

2020

Water Shortage Response Implementation Plan



Dillon Reservoir

2020 Water Shortage Response Implementation Plan

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1 INTRODUCTION

The goal of a coordinated water shortage response is to maintain the health, safety and economic vitality of the community to the extent possible. This Water Shortage Response Implementation Plan is designed to maximize available water supplies and reduce water use during times of shortage.

This Water Shortage Response Implementation Plan outlines guidelines that Denver Water will use to manage water supply and water use during water shortage. These guidelines are designed to maintain the health, safety and economic vitality of the community; to avoid adverse impacts to public activity and quality of life for the community; and to consider the needs of differing customer types as much as possible. This plan also outlines communication strategies that Denver Water will implement during a water shortage event.

Because each water shortage event is different, it is not practical to develop a set of hard-and-fast rules to apply to all water shortages. Rather, these guidelines are intended to provide a framework for timely water shortage response while maintaining flexibility to respond to unique water shortage conditions. The guidelines define objectives and tactics for water shortage responses that may be recommended to the Denver Board of Water Commissioners (the Board) for implementation. The Board may adjust or refine its response based on actual water shortage conditions.

This plan is a product of lessons learned from past water shortages in Denver Water's service area and will be updated regularly. This plan is in accordance with the Denver Water Operating Rules, including Chapter 15. Chapter 15 of the Denver Water Operating Rules defines the authority of the Board in making decisions throughout the course of a water shortage.

1.1 Water Shortage Response Implementation Plan Components

The Water Shortage Response Implementation Plan consists of:

- Water Shortage Indicators – A variety of factors that should be considered in choosing an appropriate water shortage response.
- Water Shortage Response Tools – A description of the most common tools Denver Water may use during a water shortage.
- Water Shortage Response Actions – Guidelines for augmenting water supplies and reducing water use during times of water shortage.

1.2 Defining Water Shortage

Water shortage occurs when available supplies are not sufficient to meet customer demands. A water shortage can happen in daily, seasonal or yearly time frames. Water shortages can occur quickly and require immediate restrictions or may occur gradually, with multiple years passing before any restrictions are required. In addition to a varying time period at the start of a water shortage, the duration of each water shortage is also unknown. A variety of factors play a part in determining how long restrictions will be required.

A water shortage can be caused by many different types or combinations of scenarios, including drought, system failures, system emergencies, storage restrictions, curtailments (whether legal or voluntary in nature), or other factors. One of the goals of this plan is to

recognize that water shortages can occur outside of drought. Regardless of their cause, Denver Water will utilize this Water Shortage Response Implementation Plan during any water shortage event to provide guidance to the Board.

1.3 Supply

Denver Water's supply is the estimated amount of water available from its collection system, including reservoir storage, to meet customer demand. A safety factor has been identified in Denver Water's reservoirs to provide protection against circumstances, such as an infrastructure failure, a water quality crisis, climate change, or drought conditions based on a modeled hydrological time period. The historical hydrology of the Denver Water collection system, modeled by Denver Water staff using Denver Water's Platte and Colorado Simulation Model (PACSM), identifies that there were several major drought events from 1634-2007. Shifts in weather patterns can be substantial from year-to-year and decade-to-decade, affecting both water supply and water use. Denver Water constantly monitors reservoir levels and ensures they are managed effectively and efficiently.

1.4 Long-term Customer Water Efficiency Efforts

Water use restrictions should not be confused with ongoing water efficiency efforts, as detailed in Chapter 14 of the Denver Water Operating Rules. Denver Water customers have incorporated water efficiency as a way of life in Colorado's dry climate. Denver Water is committed to water efficiency and customer outreach. Denver Water has a separate water efficiency plan, which can be found on our website.

Since the 2002-2003 drought, average per customer water use has stayed approximately 20% lower than water use levels prior to that drought, which was the result of an aggressive 10-year water efficiency program. Conservation and water efficiency are critical to our water system and are used in conjunction with other Denver Water efforts, such as our continued work in ensuring a resilient water supply through balancing our collection systems. Denver Water will continue to strive for lower per capita water use across our service area.

Some restrictions that Denver Water imposed during the 2002-2003 drought are now designated as permanent watering rules for all customers:

- Water lawns no more than three days per week.
- Do not water lawns between 10 a.m. and 6 p.m.
- Do not waste water by allowing it to pool in gutters, streets and alleys.
- Do not waste water by letting it spray on concrete and asphalt.
- Repair leaking sprinkler systems within 10 days. (An irrigation system may be operated outside the watering schedule for installation, repair or reasonable maintenance, so long as the system is attended throughout the period of operation and water waste does not occur.)
- Do not water while it is raining or during high winds.

There will be times when water use response actions are needed in addition to standard water efficiency efforts. Water use restrictions are one example of a response action that is reserved for urgent water shortage events; such restrictions are not intended for long-term application. Restrictions are used to minimize the impacts to community safety and quality of life and assist in the return of normal water supply levels. Water use restrictions will be lifted if the water supply returns to normal or, in the case of a new normal for water availability, these restrictions, in part or whole, may become permanent as our service area adapts to new conditions.

Because many Denver Water customers are already making efficient water use a permanent way of life, it may be harder to further reduce per customer water use during a future water shortage. Reduction targets in each water shortage stage have been set to reflect this principle.

1.5 Water Budgets

A water budget is a water management tool used to estimate the amount of water a landscape will require. It can be calculated for a single irrigation event, on a weekly or monthly basis, or even annually. The water budget takes into account reference evapotranspiration data, plant type(s), purpose and functionality of the landscape, irrigated landscape area, irrigation efficiency, water quality and precipitation.

During a water shortage, it may not be water efficient to implement identical watering restrictions across all customer sectors. For some larger customer classes there are necessary days and times for watering that a generalized schedule cannot accommodate. A water budget grants flexibility to larger customers in how they use their allocated water.

Denver Water encourages all customers to use water as wisely as possible. Starting in 2013, Denver Water implemented water budgets for our larger-use customers. Interested customers must apply for a water budget through our Water Efficiency Services group.

Once an application is approved, Denver Water will work with the customer to identify their water budget. Once finalized, a customer will be able to decide when and where to use the water budget and will not have to follow the published watering schedule, provided the provisions of the water budget are followed.

2 WATER SHORTAGE INDICATORS

Water shortage indicators can generally be divided into two categories: (1) water supply and (2) political, social and economic.

During a water shortage, the Board will carefully consider each of the water shortage indicators in choosing the appropriate water shortage response actions. When considering these actions, the Board will take into account the severity and immediacy of the situation.

Water shortage indicators include, but are not necessarily limited to, the following:

- Current and projected supply reservoir contents;
- Watershed characteristics in the Colorado River and South Platte River basins, such as temperature, precipitation, snowpack, stream flow, wind and soil moisture;
- Water use, including projected water use;
- Weather forecasts;
- Actions taken by local, regional and/or state governments or water suppliers regarding water use;
- Drought response actions taken by state water officials;
- Water availability conditions and/or drought conditions in the Colorado River and South Platte River basins; and
- A failure or emergency in the Water System.

2.1 Water Supply Indicators

Water supply indicators include snowpack, precipitation, temperature, wind, predicted reservoir storage, forecasted water use, evaporation, stream flow, soil moisture, and weather forecasts. Denver Water considers numerous drought indices such as, but not limited to, the U.S. Drought Monitor, the Surface Water Supply Index, the Standardized Precipitation Index and the Palmer Drought Severity Index. Each tool integrates multiple measurements and is referenced as appropriate for the particular water shortage situation as water shortage indicators. The U.S. Drought Monitor provides a visual drought index and is often referenced in combination with other indices to determine a water shortage indicator.

The use of water supply indicators to inform Denver Water's water shortage response varies by season. For example, from January through May, snowpack is an important indicator; from May through July, stream flow is an important indicator; and from August through December, water use and precipitation are important indicators. Each water shortage event is unique, and the impact of each water shortage indicator can vary greatly based on the time of year.

Reservoir contents are the result of multiple factors affecting supply, including weather, snowpack, soil moisture, runoff, water rights, bypass requirements, collection system limitations and water use.

Aggregate reservoir contents in Denver Water's system usually peak in June or July following spring snowmelt. For this reason, forecasted systemwide July 1 reservoir contents are an important indicator for water shortage response during the runoff season.

Systemwide July 1 reservoir contents are forecasted during the first weeks of February, March, April, May and June. Predictions are based on measurements of snowpack, stream flows, bypass requirements, soil moisture, water usage, precipitation and the previous year's reservoir carryover storage. The ability to predict systemwide July 1 reservoir contents improves as that date approaches. Because the forecasts of systemwide July 1 reservoir

contents prior to April are subject to significant change, Denver Water is cautious to declare or adjust a water shortage response before then.

Regardless of the water supply situation, Denver Water staff routinely monitors hydrologic conditions, and this monitoring intensifies during dry periods. If conditions change after a water shortage response has been declared, the declaration can be lifted, or the level of water shortage response can be adjusted.

2.1.1 Response Guidelines

There are no hard-and-fast relationships between reservoir contents and appropriate water shortage response. The Board will evaluate many factors in addition to reservoir contents when making its water shortage response decisions. Reservoir storage is just one indicator that Denver Water uses for water shortage response. A list of water shortage indicators the Board will consider can be found at the beginning of this Chapter. The Board is not limited to just these indicators and may also use other tools, information and/or resources.

2.2 Political, Social and Economic Indicators

In addition to hydrologic data and reservoir storage information, Denver Water's water shortage response will take into account public perceptions about the water shortage, the water shortage response activities of other local, regional and/or state governments or water providers, media coverage and economic or political considerations. Although political, social and economic indicators may not always be quantitative, they can be monitored and described for consideration in the Board's decisions about water shortage response.

2.2.1 Response of Other Water Suppliers

Water shortages affect the supplies of Denver metro-area water providers in different ways. For example, northern Denver suburbs that rely on single watersheds may be better or worse off during a water shortage, depending on localized water supply conditions. Moreover, other metro-area systems that have junior water rights could be impacted earlier or more severely than Denver Water's system.

The Board will weigh the effects of implementing restrictions on Denver Water customers' water use if those restrictions differ from other utilities, either in timing or level of restrictions. Alternately, the Board may consider developing a unified metro-area response with restrictions consistent with those of other utilities. It is also important to understand that, because of Denver Water's size and influence, Denver Water's water shortage response decisions can influence the water shortage response decisions of other local water utilities.

Denver Water will also be mindful of water shortage conditions across Colorado, especially in the South Platte River and Colorado River basins.

2.2.2 Media Response

Much of the information customers receive about water shortage comes from traditional and social media outlets. Members of the news media can be helpful in conveying factual information to customers, and they also play a key role in shaping public perception of water shortage. Denver Water will work closely with the news media, and share information via social media and Denver Water's websites to keep customers as informed as possible.

2.2.3 Economic Impacts

One of the principles guiding Denver Water's water shortage response is to maintain the economic vitality of the community to the greatest extent possible. Water restrictions imposed in response to water shortage can impact businesses in different ways. Denver Water

recognizes our customers benefit from maintaining healthy stream conditions and reservoir levels for recreational activities. As part of its public outreach efforts, Denver Water will continue to carefully coordinate restriction programs with water-reliant industries so that the economic activity of surrounding communities, recreation enterprises and other individual customer needs are considered as much as possible.

2.2.4 Political Response

Political response to a water shortage can take many forms and can depend on the constituents affected. For example, the Board might be asked to save some of its water supply for providers with less reliable systems, or mountain communities near Denver Water's collection system might request the Denver metro area to conserve more during water shortage.

2.2.5 Environmental Effects

A water shortage event that reduces stream flow within the collection system will reduce inflows to Denver Water's reservoirs. Lowered reservoir levels not only decrease water supply available to Denver Water's customers, but prolonged water shortage can affect the environment, including stream health and fisheries downstream of Denver Water's diversions and reservoirs. Denver Water monitors stream and reservoir levels so that environmental effects are taken into account in water shortage-response decisions.

Water use restrictions, and subsequent reductions in customer water demand, support the conservation of water stored in Denver Water's reservoirs. However, water use restrictions and subsequent reductions in customer usage in the Denver metro-area will not directly result in increased water in streams within the Denver Water collection system. There are several factors that affect diversion rates from streams in Denver Water's collection system, such as water rights, reservoir storage levels, treatment plant operations, systemwide operations and maintenance needs, resiliency of water supply sources, among other factors besides customer demand rates.

2.3 Uncertainty Associated with Forecasts

Although Denver Water experts are continually monitoring weather reports and water shortage indicators throughout the year, future weather, precipitation and temperature cannot be predicted with absolute certainty. Forecasting a future water shortage or knowing with certainty if one currently exists can be difficult. When a dry year occurs, for example, it is unknown whether it is the first year of a three-, five-, 10-year or longer drought, or if it is merely a dry year somewhere in a series of average-to-wet years. Even though water shortages cannot always be predicted, Denver Water will continue to prepare for water shortage contingencies and continue to advise customers of the latest water supply information so they can consider it in their own planning.

3 WATER SHORTAGE RESPONSE TOOLS

As water shortage indicators emerge, efforts to add water supplies and reduce water use increase.

This Water Shortage Response Implementation Plan consists of two components: the *indicators* that inform and help guide staff recommendations to the Board regarding an appropriate water shortage response, and the corresponding *tools* and *actions* the Board may decide to use and take in response. Denver Water has a permanent, interdivisional Water Shortage Response Committee made up of staff who meet regularly throughout the year and monitor all water shortage indicators. When there is a water shortage or a potential for water shortage, this committee will evaluate the effectiveness of any current water shortage response and the need for additional water shortage responses. Recommendations for adjusting the response will be submitted to the Board by the Water Shortage Response Committee. Because every water shortage is different, the Board will refine water shortage response actions based on actual conditions.

The framework for the Board's water shortage response actions includes four stages of water shortage severity. Each stage is based on water shortage indicators, as well as various political, social and economic indicators discussed in the previous *Water Shortage Indicators* section.

3.1 Four Stages of Water Shortage

For each stage, progressively more stringent responses are recommended. Some water shortage response measures — particularly those designated for mild episodes of water shortage — require minimal customer effort. However, measures can become mandatory, more costly and potentially intrusive as a water shortage intensifies. The four stages of water shortage include:

- 1) Water Shortage Watch – increased communication and education; possible water use restrictions as provided by contract.
- 2) Stage 1 Water Shortage – mandatory water use restrictions, including limited outdoor watering.
- 3) Stage 2 Water Shortage – increased mandatory water use restrictions, including certain prohibitions on outdoor watering.
- 4) Stage 3 Water Shortage – rationing of water.

To activate a particular water shortage stage, the Board declares a water shortage stage and adopts an effective date for imposing the applicable restrictions. Because many water shortages involve mandatory restrictions, they are incorporated into Denver Water's Operating Rules and become enforceable pursuant to the Denver City Charter, the Denver Revised Municipal Code, and provisions in Denver Water's water service agreements and water leases. Chapter 15 of the Denver Water Operating Rules contains restrictions that apply during a water shortage, as declared by the Board. Each Board declaration of a water shortage will also indicate the specific type of water shortage occurring, e.g., drought, systemwide emergency, curtailment, etc.

Fact sheets for each of the four stages can be found in section 4.2 of this document.

3.2 Toolbox of Water Shortage Response

Denver Water's primary response to water shortage is to reduce water use so that supplies will be available for the most essential uses throughout the water shortage. A variety of actions, rather than one single approach, is generally more effective at creating an overall atmosphere that promotes water use reductions. The actions discussed in the sections that follow include restrictions, water shortage pricing, water use education and enforcement, and monitoring and evaluation.

Restricting the number of days and times allowed for watering landscapes can be an effective method for reducing water use. Other methods, such as public information efforts and water shortage pricing, complement those watering restrictions. Other actions may not substantially reduce water use but may eliminate discretionary uses of water or heighten public awareness of water shortage severity.

3.2.1 Water Use Restrictions

Once the Board has declared a water shortage, Denver Water will activate the corresponding set of recommended responses. Denver Water's goal for water shortage response is to maintain the health, safety and economic vitality of the community to the extent possible in the face of water shortage.

The character of Denver and surrounding communities includes a verdant tree canopy and important recreational amenities for its residents and visitors. Denver Water will strive to avoid banning outdoor water use to protect those resources during periods of water shortage. While we recognize future uncertainties may limit the ability of Denver Water to meet this goal, projects and programs will be put in place to reasonably maintain urban landscapes, with a priority on public spaces that provide a community benefit.

Denver Water follows the principles below as much as possible when restricting water use during a water shortage.

Avoid irretrievable loss of natural resources.

- Allow for watering of trees, if possible.
- Avoid damaging perennial landscaping, if possible.
- Tailor watering restrictions to known landscape needs as much as possible.

Restrict less-essential uses before essential uses.

- From May 1 to Oct. 1, customers must follow Denver Water rules for outdoor water use found in section 1.4 of this document.
- Denver Water will curtail less-essential outdoor water use before restricting essential outdoor use/domestic indoor use. For example, limiting or banning irrigation of residential/commercial/government lawns first while allowing watering of trees,

Prioritize the preservation of public and community spaces.

- Have a water budget program for public spaces to allow those customers to prioritize water use for heavily used landscapes.
- Preserve community pools before residential pools.

Minimize adverse financial effects to customers.

- Be respectful of water-based businesses that will be financially impacted by restrictions.

- Engage in ongoing dialogue with the landscaping industry to obtain input from these businesses and provide information that facilitates the ability for these businesses to plan around the uncertainty of a water shortage event.

Implement extensive public information and media relations programs.

- Provide clear and accurate information to customers about conditions and actions they can take to reduce water use.
- Maintain the trust of customers and stakeholders.
- Ensure communications and education are appropriate and tailored to the needs of customers, including strategies for communities that may have more barriers to receiving the information.

3.2.2 Water Shortage Pricing

Water shortage pricing may be implemented as part of a water shortage response or declaration by the Board. Water shortage pricing is designed to increase awareness of the water shortage's severity, assist in meeting water-use reduction targets through pricing signals and/or maintain the financial health of the utility. Water shortage pricing is different from the regular rate structures for water service in that it is temporary in nature. The water shortage declaration will define the criteria for implementing and removing water shortage pricing.

Denver Water will consider several guiding principles in developing water shortage pricing:

- The relationship between price and demand.
- The ability to incorporate water shortage pricing into an overall program to increase customer awareness of the water shortage's severity and importance of saving water.
- The applicability of water shortage pricing to current water demands, new taps or other demands on the water supply.
- The severity of the water shortage and water shortage response philosophies.
- The ability to integrate water shortage pricing into existing Denver Water and Master Meter billing systems.
- Public information and education necessary to help customers understand water shortage pricing.

3.2.3 Water Use Education and Enforcement

During a water shortage, Denver Water will continue to educate customers about efficient water use, enforce water waste rules and water shortage restrictions, and help customers to save water. Denver Water will also monitor its service area to identify non-compliance with water shortage restrictions. The primary goal of the program is to educate and inform customers and, secondarily, to enforce penalties against consistent violators.

Denver Water will distribute educational materials, help customers reduce their water use and answer questions about the water shortage. Customers are also able to report water waste through Denver Water's Customer Care phone number, 303-893-2444, or online at www.denverwater.org/ReportWaste. Violators may receive written warnings and may be fined for repeat violations. Flow restrictors may be installed at properties with repeat violations. All customers (owner or occupant of a property) are responsible for complying with water shortage restrictions and exemption terms.

3.2.4 Water Shortage Response within Master Meter Districts

Master Meter districts receiving water from Denver Water are governed by Denver Water's Operating Rules. Master Meter districts retain the right as provided in their respective water service agreements to make and enforce their own rules, including more restrictive rules, as

long as the rules are not inconsistent with Denver Water's rules. Master Meter districts should assist Denver Water in enforcing the Operating Rules.

As such, it is mandated that Master Meter districts have a water use education and enforcement program during water shortage events to ensure customers comply with Operating Rules. Master Meter districts can choose to opt-in to Denver Water's water use education and enforcement program or create their own program. If opting-in to Denver Water's program, Denver Water will monitor the Master Meter district and work closely with the district to facilitate customer communication, education and enforcement.

If a Master Meter district chooses to create its own water use education and enforcement program, the following program elements are required:

- Creating a mechanism to educate customers about water shortage restrictions, such as online or printed materials and personal customer interaction.
- Creating a reporting tool, such as a phone number or email, that allows customers to report violations of water waste rules.
- Monitoring for violations of water waste rules.
- Tracking customer violations by account.

3.2.5 Monitoring and Evaluation

When water shortage conditions emerge, staff will intensify its monitoring and evaluation activities. The monitoring and evaluation program will track information, such as snowpack, soil moisture, stream flow, precipitation, water rights, reservoir levels and weather forecasts. In addition, water usage and its corresponding revenue will be compared to normal use and weather-adjusted expected use. If water-reduction goals are not being met, the Board may increase public outreach and/or the level of water shortage response.

3.2.6 Recycled Water

Denver Water has the right to reuse a major portion of its water imported from the West Slope, as well as a small portion of its East Slope supplies. Denver Water has a recycling plant that takes previously cleaned wastewater, treats it to state standards for recycled water, and delivers it to customers for irrigation and industrial purposes.

Recycled water has different supply characteristics than potable water, and its source water may be more abundant than potable water during periods of drought or water shortage. Licensees who use recycled water are subject to regulations on usage that do not apply to licensees of potable water. In recognition of these differing circumstances, Denver Water reserves the right to adopt different water use restrictions for recycled water licensees, or to refrain from imposing any water use restrictions on recycled water licensees, depending on the availability of the recycled water source at the time of a declaration.

3.2.7 Use of Water Not Provided by Denver Water

Some customers in Denver Water's service area have access to water sources that are not owned, controlled or provided by Denver Water. Though the use of such water is not under the direct control of Denver Water, those customers will be subject to restrictions in the Operating Rules related to signage, avoidance of contamination of the potable water system and prevention of water waste.

3.2.8 Increasing Water Supply

In addition to reducing water use during a water shortage, Denver Water will continue to evaluate the potential for increasing its supplies by gaining access to other water sources.

Each augmentation option presents unique intergovernmental and technical issues, and each will depend on current conditions.

4 WATER SHORTAGE RESPONSE ACTIONS

4.1 Program Actions by Stage

The table below is meant to be a guide to water uses under various levels of water shortage restrictions. Denver Water reserves the right to modify these program elements as needed to meet changing water supply conditions.

Element	Normal	Water Shortage Watch	Stage 1	Stage 2	Stage 3
<i>Outdoor Watering and Irrigation</i>					
Turf grass	Maximum of three days/week of customer's choice.	Maximum of three days/week of customer's choice.	One to two days/week per mandatory schedule.	No watering allowed.	No watering allowed.
New grass seed or new sod	Extra watering allowed.	Extra watering allowed with approved exemption.	Except in the months of June-August, extra watering allowed with approved exemption.	No watering allowed.	No watering allowed.
New plantings	Allowed.	Allowed.	Allowed.	Not allowed.	Not allowed.
Sod replacement after a Denver Water construction project	Allowed.	Allowed.	No installations from June through August.	Not allowed.	Not allowed.
Trees, shrubs and perennials	May be watered by hand-held hose or low-volume non-spray except from 10 a.m. to 6 p.m.	May be watered by hand-held hose or low-volume non-spray except from 10 a.m. to 6 p.m.	May be watered by hand-held hose or low-volume non-spray on any day, not 10 a.m. to 6 p.m.	Existing trees and shrubs may be watered by means of a hand-held hose or low-volume non-spray once per week on scheduled day.	If allowed, use hand-held hose or low-volume non-spray one assigned day per month.

Element	Normal	Water Shortage Watch	Stage 1	Stage 2	Stage 3
Flowers, vegetables and community gardens	May be watered by automatic system on any day, not between 10 a.m. and 6 p.m., and by hand-held hose or low-volume spray at any time.	May be watered by automatic system on any day, not between 10 a.m. and 6 p.m., and by hand-held hose or low-volume spray at any time.	May be watered by means of a hand-held hose or low-volume non-spray irrigation on the assigned watering days, not between 10 a.m. and 6 p.m.	May be watered by means of a hand-held hose or low-volume non-spray irrigation on assigned watering day(s), not between 10 a.m. and 6 p.m.	No watering allowed.
Athletic and playing fields	No waste of water.	No waste of water.	Irrigated via mandatory schedule or water budget.	Irrigated via mandatory schedule or water budget.	No watering allowed.
Golf courses	No waste of water.	No waste of water.	Irrigated via mandatory schedule or water budget.	Tees and greens irrigated by water budget.	No watering allowed.
Daytime irrigation of high-traffic areas (parks, golf courses)	Targeted and limited irrigation when necessitated by weather conditions.	Targeted and limited irrigation when necessitated by weather conditions.	Targeted and limited irrigation when necessitated by weather conditions, with notification to Denver Water prior to application.	Irrigated via mandatory schedule or water budget.	No watering allowed.
Irrigation taps not covered by other rules	No waste of water.	No waste of water.	Irrigated via mandatory schedule or water budget.	Irrigated via mandatory schedule or water budget, following the same outdoor watering restrictions (trees, shrubs and perennials only).	No watering allowed.

Element	Normal	Water Shortage Watch	Stage 1	Stage 2	Stage 3
Water budgets	Normal allocated budget.	Some changes to allocated budget possible.	Allocated budget decreased. Any property exceeding water budget will be placed on general mandatory schedule.	Allocated budget significantly decreased. Any property exceeding water budget will be placed on general mandatory schedule.	Possible suspension of water budget.
<i>Water Features</i>					
Unlined ponds	Filled using approved backflow.	Filled using approved backflow.	No filling allowed unless used for irrigation.	Not allowed.	Not allowed.
Swimming pools / lined ponds	N/A	N/A	No waste of water.	Single-family residential pools shall not be filled or refilled. Operation of other pools will be permitted.	No filling of any pools.
Other water features (fountains, waterfalls etc.)	N/A	N/A	Customers are highly encouraged to not operate any existing outdoor fountain or waterfall that sprays water into the air.	Customers are prohibited from operating any existing outdoor fountain or waterfall that sprays water into the air. No new features allowed.	No operation of any water features.
Misting devices	N/A	N/A	Not allowed.	Not allowed.	Not allowed.

Element	Normal	Water Shortage Watch	Stage 1	Stage 2	Stage 3
Washing / Events					
Cars – washing at home	With bucket or hand-held hose with shut-off nozzle.	With bucket or hand-held hose with shut-off nozzle.	With bucket or hand-held hose with shut-off nozzle.	Not allowed. Must use certified commercial car washes.	Not allowed.
Cars – commercial car washes	N/A	N/A	Uncertified car washes shall close operations for three days/wk.	Only car washes using recycled water are permitted to operate.	Only car washes using recycled water are permitted to operate.
Fleet vehicle washing	Must use a car wash or washing equipment certified by Denver Water.	Must use a car wash or washing equipment certified by Denver Water.	Maximum one time per week, certified car washes only.	One time per month only for health and safety; certified car washes only.	Only car washes using recycled water are permitted to operate.
Charity events (e.g., car washes)	N/A	N/A	Denver Water approval needed.	Not allowed.	Not allowed.
Street cleaning equipment	N/A	N/A	N/A	Obtain water from designated locations only.	Extreme health and safety issues only; high-efficiency equipment only.
Washing / impermeable surfaces	Use dry cleanup methods prior to washing. No waste of water.	Use dry cleanup methods prior to washing. No waste of water.	Permitted on assigned watering days. Use dry cleanup methods prior to washing. High-efficiency equipment required.	Health and safety issues only; high efficiency equipment required. Use dry cleanup methods prior to washing.	Health and safety issues only; high efficiency equipment required. Use dry cleanup methods prior to washing.

Element	Normal	Water Shortage Watch	Stage 1	Stage 2	Stage 3
Commercial-Industrial Processes					
Restaurants	N/A	Voluntary participation in the “water served only on request” program. Participants must comply with Denver Water's signage standards.	Voluntary participation in the “water served only on request” program; Participants must comply with Denver Water's signage standards.	Mandatory participation in the “water served only on request” program. Participants must comply with Denver Water's signage standards.	Mandatory participation in the “water served only on request” program. Participants must comply with Denver Water's signage standards.
Lodging	N/A	N/A	Laundry restrictions.	Laundry restrictions.	Laundry restrictions.
Construction water	N/A	N/A	Best management practices; no water waste; permit rescinded for violations.	Best management practices; no water waste; permit rescinded for violations.	On case by case basis; best management practices, no water waste; permit rescinded for violations.
Hydrant special use permits	N/A	N/A	Cancelation clause; intended use only, possible surcharge.	Limited uses (eliminate equipment cleaning); possible surcharge.	No hydrant special use allowed. Firefighting uses only.

4.2 Water Shortage Response Fact Sheets

4.2.1 Water Shortage Watch: Increased Communication and Education; Possible Water Use Restrictions as Provided by Contract

Description:

A Water Shortage Watch will increase communication to customers to alert them that water supplies are below average, conditions are dry, and continued dry weather could lead to mandatory water use restrictions.

History:

A Water Shortage Watch or other voluntary restrictions have been implemented in the following years: 1977, 1983, 1984, 1985, 1986, 1987, 1988, 2002, 2003, 2004, 2012, 2013, 2014.

General Indicators:

During a water shortage, the Board will carefully consider each of the water shortage indicators in choosing the appropriate water shortage response actions. When considering these actions, the Board will take into account the severity and immediacy of the situation.

Water shortage indicators include, but are not necessarily limited to, the following:

- Current and projected supply reservoir contents;
- Watershed characteristics in the Colorado River and South Platte River basins, such as temperature, precipitation, snowpack, stream flow, wind and soil moisture;
- Water use, including projected water use;
- Weather forecasts;
- Actions taken by local, regional and/or state governments or water suppliers regarding water use;
- Drought response actions taken by state water officials;
- Water availability conditions and/or drought conditions in the Colorado River and South Platte River basins; and
- A failure or emergency in the Water System.

Specific Water Shortage Watch Indicators:

1. Projected useable reservoir contents between 70% and 100% full on July 1.
2. Watershed characteristics, such as precipitation, snowpack, stream flow, wind and soil moisture, indicate abnormal and prolonged dryness.
3. Service-area precipitation indicates abnormal and prolonged dryness.
4. Other local, regional and/or state governments or water suppliers are preparing to respond to the dryness.
5. News media are sending messages that imply water shortage may be pending.
6. Customers believe a Water Shortage Watch and its corresponding actions are appropriate.
7. Customer water use is significantly above recent average.
8. Elected officials are suggesting Denver Water adopt a Water Shortage Watch or similar response.
9. There are water availability issues and/or water shortage conditions inside of the Colorado River or South Platte River basins.
10. Denver Water experiences a critical failure in the water system.

Potential Denver Water Responses:

- Increase communication and education to customers and stakeholders to explain that we are beginning to see indicators of water shortage.
- Encourage customers to continue to use water efficiently and provide suggestions for voluntarily reducing water use to reduce the risk of progressing to mandatory restrictions.
- Prepare external stakeholders and internal staff for the possibility of mandatory restrictions.
- Enhance the water use education and enforcement program.
- Employ voluntary “drinking water upon request” program for food service operations.
- A list of other possible restrictions can be found in the *Water Shortage Response Actions* table found in this document.

Fixed-Amount Water Contracts:

In connection with a Water Shortage Watch, the Board may determine that providing an adequate supply of water for the people of Denver requires water use restrictions for water deliveries to lessees who receive Nonpotable Water or Potable Water under fixed-amount contracts. (Charter, Art. 10.1.13.) If such a determination is made, water deliveries pursuant to applicable contracts will be restricted as follows:

- a. For agreements with provisions for reduction in deliveries under drought/water shortage conditions, the amount delivered shall be reduced as determined by the Board (by up to 10%) or as otherwise provided in the fixed-amount contract.
- b. For agreements with provisions requiring progressive curtailment or the adoption of the same or similar water use restrictions as the Board during drought/water shortage conditions, the lessee shall implement the responses and voluntary water use restrictions contained in Chapter 15 of the Denver Water Operating Rules.
- c. For all agreements, the Board reserves the ability to take all appropriate and necessary measures to address water shortages, including the adoption of drought pricing or other methods to achieve reduction in water consumption outside Denver as necessary to provide an adequate supply of water to the people of Denver.
- d. Any water delivered by the Board during a Drought Watch shall not be used for irrigation between the hours of 10:00 a.m. and 6:00 p.m. during all months of the year, unless allowed by the Board.

4.2.2 Stage 1 Water Shortage Response: Mandatory Water Use Restrictions, Including Limited Outdoor Watering

Description:

A Stage 1 Water Shortage Response imposes mandatory restrictions and requires greater effort on the part of customers. The Board will decide customer watering days once they declare Stage 1 restrictions. Stage 1 allows for one or two day(s) per week watering.

History:

A Stage 1 Water Shortage Response has been implemented in the following years: 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1954, 1955, 1956, 1977, 1978, 1979, 1980, 1981, 1982, 2002, 2003, 2004, 2013.

General Indicators:

During a water shortage, the Board will carefully consider each of the water shortage indicators in choosing the appropriate water shortage response actions. When considering these actions, the Board will take into account the severity and immediacy of the situation.

Water shortage indicators include, but are not necessarily limited to, the following:

- Current and projected supply reservoir contents;
- Watershed characteristics in the Colorado River and South Platte River basins, such as temperature, precipitation, snowpack, stream flow, wind and soil moisture;
- Water use, including projected water use;
- Weather forecasts;
- Actions taken by local, regional and/or state governments or water suppliers regarding water use;
- Drought response actions taken by state water officials;
- Water availability conditions and/or drought conditions in the Colorado River and South Platte River basins; and
- A failure or emergency in the Water System.

Specific Stage 1 Water Shortage Indicators:

1. Projected useable reservoir contents between 45% and 85% full on July 1.
2. Watershed characteristics, such as precipitation, snowpack, stream flow, wind and soil moisture, indicate severe and prolonged dryness.
3. Other local, regional and/or state governments or water suppliers are planning to enact mandatory restrictions.
4. Customers believe that mandatory water use restrictions are appropriate.
5. State water officials are engaged in water shortage response activities.
6. Circumstances warrant possible adverse impacts on water-dependent businesses involved in outdoor water use.
7. Customer water use is significantly above recent average.
8. There are water availability issues and/or water shortage conditions inside of the Colorado River or South Platte River basins.
9. Denver Water experiences a critical failure in the water system.

Use Reduction Target: 20% of customer average use, or approximately 50,000 acre-feet (1 acre-foot = 325,851 U.S. gallons).

Key Restrictions:

1. Existing watering rules will still be in effect as specified in the Long-term Water Efficiency Efforts section of this document.
2. Outdoor watering shall be limited to one or two day(s) per week or similar reductions through water budgets.

Below is a sample of what a watering schedule could look like:

Example: 2-day per week watering schedule	
Single-family and small multi-family (less than 7 units) residential properties with odd-numbered addresses	Sunday Wednesday
Single-family and small multi-family (less than 7 units) residential properties with even-numbered addresses	Saturday Tuesday
Multi-family (7 or more units) and apartment properties	Monday Thursday
Office Buildings	Tuesday Friday
Properties that are managed for the sole enjoyment and recreation of the public, including parks and schools	Any day(s) of the week, but entities must opt-in to the Denver Water water budget program and stay equal to or under the water budget allocated by Denver Water
All others	Monday Friday

3. Trees, shrubs and perennials may be watered by means of a hand-held hose or low-volume non-spray irrigation on any day, but not between 10:00 a.m. and 6:00 p.m. during all months of the year.
4. Annuals and vegetables may be watered any day by means of a hand-held hose or low-volume non-spray irrigation, but not between 10:00 a.m. and 6:00 p.m. during all months of the year.
5. An irrigation system may be operated outside the watering schedule for installation, repair, or reasonable maintenance, so long as the system is attended throughout the period of operation and water waste does not occur. All irrigation control systems must be reprogrammed for operation in compliance with the schedule provided by the Board or must be operated manually.
6. The Board, in the interest of public safety and fire prevention, may exempt irrigation of Green Roofs in the Denver Water service area from the water schedule restrictions provided the Green Roof is irrigated within the limits specified by the Board.
7. Voluntary “drinking water upon request” program for food service operations.
8. A list of other possible restrictions can be found in the *Water Shortage Response Actions* table found in this document.

Water Shortage Pricing:

A water shortage pricing program may be used to increase awareness of the water shortage’s severity, assist in meeting water-use reduction targets through pricing signals and/or maintain the financial health of the utility.

Fixed-Amount Water Contracts:

In connection with a Stage 1 response, the Board has determined that providing an adequate supply of water for the people of Denver requires the restrictions contained in Chapter 15 of the Denver Water Operating Rules. (Charter, Art. 10.1.13.) Water deliveries to Licensees who receive Nonpotable Water or Potable Water under fixed-amount contracts will be restricted as follows:

- a. For agreements with provisions for reduction in deliveries under drought/water shortage conditions, the amount delivered shall be reduced as determined by the Board (by up to 30%) or as otherwise provided in the fixed-amount contract.
- b. For agreements with provisions requiring progressive curtailment or the adoption of the same or similar water use restrictions as the Board during drought/water shortage conditions, the lessee shall implement the water use restrictions contained in Chapter 15 of the Denver Water Operating Rules.
- c. For all agreements, the Board reserves the ability to take all appropriate and necessary measures to address water shortages, including the adoption of drought pricing or other methods to achieve reduction in water consumption outside Denver as necessary to provide an adequate supply of water to the people of Denver.
- d. Any water delivered by Denver Water during a Stage 1 response shall not be used for irrigation between the hours of 10:00 a.m. and 6:00 p.m. during all months of the year, unless allowed by the Board.

4.2.3 Stage 2 Water Shortage Response: Increased Mandatory Water Use Restrictions, Including Certain Prohibitions on Outdoor Watering.

Description:

A Stage 2 Water Shortage Response imposes mandatory restrictions on Denver Water's customers. Stage 2 water shortage restrictions are severe and will likely result in damage to or loss of landscapes.

History:

A Stage 2 Water Shortage Response has been implemented in the following years: 2002, 2003.

General Indicators:

During a water shortage, the Board will carefully consider each of the water shortage indicators in choosing the appropriate water shortage response actions. When considering these actions, the Board will take into account the severity and immediacy of the situation.

Water shortage indicators include, but are not necessarily limited to, the following:

- Current and projected supply reservoir contents;
- Watershed characteristics in the Colorado River and South Platte River basins, such as temperature, precipitation, snowpack, stream flow, wind and soil moisture;
- Water use, including projected water use;
- Weather forecasts;
- Actions taken by local, regional and/or state governments or water suppliers regarding water use;
- Drought response actions taken by state water officials;
- Water availability conditions and/or drought conditions in the Colorado River and South Platte River basins; and
- A failure or emergency in the Water System.

Specific Stage 2 Water Shortage Indicators:

1. Projected useable reservoir contents between 30% and 60% full on July 1.
2. Watershed characteristics, such as precipitation, snowpack, stream flow, wind and soil moisture, indicate extreme and prolonged dryness.
3. Other local, regional and/or state governments or water suppliers have enacted or are considering severe restrictions on outdoor water use.
4. Customers believe that increased mandatory water use restrictions are appropriate.
5. State water officials have declared a water shortage emergency.
6. Lack of water begins restricting some water-dependent businesses.
7. Customer water use is significantly above recent average.
8. Water availability issues and/or water shortage conditions inside of the Colorado River or South Platte River basins.
9. Denver Water experiences a critical failure in the water system.

Use Reduction Target: 35% of customer average use, or approximately 87,500 acre-feet (1 acre-foot = 325,851 U.S. gallons).

Key Restrictions:

1. Existing watering rules will still be in effect as specified in the Long-term Water Efficiency Efforts section of this document.
2. Lawn irrigation will be prohibited without specific written permission of the Board, or through a Board-approved water budget.
3. Existing trees, shrubs and perennials may be watered by means of a hand-held hose or low-volume non-spray irrigation no more than once a week in accordance with the schedule set forth in the declaration. Such irrigation may not occur between the hours of 10:00 a.m. and 6:00 p.m. during all months of the year. No new trees, perennials, or shrubs may be planted.
4. Existing annual and vegetable plantings in household and community gardens may be watered any day of the week by means of a hand-held hose or low-volume non-spray irrigation. Such irrigation may not occur between the hours of 10:00 a.m. and 6:00 p.m. during all months of the year. No new annual or vegetable plantings may be planted.
5. An irrigation system may be operated for installation or repair, so long as the system is attended throughout the period of operation and water waste does not occur.
6. The Board, in the interest of public safety and fire prevention, may exempt irrigation of Green Roofs in the Denver Water service area from the water schedule restrictions provided the Green Roof is irrigated within the limits specified by the Board.
7. Mandatory “drinking water upon request” program for food service operations.
8. A list of other possible restrictions can be found in the *Water Shortage Response Actions* table found in this document.

Water Shortage Pricing:

A water shortage pricing program is likely to be used to increase awareness of the water shortage’s severity, assist in meeting water-use reduction targets through pricing signals and/or maintain the financial health of the utility.

Fixed-Amount Water Contracts:

In connection with a Stage 2 response, the Board has determined that providing an adequate supply of water for the people of Denver requires the restrictions contained in Chapter 15 of the Denver Water Operating Rules. (Charter, Art. 10.1.13.) Water deliveries to Licensees who receive Nonpotable Water or Potable Water under fixed-amount contracts will be restricted as follows:

- a. For agreements with provisions for reduction in deliveries under drought/water shortage conditions, the amount delivered shall be reduced as determined by the Board (by up to 50%) or as otherwise provided in the fixed-amount contract.
- b. For agreements with provisions requiring progressive curtailment or the adoption of the same or similar water use restrictions as the Board during drought/water shortage conditions, the lessee shall implement the water use restrictions contained in Chapter 15 of the Denver Water Operating Rules.
- c. For all agreements, the Board reserves the ability to take all appropriate and necessary measures to address water shortages, including the adoption of drought pricing or other methods to achieve reduction in water consumption outside Denver as necessary to provide an adequate supply of water to the people of Denver.
- d. Any water delivered by Denver Water during a Stage 2 response shall not be used for irrigation between the hours of 10:00 a.m. and 6:00 p.m. during all months of the year, unless allowed by the Board.

4.2.4 Stage 3 Water Shortage Response: Rationing of Water

Description:

A Stage 3 Water Shortage Response activates a rationing program for Denver Water's customers. *Conditions that would lead to a Stage 3 water shortage are highly unlikely.* However, if conditions warrant, Denver Water's Board may implement a rationing program for an indefinite period of time to ensure, to the extent possible, that there is adequate water for essential uses. (e.g., domestic indoor use.) All outdoor watering may be prohibited, and indoor water use may be restricted. Stage 3 water shortage restrictions will damage the quality of life in Denver Water's service area, including the long-term loss of landscapes.

History:

Denver Water has never implemented a Stage 3 Water Shortage Response.

General Indicators:

During a water shortage, the Board will carefully consider each of the water shortage indicators in choosing the appropriate water shortage response actions. When considering these actions, the Board will take into account the severity and immediacy of the situation.

Water shortage indicators include, but are not necessarily limited to, the following:

- Current and projected supply reservoir contents;
- Watershed characteristics in the Colorado River and South Platte River basins, such as temperature, precipitation, snowpack, stream flow, wind and soil moisture;
- Water use, including projected water use;
- Weather forecasts;
- Actions taken by local, regional and/or state governments or water suppliers regarding water use;
- Drought response actions taken by state water officials;
- Water availability conditions and/or drought conditions in the Colorado River and South Platte River basins; and
- A failure or emergency in the Water System.

Specific Stage 3 Water Shortage Indicators:

1. Projected useable reservoir contents less than 50% full on July 1.
2. Watershed characteristics, such as precipitation, snowpack, stream flow, wind and soil moisture, indicate exceptional and prolonged dryness.
3. Other water suppliers are rationing water.
4. News media are sending messages that we are in a crisis situation.
5. Customers believe we are in a crisis situation.
6. Elected officials are saying that water rationing is appropriate.
7. The situation suggests that severe impacts to water-dependent businesses are unavoidable.
8. There are water availability issues and/or water shortage conditions inside of the Colorado River or South Platte River basins.
9. Denver Water experiences a critical failure in the water system.

Use Reduction Target: 50% of customer average use, or approximately 125,000 acre-feet (1 acre-foot = 325,851 U.S. gallons).

Key Restrictions:

1. A Stage 3 water shortage activates a rationing program for Denver Water's customers. Denver Water's Board may implement a rationing program for an indefinite period of time to ensure, to the extent possible, that there is adequate water for essential uses (e.g., domestic indoor use.). All outdoor watering may be prohibited, and indoor water use may be restricted.
2. The Board, in the interest of public safety and fire prevention, may exempt irrigation of Green Roofs in the Denver Water service area from the water schedule restrictions provided the Green Roof is irrigated within the limits specified by the Board.
3. A list of other possible restrictions can be found in the *Water Shortage Response Actions* table found in this document.

Water Shortage Pricing:

A water shortage pricing program is likely to be used to increase awareness of the water shortage's severity, assist in meeting water-use reduction targets through pricing signals and/or maintain the financial health of the utility.