Record-Breaking Drought
in the Lower Cienega Watershed, Pima County: Monitoring Results and Recommendations

Pima Association of Governments' (PAG) drought reporting uniquely depicts the localized drought impacts on a shallow groundwater-dependent system, important for habitat and rural residents dependent on this water source. Streams and rivers are rare, exceptionally productive systems in the arid landscape of Arizona that are especially sensitive to changes in water availability. With long-term support and interest from its member jurisdictions, PAG has consistently monitored the shallow groundwater-dependent riparian area of Cienega Creek Preserve on a monthly and quarterly basis since 1989 and reported the findings to ADWR for compilation into state records. This rich dataset is used by numerous entities to track and evaluate the seasonal, annual and cumulative impacts of drought. This Preserve, located outside of Tucson, AZ, is the site of a rare, low-elevation perennial stream that is of regional importance for its environmental and recreational value, and it has been designated as an "Outstanding Water" by the State of Arizona.

In 2014, PAG's analysis documented several record-breaking water level trends that indicate a heightened level of drought risk to the ecosystem, especially during the driest times of the year. June 2014 showed only 0.86 miles of flow, which is the lowest flow length in our historical record. This is 9% of the full 9.5 miles of flow extent observed in June of the mid-1980s. In addition, 2014 records showed the lowest levels of average annual streamflow on historical record and a five-foot drop in average well levels, with some wells dropping as much as 12 feet in one year. Because surface water baseflows and groundwater are strongly correlated, these downward trends parallel each other.

Annual reports and studies can be found on PAG's Cienega Creek web pages. Based on a 2013 Pima County report, precipitation in the Cienega Watershed has been declining in the winter but shows no trend in the summer. PAG's Cienega Creek monitoring data reflects the lack of winter rains as found in June, which is the

season with the most significant decline in streamflow. This delayed seasonal impact can only be recognized by monitoring the creek and tracking long-term response in addition to precipitation.

Erosion is another result of drought in this system. PAG has tracked a major erosion headcut in the streambed that progressively erodes after major flood events, if those floods are preceded by dry periods. Mortality of cottonwood and mesquite bosques, due to dropping water tables and erosion have been observed since 2001, with continuing observations in 2014.

With disappearing flow extents and a significant drop in groundwater levels, PAG recommends that further ecological monitoring be conducted to track the populations of species and their habitats and their water needs in Cienega Creek Preserve. Pima County's preserve has been a successful harbor for threatened and endangered species with few invasive species issues to which the impacts of drought pose an increasingly serious threat. Water trends cause land managers in the region to be concerned about the prospects for long-term health of the aquatic and riparian system of Cienega Creek.

Increased coordination with land use planners and well owners to encourage conservation strategies near vulnerable riparian area is recommended. Monitoring is recommended where groundwater restoration methods are applied to increase stormwater infiltration. PAG's 2012 report on groundwater use near shallow groundwater areas showed a steady increase of wells drilled in the Cienega-Davidson area since 1990. Drought information is primarily disseminated by large municipal water providers in urban areas, and private wells are isolated from, and exempt from, coordinated water use tracking requirements. These well owners may not be receiving conservation messaging even while their water use may increase to compensate for the lack of rainfall.