



Drought Resiliency and Preparedness Update

Terry Piekarz, Municipal Utilities Director, 480-350-2660, terrance_piekarz@tempe.gov

Tempe's Drought Resiliency and Preparedness Plan and Water Resources Master Plan provide the water utility with the tools to meet the demands of the water service area, now and into the future.



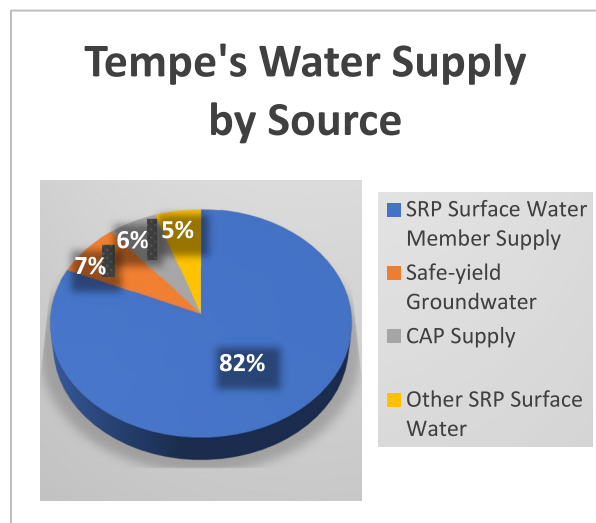
Together, these plans identify current and future water supplies, contain indicators and triggers for potential shortages and identify current and future strategies and resources required to meet supply challenges posed by climate change or drought.

Droughts are the result of many factors largely beyond the control of a municipal water utility. In contrast, shortages caused by droughts can be planned for, and potentially mitigated, if they are predicted with significant lead time. Therefore, it is critical to understand how and when droughts have the potential to create shortages to surface water supplies or groundwater stored in aquifers.

The most visible impact of drought is a decrease in the availability of renewable surface water supplies. Throughout the majority of the past two decades, Arizona, and much of the southwestern United States, have experienced various levels of persistent drought. During this time, significant variations in the amount of annual runoff from the Salt, Verde and Upper Colorado River watersheds have occurred. Historically, the storage and delivery systems of Salt River Project (SRP) and Central Arizona Project (CAP) have been efficiently managed to avoid significant shortages, despite prolonged moderate droughts. Whenever significant and prolonged drought conditions are observed on the watersheds that supply Tempe with surface water, the water utility remains engaged with SRP and CAP to ensure Tempe is prepared for projected shortages.

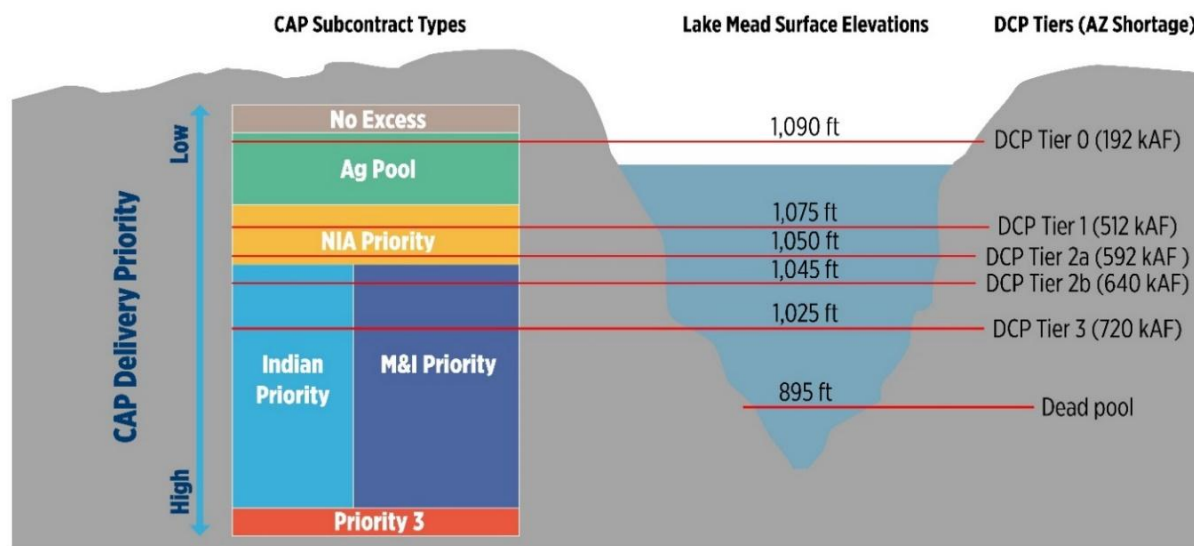
Recently, despite an ongoing drought, SRP's watersheds have experienced several years of wet conditions, resulting in reservoir levels in normal ranges for this time of year. However, this is not the case for the Colorado River system. Since the mid-2010s, the Colorado River reservoir system has consistently struggled to maintain storage of 50 percent of capacity. In May 2021, the two primary reservoirs of the system, Lake Powell and Lake Mead, are at 38 percent of capacity. This massive

reservoir system supports nearly 5.5 million acres of farmland and provides water to more than 40 million people in the western United States and Mexico.



In an effort to prevent shortages that would trigger federal actions and create restrictions on the operation of the Colorado River system, users of the Colorado River convened and representatives from the Department of Interior, the Bureau of Reclamation and each of the seven Colorado Basin states crafted agreements describing voluntary reductions in supplies and other measures that would be enacted should the water level in the reservoirs continue to decline. The Drought Contingency Plan (DCP) effort in Arizona involved a group of nearly 40 stakeholders who developed a package of agreements that came to be called the Arizona DCP Implementation Plan. On

April 16, 2019, the Drought Contingency Plan Authorization Act was signed into law and on May 20, 2019, the DCPs for each state were signed by their respective representatives. In 2020, the DCP officially started as the Colorado River system was deemed to be in DCP Tier 0 shortage and Arizona was required to reduce its CAP allocations by 192,000 acre-feet.



2022 will likely bring a DCP Tier 1 shortage, which will require Arizona to reduce its CAP allocations by 512,000 acre-feet. Although these shortages pose challenges for water utilities and water managers in Arizona, agreements and significant planning has prevented municipal providers like Tempe from experiencing physical reductions to their CAP supplies in 2022, or the near future.

To address the long-term impacts of Colorado River shortages, Tempe is focused on further improving its long-standing water efficiency and conservation program, which ensures that water is utilized as efficiently and effectively as possible. Additionally, the State of Arizona is working with partners in the seven Colorado

River basin states, the Federal Government and Native American tribes to collaboratively make changes to the management of the Colorado River system. These efforts, combined with additional actions, will ensure Tempe's access to CAP supplies, which contribute to meeting the water needs of the community, now and into the future.

Although less visible, drought can also affect groundwater. While this is not the case for Tempe's aquifers, drought can reduce groundwater directly by creating reductions to precipitation and stream flows, which naturally recharge the aquifer, or indirectly through increased groundwater pumping as surface water supplies grow scarce. To prevent groundwater shortages, water providers operating within the Phoenix Active Management Area (AMA) are subject to limitations on the amount of groundwater they can utilize to meet water system demands. The management goal of the Phoenix AMA is to achieve and maintain safe-yield, which is a condition where the volume of withdrawals from an aquifer and the volume recharged are balanced. The Phoenix AMA has not achieved safe-yield. However, groundwater levels in the basin are mostly stabilizing due to the limited use of groundwater and significant recharge activities.

Long-term Storage Credits (LTSC) are generated by recharging and storing available sources of water, other than groundwater, in the aquifer for future use. LTSC can be withdrawn from the aquifer without impacting the goal of achieving safe-yield and are therefore considered renewable. Tempe is committed to generating LTSC as a sustainable means to provide for future water demands, should shortages occur to surface water supplies. To ensure access to this critical backup water supply, Tempe stores water in the aquifer, develops and maintains the infrastructure necessary to withdraw that water when necessary and monitors the aquifer to ensure that it remains healthy and available for use when needed.

Identifying and monitoring drought indicators that can lead to shortages is a critical aspect of Tempe's drought resiliency and preparedness efforts. For each of Tempe's water supplies, shortage indicators and triggers have been selected that reflect a point at which drought conditions are anticipated to stress supplies and potentially lead to shortages.

Tempe Supplies, Shortage Indicators, Triggers and Estimated Impact to Water Utility Production

Shortage Management Stage	SRP Trigger	CAP Trigger	Groundwater Trigger	Long-term Storage Credit (LTSC) Trigger	Impact on Water Utility Production*
Watch	Drought of concern on SRP/CAP watersheds	DCP Tier 0	Monitor and trend static groundwater levels from wells	Annual LTSC Utilization is greater than recharge	0
Alert	Allocation reduced by less than 10 percent	DCP Tier 1	Static groundwater trends indicated downward trend	<72,000 acre-feet LTSC balance	Up to 3.5
Advisory	Allocation reduced by 10 to 20 percent	DCP Tier 2	Static groundwater levels drop to within 50 feet of pump intakes at wells	<60,000 acre-feet LTSC balance	Less than 4 to 8.2
Emergency	Allocation reduced by 20 percent or greater	DCP Tier 3	n/a	n/a	8.3 or greater

*Note: Potential surface water supply reduction in millions of gallons per day.

There are many tools available to the water utility to manage demands when shortages are predicted or occurring. These range from recommending changes to non-essential water-using activities to instituting fines and surcharges for non-compliance with temporary water usage restrictions. Tempe’s Drought Resiliency and Preparedness Plan contains demand management strategies that can be applied across many customer types to ensure that the water utility maintains the ability to provide water and satisfy as much demand as possible, regardless of the magnitude of a shortage.