



*City of Bozeman Water  
Conservation Program  
Report  
2015-2022*



# 2015-2022 City of Bozeman Water Conservation Program Report

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## Introduction

### 2013 Integrated Water Resources Plan

The 2013 Integrated Water Resources Plan (IWRP) is a proactive long-range plan which resulted from the City of Bozeman's recognition that continued population growth will occur into the future and eventually result in water demands that will exceed available water supplies. The City's existing water supply sources are finite; thus, new supplies must be developed, and demand must be reduced to meet projected future needs.

The IWRP identifies water supply and use policies and practices for future consideration and recommends that water conservation be cornerstone to Bozeman's water resource management. Specifically, the IWRP recommends that roughly fifty percent of the projected water supply/demand gap be reduced through water conservation. Water conservation, also known as demand management, generates additional water supply for the future by using water more efficiently today.

The City Commission's adoption of the IWRP and the IWRP Implementation Plan highlights the significant role that water conservation plays in addressing the city's long-term water supply needs.

### Program Goals

The goal of the City of Bozeman's Water Conservation Program is to protect and enhance water resources through conservation in order to meet the IWRP's 50-year demand reduction target.

The program objectives include (i) establishing and strengthening the community's water conservation ethic; (ii) ensuring adequate supplies are available to meet current and future customer demands; (iii) ensuring adequate supplies are available in times of drought for emergency response and long term drought mitigation.

The strategies implemented to facilitate the achievement of the goal include (i) providing an equitable distribution of water conservation benefits throughout all of the customer classes and the community; (ii) utilizing a variety of methods to raise awareness of the value of water, ways to conserve, and to encourage participation in initiatives; and (iii) developing mechanisms to track and forecast demands and evaluate and modify elements of the Program as needed.

## Water Demand

### Historical and Current Trends: All Customer Classes

As population continues to grow in Bozeman, total water demand is increasing at a much lower rate. As illustrated in Figure 1, total population has grown by over 106% from 2000 to 2022 while total water use has only increased by roughly 26% over this time, indicating that water use efficiency is becoming more commonplace among customers, especially in recent years (2014-2022). This trend is likely a result of the City's Water Conservation Program initiatives, changing development patterns, and the Energy Policy Act of 1992, which set maximum flow rates and flush volumes for bathroom fixtures.

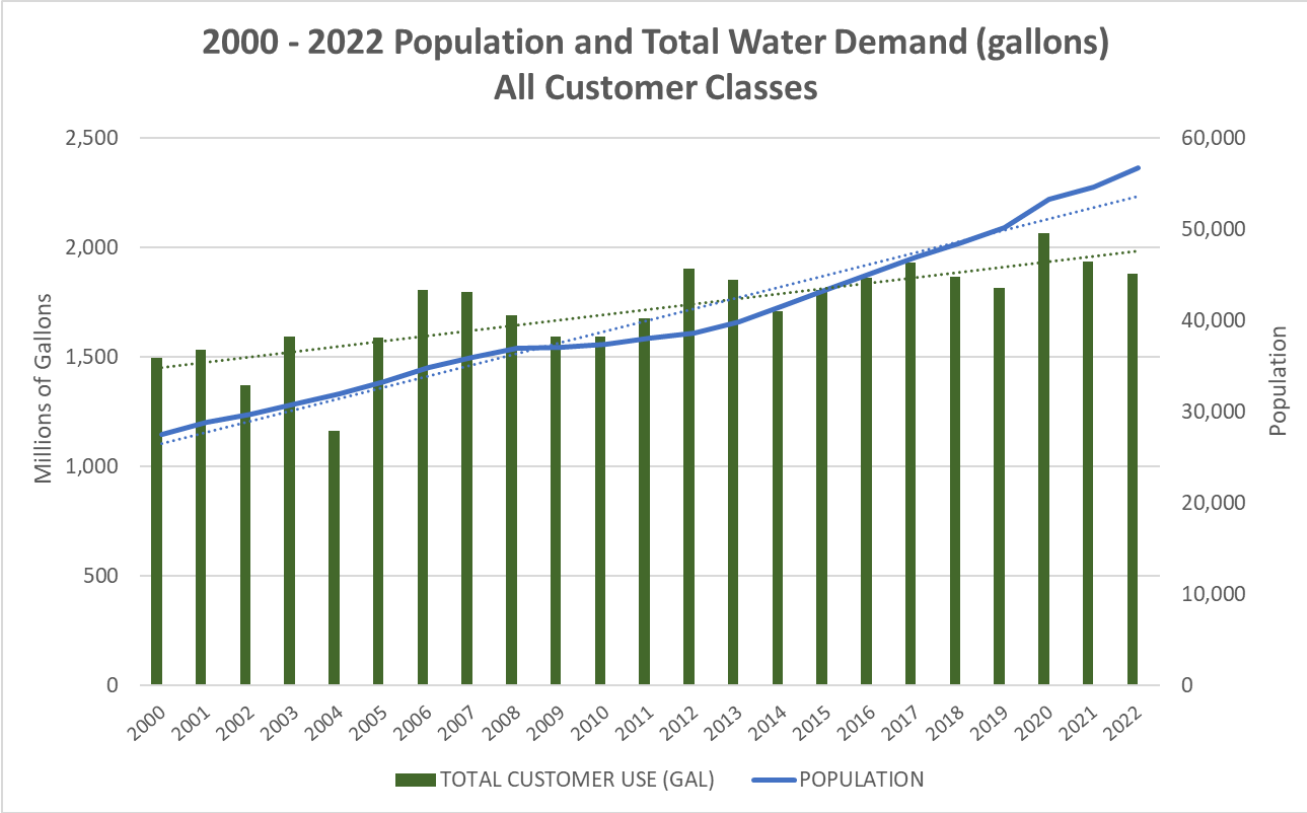


Figure 1. Population and Total Water Demand (gallons) from 2000 – 2022 for All Customer Classes

Figure 2 displays the average proportion of annual water demand consumed by each of the City’s customer classes. Residential customers (single family and multi-family) represent 64% of total annual water demand. Over 13,000 of the 14,750+ connections in the City’s service area are residential. Commercial customers consume about 23% of total annual demand, with MSU (8%), government (3%), and industrial (2%) accounts making up the rest.

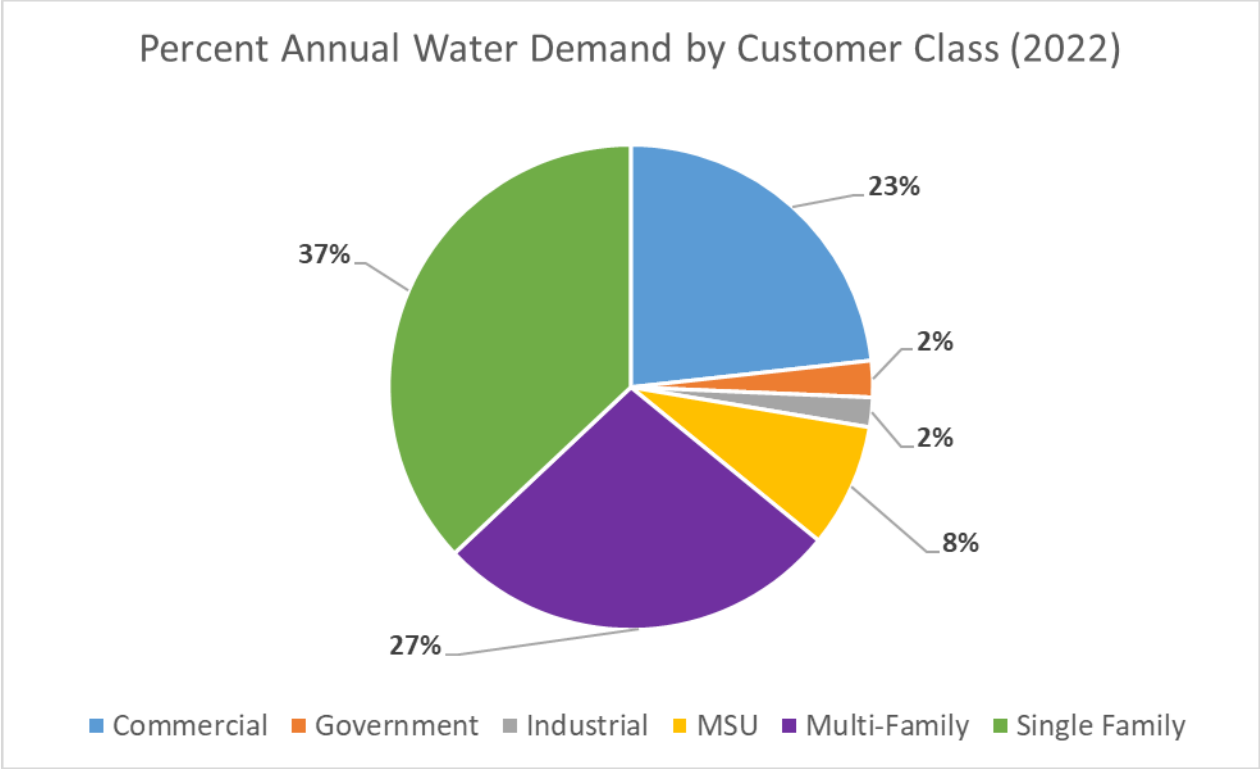


Figure 2. Percent Annual Water Demand by Customer Class (2022)

Water consumption is often characterized by daily per person use, measured in gallons per capita per day (GPCD), which can serve as a useful indication of water conservation program effectiveness such that it accounts for population growth. When evaluating GPCD demand and correlating these trends to program effectiveness, it is important to look at demand trends over the course of multiple years, as year to year fluctuations in weather can have a large impact on outdoor water use.

For these purposes, the total annual average GPCD is calculated as total annual water use (measured as the sum of annual demand from each metered connection; includes all customer classes) divided by service area population divided by 365 days. Evaluating GPCD demand using this formula provides average demand trends across all customer classes, which is necessary for informed program planning and evaluation, and provides guidance as to where program efforts should be focused.

$$\text{Total Annual Average GPCD} = \frac{\text{total annual demand from all metered connections}}{\text{service area population} / 365 \text{ days}}$$

GPCD can also be calculated to identify trends in water use among a specific customer class or during certain times of the year by adjusting the variables outlined in the equation above.

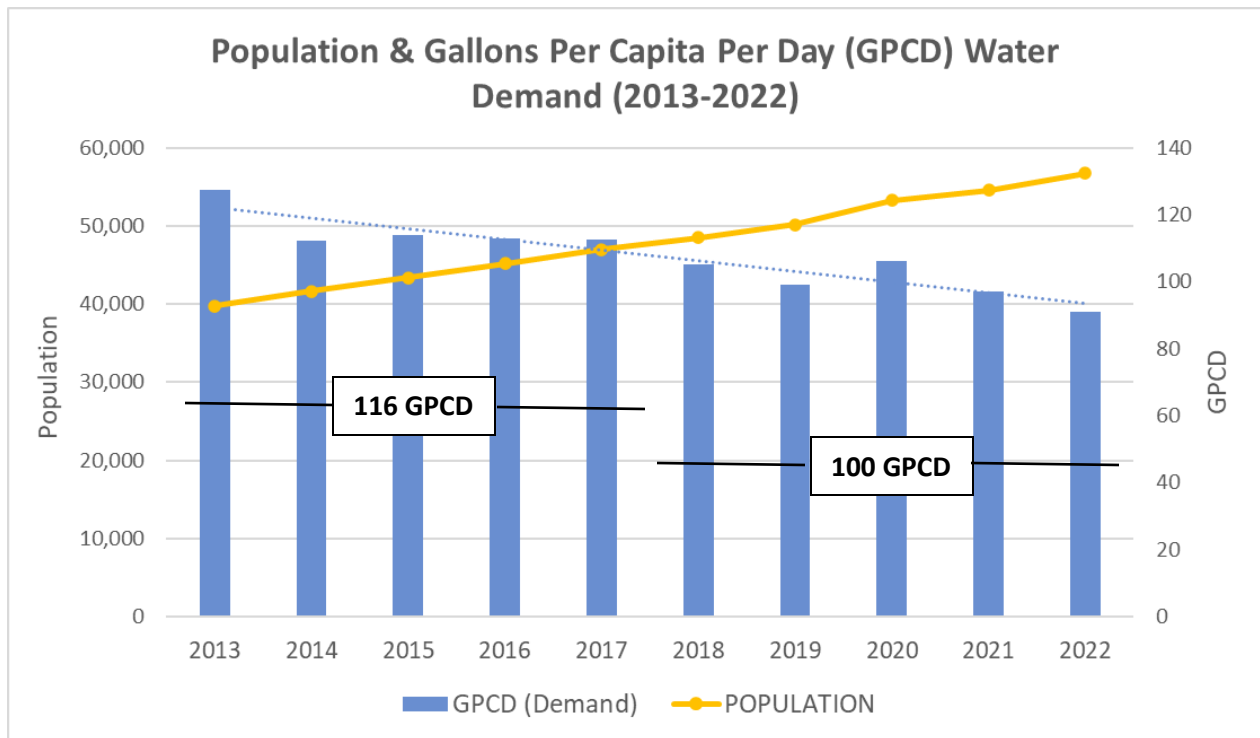


Figure 3. Gallons Per Capita Per Day Water Demand and Population (2013-2022); All Customer Classes

Total annual average GPCD demand has exhibited a downward trend despite population growth and an increase in metered connections over the last ten years. Specifically, total annual average GPCD from 2013-2017 was 116, and total annual average GPCD from 2018-2022 was 100, as illustrated in Figure 3. This represents a total 5-year average GPCD decrease of 14% since the inception of the Water Conservation Program.<sup>1</sup>

#### Seasonal and Residential Trends

Due to the high proportion of residential water demand and the high outdoor water use observed within the residential customer classes, evaluating residential water use trends is important to best target Water Conservation Program efforts. Residential water demand fluctuates significantly throughout the year, as much of the water consumed in the summer months is used on lawns and landscapes. Figure 4 illustrates water demand patterns for all customer classes throughout the year. Summer season demands from June through September increase dramatically across the single family customer class.

<sup>1</sup> The Water Conservation Program initiatives began in 2014, after the adoption of the 2013 Integrated Water Resources Plan (except for the toilet rebate program, which began in 2008).



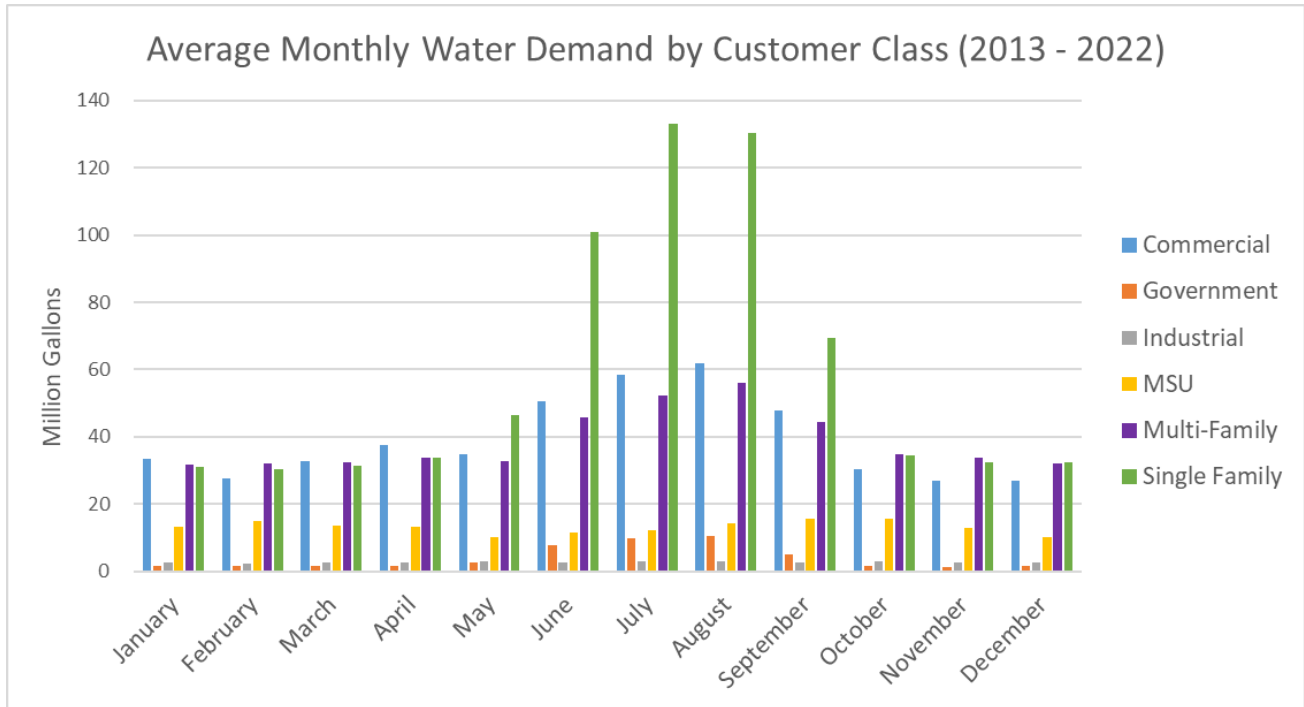


Figure 4. Average Monthly Water Demand by Customer Class (2016-2022)

Total annual average residential water demand, which includes the single family and multi-family customer classes only, has declined overall over the last ten years from 75 GPCD in 2013 to 58 GPCD in 2022. Peak average residential demand (observed during the months of July and August when outdoor watering is at its highest), has also declined overall, from 148 GPCD in 2013 to 113 GPCD in 2022.

Summer water use trends (specifically, use that occurs in June through September) can fluctuate dramatically from one year to the next due to the strong correlation between outdoor water use and local weather conditions. Specifically, outdoor water use trends closely with net evapotranspiration (net ET). Net ET is the sum of precipitation received and water lost to evaporation and plant transpiration and represents the amount of supplemental irrigation water required to maintain plant health (in units of inches). The higher the net ET, the more water plants require to remain healthy, and the more supplemental irrigation is applied to maintain plant health. This relationship is demonstrated in Figure 5, which shows single family water use trends against net ET trends.

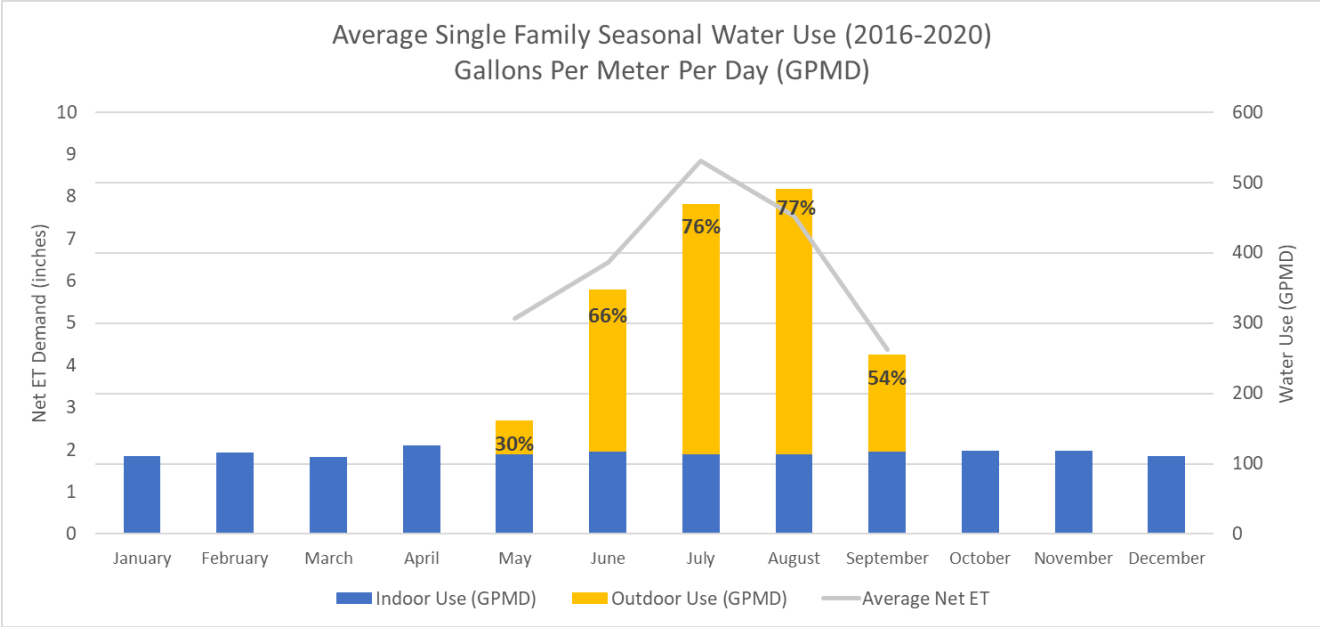


Figure 5. Average Single Family Seasonal Water Use (2016-2020) represented as Gallons per Meter per Day<sup>2</sup>

On average, 70% of total single family water use in the summer months goes to watering lawns and landscapes. Based on the data included in Figure 5, in peak months of July and August, when conditions are exceptionally hot and dry, the average single family home consumes about 480 gallons of water per day. Of the 480 gallons consumed per home per day in July and August, only 113 are used inside the home for essential uses.

### Water Conservation Rebates and Free Products

The Water Conservation Program provides free water saving products and offers rebate incentives for the installation of high efficiency indoor fixtures and appliances, as well as outdoor irrigation components and water-efficient landscaping. Free products and rebate incentives are a critical, cost-effective initiative to help achieve real, measurable water savings throughout the community.

#### Indoor Rebates

Indoor rebates are offered to water customers for the installation of WaterSense® labeled high efficiency toilets and showerheads, as well as high efficiency clothes washers that meet CEE Tier® specification, which use at least 20% less water than standard counterparts without compromising performance. Table 1 displays the total number of indoor rebate products installed from 2015 – 2022. Complimentary high efficiency showerheads provided to residents through the Showerhead SWAP Program are included in the showerhead rebate data in Table 1. Three high efficiency urinal rebates were also issued in 2022.

<sup>2</sup> 2021 and 2022 water use data were excluded from this graph because they were not representative of the correlation between outdoor water use and net ET due to a Stage 2 drought declaration in 2021 in which outdoor watering was limited to two days per week, and the implementation of permanent outdoor watering restrictions in 2022 which limited outdoor watering to three days per week.

Table 1. Number of Indoor Rebate Products Installed (2015 - 2022)

	2015	2016	2017	2018	2019	2020	2021	2022
<b>Toilets Pre-1996<sup>3</sup></b>	162	225	122	122	75	72	70	61
<b>Toilets Post-1996</b>	28	160	97	188	61	33	80	50
<b>Clothes Washers</b>	158	127	135	140	93	94	50	47
<b>Showerheads</b>	N/A	1	155	143	152	58	28	19

## Outdoor Rebates

Outdoor rebates are offered to water customers for the installation of high efficiency irrigation system components, drought tolerant plants, and the removal of high water use turfgrass. More specifically, rebates are provided for the following:

1. Weather-based ‘smart’ irrigation controllers use local weather and landscape conditions to make decisions about sprinkler system watering duration and frequency to best match plant water needs.
2. Multi-stream, multi-trajectory (MSMT) nozzles deliver water more efficiently than fixed spray nozzles, in which 50% of the water can be lost to evaporation and wind drift.
3. Rain sensors override the sprinkler system when a certain amount of rain has fallen to shut off the system. When the sensor dries, it opens the connection to allow the system to resume normal operations.
4. Drip irrigation delivers water directly to plant roots, minimizing water lost to evaporation, wind drift and runoff.
5. Drought tolerant plants require less maintenance than turfgrass and use 75% less water.
6. Turf removal results in significantly decreased outdoor water use when replaced with drought tolerant plants or other pervious material.

Table 2. Number of Outdoor Rebate Products Installed (2015 – 2022)<sup>4</sup>

	2015	2016	2017	2018	2019	2020	2021	2022
<b>MSMT Nozzles</b>	150	664	1015	1144	707	633	2157	496
<b>WaterSense® Irrigation Controllers</b>	6	13	16	35	26	19	20	17
<b>Rain Sensors</b>	6	7	18	20	15	11	3	2
<b>Drip Irrigation</b>	N/A	N/A	8	12	7	3	5	8
<b>Drought Tolerant Plants</b>	N/A	N/A	16	18	20	21	31	43
<b>Turf Removal</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	48

Table 2 outlines the total number of outdoor rebate products installed from 2015-2022. The drip irrigation and drought tolerant plant rebates began in 2017. The turf removal rebate began in 2022.

<sup>3</sup> High efficiency toilets that replace standard counterparts installed prior to 1996 are assumed to result in a higher water savings due to the Energy Policy Act of 1992, which decreased the standard flush volume from 3.5 gallons/flush to 1.6 gallons/flush. As such, the installation of a high efficiency toilet in place of a ‘pre-1996’ toilet is issued a higher rebate amount than those installed after 1996 (i.e., ‘post-1996’).

<sup>4</sup> The WaterSense® irrigation controller, MSMT nozzle, and rain sensor values represent total products installed. The drip irrigation, drought tolerant plant, and turf removal values represent total rebates issued. Actual quantities of drip irrigation components and drought tolerant plants installed, as well as square footage of turf removed, are much higher.

## Rebate Incentive Water Savings Achieved

It is estimated that over 20.3 million gallons of water have been saved through the City’s indoor rebates from 2015-2022, as represented in Figure 6.

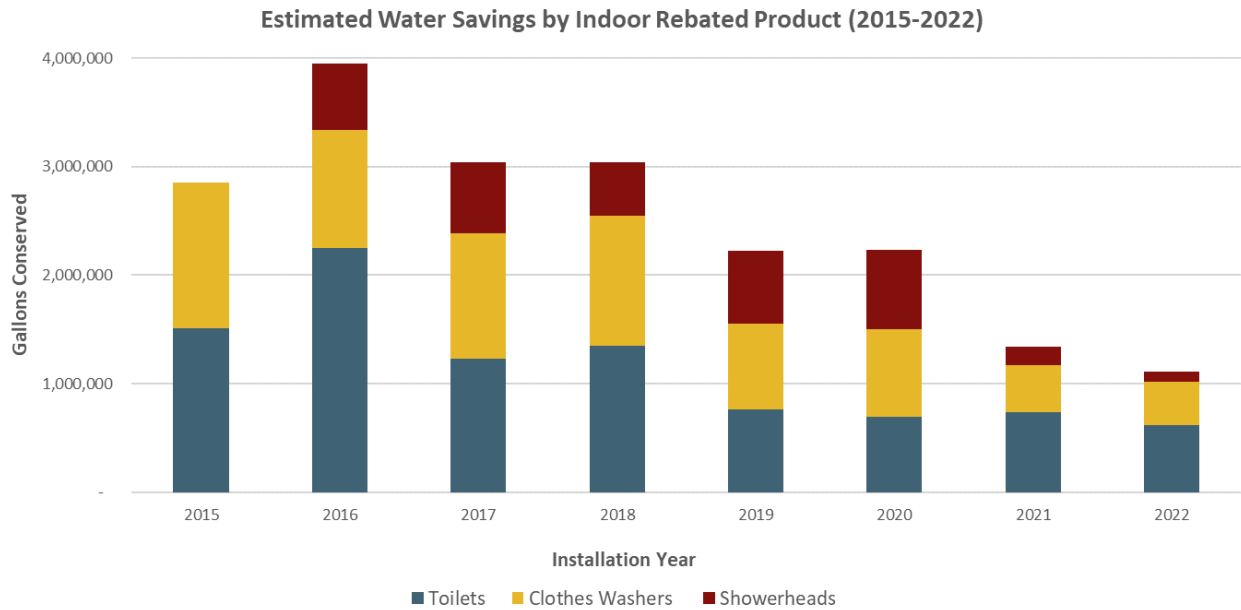


Figure 6. Estimated gallons of water saved through the City’s indoor rebate program (2015 – 2022)

It is estimated that over 7.9 million gallons of water have been saved through City’s outdoor rebates from 2015-2022, as represented in Figure 7.

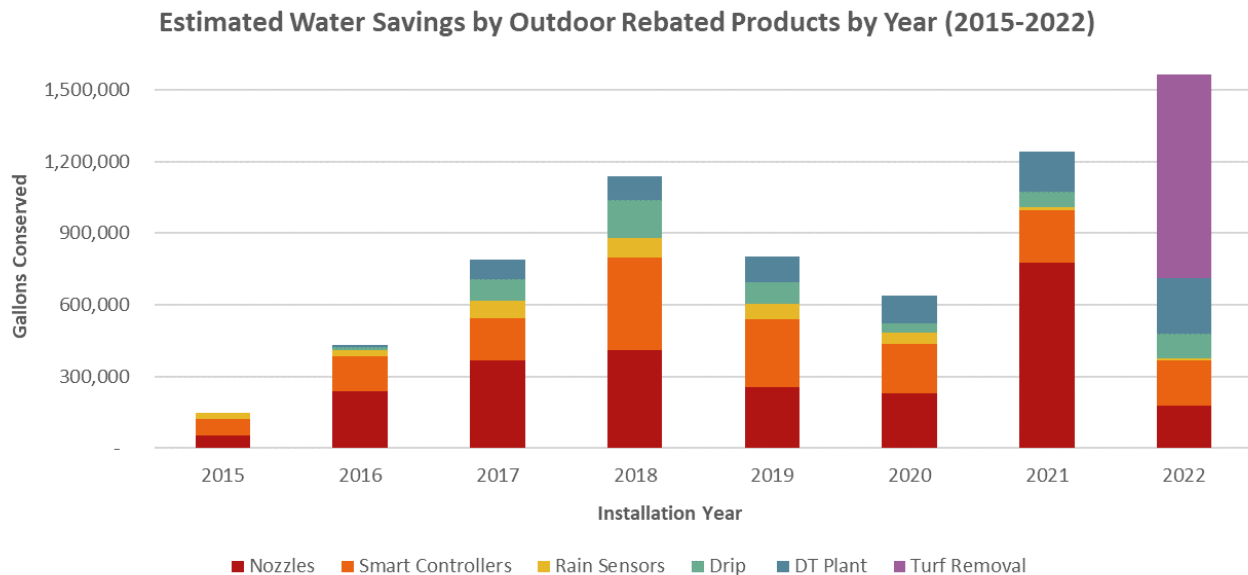


Figure 7. Estimated gallons of water saved through the City’s outdoor rebate program (2015 – 2022)

It is estimated that 28.2 million gallons of water is saved annually through all rebated products installed from 2015 – 2022. This is enough water to support 346 single family homes or 692 multifamily residences.

## Free Products

The Water Conservation Program provides free water saving fixtures and products to water customers to encourage water efficiency and ensure that water conservation is accessible and equitable for all City water users. Free products are provided to reduce indoor and outdoor water use.

### Indoor Products

**Toilet Dye Tabs:** Simple blue dye tabs dropped into the toilet tank which will cause the toilet bowl to turn blue if a leaking toilet flapper is detected.

**3" Universal Toilet Flappers:** If a water customer detects a leak using a toilet dye tab, they likely need to replace their toilet flapper. The City has 3" universal toilet flappers available for all City water users, which are compatible with most modern toilets.

**Toilet Tank Displacement Bags:** Toilet tank displacement bags can be filled with water and placed inside the tank to achieve the required water level in the tank, while decreasing the water needed to actually flush the toilet. This product is only recommended for toilets rated at 3.5 gallons/flush or greater.

**Faucet Aerators:** Faucet aerators introduce air into the stream of water on a faucet, thus decreasing water consumption without compromising pressure. 1.0 gallon/minute WaterSense® labeled dual-thread faucet aerators are available for household use and 0.5 gallon/minute WaterSense® labeled aerators are available for commercial use. From 2019 to 2022, the City has given out over 350 aerators which have the potential of saving over 3,300 gallons a day.

**Showerheads:** Free high efficiency 1.5 gallon/minute WaterSense® labeled showerheads are offered to customers through the Showerhead SWAP program. Customers must bring in their old inefficient showerhead to swap it out for a new, high efficiency showerhead. Standard showerheads use 2.5+ gallons/minute, meaning residents can save over one gallon of water for every minute of showering. The number of showerheads provided to water customers free of charge is included in the 'Showerheads' section in Table 1.

**Shower Timers:** It's easy to lose track of time in the shower. A five minute shower timer reminds residents to only take 5 minute showers. A suction cup included on the back of the timer allows for the timer to attach directly onto the shower wall.

**Fix-A-Leak Kits:** The contents of this kit are included in a water-proof bag for easy under-the-sink storage and equips residents with all of the knowledge and supplies needed to fix common household leaks. The kit includes an assortment of hose bibs and O-rings, Teflon tape, silicone grease, toilet dye tabs, a drip gauge, shower timer, and a faucet aerator. It also includes an informative plumbing guide created by the Alliance for Water Efficiency to empower residents to identify and fix leaks themselves, eliminating costs associated with hiring a professional plumber.

**Pre-Rinse Spray Valves (PRSVs):** Traditional PRSVs are rated at 3 gallons/minute or higher. The City's 1.15 gallon/minute spray valves decrease the water used to spray down dishes without compromising water pressure and performance, ensuring the spray down is effective.

#### Outdoor Products:

**Summer Savings Kits:** This kit includes a positive pressure handheld garden hose nozzle, a soil moisture sensor, and rain gauge. These items equip residents to water only when the soil requires it, and eliminate wasteful watering associated with continuous spray hose end sprinklers.

**Mulch:** Self-serve arborist wood mulch is available at two locations in the City. A 3-to-4-inch layer of mulch around trees, shrubs, and other garden plants has been shown to dramatically decrease plant watering needs by retaining soil moisture.

## Education, Outreach and Engagement

Education, outreach and engagement efforts are the foundation of the City's Water Conservation Program. Without a robust public outreach initiative, water customers will be unaware of the need to conserve water and resources available to reduce water use.

### Website Resources

The first phase of the Water Conservation Division's website went live in March 2015 and included information about the value of water, the benefits of water conservation, water resource planning information, the 2014 Bozeman Awareness and Conservation Survey, applications for indoor rebates, a home use water calculator, and other resources.

As the Water Conservation Program continues to grow, so does the Program's website content. The website now includes numerous subpages, including but not limited to residential and commercial indoor rebates, residential and commercial outdoor rebates, free products, information about the Dropcountr free water use portal, drought management, permanent outdoor watering restrictions, sprinkler system assessments, commercial water audits, drought tolerant demonstration gardens, and a suite of water-smart educational resources with indoor and outdoor water use efficiency tips and information.

Next steps for the Division's website include developing and displaying a weekly recommended watering schedule catered to Bozeman residents during the summer months, additional educational resources, and an interactive dashboard displaying Program achievements. Program achievements are a direct reflection of community efforts in advancing water conservation. These efforts serve as an excellent example that it takes each and every one of us to conserve water for the future and that together these efforts make a big impact.

All outreach materials produced, whether in print, online, or on the radio, direct customers to the Utilities Department website where the Water Conservation webpages can be accessed for more information.

### Water Conservation Videos

In 2017, the Water Conservation Program created a video titled "Water in Bozeman: The Big Picture", which is made available on the Program website. The four-and-a-half-minute video tells the story of

where Bozeman’s water comes from and why conserving Bozeman’s limited water supplies is so important. The video also highlights how the Water Conservation Program is working with schools to inform students on where their water comes from and how they can work together to conserve it.

In 2022, the Water Conservation Division worked in collaboration with the City’s Communication and Engagement team to develop a video titled “What’s the Plan? Bozeman’s Water Future”, which is made available on the Utilities Department website. The two-minute video describes Bozeman’s finite water supplies and efforts the City is undertaking to ensure that it can meet growing demands into the future.

### Water Smart Bozeman Campaign

Many Bozeman residents do not know where their water comes from, nor do they recognize the finite nature of the City’s water supply. Without this understanding, residents are less likely to recognize the importance of conserving water supplies now to ensure a reliable water supply for the future. Information about Bozeman’s water supply is regularly incorporated into the Program’s outreach materials. Outreach materials are accompanied by the Program’s slogan, ‘Water Smart Bozeman: Doing One Thing Makes A Difference’, which is intended to convey the importance of everyone doing their part to save water to ensure a reliable water supply for Bozeman’s future.

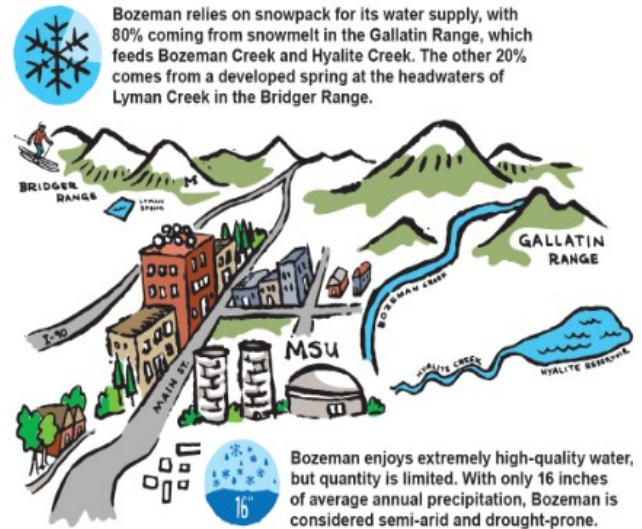


Image 1. Water-Smart Bozeman campaign image that educates residents about where Bozeman’s water comes from

### Bozeman Water Smart Guides

To support ongoing Water Smart Bozeman campaign efforts, print publications were prepared to educate the community about the many innovative and impactful ways residents can take action to conserve water in their daily lives.

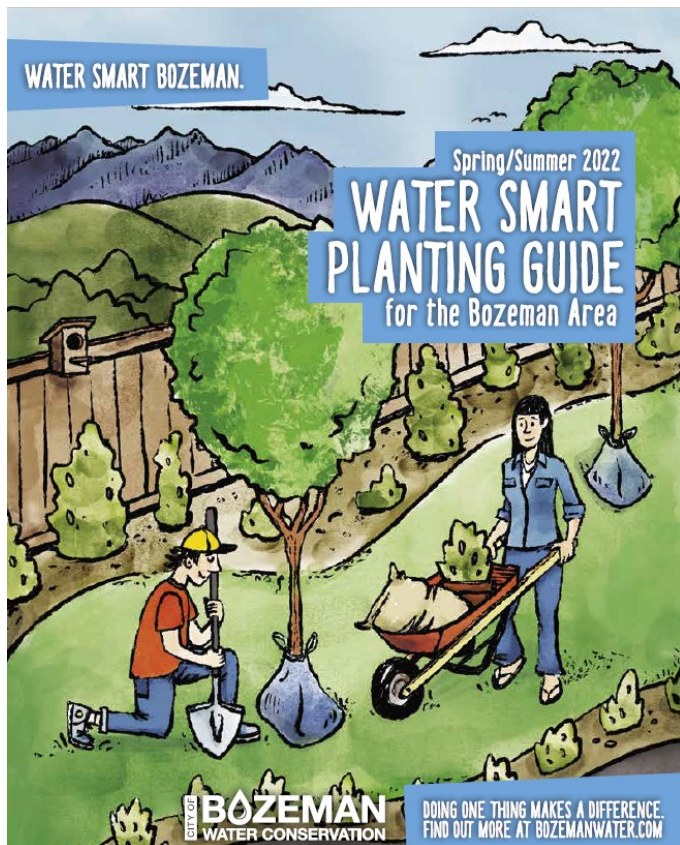


Image 2. Cover of the 2022 edition of the Water Smart Plant Guide

### Water Smart Planting Guide

In 2016, the Water Conservation Program produced the first annual Water Smart Planting Guide. Distributed every spring as a supplement in the Bozeman Daily Chronicle, this 31 page booklet includes information on Bozeman’s water supply, drought information, recommended outdoor watering practices, understanding and evaluating your irrigation system, landscape and soil health tips, composting instructions, outdoor rebate information, tips for DIY landscape makeovers, examples of how the City is doing its part to conserve water, and 10 pages of drought tolerant plants that qualify for a rebate. After being distributed in the Chronicle, the Guide is made available to residents at local plant nurseries, City offices, demonstration garden sites, and other outreach events throughout the summer months. A digital copy is made available online.

### Water Smart Indoor Guide

In 2022, the Water Conservation Program developed a Water Smart Indoor Guide to be made available to residents throughout the year. This 15-page booklet includes information on Bozeman’s drought management, how water is used among various fixtures in the home, understanding your utility statement, identifying and repairing leaks, replacing fixtures, commercial indoor water use audits and incentives, kid activities, how the City is doing its part to conserve indoor water use, and other tips and tricks for reducing indoor water use. After being distributed in the Bozeman Daily Chronicle, the Guide is made available to residents at City offices. A digital copy is made available online.

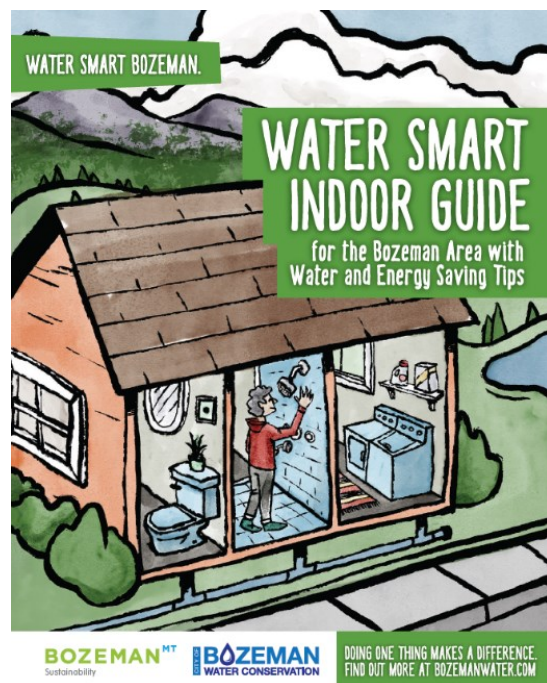


Image 3. Cover of the Water Smart Indoor Guide

### Irrigation Outreach Campaign

With roughly fifty percent of total annual residential water use going into lawns and landscapes in the summer, outdoor water use efficiency education is



paramount to Program efforts. The irrigation outreach campaign began in 2016 and runs from May through August each year. It includes information on efficient lawn watering and maintenance practices, how to incorporate drought tolerant plantings into your landscape, outdoor rebates, and more.

The campaign includes print ads in the Bozeman Daily Chronicle, online ads, social media ads, and radio ads. The distribution of the Water Smart Planting Guide in the Bozeman Daily Chronicle marks the kick-off of the irrigation campaign. The campaign also includes the distribution of utility statement stuffers to educate water customers on how to most efficiently manage lawn and landscape watering throughout the summer.

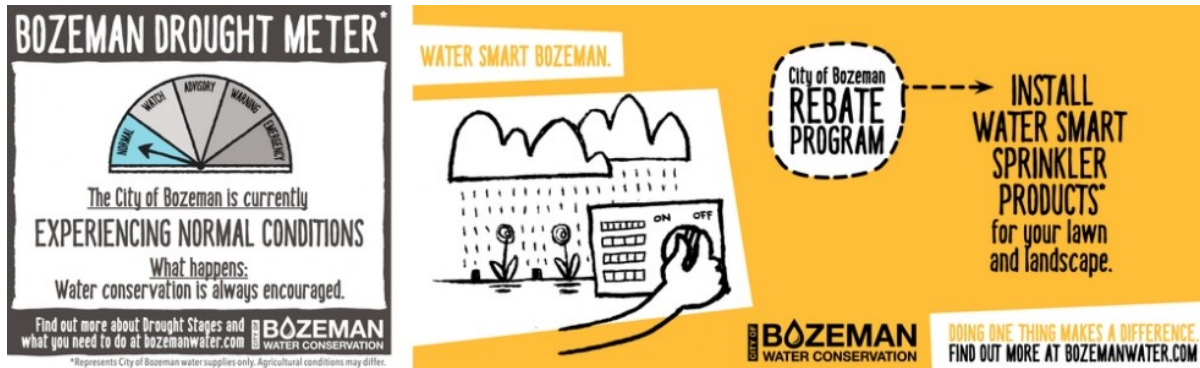


Image 4. A drought campaign advertisement informing residents about the current drought conditions in Bozeman

## Drought Campaign

Upon the adoption of the Drought Management Plan in January 2017, the Program developed a drought education campaign. Due to the unpredictable nature of drought events, it is important to educate community members about drought even during normal or wet years. The Water Conservation Program does this by creating social media posts and print ads that inform the community about Bozeman’s finite water supplies and drought prone climate regardless of season or current drought conditions. The Water Conservation Program carefully considers drought outreach needs based upon local drought conditions at any given time. Messaging will occur on a regular basis and adjust in scope and frequency pursuant to the declared drought stage (if applicable).

The Bozeman drought meter was developed as a simple, clear way of communicating current drought conditions to residents. The drought meter is published on the weather page in the Bozeman Daily Chronicle every Friday from June through September and is included on the City’s website.

## Dropcountr Water Use Portal



Image 5. Advertisement for the Dropcountr Water Use Portal

A key component to using water more efficiently is understanding how it is being used to begin with. The free Dropcountr water use portal provides water customers with the information needed to understand how they are using water inside and outside their home or business, and in turn empowers them to reduce their use. The customer-facing tool, HOME, provides water customers with the ability to track their water use at the yearly/monthly/daily timescale, compare use to similar households and utility-developed water use goals, set usage alerts to manage their bill, see which rate tiers their use falls within (single family customers), and receive leak alerts.<sup>5</sup>

Water use goals provided in HOME are specific to each customer account. The goal is based on a 'per person per day' indoor water use efficiency standard and applied to the number of people in the household. If the customer selects 'sprinkler system' in their Dropcountr profile, the goal adjusts during summer months to reflect efficient outdoor water use, which is based on the customer's irrigable area and net evapotranspiration values for that month. As of 2022, over 3,000 customers are registered for Dropcountr.

The water utility tool, CLEAR, provides City staff with geospatially represented end-use information to inform water conservation program efforts. This includes filtering customer accounts for numerous attributes such as account type, consumption, parcel size, percent-irrigated area, etc.



Image 6. An advertisement generated to promote sprinkler system assessments on the water conservation webpage

<sup>5</sup> Daily water usage and leak alerts are only available to water customers with AMI meters that communicate consistently with City data collectors receiving hourly water use data. The City's water meter replacement program is actively replacing all older meters with AMI meters capable of this data transfer. Customers without AMI meters capable of this functionality are able to access monthly water usage in Dropcountr and benefit from its many other features.

## Sprinkler System Assessments

Roughly fifty percent of annual residential water use goes into lawns and landscapes in the summer. Single family residential customers comprise the city’s largest water user class and the majority of these homes have automatic in-ground sprinkler systems.

Over time, even the most efficiently designed irrigation system will begin to break down. In absence of a regular maintenance schedule, minor operation and performance problems can continue for months resulting in excessive water use and poor irrigation efficiency. Sunken sprinkler heads that do not “pop-up” properly, misaligned spray patterns that throw water onto hardscapes, and broken or missing sprinkler heads resulting from snow plowing or mower damage can result in significant water waste if gone unnoticed and unrepaired.

Many homeowners do not know the proper duration and frequency for watering lawns, and thus set their irrigation timers to water their landscape more than necessary. In many cases, homeowners “set it and forget it”, or attempt to fix performance issues by overwatering problem areas regardless of the cause. This leads to water waste and often times could be prevented with minor irrigation system adjustments, repairs, and/or upgrades.

The Water Conservation Program offers free sprinkler system assessments to address high outdoor water use observed among residential customers in the summer. Sprinkler system assessments are an effective tool for identifying problems within an irrigation system that could be leading to water waste. This free service to residents consists of three main components: (1) site inspection to identify needs of system repairs or opportunities for increasing system efficiency, (2) system performance testing to determine the effectiveness and rate at which the system applies water to the landscape, (3) a customized watering schedule tailored to site conditions and plant water demands. Together, each component of the sprinkler system assessment can result in substantial water savings once the recommended watering schedule and performance upgrades are implemented by the homeowner.



*Image 7. Water conservation technicians performing a residential sprinkler system assessment*

Water conservation staff have been trained and certified by the Irrigation Association as landscape irrigation auditors to offer the best service to residents. After performing the sprinkler system assessment, a detailed report is sent to the resident outlining recommendations for improving system efficiency along with a recommended watering schedule and site map outlining sprinkler heads on the property.

By the end of the 2022 irrigation season, water conservation staff had completed 457 sprinkler system assessments. It is estimated that 670,000 gallons of water per year is being saved through the implementation of recommended watering schedules (includes all 454 assessments and excludes efficiency repair recommendations). Over 9,000 individual issues were identified and suggested for repair to the homeowner. Additional water savings are likely achieved through system repairs implemented by the homeowner; however, an analysis of those savings estimated has not been completed.

Table 3. Sprinkler System Assessment (SSA) Data (2016 - 2022)

	2016	2017	2018	2019	2020	2021	2022 <sup>6</sup>	Total
<b>Number of SSAs</b>	24	42	65	60	91	106	69	457
<b>Sprinkler system issues identified</b>	363	92	828	987	2,579	2,523	2,378	9,750
<b>Watering time reduction (min)</b>	-1,394	939	8,114	4,724	11,058	31,924	6,798	66,489
<b>Estimated water savings (gal)</b>	-	-	220,823	14,064	127,900	217,286	91,133	671,206

### Commercial Water Audits/Site Assessments

Bozeman commercial water customers account for about 24% of total City-wide water demand, which is largely comprised of various hospitality and tourism-based establishments. Garnering support for water conservation among the commercial sector is valuable to the City, yet challenging to achieve. Business operators are often so busy with day-to-day operational needs, they are left with little time to consider and implement water efficiency measures in the workplace. With this in mind, City staff began offering free site assessments in 2020 to assist businesses with making water-smart decisions in their workplace. From 2020 to 2022, six commercial site assessments were completed by City staff, resulting in a cumulative savings of approximately 991,000 gallons annually.

Table 4. Quantity of efficient fixture retrofits installed and associated water savings for commercial water use assessment participants (2020-2022)

Fixture Retrofit	Quantity installed	Total annual savings (gal)
Aerator	178	199,528
Showerhead	135	358,021
Toilet	85	330,602
Pre-rinse Spray Valve	2	11,499
Custom Rebate	2	91,761
<b>Total</b>	<b>402</b>	<b>991,411</b>

Table 4 outlines the total number of water-efficient fixtures installed by commercial water use assessment participants from 2020-2022.

During the site assessment, trained staff visit the commercial facility to assess all water consuming fixtures. Each fixture is inspected for leaks and its flow rate is measured in order to determine its existing water usage. On-site installation of high efficiency, WaterSense<sup>®</sup> labeled fixtures including faucet aerators, showerheads, and pre-rinse spray valves is also provided during the assessment in order to deliver immediate and measurable water savings for the business.

Following the conclusion of the assessment, City staff generate a customized report for the business featuring tailored recommendations to increase water efficiency, information on available water fixture rebates, and a customized return-on-investment spreadsheet to demonstrate the cost-effectiveness of

<sup>6</sup> In 2022 the number of sprinkler system assessments were significantly reduced due to wet weather conditions that resulted in increased cancellations.

water-efficient retrofits in the workplace. Customized rebate offerings are also generated by staff to meet the unique needs of each facility.

### Customer Engagement Resources

To assist hospitality establishments with water conservation messaging to guests, engagement signage was created by City staff. Hotel linen reuse cards were developed, which instruct guests to hang up their towels and forego laundering. Restaurant coasters and table tents were also created, informing customers that water is served only by request. All customer engagement signage is freely available to commercial water customers for use at any time. However, during a declared Stage 2 drought and above, towel and linen-reuse signage will be required for all lodging establishments.



Image 8. City-provided customer engagement signage for lodging establishments

### Drought Tolerant Demonstration Gardens

Water smart demonstration gardens were installed throughout the City to showcase the beauty of drought tolerant landscapes and inspire the community to adopt similar gardens within their own landscapes. The Water Conservation Division and the Strategic Services Department collaborated to create an interactive online map of the demonstration gardens, making information about these water-saving gardens accessible for all. The demonstration gardens consume at least 75% less water than traditional turfgrass landscapes and feature sustainable, pollinator-friendly landscape designs intended to minimize maintenance and conserve water.

### Museum of the Rockies

The Water Conservation Division partnered with Montana State University and Museum of the Rockies in 2018 to showcase efficient irrigation techniques and low water use plants suited for Bozeman's semi-arid climate. The garden beds feature a variety of water-smart and native drought tolerant plants designed to flower all season long. The plants selected are long-lived, hardy to this region, and create abundant food sources for local pollinator species. Inside the Museum of the Rockies, community members can find an informative brochure that explains water efficient practices implemented in the gardens, an extensive plant list, and the most recent version of the Water Smart Planting Guide.



Image 9. Interpretive signage at the Museum of the Rockies garden



Image 10. Drought tolerant bunchgrasses at Bozeman City Hall



Image 11. Bozeman Public Library garden



Image 12. Drought tolerant perennials at the Museum of the Rockies

## City Hall

The Water Conservation and Stormwater Divisions joined efforts in 2017 to install a demonstration garden at City Hall. The garden features permeable pavers which assist in reducing stormwater runoff, efficient drip irrigation and water smart landscaping that reduces water use. A City Hall water wise garden brochure was created to inform the community about alternatives to impermeable pavement and provide guidance on the many plant varieties and irrigation practices that reduce outdoor water use.

## N. 7<sup>th</sup> Ave. Street Medians

In 2015, The City installed drought tolerant shrubs, perennials and grasses in the medians on North 7<sup>th</sup> Avenue between the blocks of Aspen and Villard Street. The North 7<sup>th</sup> Ave. street medians provide a great example of how the right plants can thrive in harsh environments, where they are subject to pollution and heat island effects. These medians not only add a splash of color for City commuters but also use over 80% less water than turfgrass medians across town.

### Bozeman Public Library

Installed in 2019, drought tolerant plantings are featured along the west side of the Bozeman Public Library. Representing a colorful alternative to turfgrass, the raised beds use at least 75% less water than standard turfgrass. The garden boxes utilize low-volume drip irrigation to efficiently deliver water directly onto plant roots, eliminating water lost to evaporation and wind drift.

### N 27<sup>th</sup> Ave. Street Medians

In 2021, water wise landscaping was installed along the North 27<sup>th</sup> medians, extending from the blocks of Oak St. to Baxter Lane. The landscaping in these medians feature a Fescue grass seed mix that provides an example of an alternative lawn to Kentucky bluegrass. Select medians provide colorful drought tolerant plantings in a unique design as well.

### Bozeman Public Safety Center

Installed in 2022, the landscaped area at the Bozeman Public Safety Center is comprised of only 12.5% turfgrass, with drought tolerant fescue grass (60.5%) and drought tolerant perennials and shrubs (27%) making up the rest of the area. Turfgrass was used in select areas to emphasize building entries and provide space for outdoor activities. Efficient subsurface drip irrigation was installed in the boulevards to eliminate water waste from overhead spray irrigation, while trees were connected to separate irrigation valves to allow for watering during times of drought related watering restrictions.

### Events and Presentations

Water conservation staff participate in several community events every year to educate residents on where Bozeman’s water comes from and how they can do their part to conserve it. Water Conservation Program outreach efforts include structured educational presentations targeted for specific community groups as well as informal ‘tabling events’, in which staff provide water efficiency information to residents who stop by to learn about water conservation. Some of these events include Music on Main, Bozeman Farmer’s Market, MOSS Watershed Festival, Gallatin Valley Earth Day Festival, YMCA summer camps, and Montana State University’s Catapalooza. Structured educational presentations were made to college students and faculty, landscape professionals, Inter Neighborhood Council presentations, and many more. Summaries of select community events are included below.

### Bozeman Farmers’ Market

Since 2016, water conservation staff have been attending the Bozeman Farmers’ Market. This community outreach event elevates public knowledge of Program initiatives and ways residents can save water. The water conservation booth provides water-saving resources, fun trivia questions to get residents thinking about their water resources, and overall education regarding daily water use choices.



*Image 13. Water Conservation Technician, Chelsey Trevino, leading outreach activities at Bozeman’s Summer Farmers’ Market*

### Fix-a-Leak Week

The U.S. Environmental Protection Agency’s (EPA) WaterSense® Program Fix-a-Leak Week initiative provides the Water Conservation Program with a unique opportunity to educate residents about identifying and repairing household leaks. In 2022, water conservation staff set up a booth outside of ACE Hardware during Bozeman’s Run to the Pub. Prizes included a water efficient toilet and a water-saving shower flower, which were raffled to residents who stopped by the water conservation booth. Free fix-a-leak kits, toilet dye tablets and toilet flappers were provided to residents and an ACE Hardware staff member with plumbing experience participated in this event so that residents could receive a hands-on explanation of how to repair leaky toilets.

### Montana State University’s Catapalooza

Catapalooza is an annual event hosted by Montana State University where students can engage with around 400 local vendors and organizations. Water conservation staff have made multiple appearances at Catapalooza to provide students with information about Bozeman’s water supply and the importance of water conservation.

### Sweet Pea Festival Parade

In 2022, water conservation staff joined in the Sweet Pea Parade, handing out about 150 water conservation bags to parade attendees. These bags included free water-saving resources such as toilet dye tablets, aerators, and educational materials.

### Water Bottle Fill Station

The water bottle fill station was purchased in 2015 and provides residents with an opportunity to fill reusable water bottles with Bozeman’s high quality drinking water at events. The water bottle fill station is decorated with water conservation related informational decals and has made an appearance at approximately 120 community events from 2016 to 2022.



Image 14. A live toilet leak repair demonstration on Main Street to celebrate EPA WaterSense® Fix-A-Leak Week



Image 15. Water Conservation staff educating MSU students about Bozeman's limited water supplies during Catapalooza



Image 16. Water Conservation staff handing out goodies during the annual Sweet Pea Festival parade



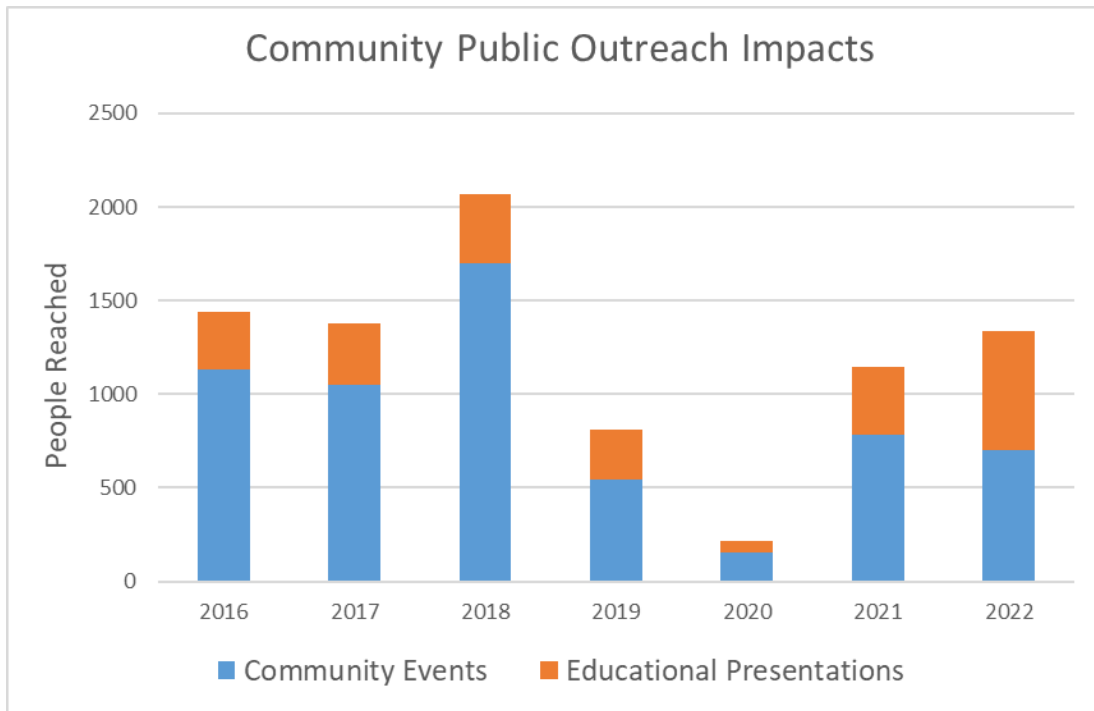


Figure 8. People reached through community events and educational presentations (2016-2022)<sup>7</sup>

### Water Wise Landscaping Seminars

In 2021 and 2022, the City hired Green Gardens Group, LLC. to host a series of online landscaping courses targeted at homeowners. This EPA WaterSense® accredited Watershed Wise Landscape Webinar Series provided comprehensive and free guidance to water customers regarding landscaping basics, turf removal and organic maintenance, irrigation efficiency, composting and soil health, and drought tolerant landscape design. Taught by experienced landscape designers through a series of five interactive online courses, this seminar provided water customers with information needed to transform their landscape, improve water quality and reduce outdoor water use. Course content was customized for the City of Bozeman and offered to customers throughout the months of May and June. Considering the limitations imposed on in-person outreach events due to COVID-19 in 2021, these online courses provided the community with an opportunity to safely engage and learn about outdoor water use efficiency.

### Landscape and Irrigation Industry Education and Course Offerings

Providing educational opportunities for landscape and irrigation professionals is paramount to achieving Water Conservation Program outdoor water use efficiency goals. As such, the City hosts professional training classes for local landscape and irrigation professionals to receive the education needed to design and install efficient irrigation systems and landscapes.

<sup>7</sup> Due to staff shortages in 2019 and isolation impacts of COVID-19 in 2020, outreach opportunities were limited resulting in fewer people reached in those years.

## Irrigation Association Classes

The Irrigation Association offers a suite of classes for landscape and irrigation professionals to provide them with the knowledge needed to install and maintain efficient irrigation systems.

Landscape certification classes hosted in Bozeman through the Irrigation Association include:

**Certified Landscape Irrigation Auditor-** Certified Landscape Irrigation Auditors (CLIAs) are professionally trained to quantify and analyze landscape irrigation water use by performing practical, repeatable, and defensible tests. A CLIA can professionally collect site data, make recommendations for system repairs and maintenance needs, develop irrigation schedules based on the site's irrigation uniformity and efficiency, and work with water managers and property owners to manage overall irrigation water use.

**Certified Irrigation Contractor-** Certified Irrigation Contractors (CIC) have met advanced qualifications necessary for installing, repairing, and maintaining irrigation systems to meet contract specifications and requirements while demonstrating an understanding of basic hydraulic, mechanical, and electrical irrigation concepts. While executing projects, a CIC will exercise a basic understanding of good business practices, abide by the legal rights and obligations of the construction contract, and adhere to Montana licensing laws and codes.

## Qualified Water Efficient Landscaper Classes

In 2021, the City was approved as a professional certifying organization through the EPA to begin offering the WaterSense® Qualified Water Efficient Landscaper (QWEL) course to local landscape and irrigation professionals. This 20-hour course covers topics such as Bozeman's local water supply, creating sustainable landscapes, the role of soil in water efficiency, calculating water budgets, irrigation system componentry, irrigation maintenance and troubleshooting, performing an irrigation system audit, irrigation scheduling for landscape needs, and information on water efficient technology. After completing this free 20-hour course, participants may take an exam to become a QWEL certified landscape or irrigation professional. Bozeman's first QWEL course was hosted in December 2022. Twenty-seven professionals attended the course and 14 of the attendees received the QWEL certification.

## Kid Activity Kits

The City offers free educational kid activity kits that teach where the City gets its water from and ways to save water at home. Each kid activity kit comes with an activity sheet that guides them in calculating their water use. Kit offerings include the Brush Better Kit, Shower Better Kit and the Can-Do Sprinkler Test Kit. The Brush Better and Shower Better Kits teach ways to reduce bathroom water use and the Can-Do Sprinkler Test Kit provides kids with an opportunity to do their own sprinkler system assessment.

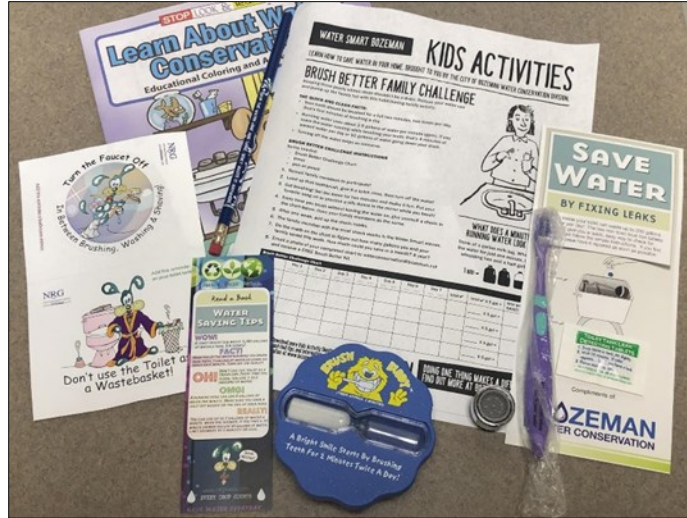


Image 17. The "Brush Better" kid activity kit includes a toothbrush, 2-minute brush timer, stickers, toilet leak detecting dye tabs, and an educational activity sheet.

### Project WET School Curriculum

In 2015, the Water Conservation and Stormwater Divisions worked with Project WET to create the Bozeman Water Conservation and Stormwater Management Educator Guide to be used in local schools at the 5<sup>th</sup> and 6<sup>th</sup> grade level. The Educator Guide includes five place-based, hands-on lessons about water quality, water conservation, and watershed literacy. The Water Conservation Division worked closely with Project WET to host teacher trainings that would allow teachers to feel confident incorporating the lessons into their curriculum.

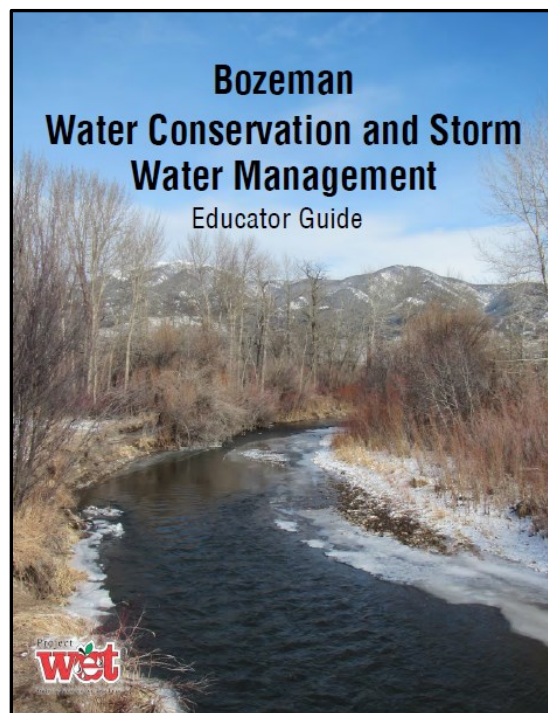


Image 18. The cover of the Project WET curriculum guide

From 2015 – 2018, teachers taught the curriculum to over 1,300 students. In 2018, Project WET revised the curriculum to target 5<sup>th</sup> grade learning objectives specifically and submitted the curriculum to the Bozeman School District for adoption as a base resource, which would make it part of the mandatory science curriculum. The Educator’s Guide was instead adopted as a supplementary resource for teachers to add into their standard science curriculum voluntarily.

In 2022, the City of Bozeman and Montana Outdoor Science School (MOSS) entered into an agreement to implement the Bozeman Water Conservation and Stormwater Management Educator Guide Curriculum – Direct Student Engagement Program (Program). Six 5<sup>th</sup> grade classrooms totaling 173 students participated in the City’s 2022 Program with MOSS.

Table 5. Project WET School Curriculum Participation (2015 - 2022)

School Year <sup>8</sup>	# of Participating Teachers	# of Participating Students
2015	3	81
2016	5	473
2017	7	492
2018	2	260
2022	6	173

## Utility Management

### Senior Center Bulk Retrofit

In October 2016, the Water Conservation Division partnered with the City Facilities Division to install high efficiency fixtures in the Senior Center. This included the installation of 18 high efficiency WaterSense® labeled toilets and two high efficiency WaterSense® labeled urinals. An analysis of water consumption since the retrofit shows that the Senior Center is using **41% less water** than it did before the installation of high efficiency plumbing fixtures. This project has also resulted in **water bills that are 26% lower** than they were before the installation of these products.

### City Park Central Irrigation Control System

In 2016, the Water Conservation Division partnered with the Parks Department to select a Central Irrigation Control System (CICS) for use at City Parks. The CICS allows for remote access to all park irrigation systems connected to the CICS. This provides City staff with the ability to program, monitor, and adjust irrigation control settings without needing to travel to each location. The CICS also includes ‘smart’ technology that allows for automatic program adjustments based on weather and includes flow sensing to identify leaks and send leak alerts to City staff.

### City Facility Aerator Installation

In 2018, the Water Conservation Division partnered with the City Facilities Division to retrofit all lavatory faucets in City facilities with 0.5 gallon/minute faucet aerators, which is estimated to reduce hand washing water use by nearly 80% compared to pre-existing standard faucet aerator flows.

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<sup>8</sup> The curriculum was not implemented in the 2020 and 2021 school year due to COVID-19 (2020) and the City’s transition to the Direct Student Engagement Program with MOSS (2021).

## City Facility Irrigation Audits

In 2021 and 2022 water conservation staff completed a total of three irrigation audits (also referred to as sprinkler system assessments) at City facilities, including City Hall, Fire Station 3, and the Stiff Professional Building. Each assessment was followed by the development of a comprehensive report outlining specific issues observed in each irrigation zone, recommendations for repairs, recommendations for increasing system efficiency, a system site map, and recommended watering schedules for early summer, mid (peak) summer, and late summer/early fall. Next steps include collaborating with the City Facilities Division to identify opportunities to implement report recommendations.

## Sunset Hills Cemetery and Lindley Park Water Conservation Project

The Sunset Hills Cemetery and Lindley Park Water Conservation Project installed infrastructure to convey the City's irrigation water right on Bozeman Creek efficiently and effectively to Sunset Hills Cemetery to be used for irrigation. Prior to the completion of this project, the City spent roughly \$25,000.00 per year to use treated, potable water to irrigate the lands at Sunset Hills Cemetery. The completion of this project not only reduces operating costs for the City, but it also conserves over 11 million gallons of potable water previously used to irrigate the cemetery, increases availability of domestic water supplies during periods of drought, reduces safety risks to city staff associated with operation of the original Bozeman Creek diversion structure, and increases instream flows for fish habitat.

The scope of this project included the following work:

- Replacement of the original Bozeman Creek diversion to Story Ditch with a new automated diversion and aquatic species passage rock ramp;
- Installation of 800 feet of 24-inch diameter pipeline to convey water from the diversion point to pump station;
- Construction of a 1,250 gallon per minute pump station on Story Ditch;
- Construction of 850 feet of pipeline from the pump station to the irrigation system at Sunset Hills Cemetery; and
- Leak detection of the existing irrigation system at Sunset Hills Cemetery.



*Image 19. Installation of Automated Diversion Structure*



Image 20. Installation and Measurement of Aquatic Species Rock Ramp

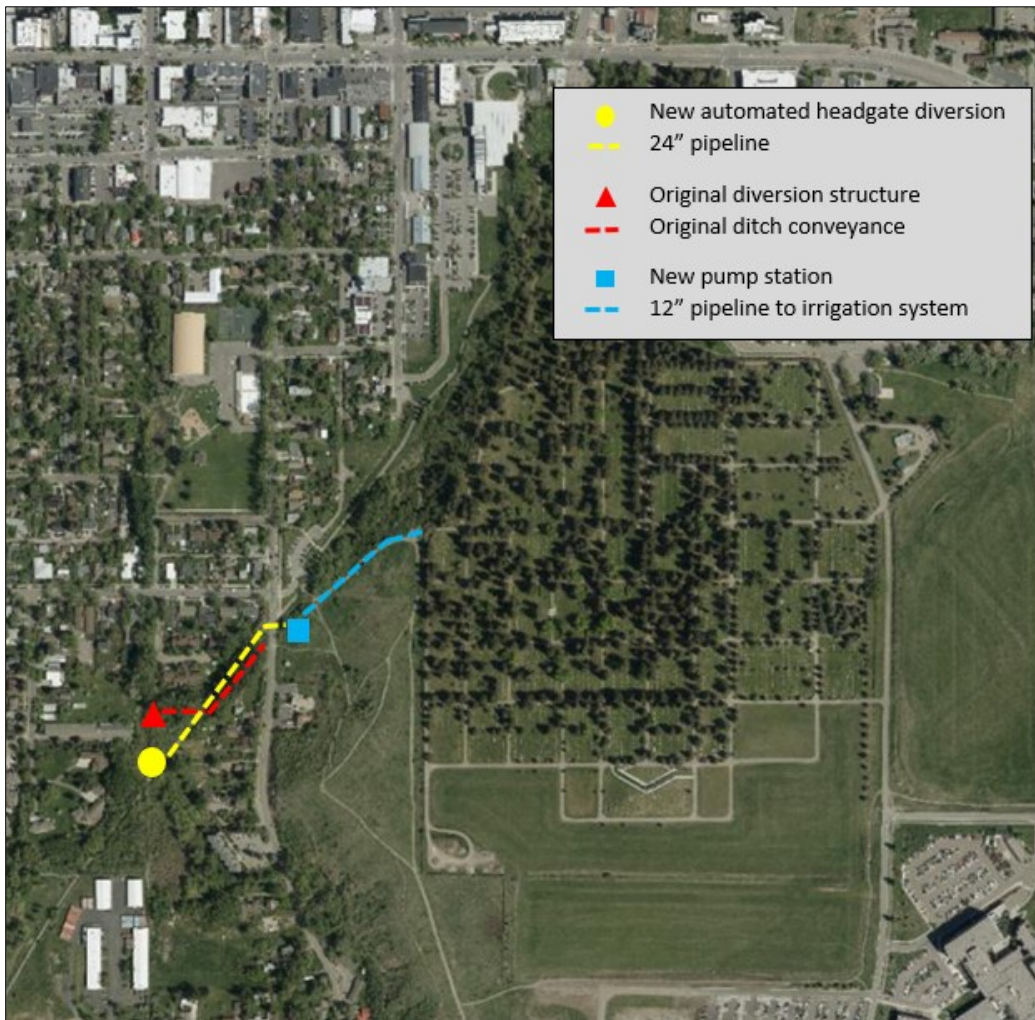


Image 21. Sunset Hills Cemetery and Lindley Park Water Conservation Project

The project was completed in 2019 and was funded by the City of Bozeman, the Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant Program, and the Montana Department of Natural Resource Renewable Resource Grant and Loan Program.

## Utility Water Loss Audit

The Utility Department proactively manages water loss through proactive leak detection, customer meter replacement, and careful customer meter reading data management. To better understand the impact of current practices and identify opportunities to augment those practices, an American Water Works Association (AWWA) utility water loss audit, including a review of current water loss management practices and a real loss component analysis (RLCA), was completed in 2021.

An AWWA water loss audit compares the volume of water supplied with the volume of authorized uses in a year to calculate the volume of water loss. The volume of water loss can be split into two important types of loss that are managed differently, real loss and apparent losses. Real losses are physical leaks in the distribution system before customer meters. Apparent losses are nonphysical losses that occur when water is successfully delivered to customers but is not measured or recorded accurately. The RLCA subdivides the volume of real losses from the water audit into categories to help identify the most appropriate loss management strategies. Although some amount of leakage is inherent in any distribution system, the findings and recommendations from this audit are critical for providing staff with the information needed to prioritize and implement future water efficiency projects in a manner that is most cost effective and achieves the greatest amount of water savings.

## Net Blue Water Offset Project

The Net Blue Water Offset Project was a partnership between the Alliance for Water Efficiency (AWE), a stakeholder-based nonprofit organization dedicated to the efficient and sustainable use of water, and the Water Conservation Division to develop a water neutral growth incentive or policy for the City of Bozeman. This project was based upon the Net Blue Toolkit, which was developed by AWE in collaboration with cities from across the country. The Toolkit includes a water demand offset ordinance template and methodology workbook to use in creating policies for water-neutral community growth in new developments. This includes methods for offsetting the projected water demand of new development through implementation of water efficiency measures to create a neutral or reduced impact on water supplies.

These water demand offset policies may include the following conditions: mandatory or incentivized, applied to indoor or outdoor water use, required for all new developments or only those with a water demand above a specific threshold, implemented through offsite or onsite efficiency measures, in effect throughout the year or only in times of drought, presented as an alternative to cash-in-lieu fee requirements or included in addition to cash-in-lieu fee requirements; applied to various development types;; or established to offset the development's entire water demand or only a portion of the demand.

This project provided City staff with additional water efficiency, community planning, and legal policy support, which resulted in the development of a revised water adequacy policy (adopted in 2020) and a revised Water Adequacy Administrative Procedures Manual (WAPM). The water adequacy policy and WAPM outlines voluntary water efficiency offset incentives that developers may pursue to reduce their water demand, which in turn reduces their cash-in-lieu of water right fees associated with meeting water adequacy requirements in new development.

## Community Projects

### HRDC Low Income Bulk Retrofit Project

HRDC properties bathroom fixture replacement project was a partnership with HRDC and the Water Conservation Division to upgrade HRDC's single family and multi-family properties by installing high efficiency bathroom fixtures in all bathrooms. The multi-family retrofits were completed in December 2015, and the single family residence retrofits were completed in January 2016. The multi-family properties that participated in this program achieved a **35% reduction in annual consumption** the year following product installation when compared to the 5-year average consumption prior to installation. Single family properties realized a **22% reduction in annual consumption** the year following product installation when compared to the 5-year average consumption prior to installation. These retrofits provided water, energy and monetary savings for families in need who might not otherwise be able to participate in the City's rebate initiatives.

### MSU Native Grasses Project

In an effort to identify various native grass cultivars that can thrive with little or no supplemental irrigation after establishment, no fertilizer and infrequent mowing, the Water Conservation and Streets Divisions partnered with Montana State University Professor of Plant Sciences, Tracy Dougher, to study how various drought tolerant native grasses perform under extreme landscape conditions. Two street medians were used as test sites to develop protocols for use throughout the city.

The project was intended to provide the development community with viable drought tolerant grass alternatives to consider when designing landscapes and determining water requirements for a project.

After the completion of the study, Dr. Dougher provided results to City staff, indicating which grass cultivars were most successful. Results from this study were used to directly inform the development and installation of seed mixes used in the N 27<sup>th</sup> Ave. median and the Bozeman Public Safety Center demonstration sites.



*Image 22. The Native Grasses Project was conducted in collaboration with Montana State University Professor, Dr. Tracy Dougher.*





*Image 23. A North 27th traffic median with a drought tolerant fescue blend seed mix*

## Drought Management

In 2017, the City adopted its first Drought Management Plan to reduce water usage during times of shortage. The Plan includes a drought vulnerability assessment, drought monitoring and declaration framework, targeted drought communication strategies, drought response measures, and drought response enforcement. Water conservation staff monitor drought conditions throughout the year through a drought monitoring tool, which evaluates local water supply data and regional drought indices to evaluate current drought status. The drought monitoring tool generates a composite drought score, which correlates to drought stages outlined in the Drought Management Plan to provide City staff with needed information to evaluate drought risk and make recommendations for a drought declaration, as needed.

Four stages of drought are outlined in the Plan, increasing in severity from Stages 1 through 4. Each stage includes an achievable system-wide water reduction target which correlates to the response measures recommended for each stage.

Stage 1 Drought Watch	Stage 2 Drought Advisory	Stage 3 Drought Warning	Stage 4 Drought Emergency
Conserving water is encouraged, but not mandatory. <ul style="list-style-type: none"> <li>• 0-22% drought surcharge</li> <li>• 10% system wide water reduction target</li> </ul>	Mandatory outdoor watering restrictions begin. <ul style="list-style-type: none"> <li>• 10-39% drought surcharge</li> <li>• 20% system wide water reduction target</li> </ul>	Lawn watering ban in effect. Outdoor water use is restricted. <ul style="list-style-type: none"> <li>• 20-100% drought surcharge</li> <li>• 30% system wide water reduction target</li> </ul>	Water is rationed for essential uses only. <ul style="list-style-type: none"> <li>• 25-200% drought surcharge</li> <li>• 40% system wide water reduction target</li> </ul>

In 2019, the City adopted drought surcharge and drought reserve utility rates for water customers. The drought reserve is a \$0.08 charge per hundred cubic feet of water (HCF) that is applied to all Bozeman water customers regardless of drought conditions. Drought surcharges only go into effect during a declared drought and vary based on customer class and volumetric use. Drought reserve and surcharges are intended to mitigate financial impacts to the water utility resulting from decreased revenue from watering restrictions, as well as incentivize water conservation specifically during times of drought.

EXPECTED INCREASE AMOUNT BASED ON DECLARED DROUGHT STAGE				
	STAGE 1	STAGE 2	STAGE 3	STAGE 4
<b>Single Family Residential</b>				
Tier 1 (0-6 HCF)	0.0%	10.0%	20.0%	25.0%
Tier 2 (6-25 HCF)	21.9%	39.6%	100.0%	200.0%
Tier 3 (25-55 HCF)	21.9%	39.4%	100.0%	200.0%
Tier 4 (55+ HCF)	21.8%	39.4%	100.0%	200.0%
<b>Multi-Family Residential</b>	15.6%	23.8%	23.8%	25.0%
<b>Commercial</b>	15.6%	25.0%	25.0%	25.0%

Image 24. A chart used in outreach materials that guides water customers through utility bill drought surcharges

In the summer of 2021, the City experienced drought conditions that resulted in a Stage 2 drought declaration. Response measures limiting outdoor water use to two days per week were enacted and drought surcharges went into effect. Throughout the course of the drought declaration, a communications campaign was in effect with a goal of reaching water customers to inform them of drought conditions, mandatory response measures, and surcharges. By the end of the drought declaration, total system-wide water use was reduced by 23%, exceeding the 20% reduction goal

associated with a Stage 2 drought declaration. This water use reduction demonstrates that the Bozeman community did their part to reduce use during times of shortage, successfully ensuring that the utility had water to support essential uses. The drought declaration of 2021 prompted updates to the City’s drought declaration process, resulting in the development and adoption of the 2022 Drought Management Plan.

## Tiered Rate Structure

**Tier 1: 0-6 HCF\***  
**Normal, essential/indoor water use.**

- The average indoor water use for an average home in Bozeman is 4.7 HCF
- The cost per unit (HCF) of water in this tier has decreased from the previous Tier 1 rates, making water for essential use now more affordable.

**Tier 2: 6-25 HCF\***  
**Responsible outdoor water use.**

- An average home watering their lawn to meet, and not exceed, the average needs of the lawn during the summer months will fall into this tier.

**Tier 3: 25-55 HCF\***  
**Inefficient outdoor water use.**

- This size of this tier is based on the amount of water needed to apply twice as much water to your lawn as is required in peak season (July/August) when conditions are exceptionally hot and dry.

**Tier 4: 55+ HCF\***  
**Excessive outdoor water use.**

- Water used is more than twice the amount of water needed to meet peak lawn watering needs in the summer.

\* HCF (hundred cubic feet) is equal to 748 gallons.

Image 25. The single-family tiered rate billing structure encourages water conservation among residents by keeping volumetric rates lower for customers who use water efficiently.

In 2019, the City Commission adopted revised water rates based on a cost of service analysis that identified the true cost of serving each utility customer class. A tiered, inclining block rate was developed for the single family customer class to ensure that customers pay for the true cost of usage, keeping the cost of water for essential uses low, and sending a price signal that speaks to the value of Bozeman’s limited water supplies. In a tiered, inclining block rate structure, the cost of water per unit used increases from one tier to the next. Each of the four tiers were sized based on Bozeman-specific water use and parcel size data to accurately capture water for essential uses (tier 1), responsible outdoor use (tier 2), inefficient outdoor use (tier 3), and excessive outdoor use (tier 4). This type of rate structure ensures that water rates are equitable among a customer class with widely varying outdoor water use patterns.

## Permanent Outdoor Water Use Restrictions

The months of May through September often lend to hot and dry summer conditions in Bozeman. When these conditions occur, city-wide water demand increases substantially due to the watering of lawns and landscapes. Turfgrass lawns are usually irrigated by means of overhead spray irrigation and require about 15 gallons of supplemental irrigation per square foot, per irrigation season in order to maintain a healthy appearance.

In 2022, the Bozeman City Commission adopted mandatory permanent time of day and day of week outdoor watering restrictions for the use of overhead spray irrigation. Restrictions are permanently in effect every year, regardless of conditions and apply to all systems connected to city water for irrigation. These restrictions limit watering only during the most efficient times of the day and require that a property irrigate no more than three days per week.



Image 26. Time of day and day of week restrictions for the use of overhead spray irrigation apply to all residents connected to City of Bozeman water supplies.

## Exemptions

A 45-day exemption is permitted for the installation of new sod on a property to accommodate establishment watering needs. Irrigation for the purposes of sprinkler installation, repair, and maintenance is also permitted anytime to ensure that systems function efficiently and can be repaired as quickly as possible. Hand watering with a positive shut-off nozzle and the use of low-volume drip irrigation for the purposes of irrigating food gardens and ornamental landscape plants is always permitted. Bozeman residents connected to private wells are not required to comply with the permanent watering restrictions, but voluntary participation is always encouraged by staff.

Criteria were developed for special circumstances in which an exemption or relaxation from the water restrictions is required. All criteria are outlined in *Administrative Order 2023-02: Outdoor Water Use Restrictions Administrative Procedures Manual*.

## Enforcement

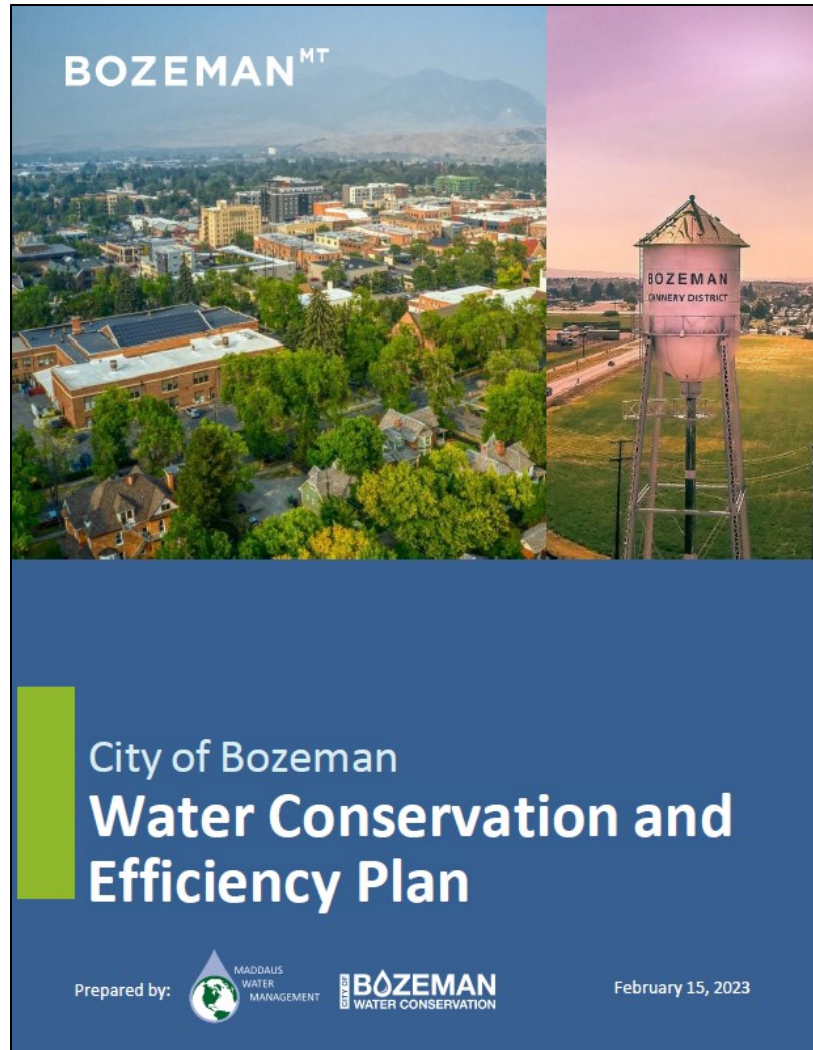
Water conservation staff rely primarily upon community notifications to identify cases of non-compliance throughout the City. Residents can contact the Water Conservation Division by phone, email or online survey to report non-compliance. Upon receipt of a notification, City staff directly contacts the property owner to inform them of the non-compliance. Repeat violators will be contacted by water

conservation staff via door hangers and certified mail, urging compliance. Eventually, water service at the violator's property may be discontinued and fines may be issued.

## Water Conservation Plan

Water conservation is an integral part of the City's long term water resource planning efforts and essential to ensuring that the City can meet future demands as it continues to grow. Recognizing the important role that water conservation plays in meeting future water demands, the City hired a consultant with expertise in water conservation plan development to create a robust, 20-year water conservation plan for the City.

The plan evaluates various program measures through the lens of qualitative and quantitative screening criteria to determine which measures are best suited for implementation in Bozeman. Quantitative screening criteria include a benefit cost analysis for each program measure considered for implementation. This analysis provides the City with an understanding of achievable water savings for each individual program measure, as well as budgetary and staffing needs required to successfully implement each measure.



*Image 27. Cover of the 2023 Water Conservation Plan*

The water conservation plan serves as a framework for Program planning. However, it is important to recognize that City priorities evolve, resources fluctuate, water use patterns change, water-efficient technologies rapidly improve -- and that plan implementation needs to be adaptable to these and other changing circumstances. As such, the City identified a need to have a planning tool capable of capturing these changing circumstances to maintain flexibility in Program planning and implementation while accurately capturing water savings projections. To meet this need, the City was provided with a populated Least Cost Planning Decision Support System Model (DSS Model) from its consultant. The DSS Model was used to prepare long-range, detailed demand projections, and includes extra detail to enable a more accurate assessment of the impact of water efficiency programs on demand, and provide a rigorous and defensible modeling approach necessary to support staff in informed program decision making.

The water conservation plan will be brought to the Bozeman City Commission for adoption in late 2023 and will serve as a guide for future program development as well as inform City of Bozeman long term strategic water resource management.

