

Waiting for the Rain: Tracking Drought Status across Arizona

Summer Waters, Extension Agent, Water Resources, Maricopa County and Michael Crimmins, Ph.D.,
Climate Science Extension Specialist, Soil, Water and Environmental Science Department, University of Arizona

Arizona has two distinct 'wet' seasons that bring most of the annual total precipitation to the region; the winter and summer. The summer monsoon season is probably the most anticipated season in part because it brings exciting thunderstorm activity and welcome relief from the relentless heat. Summer precipitation during the monsoon season also delivers water critical to ecosystems and agricultural production systems including ranching and dryland farming. However, decades of drought and some disappointing monsoon seasons in recent years have left people across the state wondering if the rain would really show up this summer. Could the monsoon season bring enough rain to end this drought and revive rural Arizona? While it could certainly provide some short-term relief from the dry conditions across Arizona, the summer precipitation is only one piece of a complex climate puzzle. This article provides a look at recent history, an overview of the current drought status maps, and links to additional resources. This information can help you better understand the drought we are all experiencing, the role of government agencies in drought preparedness, and what actions you can take in order to adapt to these conditions; whether in the short-term or long-term.

BACKGROUND

In 2003 the Governor of Arizona declared a drought emergency and established the Governor's Drought Task Force (Task Force). The Governor directed the Arizona Department of Water Resources (ADWR) to provide statewide leadership in this effort with an emphasis on providing assistance to rural communities with potable water supply needs and developing longer-term drought preparedness and response plans. The Task Force sought to accomplish this by focusing on drought monitoring, improving drought status and water conservation communication, building capacity in conducting drought planning and drought emergency coordination, and encouraging actions which could potentially mitigate the economic and social impacts of drought. This approach relies on effective scientific monitoring of drought conditions and stakeholder engagement. Monitoring drought status is the backbone of the Arizona Drought Preparedness Plan, bringing state, federal and local agencies together to report Arizona's drought status. Drought status maps provide up-to-date information about the severity of drought in different watersheds and/or counties. Anyone can use them to find out more about drought conditions and prepare to cope with drought impacts on plants, animals, and water supplies.

IS ARIZONA EXPERIENCING DROUGHT?

Arizona is in the second decade of statewide drought due to long-term precipitation deficits. The 2003 Drought Emergency Declaration issued by the Governor's office has persisted into 2012, and many counties have had drought disaster determinations by the U.S. Secretary of Agriculture since the late 1990s. The Arizona Department of Water Resources provides statewide leadership in facilitating the Governor's Drought Interagency Coordinating Group and the State Drought Monitoring Technical Committee (MTC) in

order to assess Arizona's drought conditions. The MTC analyzes data and observations from many organizations in order to determine if the drought status declaration is still accurate and then they post easy-to-interpret maps and information about current drought status. This information enables the public and local leaders to look at the drought conditions in their area over time and make decisions about the future based on the most current data.

HOW IS DROUGHT DETERMINED?

Drought is determined by factors such as precipitation deficit relative to "normal" or average levels, impacts on the environment and agricultural systems. Due to the complexity of how precipitation patterns interact with ecosystems and water resources in Arizona, drought conditions can exist at multiple timescales all at once. It may take several years of below-average precipitation to impact a large-scale reservoir system (long-term drought impact), while one unusually dry monsoon season can dramatically impact rangeland conditions across the state (short-term drought impact). In Arizona, the MTC works with authors for the U.S. Drought Monitor to determine short-term drought status by interpreting recent weather conditions and impacts that respond to precipitation over the course of several days to one month. The MTC determines long-term drought status on a quarterly basis by analyzing precipitation data in a manner that considers changes over many months to years. Long-term records (often greater than 30 years in length) of precipitation and streamflow are needed to assess whether current conditions are unusual with respect to the historical record. Observations from field experts on conditions of the local ranges or plant health are also used in creating the drought status maps for Arizona. Drought status maps are available online and updated on a regular basis so Arizonans can be informed about drought status and water supply conditions.

U.S. DROUGHT MONITOR MAP

The Drought Monitor map (available at <http://droughtmonitor.unl.edu>) is the only official drought monitoring product recognized by USDA and used for making decisions regarding USDA drought relief programs. It is released weekly (every Thursday) and represents data collected through the previous Tuesday. The U.S. Drought Monitor is an assessment of recent conditions and drought status developed as a collaborative effort between federal agencies and academic partners. The U.S. Drought Monitor maps are based on a mix of measured and descriptive data, including (but not limited to) the Palmer Drought Severity Index, soil moisture, streamflow, precipitation, and measures of vegetation stress, as well as assessments of drought impacts.

ARIZONA DROUGHT STATUS UPDATES

Each week, ADWR posts the U.S. Drought Monitor's map of Arizona on their website. A short-term drought status report is written at the beginning of each month to provide a more in depth review of conditions in Arizona. The short-term drought status update report is a brief summary of recent weather conditions across the state and their impact on the overall drought

status. Observations received from citizen scientists and other collaborators are an important source of input to this update.

Arizona's long-term drought status map is updated quarterly. The drought status is determined by comparing the precipitation and streamflow percentiles for the past 24, 36 and 48 months to a 40-year historical record. The resulting map uses the same key as the US Drought Monitor. However, the long-term drought status map is displayed by watershed, unlike other maps that show drought status by county. This is important because a watershed defines the area of land that carries precipitation to a particular stream or river. One watershed may span several counties. As a result, counties may need to work together in order to effectively prepare for long-term drought impacts on local surface water resources.

Each fall, the ADWR also releases an Arizona Drought Preparedness Annual Report that summarizes drought conditions and drought preparedness activities for the water year (October 1 - September 30). It includes summaries of winter precipitation, summer precipitation, drought status changes, the water year summary, next year's outlook, drought designations and declarations, requests for resources to enhance drought planning and monitoring, and updates on methodology.

WHERE TO FIND THESE MAPS AND OTHER RESOURCES

The tools described in this article are listed below with the corresponding website where they can be found. The information is designed to fit together so people can find out about drought conditions on different timescales.

These can be powerful tools when combined with other information such as temperature and precipitation outlook and streamflow forecasts. Whether you need to cope with the impacts of drought conditions on plants and animals or prepare for long-term drought impacts on your community's surface water supply, this data is available to inform your decision making.

US Drought Monitor Maps

<http://droughtmonitor.unl.edu>

<http://www.drought.gov>

Arizona Drought Updates

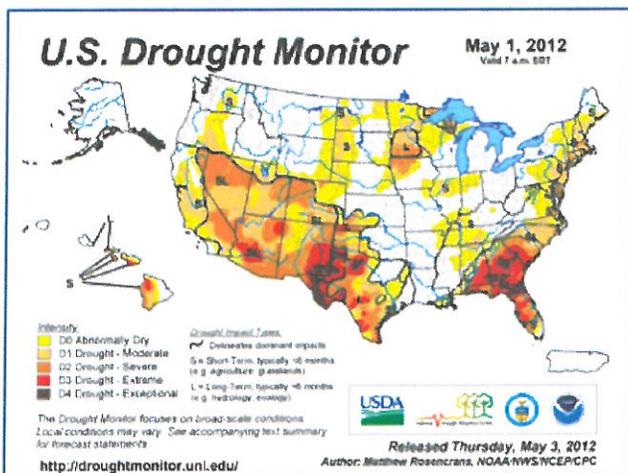
<http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/DroughtStatus2.htm>

Climate Summaries and Weather Outlooks

<http://www.climas.arizona.edu/outlooks/swco>

WHAT YOU CAN DO?

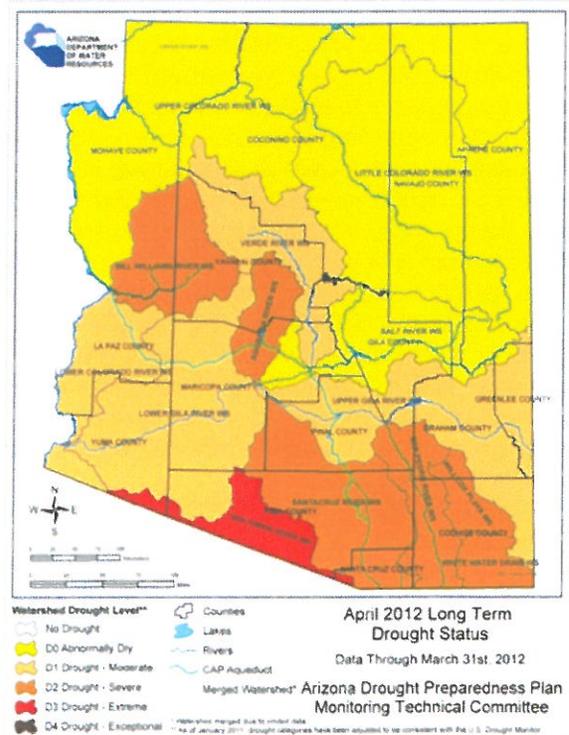
Water in Arizona is critical for agriculture, industry, and the natural environment as well as residential and commercial uses. Whether you use surface water (from lakes and reservoirs) or groundwater (from aquifers) it will take time to recover from the deficit that is created by drought. Surface water can replenish in 1-5 years of above-average precipitation, whereas it may much longer for the water table to return to normal after a drought. Drought recovery depends on many factors including the extent and duration of drought. During long-term droughts such as the one Arizona is currently experiencing, everyone can do their part to conserve water and mitigate the impacts of drought. So if we do get plentiful monsoon



How to Interpret the Map

The colors range from light to dark -- which indicate less severe conditions to more severe conditions.

- D0-Abnormally Dry-used for areas showing dryness but not yet in drought, or for areas recovering from drought.
- D1- Moderate Drought
- D2-Severe Drought
- D3-Extreme Drought
- D4-Exceptional Drought



season precipitation, feel free to enjoy the rain, but remember that the current drought won't be over. During long-term droughts everyone can play a role in mitigating the impacts of drought by conserving water and getting involved with community efforts. Here are some ideas for coping with drought impacts:

RESIDENTIAL AND COMMERCIAL LANDSCAPES

SUMMER WATERS



Drought Tolerant Landscape

Landscape with low-water use plants that are adapted to tolerating drought conditions. During drought, water trees first and other mature drought-tolerant plants less frequently. Check your irrigation system regularly for leaks and adjust your irrigation timer seasonally or monthly. If it does rain, be sure to turn off your irrigation system using the rain

switch on the irrigation controller. For more information about desert-adapted landscape plants and efficient landscape irrigation go to <http://extension.arizona.edu/maricopa/smartscape-program>

AGRICULTURE

MICHAEL CRIMMINS



Drought Impacts

Farmers may implement practices such as deficit irrigation to cope with drought, but sometimes loss is inevitable and extreme. When the USDA declares a county a disaster area, funding is available to farmers and ranchers in that county as well as in the contiguous counties. Financial assistance is available to producers when low yields, loss of inventory or

conditions prevent planting due to natural disasters as well as producers who suffered grazing losses due to drought or fire in certain circumstances. Contact the USDA Farm Services Agency for more information, or see the online fact sheets online at

http://www.fsa.usda.gov/Internet/FSA_File/nap09.pdf
http://www.fsa.usda.gov/Internet/FSA_File/lfp_2011_pfs.pdf

NATURAL AREAS AND WILDFIRE

JASON COIL



Wildfire Threatens Home

Some communities organize events to clear dried vegetation such as brittle bush from natural areas at the onset of fire season to reduce the risk of wildfires. If your home borders a natural area, to protect it from wildfires make sure that plants near the house are more widely-spaced and lower-growing than those farther away. Check for fire restrictions

before burning and never leave any fire unattended. Use the ash tray in your vehicle for cigarette butts if you smoke. For more information go to <http://cals.arizona.edu/firewise>.

ARIZONA DROUGHTWATCH

SUMMER WATERS



Volunteer Scientists in Training

DroughtWatch is a monitoring program designed to collect, summarize and display timely observations of drought impacts across Arizona. Observations of local drought impacts are invaluable in properly monitoring and characterizing drought across Arizona's complex landscape. You don't have to be an expert to provide meaningful information. You can seek out local field

experts in your community and help get their observations into the online system. Drought impact observations may include reduced stock pond storage, vegetation stress, or low streamflows. Help characterize and monitor changes in drought conditions by reporting drought impacts to <http://azdroughtwatch.org>.

VOLUNTEER PRECIPITATION MONITORING

PAW JUSTICE



Basin Rain Gauge

Help track precipitation levels and drought conditions throughout the year right in your own backyard! Consider collecting rainfall observations and share them online with programs such as Rainlog.org and the Community Collaborative Rain and Hail Study (CoCoRAHS). These programs help supplement official, but sparse, precipitation observations collected across the state. An observation from your location could help highlight worsening or

improving drought conditions missed by the official precipitation monitoring network. Check out <http://www.rainlog.org> and <http://www.cocorahs.org>.

WHAT'S NEXT?

On May 10th, 2012 the Governor's Drought Interagency Coordinating Group met to review the data from various agencies regarding drought conditions in Arizona and surface water supplies. Based on the information presented, the group recommended that the Governor's Drought Task Force maintain the drought emergency declaration initially issued in 2003. While the short-term drought status maps indicated some improvement in drought conditions throughout southeastern Arizona, conditions had worsened in central and northeastern Arizona. The long-term drought status maps indicated that all of the state is experiencing some level of drought. To make matters worse, snowpack reported throughout Arizona and in the Colorado River basin was extremely low, so surface water reservoirs will not be replenished by snowmelt from winter precipitation. These worsening drought conditions will make summer rain all the more anticipated in 2012. Summer storms have already made headline news in parts of southern and central Arizona, leaving many with a sense of cautious anticipation...waiting for the rain.

