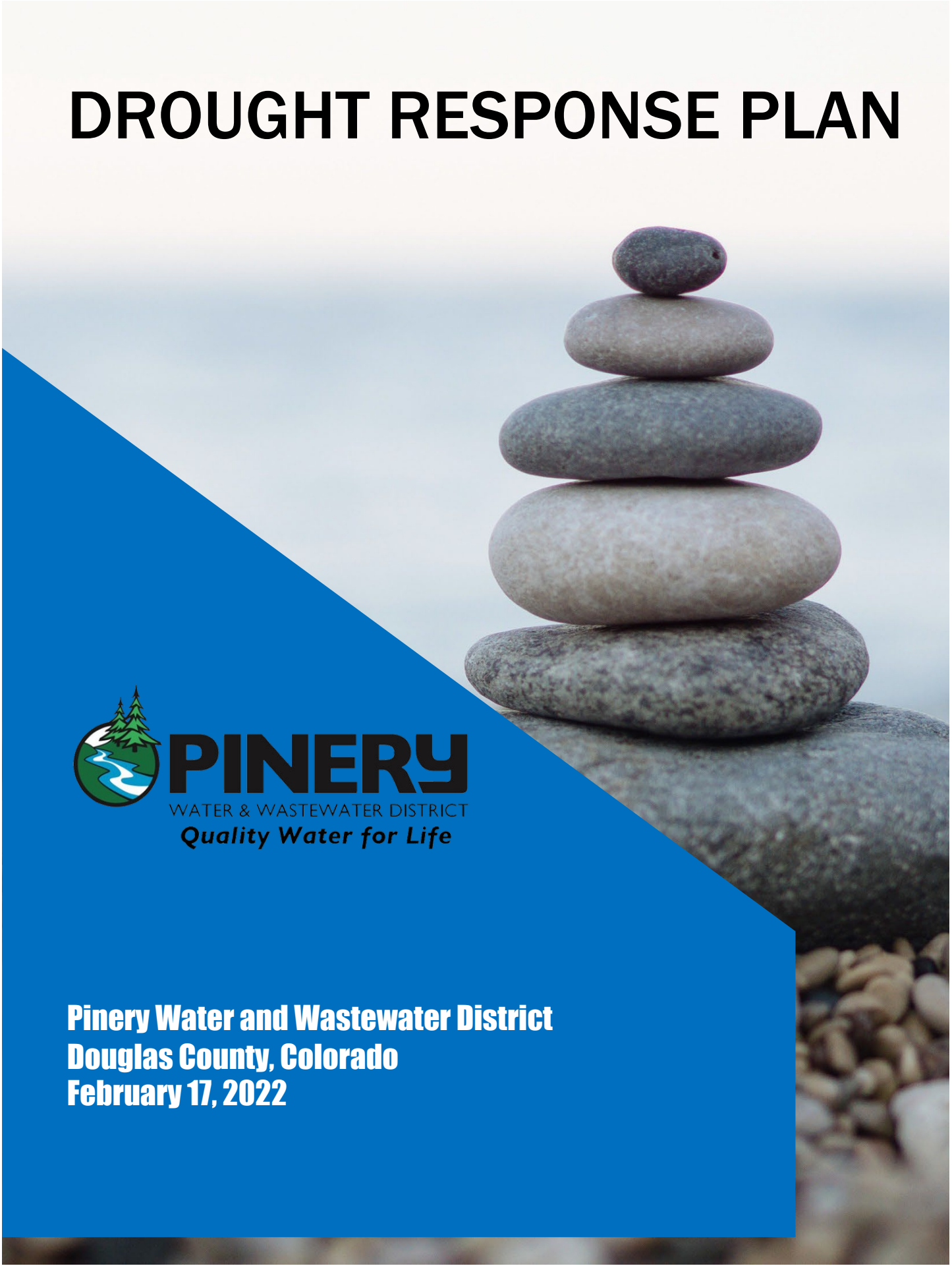
DROUGHT RESPONSE PLAN



PINERY
WATER & WASTEWATER DISTRICT
Quality Water for Life

Pinery Water and Wastewater District
Douglas County, Colorado
February 17, 2022

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EXECUTIVE SUMMARY

The Pinery Water and Wastewater District (Denver Southeast Suburban Water and Sanitation District d/b/a Pinery Water and Wastewater District) owns and operates its water supply and wastewater treatment facilities and provides services to about 4900 customers. The Pinery is committed to providing a sustainable and quality water supply to the community and to strives to minimize the adverse effects of a water supply shortage. Since droughts are a natural phenomenon of Colorado's climate, and with the increasing frequency of more arid conditions, indications are that the potential for drought may likely continue. This Drought Response Plan works in concert with the District's Water Efficiency Plan to encourage the efficient use of water at all times, to prepare the water supply system to be as robust as possible through drought mitigation plans, and to establish drought response strategies so as to implement restrictions only as current conditions dictate.

District staff rely upon national drought monitoring tools and indices as well as state and local hydrologic and climatic information to monitor for area drought conditions. Through this monitoring, coupled with monitoring and analyses of the specific District indicators, staff will determine appropriate drought stage declarations for the District as condition dictate. Section 6 of this plan provides an overview of the staged response program and Section 7 provides additional information about the implementation process.

PROFILE

The Pinery Water and Wastewater District (Denver Southeast Suburban Water and Sanitation District d/b/a Pinery Water and Wastewater District) provides water and wastewater services to approximately 8,500 acres of unincorporated, but urbanized development in northeastern Douglas County. The current service area is located approximately six miles east of I-25 and 25 miles south of Denver along Cherry Creek and State Highway 83. The District presently serves about 4,900 single-family units (SFUs) and has projected a total build out of 5,700 SFUs. A total of 3,520 SFUs are planned for east of Parker Road, and 2,180 SFUs are planned for west of Parker Road.

The District's primary current water supply comes from two sources: eighteen (18) nontributary groundwater from Denver Basin aquifer wells and seven (7) tributary groundwater from Cherry Creek Alluvial wells. In July 2018, the District began receiving 500 acre-feet (AF) of WISE water on average each year. In addition, the District owns and operates a tertiary wastewater treatment plant that discharges to Cherry Creek. Average daily wastewater treatment is currently around 1.0 million gallons per day. The treatment plant is rated to treat up to 2.0 million gallons per day. The District exchanges

the reusable effluent upstream to its alluvial wells. A current project to develop the Walker Reservoir and the ability to store reusable effluent and junior water rights, will add up to an additional 2000 900 acre-feet per year to the District's available water supply.

POPULATION

The Pinery Water and Sanitation District provides water and wastewater services to approximately 14,000 people in northeastern Douglas County. The District population is expected to grow slowly and steadily to over 17,000 people by buildout sometime after around 2050.

DROUGHT RESPONSE PLANNING PROCESS

The District developed this Drought Management Plan in accordance with the Drought Management Planning Guide for Water Providers developed by the Colorado Water Conservation Board, which was updated in 2020. Colorado
Water Conservation Board, which was updated in 2020.

STAKEHOLDER PARTICIPATION

The District's Drought Management Plan reflects input from stakeholders within the District. The Drought Planning Committee developed the plan which was reviewed for input by a public advisory committee which is the District's Water Efficiency Task Force, and by the Board of Directors.

1.0 INTRODUCTION and PLANNING PROCESS

1.1 DROUGHT MANAGEMENT PLANNING OVERVIEW

Droughts are a natural phenomenon of Colorado's climate and, as such, the District must anticipate and plan for droughts. Coupled with Colorado's and the District's continued growth, a higher demand on finite water supplies will continue. Therefore, to appropriately address drought-related impacts, the District has developed a Drought Response Plan to help anticipate and plan for droughts, including the actions and components useful in drought mitigation and response. Drought mitigation refers to actions taken in advance of a drought that reduce potential drought-related impacts when the event occurs. Drought response planning refers to the conditions under which a drought-induced watersupply shortage occurs and specifies the actions that should be taken in response.

1.2 DROUGHT PLANNING COMMITTEE

The District's Drought Management Plan reflects input from stakeholders within the District. The Drought Planning Committee developed the plan which was reviewed for input by a public advisory committee which is the District's Water Efficiency Task Force, and by the Board of Directors. The members of each of those groups are shown below.

STAFF DROUGHT PLANNING COMMITTEE	
Member	**Job Title**
Heather Beasley	District Manager
Dan Hammonn	Water Superintendent
Kevin Clark	Wastewater Superintendent
Richard Krulish	Capital Projects Manager
Rhonda Lancaster	Billing Supervisor
Rod Bergholm	Business Analyst

PUBLIC DROUGHT ADVISORY COMMITTEE	
Water Efficiency Task Force	**Pinery WWD Board of Directors**
Joshua Conners	Walt Partridge
Joel Fox	Steve Tinnes
Lisa Neal-Graves	Terry Franklin
Alice Ramsey	Kenneth Smith
Nancy Sammons	Jim McGannon
Jerry Roberts	
Jon Scanlon	
Jim McGannon (Board liaison)	

The Planning Committee includes water provisioning professionals with decades of service and deep knowledge of the District and its water characteristics and capabilities, having successfully managed the District through times of plentiful water as well as

drought conditions. The Water Efficiency Task Force includes members of the community with varied backgrounds representing a broad spectrum of interests relative to the quality and quantity of water available to the community. The Board of Directors, also comprised of members of the community, brings a broad background of business management experience, including environmental conservation, to set the direction and priorities of the District.

1.3 HISTORICAL DROUGHT PLANNING EFFORTS

Historically, the water supplies available to the District have been sufficient to meet current and projected demands. Even during the unusually dry periods, the District has not needed to implement more than voluntary watering restrictions, and only during the high demand portion of the irrigation season. However, in view of increasingly arid weather patterns in the area and the District's active housing development market, a renewed focus on drought mitigation and response planning is appropriate so as to be prepared should conditions require actions beyond the voluntary restrictions.

1.4 RELATIONSHIP TO OTHER PLANNING MECHANISMS

Conservation strategies are not new to the District, and result in an ongoing reduction in water demand that provide long-term drought mitigation benefits. Table 1 lists conservation measures that the District has incorporated as part of the Water Efficiency Plan which was updated in 2018. These conservation measures are included as drought mitigation in this Drought Management Plan.

Table 1: Drought Strategies

DROUGHT STRATEGIES		
Conservation Measures	**Long-Term Mitigation**	**Short-Term Response Strategy**
Free irrigation audits for parks, open spaces, and residential lots	**X**	**X**
Install water saving fixtures, toilets, and/or appliances	**X**	
Reduce turf and landscaping irrigation with Garden in a Box program	**X**	**X**
Limit outdoor watering to specific times of the day	**X**	**X**
Limit number of watering days per week	**X**	**X**
Identify high water use customers and develop water saving targets	**X**	**X**

As will be shown later, these measures, combined with the ongoing conservation messages included on the District website and monthly bill inserts, have resulted in significant conservation results by the users. Water usage per household and per capita have declined significantly over the past several years.

Additionally, Douglas County has been active in conservation activities, including efforts to decrease the risk and frequency of wildfires in the area, etc. With a large portion of the State of Colorado in some stage of drought conditions, considerable news coverage by television and newspaper has also been helpful in getting the message to District users.

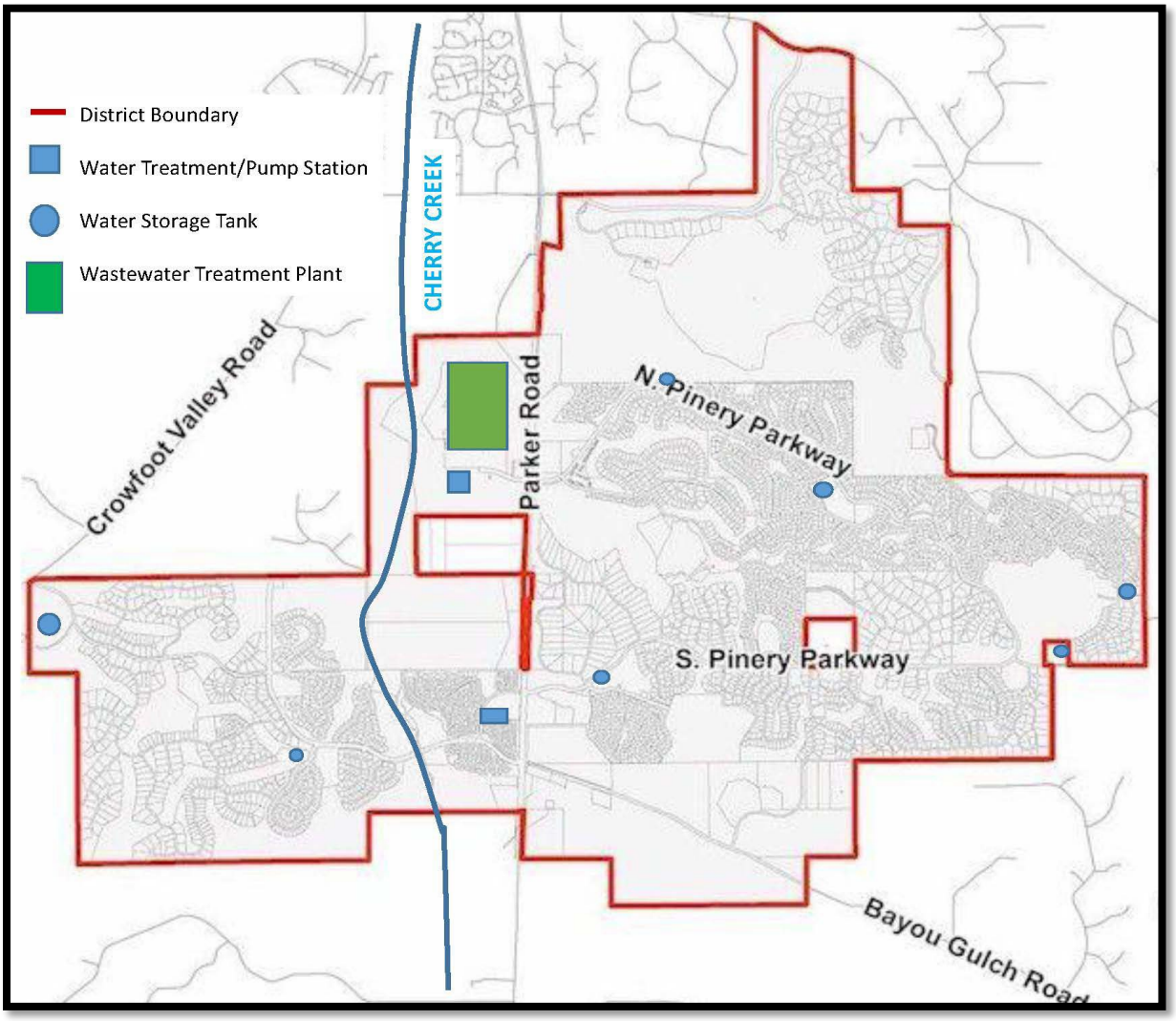
1.5 PROFILE OF EXISTING SYSTEM

The Pinery Water and Wastewater District (Denver Southeast Suburban Water and Sanitation District d/b/a Pinery Water and Wastewater District) provides water and wastewater services to approximately 8,500 acres of unincorporated, but urbanized development in northeastern Douglas County. The current service area is located approximately six miles east of I-25 and 25 miles south of Denver along Cherry Creek and State Highway 83 (see Figure 1). The District presently serves about 4,900 single-family units (SFUs) and has projected a total build out of 5,700 SFUs. A total of 3,520 SFUs are planned for east of Parker Road, and 2,180 SFUs are planned for west of Parker Road.

The District's primary current water supply comes from two sources: eighteen (18) nontributary groundwater from Denver Basin aquifer wells and seven (7) tributary groundwater from Cherry Creek Alluvial wells. Water from the wells is treated for corrosivity and chlorinated and pumped through the distribution system that consists of seven pump stations and ten underground storage tanks amounting to approximately 10.5 million gallons of storage.

The Water Infrastructure and Supply Efficiency (WISE) Partnership is a regional water supply project between Aurora Water, Denver Water and South Metro Water Supply Authority. The agreement was established in 2009 and shares available water supplies and infrastructure capacity to provide significant benefits to all three WISE partners. It will reduce groundwater reliance and bolster renewable water supplies to the South Metro area, while maximizing the use of existing water assets belonging to Aurora and Denver Water. In July 2018, the District began receiving 500 acre-feet of WISE water on average each year.

Figure 1 – Pinery Water and Wastewater District Map



The District owns and operates a tertiary wastewater treatment plant that discharges to Cherry Creek. Average daily wastewater treatment is currently around 1.0 million gallons per day. The treatment plant is rated to treat up to 2.0 million gallons per day. The District exchanges the reusable effluent upstream to its alluvial wells.

WATER SUPPLY RELIABILITY

Most of the District's water supply (more than 70%) comes from renewable (reusable effluent and senior tributary) rights that the District owns on Cherry Creek. The District's senior rights to this water date back to the 1870's and except for 2002, these rights produce adequate supply in nearly all years. During the drought of 2002, these rights were unavailable for much of the summer because of the needs of more senior rights downstream on the Platte River. In the interim, the demand was met during that period by relying more heavily on Denver Basin groundwater.

In 2016, the District developed a spreadsheet Operations Optimization Model (OOM) and a separate spreadsheet Water Supply Forecasting Tool (WSFT) to assist staff efficiently utilize its various available water supplies and to forecast water supply needs based on growth.

The District's water usage for 2020 was about 3,875 AF. Of this amount, 2,274 AF came from tributary wells and 1601 AF came from non-tributary wells. Table 2 summarizes the 2020 water use for the District.

Table 2: Summary of 2020 Water Use

Water Source	AC-FT
Tributary Wells (Cherry Creek Alluvial)	2274
Non-tributary Wells (Denver Basin Aquifer)	1601
Total	**3875**

With the ultimate build out of 5,700 SFUs, sometime post-2050, the water requirement is estimated at about 4,423 AF (annually). Although the District is entitled to over three times the build out demand from the Denver Basin aquifer, most of the water will come from tributary groundwater. Pumping from the deeper Denver Basin groundwater source is expected to increase in cost overtime, therefore it is envisioned that this use will be managed very closely to keep water costs for the District's customers reasonable. The Denver Basin aquifer is expected to provide the District's customers with reliable water supply in times of drought.

SUPPLY SIDE LIMITATIONS AND FUTURE WATER NEEDS

As mentioned above, the District developed a spreadsheet model called the Water Supply Forecasting Tool (WSFT) to help staff understand water supply needs as development occurs in the District. The model projects water supplies under various hydrologic, growth pace and conservation impact scenarios out to the year 2050. The WSFT can:

- incorporate changes in annual and seasonal alluvial groundwater flow to estimate shallow well production.
- track reusable return flows from the District's wastewater treatment plant.
- estimate water demand impacts based on conservation savings; and
- track supply versus demand monthly for all available water supplies.

This model was used to evaluate the District's 10-year capital plan regarding the timing of beginning new water supply projects. Based on the results of this model, the District is in good shape to meet water demands with its current water supplies for the foreseeable future. Near 2040, water demand (in a maximum month scenario, dry year yield and without storage of any kind) comes close to equaling available water supplies. The District is also planning to complete a comprehensive Water Supply Master Plan in the next 2-3

years. This will further help to solidify the District's plans to provide a sustainable water supply to its customers. For now, the plan to provide water is to operate both of the District's water augmentation plans by using senior tributary water when in priority, using and reusing WISE supplies as available, develop a District-wide Aquifer Storage and Recovery (ASR) program, and develop, over the next ten years, the infrastructure needed to deliver an additional 400 AF of water through the Cherry Creek Project Water Authority.

CUSTOMER PROFILE

The Pinery Water and Sanitation District provides water and wastewater services to approximately 13,000 people in northeastern Douglas County. It began as a District to serve one master-planned single family residential community in the early 1970's. The oldest houses (and infrastructure) in the District were built in the late 1960's and early 1970's. The District population is expected to grow slowly and steadily to over 17,000 people by buildout sometime after 2050. The District has the following customer classifications in its billing system:

- Residential (water and sewer)
- Residential (water only)
- Commercial
- Wholesale Wastewater
- Large irrigator (irrigation water only)
- Golf Course

An overview of each of the water use types is presented below and a summary of historic water deliveries differentiated by customer class is presented in Table 3.

Residential – The District provides water to single family residences within its service area. This water is used for both indoor and outdoor uses.

Commercial – The District provides water to commercial establishments located along the Parker Road corridor, local churches, homeowner associations and four schools for indoor and outdoor use.

Large Irrigator / Other Uses – The District supports the irrigation of various parks and green spaces owned and maintained by various homeowner associations and Douglas County. These are separate taps from the commercial water users and are only used seasonally. The District also provides construction water on a temporary basis for dust control, make-up water and other uses to developers on an as-needed basis.

Golf Course – The District provides water to three local golf courses (Pinery, Pradera, and Colorado Golf) through both dedicated Denver Basin wells and treated water from all sources. The golf course provided water is contained in a series of small lakes and ponds,

such that the amount of water used by the golf courses in any particular year may not be the same as the water pumped to the small lakes and ponds given the storage capacity of these lakes and ponds.

Non-revenue water – Each year, the District estimates the amount of non-revenue water (i.e., water associated with real and apparent system losses, periodically flushing of the water distribution system) that is lost each year. This estimate will be refined as the water conservation plan is implemented. Currently, it is estimated that about 9% of treated water demand is related to the combination of real and apparent system losses.

Table 3: Historic average water deliveries and percentage by customer class, 2007-2020

Customer Class	% of Total Annual Water Deliveries	Average Demands (AC-FT)
Residential	62.2%	1,921
Commercial	3.5%	109
Large Irrigator	5.7%	175
Golf Course	19.8%	610
Non-Revenue Water	8.8%	273
	100.0%	**3,088**

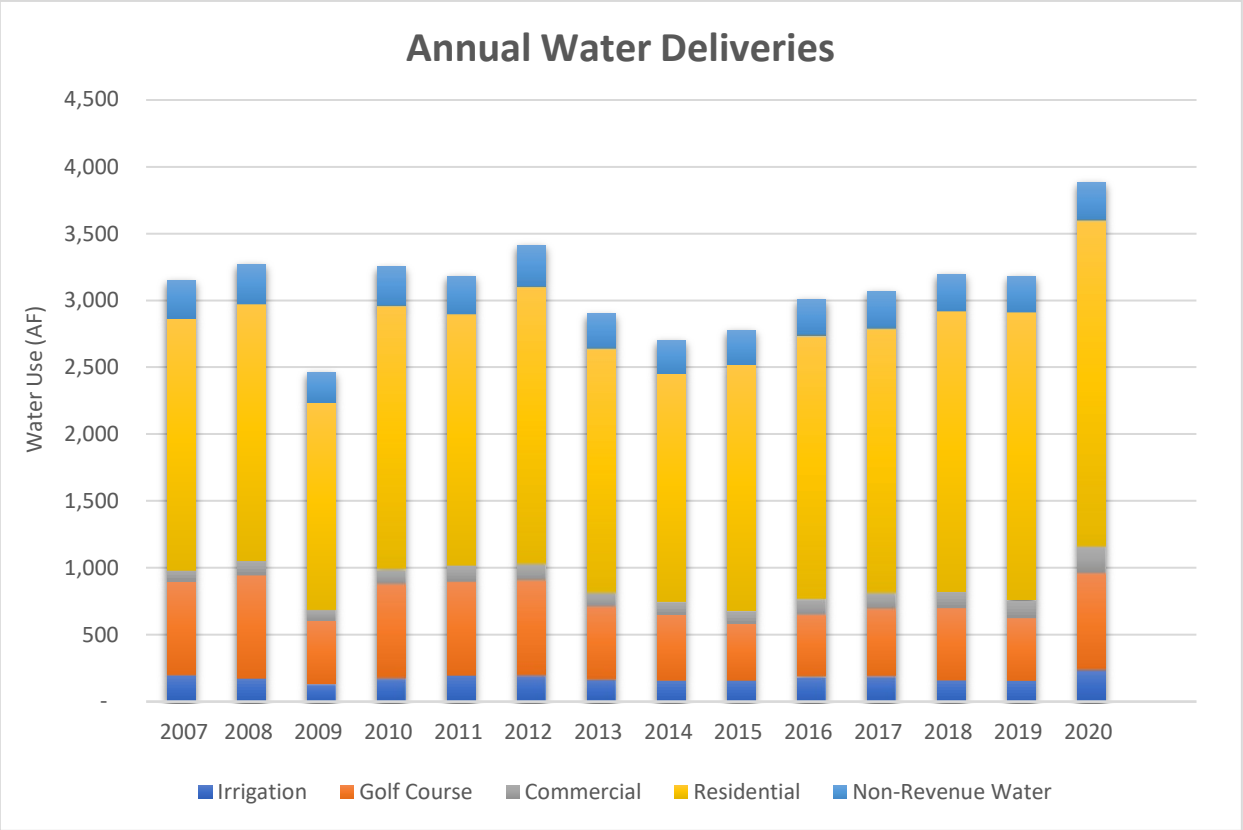
The five largest water users in terms of annual water use are as follows:

1. Pinery Country Club – a 27-hole golf course and country club with a pool located on the southeast side of the District.
2. Colorado Golf Country Club, LLC – one full 18-hole course, one 9-hole short course and clubhouse with a pool at the northeast end of the District.
3. Pradera Country Club – one 18-hole golf course with clubhouse and a pool.
4. Douglas County School District – one high school, one middle school and two elementary schools with accompanying irrigation and sports fields.
5. Pinery Glen Homeowners Association – one pool facility, community landscaping tracts and one central sports field/park.

All three golf courses are supplied raw water via delivery from a deep Denver Basin groundwater well to the golf course lakes. The District also has the ability to divert potable water to the golf courses if the pace of irrigation outmatches the raw water deliveries. On occasion (during extremely dry summers, i.e., 2012 and 2017 and 2020, the golf courses have had to use potable water diversions and/or curtail irrigation for weeks at a time.

The annual water deliveries and breakdown by customer class are shown for year 2007 through 2020 in Graph 1. The increase in demand evident in year 2020 reflects not only the very dry summer but also the increase in users resulting from active home construction in several developments in the District.

Graph 1 - Annual Water Deliveries



1.6 GOALS, OBJECTIVES AND OPERATING PRINCIPLES

The objectives of the Districts Drought Management Plan are as follows:

- Accomplish planning for droughts before they occur.
- Develop tools to identify and classify a drought given knowledge of our water supply and use.
- Prepare for responding to a drought by increasing supply and decreasing demand.

The following water usage priorities will guide the development of the plan and the decision making in times of a drought with Health and Safety of the community being the Pinery's highest priority.

1. Health and Safety – Interior residential, essential commercial, school, sanitation, hospitals, firefighting, etc.
2. Indoor Commercial and Industrial – use necessary to maintain economic base and protect jobs
3. Outdoor residential irrigation
4. Large landscaping in public parks, HOA entry ways, Golf Courses and Bulk water
5. Water for new construction

These operating principles are reflective of the community's values and will be reviewed prior to implementing mandatory water use reductions.

2.0 DROUGHT IMPACT and VULNERABILITY ASSESSMENT

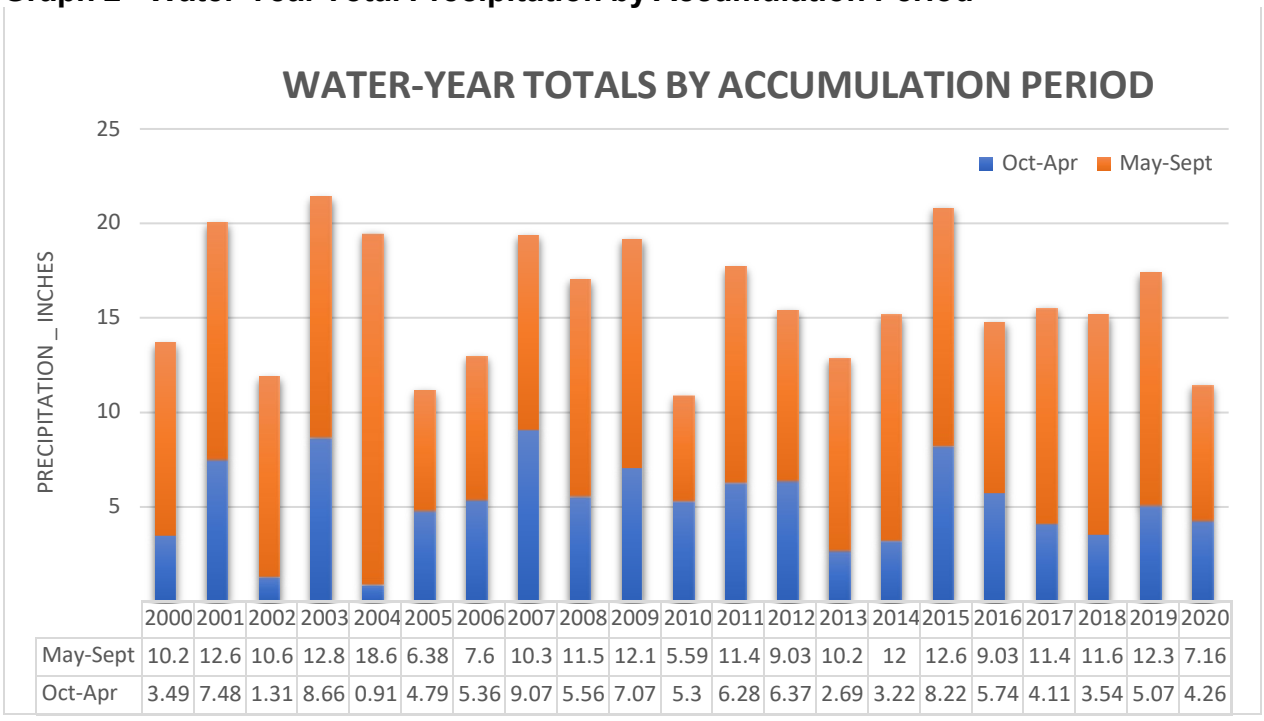
This section provides an overview of historical droughts the District has experienced, the corresponding changes to supplies and demand that resulted, and the mitigation and response measures taken to minimize the impacts.

2.1 HISTORICAL DROUGHT IMPACT ASSESSMENT

Much of Colorado, including the District's service area, is experiencing frequent drought conditions. A good indicator of past droughts and their impact on available water supplies is the amount of precipitation received at District weather stations. Staff records and tracks precipitation data hourly. Current year's data is compared to historical data to identify trends resembling previous years' performances that may point to potential drought conditions.

In reviewing this information, the most meaningful analysis of precipitation data results from using a "water-year" bases rather than the normal calendar year. The water year (October Previous Year - September Current Year) can be divided into two accumulation periods, the Moisture Build-Up Period (Oct – April) and the Summer Irrigation Period (May – Sept). Conditions during the Moisture Build-Up Period gives an indication of relative drought conditions as the District heads into the Summer Irrigation Period when the demand increases substantially. Results for this comparison for the past twenty-one years are shown in the following graph

Graph 2 - Water-Year Total Precipitation by Accumulation Period



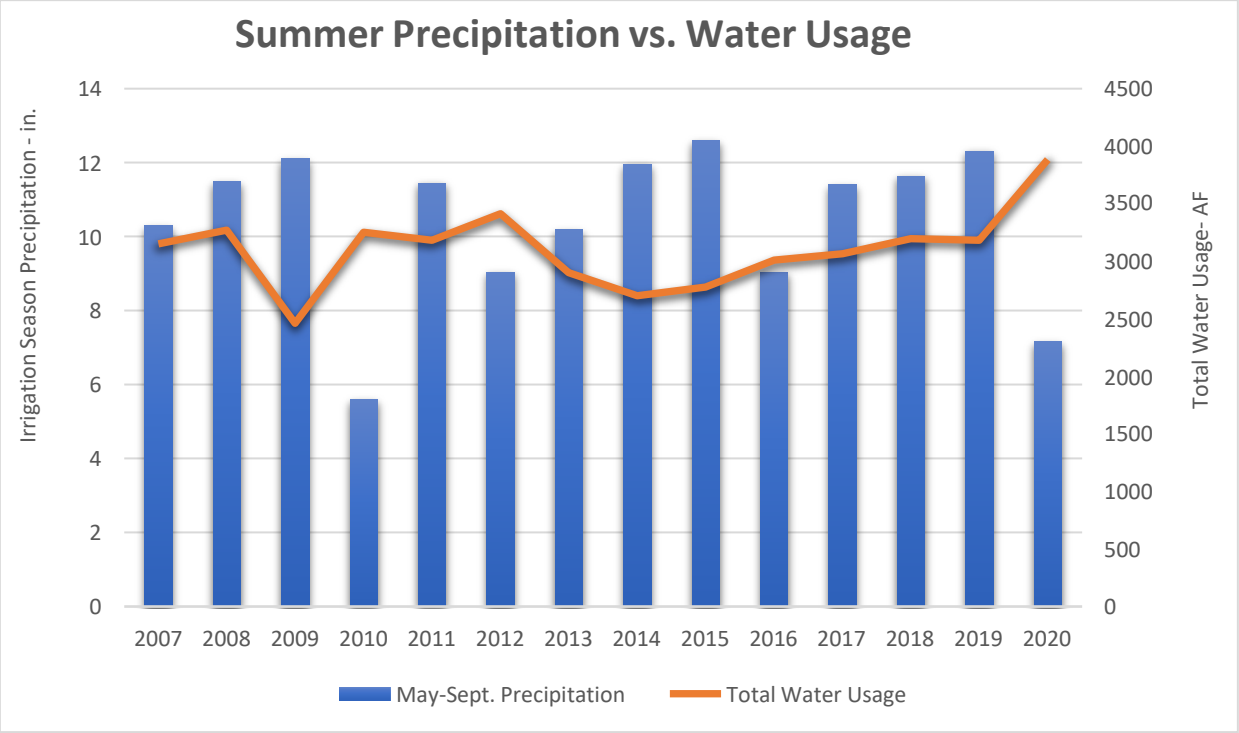
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
May-Sept	10.2	12.6	10.6	12.8	18.6	6.38	7.6	10.3	11.5	12.1	5.59	11.4	9.03	10.2	12	12.6	9.03	11.4	11.6	12.3	7.16
Oct-Apr	3.49	7.48	1.31	8.66	0.91	4.79	5.36	9.07	5.56	7.07	5.3	6.28	6.37	2.69	3.22	8.22	5.74	4.11	3.54	5.07	4.26

Some insights from the above graph are as follows:

- A low moisture accumulation during the Moisture Build-Up Period is an early indicator of potential development of drought conditions. The Moisture Build Up Period is represented by the blue portion of the stacked bar chart above. Years 2002 and 2004 were particularly low, but of even greater concern is the increased consistency of lower moisture received during the Moisture Build-Up Period in recent years. Average precipitation received during this period for years 2017-2020 was 4.2” compared to the 5.4” average for the previous 17 years.
- If low precipitation continues during the Summer Irrigation Period, represented by the orange portion of the stacks, a drought is increasingly likely.
- Confirming examples include:
    - Water year 2002: The Moisture Build-Up Period (Oct. 2001-April 2002) was very dry, registering only 1.31". Early indications were for drought conditions. Fortunately, May through September saw 10.6” of precipitation, which prevented a serious drought.
    - Water years 2005-2006: The Moisture Build-Up Period moisture was not great but neither was the Summer Irrigation Period moisture, resulting in two low moisture years.
    - Water year 2010 is the lowest moisture year of the period. Fortunately, it was followed by a strong year.
    - Water year 2020 was the fourth driest year of the period and the third lowest during the irrigation period.

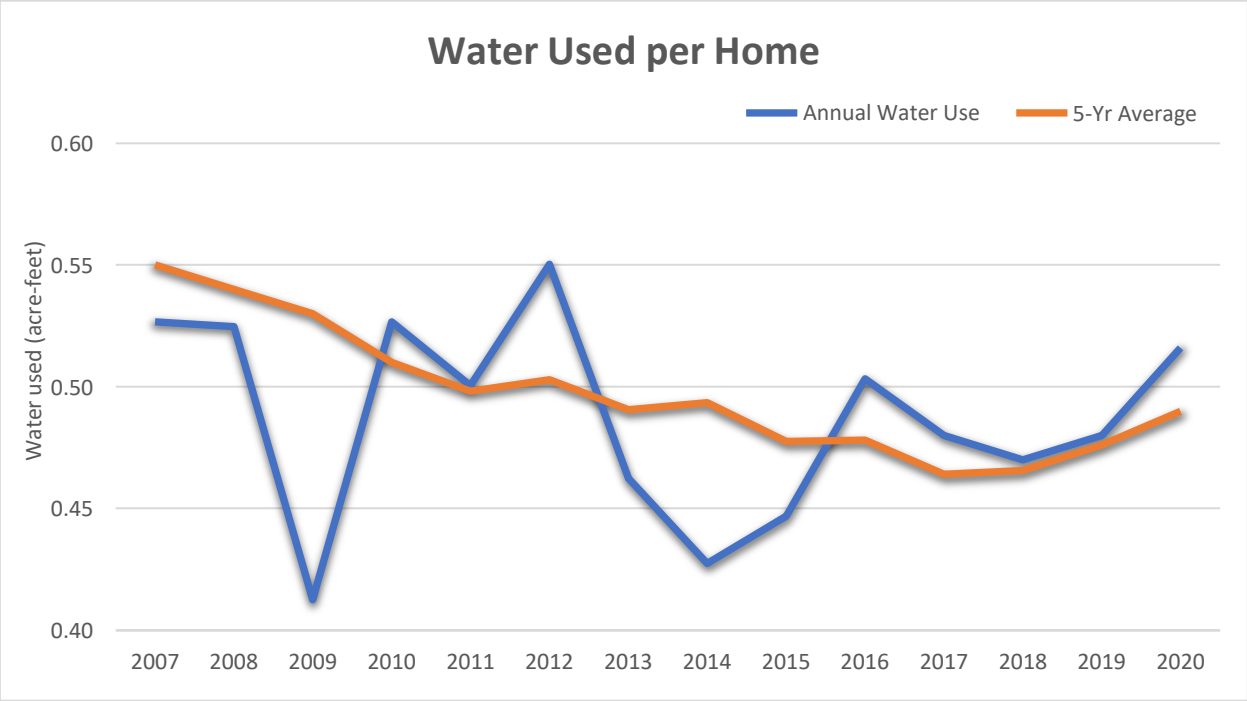
Total yearly water usage is impacted by drought, particularly if the drought occurs during the irrigation season. Graph 3 correlates the precipitation received during the summer irrigation season (blue bars) to the total yearly water used (orange line), and tracks as expected with increased usage occurring during low moisture years. The impact of increased housing growth in the District during the last few years has resulted in additional usage beyond what the moisture pattern would indicate for those years. Year 2020 wasa record year for water usage resulting from both impacts, low precipitation during the summer months and significant housing growth.

Graph 3 – Summer Precipitation vs. Water Usage



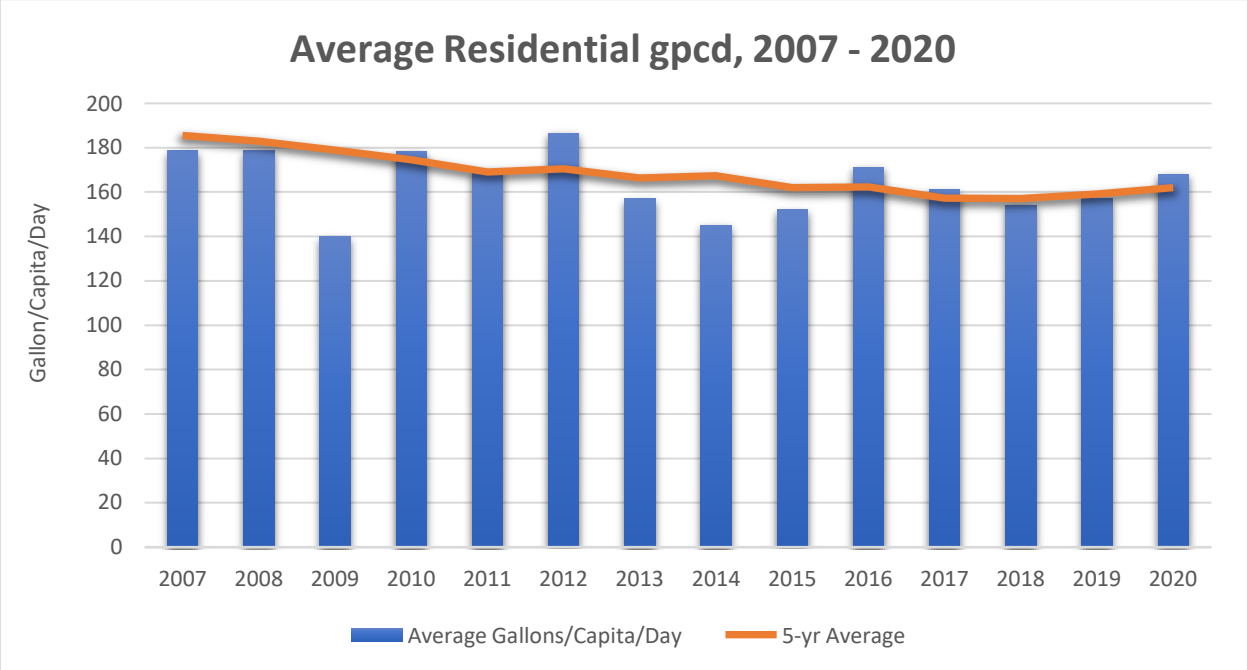
Usage patterns are also an important indicator. While total usage would be expected to increase as the number of users increase, progress has been made in the District's annual water usage per home as shown in Graph 4 below. Reflected by the 5-year average line, the annual residential water use has decreased over time with the water efficiency activities that have been in place. In 2007, the average amount of water used per residential connection was about 0.55 AF per year. By 2017, the District saw a sixteen percent reduction (16%), to 0.46 AF of water used per residential connection. The past two years have seen some increase in usage due to the extended dry conditions, active home construction, and the addition of new homes with large irrigable landscapes in the District.

Graph 4 - Average Residential Use



As would be expected, Graph 5 shows a similar pattern in the average residential gallons per capita per day (gpcd), decreasing by 15%, from 185 gpcd in 2007 to 157 gpcd in 2017 and 2018, followed by some modest increases since then.

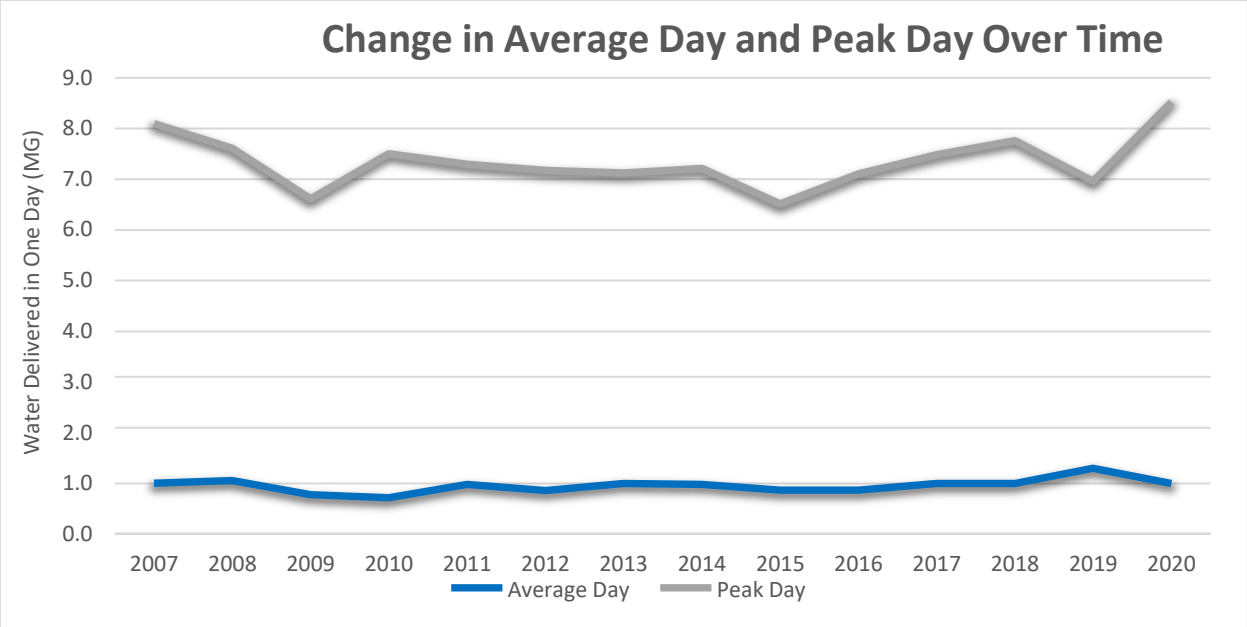
Graph 5 - Average Residential Use



The District has a high peak day demand, usually occurring in July or August of each year. The peak day demand in 2020 occurred in August and was 8.52 million gallons, the

highest per day demand in District history. The average day demand in 2020 was 0.99 million gallons per day, which suggests that the Pinery had a peak factor of 8.5. The average peak factor from 2007 through 2020 is 7.35, as shown in Graph 6. The fact that the Pinery is a relatively small service area while serving three full golf courses leads to such an extreme peak factor. Peak day represents the ultimate demand on District capabilities and, as such, is an important factor in District planning, including the potential impacts of extended drought conditions.

Graph 6 – Average Day and Peak Day Usage



The District has historically encouraged efficient water usage habits, including low water-usage fixture mandates for all new home construction, covenants limiting the total area of developed landscaping, voluntary watering restrictions during the peak irrigation season, and a tiered water usage billing program with higher rates at greater monthly usage volumes. More recently, messages encouraging conservation are included in the newsletter accompanying each monthly water usage bill, area HOA newsletters, the District website, and social media sites. Free sprinkler system audits are offered, and water efficient landscaping modifications are encouraged. Consequently, even with growth in total users, the average day usage has remained relatively constant. Along with the peak day factor, monitoring of this trend is important for drought planning.

While current water efficiency efforts have been encouraging in reducing the usage per home and per capita, total usage will most likely continue to increase as the District grows to build-out. During the summer irrigation season each year the District increases its pumping from deep wells to meet the demand. As drought conditions persist, the deep well pumping is increased, and the costs rise accordingly. The wells are carefully monitored, and pumping schedules are adjusted to optimize efficiency and costs.

A reduction in the District's storage reserves is also more significant during drought conditions. No drinking water storage currently exists, only raw water for lakes, and the District has kept the lake levels consistent through additional pumping during most drought conditions. Limitations on water delivered to golf courses has occurred during some extended drought periods.

The District has invested in developing several new water sources to reduce its dependence on groundwater, which has also increased its drought resiliency. Details on these investments will be provided further on in the plan. Worksheet A shows a summary of the historical drought impacts in the District.

2.2 IDENTIFYING and ASSESSING FUTURE VULNERABILITIES

As previously stated, while current water efficiency efforts have been encouraging in reducing the usage per home and per capita, total usage will most likely increase as the District grows to build-out. This growth, combined with possible extended drought conditions, could present additional future impacts.

During the summer irrigation season each year the District increases its pumping from deep wells to meet the demand. As drought conditions persist, the deep well pumping is increased, and the costs rise accordingly. The wells are carefully monitored, and pumping schedules are adjusted to optimize efficiency and costs. While the deep well reserves appear adequate to meet the District's anticipated demand through build-out, the resulting operating costs may become prohibitive, particularly during extended drought periods.

If drought conditions persist, additional challenges may face the District, as summarized on Worksheet A, including:

- Loss of revenue from the necessary reduction in customer usage.
- Continued decline of water surface elevation and thus, production capacity, in the deep groundwater and shallow alluvial wells.
- Reduction in storage reserves.
- Potential disruption in other water supplies.
- Public landscaping stressed or killed.
- Customer outreach to heighten awareness about the need for water conservation.

To prepare for these possibilities, the District has taken several actions to strengthen its response to potential prolonged drought conditions, including:

- Establishing a Revenue Stability Fund to address temporary revenue reductions from decreased usage,

- Building a new raw water storage capability, the Walker Reservoir, to better regulate Cherry Creek supplies during drought conditions. This is a cooperative effort with three other providers which will significantly increase the District's storage capability and add flexibility to its provisioning efforts.
- Expanding water supply portfolio through agreements with neighboring providers.
- Increasing the raw water supply by drilling new wells. These new wells will reduce the demand on the potable water supply.
- Accelerating its public outreach program through information on the website and newsletters.
- Creating the potential to institute a water budget to be used in times of drought to help alter water use habits.
- Examining the feasibility of using ASR to stabilize decline in wells.

Adding these factors to the District's current capabilities will increase and strengthen its water supply and accompanying operating procedures to help address most anticipated drought situations. Additional information on these responses is included in Section 5.0 of the plan.

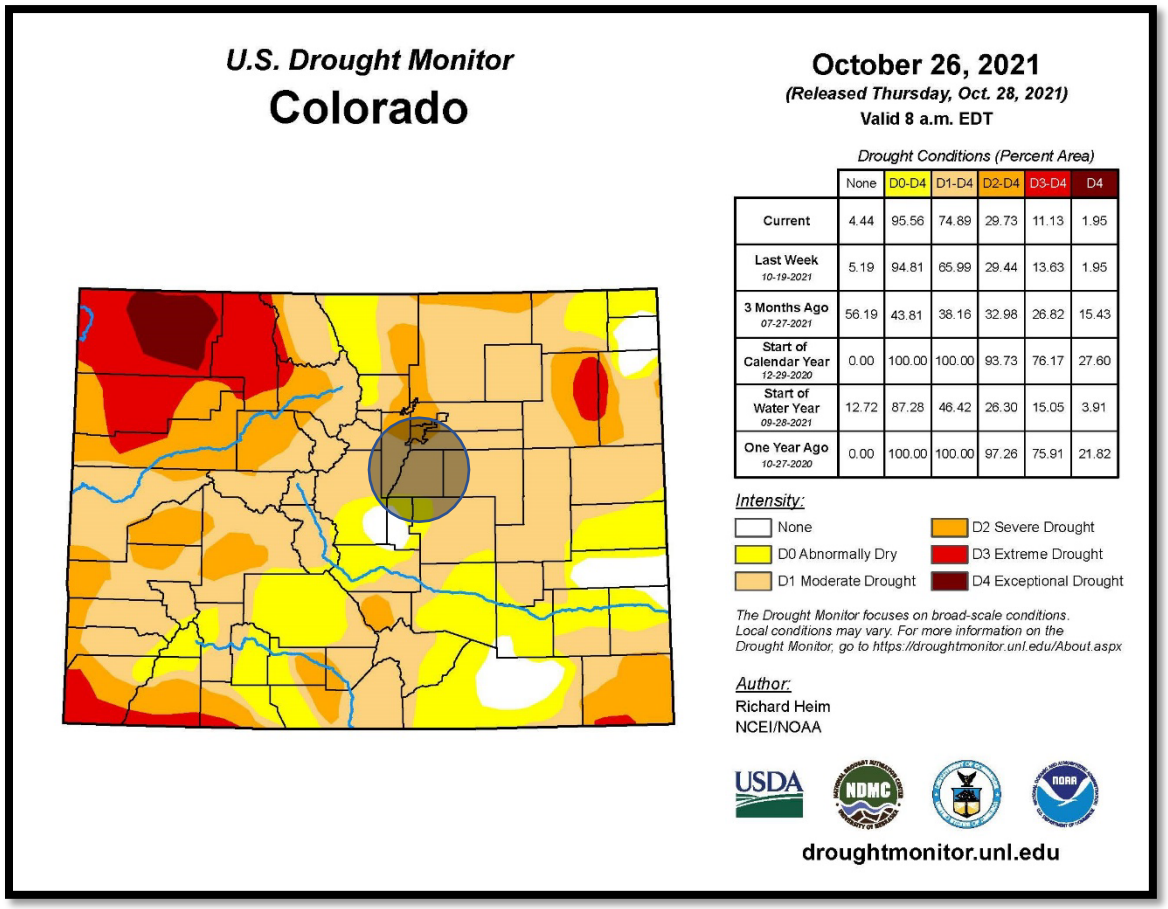
3.0 DROUGHT MONITORING

This section provides a detail of the public sources of information the District staff will use to predict/indicate potential or current drought occurrences. The District uses several indicators to determine the likelihood and potential severity of a drought as summarized on **Worksheet E** attached. Some are long term indicators, used during the moisture buildup period, and others are short term, used during the summer irrigation period.

3.1 LONG TERM INDICATORS

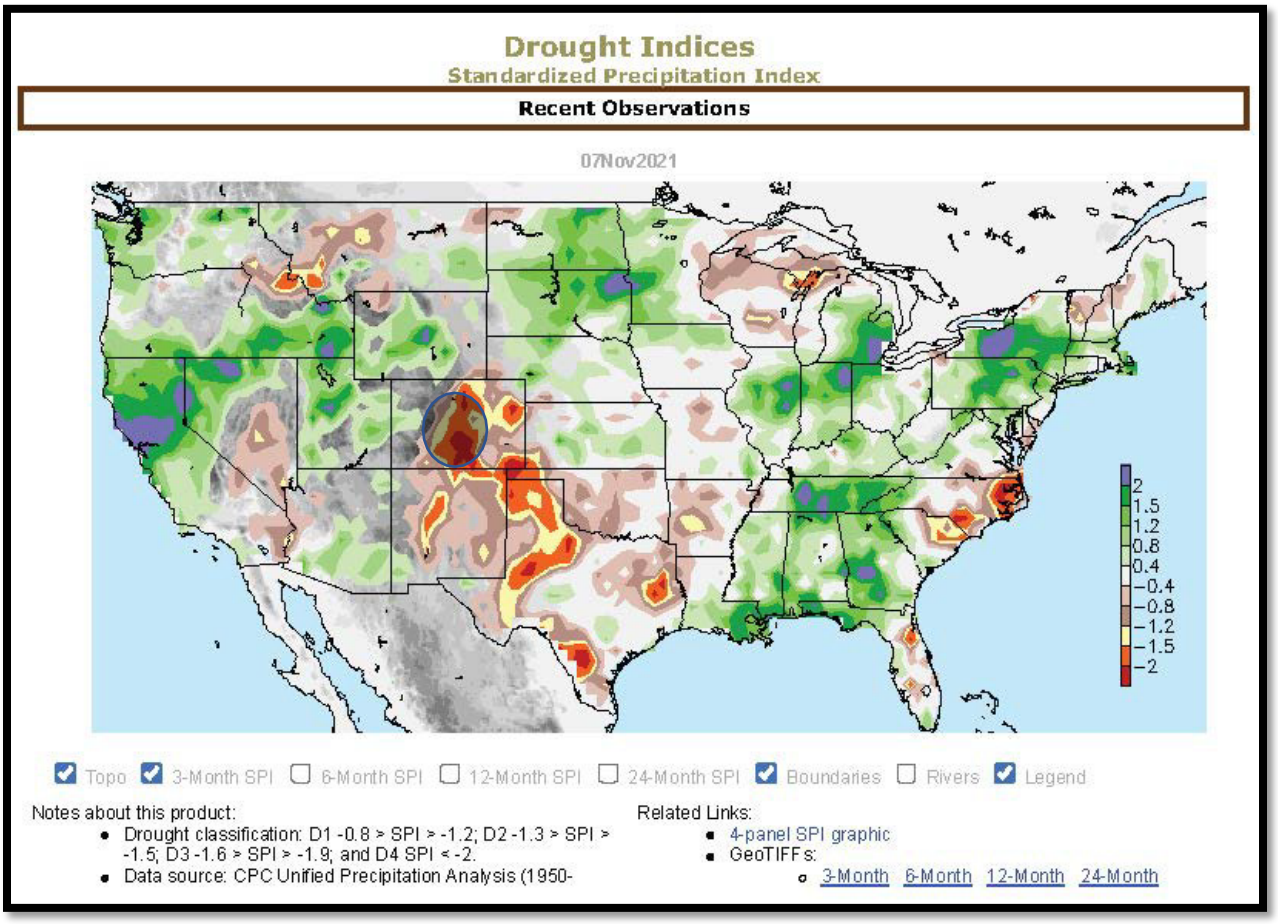
Colorado Drought Monitor

U.S. Drought Monitor is a weekly national drought summary and map (shown below). Staff monitors the rating specified for the Douglas County (shown inside the circle on the map below). In the map shown below, Douglas County is in D1 – Moderate Drought stage.



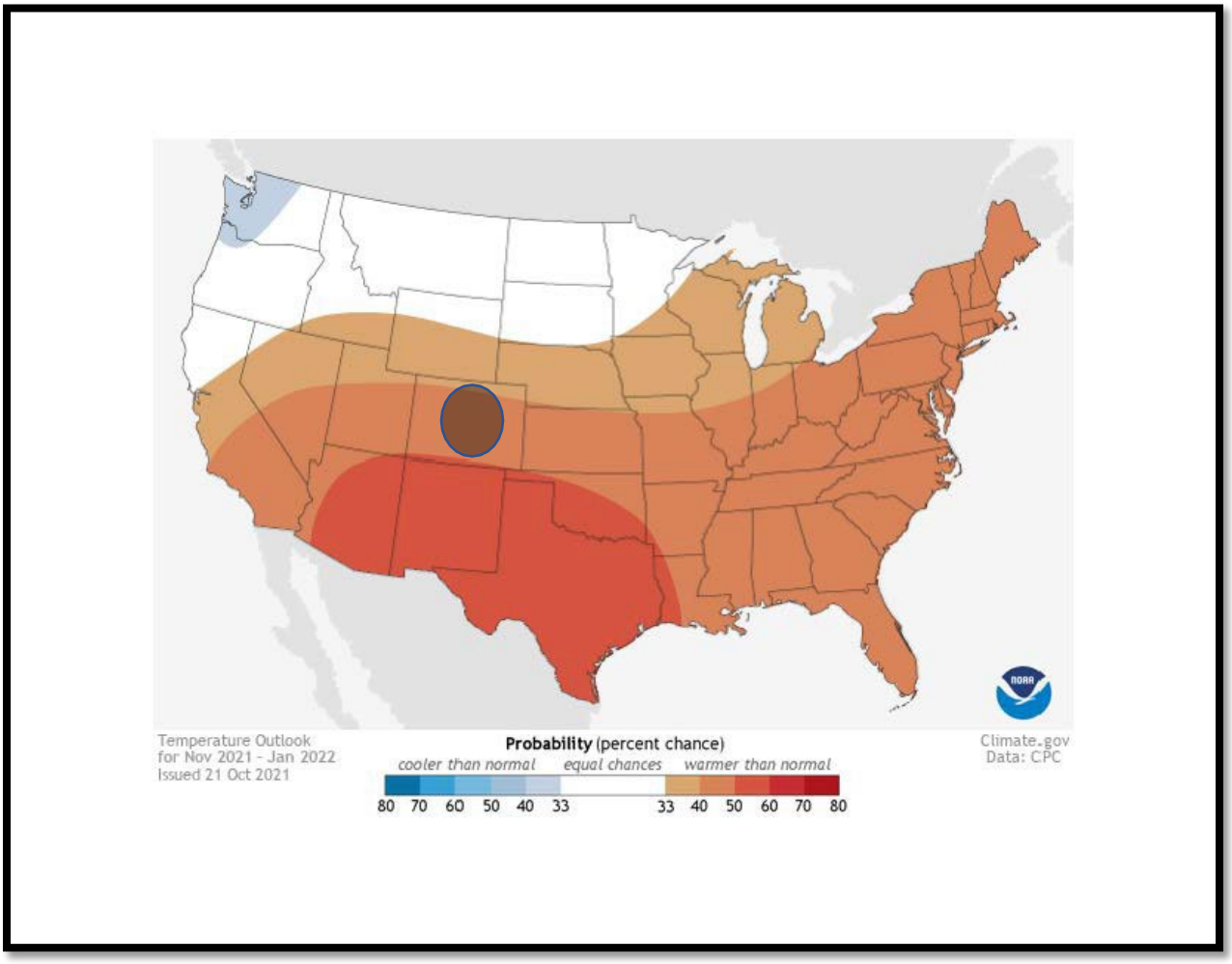
Drought Indices - Standardized Precipitation Index

The National Oceanic and Atmospheric Administration (NOAA) publishes a probability index based on precipitation. In this example, portions of Colorado (where Pinery is located) is predicted to have less precipitation than normal and will be in Drought Stage 3-4 in the next three months.



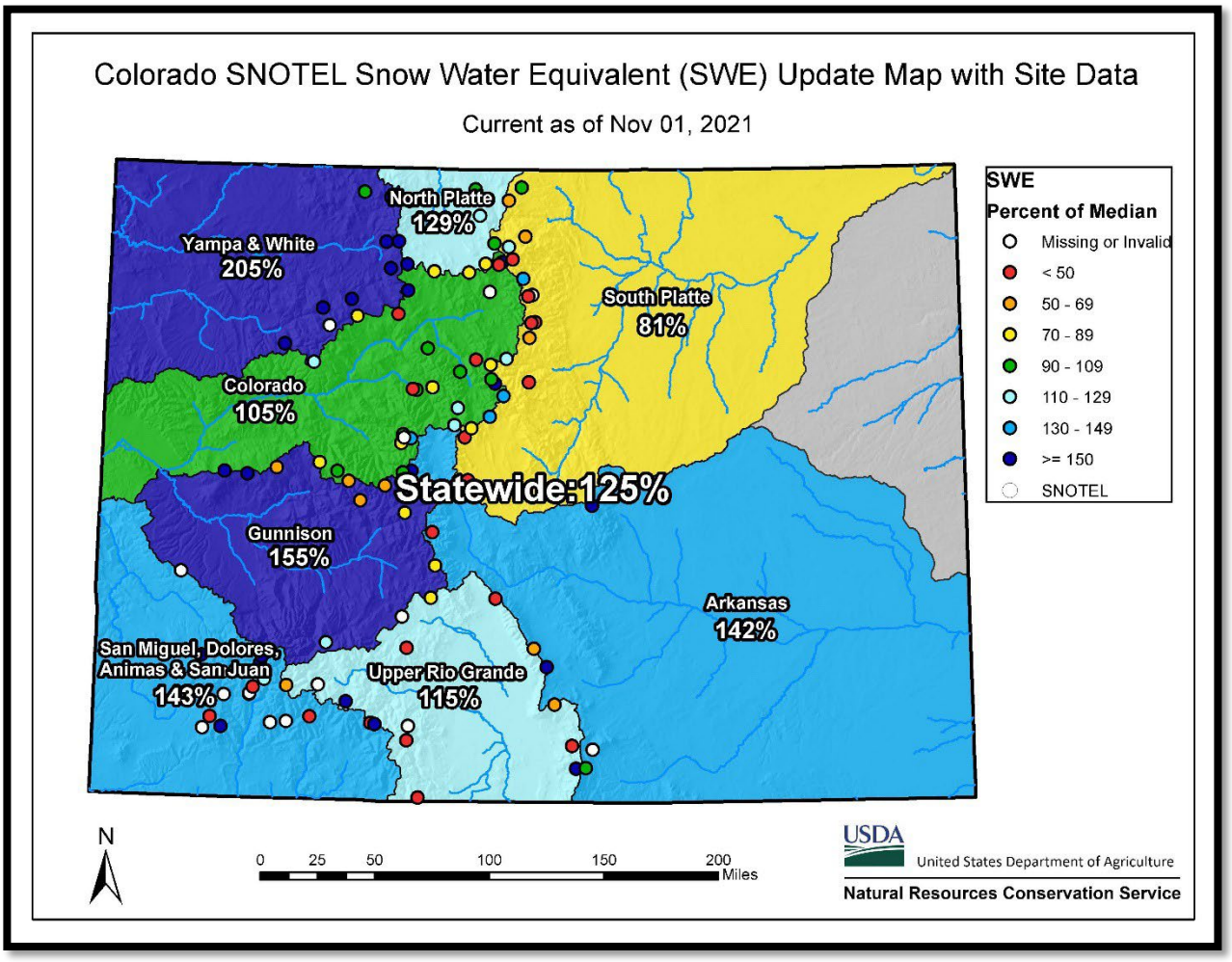
Three Month Temperature Outlook

NOAA also publishes a probability index based on temperature. In this example, there is a 50% greater chance that almost all of Colorado will experience higher than normal temperatures in the next 3 months.



Colorado Snow Pack

The United States Department of Agriculture publishes real-time estimates of snow-pack in each river basin. The Pinery is located inside of the South Platte River basin as Cherry Creek confluences with the South Platte River in Denver. This most recent map shows that the South Platte River Basin has just 81% of the median snow pack for this time of the year. Although the Pinery does not have any water rights on the South Platte River, the snow pack is an early indicator of “calls” on the river that will interrupt water rights diversions in the entire basin.



3.2 CURRENT TERM INDICATORS

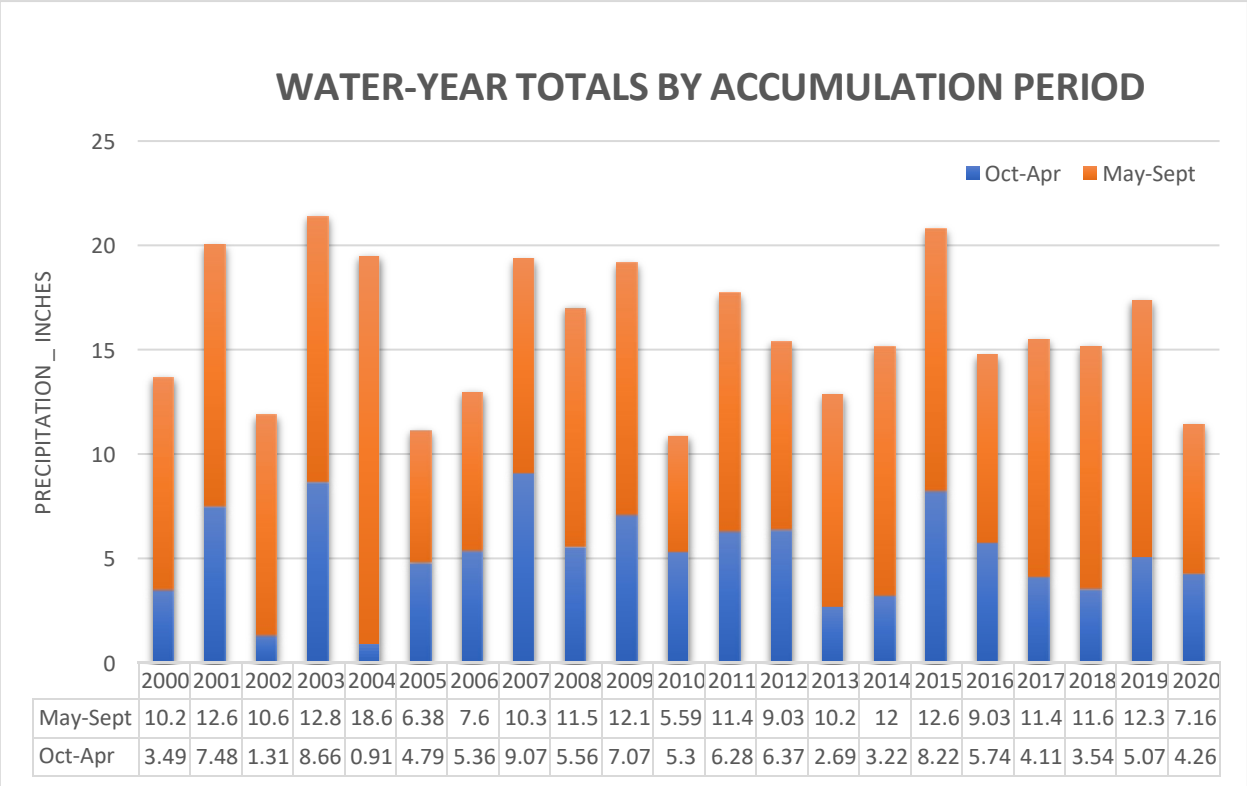
Water-Year Total Precipitation by Accumulation Period

As shown earlier in Section 2.1, precipitation received at District weather stations is a good indicator of past droughts and their impact on water supplies. Precipitation data is recorded and tracked monthly. Current year's data is compared to historical data for trends resembling previous years' performances that may point to potential drought conditions.

In reviewing this information, the most meaningful analysis of precipitation data results from using a "water-year" bases rather than the normal calendar year. The water year (October Previous Year - September Current Year) can be divided into two accumulation periods, the Moisture Build-Up Period (Oct – April) and the Summer Irrigation Period (May – Sept). Conditions during the Moisture Build-Up Period gives an indication of relative

drought conditions as the District heads into the Summer Irrigation Period when the demand increases substantially. Results for this comparison for the past twenty-one years are shown in the following graph:

Graph 7 - Water-Year Total Precipitation by Accumulation Period



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
May-Sept	10.2	12.6	10.6	12.8	18.6	6.38	7.6	10.3	11.5	12.1	5.59	11.4	9.03	10.2	12	12.6	9.03	11.4	11.6	12.3	7.16
Oct-Apr	3.49	7.48	1.31	8.66	0.91	4.79	5.36	9.07	5.56	7.07	5.3	6.28	6.37	2.69	3.22	8.22	5.74	4.11	3.54	5.07	4.26

A low moisture accumulation during the Moisture Build-Up Period is an early indicator of potential development of drought conditions. The Moisture Build Up Period is represented by the blue portion of the stacked bar chart above. Years 2002 and 2004 were particularly low, but of even greater concern is the increased consistency of lower moisture received during the Moisture Build-Up Period in recent years. Average precipitation received during this period for years 2017-2020 was 4.2” compared to the 5.4” average for the previous 17 years.

With additional low precipitation during the Summer Irrigation Period, a drought is increasingly likely. Confirming examples include:

- Water year 2002: The Moisture Build-Up Period (Oct. 2001-April 2002) was very dry, registering only 1.31". Early indications were for drought conditions. Fortunately, May through September saw 10.6” of precipitation, which prevented a serious drought.

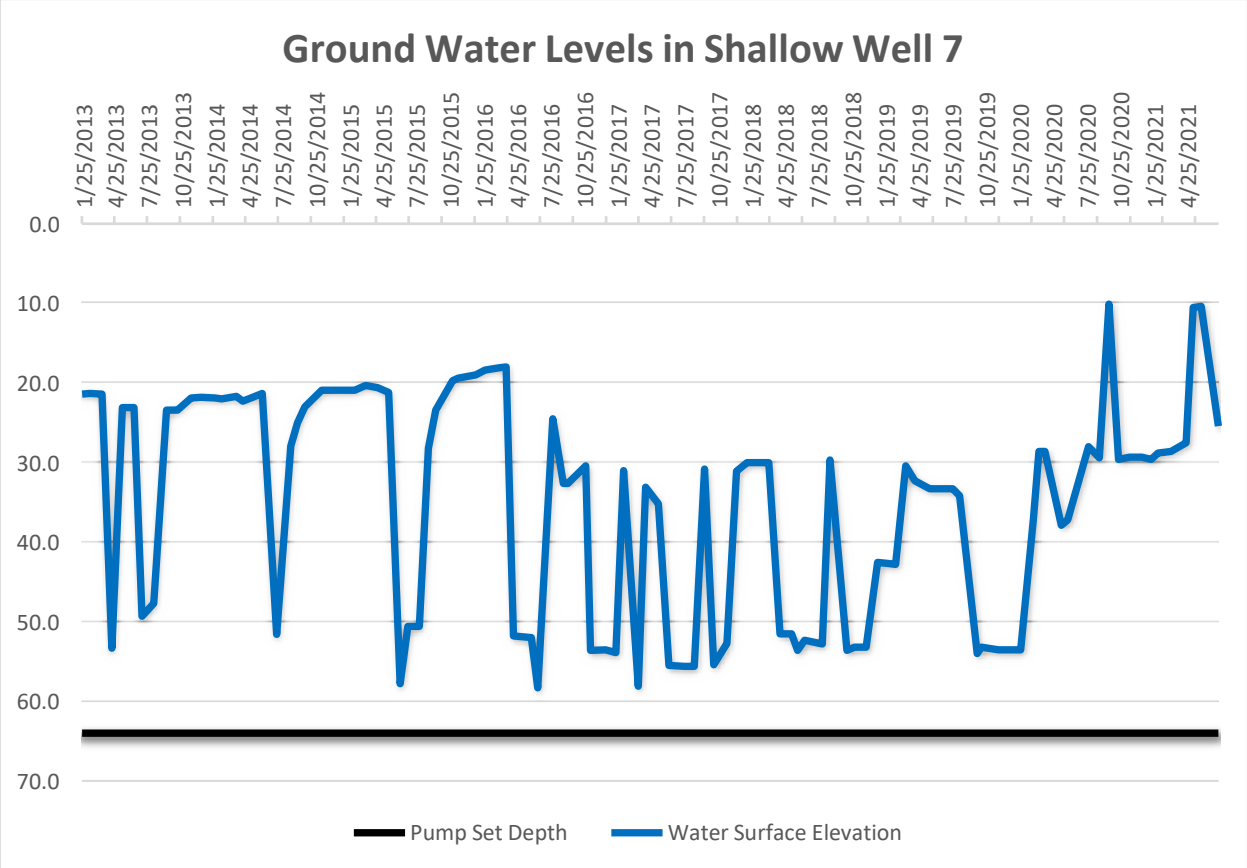
- Water years 2005-2006: The Moisture Build-Up Period moisture was not great but neither was the Summer Irrigation Period moisture, resulting in two low moisture years.
- Water year 2010 is the lowest moisture year of the period. Fortunately, it was followed by a strong year.
- Water year 2020 was the fourth driest year of the period and the third lowest during the irrigation period.

Alluvial Well Water Levels

Staff measures the depth to water below the ground level to understand the amount of recharge of Cherry Creek aquifer. The water levels typically decline through winter as the ground is frozen and no one is irrigating and then recharge in the summer.

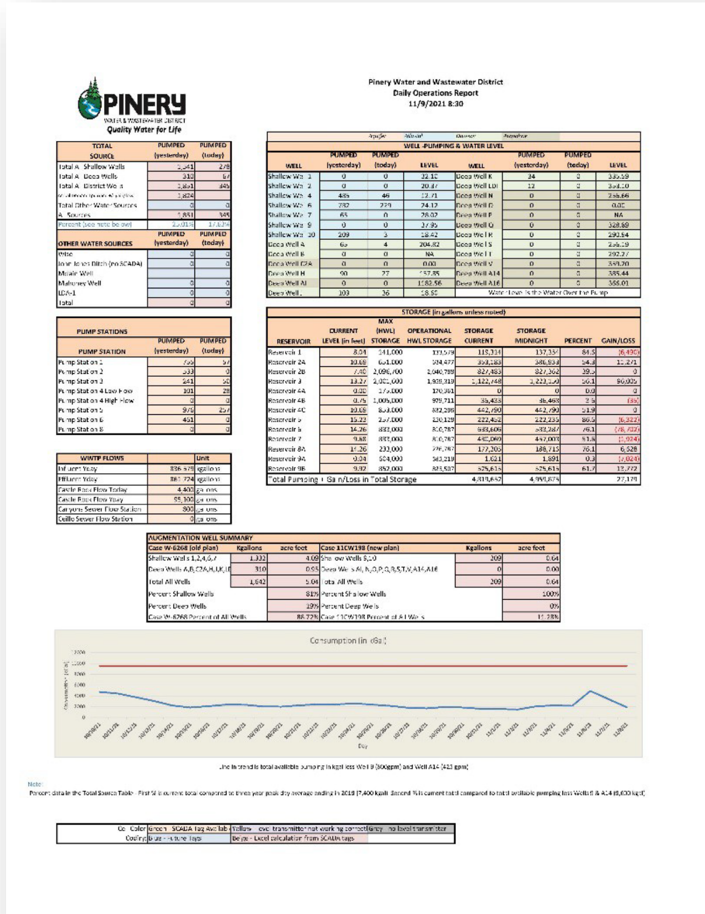
The graph below shows the water surface elevation from ground level over time for one of the District's large producing alluvial wells, Shallow Well 7. The water level cycles through the year, dropping very low late each summer and recovering during the low water use months.

Graph 8 – Water Surface Elevation in Shallow Well 7



Customer Demand

Staff distributes a daily report that provides a snapshot of all the District's facilities, including customer demand (shown below) compared to the District's production capacity, tank levels, water pumped and well production.


Pinery Water and Wastewater District
Daily Operations Report
11/9/2021 8:30

In summary, the District will continue to use the following Drought Severity Indicators to monitor the potential for and severity of drought conditions in its service area:

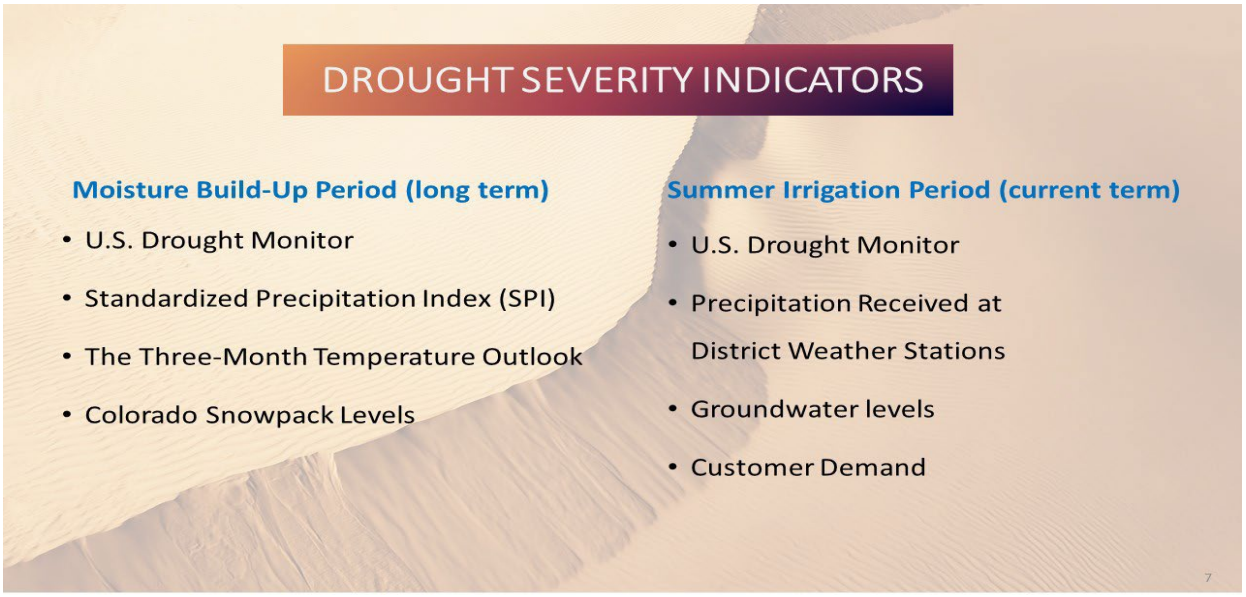
- U.S. Drought Monitor
- Standardized Precipitation Index (SPI)
- The Three-Month Temperature Outlook
- Colorado (South Platte River basin) Snowpack Levels
- Precipitation Received at District Weather Stations
- Alluvial Well water levels
- Customer Demand

4.0 DROUGHT STAGES, TRIGGER POINTS, and RESPONSE TARGETS

This section presents the drought stages, trigger points and response targets used by the District and shows how they are incorporated into a drought declaration and response effort.

4.1 DROUGHT STAGES and TRIGGER POINTS

To monitor whether the District is experiencing drought conditions, and if so, how severe those conditions are becoming, staff monitors several official reports as well as specific local indicators. Applicable data is observed during the two periods of the year, the Moisture Build-Up Period and the Summer Irrigation Period. The drought severity indicators adopted by the District are shown on the following summary:



As these indicators are monitored, staff will determine if the data indicates that drought conditions exist. If so, the stage of drought will be determined based on the triggers associated with each stage as shown in the table below. These triggers include current information from the Colorado Drought Monitor Map, the water level at Walker Reservoir, and the District's shallow well production data.

The Colorado Drought Monitor Map is an excellent indicator of the drought conditions across the State. The conditions at Walker Reservoir and at the shallow wells provide data specific to the District. Based on the combination of this data the District has defined four drought stages, D0 through D4, labeled as Watch, Warning, Critical and Emergency. As drought conditions change the drought stage declarations will change accordingly. The four stages and the trigger points associated with each stage are summarized in the following table.

Table 4: District Drought Stages and Trigger Points

Drought Stage		Trigger Points
Stage 1 – D0	Abnormally Dry – Watch	Colorado Drought Monitor Map
Stage 2 – D1	Moderate Drought - Warning	Colorado Drought Monitor Map Walker Reservoir below 80% capacity
Stage 3 – D3	Extreme Drought – Critical	Colorado Drought Monitor Map Walker Reservoir below 65% capacity 10% loss of production in alluvial wells
Stage 4 – D4	Exceptional Drought - Emergency	Colorado Drought Monitor Map Walker Reservoir below 35% capacity 30% loss of production in alluvial wells

4.2 DROUGHT RESPONSE TARGETS

Staff will initiate the response actions listed below and each stage will build upon the actions of the previous stage.

Stage 1 – Abnormally Dry

Staff will watch the drought severity indicators above and the three items listed in the table above

When Douglas County is shown to be in Drought Stage D0-D1 on the Colorado Drought Monitor Map staff will initiate the response listed below.

Stage 1 Response Strategies

- Staff will identify High water users in the District and target water efficiency communication to those users.
- Staff will continually communicate the District Drought Stage in its monthly newsletter and on its website.
- To increase awareness, District staff may introduce social media messaging to reach more customers.

Stage 2 – Moderate Drought

When Douglas County shows to be in Drought Stage D2 on the Colorado Drought Monitor Map and when Pinery's capacity in Walker Reservoir falls below 80% full (excepting weekly operational uses), the District will progress to Drought Stage 2. Staff will be targeting a 10% reduction in water use throughout the District.

Stage 2 Response Strategies

- Staff will begin to advertise the Voluntary Watering Restrictions through A-frame Signs, on its website and through postal mailings.
- Staff will audit water usage across all customer classes and will work with owners to bring down water use.

Stage 3 – Extreme Drought

When Douglas County shows to be in Drought Stage D3 on the Colorado Drought Monitor Map and when Pinery's capacity in Walker Reservoir falls below 65% full (excepting weekly operational uses) and when the District's alluvial wells show a 10% reduction in production capacity from the previous 3 weeks, the District will progress to Drought Stage 3. Staff will be targeting a 20% reduction in water use throughout the District.

Stage 3 Response Strategies

- Mandatory Watering Restrictions.
- Operational modifications such as reducing/eliminating routine fire hydrant flushing.
- Limit or prohibit installation of new sod.
- Prohibit/reduce the filling of private swimming pools.

Stage 4 – Exceptional Drought

When Douglas County shows to be in Drought Stage D4 on the Colorado Drought Monitor Map and when Pinery's capacity in Walker Reservoir falls below 35% full (excepting weekly operational uses) and when the District's alluvial wells show a 20% reduction in production capacity from the previous 3 weeks, the District will progress to Drought Stage 4. Staff will be targeting a 30% reduction in water use throughout the District. Along with the actions described above, the following response actions will be taken.

Stage 4 Response Strategies

- Limit the release of taps for new development and/or water for construction purposes.
- Mandatory restrictions on Large Irrigators such as golf courses, open spaces, etc.
- Prohibit the operation of ornamental outdoor water fountains/ water features.

5.0 DROUGHT MITIGATION and RESPONSE STRATEGIES

This section discusses the drought mitigation and response strategies in place or planned by the District. While drought response measures often achieve some temporary water savings through limitations or restrictions on water usage, drought mitigation measures are designed to apply prior to a drought to avoid or reduce the impacts of the drought and have been a priority for the District.

5.1 DROUGHT MITIGATION MEASURES and ACTION PLAN

The District has been proactive in supplementing its water supply resources in anticipation of on-going dry conditions for the area and in light of the likelihood of continued growth to build-out within the next several years. As a result, several mitigation and response strategies have been implemented.

Worksheets B and C show potential mitigation and response strategies for Supply-Side (Worksheet B) and Demand-Side (Worksheet C) and indicate those strategies that the District is addressing. In-place strategies are shown as 'Existing' while new strategies in progress or being considered are shown as "New". A summary of the Mitigation Action Plan including important project dates, administration responsibilities and funding sources is presented on Worksheet H.

5.2 SUPPLY-SIDE RESPONSE STRATEGIES

Augmenting its water supply and efficiently managing that supply are mutual objectives of the District. Periodic leak detection surveys are performed, defective meters are replaced, and programmed maintenance and repair programs are completed each year to minimize water loss in the distribution system. Targeted wells have been drilled deeper or flushed to increase maximum flow rates. Conversion to a chloramine treatment process was completed to increase efficiency and to make District processes compatible with neighboring providers to facilitate interchange agreements. Technological improvements are monitored and implemented as appropriate to keep the operations as efficient as possible.

Additional new projects currently in progress will supplement and diversify the District's water portfolio. Through a $5.3M investment in a joint project with three other water providers, the District will significantly increase its storage capability with the completion of the Walker Reservoir in 2023. With its 46% share of the new reservoir's capacity, the District will add 300 acre-feet of storage which could yield up to 2,000 acre-feet of water each year.

A $1.0M project to install individual residential water meter monitoring capability is underway and will complete in 2022. This will give users the ability to manage their water use through easy-to-understand consumption graphs and configurable leak notifications, providing timely, visual access to their water usage behavior.

Two new wells are scheduled for drilling, in November 2021 and February 2022, to increase raw water availability for golf course needs thus reducing a significant demand on the potable water system. All these projects will add diversity and flexibility to the water portfolio and should allow the District to meet its demand for the foreseeable future. Additional future augmentation projects, such as ASR (Aquifer Storage and Recovery) and others shown as "To Be Determined (TBD)" on Worksheet H will be brought online if/when conditions require the additional investments.

5.3 DEMAND-SIDE RESPONSE STRATEGIES

As stated earlier, the District has historically encouraged efficient water usage habits, including low water-usage fixture mandates for all new home construction, covenants limiting the total area of developed landscaping, voluntary watering restrictions during the peak irrigation season, and a tiered water usage billing program with higher rates at greater monthly usage volumes. With these efficiency measures in place, sufficient water has been available to meet demand through all previous droughts with the exception of a few occasions when water was denied to the golf courses for short periods.

With the supply augmentation projects that are in place or planned, it is anticipated that the resulting water supply portfolio will be sufficient to meet demand. If, however, further reductions in usage are required, several additional demand-side mitigation and response strategies have been defined and are available for District implementation as dictated by current drought conditions.

Worksheet C summarizes the demand-side mitigation and response strategies that are in place or available to the District to address drought conditions. Depending upon the stage of drought being addressed, strategies could include any or all of the following:

- Restrictions on issuance of new taps.
- Irrigation audits on provider/municipal parks and open spaces.
- Instructional resources to businesses on developing an office/business specific drought mitigation and response plan.
- Time limits for watering.
- Elimination of all fire hydrant uses except those required for public safety.
- Turning off ornamental fountains in buildings and parks.
- Enforcement of landscape watering restrictions.
- Enforcement of policy guidelines/limitation for installation of new sod and/or other landscaping.
- Enforce restrictions on spraying of impervious surfaces.
- Prohibiting or limiting vehicle washing, nonrecirculating fountains, or filling and use of swimming pools.
- Prohibit/limit use of construction water.

- Turning off public drinking fountains.
- Promoting commercial car washes to install water recycling technology.

5.4 DROUGHT PUBLIC INFORMATION CAMPAIGN

As drought conditions develop or persist in the area the District will continue to keep its users informed on the impacts on water availability and the degree of urgency needed in addressing water usage. Key information will be available on the District website and will be distributed to targeted audiences through email messages and monthly newsletters. Customer service staff is always available by telephone to address questions and concerns.

Information that will be available includes the scope and severity of the drought conditions, any declared drought stage and its associated water restrictions, any rate increases or drought surcharges that are planned, and tips and encouragement for reducing water usage. This information is summarized on Worksheet D.
Staff continuously monitors water usage and supplies and will declare appropriatedrought stages and associated impacts and restrictions as conditions warrant.

6.0 STAGED DROUGHT RESPONSE PROGRAM

As shown earlier in Section 4.0, a staged drought response is planned for the District with appropriate responses ranging from primarily watching the indicators and informing the users to more strict enforcement and even some limitations and prohibitions on usage as conditions warrant. The planned responses are summarized on Worksheet G. The staged drought response plan is based on the best available information to-date and future adjustments may be necessary prior to or during drought periods to sufficiently address water shortages. Communication with users will be high priority, particularly as conditions result in declaration of drought beyond Stage 1 – Watch.

7.0 DROUGHT RESPONSE OPERATIONAL and ADMINISTRATIVE FRAMEWORK

No unique operational or administrative framework or procedures are needed at the District in order to effectively respond to changing drought conditions. The District water operations staff is few in numbers and work in close proximity to each other so daily communications are the norm. Decisions are made and communicated effectively. Monitoring of the demand, the systems and their conditions and operations is continual and current and is no different during drought conditions than otherwise. With clear triggers and well-defined stages, in place, staff will communicate the current drought stage and the likelihood of any change through the defined information channels as soon as change becomes evident.

8.0 PLAN ADOPTION

On November 17, 2021, the first draft of this plan was presented to the Board of Directors of the Pinery Water and Wastewater District. The Board discussed the draft and provided comments. The 60-day period for public comments began November 11, 2021 and ended January 10, 2022.

8.1 PUBLIC REVIEW PROCESS

On November 11, 2021 this plan was posted on the District website for review and comment. Hard copies were made available by request and were mailed to any interested members of the community.

A public hearing was scheduled for January 19, 2021, and continued to February 16, 2022, during the regular Board of Directors Meetings.

Twelve comments were received from the public during the 60-day public comment period.

Copies of all public comments, and the official plan adoption resolution from the Board of Directors are attached.

8.2 DROUGHT RESPONSE PLAN APPROVAL

Local Approval

Public comments and proposed changes were presented to the District Board of Directors on January 19, 2022, and on February 16, 2022. The Pinery Water and Wastewater District Board of Directors formally adopted the 2021 Drought Response Plan on February 16, 2022.

8.3 DROUGHT RESPONSE PLAN REVIEW AND UPDATE

The District plans to review and update this Drought Response Plan every ten years. The next update is scheduled to be completed in 2031.

WORKSHEET A

PINERY
WATER AND WASTEWATER DISTRICT
Quality Water for Life

Historical Drought Impacts, Future Potential Impacts, and Mitigation

WORKSHEET A - HISTORICAL IMPACTS, FUTURE POTENTIAL IMPACTS AND MITIGATION

Historical, Existing and Potential Drought Impacts [1]	Historical Drought Assessment				Vulnerability Assessment		Possible Mitigation & Response Strategies [9]
	Historical Impact [2]	Ranking of Drought Impact Severity [3]	Historical/Existing Mitigation & Response Strategies [4]	Comments [5]	Potential Future Impact [7]	Ranking of Potential Impact Severity [8]	
Water Provider							
Loss of revenue from reduction in water sales					X	2	Revenue Stability Fund
Reduction in municipal well production	X	1	Turn down pumps, rotate wells		X	1	Find replacement supply to bolster supply in creek, ASR to stabalize decline
Reduction in storage reserves	X	3	-	No drinking water storage currently. Just raw water for lakes, and the District has kept levels consistent even in drought.	X	2	Pinery will have Walker Res to better regulate Cherry Creek supplies in drought conditions.
Disruption of water supplies					X	3	Vary water supply portfolio
Degraded water quality							
Higher water treatment costs							
Sediment and fire debris loading to reservoirs following a wildfire							
Increased costs and staff time to implement drought plan							
Increased data/information needs to monitor and implement drought mitigation plan							
Costs to acquire/develop new water supplies/water rights transfers	X	3	Developing new supplies has been to reduce reliance on groundwater but has benefit in increase drought resiliancy.				
Costs to increase implement shortage response							
Public favorable/unfavorable perception of provider regarding drought response							
Scarcity of equipment and other water related services (e.g., contractors to repair wells)							
List other provider related impacts							
Community and Societal							
Domestic landscaping stressed or killed	X	3					
Public landscaping stressed or killed	X	3	Pinery has had to severely limit water delivered to golf course during drought times.		X	3	Increase raw water supply by drilling new wells near Betts lake and Pradera GC will help to reduce impacts to potable system and interuption in irrigation supply.
Lower quality drinking water (e.g., poor taste and odor)							
Reduced firefighting capability							
Cross-connection contamination as a result of lower pressures							
Increased pollutant concentrations							
Reduced quality of life							
Loss of human life (e.g., heat stress)							
Public safety from wildfires							
Reduction in fire fighting capabilities							
Increased respiratory ailments							
Increased disease caused by wildlife concentrations							
Mental and physical stress							
Increased political conflict							
Reduction or modification of recreational activities							
Inequal distribution of drought response implementation							

Historical Drought Impacts, Future Potential Impacts, and Mitigation

Historical, Existing and Potential Drought Impacts [1]	Historical Drought Assessment				Vulnerability Assessment		Possible Mitigation & Response Strategies [9]
	Historical Impact [2]	Ranking of Drought Impact Severity [3]	Historical/Existing Mitigation & Response Strategies [4]	Comments [5]	Potential Future Impact [7]	Ranking of Potential Impact Severity [8]	
Changes to population growth trends (more likely during a long-term drought)							
Heightened awareness about water conservation	X	3			X	3	Staff is consistently working on public outreach campaign.
Change in water use behavior to conserve water	X	3			X	3	There is potential to institute a water budget to be used in times of drought. This would alter water use habits.
Re-evaluation of social values (priorities, needs, rights)							
List other community related impacts							
Economic							
Decreased land prices							
Land subsidence as a result of groundwater depletions							
Income loss to farmers that indirectly affects municipal businesses							
Loss to recreation and tourist industry							
Reduction of economic development							
Increase in food prices							
Restrictions/limitations on landscaping harms landscaping companies							
Impacts to large scale commercial water users (e.g., golf courses)							
Loss in hydropower energy							
List other economic related impacts							
Environmental and Recreational							
Increased risk of frequency and severity of wildfires	X	1	Much effort is put into "Defensible Space" around private homes.	I'm unclear about how the Pinery can do anything to affect change or mitigate these impacts. Cherry Creek is efemeral in nature so low levels are consistent with historical trends, we don't have jurisdiction over any of the other categories in this section of the table.	X		
Beetle kill	X	2			X		
Stress to surrounding natural environment	X	3			X		
Loss of wetlands	X	3			X		
Lower streamflows	X	3			X		
Lower lake/reservoir levels	X	2			X		
Increased susceptibility to plant disease	X	3			X		
Increased wind and water erosion	X	3			X		
Reduced flow from springs							
Air quality effects (e.g. dust and pollutants)							
Visual and landscape quality (e.g., dust, vegetative cover, etc.)							
Stress to fish and other wildlife	X	3			X		
Lower water quality in streams and/or lakes/reservoirs							
Campfire bans	X	3			X		
Land subsidence							
List other envrionmental and recreational related impacts							

WORKSHEET B

PINERY
WATER AND WASTEWATER DISTRICT
Quality Water for Life

Supply-Side Mitigation and Response Strategies

Supply-Side Mitigation and Response Strategies [1]	Long-term Mitigation Actions [2]	Short-term Response Strategy [3]	Candidate Long-term Mitigation Actions [4]	Canditate Short-term Response Strategy [5]	Screening Ranking Value [6]	Post-Screening Selection of Mitigation and Response Strategies [7]	Comments [8]
Water Supply Augmentation							
Establish drought reserves	X		ex				
Draw from drought reserves		X	ex				
Increase groundwater pumping		X	ex				
Deepen wells	X	X	ex				
Develop supplemental groundwater/conjunctive use	X		ex				
Treat water normally used for non-potable irrigation for potable purposes	X	X					
Reactivate abandoned wells		X					
Flush existing wells to develop maximum flow rates	X	X	ex	ex			
Blend primary supply with water of lesser quality to increase supplies		X					
Rehabilitate operating wells	X	X	ex				
Employ desalination of brackish groundwater	X						
Utilize poorer quality water that normally not used if can meet safety standards		X		new	4		
Increase use of recycled water	X	X	ex				
Utilize ditch water or treated effluent for irrigating landscaping/parks	X	X	ex				
Build new facilities to enhance diversion or divert new supplies	X		ex				
Lower reservoir intake structures	X	X					
Use reservoir dead storage		X					
Acquire additional storage	X		new		5		
Build emergency dams	X	X					
Reactivate abandoned dams	X	X					
Cloud seeding	X	X					
List additional strategies identified using Worksheet A or alternative sources							
Water Supply Portfolio and Cooperative Agreements							
Call back water rights that others are allowed to use		X					
Purchase/lease water from other entities (e.g., neigboring cities)		X		ex			
Consider filing SWSP to temporarily use agricultural water rights if water is available		X					
Lease irrigation rights from farmers		X					
Capitalize on new regional water supply opportunities that may result as a result of drought	X	X					
Lease private wells		X					
Cancel municipal leases of water to farmers		X					
Use irrigation decrees		X					
Invoke drought reservations that allow reduction in bypass requirements		X					
Renegotiate contractually controlled supplies	X	X					
Develop water transfers with other entities	X	X					
Develop water bank to facilitate water transfers in times of drought	X		new		3		ASR would effectively bank water in the aquifer to be able to be withdraw in times of drought.
Develop interconnects with other entities	X	X	ex				
Trade water supplies with other entities to increase yield		X	ex				
Increase water quality monitoring		X					
List additional strategies identified using Worksheet A or alternative sources							
Improve Water Distribution Efficiency							
Conduct distribution system water audit	X	X	ex	ex			
Repair leaks in distribution system	X	X	ex	ex			
Reduce distribution system pressure		X					
Replace inaccurate meters	X		ex				
Calibrate all production, commercial, industrial, and zone meters	X						
Install meters at key distribution points to isolate areas of overuse and probable leakage	X						
Minimize reservoir spills	X	X					

Supply-Side Mitigation and Response Strategies

Supply-Side Mitigation and Response Strategies [1]	Long-term Mitigation Actions [2]	Short-term Response Strategy [3]	Candidate Long-term Mitigation Actions [4]	Canditate Short-term Response Strategy [5]	Screening Ranking Value [6]	Post-Screening Selection of Mitigation and Response Strategies [7]	Comments [8]
Change operations to optimize efficiency and distribution of supplies	X	X	ex	ex			
Change pattern of water storage and release operations to optimize efficiency	X	X	new	new	5		
Reduce reservoir evaporation (e.g., reduce storage in reservoirs with high evaporation rates)	X	X	new	new	5		
Reduce reservoir seepage (e.g., reduce storage in reservoirs with high seepage rates)	X	X	new	new	5		
Recirculate wash water	X						
Enhance efficiency of water treatment facilities	X		ex				
List additional strategies identified using Worksheet A or alternative sources							
Emergency Response							
Declare a drought/water shortage and appropriate stage		X		new	5		
Establish water hauling programs	X	X					
Restrict/prohibit new taps		X		new	2		
Identify state and federal assistance	X	X					
Provide emergency water to domestic well users		X					
List additional strategies identified using Worksheet A or alternative sources							
Public Education and Relations							
Establish a public advisory committee	X	X	**ex**	**ex**			**Water Efficiency Task Force**
Implement Drought Public Education Campaign with long- and short-term strategies. (See Worksheet D)	X	X					
Extend boat ramps and docks for recreational use when reservoirs are low	X	X					
List additional strategies identified using Worksheet A or alternative sources							

WORKSHEET C

PINERY
WATER AND WASTEWATER DISTRICT
Quality Water for Life

Demand-Side Mitigation and Response Strategies

WORKSHEET C - DEMAND-SIDE MITIGATION AND RESPONSE STRATEGIES

Mitigation and Demand-Side Response Strategies [1]	Type of Strategy		Candidate Long-term Mitigation Actions [4]	Canditate Short-term Response Strategy [5]	Screening Ranking Value [6]	Post-Screening Selection of Mitigation and Response Strategies [7]	Comments [8]
	Long-term Mitigation Actions [2]	Short-term Response Strategy [3]					
Provider/Municipality							
Develop drought public education campaign with long-term and short-term demand management strategies	X	X	new	new	5		
Identify high water use customers and develop water saving targets	X	X	ex	ex			
Implement conservation measures that also provide water saving benefits during drought periods (e.g., water fixture rebates)	X		ex				
Restrict the issuance of new taps		X		new	2		
Implement drought surcharges		X		new	4		
Implement a modified rate structure for drought periods	X	X		new	4		
Conduct irrigation audits on provider/municipal parks and open spaces	X	X		new	4		
Educate provider/municipal staff on how to save water	X	X	ex	ex			
Provide instructional resources to business on developing an office/business specific drought mitigation and response plan	X	X	new	new	3		
Eliminate/reduce irrigation on provider/muncipal owned parks and landscaping	X	X	ex	ex			
Limit outdoor watering to specific times of the day	X	X	ex	ex			
Limit number of watering days per week	X	X	ex	ex			
Set time limit for watering	X	X	new	new	4		
Prohibit watering during fall, winter, and early spring		X					
Convert sprinklers to low volume irrigation where appropriate	X						
Restrict outdoor misting devices		X					
Reduce street cleaning, sidewalk, and driveway washing		X					
Limit/prevent washing of provider/municipal fleet vehicles		X		ex			
Limit hydrant washing and flushing		X		ex			
Limit use of water for fire training		X					
Eliminate all fire hydrant uses except those required for public safety		X		new	3		
Turn off ornamental fountains in buildings and parks		X		new	3		
Install water saving fixtures, toilets, and/or appliances in provider/municipal-owned buildings	X		ex				
Conduct indoor water audits	X	X					
List additional strategies identified using Worksheet A or alternative sources							
Residential							
Enforce landscape watering restrictions	X	X	**new**	**new**	**4**		
Limit outdoor watering to specific times of the day	X	X	**ex**				
Limit number of watering days per week	X	X					
Set time limit for watering	X	X	**ex**				
Prohibit lawn watering during fall, winter, and early spring		X					

Demand-Side Mitigation and Response Strategies

Mitigation and Demand-Side Response Strategies [1]	Type of Strategy		Candidate Long-term Mitigation Actions [4]	Canditate Short-term Response Strategy [5]	Screening Ranking Value [6]	Post-Screening Selection of Mitigation and Response Strategies [7]	Comments [8]
	Long-term Mitigation Actions [2]	Short-term Response Strategy [3]					
Limit watering to hand-held hose or no-volume nonspray device		X					
Promote outdoor water audits	X	X	ex	ex			
Convert sprinklers to low volume irrigation where appropriate	X	X					
Limit/restrict outdoor misting devices	X	X					
Limit/prohibit installation of new sod, seeding, and/or other landscaping		X					
Enforce policy guidelines/limitations for installation of new sod and/or other landscaping	X	X	new	new	3		
Enforce restrictions on spraying of impervious surfaces		X		new	4		
Prohibit/limit vehicle washing		X		new	4		
Prohibit/limit nonrecirculating fountains		X		new	4		
Prohibit/limit filling and use of swimming pools		X		new	4		
Enforce indoor water restrictions		X					
Promote indoor water audits	X	X					
Promote/require installation of water efficient appliances (e.g., dishwaters, clothes washer)	X	X	ex	ex			
Promote/require graywater use	X	X					
Provide acoustical meters to assist customers in identifying leaks	X	X					
Require water efficient fixtures and/or appliances on house resale or remodeling	X						
Provide historical monthly water usage on water bills	X	X	ex	ex			
Promote/enforce reduction of water-cooled air conditioning		X					
List additional strategies identified using Worksheet A or alternative sources							
Commercial and/or Industrial							
Prohibit/limit use of construction water		X		new	5		
Enforce policy guidelines/limitations for installation of new sod and/or other landscaping	X	X		new	4		
Enforce outdoor landscape watering restrictions	X	X		new	4		
Promote/require indoor and outdoor water audits where applicable	X	X					
Turn off indoor and outdoor ornamental fountains		X		new	4		
Prohibit/limit filling and use of swimming pools		X		new	4		
Promote/enforce installation of water efficient fixtures and appliances	X	X	ex	ex			
Turn off public drinking fountains		X		new	2		
Promote reduction of water-cooled air conditioning		X					
Promote/require buildings with water-cooled air conditioning to raise the temperature modestly		X					
Prohibit/limit dealership washing of vehicles		X					
Enforce water use restrictions on commercial car washes							
Promote commercial car washes to install water recycling technology and/or other BMPs	X	X	new	new	5		
Promote service of water in restaurants only upon request	X	X					
Promote reduction in frequency of linen and towel washing in hotels	X	X	ex	ex			
Provide instructional resources on developing a business/office specific conservation plan	X	X					
Promote/require conversion of cooling towers and other industrial water using processes	X						
List additional strategies identified using Worksheet A or alternative sources							

WORKSHEET D

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Drought Public Information Campaign

WORKSHEET D - PUBLIC INFORMATION CAMPAIGN

Public Information Campaign Components	Screening [1]		Targeted Audience [2]																Coordinate with Other Entities [4]
	Long-term Mitigation Actions	Short-term Reponse Strategy	Decision makers/policy makers	Governmental bodies/city departments (e.g. parks, fire department)	Community recreational facilities	Media	Single-family residential	Multi-family residential	HOAs	Commercial business owners	Commercial business employees	School facility managers	School children	Industrial businesses	Specific targeted businesses (local nurseries, landscape architects, health facilities)	Large water users (golf courses)	*Insert other audience members [3]*	
Drought Information to Convey to the Public																			
Drought awareness: status of current drought conditions, drought stage and associated water restrictions	Yes	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Sustainability and vulnerabilites of water supply system	No	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Where customers may access drought management plan	Yes	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Measures and/or impacts that customers can expect if drought continues or intensifies	Yes	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Factors that could influence water supply services and cost of services	No	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Water provider's actions to save water and/or acquire new water - lead by example	Yes	Yes					g,s	g,s	g,s	g,s		g,s		g,s		g,s			
Policy recommendations, requirements, and penalties	Yes	Yes					g,s	g,s	g,s	g,s		g,s		g,s		g,s			
violations	Yes	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Explanation of rate increases/drought surcharge	No	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Increase advertisement of water saving incentives in conservation and drought plans	No	No																	
Water savings tips	Yes	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Landscaping tips during a drought (e.g., which plants to convert to drip, which to save, which to let die)	No	No																	
Post-drought landscape revival information	No	No																	
Use of gray water where legal and appropriate	No	No																	
Promote existing xeriscape gardens	Yes	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Promote ways to clean sidewalks, driveways, and other hard surfaces without using hoses	No	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Promote ways to wash vehicles to minimize water waste	No	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Water saving targets and actual consumption by individual customer, city, sector, etc.	No	No																	
Instruction to customers on how to set up a low water use plan for their homes or business	No	No																	
Instructions on how to track water use within the home	Yes	Yes					g,h,s	g,h,s	g,h,s	g,h,s		g,h,s		g,h,s		g,h,s			
Publicize efforts of individuals and businesses as examples of how to reduce water use	No	No																	
Encourage intense public discussion and media involvement concerning ways to reduce water use while minimizing impacts (e.g., landscaping impacts)	No	No																	
Do-it-yourself water waste reduction/water savings brochure	No	No																	
Provide customers with a drought report card at the end of the year showing monthly/annual water use pre-drought and during the drought	No	No																	

Drought Public Information Campaign

Public Information Campaign Components	Screening [1]		Targeted Audience [2]															Coordinate with Other Entities [4]
	Long-term Mitigation Actions	Short-term Reponse Strategy	Decision makers/policy makers	Governmental bodies/city departments (e.g. parks, fire department)	Community recreational facilities	Media	Single-family residential	Multi-family residential	HOAs	Commercial business owners	Commercial business employees	School facility managers	School children	Industrial businesses	Specific targeted businesses (local nurseries, landscape architects, health facilities)	Large water users (golf courses)	*Insert other audience members [3]*	
Open burning restrictions to reduce wildfire or grass fires	No	No																
Restrictions on fishing to reduce stress on aquatic species	No	No																
Restrictions on use of atheltic fields to minimize turf impacts	No	No																
Emergency water supply or bottled water distribution centers	No	No																
Insert additional information to convey to the public [3]																		

WORKSHEET E

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Drought Monitoring

WORKSHEET E - DROUGHT MONITORING AND TRIGGER POINT DEVELOPMENT

Identification of Drought Indicators and Development of Trigger Points					
Drought Indicators and Resources [1]	**Currently Monitored [2]**	**New Indicator [3]**	**Key Drought Indicator Selected to Develop Trigger Points [4]**	**Timing [5]**	**Notes on Key Values and Thresholds [6]**
Water Supply Factors					
Reservoir storage levels in supply system		x	x	Reservoir level trigger point - Summer irrigation season	% of capacity
Total storage	x		x		
Projected water right yields	x				
Total supplies (existing and/or projected)	x		x	Shallow wells trigger point - loss in production	% Reduction
Projected demands (existing and/or projected)	x		x		
Shortage (existing and/or projected)	x		x		
Availability of alternative water supplies					
Water qualiity	x		x		
Climatic and Hydrologic Data					
Streamflows	x		x		
Reservoir levels		x	x		
Precipitation records	x				
Snowpack	x				
Groundwater levels	x		x		
River administration in Colorado (call data)	x				
Soil moisture					
Evapotranspiration					
Temperature	x				
Drought Related Indices					
Standard Precipitation Index (SPI)					
Surface Water Supply Index (SWSI)					
Evaporative Demand Drought Index (EDDI)					
Modifed Palmer Drought Index					
Resources					
US Drought Monitor	x		x	Colorado Drought Monitor Map	Drought Level
Colorado Climate Center Webinar					
Colorado Flood and Water Availability Task Force Updates					
NRCS Outlooks (streamflow, precipitation, snowpack)	x				
NOAA Climate Prediction Center Outlooks (Temperature and Precipitation)	x				
NOAA Climate Prediction Center Monthly and Sesaon Drought Outlooks	x				
ENSO (La Nina/El Nino)					
National Interagency Fire Center Wildfire Outlooks					
Add additional drought indicators					

WORKSHEET F

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Drought Stages, Trigger Points and, Response Targets

WORKSHEET F - DROUGHT STAGES, TRIGGER POINTS, AND RESPONSE TARGETS

Drought Stages, Trigger Points, and Response Targets			
Stage [1]	**Drought Trigger Point(s)** [2]	**Response Targets (Water Savings)** [3]	**Summary of Key Response Actions** [4]
Stage 1 - D0 Watch Abnormally Dry	**Colorado Drought Monitor Map**	**Awareness of Drought**	**Identify High water Users** **Promote Status of Drought** **Promote awareness of drought stages and associated restrictions**
Stage 2 - D1 - D2 Warning Moderate Drought	**Colorado Drought Monitor Map** **Walker Reservoir below 80% capacity**	**10% Reduction in water use**	**Voluntary Watering Restrictions** **Irrigation Audits on Open Space/Large Irrigators**
Stage 3 - D3 Critical Extreme Drought	**Colorado Drought Monitor Map** **10% production loss in Shallow Wells** **Walker Reservoir below 65% capacity**	**20% Reduction in water use**	**Mandatory watering Restrictions** **Eliminate/reduce routine hydrant flushing** **Limit/prohibit installation of new sod** **Prohibit/reduce filling of private swimming pools**
Stage 4 - D4 Emergency Exceptional Drought	**Colorado Drought Monitor Map** **20% production loss in Shallow Wells** **Walker Reservoir below 35% capacity**	**30% Reduction in water use**	**Limit the release of new taps** **Eliminate/reduce irrigation on Large Irrigators** **Prohibit operation of ornamental indoor/outdoor water fountains/features**

WORKSHEET G

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Staged Drought Response Program

WORKSHEET G - STAGED DROUGHT RESPONSE PROGRAM

	Drought Stages [1]			
	Stage 1 - Watch Abnormally Dry - D0	**Stage 2 - Warning Moderate Drought - D1-D2**	**Stage 3 - Critical Extreme Drought - D3**	**Stage 4 - Emergency Exceptional Drought - D4**
Trigger	***Colorado Drought Monitor Map***	***Colorado Drought Monitor Map Walker Reservoir < 80% Capacity***	***Colorado Drought Monitor Map 10% Shallow Wells Production Loss Walker Reservoir < 65% Capacity***	***Colorado Drought Monitor Map 20% Shallow Wells Production Loss Walker Reservoir < 35% Capacity***
Response Target	***Watch***	***10% Reduction in Water Use***	***20% Reduction in Water Use***	***30% Reduction in Water Use***
Response Strategies [2]				
	Identify High Water Users	***Voluntary Water Restrictions***	***Mandatory Watering Restrictions***	***Limit the Release of New Taps***
	Promote Status of Drought	***Irrigation Audits on Open Space & Large Irrigators***	***Drought Surcharge***	***Drought-Specific Water Rate Structure***
	Promote Awareness of Drought Stages and Associated Restrictions		***Eliminate/Reduce Routine Hydrant Flushing***	***Eliminate/Reduce Irrigation on Large Irrigators***
			Limit/Prohibit Installation of New Sod	***Prohibit Operation of Ornamental Indoor/Outdoor Water Fountains/Features***
			Prohibit/Reduce Filing of Private Swimming Pools	
Public Education Campaign Activities [3]				
Public Education Campaign Activities	*Stage 1 Activities*	*Stage 2 Activities*	*Stage 3 Activities*	*Stage 4 Activities*
	Messages on website, monthly newsletters	***Messages on website, monthly newsletters and***	***Messages on website, monthly newsletters and email***	***Messages on website, monthly newsletters and email***
	Specific details of Public Education Campaign Activities will be determined by staff as drought conditions are declared and will be tailored to the conditions present at the time of the declaration.			
Enforcement Actvities [4]				
General description of enforcement	*Stage 1 Activities*	*Stage 2 Activities*	*Stage 3 Activities*	*Stage 4 Activities*
	Specific details of enforcement activities and responsibilities will be determined by staff as drought conditions are declared and will be tailored to the conditions present at the time of the declaration.			

WORKSHEET H

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Mitigation Action Plan

WORKSHEET H - MITIGATION ACTION PLAN

Mitigation [1]	Implementation Activities [2]	Milestone Deadlines [3]	Administration [4]	Funding [5]	
Establish drought reserves	Existing				
Draw from drought reserves	Existing				
Increase groundwater pumping	Existing				
Deepen wells	Existing				
Develop supplemental groundwater/conjunctive use	Existing				
Flush existing wells to develop maximum flow rates	Existing				
Rehabilitate operating wells	Existing				
Utilize poorer quality water that normally not used if can meet safety standards	**new**	**TBD**			
Increase use of recycled water	Existing				
Utilize ditch water or treated effluent for irrigating landscaping/parks	Existing				
Build new facilities to enhance diversion or divert new supplies	Existing				
Acquire additional storage	**Build Walker Reservoir**	**2023**	**Staff**	**CWCB Grant**	
Purchase/lease water from other entities (e.g., neigboring cities)	Existing				
Develop water bank to facilitate water transfers in times of drought	**new**	**TBD**			ASR would effectively bank water in the aquifer to be able to be withdraw in times of drought.
Develop interconnects with other entities	Existing				
Trade water supplies with other entities to increase yield	Existing				
Conduct distribution system water audit	Existing				
Repair leaks in distribution system	Existing				
Replace inaccurate meters	Existing				
Change operations to optimize efficiency and distribution of supplies	Existing				
Change pattern of water storage and release operations to optimize efficiency	Existing				
Reduce reservoir evaporation (e.g., reduce storage in reservoirs with high evaporation rates)	new	**TBD**			
Reduce reservoir seepage (e.g., reduce storage in reservoirs with high seepage rates)	new	**2023**	**Staff**		
Enhance efficiency of water treatment facilities	Existing				
Declare a drought/water shortage and appropriate stage	new	**As Needed**	**Staff**		
Restrict/prohibit new taps	new	**As Needed**	**Staff**		
Establish a public advisory committee	Existing				**Water Efficiency Task Force**
Implement Drought Public Education Campaign with long- and short-term strategies. (See Worksheet D)					