

2020 Water Conservation Status Report



City of Colorado Springs
Parks, Recreation and Cultural Services



Executive Summary

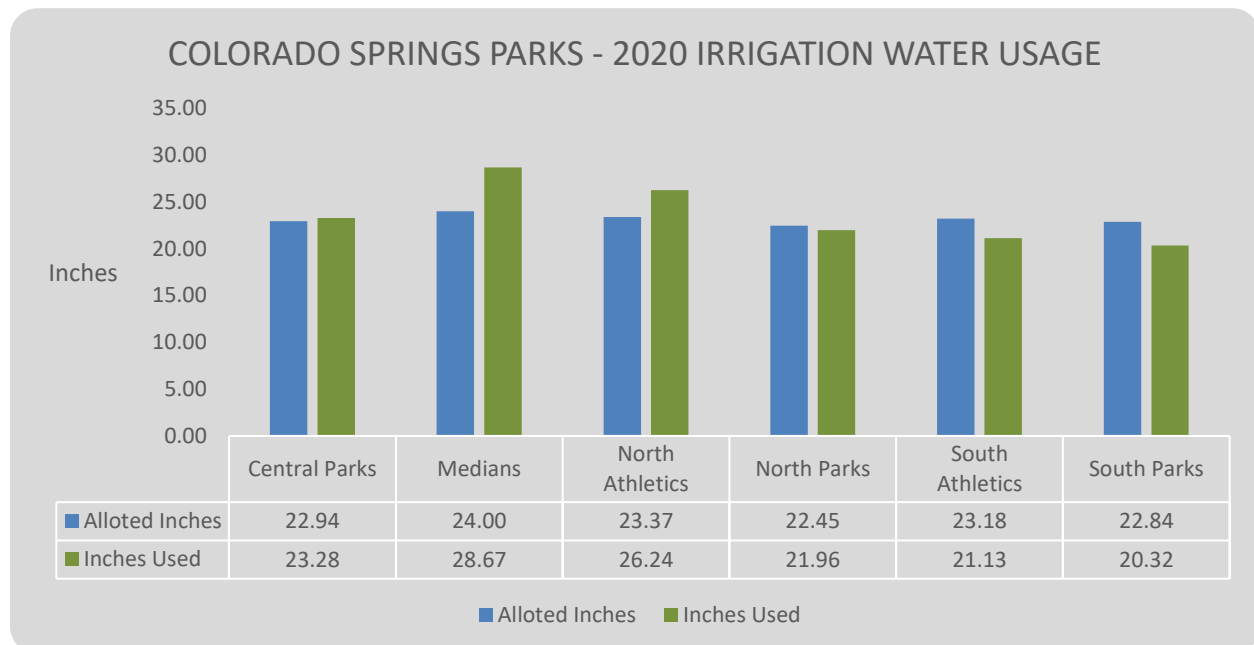
In 2010, the Colorado Springs Parks, Recreation and Cultural Services Department, in conjunction with Colorado Springs Utilities, developed a multi-faceted Water Conservation Program for the park system. The program was implemented to improve irrigation system infrastructure, provide educational resources to Parks staff, and to create a culture of water use efficiency. The program is now in its 11th year and continues to be a primary focus and priority of senior leadership and parks staff.

The Department manages irrigation systems that deliver water to over 860 irrigated acres of turf, native grasses, landscape plants, and trees. To meet the never-ending maintenance challenge of keeping the irrigation systems operating at peak efficiency, the Department employs 38 ALCC (Associated Landscape Contractors of Colorado) Certified Irrigation Technicians to maintain the irrigation systems and manage annual water allotments. A full-time Water Conservation Specialist is also on staff to lead and support program goals.

The focus of the Water Conservation Program, and this report, is related to irrigation water use in the neighborhood and primary parks, sports complexes and downtown medians.

2020 Irrigation Water Usage

As shown in the chart below, actual water usage compared to the water allotment was variable among districts. With the extremely warm and dry weather that was experienced throughout the summer months, District Supervisors were given the directive, that if needed, to use additional water above and beyond the allotment at certain sites. As a contingency for extra water needs, over the last 2 years, a project account was created to provide additional funding when the current year budget would not cover the cost of water demand. In 2020, this project account had a balance of \$383,000.



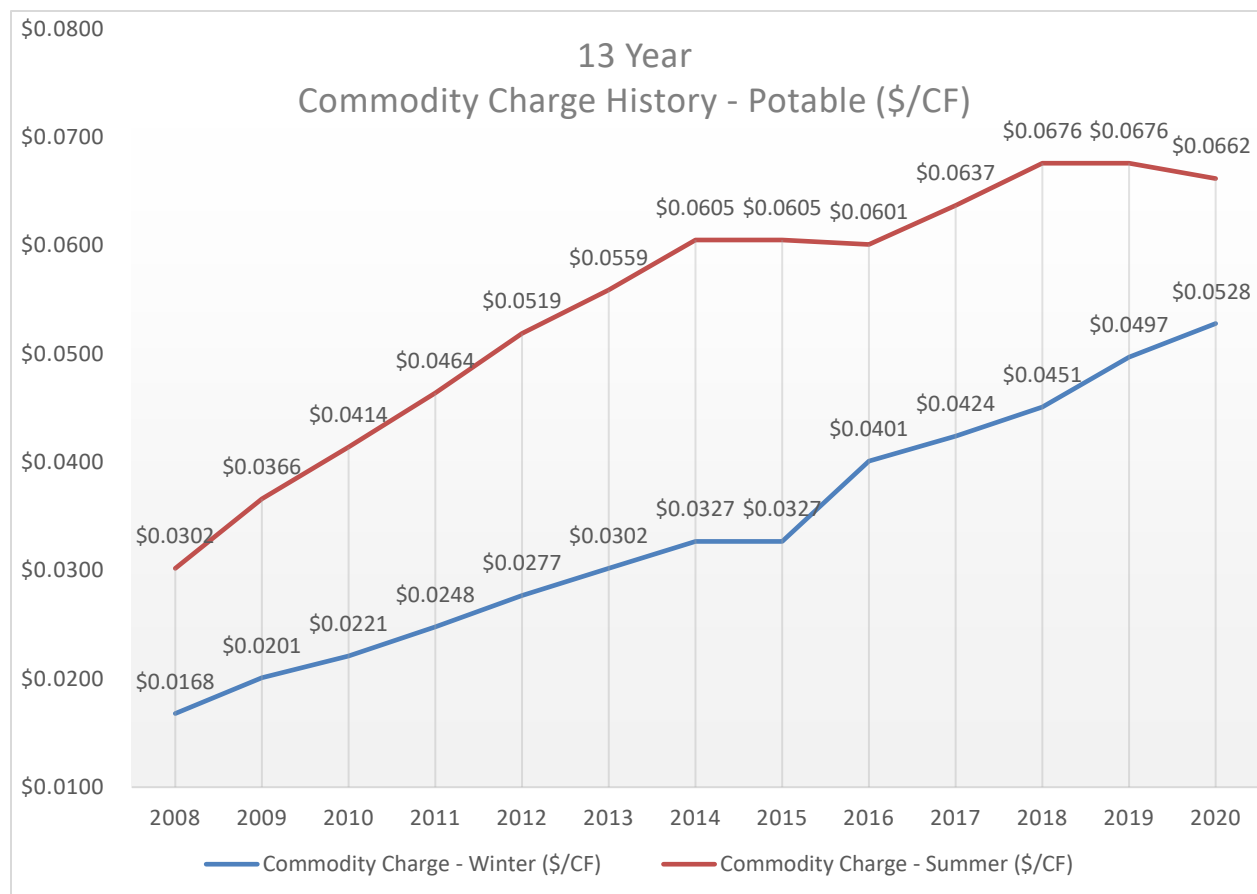
Water Sources and Rates

Potable Water

Colorado Springs is the only large city along the Front Range not built around a major river. For this reason, the majority of its drinking water comes from snow melt approximately 100 miles away and is transported through a series of pipes, tunnels, reservoirs and pumping stations. Because of the complexity and scale of its water system, the cost of water is high relative to other large water providers along the Front Range.

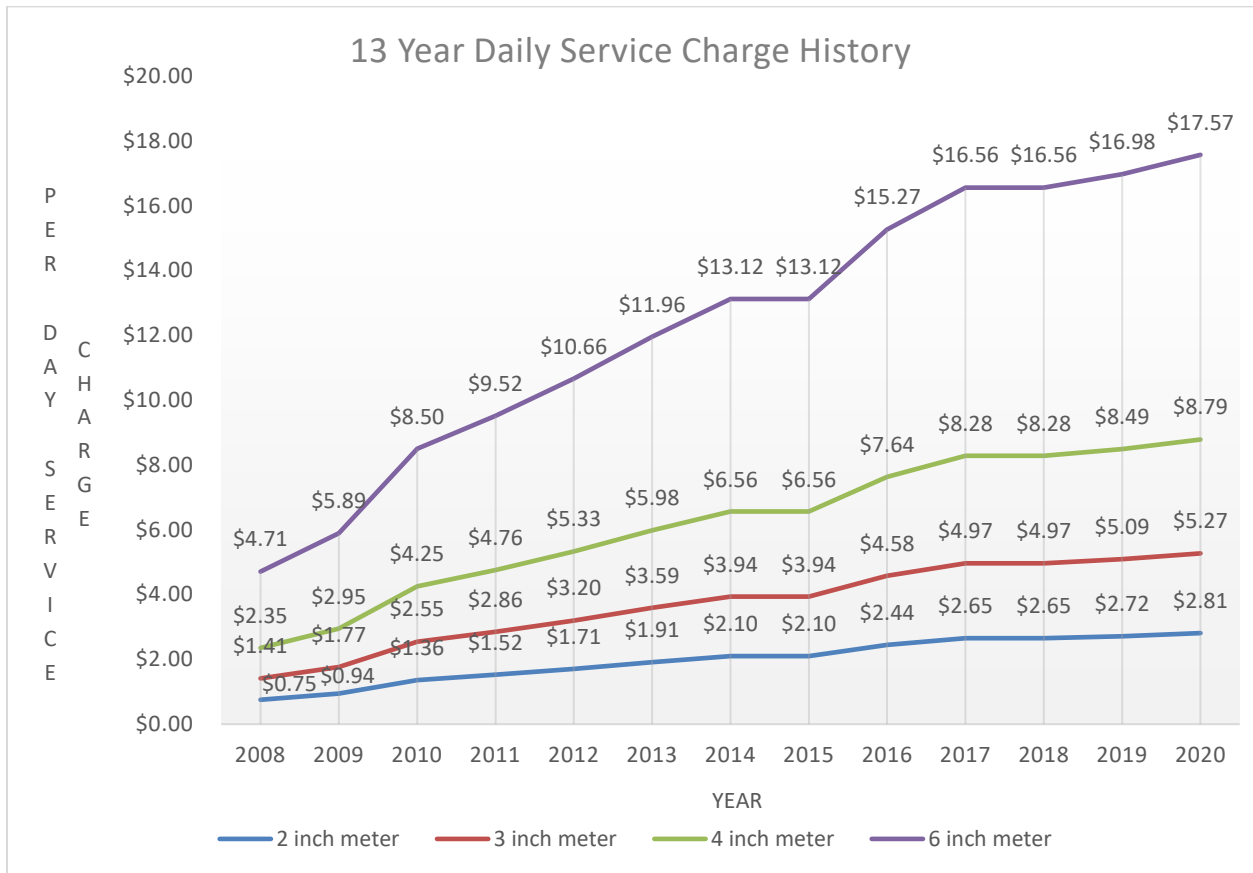
From 2011-2021, City Council approved eight water rate increases that impacted Nonresidential and Non-potable water customers with the intention of providing stable revenue and encouraging wise water use for outdoor landscapes. The primary drivers behind the rate increases were to produce funding for: construction of the Southern Delivery System; replacement and repair of aging infrastructure; increases in labor and operating costs; and compliance with the Water Surplus Rates established by City Council.

Over the last 13 years the commodity charge for potable water has increased 119% for summer rates and 214% for winter rates. For the irrigation season of 2020, the summer rates actually decreased 2% while the winter rates increased by 6%.



Service Fees

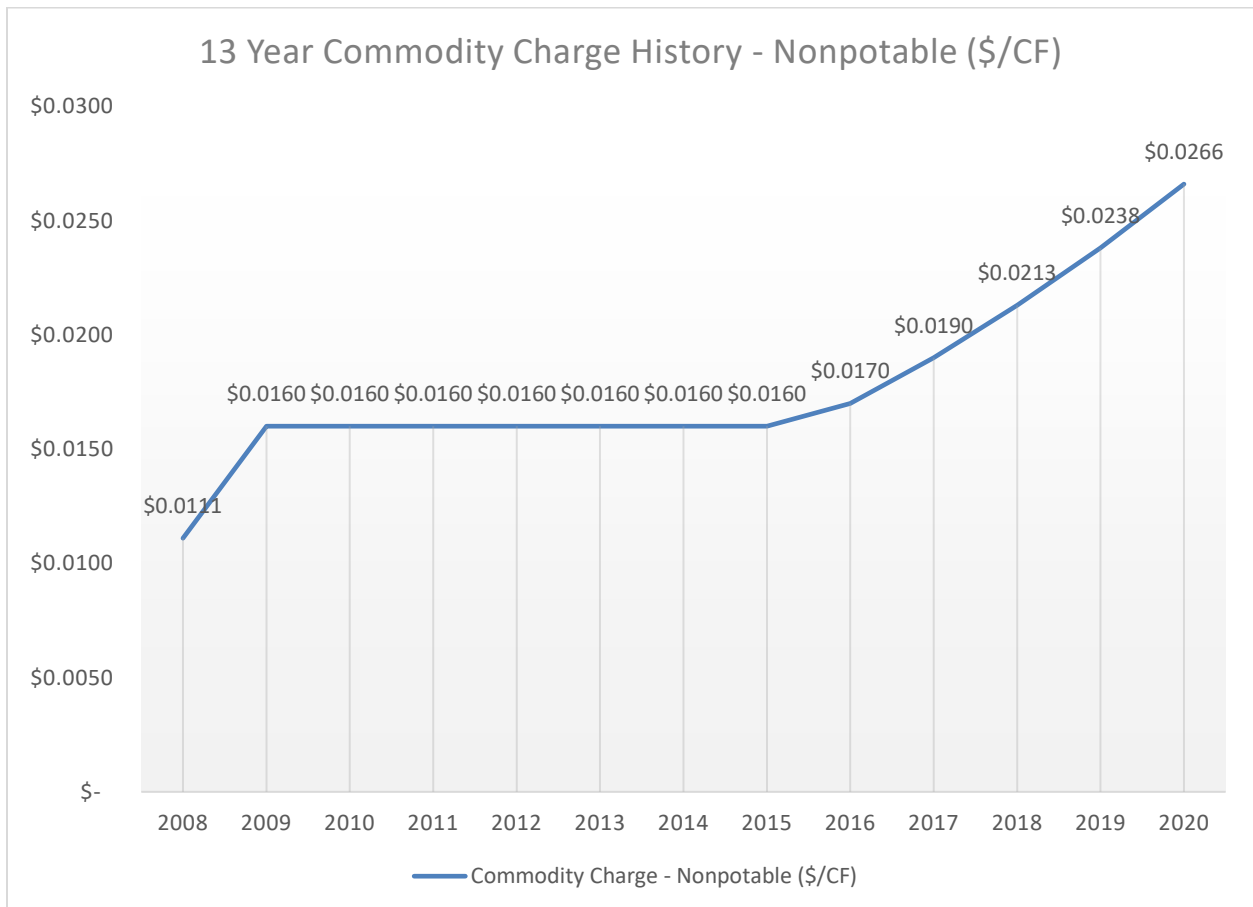
Service fees are assessed on a daily basis to all accounts utilizing potable water and are dependent on meter size. Much like the cost of water, daily service fees have increased significantly over a 13 year span. Because of this, when not in use during the winter months, meters are disconnected by Colorado Springs Utilities field staff and are not assessed a fee.



Non-potable Water Rates

Colorado Springs Utilities non-potable water system is one of the oldest in the state and was first requested by CDOT to supply water to irrigate along the I-25 corridor during its construction. The current system supplies raw or reclaimed water or a blend of both to 30 customers, eight of which are City Parks. Colorado Springs Utilities has only one non-seasonal user of non-potable water, Drake Power Plant. In the past ten years between 10-12% of the total amount of water used in Colorado Springs was non-potable.

Over the last 13 years the commodity charge for non-potable water has increased 114%. In 2020 alone, rates increased by 11.76% to \$.0266/cu ft. Non-potable water remains attractive for irrigation use due to the lower cost compared to potable water, no daily service fees and less restrictions during times of drought. In the years to come, the Parks Department would like to continue to pursue opportunities for increasing use of non-potable water. Unfortunately, the somewhat limited infrastructure of the non-potable system makes adding additional sites cost prohibitive. At the present time, 97 acres of Parks property are irrigated using non-potable water.



Water Budget

Each year as the new water rates are announced, budgetary estimates are made to determine the expected cost of water to irrigate Parks property. Although the associated water costs are no longer paid for from the Parks budget, this is still an important figure to have for tracking purposes.

The annual allotted water cost is determined on an individual site basis and takes into consideration the cost of water per cubic foot, acreage and turf type. Also included in the calculation are domestic water, lake augmentation, off-season usage and daily service fees. Below is a breakdown of the overall 2020 water budget.

2020 Parks Water Budget	
District	Annual Allotted Water Costs (24")
Central Parks	\$660,249
Medians	\$211,793
North Athletics	\$335,806
North Parks	\$1,613,349
South Athletics	\$537,995
South Parks	\$1,006,688
Total	\$4,365,879
Domestic	\$50,000
Lakes - augmentation	\$50,000
Off Season	\$125,000
Daily Service Fees	\$177,847
Total	\$402,847
Grand Total	\$4,768,726

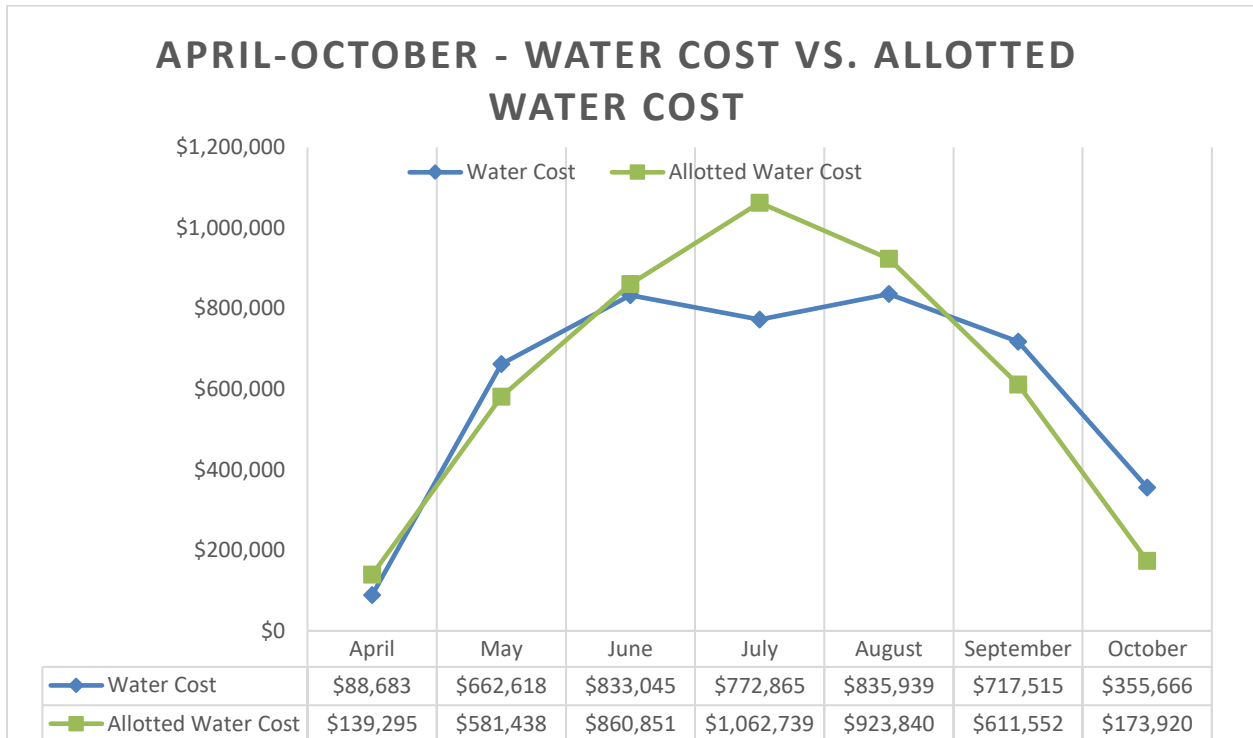
Annual Water Cost vs. Allotted Water Cost

The chart below illustrates the actual water cost vs. what was allotted in 2020. Overall, during an exceptionally warm and dry year, 98% of the irrigation water budget was used totaling \$4.26M.

District	Annual Water Cost	Annual Allotted Water Cost	Annual % Allotted Water Cost Used
Central Parks	\$676,149	\$660,249	102%
Medians	\$252,621	\$211,793	119%
North Athletics	\$386,182	\$335,806	115%
North Parks	\$1,587,582	\$1,613,349	98%
South Athletics	\$474,153	\$537,995	88%
South Parks	\$889,712	\$1,006,688	88%
Grand Total	\$4,266,399	\$4,365,879	98%

Monthly Water Cost vs. Allotted Water Cost

The graph below represents the total departmental water cost, by month, compared with the allotted water cost. In April, the irrigation systems were slow to come on and water saved during this timeframe was applied in May. In June, the Department watered just under the allocation with next to no rainfall, then in July and August saw an uptick in precipitation. Water saved during these months was then applied in September and October to get the landscapes as healthy as possible heading into the early winter.

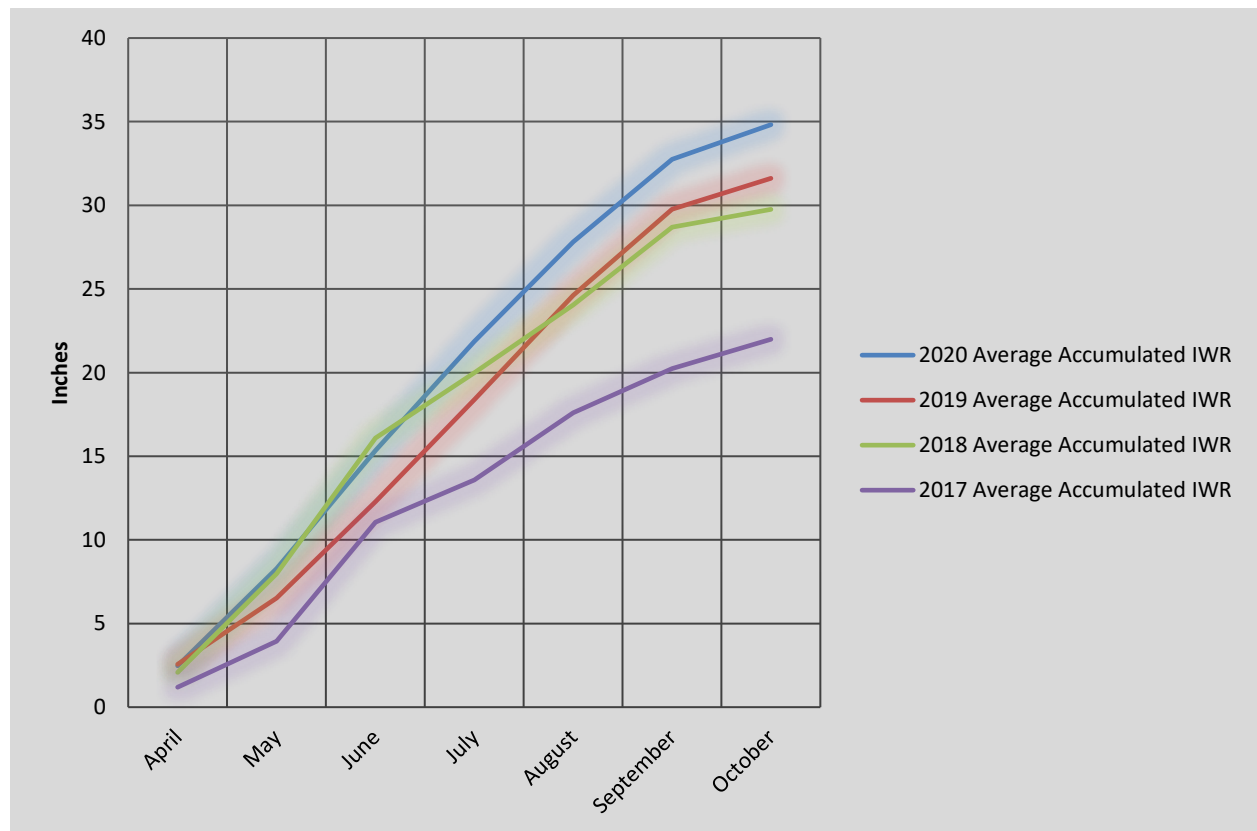


2020 Irrigation Water Requirement and Consumptive Usage Reporting

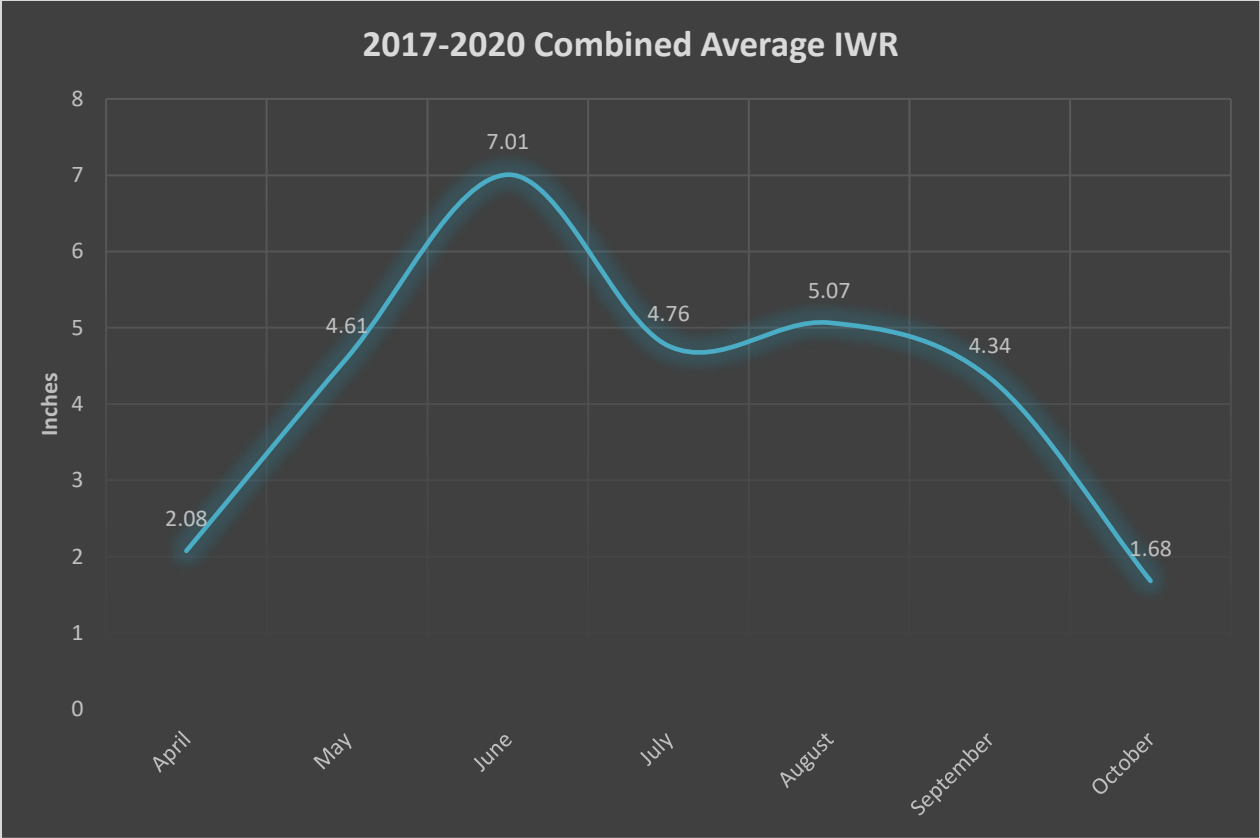
Irrigation Water Requirement

Throughout the irrigation season weather data is collected and comprehensively analyzed to determine the amount of supplemental irrigation water needed for the landscapes. The precipitation data is collected from the (1) Air Force Academy, (2) Patty Jewett Golf Course and (3) Colorado Springs Airport to represent northern, central and southern portions of the city. Evapotranspiration (ET) rates are collected from smart irrigation controllers in similar localities. The irrigation water requirement (IWR) can then be calculated to see how much irrigation water was required during a particular time period.

The reoccurring theme in 2020 that had a significant impact on the IWR was above normal temperatures and below normal precipitation. The summer (June, July, and August) was the third warmest on record while receiving 3.63" less than normal precipitation. We also experienced 52 days at or above 90 degrees which is a new annual record. Our accumulated average irrigation water requirement was just under 35" and was, according to Colorado Springs Utilities, the highest on record.



* The IWR takes into consideration the Gross ET, Turfgrass Crop Coefficient, Useable Rainfall and Irrigation Efficiency.



Consumptive Use Reporting

Water consumption for Parks irrigation is tracked and analyzed by the Water Conservation Specialist. Monthly consumption and cost analysis reports are created and distributed to senior leadership, the budget office, and district supervisors with the audience dictating the report type and level of detail. The water meter consumption numbers are provided by Colorado Springs Utilities at the beginning of each month.

The reports for district supervisors are at the individual park level and are intended to capture sites with higher or lower than expected monthly or YTD consumption. For senior leadership, a report is provided that details YTD cost compared to the budgeted amount at the district level. These reports are distributed within the first ten days of the month. Below is an example of the October water consumption report distributed to district supervisors.

Row Labels	April Usage (inches)	May Usage (inches)	June Usage (inches)	July Usage (inches)	August Usage (inches)	September Usage (inches)	October Usage (inches)	Annual Usage (inches)	% Annual Allocation Used
Adams Park	1.45	2.37	3.81	4.75	3.96	4.58	1.39	22.32	93%
Audubon Park Irrigation	0.00	2.78	4.42	2.03	2.69	4.51	0.70	17.13	71%
Betty Krouse	0.00	2.36	2.89	3.27	4.04	5.60	1.25	19.40	81%
Bonforte Irrigation	0.33	1.45	3.31	4.31	2.04	3.86	1.06	16.35	68%
Boulder Park Irrigation	0.27	1.44	2.42	3.94	4.20	4.97	1.71	18.95	79%
Bristol	0.36	1.27	1.87	2.91	2.64	8.93	3.15	21.14	88%
Frank Waters	0.04	2.43	3.18	4.43	3.48	3.70	1.00	18.27	76%
Franklin	0.00	1.07	2.49	7.43	4.57	7.18	0.00	22.75	95%

Water Shortage Ordinance and Water Allocation Plans

From Colorado Springs Utilities 'Water Shortage Ordinance Changes' –“The Water Shortage Ordinance (WSO) has been in place since 2002 and establishes the rules that govern the response options available to City Council during a water shortage. This Ordinance is a key means for City Council and Colorado Springs Utilities to protect water supply, maintain water service essential for public health and safety, and minimize adverse impacts to economic activity.

Colorado Springs Utilities has updated the WSO to include a long-term focus on reducing the waste of water at all times, updates to the water shortage response rules, and removing rules that have been superseded by new state laws. This program will contribute 10% to our overall savings target of 375 acre-feet in 2021 and 450 acre-feet by 2030 which, in turn, will provide a future source of supply for our community.

The Proposed Water Waste Changes:

The following actions are now considered water waste in the updated WSO:

1. Watering landscaped areas, other than drip irrigation, between the hours of 10:00 a.m. and 6:00 p.m. during the period from May 1 to October 15.
2. Watering landscaped areas with potable water more than three (3) days per week, with the following exceptions:
 - a. Watering under an establishment permit;
 - b. Watering under a water allocation plan;
 - c. Watering new plant material on the day of planting;
 - d. Watering of turf grass that is essential for high use sports fields;
 - e. Operating and attending to an irrigation system as needed for installation, repair, or reasonable maintenance; and
 - f. Watering trees, shrubs, and plants (including vegetable and flower gardens) with a drip irrigation system, handheld hose equipped with an active positive shutoff nozzle or handheld container at any time.

What is an Allocation Plan?

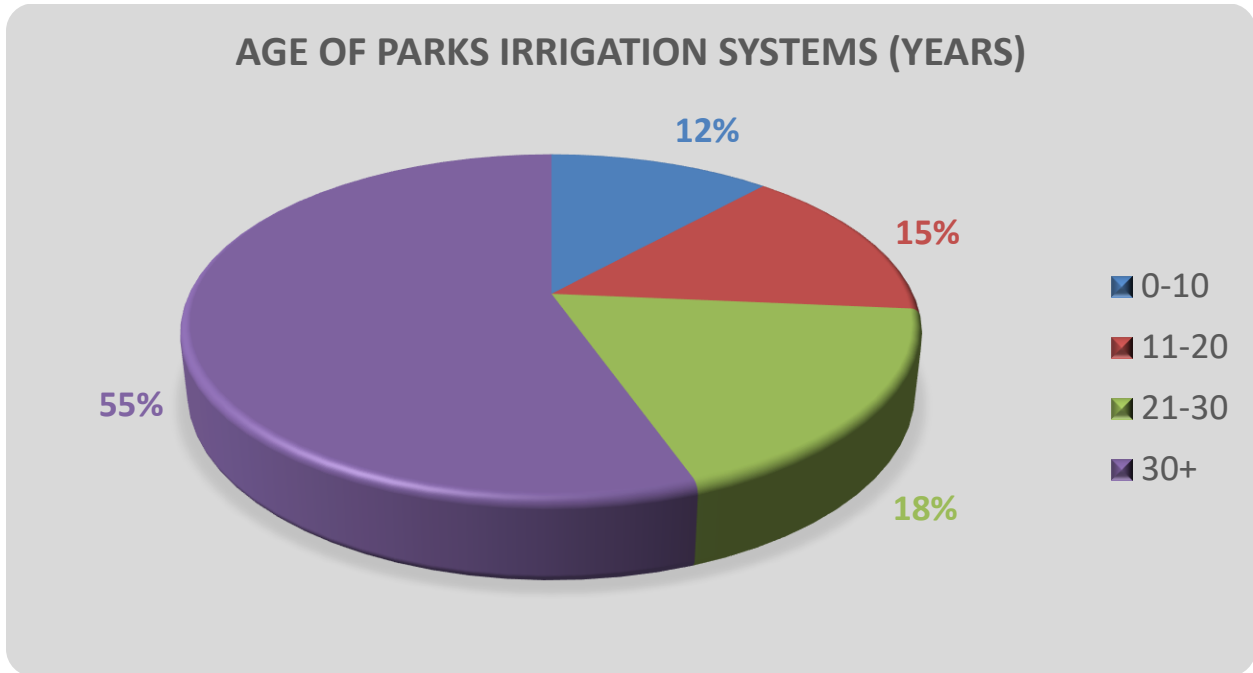
Residential and commercial customers who are not able to meet the three days per week watering requirements can apply for an allocation plan. An allocation plan defines a site-specific volumetric limit of water to be used for irrigation not to exceed the declared stage or outdoor landscape watering level. Water allocations are designed to give customers flexibility in meeting the three day a week watering limitations, for reasons such as alternative schedules due to smart controllers, soil type, existing irrigation system condition, etc. It does not give a customer more water or allow them to water during the 10am – 6pm window.”

What this means for Parks

Because the irrigation systems in most City parks are limited by how much water they can apply during a single irrigation event, watering only three days a week is not feasible and would not supply enough water to keep the landscapes healthy. Instead, most Parks have received Allocation Plans, with the exception of athletic, high-use and non-potable sites. Conveniently, the volumetric amount of water described above equates to 24” annually, which is precisely how much water is budgeted by Parks on an annual basis.

Jacobs Study Findings

In 2019, Parks began compiling extensive infrastructure data for the Jacobs Study Report which, among other things, provided insight to the age and condition of Parks irrigation systems. After analyses of the data it was found that 128 sites accounting for 350 acres were 30+ years old. Based on the industry assumption that an irrigation system's useful life is between 25-30 years, these systems are in need of replacement.



At an average cost of \$19,250 per acre, it will require \$6,737,500 to replace the irrigation systems that are 30+ years old. Current funding levels suggest this could take over 60 years.

Irrigation System Efficiency Improvements

Retrofits, Rain Sensors, Master Valves and Flow Sensors

Due to circumstances during the economic downturn in the late 2000's, great efforts have been made to improve and prolong the existing irrigation infrastructure and to improve water use efficiencies within the parks system. Below are detailed descriptions of the many ways this has been, and continues to be accomplished.

Between the years 2010-2014, the Parks Department, assisted by Colorado Springs Utilities, replaced inefficient sprinkler heads in 95 park sites consisting of 455 irrigated acres, with new, water efficient heads with check valves. Additionally, all sprinkler heads were adjusted, raised, and leveled to achieve maximum allowable distribution uniformity at a cost that was lower than replacing the irrigation system in its entirety.



Rain sensors are an integral part of landscape water conservation and are an inexpensive way to reduce water waste. Because of this, each park site is equipped with a rain sensor that will automatically postpone scheduled irrigation during significant rain events. Once the sensors have dried out, scheduled irrigation will resume as normal. Although convenient, these sensors must still be maintained and checked by park technicians to ensure they are operating as expected during and after rainfall has occurred.

Smart Irrigation controllers offer several ways to conserve water and increase management efficiency. One of the ways they accomplish this is to utilize local weather data, in conjunction with user defined parameters such as micro climate and sprinkler head performance, to precisely determine irrigation run times. This is a significant benefit to the end user as these controllers can make adjustments 24 hours per day, 7 days per week, to apply the appropriate amount of water based on the needs of the plant material. Additionally, these controllers offer an increased management efficiency by allowing park technicians to manually and remotely make adjustments via their phones or computers and can be immediately alerted of any operating system deficiencies, such as flow or electrical issues.



WeatherTRAK smart irrigation controllers have been in use in the parks system for several years. After initial research and product testing, it was determined that WeatherTRAK controllers would be the best platform to implement system wide. Currently, 79% of all park sites are equipped with a smart irrigation controller that are under the direct management of a park technician.

Significant efforts have been made to install master valves and flow sensors to park sites to prevent unnecessary water loss due to irrigation system failures. These components, when coupled with smart irrigation controllers, will automatically shut the system off when a leak or break is detected. These devices have proven to be the hallmark of irrigation water conservation; therefore, the parks department sets dollars aside each year to continue the effort to get all park sites equipped with such devices. Unfortunately due to budget reductions in 2020, only 2 of these devices were installed.



Irrigation System Replacements

As was determined by the Jacob's Study, over half of the Parks irrigation systems have reached their useful life and are in need of replacement. In 2020, the irrigation systems at North Monument Valley Park and Boddington Field were replaced courtesy of TABOR refund dollars, totaling \$300k. These sites now benefit from utilizing 2-wire technology, high-efficiency sprinkler heads, leak detection devices and an overall increase in distribution uniformity that aide in water conservation and turf grass quality.



Water Footprint Reduction

Department leadership has embraced and continues to support the conversion of underutilized and often underperforming Kentucky bluegrass to a more suitable and sustainable native grass species. The process came to fruition after the economic downturn required an alternative way of thinking about green spaces and how they were utilized. Instead of lush green expanses on slopes and passive use areas, native grasses have been successfully introduced to 78 acres of Parks property. In addition to the water savings, maintenance procedures have been amended to accommodate for lower inputs. Assuming a cool-season native seed mix is selected, maintenance and water costs can be reduced by 40%. Typically, the return on investment for these projects has been less than one year once established.



Before —————> After



Before —————> After

Further water footprint reductions, totaling 43 acres, can be attributed to converting high use sports fields to synthetic turf, the use of landscape modifications and low water use plants in narrow, inefficiently irrigated utility easements, non-potable water conversions, partnerships with other entities, and the expiration of school maintenance agreements. To date a total of 121 acres of bluegrass turf has been removed via these efforts with more acres planned for conversion in the future.

New park designs, such as John Venezia Park, play a key role in the City's future water footprint reduction. More emphasis on artificial turf, low water use plants and native grasses, drip irrigation and a limited amount of Kentucky bluegrass, are all elements that are considered and incorporated into a more sustainable park design.



{John Venezia Park Landscape Statistics: 6.7 acres of artificial turf, 5 acres of irrigated native grass, 2.7 acres of non-irrigated native grass, 3 acres of drip irrigated landscape beds, 1.5 acres of Kentucky bluegrass}

Cost Savings

The Parks Department takes advantage of rebates offered by Colorado Springs Utilities that incentivize turf to native conversions and the use of eligible irrigation equipment (flow sensors, smart irrigation controllers, high-efficiency matched precipitation rate nozzles and sprinkler heads with check valves or pressure reducing stem). In 2020, the Parks Department received rebates totaling over \$31,000.

Costly irrigation leaks and breaks inevitably occur, especially without leak detection and prevention devices installed. In the event of significant water loss, Colorado Springs Utilities offers billing adjustments to be made for half of the cost of the lost water. In 2020, significant leaks occurred at Wasson Park and Goose Gossage Sports Complex resulting in credits in the amount of \$2,138.

Summary

In times of drought, irrigation for landscapes comes into direct conflict with human consumption, health and sanitation needs and is often targeted first by water purveyors as a means to conserve water. In Colorado, water conservation continues to be a critical component to ensure water supply to future generations and an ever increasing population. Part of bridging the water supply and demand gap projected to exist by 2050, will include outdoor water conservation at both the state and local levels. Through its comprehensive Water Conservation Program, the City of Colorado Springs Parks Department is indeed aligned in the effort to conserve water both now and the years to come.