



REGIONAL WASTEWATER RECLAMATION DEPARTMENT

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TO: Jackson Jenkins, Director

FROM: Kathleen Chavez, Water Policy Manager

SUBJECT: Pima County Local Drought Impact Group (LDIG) 2014 Annual Report

Attached is the Pima County Local Drought Impact Group's Annual Report to the Arizona Department of Water Resources. The report will be included in ADWR's 2014 Arizona Drought Preparedness Annual Report. The drought, entering its fifteenth year, continues to affect our environment and residents. All of the local water providers continue their Stage One Drought Declaration in their respective service areas.

Tucson temperatures continued to be warm, with the first half of 2014 the warmest on record, according to the National Weather Service. Summer temperatures were the fourth warmest on record. Although summer monsoon rains were near normal, the dry winter offset precipitation gains. Precipitation for the 2013-14 hydrologic water year, which ended September 30, was 9.74 inches, the 40th driest on record, and 1.85 inches below the normal of 11.59 inches.

In the last year, ADWR's Long Term Drought Status shows the Santa Cruz River watershed in eastern Pima County worsening from moderate drought to severe drought. The San Simon watershed in central Pima County improved from extreme drought to severe drought.

During 2014 Pima County was designated by the U.S. Department of Agriculture a primary disaster county along with five other Arizona counties. Once again, drought impacts worsened at Cienega Creek Preserve and at Agua Caliente Park. Cienega Creek reported only 0.86 miles of stream flow which is the lowest flow length since recordkeeping began in 1985. Water levels at Agua Caliente Park decreased to a level where pumping was ineffective to keep the pond filled. Water levels in Lake Mead are a regional and local concern because drought impacts on the Colorado River could result in curtailment of water delivered to the Central Arizona Project. Several municipal water providers and agricultural districts in Pima County use water from the Central Arizona Project.

During the year, the County's response plan and ordinance were reviewed. The *Vulnerability Assessment in Drought Mitigation Report* reviewed Pima County's vulnerability to drought conditions and recommended revisions to the Drought Response Plan and Water Wasting Ordinance. The plan and ordinance were adopted by the Board of Supervisors in August. The Board also requested regular reports on the status of drought conditions and Colorado River Water supplies.

Should you have any questions on the attached report, please feel free to let me know.

Enclosure

Pima County Local Drought Impact Group (LDIG) 2014 Annual Report

The Pima County Local Drought Impact Group (LDIG) has been an active component of County operations since 2006 when the Board of Supervisors adopted *the Drought Response Plan and Water Wasting Ordinance* (Chapter 8.70).

LDIG consists of water providers and local, state and federal agencies that have an interest in the cause and effect of drought conditions in Pima County. LDIG meets bimonthly to monitor the short-term and long-term drought status, discuss drought impacts and coordinate drought declarations and responses.

The County's *Drought Response Plan and Water Wasting Ordinance* established a four stage trigger category that corresponds to the Arizona Drought Monitor Report and their declaration of a watershed drought condition from "Abnormally Dry" to "Exceptional." Each "Stage" declaration within the county triggers drought stage reduction measures.

LDIG explores the impacts of drought on various sectors in Pima County including agricultural water use, ranching, wildfire, hydrology, and flooding. Because many water providers depend on Central Arizona Project water, LDIG also monitors the status of the Colorado River, the El Niño Southern Oscillation (ENSO) and other climate weather patterns in relation to their effect on drought conditions and climate variability in the southwest. For a list of presentations and agendas, please visit Pima County's [LDIG website¹](#).

The study of tree ring growth, especially at the University of Arizona's Tree-Ring Laboratory, has been used to reconstruct flows in the Colorado River and to identify periods of drought as far back as 800 A.D.; by comparison, precipitation records began in 1880. This data is being used to understand the extent, frequency, duration and severity of drought. LDIG also monitors the status of the summer monsoon season and convenes roundtable discussions of drought and water conservation outreach programs.

DROUGHT STATUS

In Tucson, the first half of the 2014 calendar year (January 2014 to June 2014) was the warmest on record with an average yearly temperature to date of 3.6°F above normal². The summer of 2014 was the 4th warmest on record with an average temperature of 87.4 °F, 1.7°F above normal (85.7 °F). At the Tucson International Airport, the first half of the year was the third driest on record, measuring only 0.61 inches of precipitation (3.27 inches is normal for January through June). Through September 26, 2014, Tucson International Airport had received 6.69 inches of rainfall³ since the beginning of the calendar year, 74 percent of the normal 9.07 inches. In September, Tropical Storm Norbert produced record rainfall at the Tucson Airport, widespread flooding and high river flows. The Santa Cruz River, Rillito River and Cañada del Oro Wash recorded the highest flows since 2007. Flows of 25,000 cubic feet per second were recorded at the Santa Cruz River and Valencia Road. Preliminary 2014 monsoon rainfall totals are projected to be slightly above normal, 5.23 inches.

The Arizona Department of Water Resources' (ADWR) long-term drought status through June 2014 shows the majority of Pima County having a drought level of "D2 Drought – Severe", covering the San Pedro River, Santa Cruz River, and San Simon River watersheds. Only the Lower Gila River watershed in the northwest corner of the county has a drought level of "D0 Abnormally Dry". ADWR acknowledges the limitations of the watershed scale drought level mapping. Drought levels are reflective of the average precipitation across an entire watershed. Because some watersheds have very few gauges, the change in drought conditions between neighboring watersheds looks stark and can be misleading. Rather, the drought conditions change gradually across watershed boundaries.

Several water providers are taking delivery of water from the Central Arizona Project. Tucson Water has the largest CAP annual municipal allocation in the state; 144,172 acre-feet. Metropolitan Domestic Water Improvement District, the Town of Oro Valley and others have smaller CAP allocations. Agricultural users and the Tohono O'odham Nation in Pima County also have access to and use CAP water. Consequently, the drought status of the Colorado River and the potential for a shortage declaration is of interest to these sectors.

¹ LDIG website: <http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=70243>

² <http://www.wrh.noaa.gov/twc/climate/monthly/jun14.php>

³ <http://www.nws.noaa.gov/climate/index.php?wfo=twc>

Every month the Bureau of Reclamation releases their 24-Month Study which provides operational announcements and near-term projections. The study released in August 2014 stated that the water release from Lake Powell to Lake Mead for water year 2015 (October 2014 to September 2015) will be ten percent greater than that of water year 2014.⁴

On August 12, 2014, the water level elevation of Lake Mead was at its lowest (1080.19')⁵ since being filled in the 1930s. Even with the increased water releases from Lake Powell, the Lake Mead water level is projected to decline in 2015. Based on the Bureau of Reclamation's projections the most probable (50th percentile) Lake Mead inflows and resulting water levels in January 2016 are three feet above the first shortage trigger of 1075'; the minimum probable (10th percentile) projected water level is four feet below 1075', which would trigger the first tier of shortages. The earliest likelihood of a shortage declaration is 2017. This shortage declaration is not expected to reduce deliveries of CAP water to Native American or municipal and industrial users.

Outflow from Lake Mead has been exceeding the inflow since 2000, except in 2004 and 2010 when there was significant snowpack in the Colorado River Basin. The flow imbalance, referred to as a structural deficit, is lowering the elevation of Lake Mead. At the current rate of decline, Lake Mead's elevation could fall below 1000 feet in five to eight years unless equalization or corrective action is taken. The consequences could reduce diversions of CAP water to municipal and industrial users and Indian users. The CAP, Arizona Department of Water Resources and Colorado River basins states are evaluating options for corrective action to reduce the declining water elevation in Lake Mead.

IMPACTS IN PIMA COUNTY

The 32 shallow groundwater areas in Pima County are important for riparian areas that are dependent on groundwater. Sustained drought conditions can adversely impact groundwater levels if nearby well owners pump more groundwater to mitigate drought effects on their property. Invasive species like buffel grass and tamarisk and fewer birds, Gila Topminnows and aerial arthropods are being observed in Pima County. There is also a significant decrease in ephemeral stream flows.

Agua Caliente Park, located northeast of Tucson has historic and cultural significance. The park's focal point is a natural artesian spring that feeds a creek and produces an abundant variety of oasis vegetation and a habitat for native species. The natural spring has been historically pumped to feed a pond which produces a recreational element for neighborhood residents and park visitors. Recently, water levels have decreased to levels where pumping is ineffective to keep the pond filled. Pima County has begun investigating measures to maintain the health and vigor of Agua Caliente Park. Components of Pima County's commitment to the park include detailed hydrologic studies, legal implications of water rights in the region, structural improvements to the pond and importing reclaimed water from the local water provider.

Cienega Creek, in eastern Pima County, continues to show the impacts of sustained drought. 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 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 the historical record, nine percent 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

⁴ <http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=47753>

⁵ <http://lakemead.water-data.com/index2.php>

stream flow on historical record and a five-foot drop in average groundwater well levels, with some wells dropping as much as 12 feet in one year (see Attachment 1). Because surface water base flows 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 2014 Pima County report⁶, 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 stream flow. 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 head-cut 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 has 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 the Cienega-Davidson 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.

DROUGHT RESPONSE PLAN

During 2014 Pima County conducted a review of its drought response plan and ordinance. The *Vulnerability Assessment in Drought Mitigation Report* reviewed Pima County's vulnerability to drought conditions concluding that County-owned open space and riparian habitat is the county asset most vulnerable to drought. The report recommended revising the Drought Response Plan and Water Wasting Ordinance and the drought stage and trigger events to more accurately reflect current drought conditions, improve coordination with other jurisdictional declarations, correct front loading of response measures, provide more flexibility and buffer against oscillating changes of drought status. On August 5, 2014, the Pima County Board of Supervisors approved a text amendment to the *Drought Response Plan and Water Wasting Ordinance*. Ordinance No. 2014-38 relating to drought amends Pima County Code Chapter 8.70 to redefine the Pima County Drought Stages (Table 8.70.050), which identifies the drought conservation measures to be put in place at each stage. The drought stages are based on the findings from the Arizona Drought Monitor Report relating to Pima County.

Table 1: Pima County Drought Stages (Table 8.70.050, revised)

Indicator	Arizona Drought Monitor Report (Pima County)
Stage 1 Alert	Moderate-Severe
Stage 2 Warning	Severe-Extreme
Stage 3 Emergency	Extreme-Exceptional
Stage 4 Crisis	Exceptional

⁶ *Impacts of the Rosemont Mine on Hydrology and Threatened and Endangered Species of the Cienega Creek Natural Preserve*, B Powell, L Orchard, J Fonseca, F Postillion, Pima County Office of Sustainability, Pima County Regional Flood Control District, July 14, 2014.

At the August 5 meeting, the Board of Supervisors also requested a report on the status of drought conditions and Colorado River Water Supplies. The September 5, 2014 report to the Board of Supervisors notes that, although serious drought conditions continue in the desert Southwest, Arizona is in a better position as a result of the State's groundwater management code and establishment of the Arizona Water Banking Authority. It also notes that Pima County has advanced a sustainability framework for County operations and implemented land use planning and development regulatory actions to assure water conservation and water use efficiencies are emphasized. Continuing declines in Lake Mead present serious challenges for the continuation of water service to all current recipients of Colorado River water. Although municipal supply is excluded from Tier One shortage restrictions, continued drought will place additional stress on all water supplies potentially impacting municipal supplies (see Attachment 2).

As of June 2014, all of the entities located within Pima County (City of Tucson, Town of Oro Valley, Town of Marana, Metropolitan Domestic Water Improvement District, Community Water Company of Green Valley, and Pima County) are at Drought Stage 1.

DROUGHT RESPONSE ACTIONS

Pima County continues its efforts to respond to drought conditions. Several organizations, such as Conserve to Enhance (C2E), urge water conservation that translates into donations to support environmental enhancement. C2E participants have saved 5.3 million gallons (16.3 acre-feet) of water since the program inception in 2011.

The Conservation Effluent Pool (CEP) is an effluent allocation set aside pursuant to intergovernmental agreements between the City of Tucson and Pima County for use in riparian restoration projects. Over the last year a CEP taskforce, coordinated by the Community Water Coalition, identified thirteen candidate projects for CEP effluent allocations. The projects are prioritized into three groups: immediate potential, strong potential, and long-term potential. Four of the projects have been recommended for implementation that all have immediate potential.

Persistent drought conditions can increase the severity and intensity of wildfires. In July 2013, Pima County released the Community Wildfire Protection Plan. With the support of the local jurisdictions, Altar Valley Conservation Alliance, Southern Arizona, Bufflegrass Coordination Center, Salt River Project, Tucson Electric Power, TRICO Electric Cooperative, Arizona State Forestry Division, Bureau of Land Management, Pascua Yaqui Tribe, Coronado National Forest, Saguaro National Park, Buenos Aires National Wildlife Refuge, and twenty-two fire departments and fire districts, the Community Wildfire Protection Plan was developed in response to the Healthy Forests Restoration Act of 2003. The act focuses on at-risk communities and unincorporated areas located in and around public lands. It provides an unprecedented incentive for the development of comprehensive wildfire protection plans in a collaborative and inclusive process. For communities to take advantage of the beneficial opportunities and federal funding, a Community Wildfire Protection Plan is necessary. Pima County has completed its plan to better protect communities from wildfire risk, educate citizens about fire risk, and be eligible and ready to apply for federal funding to implement wild land fire mitigation projects and programs.

In 2010, Pima County and the City of Tucson completed the *Water & Wastewater Infrastructure, Supply and Planning Study*. An important outcome of the study was the [2011-2015 Action Plan](#) for Sustainability. During 2014, the fourth year of the action plan implementation, Pima County completed several recommended actions. In addition to the Drought Response Plan Update, Pima County implemented the following:

- The Regional Optimization Master Plan (ROMP) is a master plan that allows Pima County Regional Wastewater Reclamation Department to meet current environmental regulatory requirements mandated by the Clean Water Act. The fundamental component of the ROMP was the replacement of one and the upgrading of the second major wastewater reclamation facilities serving the Tucson metropolitan area using state-of-the-art technology and infrastructure. As a result of the ROMP improvements, higher grade reclaimed water is being produced by the facilities. In January 2014, both new facilities were online. The higher grade reclaimed water is anticipated to be utilized more completely within the region's water provider portfolios.

- Green infrastructure and low impact development (GI/LID) are important design strategies for building in communities by adding value-based benefits with a minimal alteration to the natural environment. The cost of such community benefits is an important consideration for community leaders. As one of the results from the City of Tucson and Pima County collaboration, *Water & Wastewater Infrastructure, Supply & Planning Study*, Pima County released the AutoCASE™ Beta Testing Project Report in July 2014. The cost-benefit report focuses on data specific to the southwest and could be used as a tool to evaluate the spending of public funds on GI/LID initiatives like infiltration trenches, pervious pavers, and water harvesting cisterns.
- Pima County's Comprehensive Plan update effort, [Pima Prospers](#), will guide the region's growth, conservation and community design for decades to come and includes core elements for use of land, physical infrastructure connectivity, human infrastructure connectivity and economic development. Drought preparedness, adaptability and response actions are integrated throughout the draft plan. Pima Prospers will be finalized in the coming year.

RECOMMENDATIONS

Although drought conditions persist in Pima County, the State groundwater management code and banking of CAP supplies have helped mitigate impacts to county residents. Implementation of sustainability initiatives, land use planning, development regulatory actions and public education emphasize water conservation and water use efficiencies. Continued decline of Lake Mead is a serious concern to Pima County residents. Although municipal water supplies are exempt from Tier One shortage restrictions, continued drought will place additional stress on all water supplies potentially impacting municipal supplies. Drought impacts to open spaces and riparian areas will continue to be of concern.

The following are recommendations regarding ADWR's Drought Program:

- Arizona and ADWR, in particular, must continue to monitor the status of the Colorado River and work with the Basin States and the Bureau of Reclamation to address the structural deficit in Lake Mead. Failure to take corrective action could have impacts to both agricultural, municipal and industrial CAP deliveries in Southern Arizona in the future
- Water providers in Pima County have made significant water infrastructure investment to increase the use of renewable water supplies to achieve the Groundwater Management goal of Safe Yield. ADWR's and ADEQ's regulatory setting should be supportive of adaptive management strategies to develop new and renewable water supplies and innovative demand management
- ADWR's Drought Management Program should continue to monitor the status of drought and report statewide drought conditions through the Drought Monitoring Technical Committee and the Interagency Coordinating Group.
- ADWR should incorporate environmental benefits from recharging and/or reducing groundwater pumping near shallow groundwater dependent ecosystems when designing and developing criteria for Special Enhancements Areas and similar efforts.
- ADWR should encourage and promote a study evaluating the effectiveness of managed stormwater recharge throughout Arizona, as recommended by the Blue Ribbon Panel, and evaluate potential for recharge credits.
- Monitoring of riparian areas in other regions for localized drought impact reporting should be encouraged.
- Drought response resources should be disseminated to exempt well owners not receiving drought alerts from water providers

- Unique drought response resources should be disseminated to areas of shallow groundwater dependent ecosystems that are sensitive to well impacts and drought.
- ADWR should improve statewide coordination and information sharing of local drought responses by posting water providers' drought response plans to ADWR's Drought Program website. This could assist communities that wish to prepare or update their drought program
- During the year a number of communities, including Safford, Payson and Williams were implementing strict water restrictions. ADWR should maintain on its website a list of cities and towns where water restrictions are in place. Doing so illustrates the extent and severity of drought on water supplies
- An annual statewide roundtable of county agencies might reinvigorate the establishment of local drought impact groups. These groups can provide valuable input to the ADWR on drought conditions. They can provide a forum for sharing drought impacts, adaptive management strategies and successful drought preparedness measures for their constituencies.