

Drought Stage 3

Advanced management measures

Recommended when there is a good probability that supplies will not meet demands

Examples -

- Implement alternative/back-up water supply strategies (temporary pumping, water hauling, emergency interconnects, and water rights transfers)
- Institute water use reductions for large turf facilities
- Eliminate outdoor watering: no misters in commercial or public facilities, residential car washing, water used in fountains, or residential pool refills - consider watering trees but allowing shrubs/grass to die off
- Prohibit all public water uses not required for health or safety
- Suspend water use of interruptible customers (such as construction water) during peak periods
- Implement turf removal program
- Consider a moratorium on building permits if current demand cannot be met
- Continue actions from previous stages, if applicable

Appendix D
System Water Plan Form

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System Water Plan

Water Supply Plan

Water system name:
System ID number: 91-

1. Service area lands																						
a.	City/town where system is located:																					
b.	County where system is located:																					
c.	Township/range/section where your system is located (if known):																					
d.	Approximate square miles of service area:																					
e.	Describe or submit a map showing the boundaries of your service area (can be streets, town limits, landmarks, etc.). <i>Note that a map is not required, but may be submitted in place of a description.</i>																					
f.	Type of area served (consider majority of area served). Please check all that apply: <input type="checkbox"/> Rural <input type="checkbox"/> Suburban <input type="checkbox"/> Urban <input type="checkbox"/> Mobile home park <input type="checkbox"/> Subdivision <input type="checkbox"/> Prison <input type="checkbox"/> Other If other, describe area served:																					
g.	Typical or predominant landscaping type in residential areas: <input type="checkbox"/> Low water use landscaping <input type="checkbox"/> Turf <input type="checkbox"/> Unlandscaped/unirrigated (dirt or natural desert) <input type="checkbox"/> No outdoor water use (e.g. mobile homes with no yards) <input type="checkbox"/> Other Additional description if needed:																					
h.	Average residential lot size:																					
2. Sources of supply																						
a.	Do you serve groundwater? <input type="checkbox"/> Yes <input type="checkbox"/> No If so, do you measure water levels? <input type="checkbox"/> Yes <input type="checkbox"/> No List well registration numbers, most recent water level measurement and date measured (if applicable): <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: center; padding: 5px;"><i>Well registration number</i></th> <th style="text-align: center; padding: 5px;"><i>Water level</i></th> <th style="text-align: center; padding: 5px;"><i>Date measured</i></th> </tr> </thead> <tbody> <tr><td style="height: 20px;"> </td><td> </td><td> </td></tr> </tbody> </table> <p style="font-size: small; margin-top: 10px;"><i>(if the number of wells exceeds the space allotted, please continue on a second copy of this page, and attach it for submittal)</i></p>	<i>Well registration number</i>	<i>Water level</i>	<i>Date measured</i>																		
<i>Well registration number</i>	<i>Water level</i>	<i>Date measured</i>																				
b.	Do you serve surface water? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list name of source(s):																					
c.	What is your emergency source of water (back-up well number, name of other water provider, etc.)?																					

3. Interconnections

a. Do you have an interconnection with another water system?
Yes No
 If yes, list name of other system(s):

b. Describe interconnections, including conditions under which water transfer can take place:
Systems serving more than 1,850 people must provide a map showing interconnections

4. Water sold and purchased

a. Did you sell water to another water system during the past five years?
Yes No
 If yes, list quantities and systems:

b. Did you purchase water from another water system during the past five years?
Yes No
 If yes, list quantities and systems:

5. Storage and treatment facilities

a. Do you have storage facilities?
Yes No
 If yes, what is your total storage capacity?

b. Do you treat your potable water?
Yes No
 If yes, describe treatment facilities/methods:

6. Transmission and distribution facilities

Describe your system's transmission and distribution facilities:
Systems serving more than 1,850 people must provide a map showing transmission and distribution facilities.

7. System production

a. Is your system metered?
Yes No

Fill out the table below with the following data. If your system is not metered, fill in as much as you are able to estimate (at a minimum, provide estimates for 2006).
Average daily demand – the average daily demand for each of the indicated years (e.g. five average daily demand numbers – one number for each year).
Maximum monthly demand – the month of highest demand for each of the indicated years. Please identify the months and the total quantity of water used that month.
Peak day demand – the day of highest demand for each of the indicated years. Please provide the dates and total quantity of water used that day.

	Avg. daily demand (gallons)	Max monthly demand (gallons)	Estimated peak day demand (gallons)
2002		Month:	Date:
		Quantity:	Quantity:
2003		Month:	Date:
		Quantity:	Quantity:
2004		Month:	Date:

		Quantity:	Quantity:
2005		Month:	Date:
		Quantity:	Quantity:
2006		Month:	Date:
		Quantity:	Quantity:

b. Do you have difficulty meeting demand during times of peak use?
 Yes No
 If yes, describe:

c. Other important information related to system production and ability to meet current demands:

8. Analysis of projected water demand

a. Fill in the table below with your projected system population and projected demand.

Year	Projected population	Projected average daily demand on system (gallons)
2012		
2017		
2027		

If you have difficulty estimating your projected population, indicate whether you anticipate your population to increase, decrease, or remain stable for the indicated years. If you have difficulty projecting your average daily demand over the next 20 years, consider your current demand with the addition or subtraction of people and provide your best estimate. Projection calculations may be based on information such as gallons per capita per day, gallons per housing unit per day, number of connections and population, historic or expected demands, land use planning/classification, etc.

b. Explain how you arrived at these numbers:

c. Do you anticipate problems meeting these future demands?
 Yes No

d. Indicate any changes that may be necessary to meet demands over the next 20 years:
(for example, if demand is expected to greatly increase, options could include more advanced conservation programs, increased storage, additional wells, etc.)

Water Conservation Plan

Water system name:
System ID number: 91-

Conservation programs

a. See fact sheet Conservation and Drought Planning for Community Water Systems: How do they work together? for conservation tips and suggestions.

Check and provide a description for all that apply

Currently implementing	Planned in next five years	Conservation measures/programs	Description
<input type="checkbox"/>	<input type="checkbox"/>	Metering of source	N/A
<input type="checkbox"/>	<input type="checkbox"/>	Metering of service connections	
<input type="checkbox"/>	<input type="checkbox"/>	Water rate structures that encourage efficient water use (e.g. higher rates for higher use)	
<input type="checkbox"/>	<input type="checkbox"/>	Measures to limit lost and unaccounted for water (e.g. leak detection and repair programs, control evaporation from storage tanks, eliminate illegal connections)	
<input type="checkbox"/>	<input type="checkbox"/>	Programs to encourage low water use landscaping (e.g. low water use/drought tolerant plant list for your area, installation of efficient irrigation systems)	
<input type="checkbox"/>	<input type="checkbox"/>	Describe any education/outreach programs you are implementing <i>Please include any communication you have with your customers regarding conservation; this can be as simple as conservation tips provided in water bills. Other examples include school education programs, landscape workshops, water festivals, etc.</i>	
<input type="checkbox"/>	<input type="checkbox"/>	Other programs	

b. Describe any planned changes or additions to your current programs over the next five years:

Drought Preparedness Plan

Water system name:

System ID number: 91-

Complete the form below, or link to the online drought plan tool at <http://droughtplan.arid.arizona.edu>. If you have a curtailment tariff in place, it may be submitted in place of the drought plan if it includes all the information in the pages below.

1. Drought Plan of Action

Drought Stage Name or Number	Management measures <i>(consider measures for the system and for the customers)</i>
(Normal conditions)	Implement conservation measures/programs from water conservation plan. <i>You do not need to repeat them here. However, please include below any non-conservation related activities (such as augmenting water supply) that will be implemented under "normal" conditions.</i> Other measures:

2. Implementation of drought stages	
a.	How will you determine when to initiate a drought stage for your system? What factors will be considered? <i>(Indicators to consider include climate conditions, water supply availability, amount of supply in relation to demand, infrastructure of system, well/reservoir levels, and should most likely involve a combination of more than one.)</i>
b.	Who has the authority to initiate and/or change a drought stage for your system?
c.	If you chose to make any of your management measures mandatory for your customers, how will you enforce them?
d.	Other important information on implementation of drought stages:
3. Customer communication	
a.	Describe how you plan to educate customers on drought conditions and the need for water conservation:
b.	How will customers be notified of a drought stage declaration and implementation of associated management measures? <i>Note that different stages of drought may need different notification methods. If the system has reached the point of a water shortage, rapid notification will be necessary.</i>
4. Development of emergency supplies	
a.	Describe how you will get water to your customers in an emergency water shortage situation: <i>Note that it is the community water system's responsibility to have an emergency source of water and an emergency plan in place.</i>
5. Contact information	
a.	Address of water system:
b.	Telephone number of water system:
c.	Name and number of person(s) responsible for directing emergency operations:

Appendix E

2006 Annual Water Use Report Form

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Water Received

Part III Water Received			
Name of Water Supplier (name of water provider, right holder, waste water treatment facility (including your own facility))	Source of Water Received (groundwater, Colorado R., CAP, Salt R., Verde R., commingled, effluent, etc.)	Well Registry 55# (for water pumped or diverted, if known)	Quantity Received (acre-feet)
Total Water Received (ac-ft):			

Water Delivered

Part IV Water Delivered to Other Water Systems				
Name and Location (city or town) of Water System	Other System's Public Water System ID (ADEQ #)	Source of Water Delivered (groundwater, Colorado R., CAP, Salt R., Verde R., commingled, effluent, etc.)	Indicate Metered or How Estimated	Quantity Delivered (acre-feet)
Total Water Delivered to Other Water Systems (ac-ft):				

Part V Water Delivered to Customers			
Customer Type	# of Connections (at end of reporting year 2006)	Indicate Metered or How Estimated	Quantity Delivered (acre-feet)
Residential			
Single-Family			
Multi-Family			
Non-Residential			
Commercial			
Turf			
Other			
Total # of Connections:		Total Water Delivered to Customers (ac-ft):	

NOTE: THIS REPORT MUST BE FILED EVEN IF NO WATER WAS USED.

Effluent Use

Part VI Description of Effluent Use

A. Name of Waste Water Treatment Facility (WWTF)	Estimated Quantity of Effluent Generated at the WWTF During the Year (acre-feet)
(If effluent generated from a WWTF was used by the community water system during the year, enter the name of the WWTF identified in Part III, including your own facility.)	

B. Specific Uses to Which the Effluent Was Applied	Estimated Quantity of Effluent for Each Use (acre-feet)
(List all uses - landscaping (e.g. common areas, fountains, cemeteries), agriculture, horticulture, cooling towers, parks, golf courses, lakes, construction (i.e. dust control), etc.)	
Total Estimated Quantity Used Directly from the WWTF(s) (ac-ft):*	

* The sum of the uses should equal the total estimated quantity used directly from the WWTF(s). To accomplish this, please fill in "other" for any unaccounted or unknown uses. Do not include quantities recharged or discharged in this part.

Storage Facilities

Part VII Storage Facilities

Storage Facility Name	Storage Capacity (gallons)
Total Storage Capacity (gallons):	

Conservation Measures

Part VIII CWS Conservation Measures 2006 - Schedule CM (optional)

Please complete this form found on the reverse side to report conservation measures implemented during 2006.

This annual report, with an original signature, must be received by the Department on or before 5:00 p.m. on **June 1, 2007**.

AUTHORIZED SIGNATURE

TITLE

DATE

PRINTED NAME

EMAIL ADDRESS

TELEPHONE NUMBER

I hereby certify that the information contained in this report is, to the best of my knowledge and belief, true, correct and complete.

NOTE: THIS REPORT MUST BE FILED EVEN IF NO WATER WAS USED.

Part VIII:

CWS CONSERVATION MEASURES 2006 - SCHEDULE CM (optional)

Community Water System Name:

ADWR Community Water System ID#:

ADWR Community Water Planning contact number: 602-771-8442

If any of the information preprinted on this report is incorrect, please make necessary changes. Note: Attach additional sheets of paper, or other relevant documentation, if necessary. If this information is fully described in a bulletin, brochure, or report, you may attach that information in lieu of filling out this form.

Choose from the following programs or list other:

- Public Awareness/Public Relations**
 - Conservation Education & Training**
 - Outreach Services**
 - Physical System Evaluation & Improvement**
 - Ordinance/Condition of Service/Tariff program**
 - Rebate/Incentive Program**
 - Research/Innovation**
 - Other – Name of Program**
-

1. *Describe program(s):*

2. *Explain how the program(s) was implemented: (List any activities or efforts)*

3. *Analysis: (List results, evaluations or assessment(s))*

Appendix F

Online Reporting Tool (eCWS)

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Community Water System - Annual Report Filling - Microsoft Internet Explorer provided by ADWR

Address: https://test.secure.az.gov/az/adwr/cwsint/eCWS/(S(eixbtq45nvsdbsqijhpc55))/Wizard.aspx

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STEP 4

Step 3 - Part 1 - Groundwater Withdrawn

Well Registry 55#	Indicate Metered or How Estimated	Quantity Withdrawn (acre-feet)
No records to display.		
		Total Groundwater Withdrawn (ac-ft): 0

Back Next

User Type: External

Arizona Department of Water Resources
3550 N. Central Avenue
Phoenix, Arizona 85012

Effective November 28th, 2005, our location & Driving Directions to ADWR
ADWR privacy and web site Disclaimer.

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Step 4 - Preview and Confirm

Part 1 - Groundwater Withdrawn

Well Registry 55#	Indicate Metered or How Estimated	Quantity Withdrawn (acre-feet)
No records to display.		
		Total Groundwater Withdrawn (ac-ft): 0

Part 2 - Surface Water Diverted (Including well diversions)

Source of Water Diverted	Water Right or Claim #	Well Registry 55#	Indicate Metered or How Estimated	Quantity Withdrawn (acre-feet)
No records to display.				
				Total Groundwater Withdrawn (ac-ft): 0

Part 3 - Water Received from Others

Name of Water Supplier	Source of Water Received	Well Registry 55#	Quantity Received (acre-feet)
No records to display.			
			Total Groundwater Received (ac-ft): 0

Part 4 - Water Delivered to Other Water Systems

Source of Water	Public Water System ID	Source of Water	Well Registry	Indicate Metered	Quantity Withdrawn
No records to display.					

Done

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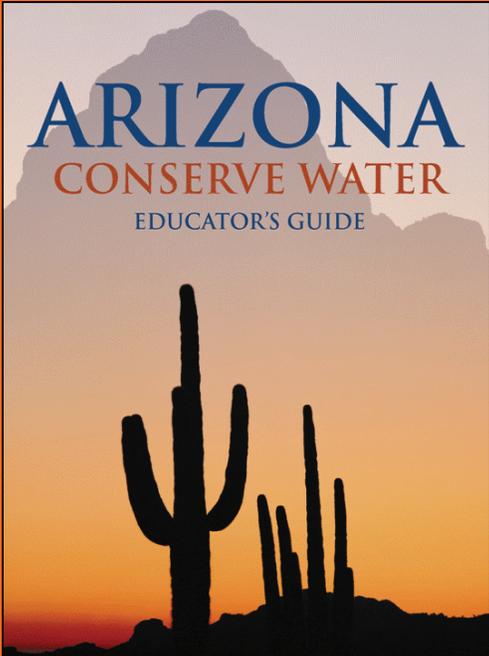
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Appendix G

Conservation Fact Sheets

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Arizona Conserve Water Educators' Guide



Conserving Water Today for Arizona's Tomorrow

In 2005, Arizona Governor Janet Napolitano called for a statewide water conservation effort to help strengthen a "culture of conservation" in the state. After hearing Governor Napolitano's call for action, the Arizona Department of Water Resources, Bureau of Reclamation's Phoenix Area Office and Arizona Project WET sprung into action. The three organizations have worked collaboratively since 2001 to create effective water education tools for Arizona teachers. Once again they formed a partnership and discussed the possibility of developing a teachers guide specific to educating Arizona's youth about water conservation. Through cooperation with the Project WET Foundation, an organization dedicated to teaching the world about water, existing Project WET curriculum was adapted to create the Arizona Conserve Water Educators' Guide. This exciting new educators' guide is now available through Arizona Project WET and has great potential to significantly contribute to statewide water conservation efforts.

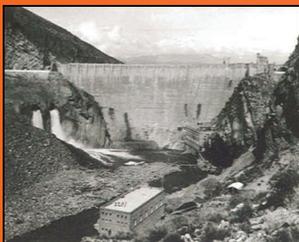
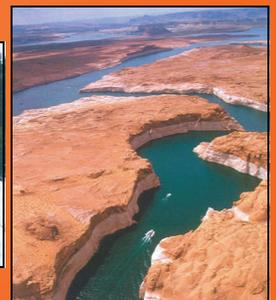
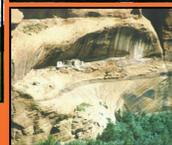
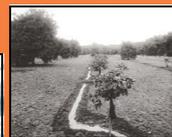
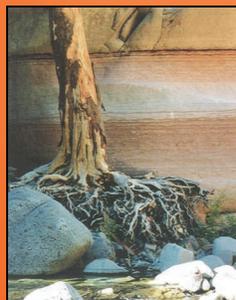
- Introducing the newest book in Arizona Project WET's teaching resources! This outstanding educators' guide was designed with Arizona teachers in mind. Using water as subject material, the 15 activities range from K-12 and meet the Arizona Standards in a number of different subjects including: Science, Geography, Math, Social Studies, History, Fine and Language Arts, Economics, and Government.
- Why choose water? Water is an extremely important, life-giving resource in our arid land. Throughout Arizona's history, careful consideration of water supplies has been key in any culture's survival. Today is no exception. In fact, where we are today offers us a great opportunity to create a sustainable future for Arizona, which is now facing issues that other parts of the country will confront later. The curriculum focuses on educating young people – our future policy makers, resource managers, scientists, and educators with the belief that developing an understanding of the importance of water can deepen the commitment to conserve it.

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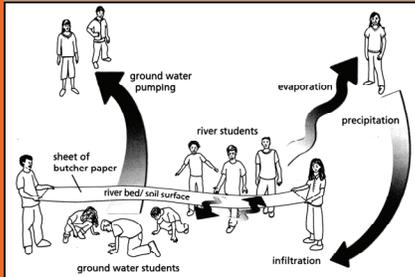
Note:

The Arizona Conserve Water Educators' Guide was carefully developed through a collaborative effort between Arizona Project WET, resource managers, policy makers, educators, scientists, a diverse group of citizens and leaders from tribal, religious, agriculture, and business communities. The educators' guide presents information in an unbiased manner. It is intended for educators and should not be mistaken for government policy.

The Arizona Conserve Water Educator's Guide is Divided into Four Parts:

Part I

A brief overview of Arizona geography, water history, management, and conservation.

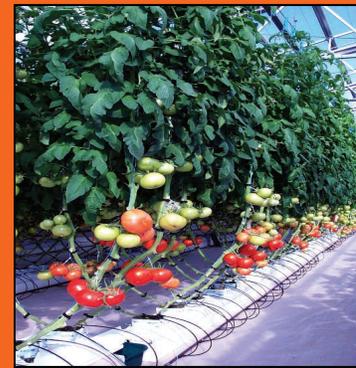


Part II

15 lesson plans that present creative hands-on, inquiry based activities to teach about a variety of aspects pertaining to water conservation. Each activity includes a detailed background section that compliments information presented in part I!

Part III

10 Case Studies of successful water conservation efforts specific to Arizona. These case studies are presented as problem-solving activities for students.



Arizona Conserve Water
Correlation to the Arizona Academic Standards
Search Page

Search by lesson title:

Lesson Title	Subject	Grade level (select all that apply)
-- Browse All Lessons --	<input checked="" type="radio"/> Writing	-- All --
A Hydrologic Primer	<input type="radio"/> Reading	0
The San Pedro Connection	<input type="radio"/> Science	1
Estivation, Xerophytes, and Ephemerals	<input type="radio"/> Math	2
Desert Seasons	<input type="radio"/> Social Studies	3
Smart Landscapes		4
Water Audit		5
Conservation Choices		6
Mixed Messages	<input type="checkbox"/> Show all applicable lessons for each result	7
Who's Right		8
Arizona Water Web		9
Chance or Choice?		10
Irrigation Innovation		11
Now and Then		12
Water Conservation Invention Convention		*High School

*Note: 'High School' grade level applies only to Science and Math

Submit Search Reset

Part IV

Each activity is correlated to one or more of the Arizona Academic Standards. Part IV includes a cross-reference chart that identifies subject areas to activities, a glossary, a bibliography, and an index.

A standards correlation tool can also be found online at http://cals.arizona.edu/AZWATER/wet/R_SC.html.

This tool allows the user to pick a standard and match it to an activity **OR** pick an activity and match it to a standard!

How to Obtain an Educators' Guide:

- **Attend the Free Workshop!** Those who attend will receive a free curriculum guide. The workshop schedule can be found at <http://cals.arizona.edu/AZWATER/wet/>.

- **Purchase the Guide** by visiting the above web site, or calling the Water Resources Research Center at (520) 792-9591 ext. 29.

Water Saving Tips and Technologies for Pools and Spas

Pools and spas are responsible for roughly 16% of water use outside the home. A standard (16 ft. X 36 ft.) uncovered pool loses approximately four feet per year to evaporation in Arizona. That is roughly the equivalent of filling the pool every year. Although it is better not to have a pool or spa from a conservation perspective, below are some water saving tips and technologies.

Design

When designing your pool, follow these simple guidelines to help reduce water waste, keep your pool clean, and save money and time.

- When designing the overflow, make sure it can be plugged or blocked easily when large groups are swimming. This prevents water loss through the line due to splashing water.
- Make sure any splash troughs drain back into the pool system.
- Aeration is the cause of significant water loss, therefore minimize the use of fountains and waterfalls.



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- A 7 mph wind at the surface of the pool can increase heat losses 300 percent! In Arizona the standard to counter this is to use low water use plants and fences to break the wind and reduce evaporative losses.
- 90% - 95% of water is lost from evaporation. Installing pool covers drastically reduces water loss, as well as keeps water cleaner so the number of backwashes and chemical shock treatments are reduced. Pool covers also provide an extra



Consider a reflective pool cover to curb heat retention of the water.

The Governor's Drought Task Force, established in 2003, developed the *Statewide Water Conservation Strategy* to address drought and the need for water conservation. A plan was developed that includes conservation recommendations. They are tied to a wide range of conservation programs, including adopting water conservation "ABCs" for residential and commercial sectors and the best available technologies. The Arizona Department of Water Resources will work with local communities to assess conservation needs.

Operation and Maintenance

A standard (16 ft X 32 ft) pool holds 20,000 gallons of water. Draining the pool wastes all that water. Below are practices, tips, and technologies to help curb the loss of the wasted water.



- Use water saving equipment like filters with cartridges whenever possible. If your filter has a backwash, choose one that includes a pressure drop gauge. This will help you determine when the pool needs to be backwashed and when it doesn't.



- Find a filter that has a sight glass so that it is easy to determine when to stop the backwash cycle.

- Use the filter backwash water for landscaping or other beneficial uses. Some cities have ordinances against letting pool water run into the street. Don't let good water go to waste!



- Refrain from keeping the water level very high. This way you minimize water loss due to splashing.

- Meter the make-up water that refills the pool to keep it level. This helps identify

- Monitor pool filling. Don't let it overflow!

- Carry out routine maintenance. Test and maintain the water quality to cut back on the need for backwashes. This will save time, effort, and





Fact Sheet

Water Saving Tips and Technologies for Vehicle Washing

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Conserving Water Today for Arizona's Tomorrow

The Governor's Drought Task Force, established in 2003, developed the *Statewide Water Conservation Strategy* to address drought and the need for water conservation. A plan was developed that includes conservation recommendations. They are tied to a wide range of conservation programs, including adopting water conservation "ABCs" for residential and commercial sectors and the best available technologies. The Arizona Department of Water Resources will work with local communities to assess conservation needs.



Washing Your Vehicle at the Car Wash



Getting your vehicle washed at a **car wash** is often the **most water efficient** way to wash your vehicle, as long as it is done by a car wash that either **recycles water** on site or sends the used water (grey water) to a treatment plant. Surprisingly, **washing your vehicle at home can use up to 148 gallons of water** or more for one washing!

Below are some tips and technologies for washing your car, as well as information on the types of car washes available.

The three basic types of professional car washes are:

1. Self-service:

This type of car wash uses roughly **12 gallons per vehicle** in Phoenix. Gallons lost to evaporation and carryout (water that is still on the vehicle at time of exit) equal about 20% of the water used.

2. In-Bay automatic:

This type uses roughly **72.5 gallons per vehicle** by rotating the washing equipment around a stationary vehicle. It loses 33% of the water used due to evaporation and carryout.



3. Conveyor driven automatic:

This type uses **44 gallons per vehicle** in Phoenix and loses 17% of that to evaporation and carryout. This type of automatic car wash is recommended above In-Bay automatic car washes.

Things to look for at the car wash:

- Recycles water and uses **Recycled Water**
- **Low flow spray wand nozzles** at self-serve car washes
- **Positive shut off valves** on hand-held spray wands
- **Some establishments, not all, display signs or association logos** that will help identify them as a water conserving car wash.

	Gallons per Vehicle	Evaporation & Carryout (%)
Self-serve	12.3	19.8
In-bay	72.5	32.8
Conveyor	43.8	16.7

Figures acquired from an International Car wash Association report by Chris Brown, 2002.

Tips for Washing Your Vehicle at Home:

Although it is more water efficient to wash your vehicle at a professional car wash (a free flowing hose can waste 100 gallons of water per wash if kept on), here are a few ways to save water at home.

- If possible, use new **Waterless Car Wash** products currently on the market. There are multiple types and brands to choose from.
(H₂O Savings:100%)
- Equip your hose with a **positive shut off valve**, so the water will only run when it is needed.
(H₂O Savings: 30% - 40%)
- Wash your vehicle on **grass or dirt**. Avoid pavement where water will just evaporate or run into the street.

Professional Car Wash Facility Operators



- For all commercial car washes, **use water reuse equipment** whenever possible.
(H₂O Savings: 50% - 80%)



- For **self-serve car washes**, choose **handheld spray wands and foamy brushes** which use no more than 3.5 gallons per minute for automobiles and light trucks. For buses and large truck washes, select equipment that use less than 3.5 gallons per minute.
(H₂O Savings: 50% - 80%)



- For self-serve car washes, make sure each spray wand, foamy brush, or similar system **has a positive shutoff valve** so that the water will not run while the system is not being used.
- **Replace spray nozzles** regularly to assure maximum efficiency of water used.
- **Replace brass or plastic** nozzles, which erode more quickly, with **stainless steel** nozzles.
- **Check for leaks and repair them promptly** as they occur.

- For automatic car washes, **select new rollover and conveyor equipment** that use **less than 3.5 gallons per minute** for light trucks and smaller vehicles. For buses and large trucks, such as Semis, use equipment which uses less than **7.5 gallons per minute**.
(H₂O Savings: 50% - 80%)



- For In-Bay car washes **Check the alignment** of the nozzles on a regular basis.
- **Replace nozzles** regularly.
- **Time the arches** precisely in the conveyor to come on right as the car arrives and to shut off right as it leaves the arch.
- Program a **dwell time** for water to run off the vehicle into the **reclaim pit** before allowing the vehicle to exit the conveyor.
- **Check for leaks and repair** them promptly as they occur.



Fact Sheet

Water Saving Tips and Technologies for Laundry Facilities and Practices

Conserving Water Today For Arizona's Tomorrow

The Governor's Drought Task Force, established in 2003, developed the *Statewide Water Conservation Strategy* to address drought and the need for water conservation. A plan was developed that includes conservation recommendations. They are tied to a wide range of conservation programs, including adopting water conservation "ABCs" for residential and commercial sectors and the best available technologies. The Arizona Department of Water Resources will work with local communities to assess conservation needs.

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Private Laundry Practices



Tip 1

When choosing a washing machine, find one under 4.0 cubic feet that uses less than 6.5 gallons of water per cubic foot. (H₂O Savings: 30% - 50%)

Tip 2

Buy a front loading washing machine that meets or beats the 2007 National Energy Policy Act standards. Look for the EnergyStar or WaterSense labels. (H₂O Savings: 30% - 50%)



Tip 3

Only do full loads of laundry or, if you must wash less than a full load, make sure to select the correct water level for each individual load.



Tip 4

To avoid costly utility charges, wash clothes during "off-peak" hours and check with your water and energy providers for area specific conservation actions.

Commercial Laundry Practices



Tip 1

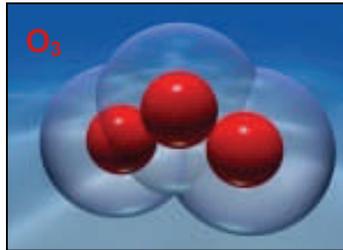
Use **tunnel washers** for large volume commercial operations.



Water Recycling System

Tip 2

Water recovery or ozone systems minimize water use for large commercial operations
(H₂O Savings: 20% - 35%)



Ozone molecule used in ozone system

Tip 3

Make sure that **equipment is easily programmable** to use only as much water as is required for the degree of soiling of the item being washed.
(H₂O Savings: 20% - 40%)

Tip 4

Install **high recover water recycling equipment** in large commercial operations.
(H₂O Savings: 70% - 95%)

Coin Laundry Facility Practices



Tip 1

Choose coin operated machines that have **tumble action (are front loading)**. These are the **most efficient** washers on the market. Although they are initially more expensive, they can pay for themselves through low utility bills within a few years. See local city's water department websites for rebates.
(H₂O Savings: about 40%)

Tip 2

Post signs urging customers to conserve water by only doing full loads of laundry or selecting the correct water level for their load, identifying water saving machines, and turn off the extra rinse cycle if applicable.

Tip 3

For **multi-family housing** with laundry facilities, use coin-operated machines in **one or two central locations**. This will result in **lower overall water use** than having a washing machine in every apartment.

Water Efficient Commercial Kitchen Technologies

There are many water saving technologies on the market for the food service industry. Below is a list of commercial kitchen technologies and water saving strategies:

The Governor's Drought Task Force, established in 2003, developed the *Statewide Water Conservation Strategy* to address drought and the need for water conservation. A plan was developed that includes conservation recommendations. They are tied to a wide range of conservation programs, including adopting water conservation "ABCs" for residential and commercial sectors and the best available technologies and the Arizona Department of Water Resources will work with local communities to assess conservation needs.



Pre-rinse Spray Valves:

Replace high water use, low pressure pre-rinse spray valves with lower water use, higher pressure valves. These newer more efficient spray valves use only 1.6 gallons per minute at 60 psi pressure. This makes them both more efficient to use and water friendly. To learn more, check out the Arizona Rinse Smart Program. (H2O savings: 25% - 60%)



Ice Machines:

When selecting ice machines, make sure they use no more than 20 gallons per hundred pounds of ice made. Flake ice machines are more water efficient (using 12 gallons per 100 pounds of ice) and should be used whenever possible. Also, be sure to choose an air cooled model over a water cooled model. (H2O savings: 15% - 50%)



Commercial ware washers (dishwashers):

Should use less 1.2 gallons per rack for fill-and-dump machines and less than 0.9 gallons per rack for all other types of machines. For under the counter machines, water use should not exceed 1.0 gallons per rack for high-temperature machines and 1.7 gallons per rack for low-temperature machines. (H2O savings: 15% - 50%)

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Conserving Water Today for Arizona's Tomorrow



Pasta Cookers:

Pasta Cookers tend to be water and energy intensive. Use the lowest temperature required to achieve boiling—212 F°. When the machine is not in use, but needs to be ready to go at a moment's notice, lowering the temperature a few degrees to “simmer” instead of “boil” greatly reduces the amount of steam, evaporation, energy, and money. When the machine is needed, turning the temperature back to boil will have the pasta cooker boiling again in just a few seconds.

Waterless Wok:

Conventional woks run water continuously over the stove to prevent over heating from built up heat under the cook top. Waterless (or air-cooled) woks allow the built up hot air to escape from two small air gaps that insulate the wok stove elements and insure release of built up air—eliminating the need for cooling water.
(H2O savings: 100%)



Connectionless Steamer:

Connectionless steamers (also called boilerless steamers) do not need either a water supply or a wastewater drain. Most connectionless steamers are also more efficient than those that use water.
(H2O savings: 80% - 95%)

Strainer Baskets:

Garbage disposals and sluice trough systems use water to process and remove food wastes. Using strainer baskets or garbage cans will save both water and energy.
(H2O savings: 50% - 100%)



Arizona Leak Detection Program

Patch the Pipe is a program of the Arizona Department of Water Resources in cooperation with the Bureau of Reclamation.



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New Efficiency Program Saves Water ...



Patch the Pipe is a new water efficiency program for municipal water systems within the State of Arizona.

This program will use state of the art digital leak detection equipment to detect leaks within a water utility's distribution system. Most utility companies report 10-20% of lost and unaccounted for water in their systems. While this could be due in some cases to theft, such losses are more likely due to leaks.

The ADWR Statewide Water Conservation Office will work with communities around the state to assess their need for this type of service and communities will be served on a first come first served basis. This program will be provided free of charge.

Background Information

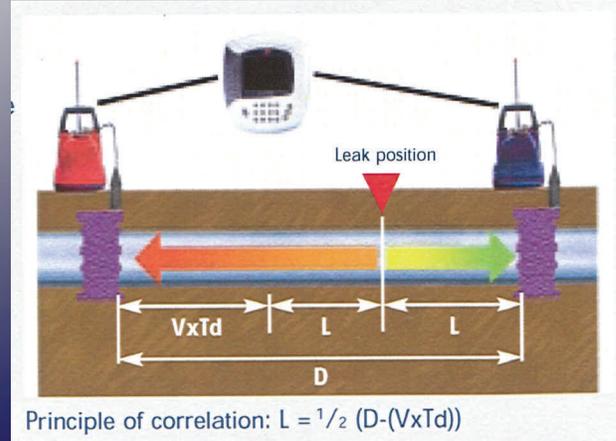
Pursuant to the Community Water System Planning Legislation, all community water systems are required to implement water conservation plans that increase the efficiency of the water system, reduce waste, and encourage consumer water conservation. To assist communities with these conservation efforts, the Arizona Statewide Water Conservation Office is providing assistance with leak detection.

The Arizona Department of Water Resources is committed to providing technology transfer and water efficiency programs to communities throughout the State of Arizona.

VISUAL DEMONSTRATIONS OF EQUIPMENT



Leak Detection System. Magnetized Units transmit leak status signals to Patroller unit



Principle of correlation: $L = \frac{1}{2} (D - (V \times T_d))$

Digital Leak Noise Correlator. Correlator Unit pinpoints leak location

Without this type of technical assistance, leaks would likely go undetected and lost and unaccounted for water percentages would remain stable or even increase. Detecting leaks is only the first step in eliminating leakage. Once the leaks are detected, it will be the utility company's responsibility to conduct the repairs. The Statewide Conservation Office will follow-up with the company to make sure that the leak has been sealed and provide technical assistance as needed.



Arizona Department
of Water Resources



Arizona's Leak Detection Program



FACT SHEET

Pre-Rinse Spray Valve Program for Arizona Restaurants

Arizona Rinse Smart is a program of the Arizona Department of Water Resources in cooperation with the Bureau of Reclamation.



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New Water Efficiency Program saves both Water & Energy.



New 1.6 gpm spray valves clean using greater velocity and lower water volumes.

Arizona Rinse Smart is a new water efficiency program for the restaurant industry. This program will focus on the replacement of high water use, low pressure pre-rinse spray valves with lower water use, higher pressure valves. Pre-rinse spray valves are initially used by many food service establishments to remove food particles before plates and trays are placed within commercial dishwashers.

Background Information

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The Arizona Department of Water Resources is committed to providing technology transfer and water efficiency programs to communities throughout the State of Arizona.



Inefficient standard spray valve



Efficient spray valve

The newer, more efficient spray valves use half as much water and clean more effectively than standard spray valves. Typically, the restaurant industry is a hard sector to reach with water efficient technologies. About two-thirds of the water used by restaurants is used for dishwashing. These new valves are rated at 1.6 gallons per minutes at 60 psi pressure. Initially, this program will focus on communities outside the state's larger metropolitan areas that have limited water supplies and/or have large seasonal fluctuations in population.

Working together in a collaborative conservation partnership:



Arizona Department
of Water Resources



Statewide Water Conservation Office

WORKING TO CREATE
A CULTURE OF
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CONSERVING WATER TODAY FOR ARIZONA'S TOMORROW

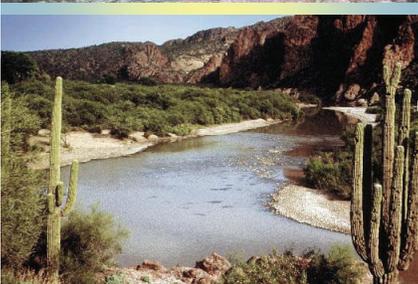
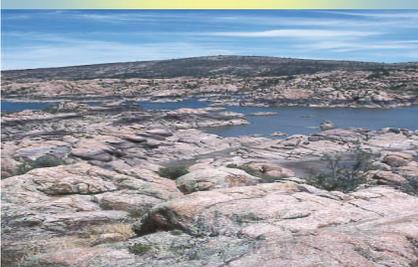
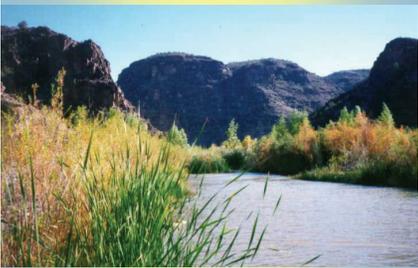


We live in a semi-arid state. In a call to action, Governor Janet Napolitano has asked for Arizona residents to adopt a “Culture of Conservation”. To this end, the Statewide Water Conservation Office within the Arizona Department of Water Resources is committed to working with communities throughout the state to assess the need for water conservation resources.

The Statewide Conservation Office was formed in 2005 with a goal of expanding the reach of existing programs, create new conservation tools for rural communities, promote water education throughout the state, create guidelines for more efficient use of water, provide suggestions for funding and implement conservation programs.

The Arizona Department of Water Resources and the Statewide Water Conservation Office’s approach to conservation can best be described as a three-legged stool: 1) Technology Transfer, 2) Education, and 3) Assistance.

Within this clear policy framework, ADWR focuses its delivery of program and services according to the four pillars. 1) Leadership, 2) Knowledge, 3) Collaboration and 4) Service. Arizona places high priority on managing its water resources to ensure that secure water supplies are available now and well into the future.



PROGRAM BACKGROUND

The Governor's Drought Task Force, established in March 2003, developed the *Statewide Water Conservation Strategy* to address drought issues facing Arizonans and the need for water conservation. As a result, a long-term implementation plan was developed which includes a series of conservation-related recommendations. These recommendations are tied to a wide range of conservation programs including the creation of a Statewide Water Conservation Office, the adoption of water conservation "ABCs" for residential and commercial sectors and the use of the best available technologies. The Statewide Water Conservation Office of the Arizona Department of Water Resources will work with local communities to assess conservation needs and opportunities for establishing new water efficiency programs.

PROGRAM HIGHLIGHTS

COMMUNITY WATER SYSTEM PLANS

The Arizona Legislature passed House Bill #2277 which requires Community Water Systems to submit to the Arizona Department of Water Resources a System Water Plan. The System Water Plan includes the following 3 components: A Water Supply Plan, A drought Preparedness Plan and a Water Conservation Plan. The Statewide Water Conservation Office will be assisting in conservation plan development and review of the plans once submitted.



WATER EFFICIENCY PROGRAMS

The Statewide Water Conservation Office will encourage the use of the best available technologies for all water use sectors. Arizona Rinse Smart is a new water efficiency program for the food service industry. This program focuses on the replacement of inefficient pre-rinse spray valves with spray valves that use 1.6 gallons per minute or less.



Patch the Pipe is a new leak detection program for the state of Arizona. This program will use digital leak detection equipment to detect lost and Unaccounted for water within a water utility's distribution network.



CONSERVATION PATCH PROGRAM

The Conservation Patch Program is being developed for organized Arizona youth organizations. The goal of the program is to:

- ◆ Develop an awareness and understanding of Arizona's water resources
- ◆ Understand that water supplies in Arizona are limited
- ◆ Understand the need to conserve water for now and future generations
- ◆ Understand that wise use of water includes reusing it for different purposes
- ◆ Serve the community in the form of water stewardship

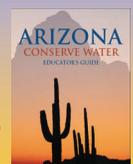


ARIZONA PROJECT WET

The Statewide Conservation Office is a sponsor of Arizona Project WET. Arizona Project WET provides Water Education for Teachers throughout the state of Arizona. The curriculum covers the properties of water, the water cycle, watersheds, groundwater, water quality, water rights, as well as understanding of the importance of water to all water users. The Statewide Conservation Office sponsors Arizona Project WET workshops. The workshops provide opportunities to learn about Arizona's water resources by participating in fun, interactive, classroom-ready activities.



The Arizona Department of Water Resources, in coordination with Arizona Project WET and the Bureau of Reclamation are developing an Arizona Conserve Water Educator's Guide. This guide has K-12 activities for teachers to bring into their classroom. One of the many great qualities of this book is it is Arizona specific.





Fact Sheet

Water Saving Technologies for Medical Facilities and Laboratories



Large hospitals operate facilities that in a large part are closely related to restaurants or hotels with food service; thus all items applicable to these types of facilities should be considered. However, medical facilities also have many unique types of equipment that use water. The following is a list of some of the more water-intensive operations and equipment found in these facilities.

X-Ray Equipment:

1. Digital x-ray equipment eliminates all water use dedicated to film development. This also eliminates the need for backflow preventers. (H₂O Savings: 75%-95%)
2. For large frame x-ray equipment, install water saver kits on cooling water loops of the film developers. This eliminates continuously flowing cooling water. (H₂O Savings: 100%)

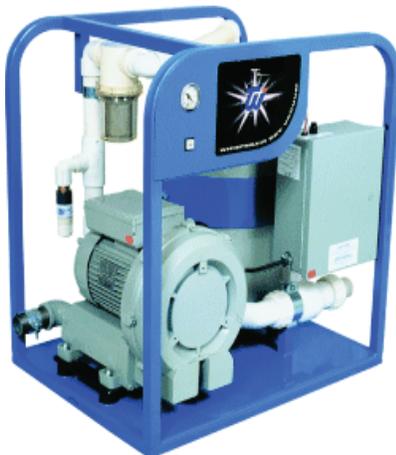


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Vacuum Pumps:

1. For medical and dental vacuum pump systems, select a dry system to save money, energy and water. Dry vacuum pump systems also eliminate the need for the installation and annual inspection of reduced pressure zone backflow preventers. (H₂O Savings: 100%)
2. Completely eliminate venturi aspirator systems by using mechanical dry vacuum equipment. (H₂O Savings: 100%)

Background

The Governor's Drought Task Force, established in 2003, developed the *Statewide Water Conservation Strategy* to address drought and the need for water conservation. A plan was developed that included a set of conservation recommendations. These are tied to a wide range of conservation programs, including adopting water conservation "ABCs" for residential and commercial sectors and the best available technologies. The Arizona Department of Water Resources will work with local communities to assess conservation needs and opportunities.

Sterilizers:

Sterilizers can represent a large amount of water use in a medical facility. Wherever possible, use a **table top steam sterilizing unit**. When using a free standing unit, choose one that has a **recirculation system** for the venturi ejector. This will reduce water use significantly. Older models with no venturi ejector or tempering water recirculation system can be **retrofitted with water saving kits**. Water saving tips for units which use vacuums can be found in the vacuum pump section. (H₂O Savings: 30%-100%)



Hood Systems:

1. For **laboratory exhaust hoods**, use dry systems whenever possible. (H₂O Savings: 100%)
2. Where **exhaust hood scrubber systems** are used, adjust flow rates to minimize water use. Incorporate recirculation systems and use alternative water sources whenever possible. (H₂O Savings: 10%-75%)
3. Include **self-closing valves** on fume hood wash down systems for special applications, like perchloric acid hoods, to limit water use.

Water Filtration:

Filtered water used in such things as **kidney dialysis** and **intravenous fluids** can be produced by using deionization resins or by a combination of deionization and reverse osmosis. Off-site **deionization** by resin tends to be **more water efficient**. However, if reverse osmosis is required, select equipment that minimizes the steam water rejection. The product water from reverse osmosis units should be able to be stored and used on demand, as opposed to some older systems that continually waste the portion of produced water not used by dumping it into sewers. (H₂O Savings: 30%-100%)

