



HIGH COUNTRY
CONSERVATION CENTER

BLUE RIVER WATERSHED REGIONAL WATER EFFICIENCY PLAN

January 2018



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Developed in partnership with:



BLUE RIVER WATERSHED REGIONAL WATER EFFICIENCY PLAN EXECUTIVE SUMMARY



The Planning Process

In 2017, High Country Conservation Center and five water providers in Summit County:



partnered for the development of a regional water efficiency plan along with individual plans for four of the five providers (excluding Town of Silverthorne) to represent the unique needs and opportunities for each service area. This regional plan elevates common themes and water saving opportunities outside of the participating utility service areas and provides opportunities for partnership and collaboration among the participating utilities.

Vision Statement

The vision of the Blue River Watershed Regional Water Efficiency Plan is to continue supplying **reliable, high quality water** to the residents and visitors of Summit County while also:

-  Protecting the natural environment upon which our economy and prosperity are based.
-  Ensuring the sustainability of our mountain lifestyle for current and future generations.
-  Fostering a culture of environmental and social responsibility through education and action.
-  Inspiring collaboration and responsible stewardship of water resources across the State of Colorado.

Overview

The Blue River watershed is located on the western slope of the Continental Divide and its drainage boundaries are coincident with the political boundaries of Summit County.

- ✓ Water supply in the Blue River watershed relies on a combination of surface water diversions, groundwater withdrawals, and reservoir releases. **Surface water supplies 83% of the demands in the watershed.**
- ✓ There are **19 water providers in the Blue River watershed** within Summit County: four municipal providers and 15 special district water providers.
- ✓ Approximately **61% of the water use in the county is delivered by the 4 providers that have developed individual water efficiency plans** - Town of Breckenridge, Copper Mountain Consolidated Metropolitan District, Town of Dillon, and Town of Frisco and is additionally covered by the individual water efficiency plans developed by these providers.

Each water provider in the county is unique in their raw water sources, system size, mix of residential and commercial customers served, and staffing and financial resources. However, some general observations can be made across providers.

- ✓ Although the water providers are not large compared to many systems on the Front Range, they tend to be **advanced in terms of metering and systemwide leak detection programs.**
- ✓ Outdoor water use tends to be relatively low, ranging from **15-25% of average annual demands.**
- ✓ **The systems do experience high peak loads** from outdoor irrigation in the summer months, with demands doubling compared to winter months.
- ✓ The systems tend to run with a **small, but dedicated and engaged staff**, who cover multiple functions including water planning, operations, and efficiency.

Through the variety of activities listed below, 370 acre-feet per year of water is projected to be saved by 2025.

- ✓ Billing upgrades
- ✓ Advanced metering and water loss control
- ✓ Institutional collaboration
- ✓ Indoor and outdoor efficiency programs
- ✓ Improving land use ordinances and regulations
- ✓ Education and outreach

Implementation and monitoring will be conducted through standing working groups and in partnership with High Country Conservation Center. Plans will be revisited and updated every 7 years as per Colorado Water Conservation Board guidelines.



3 INTRODUCTION

The Blue River watershed is one of the most critical water supply headwaters in Colorado, serving both West Slope and East Slope users. However, the water resources are stressed by a number of factors, including:

- **Population growth:** Since 1970, the population of the Blue River watershed within Summit County has grown exponentially, from a population of 2,665 in 1970 to a population of 30,367 in 2016 (CO DOLA, 2018a). Population is expected to rise to more than 51,000 by 2050 (CO DOLA, 2018a). As the resident population has grown, so too has the visiting population, with tourists taking advantage of the natural resources and recreational opportunities in the watershed.
- **A changing climate:** Warming temperatures, declining snowpack, and earlier snowmelt seasons are all predicted outcomes from the changing climate (CWCB 2014a). Summit County residents are already seeing adverse effects on snowpack and skiing, with local pleas to “make May great again!” to express the importance of preserving the local snow culture and landscape.
- **Too many demands on the river:** In dry years, most recently in 2002 and 2012, streamflows are depleted and there is not enough water in the rivers to meet all demands for recreation, snowmaking, irrigation, and other beneficial uses appropriated under Colorado’s water law system (CWCB 2016). Although good progress has been achieved in some locations to maintain minimum streamflows for environmental benefits, there is much more to do. For many residents and visitors to the Blue River watershed, the purpose of water efficiency is to put more water back into the rivers.

Figure 1 presents a map of the Blue River watershed in the context of the Colorado River Basin within the State of Colorado.

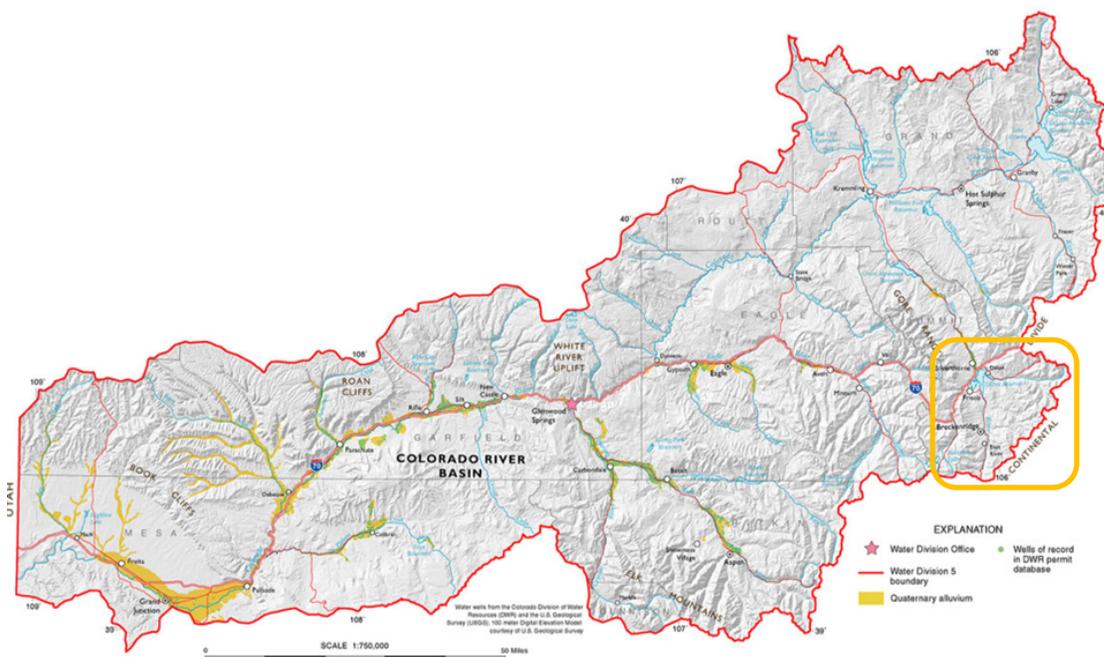


Figure 1. Map of the Colorado River Basin (Blue River watershed highlighted in yellow)

3.1 Why a water efficiency plan?

As a mountain community, home to world-class skiing, rafting, and fishing, water has long been a vital resource to the economy and culture of the Blue River watershed. The community seeks to be a leader in promoting conservation values and stewardship of natural resources. A recent study of the water supplies and demands in the Colorado River Basin lends urgency to these goals, finding that “high conservation, reuse, and linking water supply to land use are in the best interest of Colorado (CWCB 2014b).” The purpose of this regional water efficiency plan is to present the framework that residents, businesses, and communities will use to partner together to reduce water demands and to ease pressures on the natural environment.

3.2 The Planning Process

In 2017, High Country Conservation Center, Middle Park Conservation District, and five water providers in Summit County (Copper Mountain Consolidated Metropolitan District, Town of Breckenridge, Town of Dillon, Town of Frisco, and Town of Silverthorne) convened a project for the development of this regional water efficiency plan. Water efficiency plans were also developed for four of the individual water providers (excluding Town of Silverthorne) to represent the unique needs and opportunities for each service area. This regional water efficiency plan, developed for the Blue River Watershed within Summit County, elevates common themes and water saving opportunities outside of the participating service areas, and provides opportunities for partnership and collaboration amongst the participating utilities. Plan development was supported through a combination of grant funding from the Colorado Water Conservation Board (CWCB) under the Water Conservation Planning grant program, and cash and in-kind contributions from the participating providers.

The Water Conservation Act of 2004 (HB04-1365) requires all covered entities (defined as retail water providers that sell more than 2,000 ac-ft/yr) to have a State-approved water efficiency plan containing certain required minimum plan elements. While none of the water providers in Summit County currently meet the State’s definition of a covered entity, they support the spirit and intent behind water conservation planning. Therefore, the water efficiency plans were developed in accordance with the State of Colorado’s *Municipal Water Efficiency Plan Guidance Document* (CWCB 2012).

The plans were drafted using information and guidance provided by utility and planning staff in each community. Additionally, a diverse stakeholder group was formed to provide input on water savings goals, water efficiency activities, and implementation actions. In 2017, more than 30 stakeholders participated in a series of four planning workshops (baseline review, draft goals and efficiency activities, revised goals and efficiency activities, and implementation). Upon completion, the plans underwent a series of reviews by utility staff, the stakeholder group, the public, and CWCB staff. Finally, plans were submitted to the appropriate governing entity (town council or District board, as appropriate) for adoption.

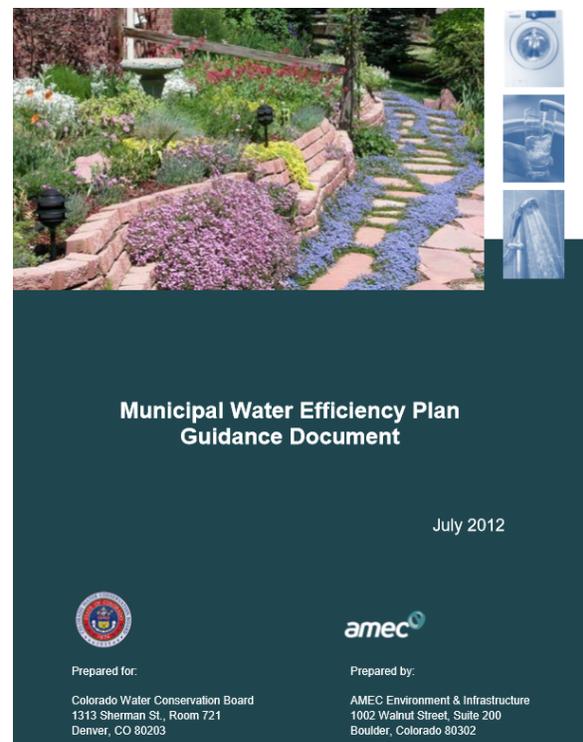


Figure 2. State of Colorado Municipal Water Efficiency Plan Guidance Document

3.3 Our Water Vision

The stakeholder group developed a vision statement to guide efforts in the Blue River Watershed towards regional water efficiency.

VISION STATEMENT

Our vision is for water providers to continue supplying reliable, high quality water to the residents and visitors of Summit County while also:

- Protecting the natural environment upon which our economy and prosperity are based.
- Ensuring the sustainability of our mountain lifestyle for current and future generations.
- Fostering a culture of environmental and social responsibility through education and actions.
- Inspiring collaboration and responsible stewardship of water resources across the State of Colorado.



4 RELATED STUDIES

This regional water efficiency plan builds on a number of collaborative plans that have been done previously in the Blue River Watershed within Summit County, many of which touch on water. A short description of related studies follows, starting with the most recent. The **References** section includes links to the plans that are available online.

- **An Energy Action Plan for Summit County, Colorado** (Xcel Energy, 2016) outlines goals and strategies for reductions in energy use and greenhouse gas emissions, and increases in renewable energy sources. The plan is currently being implemented through a partnership among Xcel Energy, High Country Conservation Center, and a diverse stakeholder group.

How it relates to this plan

Several of the energy efficiency and outreach initiatives will be leveraged for water efficiency education and outreach. This approach is discussed more in **Section 8**.

- The **Summit County Community Wildfire Protection Plan** (Summit County, 2016) states that 99% of the County's population lives in areas adjacent to or intermingled with undeveloped lands, where the wildfire risks are much higher than in developed areas. Summit County has been heavily impacted by the pine beetle infestation, which has significantly increased the number of standing dead trees and the risk of severe wildfires.

How it relates to this plan

Water providers in Summit County have expressed concerns about the potential impacts of wildfires on water supply infrastructure and water quality. Among other goals, the wildfire protection plan recommends developing community maps that show the locations of water supplies for firefighting and implementing mitigation projects to protect water supply infrastructure.

- The **Colorado Basin Implementation Plan** (Colorado Basin Roundtable, 2015) evaluates water supplies and demands in the Colorado Basin and how water resources management affects ecosystem health, agriculture, safe drinking water, conservation, land use, and water administration.

How it relates to this plan

The plan concludes that the Blue River watershed will likely be facing a gap of 22,000-48,000 acre-feet per year (ac-ft/yr) between water supplies and demands by 2050, and therefore cannot be relied upon to provide increased transbasin diversions for water users on the Eastern Slope.

- The **Blue River Watershed Source Water Protection Plan** (The Greenlands Reserve, 2014) identifies risks to the Blue River and strategies for mitigating those risks.

How it relates to this plan

Water providers in Summit County have expressed concerns about the potential for source water contamination. Risks identified in the source water protection plan include groundwater contamination from dry cleaning chemicals and surface water contamination from hazardous waste spills along Interstate 70. Mitigation strategies include improving water sharing during emergencies, analyzing storage and supply capacities during emergency conditions, and protecting water supply infrastructure.

- The **Summit County Multi-Hazard Mitigation Plan** (AMEC, 2013) describes the risks and potential impacts of a variety of natural and manmade disasters to communities in Summit County. The risks range from avalanches to hazardous material releases. The report describes the relative risk of each hazard and the steps that can be taken to mitigate the disaster's impact.

How it relates to this plan

Identified hazards that would affect water supply include dam failures, droughts, floods, and wildfires. In response to the plan findings, several communities and water providers developed resiliency strategies:

- Summit County: Enhance flood protection of the Snake River collection system to prevent potential sanitary sewer overflows or inundation of critical facilities.
 - Town of Blue River: Augment water supply with new cisterns for firefighting water capacity.
 - Town of Silverthorne: Ensure continued water distribution during extended power outages.
 - Buffalo Mountain Metropolitan District: Obtain backup power for water pumping stations.
 - Hamilton Creek Metropolitan District: Establish a water supply interconnect.
 - Multiple communities: Establish backup power connections for water treatment plants.
- The **Summit County Countywide Comprehensive Plan** provides guidance for policy decisions related to land use, development, environmental protection, economic development, and other topics.

How it relates to this plan

The Comprehensive Plan is currently being updated by County staff, but the 2009 version includes a number of guiding principles and strategies affecting water use and supply, as shown in **Table 1**.

*Table 1. Summit County Countywide Comprehensive Plan Guidelines around Water Supply and Conservation (shown in bold)
(Summit County, 2009)*

Community Aspect	Goal	Strategies
Environment	Protect and enhance the quality and quantity of water resources in the County.	<ul style="list-style-type: none"> -Determine feasible water quality monitoring data that could be evaluated on an ongoing basis. -Identify opportunities to supplement stream flows and maximize water levels in Lake Dillon. -Work to develop and implement a countywide water conservation program. -Identify funding for reclamation of abandoned mines and mine tailings so that contaminant runoff into area streams and groundwater is eliminated or mitigated.
Housing	Maintain and ensure an adequate and diverse supply of local resident and affordable workforce housing in the County.	Create incentives to facilitate and spur the construction of additional accessory apartments in the County, such as working jointly with water and sewer districts to reduce the cost of water and sewer tap fees.
Community and Public Facilities	Ensure infrastructure is planned, funded, and built to support new development.	<ul style="list-style-type: none"> -Ensure that land uses in urban areas requiring sewer and water are served by public sewer and water systems. Urban development should be served by water systems and not by individual wells. -Develop stricter water conservation measures to be applied to new and existing development (e.g. xeriscape landscaping and installation of low-flow toilet requirements). -Develop incentives or ordinances to mitigate impacts on water resource infrastructure. These may include: receiving credit for water conservation, rain sensors, submetering, soil preparation, turf limitation, waste of water, median subsurface irrigation, or restrictive covenants ordinances.
	Development of community facilities and the extension of services should be carefully planned and coordinated with the Towns, special districts, and appropriate agencies.	<ul style="list-style-type: none"> -Design community and public facilities to conserve water and energy. -Continue to work cooperatively with the Northwest Colorado Council of Governments in determining water quality and quantity issues/needs.

- The **White River National Forest Land and Resource Management Plan** (USDA, 2002) outlines the Forest Service’s goals and objectives for the management of the national forest.

How it relates to this plan

The Forest Service’s goals include the protection of water resources within the national forest, including Blue River, Straight Creek, and North Ten Mile Creek:

- **Ecosystem Health:** Improve and protect watershed conditions to provide the water quality and quantity and soil productivity necessary to support ecological functions and intended beneficial uses.
- **Multiple Benefits to People:** Improve the capability of the national forests and grasslands to provide diverse, high quality outdoor recreation opportunities. This goal includes maintaining appropriate stream levels to support fishing, boating, and other water related recreation activities.
- **Public Collaboration:** Cooperatively work with local governments to address issues of common concern and to the extent possible maintain consistency with locally adopted master plans.

5 ABOUT THE BLUE RIVER WATERSHED

The Blue River watershed’s drainage boundaries are coincident with the political boundaries of Summit County (**Figure 3**). The watershed, located on the western slope of the Continental Divide in central Colorado, is home to six municipalities (Blue River, Breckenridge, Dillon, Frisco, Montezuma, and Silverthorne) and four major ski resorts (Keystone/Vail Resorts, Breckenridge/Vail Resorts, Copper Mountain, and Arapahoe Basin). More than 80% of the watershed is public land associated with the Blue River State Wildlife Area, Arapahoe and White River National Forests, Eagles Nest Wilderness, Summit County Recreational Pathway System, and Top of the Rockies National Scenic Byway (Summit County, 2017a).

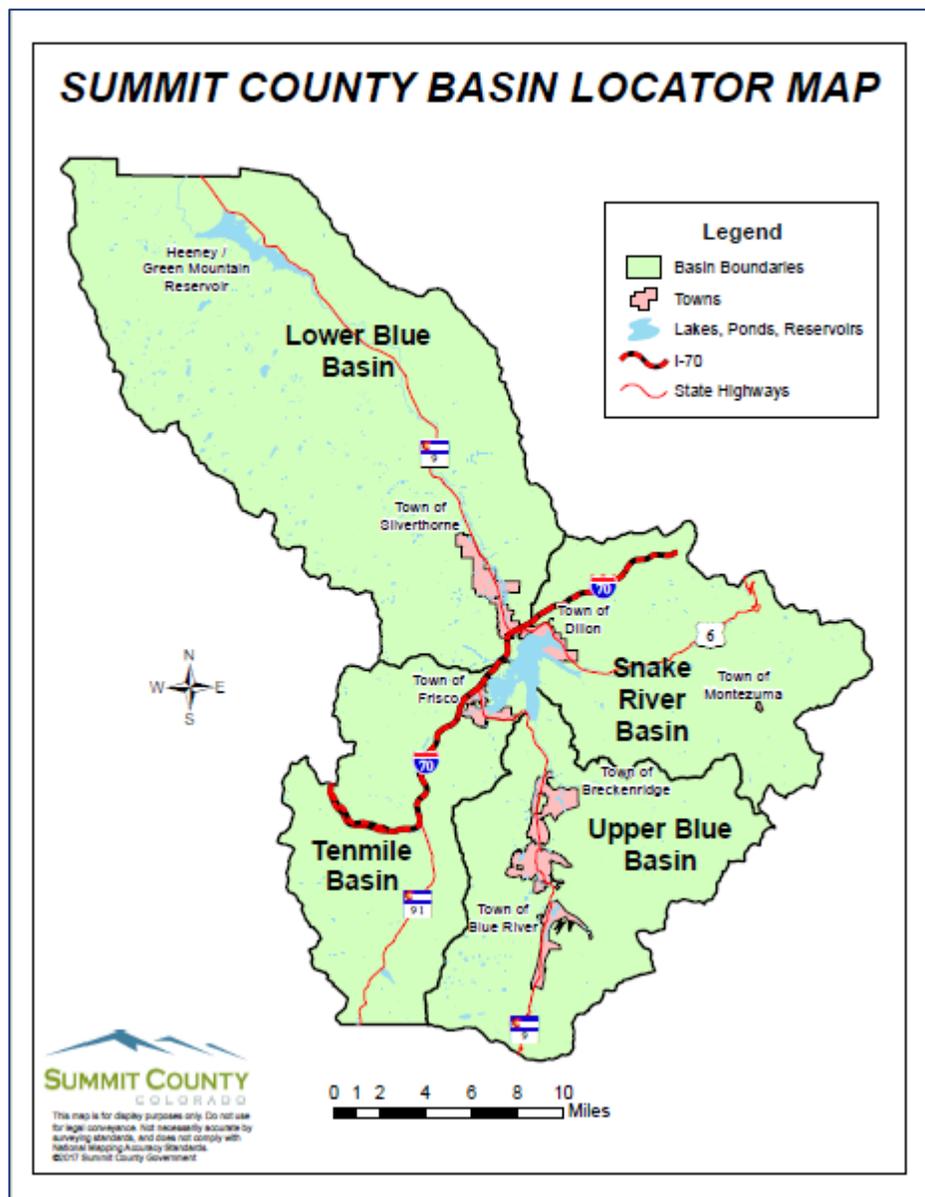


Figure 3. Map of the Blue River Watershed within Summit County (Summit County, 2017b)

5.1 Climate

The Blue River watershed within Summit County is situated at high elevations (ranging from 7,947 ft above mean sea level (amsl) at Green Mountain Reservoir to 14,270 ft amsl at Gray’s Peak) on the windward side of the Rocky Mountains (Summit County, 2017a). Because of these orographic factors, the climate in the watershed is cool (average annual temperature of 38°F), experiences heavy snowfall in the winter (average annual 111 in), and receives lesser amounts of rain in the summer (average annual 17 in) (USA.com, 2017).

5.2 Population

Since 1970, the Blue River watershed within Summit County has experienced rapid population growth, though the permanent resident population remains relatively small at 30,367 people (**Figure 4**). About 53% of the population lives in unincorporated Summit County, while 47% of the population lives in incorporated areas (Summit County, 2017c). Looking forward, permanent residents in Summit County are expected to grow by 2.6% on average year-over-year through 2050 (CO DOLA, 2018a).

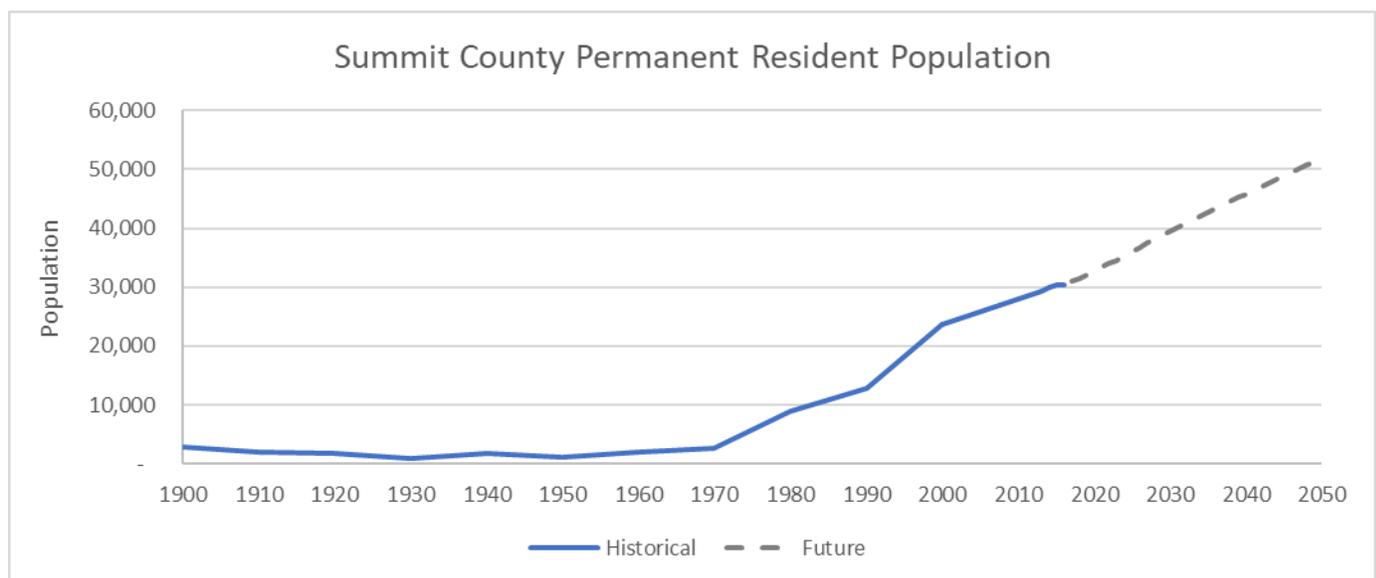


Figure 4: Summit County Permanent Resident Population Estimates (1900-2050) (CO DOLA, 2017)

In addition to the permanent residential population, the Blue River watershed within Summit County is home to many second homeowners and also experiences a large influx of visitors due to the ski industry and other outdoor recreational opportunities.

5.3 Housing

Housing in the area reflects the characteristics of a recreational destination. One-third (33%) of the housing units are owner-occupied, 17% serve as long-term rental units, and 50% serve as short-term units intended for seasonal, recreational, or occasional use (ACS, 2015). Of the owner-occupied units, many are second homes that are occupied only occasionally throughout the year.

The average home age is about 30 years, with 80% of housing units built between 1979 and 1999 and 20% built from 2000 to present (ACS, 2015). Most of the housing units (57%) are designated as

multifamily properties with two or more units. The remaining 42% of housing units are designated as single-family detached and single-family attached homes.

The Summit County Planning Department analyzes the maximum number of residential housing units that are expected to be built based on current zoning and development feasibility. Current estimates are that residential development is at 73% of build-out in unincorporated areas of the County and at 83% of build-out in incorporated areas (Summit County, 2017d). These estimates are subject to change over time.

As relates to water efficiency, older buildings represent an opportunity for indoor water savings through the replacement of fixtures and appliances. The high proportion of multifamily units and the transient population characteristics represent challenges for water education and outreach efforts. To effect long-lasting water savings, the visiting population must be engaged and influenced.

5.4 Businesses and Employment

The Blue River watershed within Summit County is home to approximately 2,100 businesses and 18,600 jobs (ACS, 2015). Major employers include the four ski resorts – Keystone/Vail Resorts, Breckenridge/Vail Resorts, Copper Mountain, and Arapahoe Basin. Ski industry trends indicate continued gains in lodging revenue, summer business, and peak days boosted by holidays and special events (Summit Daily, 2015).

The remaining top ten employers include Summit County School District, Summit County, Town of Breckenridge, Breckenridge Grand Vacations, Centura Health, and Beaver Run (Bridge Hospitality LLC). There are also many food and service businesses that cater to the tourist economy.

Current estimates indicate that commercial development in unincorporated Summit County is at 62% of build-out, although the Summit County Planning Department does not currently conduct a detailed build-out analysis for the commercial sector (Summit County, 2017d).

6 WATER SUPPLY AND USES

6.1 Water Sources

Water supply in the Blue River watershed relies on a combination of surface water diversions, groundwater withdrawals, and reservoir releases (**Figure 5**). Surface water is by far the dominant source, supplying 83% of the demands in the watershed. The Blue River, Snake River, and Tenmile Creek are important tributaries in the watershed, formed by snowmelt runoff from the highest peaks of the Rocky Mountains on the western slope of the Continental Divide. These tributaries eventually discharge directly into Dillon Reservoir (see **Figure 3** for a map of these drainages). Releases from Dillon Reservoir into the Blue River channel flow downstream until entering another on-channel storage reservoir, Green Mountain Reservoir. Releases from Green Mountain Reservoir flow downstream out of Summit County and to the confluence with the Colorado River in Grand County, CO.

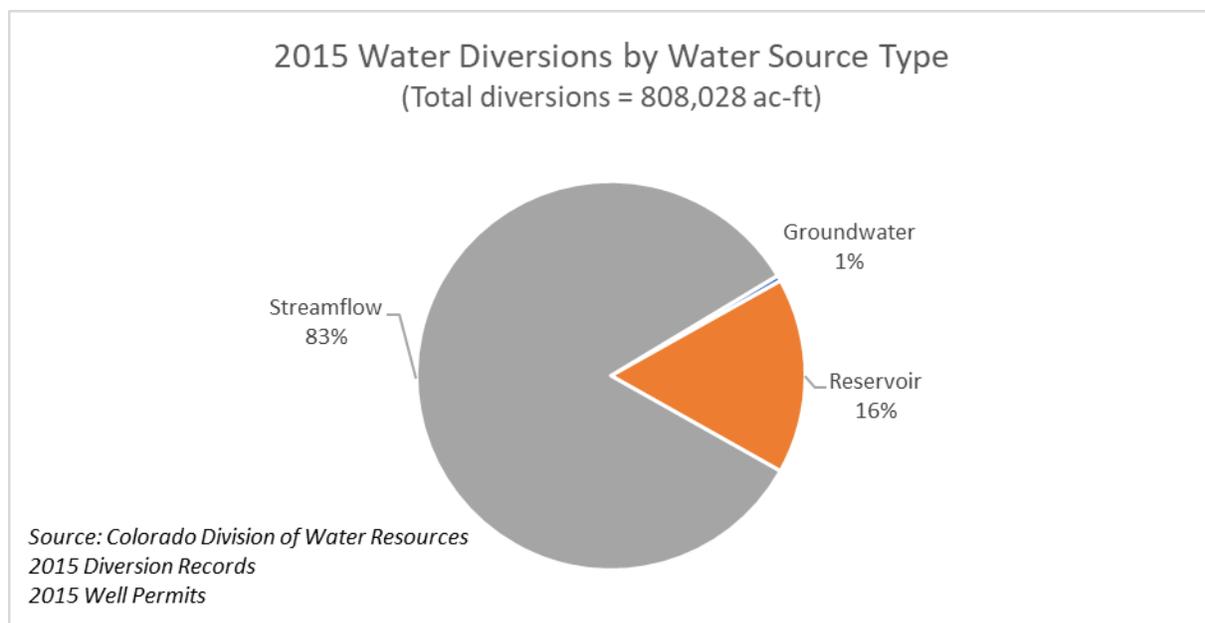


Figure 5. Water Diversions by Source Water Type (2015)

The Blue River watershed contains a number of storage reservoirs that supply water to meet 16% of the demands in the watershed. The water is used for irrigation, augmentation, snowmaking, and transbasin exports to the Front Range. The Dillon and Green Mountain Reservoirs are the largest storage reservoirs in the watershed, serving the additional purpose of hydropower generation.

Groundwater is a smaller, but still important, source of water in the watershed, supplying 1% of the total demands. The majority of groundwater supply wells are shallow alluvial wells, except in the valley where supply wells are deeper and tap into confined aquifers. Wells are classified as exempt or non-exempt, which indicates whether they are subject to administration under the prior appropriation water rights system. Owners of non-exempt wells (of which there are about 94 in the watershed) must replace out-of-priority groundwater depletions by participating in an augmentation plan. Residents in the Blue River watershed can purchase augmentation water from Summit County or from a private company

(Vidler Water). Based on the State's well permit database, there are approximately 1,800 exempt wells in the watershed that are permitted for household and domestic (indoor) use only.

6.2 Beneficial Uses

Water in the Blue River watershed is put to a variety of beneficial uses allowable under State water law, and those beneficial uses vary greatly in their impacts on watershed health. Factors that can be used to assess watershed impact are the magnitude of the diversion, the amount of water returned to the watershed after use (also referred to as the return flows or non-consumptive use), and the amount of water lost from the watershed (also referred to as the consumptive use).

Figure 6 presents a summary of beneficial uses in the Blue River watershed along with annual diversion volumes and relative impacts (low, medium, high) to the watershed as assessed by the fraction of water returned to the watershed. Hydropower generation is by far the largest use in the watershed, being served by about half of the annual diversions, but is categorized as having a relatively low impact to the watershed because almost all of the water is returned to the river. Other uses categorized as having a low watershed impact include water used for maintaining environmentally-beneficial lake levels and streamflows, fisheries, augmentation, recharge, and domestic and household only use. In these cases, the return flows are estimated to be 90-100% of the water diverted.

Uses that are categorized as having medium impact to the watershed (storage, municipal, snowmaking, industrial, commercial, and stock water) typically have return flows representing between 80-90% of the water diverted. The water that is used consumptively is primarily lost to evaporation, either from water surfaces or as a result of irrigation and snowmaking practices.

The high impact uses include transbasin exports, where water is diverted to Front Range water users and used to extinction. None of that water is returned to the West Slope. Similarly, all diversions ascribed to evaporation are considered lost from the watershed. Irrigation impacts are variable depending on the irrigation technique, but can use 55-100% of the diverted water.

2015 Water Diversions by Use Type

Total diversions = 808,028 ac-ft

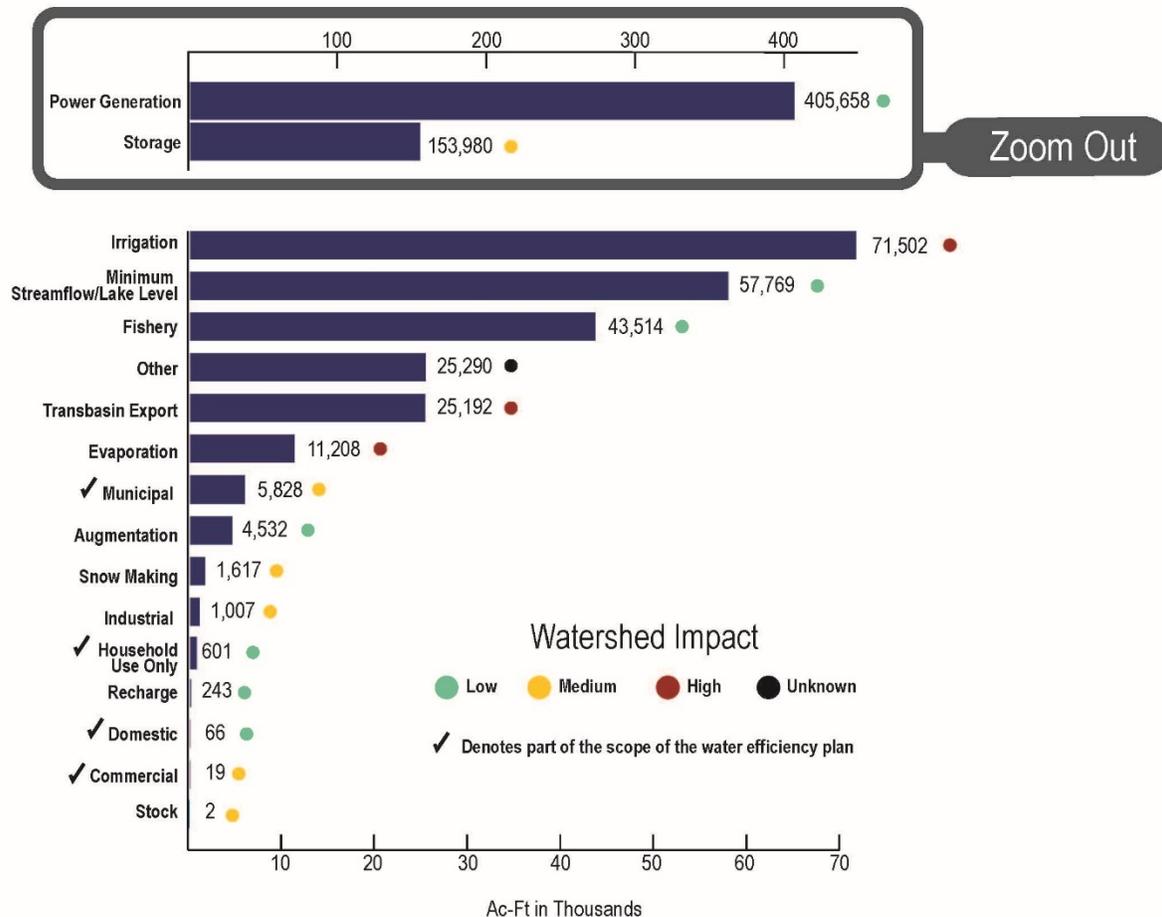


Figure 6. Water Diversions by Beneficial Use (2015)

6.3 Water Providers

There are 19 water providers in the Blue River Watershed within Summit County: four municipal providers and 15 special district water providers under Colorado Revised Statutes Title 32: Special Districts. **Figure 7** presents a map of the service areas for 13 of the water providers for which geographic data were available (CO DOLA, 2018b).

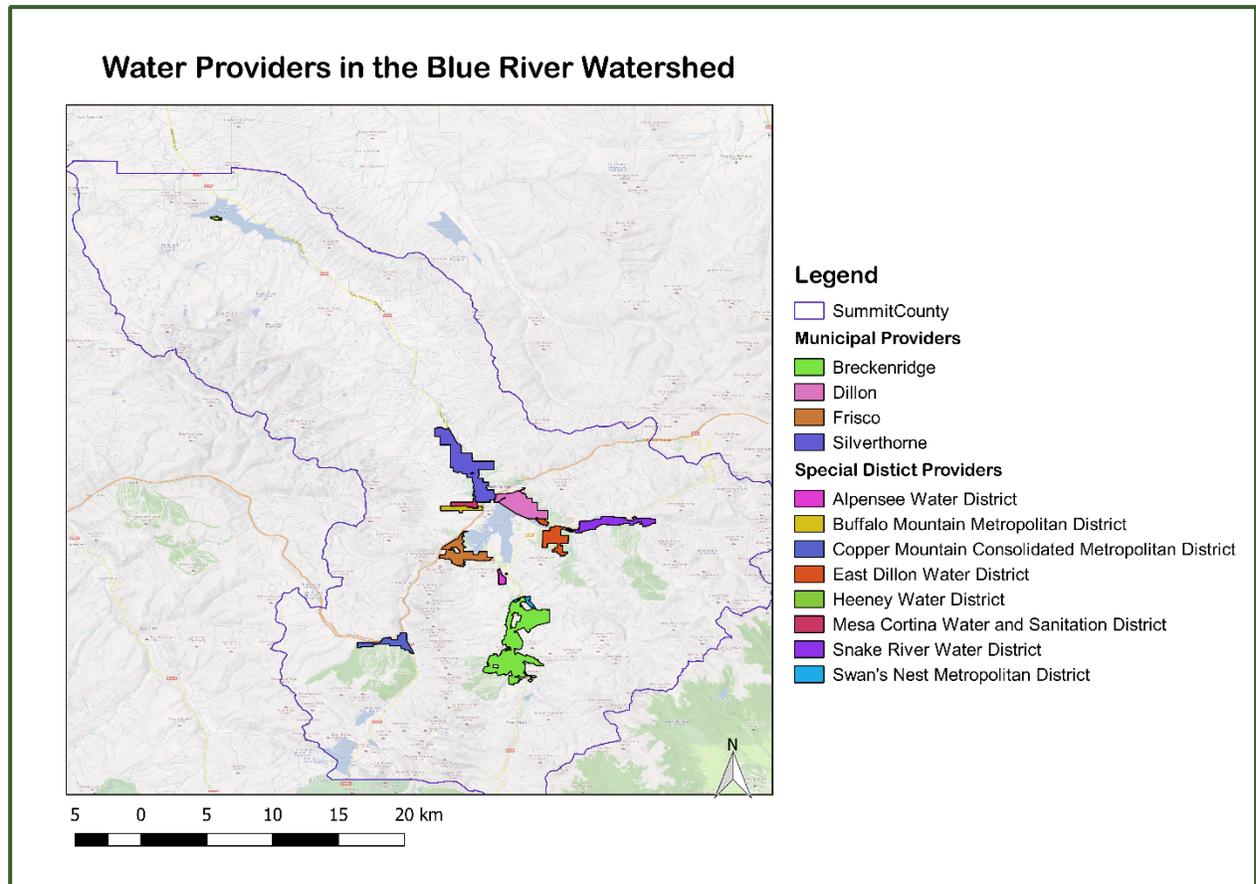


Figure 7. Map of Water Providers in the Blue River Watershed

Each water provider is unique in their raw water sources, system size, mix of residential and commercial customers served, and staffing and financial resources. However, some general observations can be made across providers:

- Although the water providers are not large compared to many systems on the Front Range, they tend to be advanced in terms of metering and systemwide leak detection programs.
- Outdoor water use tends to be relatively low, ranging from 15-25% of average annual demands. The systems do experience high peak loads from outdoor irrigation in the summer months, with demands doubling compared to winter months.
- The systems tend to run with a small, but dedicated and engaged, staff who cover multiple functions including water planning, operations, and efficiency.

Figure 8 presents a summary of 2015 water use by provider. All systems fall below the definition of 2,000 ac-ft/yr of retail water used by the State to determine covered entities. The water use values reflect the unique characters of each provider's system, and large values do not necessarily indicate inefficient water use. For example, the Town of Breckenridge, which is shown as the largest water provider, serves the largest population and also provides approximately 400 ac-ft of raw water annually for snowmaking to the Breckenridge Ski Resort. In other cases, the ski resorts hold their own water rights for snowmaking, and those uses are not reflected in **Figure 8**.

2015 Water Use by Provider

Total diversions = 5,459 ac-ft

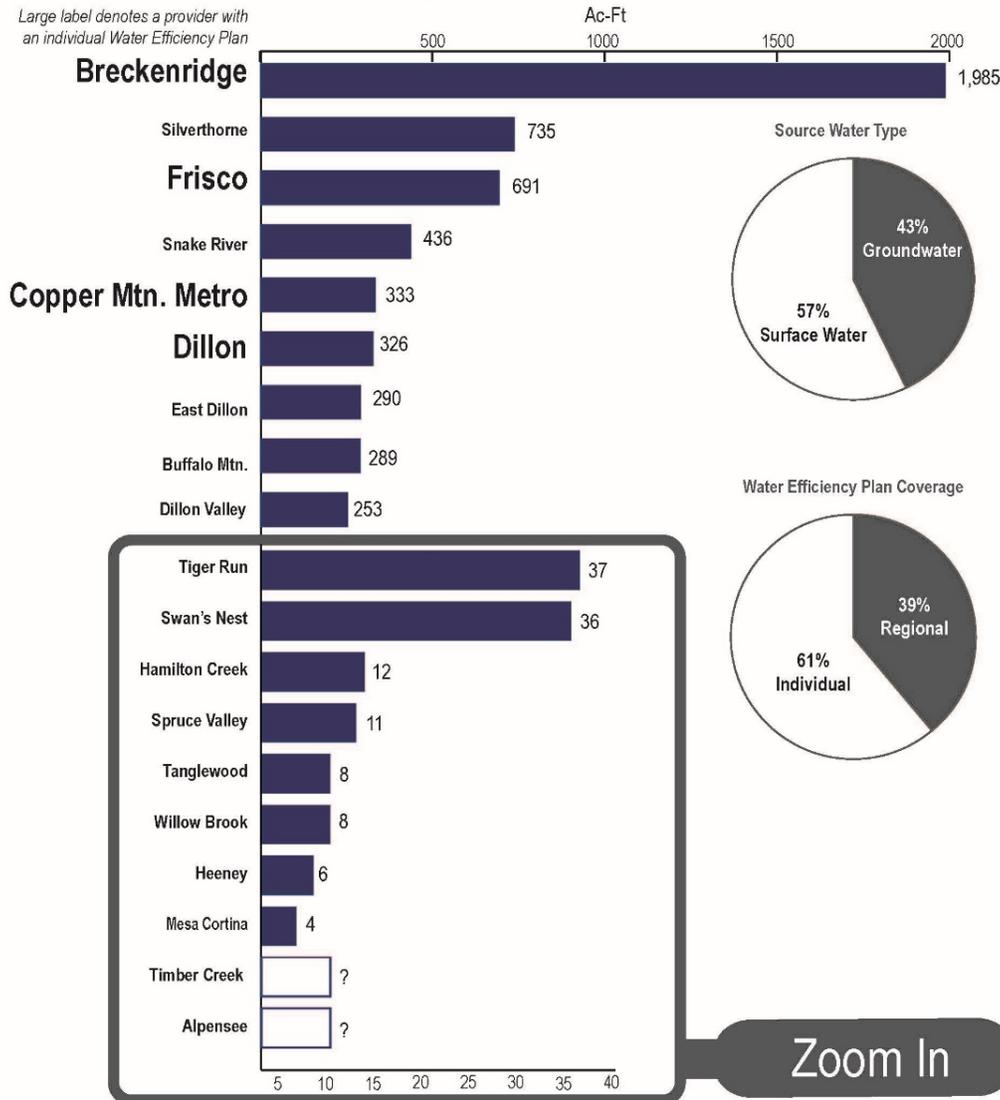


Figure 8. Water Use by Provider (2015)

The scope of this regional water efficiency plan covers the water use depicted in **Figure 8**, of which 57% is sourced from surface water and 43% is sourced from groundwater. Approximately 61% of the water use is delivered by Copper Mountain Consolidated Metropolitan District, Town of Breckenridge, Town of Dillon, and Town of Frisco. Though these four providers have developed individual water efficiency plans, this regional plan has a broader scope that covers municipal use, domestic, commercial, and household uses across all water users in the watershed.

6.4 Vulnerabilities

6.4.1 Wildfires

A common concern across the watershed is the risk from wildfires. When they do occur, wildfires create a triple threat to surface water quality:

- They increase the amount of rainfall during a storm event that is available for runoff. Wildfires burn vegetation whose canopy would normally intercept rainfall and whose roots would uptake water.
- They increase the surface runoff that occurs from subsequent storm events. Wildfires affect topsoil properties, making ground surfaces hydrophobic, so that water runs off rather than being infiltrated.
- They increase pollutant loads during subsequent storm events. Wildfires leave large amounts of debris and surface disturbances in their wake. In addition to the debris and sediment loads clogging intake infrastructure, source waters often experience spikes in turbidity, coliforms, total organic carbon, iron, manganese, and ammonia.

Wildfires can also affect the available quantity of water, if debris constricts water flow or alters the river channel.

As discussed previously in **Section 4 Related Studies**, actions that are being taken include identifying critical infrastructure, implementing mitigation projects to protect water infrastructure, and active forest management practices.

6.4.2 Droughts

Summit County has experienced significant periods of drought six times in the past 35 years, with the most recent occurring in 2002 and 2012 (AMEC 2013). While all providers in the watershed were able to meet demands during these dry period, some stream segments and groundwater supply wells ran dry. With the exception of the Town of Breckenridge, the providers in the watershed lack reservoir storage, and have to rely more heavily on demand reductions during times of drought.

As discussed previously in **Section 4 Related Studies**, actions that are being taken include establishing emergency interconnects among systems. Additionally, some providers have diversified their water supplies to include both groundwater and surface water supplies.

6.4.3 Flows and Lake Levels

Given the strong culture around outdoor recreation, for many the purpose of water efficiency is to put more water back into the rivers. There are two mechanisms by which environmentally-beneficial streamflows and lake levels are maintained in the watershed:

- **The State of Colorado's Instream Flow Program:** The Colorado Water Conservation Board is the only entity in the State authorized to hold water rights to protect streamflows and lake levels (CWCB 2005). When CWCB exercises an instream flow right, the water is left in the river or lake. Before this program was authorized, all appropriations were required to divert water out of the natural system.

Currently, there are approximately 260 miles of river in the watershed that are protected by instream flow rights (**Figure 9**). All of the principal drainages (including the Upper Blue, Lower Blue, Snake, and Tenmile) have seasonal, minimum instream flow values established. However, these water rights were typically appropriated in 1986-87, which makes them fairly junior water rights (Colorado Division of Water Resources, personal communication). This means that all water rights with more senior appropriation dates need to be satisfied before the instream flow rights can be exercised.

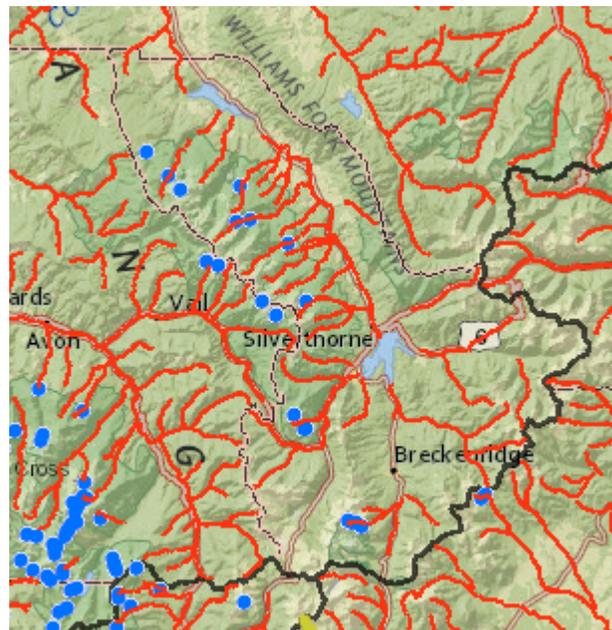


Figure 9. CWCB Instream Flow Rights (red lines = streams, blue dots = lakes) (CWCB 2018)

- Voluntary Changes to Operations:** The second mechanism used to protect streamflows and lake levels includes voluntary operational changes. Recognizing the importance of maintaining healthy streamflows for a variety of reasons, several entities – including Town of Breckenridge, Town of Frisco, and Summit County – have voluntarily modified their water operations to maintain minimum streamflows.

7 PERCEPTIONS OF WATER EFFICIENCY

7.1 Motivations

In 2016, High Country Conservation Center and Alpine Insights conducted a survey to better understand local perceptions of water efficiency (HC3, 2016). The key findings were:

- Environmental concerns were cited as the primary motivating factor (46%) for current water conservation efforts, followed by concerns about future water shortages (37%).
- The most commonly cited conservation activities included user behaviors (e.g., turning the water off while brushing teeth or washing dishes, taking shorter showers). Replacing indoor fixtures (13%), replacing landscaping (12%), and automatically-timed irrigation systems (7%) were less common.
- About one-half of respondents (52%) were aware that most residential water waste occurs outside the home from outdoor water use (HC3, 2016). Forty percent of respondents stated they would be willing to change their landscaping practices if the need for water conservation increases.
- For future conservation efforts, respondents overwhelming stated (72%) that awareness of future water shortages would increase their likelihood to conserve water.
- Less than 1% of respondents stated they were not motivated to conserve water.

7.2 Opportunities

During the planning process, stakeholders identified unique qualities and resources within the Blue River watershed that will be leveraged to achieve success with this regional water efficiency program:

- A youthful population motivated to protect the natural environment and economic vitality of the region.
- A history of regional collaboration, including sharing resources and ideas. Together, the region will be able to develop water efficiency programs and initiatives that could not be achieved individually.
- Engaged non-governmental organizations including High Country Conservation Center, Middle Park Conservation District, Blue River Watershed Group, and Friends of the Lower Blue River have the interest and the capacity to support implementation of this water efficiency plan and education and outreach efforts.

7.3 Challenges

Water efficiency programs rely on people to change their behaviors and to take actions to reduce their water use. During the planning process, the stakeholders identified a number of barriers that need to be recognized and overcome to achieve the vision of this plan:

- **Visiting population and seasonal housing:** The resident population in the Blue River watershed is small compared to the visiting population. Water conservation values need to be promoted in a positive way without adversely affecting tourism. In many cases, rental units are managed by property management companies that employ landscape companies for outdoor irrigation and

maintenance. Water conservation efforts need to target the appropriate decisionmakers with the right kind of messaging.

- **Use-it-or-lose it:** A common question that providers ask is whether water conservation efforts will affect their water rights. Colorado law recognizes the responsibility that providers have to serve customers and plan for the future, and in fact, water providers are the only entities in the State that are allowed to hold water rights in excess of their historical consumptive uses.
- **Lost revenues:** For water providers that rely heavily on volumetric water rates for operating funds, reduced water use can mean less revenue. Most water providers minimize this risk by conducting rate studies on a regular basis to assess their pricing structures and maintain financial stability while still encouraging water conservation.

8 WATER EFFICIENCY ACTIVITIES

During the stakeholder planning process, water efficiency activities were identified using multiple factors that included provider priorities, stakeholder input, opportunities for water savings, technical feasibility, and implementation capacity. When feasible, the efficiency activities were quantified in terms of their potential for water savings, customer sectors and end-uses impacted by the measure, and implementation costs. A summary of activities that are planned for implementation over the next seven years is shown in **Table 2**.

Table 2. Summary of Planned Water Efficiency Activities

Water Efficiency Activity	Provider Program	Regional Program	Projected Water Savings in 2025
Foundational Activities			
Billing Upgrades	✓		2 ac-ft/yr
Advanced Metering Infrastructure and Enhanced Water Loss Control	✓		184 ac-ft/yr
Conservation-Oriented Rates	✓		168 ac-ft/yr
Institutional Collaboration		✓	Not Quantified
Targeted Technical Assistance and Incentives			
Indoor Water Efficiency		✓	Not Quantified
Outdoor Water Efficiency		✓	17 ac-ft/yr
Ordinances and Regulations			
Land Use Planning	✓		Not Quantified
Education Activities			
Education and Outreach		✓	Not Quantified
Total Savings in 2025			371 ac-ft/yr

The following sections summarize the efficiency activities. Some of the activities will be programs that are internal to participating providers, in which case more detail can be found in the individual water efficiency plans for the participating providers:

- Copper Mountain Consolidated Metropolitan District (CMCMD, 2018)
- Town of Breckenridge (TOB, 2018)
- Town of Dillon (TOD, 2018)
- Town of Frisco (TOF, 2018)

Other activities will be accomplished through collaboration in regional programs.

8.1 Foundational Activities

8.1.1 Billing Upgrades

Billing upgrades are a provider-led program. Providers will partner with a contractor to provide customers with the WaterSmart Report Card. The report card will give customers more detailed information about their water usage, how their usage compares to similar customers, and suggestions for improving their efficiency. To estimate water savings, the top 5% of customers (in terms of annual water use) are assumed to reduce consumption by 1%. Program costs vary based on number of accounts that will receive the report card. In addition to water savings, the customer engagement associated with the report card will be extremely valuable.

8.1.2 Advanced Metering Infrastructure and Enhanced Water Loss Control

Metering and water loss control programs are specific to each provider. Water savings estimates are a function of current metering technology and water loss control programs:

- Potential water savings are estimated to be 7% of annual demands for new AMI implementations.
- Potential water savings are estimated to be 5% of annual demands for providers that have advanced meters installed but have the opportunity to improve leak detection programs.
- Potential water savings are estimated to be 2% of annual demands for existing AMI systems that have the opportunity to provide customers with direct access to their water use data.

8.1.3 Conservation-Oriented Rates

Pricing structures are specific to each provider. Although each participating provider has adopted inclining block rate structures, they vary in terms of how well the structure incentivizes conservation. Each provider intends to review their existing pricing structures as part of their next rate study, which entails an upfront cost (estimated at \$20,000) but no ongoing costs. Water savings estimates are a function of how well the current pricing structures incentivize conservation, but are typically estimated at 7.5% of annual demands for small- and medium-sized utilities (Green and Maddaus, 2010).

8.1.4 Institutional Collaboration

During the planning process, High Country Conservation Center convened an “executive committee” that included representatives from each participating provider, Summit County, the Board of County Commissioners, Middle Park Conservation District, and Northwest Colorado Council of Governments, among other entities. Members of the executive committee will continue to meet as part of the implementation of this plan to exchange information.

8.2 Targeted Technical Assistance and Incentives

8.2.1 Indoor Water Efficiency

High Country Conservation Center intends to lead an indoor water efficiency program. The program is envisioned to include two components:

- Residential indoor water audits that include direct installation of some water-saving fixtures.
- Commercial outreach through High Country Conservation Center’s ResourceWise sustainable business program. In addition to providing recommendations on opportunities to save water,

High Country Conservation Center has some financial resources available for upgrades and other water-saving projects.

8.2.2 Outdoor Water Efficiency

The outdoor water efficiency program will include two related components:

- An outdoor water audit program to evaluate irrigation systems for efficiency improvements.
- An irrigation optimization program to implement efficiency improvements.

Customers that complete the irrigation optimization program will be eligible for rebates based on the expected annual savings from the upgrades.

The water savings associated with this activity are conservative. The estimates assume that 5% of eligible customers will participate each year in the audit program, and that 25% of audit participants will complete the optimization program. Participants are expected to reduce their outdoor water use by 15% at each step of the program.

In the future, a third component for landscaper certification will be evaluated.

8.3 Ordinances and Regulations

In 2017, as part of the planning process, a regional land use planning group convened with the intent of reviewing design guidelines and landscaping codes for existing incentives and barriers to water savings. The working group includes representatives from Northwest Colorado Council of Governments who are currently seeking grant funding to develop model codes that incentivize water quality objectives and water conservation. If awarded, the grant will also include funding to help five communities amend their codes.

8.4 Educational Activities

High Country Conservation Center will lead the regional educational and outreach efforts. The top priorities for this group in 2018 include:

- Developing or assembling water conservation materials that are targeted to priority sectors in support of implementation efforts under this plan.
- Developing strategies for engaging the visiting and second homeowner population in Summit County.
- Promoting awareness around joint energy-water savings opportunities.
- Identifying key events and outreach channels for education and awareness efforts.

9 IMPLEMENTATION AND MONITORING PLANS

9.1 Implementation

The general approach to implementing the new water efficiency activities described in **Section 8** includes the following steps:

- Determine the organization responsible for leading the activity.
 - In general, water providers will be responsible for the implementation of the foundational activities (billing upgrades, AMI and enhanced water loss control, and conservation-oriented rates) and any changes to ordinances and regulations.
 - High Country Conservation Center will lead institutional collaboration, the development of an indoor water efficiency program, and education and outreach efforts.
 - The lead organization for the outdoor water efficiency program is yet to be determined.
- When needed, work with other organizations and partners to develop implementation action plans, define funding needs, and exchange information about best practices and lessons learned.
- Determine funding needs and sources for the activity.
 - For activities to be funded entirely or in part by Town operating budgets, work within the annual budgeting cycle. This approach will require identifying budget priorities and estimates a year before the activity is to be implemented.
 - For activities to be funded by external sources, look for grant and other funding opportunities. **Appendix B** includes a summary of the implementation resources that were identified during the planning process.

At the end of the water efficiency planning process, four working groups were formed to guide implementation of the regional activities:

- Education and outreach
- Indoor water efficiency
- Integrated water and land use planning
- Outdoor water efficiency

Appendix C includes implementation action plans that were developed for each working group to help transition from planning to implementation. The action plans were included as appendices so that they can evolve as the working groups meet and make progress.

9.2 Plan Review and Updates

The Water Conservation Act of 2004 (HB04-1365) requires that water efficiency plans be made publicly available for review and comment for a period of 60 days and that the plans be locally adopted by the appropriate governing entity. High Country Conservation Center complied with these requirements by providing public notice of this plan, allowing time for public review and comment, and submitting the plan for adoption along with the individual water efficiency plans to the participating providers. After the plan has been adopted, **Appendix D** will contain copies of the resolutions.

High Country Conservation Center will update this plan every seven years, as required by The Water Conservation Act of 2004. Plan updates will incorporate new data and may include revisions to the planned activities, as appropriate.

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APPENDIX A: PLAN DATA

Provided in a separate document.

APPENDIX B: IMPLEMENTATION RESOURCES

Organization / Individual	Implementation Resource	Resource Type	Additional Information
Aaron Clay	Water Law in a Nutshell Workshop	Education and Training	Contact High Country Conservation Center or Middle Park Conservation District
American Water Works Association	Topics area: water conservation programs, water loss control	Technical guidance	Website
American Water Works Association Rocky Mountain Section	Topics: water conservation, tap fees	Training	Website
Colorado Water Conservation Board	Water Conservation Implementation Grants	Grant Funding Source	Website
Colorado Water Conservation Board	Water Resource Conservation Public Education and Outreach Grants	Grant Funding Source	Website
Colorado Water Conservation Board	Water Plan Grants	Grant Funding Source	Website
Colorado WaterWise	Live Like You Love It	Education and outreach materials	Website
Irrigation Association	Topics: landscape water management	Training	Contact Northern Water (2018 training host)
Rural Communities Assistance Program	Topic areas: Water loss control, managerial, financial	Training and technical assistance	Website Contact Jeff Oxenford (720-353-4242)
Sonoran Institute	Land Use and Water Planning Workshop	Education and Training	Website
WaterNow	Project Accelerator Program	Technical and program assistance	Website

APPENDIX C: IMPLEMENTATION ACTION PLANS

Education and Outreach

Last Updated: January 14, 2018

Next Meeting Scheduled: March 15, 2018

Working Group Role	Name and Organization
Group coordinator <i>(responsible for scheduling meetings and communications)</i>	Jessie Burley, High Country Conservation Center
Team members <i>(responsible for helping with action items)</i>	<p>Joyce Allgaier, Town of Frisco</p> <p>Abbey Browne, Woodwinds Property Management</p> <p>Robert Buras, Town of Dillon</p> <p>Shellie Duplan, Buffalo Mountain Metro District</p> <p>Jeff Goble, Town of Frisco</p> <p>Greg Hardy, Trout Unlimited</p> <p>Hallie Jaeger, High Country Conservation Center</p> <p>Laura Lynch, Town of Breckenridge</p> <p>Zach Margolis, Town of Silverthorne</p> <p>Katlin Miller, Middle Park Conservation District</p> <p>Mike Nathan, A-Basin</p> <p>Deborah Polich, ?</p> <p>Jen Schenk, High Country Conservation Center</p> <p>Dan Schroder, CSU Extension</p> <p>Karn Stiegelmeier, Board of County Commissioners</p> <p>Troy Wineland, Division of Water Resources</p>

Key

Black = confirmed

Red = needs confirmation

SUMMARY OF 2018 GOALS

- Develop a coordinated education and outreach program for water conservation

STRATEGIES TO ACHIEVE GOALS

Strategy 1: Develop targeted materials by sector

- Identify top priorities for education and outreach
 - Landscaper
 - Indoor
 - Outdoor
 - Commercial
 - Residential
- Inventory existing materials and resources
 - Water utility websites (Denver Water, Town of Breckenridge, etc.)
 - Colorado WaterWise (Live Like You Love It)
 - EPA Water Sense
 - Water audit and related service providers
- Adapt existing materials and develop new materials
- Identify outreach channels

- Bill enclosures
- Social media
- Websites
- Events
- Summit Daily
- Water Warriors program
- Disseminate materials

Strategy 2: Engage the visiting population and second homeowners

- Come up with a message and then keep delivering the message because it's a changing population
- Compile list of HOAs and contact information

Strategy 3: Leverage High Country Conservation Center's Energy Programs

- Anytime talk about water, talk about energy and vice versa

Strategy 4: Aggregate and push out related information and events from other organizations

- Fix-a-leak week

SUMMARY OF ASSIGNED ACTION ITEMS

Action Item	Responsible Team Member	Due Date
Create marketing plan strategy		
Connect with organizations that can help with information dissemination		

Indoor Water Use Efficiency

Last Updated: January 13, 2018

Working Group Role	Name and Organization
Group coordinator <i>(responsible for scheduling meetings and communications)</i>	Laura Lynch, Town of Breckenridge
Team members <i>(responsible for helping with action items)</i>	Robert Buras, Town of Dillon Jeff Goble, Town of Frisco Jess Hoover, HC3 Cody Jensen, HC3 Mike Nathan, A-Basin Deborah Polich, ? ?, Summit County Building/Planning Dept
<i>Key</i>	
<i>Black = confirmed</i>	
<i>Red = needs confirmation</i>	

SUMMARY OF 2018 GOALS

- Pilot a residential program
- Develop a commercial outreach channel

STRATEGIES TO ACHIEVE 2018 GOALS

Goal 1: Pilot a residential program that includes educational materials, audits, direct installs, and/or rebates/incentives.

- Leverage HC3's Energy Smart Colorado program for indoor energy efficiency.
 - At a minimum, assess energy program for best practices and lessons learned to inform water program design.
 - Also consider leveraging energy program as an education and outreach channel (e.g., leave materials on water efficiency with residents when conducting an energy assessment).
- Research existing information and programs
 - Evaluate existing residential programs, with an emphasis on comparable mountain communities.
 - For example, Resource Central has a "Slow the Flow" program that includes a residential indoor audit program.
 - Identify rebate structures/incentives.
 - Evaluate types of direct installs needed.
 - Find biggest water savings potential for each rebate measure.
 - Compile effective educational materials.
- Design the pilot program
 - Identify water providers interested in participating in the pilot program.
 - Determine funding needs and sources for pilot program.
- Execute the pilot program.
- Assess performance of the pilot program to inform larger-scale implementation.

Goal 2: Develop a commercial outreach channel

- Research existing information.

- Compile effective educational materials relevant for various commercial sectors.
- Leverage HC3's Resource Wise green business program to connect with businesses and find water savings opportunities.
 - Use the program as an education and outreach channel
 - Leave sector-specific materials on water efficiency with businesses as part of engagement.
 - Hold a Business Lunch n' Learn workshop on water in 2018.
 - Evaluate the potential to expand the program in offering and implementing recommendations for improving water efficiency based on the results from the sustainability and energy assessment.
 - Add information about the energy-water nexus on summary reports
 - Provide water efficiency recommendations to businesses with low water scores
 - Use available funding (\$400/business) towards upgrades and projects
 - Direct installs of toilet bricks and pre-spray rinse valves
 - Determine whether water savings from these activities can be modeled

SUMMARY OF ASSIGNED ACTION ITEMS

Action Item	Responsible Team Member	Due Date
Identify fixtures/appliances to target for incentives based on water savings potential	Mike	March 2018
Research existing residential water efficiency programs	Laura	March 2018
Flesh out potential to leverage existing HC3 programs, resource needs, etc.	Jen	March 2018
Evaluate opportunities for leveraging Resource Wise	Jess and Jessie	March 2018

Integrated Water and Land Use Planning

Last Updated: January 14, 2018

Working Group Role	Name and Organization
Group coordinator <i>(responsible for scheduling meetings and communications)</i>	Joyce Allgaier, Town of Frisco
Team members <i>(responsible for helping with action items)</i>	<p>Graeme Bilenduke, Copper Mountain ski resort</p> <p>Robert Buras, Town of Dillon</p> <p>Mark Cassalia, Denver Water</p> <p>Allison Fulton, Copper Mountain Metro</p> <p>Jeff Goble, Town of Frisco</p> <p>Peter Grosshuesch, Town of Breckenridge</p> <p>Katie Kent, Town of Frisco</p> <p>Susan Lee, Town of Silverthorne</p> <p>Zach Margolis, Town of Silverthorne</p> <p>Mike Nathan, A-Basin</p> <p>Pete Oltman, North Line GIS</p> <p>Ed Pankevicius, Copper Mountain Metro</p> <p>Don Reimer, Summit County</p> <p>Elena Scott, Norris Design</p> <p>Ned West, Town of Dillon</p> <p>Lane Wyatt, NWCCOG</p>

Key

Black = confirmed

Red = needs confirmation

SUMMARY OF 2018 GOALS

- Conserve water through collaboration and actions that support all agencies in our region

STRATEGIES TO ACHIEVE GOALS

Strategy 1: Code Amendments

- Audit codes and additional regulations to identify existing barriers and incentives to water conservation (Joyce and regional planners)
- Amend water standards, codes (require certain irrigation materials and systems) - Jeff
- Look at tap fees and tying to/paying more for landscaping (Mark)
 - See Castle Rock and Aurora programs
 - Schedule an educational workshop
 - Share literature
- Look at stormwater management regulations (bioswales, tree gardens)
- Land use typology
 - Apply budgets to different types of land uses (e.g. – ballfields vs. aesthetic landscape areas) – for example, Denver Water

Strategy 2: Collaboration and Engagement

- Engage all special and metro districts to implement plan
- Set common goals among towns, districts, others to coalesce efforts (even if done at different times)

- Tap informational and regulation resources to raise the bar, give guidance, help share information and information about grants and capacity building (NWCCOG)
- Engage large water users

Strategy 3: Advance water reuse programs, especially for golf courses and snowmaking parks (Lane Wyatt and Torie Jarvis from NWCCOG QQ)

SUMMARY OF ASSIGNED ACTION ITEMS

Action Item	Responsible Team Member	Due Date	Action Item
Convene planners to initiate code audits	Joyce	Jan 2018	
Schedule an educational session on tap fees	Mark	Jan 2018	Scheduled for June 2018 through AWWA RMS

Outdoor Water Use Efficiency

Last Updated: January 14, 2018

Working Group Role	Name and Organization
Group coordinator <i>(responsible for scheduling meetings and communications)</i>	Troy Wineland, Colorado Division of Water Resources
Team members <i>(responsible for helping with action items)</i>	<p>Abbey Browne, Woodwinds Property Management</p> <p>Robert Buras, Town of Dillon</p> <p>Jeff Goble, Town of Frisco</p> <p>Torie Jarvis, NWCCOG</p> <p>Laura Lynch, Town of Breckenridge</p> <p>Zach Margolis, Town of Silverthorne</p> <p>Mike Nathan, A-Basin</p> <p>Ed Pankevicius, Copper Mountain Metro District</p> <p>Deborah Polich, ?</p> <p>Karn Stiegelmeier, Board of County Commissioners</p> <p>Scott Winter, Colorado Springs Utilities</p> <p>Lane Wyatt, NWCCOG</p>

Key

Black = confirmed

Red = needs confirmation

SUMMARY OF GOALS

- **Overarching:** Reduce outdoor water use while maintaining aesthetics for visitor and resident appeal
- **2018:** Focus on low-cost/no-cost water savings opportunities and customer education and outreach
- **2019-2021:** Design and implement regional programs aimed at outdoor water efficiency, including outdoor water audits, irrigation system optimization, and landscaper certification

STRATEGIES TO ACHIEVE GOALS

Strategy 1: Customer outreach and education

- Identify largest users (for example, HOAs)
 - Work with customers to better schedule their water use
- Work with landscape companies
 - Create a list of water-efficiency minded landscapers
 - Educate additional landscape companies
- Identify educational events, for example one county-wide meeting
 - Annual State of the River
 - NWCCOG QQ meetings
- Educate about joint energy-water savings opportunities
- Develop water budgets using GIS and irrigated lands analysis for customer outreach about the amount of water customers should be using
- Work with City Parks staff on water savings opportunities
- Send out a mailer to contract holders about metering and plantings

Strategy 2: Develop an outdoor water efficiency audit program

- Evaluate existing programs for best practices and lessons learned (for example, Denver Water)
- Identify potential service providers (for example, Resource Central Slow the Flow program)

- Design and implement a pilot program
- Implement a regional program

Strategy 3: Develop an outdoor water efficiency system optimization program

1. Evaluate existing programs for best practices and lessons learned
2. Identify potential service providers (for example, irrigation companies)
3. Design and implement a pilot program
4. Implement a regional program

Strategy 4: Develop a landscaper certification program

1. Evaluate existing programs for best practices and lessons learned
2. Evaluate working with the Irrigation Association
3. Design and implement a pilot program
4. Implement a regional program

Strategy 5: Evaluate municipal code for updates regarding vegetation requirements

1. Coordinate efforts with the land use planning working group

SUMMARY OF ASSIGNED ACTION ITEMS

Action Item	Responsible Team Member	Due Date

APPENDIX D: RESOLUTION TO ADOPT PLAN
