Water Resources Drought Management Plan

(Latest update April 2023)

Albuquerque Bernalillo County Water Utility Authority
Governing Board
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Abbreviation	Definition
AOP	Annual Operating Plan
ASR	Aquifer Storage and Recovery
AWIA	America's Water Infrastructure Act
DSCI	Drought Severity Coverage Index
EPA	Environmental Protection Agency
ERP	Emergency Response Plans
GPCD	Gallons Per Capita Per Day
OSE	New Mexico Office of the State Engineer
RRA	Risk and Resilience Assessment
SJC	San Juan-Chama
TCAC	Technical Customer Advisory Committee
USGS	United States Geological Survey
WA	Water Authority
WRMS	Water Resources Management Strategy

Executive Summary

This is the third update of the Albuquerque Bernalillo County Water Authority (Water Authority) Drought Management Plan (Plan)[1] since its inception in 2003. The Plan is integrated as part of the Water Authority's comprehensive long-term planning and operational element, *Water 2120*, which provides a road map to sustainably manage and plan for water resource management over the next century. Water 2120 is updated every 10 years, allowing the region to integrate changes in climate and supply reliability into its update. Post development of the *Water 2120* plan, the Water Authority will ensure this Plan is evaluated and updated, if necessary, to reflect changed long-term conditions.

Drought in the Water Authority's service area relates to drought conditions severity, surface water availability, and the amount of groundwater pumped during dry and high-demand periods. During drier than normal conditions water demand may increase and, in addition, surface water may not be available. These two conditions combined could result in increased groundwater pumping when compared to normal conditions and annual operation goals. As drought has its greatest impact in the irrigation season, spring through fall (the highest water demand times of the year), demand-side mitigation focuses on managing outdoor water use. Demand-side mitigation measures in winter consist of planning for the next irrigation season.

Consistent with previous versions, there are four stages of drought management triggered in the Plan (Stage 0, 1, 2, 3). Stages are triggered based on drought severity and demand-based conditions. Based on research and evaluation of other drought plans, timely triggering of resource-based triggers into and out of each stage is enhanced by automatic resource-based triggering. Therefore, each subsequent stage is triggered based on conditions documented and increased short-term conservation messaging or programming, as well as expectations and requirements for savings. Stage measures call for increases in short-term drought messaging or programming.

The Plan also documents how each stage is triggered both into and out of a given Drought Stage. Figure 1 identifies and exemplifies interactions between the Drought Triggers, Stages and Demand Management Measures. When all of Bernalillo County is in severe drought according to the U.S. Drought Monitor's Drought Severity Coverage Index (DSCI), the Water Authority will issue a Stage 0 Drought Advisory and start educating the public and working on campaigns to encourage voluntary conservation. When a Stage 1 Drought Advisory is in effect, the Water Authority Board (Board) will be briefed on groundwater pumping, water demand, and drought conditions. Table 1 identifies the specific supply and demand-based goals used to trigger Stages 1 through 3. Entering and exiting drought Stages 1 through 3 are based on triggering information related to groundwater production and the 12-month rolling average of Gallons Per Capita Per Day (GPCD).

[1] Previous versions of the Plan were called the "Drought Management Strategy." The name of the document was modified in this latest update to clearly define document intent and usage expectations necessary to cushion impacts from droughts and any potential short-term changes in water supply availability.

Each Drought Stage automatically triggers a variety of demand management mitigation measures. For Drought Stages 1 through 3, Water Authority staff updates to the Board should include severity of the drought, the amount by which annual groundwater production goals are being exceeded, and the amount the annual GPCD water usage goal has been exceeded. Whenever Stage 1 through 3 are in effect, the Water Authority Board will be briefed on water use, triggers, mitigation efforts, and drought severity at the monthly Board meetings.

Drought response measures include but are not limited to: educational (ex: increased public education and messaging), prescriptive (ex: rebates for attending drought classes, offering a rebate to customers who reduce their water use by at least 20%), and regulatory measures (ex: increasing water waste fines, mandatory day-of-the-week watering schedules). Plan approval allows staff to implement Stage-based programs, including regulatory measures.

Table 1. Drought Stages vs. Demand/Supply Goals

Groundwater Production / GPCD	DSCI ≥ 300	Less than 120% of the Annual GW Production Goal	Between 120% and 130% of GW Production Goal	Between 130% and 140% of GW Production Goal	More than 140% of the GW Production Goal
0 to < 2 GPCD over the goal	Stage 0	Stage 0	Stage 0	Stage 0	Stage 1
2-4 GPCD over the goal	Stage 0	Stage 0	Stage 1	Stage 1	Stage 2
4-6 GPCD over the goal	Stage 0	Stage 0	Stage 1	Stage 2	Stage 3
> 6 GPCD over the goal	Stage 0	Stage 1	Stage 2	Stage 3	Stage 3

NOTE: For the purpose of triggering drought stages, GPCD and groundwater production are calculated as a rolling annual average.

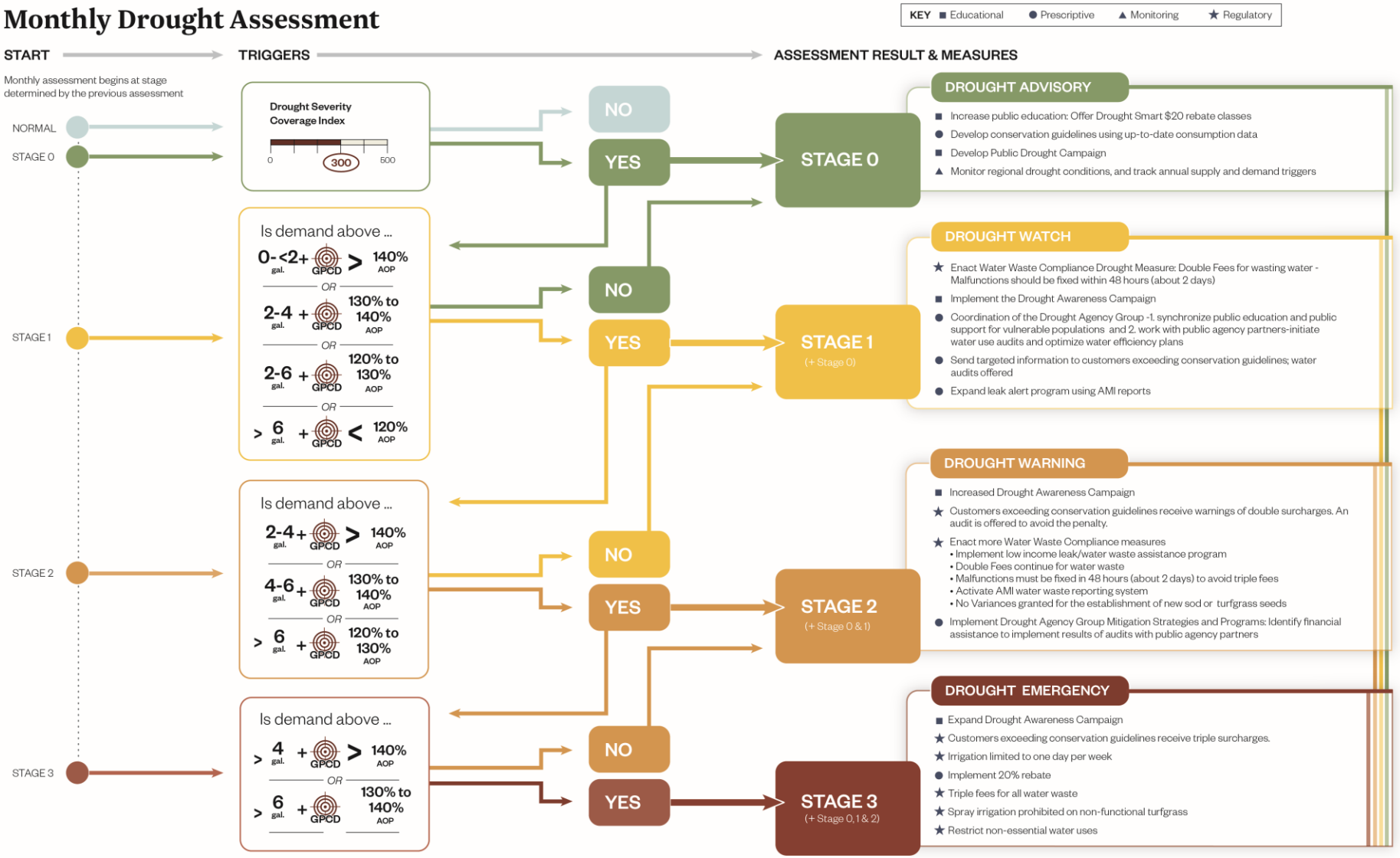

Figure 1. Triggers, Drought Stages and Measures

*The preceding stage of drought must be in effect before any subsequent levels of drought can be enacted. For example, Stage 2 cannot be entered unless Stage 1 is currently in effect and one of the listed conditions for Stage 2 is met. For the purpose of triggering drought stages, GPCD and groundwater production are calculated as a rolling annual average.

1. Introduction

This is the third update of the Albuquerque Bernalillo County Water Utility Authority (Water Authority) Drought Management Plan (Plan) since its inception in 2003. Previous versions of the Plan were called the "Drought Management Strategy." The name of the document was modified in this latest update to clearly define document intent and usage expectations necessary to cushion impacts from droughts and any potential short-term changes in water supply availability.

The purpose of this Plan is to make the best use of available public water supplies while proactively managing demand to align with *Water 2120* and associated conservation goals during periods of prolonged hydrologic drought. The Plan identifies the four stages of drought and how those stages are triggered, as well as how the stages are rescinded (i.e., how to move out of or exit a Drought Stage).

This Plan is an operational tool to ensure that Albuquerque's diversified water resources continue to be managed responsibly and proactively. During hydrologic drought, the focus remains on managing water resources while continuing to meet long-term conservation goals and optimizing short-term, demand-side activities. This continuous management process creates focus on and reflects regional environmental and cultural goals that flourish in the region. As an example, the conservation elements are designed to recognize and consider the impacts the Plan has on the very things the public finds desirable; and government agencies have promoted (ex: tree establishment via the "Treebates" program).

The four stages and triggers into and out of drought were reviewed as part of the update, as well as alternative supply triggers. The following sections detail the background behind the drought planning efforts, drought triggers and stages, as well as demand management actions to be implemented during periods of drought.

The drought plan is intended to address increased water use solely resulting from drought. It is not intended to be used to penalize its customers for slight periodic monthly or annual increases in per capita use or for increased groundwater use, due to water quality or other unforeseen conditions preventing diversion and direct use of the San Juan-Chama water as part of the Drinking Water Project.

2. Background

The Water Authority supplies about 100,000 acre-feet of water per year to more than 655,000 customers in the Albuquerque-Bernalillo County regional area. Water is supplied primarily from groundwater and surface water, as well as some reuse. Demand generally increases during the irrigation season and is lowest in late fall through early spring. Proactive management of this diversified water supply system during drought is a key element of the Water Authority's *Water 2120* water resources management strategy.[2]

[2] *Water 2120* established the need to manage the diverse water resources portfolio in Policy F.

2.1 Supply and Drought Planning Background

The need for the Drought Management Plan is two-fold. First, drought planning has been a long-standing element of the Water Authority's management strategies and, second, drought planning is required by state and federal agencies.

The Water Authority has a history of maintaining and implementing some form of drought management, dating back to April 2003 when the original Plan was adopted by the Albuquerque City Council.[3] The City established a task force to develop and finalize a drought management plan. This plan established four stages of drought and voluntary and mandatory drought response measures to protect and preserve the aquifer. The Water Authority utilized the recommended Drought Stages and corresponding drought response measures in 2006 and 2011 through Board resolution due to below average precipitation and/or above average temperatures from La Niña conditions.

In 2008, the Water Authority began utilizing surface water, in addition to groundwater, to provide its customers with a safe and more sustainable water supply. As a result, the Plan needed to be updated as the original Plan's Drought Stages were structured exclusively on groundwater use. In addition, lessons learned from the 2006 and 2011 droughts were used to design more appropriate Drought Stages and drought response measures.

In 2016, the Water Authority adopted a comprehensive Water Resources Management Strategy (WRMS), "Water 2120: Securing Our Water Future," to assure a resilient and sustainable water supply for its customers to the year 2120 with a planning horizon of 100 years. Numerous meetings were held throughout 2016 to gather input from customers and other water agencies. The last Drought Plan update occurred in 2017 and was developed to conform with *Water 2120*. This update was done to evaluate current strategies against regional best management practices.

Water 2120 consists of seventy-five policies and sub-policies for providing a resilient and sustainable water supply over a 100-year time frame, including incorporating climate change. It also provided operational and planning goals. This Plan addresses Policy C of the *Water 2120* "Establish and Maintain a Groundwater Reserve" and Policy D "Update and Maintain the Water Conservation Strategy." Water 2120 updates are scheduled every ten years. The *Water 2120* update will allow the region to evaluate and integrate potential changes in supply reliability. Post development of the *Water 2120* plan, the Authority will ensure this Plan is updated to reflect changed long-term conditions.

In addition to the historical drought planning efforts, the Drought Management Plan is required as part of the New Mexico Office of the State Engineer (OSE) permit to divert surface water from the Rio Grande for the San Juan-Chama Drinking Water Project. Condition 58 of the existing permit states that: "The City's water conservation program should be modified and updated to include a drought management plan acceptable to the OSE."

Along with the OSE permit requirement of a drought plan, the Environmental Protection Agency (EPA), under America's Water Infrastructure Act (AWIA), requires all utilities serving more

[3] The Water Authority was created by New Mexico Legislature in 2003 and replaced the City of Albuquerque Water Utility. The Water Authority was established pursuant to Section 72-1-10 et seq. NMSA 1978 with specific responsibility for public water, wastewater, and reuse in the greater Albuquerque area. The Water Authority is governed by an eight-member Governing Board consisting of three Albuquerque City Councilors, three Bernalillo County Commissioners, the Mayor of Albuquerque, and an ex-officio member from the Village of Los Ranchos.

than 3,300 people to have Risk and Resilience Assessments (RRAs) and Emergency Response Plans (ERPs) (AWIA Section 2013). The drought plan is needed to help meet the requirement to evaluate the risk to the system of natural hazards and the resilience of source water.

2.2 History of Water Resources Management

As the Water Authority diversified water sources used, particularly utilizing surface water in the San Juan-Chama (SJC) Drinking Water Project, it allowed for recharge of the aquifer and increased groundwater levels. A reduction in groundwater production (Figure 2) resulted in increasing and more stable water levels, as exhibited by Figure 3 from the United States Geological Survey (USGS).

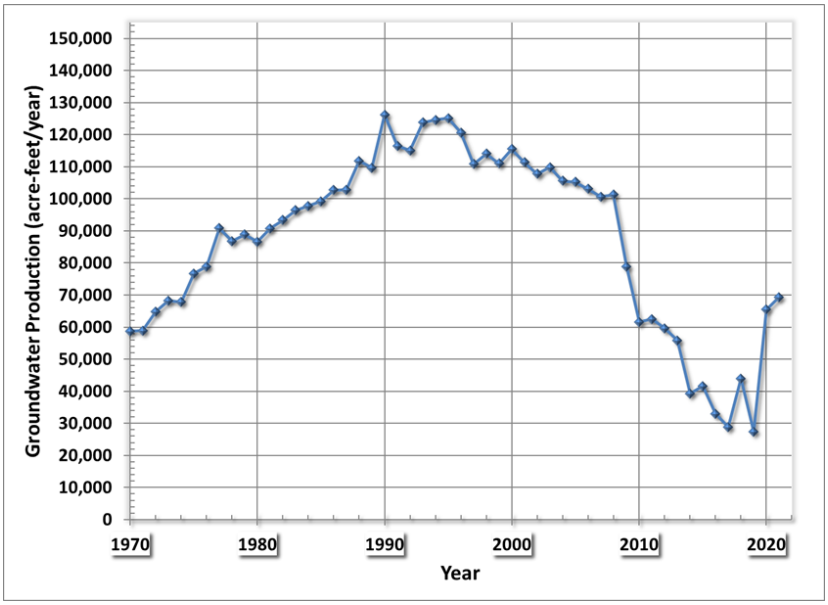

Figure 2. Groundwater Production, 1970 – 2021

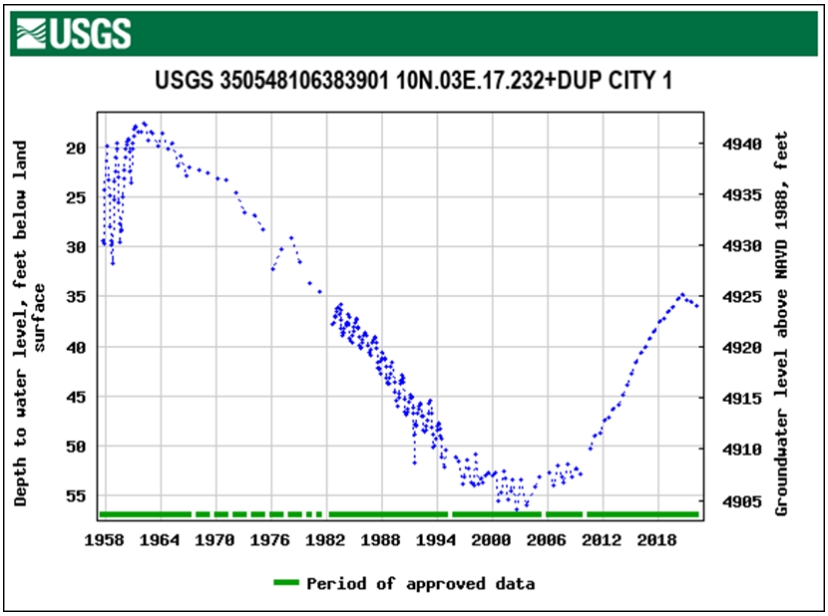

Figure 3. Groundwater Levels, 1958 – 2021

At the same time, water use was reduced through development and implementation of goal-based, long-term conservation programs and the diversification of the water supply portfolio. Water demand is met with a combination of surface water, groundwater, and reuse (Figure 4). Surface water is used preferentially when it is available, while reuse water is used seasonally, primarily for irrigation of large turfgrass areas. Groundwater is managed as a resource and conserved when possible. The Water Authority also operates several aquifer storage and recovery (ASR) sites to further recharge the aquifer.

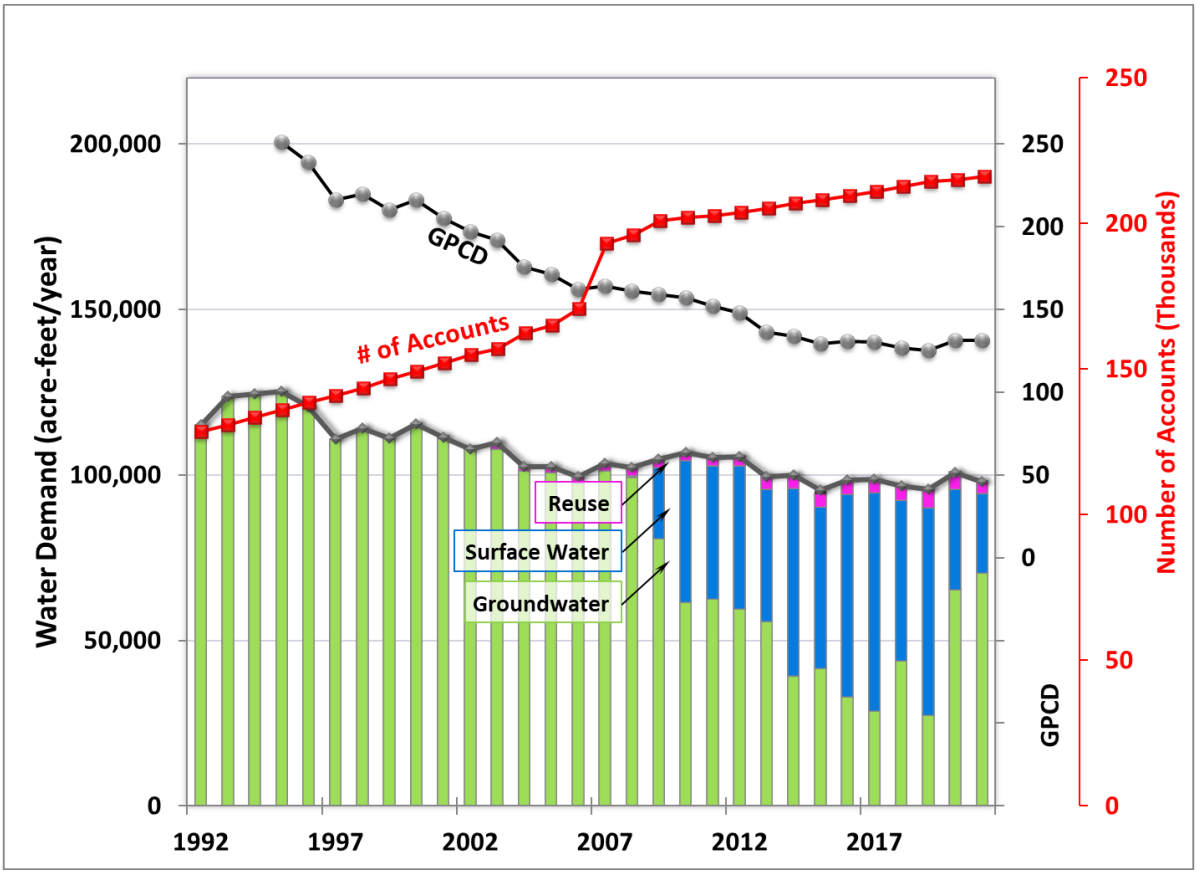

Figure 4. Water Sources Used to Meet Demand and Average GPCD

Even with an increasing population, as represented by the number of accounts in Figure 4, overall demand has decreased since the 1990s. This reduction is the result of achieving system efficiency (e.g., reduced GPCD) goals articulated in Water Authority conservation planning.

2.2.1 Gallons Per Capita Per Day (GPCD)

Water conservation has proven to be a powerful tool for managing water resources over the past twenty years. GPCD has been reduced from 250 in 1995 to 127 in 2022. This has led to an overall reduction in production from approximately 125,000 acre-feet in 1995 to approximately 98,000 acre-feet in 2015. Further water conservation efforts over the 100-year planning period are a key element to secure a resilient, affordable water supply for the Water Authority's service area. As part of *Water 2120*, a goal was set to reach 110 GPCD by 2037. The short-term milestones to this goal are consistently met (Figure 5).

Water 2120 Policy D calls for continued progress in conservation to achieve GPCD water usage of 110, further extending water supplies even in the face of climate change. The Water Authority utilizes the conservation program to reduce the GPCD to 110 by 2037. To achieve the long-term, demand-based goals, a target for the year is incorporated into the annual operations goals and objectives. To assure staying on track for achieving the long-term goal through drought conditions, the Water Authority staff evaluates how close the rolling average GPCD is to the yearly target and implements drought mitigation measures to bring back to alignment.

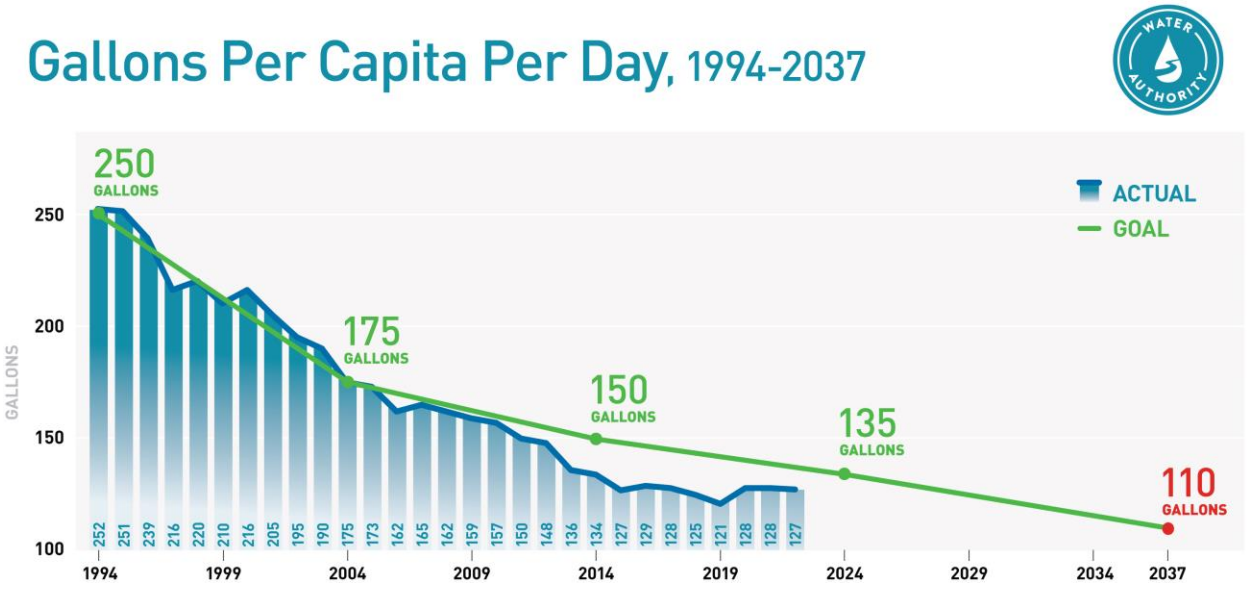

Figure 5. GPCD Trends, 1994 – 2022

2.2.2 Annual Operating Plan

Part of the drought management planning efforts rely on annual groundwater production goals. These goals are developed each year by Water Authority staff as part of the Annual Operating Plan (AOP). The AOP establishes an annual demand goal pursuant to the achievement of long-term conservation objectives. The AOP is updated annually in April and projects how to meet groundwater, surface water, and reuse usage goals for the next 12 months. The AOP is an operational tool; and the groundwater portion is used in context of this Plan to trigger into and out of Drought Stages.

2.3 Update Strategy and Timing

Consistent with nationally recognized research and manuals reviewed for the update, the Drought Management Plan is reviewed and updated every five years or when *Water 2120* is updated. This 2023 Plan update includes a review of applicable programs and current state-of-the-art manuals and operation programs from comparable utilities.

Table 2 lists the documents reviewed as part of the Plan update.

Table 2. Documents Reviewed

Organization	Document Name	Summary
Water Research Foundation	Project #4640: Managing Drought: Learning from Australia	Importance of working together, value of public engagement programs, prioritizing both supply and demand options
Water Research Foundation	Drought Management in a Changing Climate: Using Cost-Benefit Analyses to Assist Drinking Water Utilities (Report #4546)	Summarizes the costs and benefits of drought management practices implemented by water utilities and guides for utilities to conduct cost-benefit analyses to evaluate and select appropriate drought management options
National Drought Mitigation Center	Drought Ready Communities: A Guide to Community Drought Preparedness	Focuses on the role of the community and the importance of including community voice and insights in drought planning
National Drought Mitigation Center	Handbook of Drought Indicators and Indices	Evaluates various severity level responses and the importance of having easy-to-implement measures
Denver	Water Shortage Response Implementation Plan	High profile / similar geographically
Austin	Drought Contingency Plan	State required structure / good conservation plan, manager triggers
Tucson	Drought Preparedness and Response Plan	Summer monsoon / similar water resources / detailed plan

Similar to the original Plan, this updated Plan was reviewed by the Water Authority's Technical Customer Advisory Committee (TCAC) before being submitted to the Water Authority Board.

3. Drought Triggers and Stages

There are four levels of drought triggered in the plan. A Drought Advisory, Stage 0, operates as an early warning system and, using a nationally-developed, locally-applied metric, prepares the region for the enhanced drought measures by calling for increased education on drought and development of the drought campaign. Stage 0 is triggered by increases in Drought Severity and Coverage Index (DSCI) above 300 in Bernalillo County. All subsequent stages (1-3) are automatically triggered by water resource and usage conditions within the Water Authority supply area. For demand-based triggers to accurately define program intent, triggering should occur when conditions merit in a timely fashion. Entering and exiting stages are designed to be based on triggers. This plan identifies the triggering of drought stages that are based on conditions exemplified in the following figure (Figure 6).

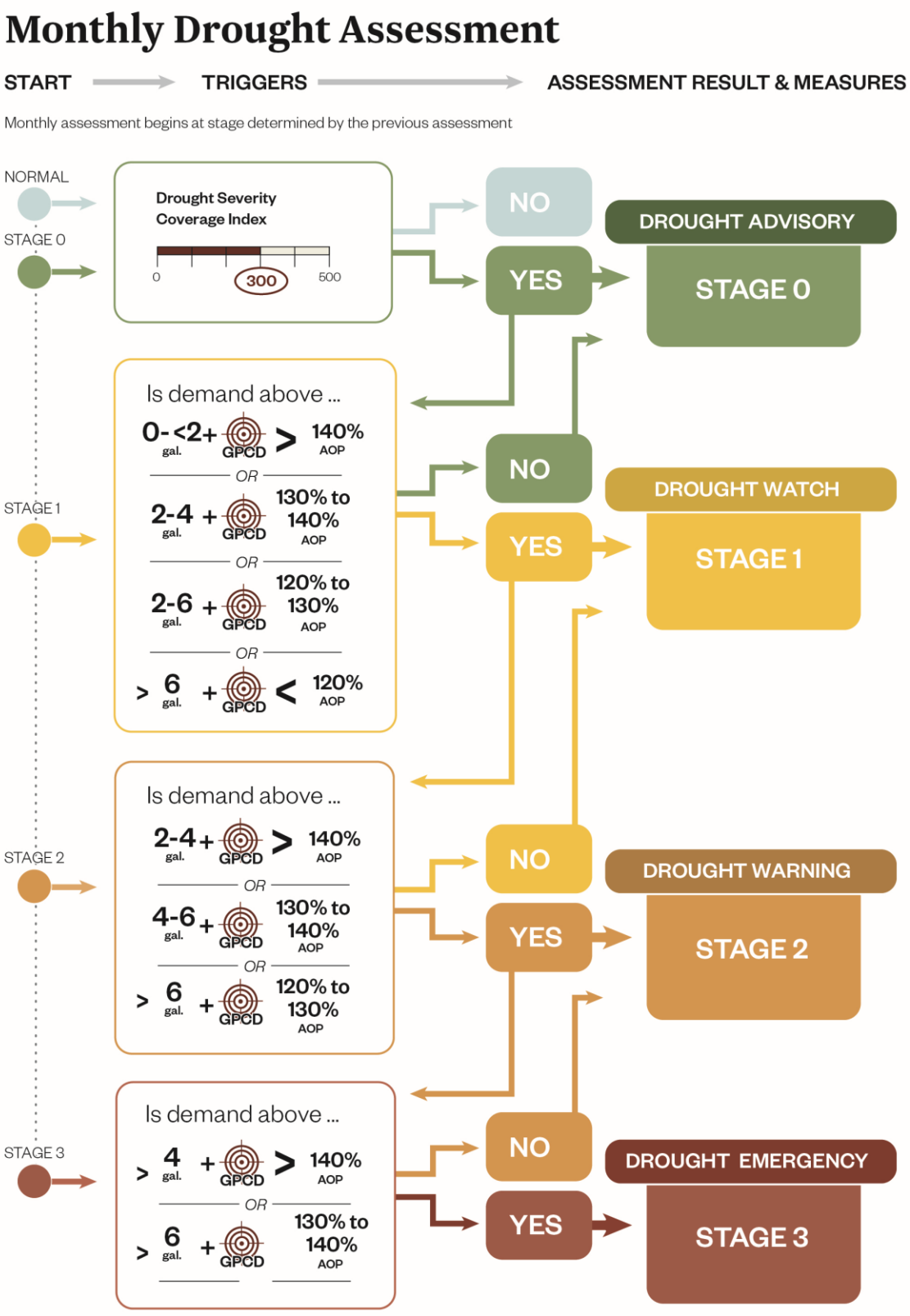

Figure 6. Drought Triggers and Stages

Stage 0 (Drought Advisory) is considered the initial Plan drought condition and is focused more on providing education to the public when conditions are exceptionally dry; while Stages 1 through 3 are considered levels where intensified drought response measures are required. When the Water Authority is no longer experiencing drought, it is considered to be in normal operating conditions.

3.1 Hydrologic and Supply Constraints Used for Trigger Identification

The Drought Stages are triggered based on hydrologic conditions, groundwater supply changes, and increases in demand demonstrated by an elevated Gallons Per Capita Per Day (GPCD). For the purpose of triggering drought stages, GPCD and groundwater production are calculated as a rolling annual average.

3.1.1 Evaluation of Hydrologic Indicators

In the Water Authority's previous drought plan, a Drought Advisory was issued when the majority of Bernalillo County was in a severe drought, according to the National Weather Service. Based on evaluation performance metrics measuring impacts of drought on this updated Plan and the need to focus on Bernalillo County, use of the Drought Severity and Coverage Index (DSCI) was recommended and selected.

The DSCI is a value that ranges from 0 to 500 and is calculated based on the United States National Weather Service Drought Monitor map over a defined, local area, through use of five area statistics. An index of 500 indicates that the entire region is in the worst category of drought, while an index of 0 denotes no drought.

The DSCI combines the magnitude and extent of drought conditions and is a more comprehensive look at hydrologic conditions in the county compared to drought severity alone, as local demand is affected by the climatic conditions in the region. Stage 0 is triggered when the entirety of Bernalillo County is in severe drought (DSCI greater than or equal to 300) with no reductions in any of the Water Authority's supplies.

The current DSCI index for Bernalillo County can be found on the U.S. Drought Monitor page for New Mexico/Bernalillo County (January 2023 link is here).

Figure 7 shows the components used in determining the DSCI for any given county in New Mexico for January 3, 2023. For this date, the DSCI for Bernalillo County is 175, with most of the county being split between D1 Moderate Drought and D0 Abnormally Dry, as seen in Table 3, based on the map shown in Figure 7.

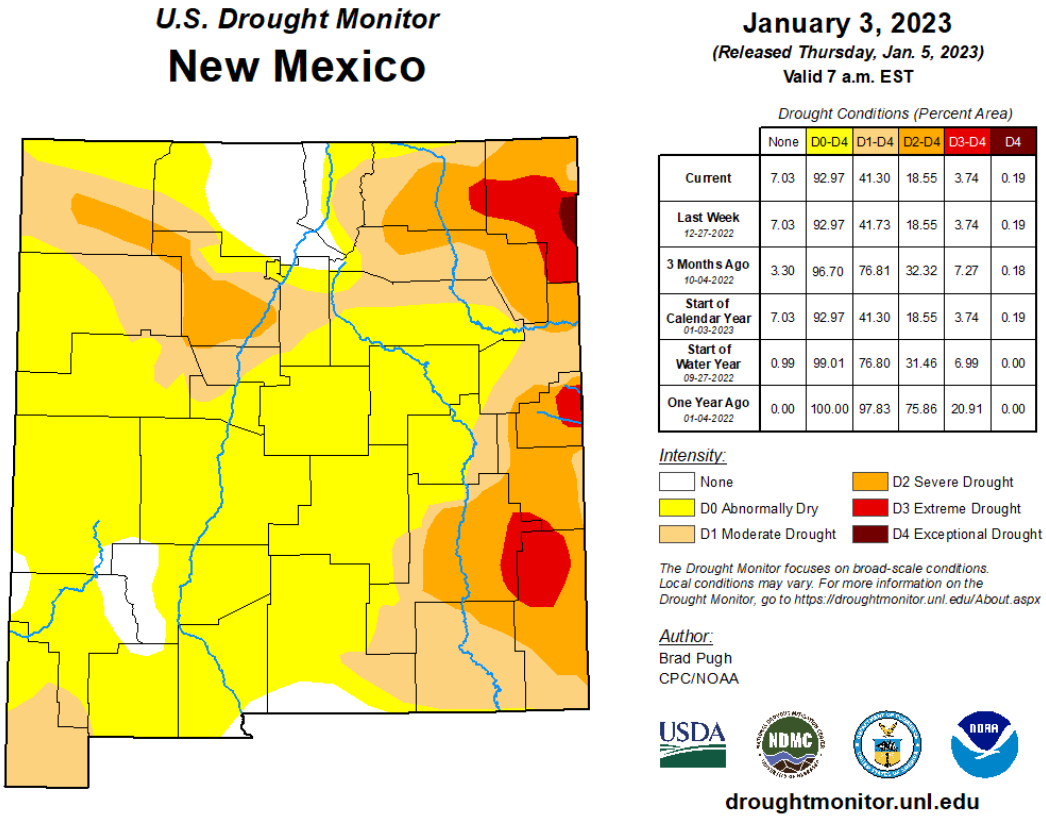

Figure 7. Example U.S. Drought Monitor Map for New Mexico

Table 3. Example DSCI Table for Bernalillo County

Week	Date	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
Current	1/3/2023	0	100	72.91	1.92	0	0	**175**

3.1.2 Supply and Demand Constraints

Drought in the Water Authority's service area relates to the availability and supply of surface water and the amount of groundwater pumped during dry periods. As drought has its greatest impact in the summer and early fall (the highest water demand times of the year), drought mitigation focuses on these time periods and reducing consumptive water use.

During drier than normal conditions, per capita water demand may temporarily increase and, in addition, surface water may not be available (due to upstream runoff conditions reflected annually each spring). These two conditions combined could result in increased groundwater production when compared to normal or expected conditions as projected in the Annual Operating Plan (AOP) (Section 2.2.2)

When a Stage 1 drought is triggered, the Water Authority's staff initiates restrictive and regulatory measures associated with that Drought Stage**.** To maintain consistent messaging, entry into or exit out of a Drought Stage may only happen at a maximum of once per month. Evaluation of hydrologic conditions for triggers should occur at the beginning of each month, with triggered changes occurring within that month. As drought conditions worsen or improve, the Water Authority Board will be updated on conditions and the public will continue to be informed in a timely fashion.

Exiting out of Drought Stages, similar to entering Drought Stages, depends on the actual groundwater production as a percentage of the AOP; GPCD compared to conservation goals; and the DSCI. For Stages 1 through 3, triggering out of drought requires either a reduction in water production relative to the AOP goals (see Section 2.2.2) or a reduction in GPCD relative to the yearly conservation plan GPCD goal (see Section 2.2.1). For example, if a Stage 0 Drought Advisory is issued due to Bernalillo County being in a DSCI equal to or greater than 300 at the beginning of the month, the Water Authority would return to normal conditions if, after a month, the DSCI dropped below 300. The specific groundwater production versus AOP and GPCD criteria for triggering into and out of drought are detailed in the next section.

3.2 Drought Declaration Criteria

As detailed in Section 2.2.2, each year in April, the Water Authority sets an annual operating plan with usage goals for groundwater, surface water, and reuse. The AOP is required by the U.S. Fish & Wildlife Service and submitted to U.S. Bureau of Reclamation to coordinate river operations. The Drought Stages are tied to the groundwater production predicted in the AOP as well as customer use above long-term conservation goals as indicated by the 12-month running average GPCD.

There are three Drought Stages that can be formally declared along with an early alert system, the (Drought Advisory Stage 0). The Drought Advisory does not require regulatory-based conservation but, rather, calls for increased public education. Each of the remaining Drought Stages (1-3) contains educational, regulatory, and prescriptive measures that are anticipated to manage demand to mitigate beyond current GPCD- and AOP- (Section 2.2.1 and Section 2.2.2) based triggers. Most measures are aimed at reducing outdoor water usage, as it is most likely to increase during drought.

Drought Stages are linked to a combination of demand and supply triggers based on surface water availability, increases in groundwater production, and increases in consumptive use. Both the supply and demand triggers are important elements of drought-stage triggering.

Table 4 provides the demand criteria for entering and exiting each Drought Stage. Both groundwater production and GPCD criteria are fundamental to this approach. The percentage above the annual groundwater production goal, as set in the AOP, establishes that groundwater supplies are being used at a higher rate than anticipated due to either changes in surface water supply or increases in consumption. The amount of GPCD over the goal (determined by *Water*

2120 yearly targets) indicates whether water consumption has increased, thus causing the increased water use.

The response of customers to the Drought Advisory, when groundwater production is less than 140% of the AOP groundwater production goal and the amount of GPCD over the long-term conservation goal, helps determine entry into any restrictive stages of the Plan (1-3). Stage 1 has been declared twice, once in 2013 and again in 2021. Stages 2 and 3 have never been enacted.

Table 4. Drought Stages Based Criteria Chart

Groundwater Production / GPCD	DSCI ≥ 300	Less than 120% of the Annual GW Production Goal	Between 120% and 130% of GW Production Goal	Between 130% and 140% of GW Production Goal	More than 140% of the GW Production Goal
0 to < 2 GPCD over the goal	Stage 0	Stage 0	Stage 0	Stage 0	Stage 1
2-4 GPCD over the goal	Stage 0	Stage 0	Stage 1	Stage 1	Stage 2
4-6 GPCD over the goal	Stage 0	Stage 0	Stage 1	Stage 2	Stage 3
> 6 GPCD over the goal	Stage 0	Stage 1	Stage 2	Stage 3	Stage 3

4. Drought Stage Demand Management Measures

Comprehensive strategies aimed at managing demand and groundwater production have been developed for each stage of drought. These demand-based measures have been effective in the past and have been implemented with success. Outdoor measures are used mainly during the irrigation season and generally are discontinued during non-irrigation season which are historically-low demand periods. If still in drought stages, programs will be reinvigorated just prior to the following irrigation season.

Board approval of this Drought Management Plan provides staff with the authority to implement specific educational, prescriptive, or regulatory measures. Water Authority staff will generally use educational and prescriptive measures identified for each Drought Stage but may consider the use of other measures, as needed.

If the adoption of the methods at a particular Drought Stage is not achieving the desired results, staff may consider use of additional drought response measures without moving to a higher Drought Stage.

If water use cannot be reduced sufficiently using methods described in the following sections and additional savings are needed, additional conservation measures may be implemented.

Table 5. Drought Stages and Demand-Based Measures

4.1 Drought Stage 0 – Drought Advisory

A Drought Advisory is declared when the entirety of Bernalillo County reaches a Drought Severity Coverage Index (DSCI) of 300, regardless of water usage patterns. The Drought Advisory is intended to be an early-warning system for customers alerting them to the need for increased awareness of water use, as the service area is experiencing a drought.

Upon declaration of a Drought Advisory, the staff is directed to immediately increase public education on drought. Along with increased public education, the Water Authority will design a Drought Awareness Campaign, develop conservation guidelines using up-to-date consumption data, and may offer a Drought Smart class with a $20 rebate.

If declaration of the Drought Advisory is ineffective at keeping water use less than 6 Gallons Per Capita Per Day (GPCD) over the yearly conservation GPCD goal; or if groundwater production is greater than 120% of Annual Operating Plan goal and GPCD is between 2 to 4 GPCD over the yearly conservation goal (as identified in Table 4); a Stage 1 Drought Watch will be triggered.

4.2 Drought Stage 1 – Drought Watch

A Stage 1 Drought Watch is declared based upon triggering elements identified in Table 4. For example, if DSCI is greater than 300 (Stage 0), and groundwater production is between 120% and 130% of the AOP goal, and GPCD is between 2 and 6 GPCD above the conservation goal, Stage 1 would be triggered.

When in Stage 1 Drought Watch, it is important to continue providing public education and campaigns focusing on drought awareness designed to help customers voluntarily reduce their water usage without enacting regulatory measures.

The development and coordination of a Drought Agency Group is designed to get all applicable governmental agencies coordinating and promoting program elements throughout their entities. Stage 0 Drought Advisory programs may also be continued and used in Stage 1.

4.3 Drought Stage 2 – Drought Warning

A Stage 2 Drought Warning is triggered and declared based upon triggering elements identified in Table 4. For example, if Stage 1 conditions were currently in place, and groundwater production moved to between 130% and 140% of the AOP, and GPCD is between 4 and 6 GPCD above the conservation goal, Stage 2 is triggered.

Entering Stage 2 Drought Warning requires more regulatory measures than the previous Drought Stages but still calls for continued awareness and communication with the public. Irrigation and outdoor water usage are generally the focus for reduction through restrictions on frequency of watering and the establishment of irrigation windows. As with Stage 1, programs from previous stages also may be sustained.

4.4 Drought Stage 3 – Drought Emergency

A Drought Emergency is triggered and declared based upon triggering elements identified in Table 4. For example, if Stage 2 conditions were currently in place, and groundwater production

moved to between 130% and 140% of the AOP goal, and GPCD is greater than 6 GPCD above the conservation goal, a Stage 3 Drought Emergency would be triggered.

Drought Emergency requires the most restrictive regulatory measures to manage aquifer levels for the long-term. Triple surcharges are identified for use to encourage decreased water usage, while voluntary prescriptive measures are still being implemented, such as a rebate for customers who decrease their water usage by twenty percent. Irrigation and outdoor water usage are generally targeted for reduction, due to increases associated with meteorological drought.

Programs from previous stages also may be utilized.

5. Next Steps

This Plan, an element of the *Water 2120* plan, is designed to be evaluated and updated periodically. These updates at minimum should consider changes in long-term water supply availability conditions affected by aridification. For example, changes in short and long-term demand management programming might need to occur to curb outdoor water use during extended water supply-based droughts. Implementation strategies are designed to communicate with Water Authority customers based on technologies currently available. Additionally, the Water Authority should continue to ensure that impacts to low income and vulnerable populations are minimal during stage-based drought measure implementation.

6. References

Akyuz, F. A. 2017. Drought Severity and Coverage Index. United States Drought Monitor. https://droughtmonitor.unl.edu/About/AbouttheData/DSCI.aspx. January 2023.

American Water Works Association (AWWA), 2019. Manual of Water Supply Practices – M60, Second Edition, Drought Preparedness and Response.

Austin Drought Contingency Plan https://www.austintexas.gov/sites/default/files/files/Water/Conservation/Planning_and_Policy/2016DroughtContingencyPlan.pdf

Denver Water Shortage Response Implementation Plan https://www.denverwater.org/sites/default/files/water-shortage-response-implementation-plan.pdf

Environmental Protection Agency (EPA), 2022. America's Water Infrastructure Act: Risk and Resilience Assessments and Emergency Response Plans. https://www.epa.gov/waterresilience/awia-section-2013. January 2023.

National Drought Mitigation Center, Drought Ready Communities: A Guide to Community Drought Preparedness Focuses on the role of the community and the importance of including community voice and insights in drought planning.

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