ArkDSS Memorandum
Final

To: Bill Tyner and Kelley Thompson, Colorado Division of Water Resources

From: Wilson Water Group

Subject: Task 2.1 – Colorado Springs Utilities Operating Memorandum

Date: April 2019

INTRODUCTION

One of the Task 2.1 objectives is to:

> *Develop and document an understanding of the operations of key water use facilities in the basin in order to accurately represent the use and operations in the water rights allocation modeling. This understanding will be developed through interviews with DWR personnel, operators of large canal and reservoir systems, and representatives of federal facilities.*

Key water use facilities include diversion structures, transmountain diversions, reservoirs, and reservoir systems.

- Diversion structures include structures that divert Colorado Springs Utilities (CS-U) native water rights and/or carry CS-U transbasin diversions and changed ditch shares.
- Transmountain diversions include those structures that transport non-native water from another basin into the Arkansas River basin for use by CS-U.
- Key reservoirs include reservoirs or reservoir systems owned by CS-U and reservoirs that store CS-U native water, transbasin water, or changed ditch shares. Reservoir systems are defined as a group of reservoirs on the same tributary or filled by the same diversion structure that satisfy a common demand or are operated in a similar fashion.

A number of CS-U components have been identified as key structures for the Arkansas River Decision Support System (ArkDSS) surface water modeling efforts. The purpose of this memorandum is to document physical, legal, and operational aspects of those key structures.

The information provided in this memorandum was developed from publicly accessible sources, information provided by CS-U, and discussions with representatives of CS-U. Information in this memorandum is believed to be accurate. However, this information should not be relied upon in any legal proceeding.

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SYSTEM OVERVIEW

CS-U currently delivers water to approximately 470,000 people in Colorado Springs and surrounding areas, including the Ute Pass communities; military bases; and limited suburban areas outside the city limits. The utility operates a complex system of storage and delivery pipelines that draw water from Arkansas River and tributaries of the Upper Colorado River basin. The City of Colorado Springs has a water history that dates back nearly 150 years as highlighted in the following time line:

- 1870s – Early settlers dug an open ditch from Fountain Creek into Colorado Springs to provide domestic water supplies. Drinking water was largely sourced from local wells.
- 1873 – Development of Ruxton Creek water supplies begin.
- 1890 – Development of South Slope System begins via construction of Lake Moraine Dam, McShane Ditch and Strickler Tunnel.
- 1894 – Boehmer Reservoir was constructed.
- 1896 – Bighorn and Wilson Reservoirs were constructed.
- 1901 – Survey work was initiated to develop the North Slope System.
- 1904 – St. John Tunnel was constructed.
- 1905 – Mason and McReynolds Reservoirs were constructed.
- 1908 – City acquired private property in the North and South Catamount, Crystal, North Cascade, South Cascade, and Cascade Creek drainages.
- 1929 – Big Tooth Reservoir was completed.
- 1930 – Purchased Empire Land and Water Company.
- 1930s – Crystal and South Catamount Reservoirs were built.
- 1949 – Purchased Old Northfield Reservoir, Nichols Reservoir, and treatment facility.
- 1950s – Blue River Project was completed and was CS-U's first transbasin system.
- 1960 – North Catamount Reservoir was constructed.
- 1960s – City develops local reuse of transmountain return flows via non-potable system and local exchanges, local exchanges later decreed by Water Court in 1987.
- 1967 – Homestake Phase I was completed as a joint venture of CS-U and Aurora Water.
- 1972 – Purchased shares in Twin Lakes Company.
- 1984 – Purchased CFI water rights.
- 1985 – Begin deliveries of Fry-Ark water from Pueblo Reservoir via Fountain Valley Conduit.
- 1986 – Purchase majority interest in Colorado Canal, Lake Henry, and Lake Meredith.
- 1980s – City develops Arkansas River Exchange Plan for transmountain and Colorado Canal waters, decreed by Water Court in 1987 and 1993, respectively. Uses of fully consumable non-sewered return flows decreed by Water Court in 1991.
- 1994 – Colorado Court of Appeals upheld Eagle County's decision to deny 1041 permit for the construction of Homestake II.
- 2015 – City purchases shares in FMIC and Chilcott.
- 2016 – Completed Southern Delivery System to convey water from Pueblo Reservoir to Colorado Springs and other participating entities.

Colorado Springs is the second largest city in the state. The location of CS-U's key structures and water delivery/storage systems in the Arkansas River basin are shown in Figure 1. The CS-U service area is highlighted in purple. Also included in the figure, for reference, are CS-U's major western slope system structures. Simplified diagrams of CS-U's key water systems are described and shown below.

The water demands supplied by CS-U are throughout Colorado Springs city limits and within neighboring areas. CS-U operates a complex raw water supply network to serve these demands. The raw water supply network can be divided into the following systems:

1. South Slope System
2. North Slope System
3. Northfield System
4. Rosemont System
5. South Suburban System
6. Local Fountain Creek Watershed System
7. Homestake Project
8. Twin Lakes Water System
9. Blue River Con-Hoosier Project
10. Fountain Valley Authority / Southern Delivery System
11. Colorado Canal System

These supply systems work in conjunction to meet demand by delivering available raw water supplies to treatment plants within CS-U's service area. Due to physical limitations and the nature of the local topography, not all systems can effectively distribute water throughout the service area. Therefore, water supplies have been adequately positioned such that system demands can be consistently met. However, for the purposes of modeling, CS-U water demands will be represented as a single demand that can be met from each source, with consideration for capacity limitations. This approach will allow the model to simulate actual system operations.

Key structures are identified below for each of the water systems owned and operated by CS-U. Note that CS-U owned facilities located on the western slope are discussed and detailed in the Upper Colorado River Water Resource Planning Model documentation. Infrastructure owned by CS-U in the upper South Platte basin is described in the South Platte River Water Resource Planning Model documentation.

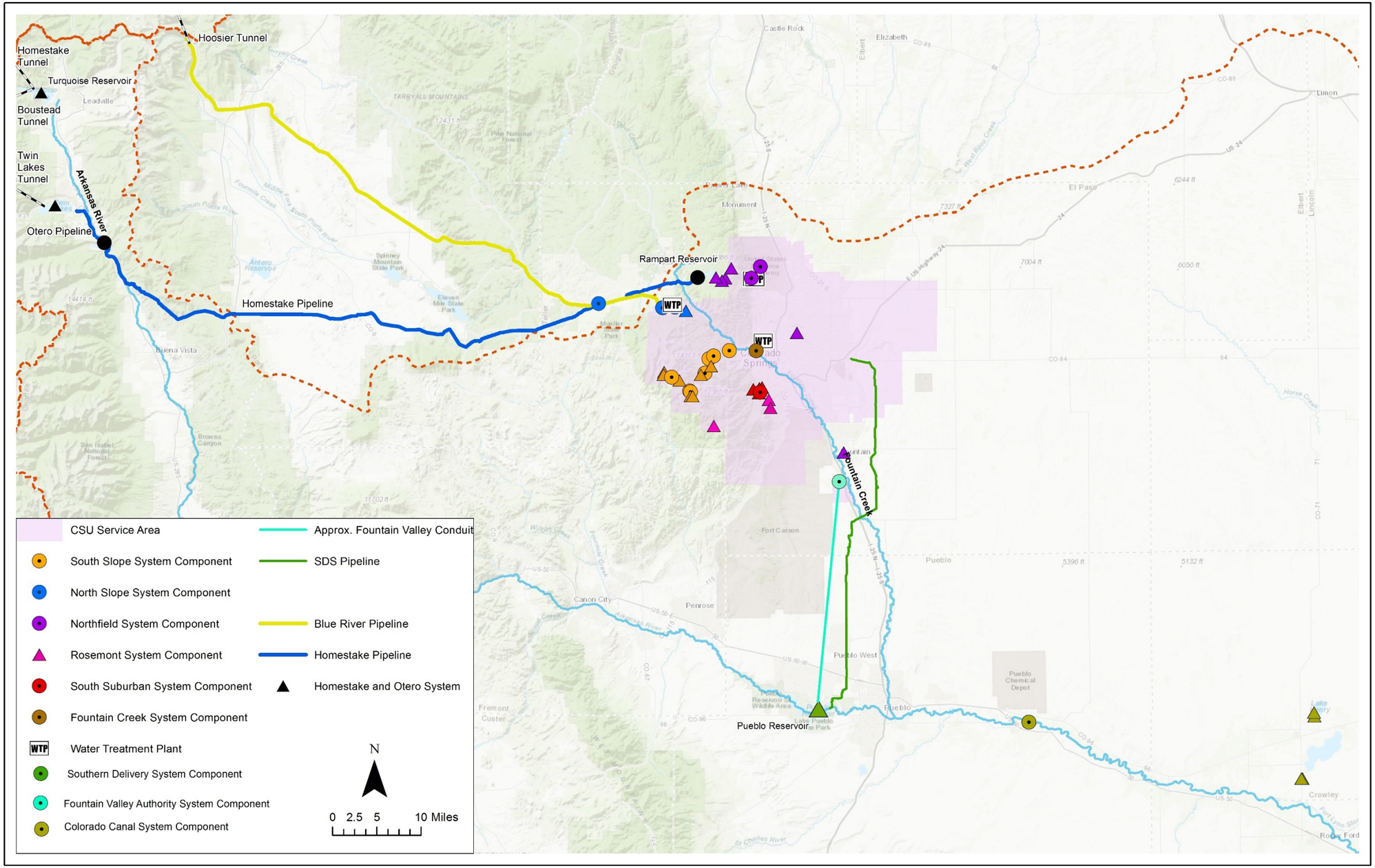

Figure 1: Colorado Springs Utilities – Water Supply Systems

PHYSICAL INFORMATION

The following sections include physical descriptions of the key CS-U owned structures in the Arkansas River basin, followed by a discussion of specific water rights and operations.

1. Physical Information – South Slope System

As shown in Figure 2, the South Slope System consists of a series of small reservoirs that collect runoff from alpine drainages on the southern slope of Pikes Peak in Water District 12. These reservoirs are part of a transbasin system that diverts water from the upper Beaver Creek watershed and conveys supplies to Ruxton Creek, tributary to Fountain Creek in Water District 10, via the St. John's Tunnel. Water diverted through St. Johns Tunnel is generally derived from direct flow use water rights and is not stored in reservoirs located in upper Ruxton Creek drainage. Water in the Ruxton Creek reservoirs is native water stored by local exchange as described below. Raw water from the Ruxton Creek reservoirs is conveyed by pipelines to the Ruxton Hydroelectric Plant, Manitou Hydro Electric Plant, and Mesa Treatment Plant. Water from the South Slope System is ultimately delivered and treated at the Mesa Water Treatment Plant. Water is distributed within the lower half of the CS-U service area from the Mesa Water Treatment Plant and currently cannot serve the northern portions at higher elevations.

The South Slope System typically yields about 2,000 acre-feet per year from in-priority diversions. An additional 4,000 acre-feet of yield is made available in the South Slope System via exchanges. Exchanges primarily occur as fully consumable return flows available in Fountain Creek are exchanged upstream into Ruxton Creek reservoirs. Alternatively, exchanges may also be operated to move fully consumable water stored in Pueblo Reservoir upstream via Beaver Creek and into Water District 12 reservoirs. Water diverted into the South Slope System by exchange from fully consumable or transbasin water can be used to extinction. In-priority diversions within the South Slope System are single use water by decree, and may not be reused.

The major structural elements in CS-U's South Slope System include, Big Horn Reservoir, Wilson Reservoir, Boehmer Reservoir, McReynolds Reservoir, Mason Reservoir, Strickler Tunnel, St. Johns Tunnel, Moraine Reservoir, Big Tooth Reservoir, Ruxton Hydroelectric Plant, and Manitou Hydroelectric Plant. In total, the reservoirs have a capacity of about 7,000 acre-feet.

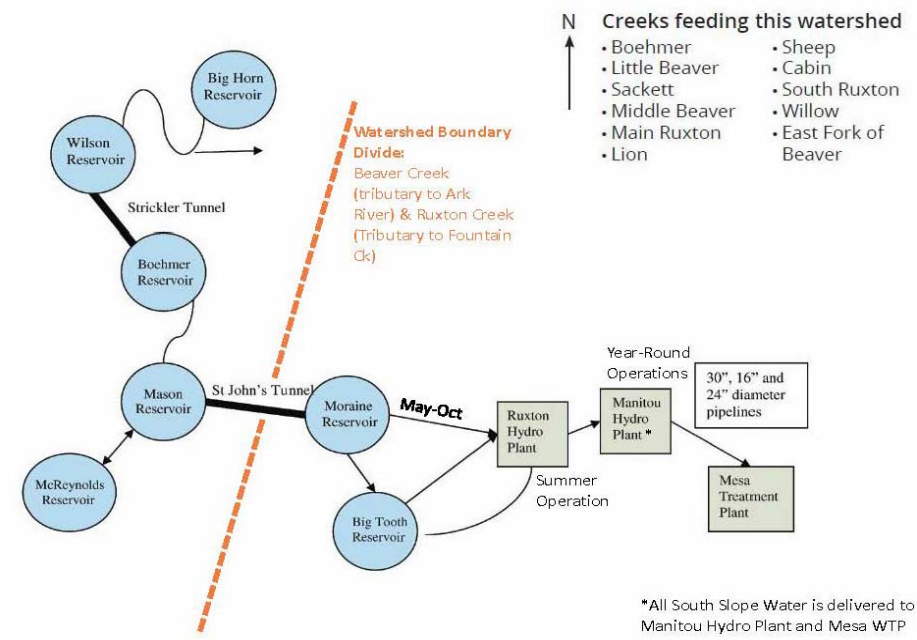

Figure 2: Colorado Springs Utilities - South Slope Water System

Big Horn Reservoir (Structure ID 1203816)

Big Horn Reservoir (aka Colorado Springs Reservoir No. 7) is located on the West Beaver Creek on the south slope of Pikes Peak and has an absolute storage right for 191 acre-feet. Water may be delivered to Victor Mine by contract with CS-U. Water is released from Big Horn Reservoir via West Beaver Creek and is collected at Wilson Reservoir.

HydroBase contains relatively complete storage records for Big Horn Reservoir from 1950 to present.

Wilson Reservoir (Structure ID 1203817)

Wilson Reservoir (aka Colorado Springs Reservoir No. 8) is located downstream from Big Horn Reservoir (elevation 11,700 feet) on a tributary to West Beaver Creek. The reservoir has an absolute storage right for 669 acre-feet. Contracted water may also be delivered to Victor Mine. Water released from Wilson Reservoir is conveyed via gravity through the Strickler Tunnel to Boehmer Reservoir, located on the Boehmer Creek tributary to Middle Beaver Creek.

HydroBase contains relatively complete storage records for Wilson Reservoir from 1950 to present.

Boehmer Reservoir (Structure ID 1203813)

Boehmer Reservoir (aka Colorado Springs Reservoir No. 2) is on the East Fork of West Beaver Creek and is connected to Wilson Reservoir via gravity tunnel. The reservoir has an absolute

storage right for 541 acre-feet. Water released from Boehmer Reservoir is conveyed downstream to Mason Reservoir.

HydroBase contains relatively complete storage records for Boehmer Reservoir from 1950 to present.

McReynolds Reservoir (Structure ID 1203815)

McReynolds Reservoir (aka Colorado Springs Reservoir No. 5) is located downstream of Boehmer Reservoir and adjacent to Mason Reservoir. The reservoir has an absolute storage right for 2,050 acre-feet on Middle Beaver Creek. Due to the relative elevation differences between McReynolds Reservoir and Mason Reservoir, water may be interchanged between the two reservoirs via gravity.

HydroBase contains relatively complete storage records for McReynolds Reservoir from 1950 to present.

Mason Reservoir (Structure ID 1203814)

Mason Reservoir (aka Colorado Springs Reservoir No. 4) is an on-channel reservoir located downstream from Boehmer Reservoir and adjacent to McReynolds Reservoir. The reservoir has an absolute storage right for 2,653 acre-feet. Due to the relative elevation differences between McReynolds Reservoir and Mason Reservoir, water may be interchanged between the reservoirs via gravity. Water is conveyed from Mason Reservoir in Water District 12 to Water District 10 via the St. John's Tunnel.

HydroBase contains relatively complete storage records for McReynolds Reservoir from 1950 to present.

St. John's Tunnel (Structure ID 1200539)

St. John's Tunnel moves water from Mason Reservoir in Water District 12 to Water District 10 (tributary to Ruxton Creek). The tunnel has a decreed rate of 6.4 cfs. The tunnel may also convey an additional 11.7 cfs as alternate points of diversions from other water rights. Records show that average annual diversions are about 4,400 acre-feet per year.

HydroBase contains mostly complete diversion records for St. John's Tunnel from 1971 to present, with data missing from 1987 through 1991.

Lake Moraine Reservoir (Structure ID 1003654)

Moraine Reservoir has an absolute storage right for 824 acre-feet and a capacity of approximately 1,250 acre-feet. The reservoir is located on Ruxton Creek and filled primarily by local exchange. Water from Lake Moraine Reservoir is typically released by CS-U through the Ruxton Creek Pipeline (1000581). The pipeline is operated during the summer months (Jun-Oct) and diverts additional supplies from Sheep Creek and Lion Creek in route to the Ruxton

Hydroelectric Plant and Manitou Hydroelectric Plants. Alternatively, water from Lake Moraine Reservoir may also be piped to Big Tooth Reservoir.

HydroBase contains relatively complete storage records for Lake Moraine Reservoir from 1950 to present, with data missing from 1973 through 1976.

Big Tooth Reservoir (Structure ID 1203668)

Big Tooth Reservoir (aka Upper South Ruxton Reservoir) is an on channel reservoir located at the junction of Willow Creek and South Ruxton Creek and is filled from native water by local exchange. The reservoir has an absolute storage right for 277 acre-feet. Big Tooth Reservoir is owned by CS-U and used to supply municipal water to the City of Colorado Springs. Water from Lake Big Tooth Reservoir is released by CS-U via pipeline and brings water to the Ruxton Hydroelectric Plant, Manitou Hydroelectric Plant and Mesa Water Treatment Plant.

HydroBase contains relatively complete storage records for Big Tooth Reservoir from 1994 to present. There are earlier storage records that are much greater than current capacity; further research is required prior to relying on those records during modeling efforts.

Ruxton Hydroelectric Plant

The Ruxton hydroelectric plant typically operates only from May through October when demands are highest. When in operation, the South Slope System supplies are conveyed to the Ruxton hydroelectric after bay and then the combined flows are diverted to the Manitou Hydro Plant for power production. The Division of Water Resources has not assigned a WDID to the Ruxton Hydroelectric Plant.

Manitou Hydroelectric Plant (1000874)

The Manitou Hydroelectric Plant operates year-round with water supplied from the South Slope System/Ruxton Creek System and the North Slope System. Outflow from Manitou Hydroelectric Plant is combined with Manitou Creek diversions before it is conveyed to the Mesa Water Treatment Plant. The Mesa Water Treatment Plant has a capacity of 42 MGD.

HydroBase contains diversion data for Manitou Hydroelectric Plant from 1991 through 2013.

2. Physical Information – North Slope System

The North Slope System consists of a series of reservoirs located on the north slope of Pikes Peak, as shown in Figure 3. These reservoirs primarily serve to receive water and regulate supplies from the Blue River/Con Hoosier System via the gravity fed Blue River Pipeline. Water supplied from the Homestake Project can also be brought into the North Slope System via the Twin Rock Pump Station. Native water supplies are also diverted via direct flow water rights, or into storage when in-priority.

Water supplies collected in the North Slope System are primarily used to supply the Manitou Hydroelectric Power Plant, Mesa Treatment Plant and the Ute Pass Water Treatment Plant. Added flexibility is developed into the system to allow water from the North Slope System to be

conveyed to the Northfield System and Pine Valley Treatment plants if necessary. Water is distributed within the lower half of the CS-U service area from the Mesa Water Treatment Plant and cannot serve the northern portions at higher elevations. The Northfield Transfer Line connecting the North Slope and Northfield Systems allow water to be directed to the Northfield System in emergency circumstances.

North Slope System typically yields about 4,000 acre-feet per year from in-priority direct diversions, diversions into storage, or local exchanges. Local exchanges primarily occur as fully consumable return flows are moved upstream via Fountain Creek. Water diverted into the North Slope System by exchange from fully consumable credits or transbasin water can be used to extinction. In-priority diversions within the North Slope System are single use water by decree and may not be reused.

The major structural elements in CS-U's North Slope System include North Catamount Reservoir, South Catamount Reservoir, Crystal Reservoir, Cascade Creek Diversion, French Creek Diversion and Ute Pass Treatment Plant. In total, the three reservoirs have a capacity of about 18,100 acre-feet.

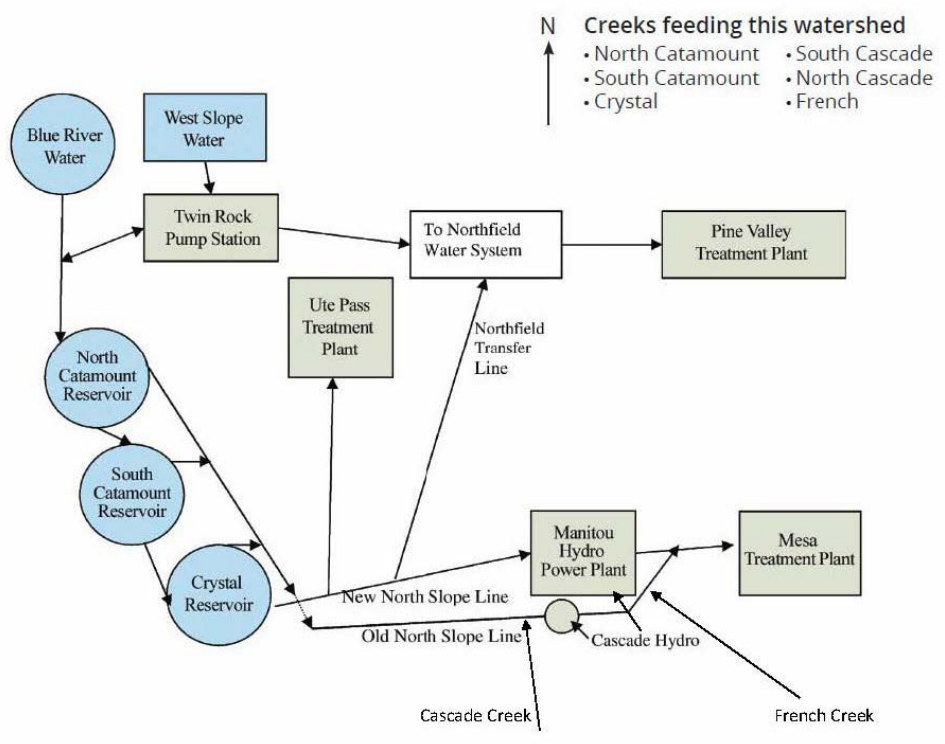

Figure 3: Colorado Springs Utilities - North Slope System

North Catamount Reservoir (1003673)

North Catamount Reservoir has an absolute water right for 10,500 acre-feet per Civil Action 13801 supplemental decree. The reservoir has a capacity of 12,030 acre-feet. The reservoir is located North Catamount Creek. Water from the Blue River/Con Hoosier System can be stored in North Catamount Reservoir via the Blue River Pipeline. North Catamount Reservoir is connected to South Catamount Reservoir and Crystal Reservoir via the Old North Slope Line. This line is used to regulate storage levels between North Catamount, South Catamount, and Crystal Reservoirs and deliver water to downstream Cascade Hydroelectric Plant and Mesa Water Treatment Plant. No bypasses are required, but seepage or other releases that occur are measured.

HydroBase contains relatively complete storage records for North Catamount Reservoir from 1980 to present.

South Catamount Reservoir (1003644)

South Catamount Reservoir has a senior and junior storage right both for 2,604 acre-feet, which is the approximate capacity of the reservoir. The reservoir is on South Catamount Creek; however is primarily filled with Blue River/Con Hoosier System water conveyed from North Catamount Reservoir by way of the Old North Slope Line. Native supplies are also available when in priority or by exchange. Water stored in the reservoir can be delivered to Mesa Water Treatment Plant, Ute Pass Treatment Plant, or the Northfield System for treatment at Pine Valley Treatment Plant. No bypasses are required, but seepage or other releases that occur are measured.

HydroBase contains relatively complete storage records for South Catamount Reservoir from 1966 to present.

Crystal Creek Reservoir (1003667)

Crystal Creek Reservoir has a senior and junior storage right both for 3,479 acre-feet, which is the approximate capacity of the reservoir. The reservoir is on Crystal Creek is primarily filled with native supplies, however Blue River water can be conveyed into Crystal Creek Reservoir from North Catamount Reservoir and South Catamount Reservoir by way of the Old North Slope Line. Native water supplies are high in fluoride and require blending with west slope water supplies. Water stored in the reservoir can be delivered to Mesa Treatment Plant, Ute Pass Treatment Plant, or to the Northfield System for treatment at Pine Valley Treatment Plant. No bypasses are required, but seepage or other releases that occur are measured.

HydroBase contains some storage records for Crystal Reservoir from 1966 to present, but there are several years of missing data.

New North Slope Line

The New North Slope Line has a capacity of 25 cfs and conveys water from Crystal, North Catamount or South Catamount Reservoirs directly to the Manitou Hydroelectric Plant to

generate power and then to Mesa Water Treatment Plant. The New North Slope Line is configured such that raw water can be directed to the Northfield Transfer Line, or Ute Pass Treatment Plant as needed. Note, the Northfield Transfer Line is generally reserved for emergencies and rarely operated.

Old North Slope Line

The Old North Slope Line has a capacity of 14 cfs and connects North Catamount, South Catamount, and Crystal Reservoirs. This pipeline allows water from each reservoir to be moved to another depending on desired management practices. The pipeline extends below Crystal Reservoir along Ruxton Creek and is configured such that two additional diversions can be operated to add additional physical water supplies within the line. These two pickups are Cascade Creek Diversion (1000572) decreed for 4.95 cfs and French Creek (1000574) decreed for 2.775 cfs. Water flowing in the Old North Slope line is delivered to the Cascade and Manitou Hydroelectric Plants before being piped to the Mesa Water Treatment Plant.

Northfield Transfer Line

Northfield Transfer Line connects to the New North Slope Line and can divert water from the North Slope System to Nichols Reservoir in the Northfield System. The line is gravity fed and has a capacity of 18 cfs. This system is intended to operate as a backup for operational flexibility and is rarely used.

3. Physical Information – Northfield System

The Northfield System is located west of the U.S. Airforce Academy and is positioned at an elevation such that raw water stored in the Northfield System can bolster water supplies in all other parts of the CS-U distribution system. Water from the Northfield System is treated at the Pine Valley and McCullough Water Treatment Plants, which primarily serve the northern half of CS-U's system. This system is located at the highest elevation within the CS-U service area and therefore, can be used to support, if not directly supply, the lower service area regions. This system has limited native water supplies and is primarily supported by Homestake Pipeline water imports.

Rampart Reservoir is the primary storage facility in the Northfield System, shown in Figure 4, and is located on West Monument Creek. Nichols and Northfield Reservoirs are located downstream from Rampart Reservoir and are considerably smaller. Water supplies stored in the Northfield System provide water to the Tesla Hydroelectric Power Plant, Pine Valley Water Treatment Plant and the McCullough Water Treatment Plant. Water from the North Slope System can also be conveyed to the Northfield System, if necessary. In addition, Blue River Pipeline and Homestake Pipeline connections at the Twin Rock Pump Station allow Blue River/Con Hoosier System water supplies to be transferred from the Blue River Pipeline to the Homestake Pipeline for delivery to the Northfield System.

The Northfield System typically yields about 2,500 acre-feet per year from in-priority direct diversions, releases from storage, or local exchanges. Local exchanges primarily occur as fully consumable return flows are moved upstream from Fountain Creek to Monument Creek. Water

diverted into the Northfield System by exchange from fully consumable credits or transbasin water can be used to extinction. In-priority diversions within the Northfield System are single use water by decree and may not be reused.

The major structural elements in CS-U's Northfield System include Twin Rock Pump Station, Rampart Reservoir, Nichols Reservoir, Northfield Reservoir, and Tesla Hydroelectric Plant. In total, the three reservoirs have a capacity of about 41,700 acre-feet.

The history, operations, and current specifications of Northfield infrastructure are summarized below. Further discussion of the operations of these units with respect to the Colorado Springs Utilities' demand is included in the Operational Information section.

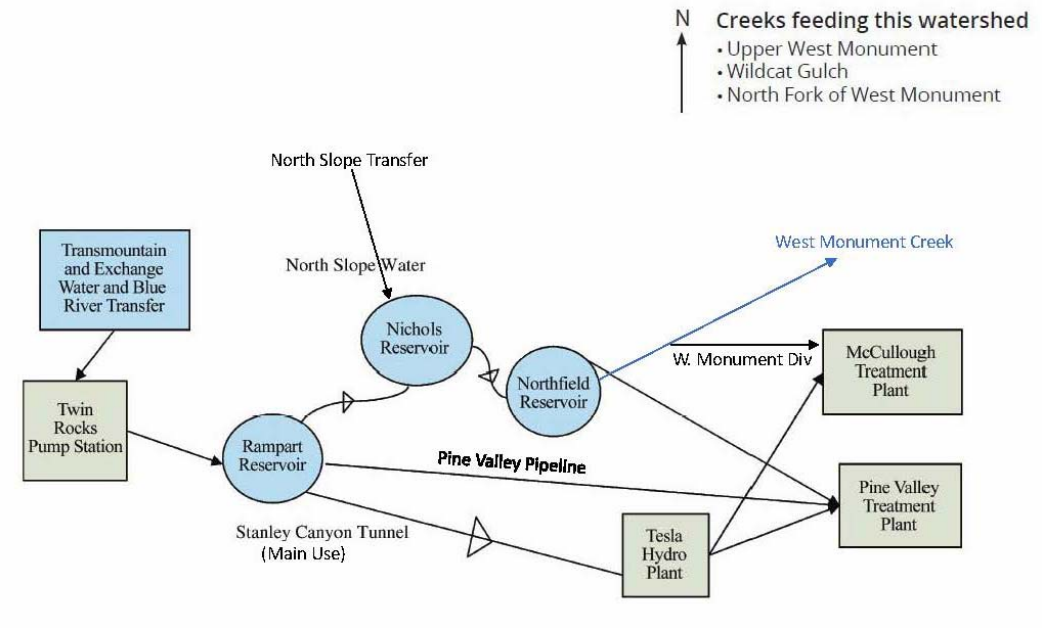

Figure 4: Colorado Springs Utilities – Northfield System

Twin Rocks Pump Station

The Twin Rocks Pump Station is located at the intersection of the Blue River Pipeline and Homestake Pipeline west of Divide in Water District 23. The pump station was constructed in 2002 to increase the rate of water flowing through the Homestake Pipeline over the divide between in the South Platte River basin and the Arkansas River basin. Water flows from the pump station into CS-U's Rampart Reservoir in the Northfield System. The pump station also serves as an interconnect between the Blue River Pipeline and Homestake Pipeline, where water flowing though the Homestake Pipeline can be directed to the Blue River Pipeline, and water from the Blue River Pipeline can be directed down the Homestake Pipeline.

Rampart Reservoir (1003670)

With a capacity of 40,871 acre-feet, Rampart Reservoir is the main storage facility in the Northfield System. The reservoir receives little local water supplies, and instead largely relies on

imported water from the Homestake Pipeline. As noted above, Blue River water supplies may also be directed into the Homestake Pipeline at the Twin Rocks Pump Station.

Water stored in Rampart Reservoir is typically delivered to Tesla Hydro Plant via the Stanley Canyon Tunnel, and then piped to McCullough Water Treatment Plant or Pine Valley Treatment Plant. However, water can be allowed to flow down West Monument Creek to Nichols and Northfield Reservoirs. U.S. Forest Service requires a minimum bypass equal to 4 cfs from Rampart Reservoir. However, seepage from the embankment is typically sufficient to fulfill the requirement.

HydroBase contains relatively complete storage records for Rampart Reservoir from 1980 to present.

Nichols Reservoir (1003674)

Nichols Reservoir, also known as Northfield Reservoir No 4, is owned by CS-U and has a decreed volume of 349.8 acre-feet and a physical capacity of 414 acre-feet. It is located below Rampart Reservoir and may receive direct released from Rampart Reservoir, or water via the North Slope Transfer pipeline. Releases from Nichols Reservoir are conveyed downstream to Northfield Reservoir via gravity. Nichols reservoir was drained in 2012 due to dam safety concerns; however, CS-U has repaired the embankment and is filling the reservoir again in water year 2018.

HydroBase contains relatively complete storage records from about 1990 to present.

Northfield Reservoir (1003671)

Northfield Reservoir, also known as Northfield Res No. 1, is owned by CS-U and has a capacity of 276 acre-feet. The reservoir is located, downstream from Nichols Reservoir and is primarily filled via direct releases from the Nichols and Rampart reservoirs. Water may be delivered directly from Northfield Reservoir to Pine Valley Water Treatment Plant via pipeline, or releases can be made to West Monument creek. Released water can then be diverted from West Monument Creek at a downstream location via pump and piped to McCullough Water Treatment Plant.

HydroBase contains relatively complete storage records since 1967.

Tesla Hydroelectric Plant

Tesla Hydroelectric Plant was brought online in 1997 and is the largest turbine operated by CS-U (28.6 Megawatts). The hydroelectric plant receives its supply via Rampart Reservoir releases through the Stanley Canyon Tunnel.

4. Physical Information – Rosemont System

The Rosemont System conveys water from the headwaters of Beaver Creek in WD 12 to WD 10 via a system of gravity fed reservoirs tunnels and pipelines, shown in Figure 5. The system

includes a collection system in the East Beaver Creek watershed, and a gravity pipeline that carries water over the divide into the Cheyenne Creek watershed for use at the Broadmoor Hotel, but can also be diverted to the South Suburban system for use as Colorado Springs municipal supply.

Rosemont Reservoir is the largest storage facility in the Rosemont System and is located on East Beaver Creek on the south slope of Pikes Peak. Water diverted and stored in Rosemont Reservoir is supplemented by water diverted in the Gould Creek drainage via the Platt Rogers Tunnel. Once stored in Rosemont Reservoir, a 2 cfs pipeline directs water to Penrose Reservoir and Fisher Canon Reservoir near the Broadmoor Hotel. Currently all water supplies are used for irrigation at the Broadmoor Hotel golf courses.

The water system yields about 1,100 acre-feet per year on average.

The history, operations, and current specifications of Rosemont System infrastructure are summarized below. Further discussion of the operations of these units with respect to the Colorado Springs Utilities' demand is included in the Operational Information section.

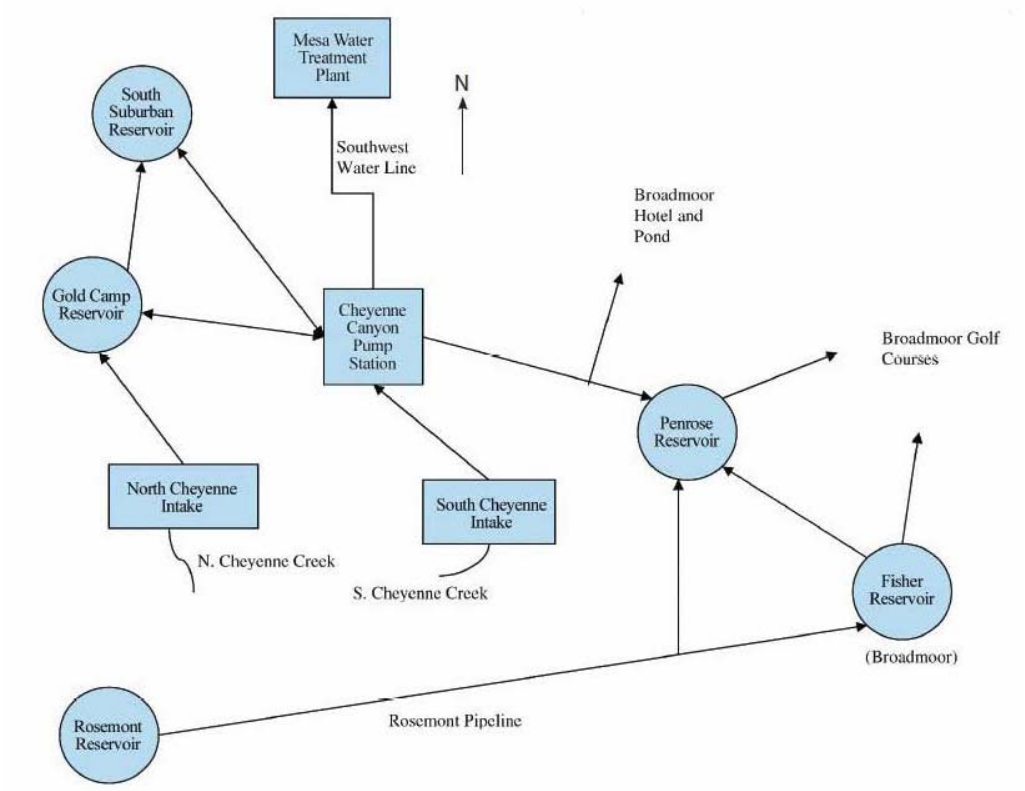

Figure 5: Colorado Springs Utilities – Rosemont and South Suburban Systems

Rosemont Reservoir (1203820)

Rosemont Reservoir is owned by CS-U and has a capacity of 2,541 acre-feet. It is located on East Beaver Creek in WD 12 and receives supplemental water supplies from the Gould Creek drainage via the Platt Rogers Tunnel. Releases from Rosemont Reservoir are conveyed downstream via 2 cfs gravity pipeline to Penrose Reservoir and Fisher Canyon Reservoir.

HydroBase contains relatively complete storage records from 1950 through 2014.

Broadmoor Pipeline (1004612)

The Broadmoor Pipeline has a capacity of 2 cfs and delivers water from Rosemont Reservoir to Penrose Reservoir and Fisher Reservoir via gravity.

HydroBase has diversion records complete for the Broadmoor Pipeline from 1992 to present.

Penrose Reservoir (1003682)

Penrose Reservoir is an off-channel reservoir in WD 10 located near the Broadmoor Hotel. The reservoir has a decreed water right of about 56-acre-feet and is used to store water delivered from Rosemont Reservoir.

HydroBase some relatively complete storage records for Penrose Reservoir from 2010 to present.

Fisher Canon Reservoir (1003688)

Fisher Canon Reservoir is an off-channel reservoir in WD 10 located near the Broadmoor Hotel. The reservoir has a decreed water right of about 54 acre-feet and is used to store water delivered from Rosemont Reservoir and Penrose Reservoir.

HydroBase has complete storage records for Fisher Reservoir from 2011 to present.

5. Physical Information – South Suburban System

The South Suburban system is owned by CS-U and used to provide municipal water within their service area. The system diverts water from North Cheyenne Creek and South Cheyenne Creek to fill South Suburban Reservoir and Gold Camp Reservoir as shown in Figure 5. Water released from storage is pumped via the Cheyenne Canyon Pump Station to the Mesa Water Treatment Plant. On average, the South Suburban System yields about 1,500 acre-feet per year.

Gold Camp Reservoir (1003646)

Gold Camp Reservoir is an off channel reservoir owned by CS-U and is decreed for 229 acre-feet, and has a capacity of 345 acre-feet. The reservoir can be filled via gravity diversions from North Cheyenne Intake, or pumped water from the South Cheyenne Intake. Diversions into storage are typically made via exchange of fully consumable effluent, while direct flow water rights are taken directly to Mesa Water Treatment Plant. Stored water can be moved via gravity

to South Suburban Reservoir or conveyed back to the Cheyenne Canyon Pump Station before being sent to the Mesa Water Treatment Plant.

HydroBase contains relatively complete storage records for Gold Camp Reservoir from 1976 to present.

South Suburban Reservoir (1003645)

South Suburban Reservoir is an off-channel reservoir owned by CS-U and decreed for 208 acre-feet. The reservoir can be filled via gravity releases from Gold Camp Reservoir, or water may also be pumped into storage from the South Cheyenne Intake. Water stored in South Suburban Reservoir can be pumped to the Mesa Water Treatment Plant via the Cheyenne Canyon Pump Station. Diversions into storage are typically made via exchange, while direct flow water rights are taken directly to Mesa Water Treatment Plant.

HydroBase contains relatively complete storage records for South Suburban Reservoir from 2076 to present.

North Cheyenne Intake (1000608)

The diversion structure is owned by CS-U and decreed for 0.9 cfs. The diversion is typically gravity fed to the Cheyenne Canyon Pump Station before being sent to the Mesa Water Treatment Plant, Gold Camp Reservoir, and South Suburban Reservoir.

Diversion records are not available in HydroBase.

South Cheyenne Intake (1000537)

The diversion structure is owned by CS-U and decreed for 23.85 cfs. Diversions are typically pumped directly to the Mesa Water Treatment Plant, although they can be used to filled Gold Camp Reservoir or South Suburban Reservoir.

Relatively complete diversion records are available on HydroBase from 1950 through 2015.

Cheyenne Canyon Pump Station

The pump station has a capacity of 11 cfs and is used to move water diverted from North and South Cheyenne Creeks into storage and for treatment at Mesa Water Treatment Plant. It also has a 3 cfs pump that can pump to Penrose Reservoir to supplement the irrigation supply for the Broadmoor.

6. Physical Information – Local Fountain Creek Watershed System

CS-U owns and operates additional surface water diversions within the Fountain Creek basin. The primary diversion, the 33rd St. Pump Station, is used to supply water to Mesa Water Treatment Plant. The City maintains water rights at various other diversion locations, however many have since been decreed alternate points of diversion and the water is physically diverted at other locations. The Pikeview Intake diverts water to a small reservoir and then on to Mesa

WTP or into the non-potable system, the Bear Creek diversion is planned for reconstruction to take water to Mesa WTP. The West Monument Creek Intake conveys local supplies to the McCullough Water Treatment Plant.

33rd St. Pump Station (1000883)

The City owned pump station is decreed as an alternate point of diversion for several senior water rights totaling about 104 cfs. However, by agreement CS-U limits pumping to the physical capacity of 13.9 cfs. The pump station is primarily operated to divert any in-priority water rights that were not diverted at upstream locations and exchanged water to the Mesa Water Treatment Plant. Prior to the 2002 drought and recent fires, the pump station diverted from 2,400 acre-feet to 4,000 acre-feet per year. However, due to fire related sediment concerns, the pump station now only yields about 400 acre-feet per year. CS-U is currently planning to improve the river intake structure to better accommodate increased sediment loading.

7. Physical Information – Homestake Project

The Homestake Project is a transbasin water project owned and operated as a joint venture between CS-U and Aurora Water. The Project diverts water from the headwaters of the Eagle River in the Colorado River basin (WD 37), as shown in Figure 6. Water is delivered to the upper Arkansas River (WD 11) via the Homestake Tunnel. In the Arkansas River basin, water delivered from the Homestake Tunnel is stored in the Homestake Project account within Turquoise Reservoir. By agreement with U.S. Bureau of Reclamation, CS-U and Aurora Water generate power with Homestake water by using the Mt. Elbert Conduit to convey water from Turquoise Reservoir to Twin Lakes Reservoir. At Twin Lakes Reservoir, CS-U and Aurora Water take delivery of Homestake water via the 180 cfs Otero Pipeline. Water is sent through the Otero Pipeline by gravity to the Otero Pump Station near Buena Vista. At the Otero Pump Station, Homestake water is lifted over the divide between the Arkansas River basin and the South Platte basin and conveyed east into South Park. Aurora's portion of Homestake water is split from CS-U's south of Spinney Reservoir. CS-U's portion continues to flow east at this location over the divide separating South Park from the Fountain Creek basin via the Homestake Pipeline. This pipeline can deliver about 59 cfs to Rampart Reservoir without additional pumping and Twin Rock Pumping Station can be used to boost flows through the Homestake Pipeline to a rate of 105 cfs and provides flexibility to carry water to the North Slope System in needed.

CS-U receives 50 percent of the annual yield from the Homestake Project, or about 13,000 acre-feet per year. All water diverted from the Homestake Project is transbasin water and can be used to extinction. CS-U tracks return flows and reuse to ensure maximum utilization.

The history, operations, and current specifications of Homestake Project infrastructure are summarized below. Further discussion of the operations of these units with respect to the Colorado Springs Utilities' demand is included in the Operational Information section.

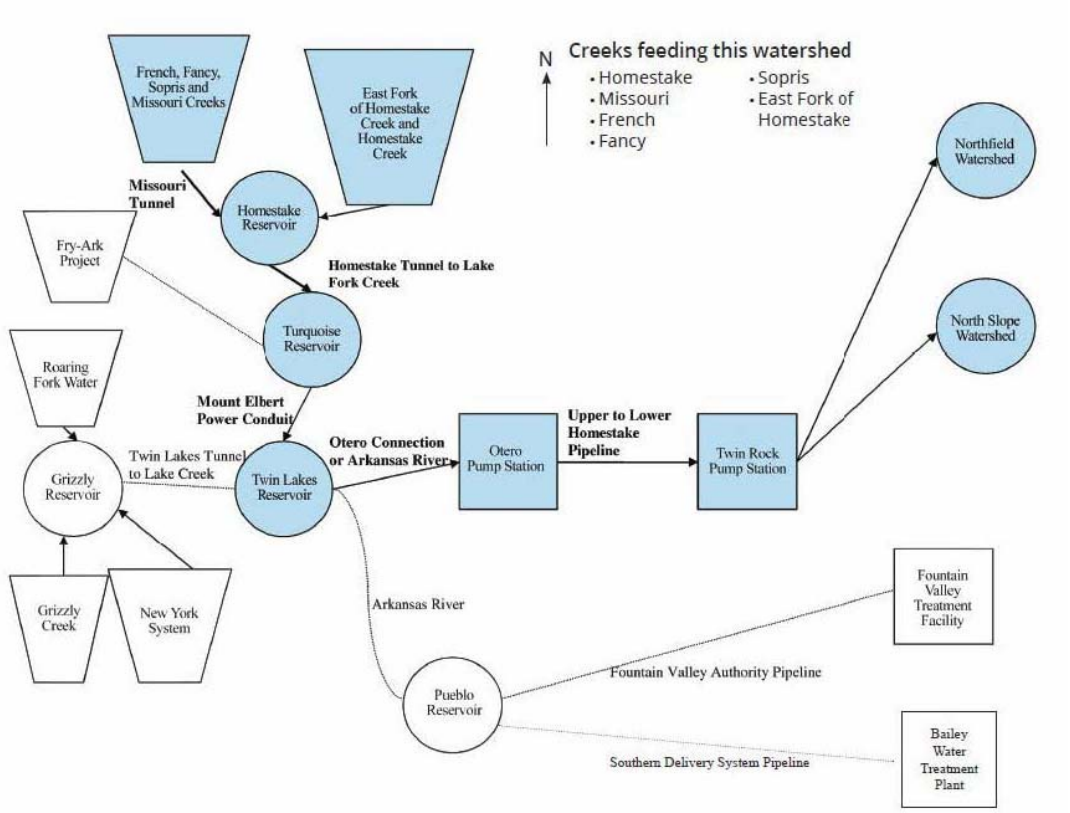

Figure 6: Colorado Springs Utilities – Homestake Project and Twin Lakes Water Systems

Homestake Tunnel (3704614)

The Homestake Tunnel is a transmountain diversion tunnel that carries water from the upper Eagle watershed to the Lake Fork Creek above Turquoise Reservoir. The tunnel has a rated capacity of 300 cfs, although annual peak data shows significantly higher values for maximum flows. Half of the water delivered through the tunnel is owned by CS-U. Diversions through the tunnel are measured at the east portal by DWR's HOMTUNCO gage (09063700).

Relatively complete diversion records are available on HydroBase from 1967 to present.

Turquoise Reservoir (1103500)

Turquoise Reservoir is part of the Fry-Ark Project and is managed by the U.S. Bureau of Reclamation. CS-U has a 15,000 acre-feet account in the reservoir used to store transbasin Homestake Project water supplies. In addition, CS-U also owns 17,437 acre-feet of the senior Turquoise Reservoir storage right commonly referred to as the CF&I account. This senior water right yields about 800 acre-feet per year of consumable water and is primarily utilized to store other water sources via exchange.

Only a few years of Turquoise Reservoir storage data is currently in HydroBase, but a complete dataset of reservoir content was obtained from Reclamation and provided to DWR for inclusion.

Twin Lakes Reservoir (1103503)

Twin Lakes Reservoir is part of the Fry-Ark Project and is managed by the U.S. Bureau of Reclamation. The reservoir was originally owned and operated by the Twin Lakes Reservoir and Canal Company; the Fry-Ark Project expanded the reservoir to its current size. CS-U is the majority shareholder in the Twin Lakes Reservoir and Canal Company, which has ownership of 54,000 acre-feet of the senior storage right that can be used to store both native water supplies when in-priority and can be used to store other water supplies, including water imported from the Independence Pass Transmountain Diversion System (IPTDS). Water stored in Twin Lakes Reservoir is typically taken for delivery to CS-U through the Otero Pipeline and Otero Pump Station.

Only a few years of Twin Lakes Reservoir storage data is currently in HydroBase, but a complete dataset of reservoir content was obtained from Reclamation and provided to DWR for inclusion.

Otero Pump Station (1100529)

Otero Pump Station is located near Buena Vista, Colorado and is used to deliver water stored in Twin Lakes Reservoir to both CS-U and Aurora Water. The Otero Pump station then lifts water from the Arkansas River basin into the South Platte south of Spinney Reservoir. Aurora's water is released and water pumped for CS-U continues to flow east to the Twin Rocks Pump Station for delivery to Rampart Reservoir in CS-U's Northfield System. CS-U's pipeline from Aurora's turnout south of Spinney Reservoir to Rampart Reservoir can deliver about 59 cfs via gravity to CS-U; however, with Twin Rocks Pump station the delivery rate can increase to 105 cfs.

HydroBase only has a few years of diversion records through the Otero Pipeline; they have historically been kept in the Division 2 office. They will be reviewed and provided to DWR for inclusion in HydroBase.

Homestake Pipeline (1004615)

The 105 cfs capacity Homestake Pipeline connects the Otero Pump station to Rampart Reservoir in the Northfield System. The pipeline carries Twin Lakes, IPTDS, Homestake, CF&I, and Exchange water to CS-U. HydroBase has diversion records complete from 1991 to current.

Where to find more information:

- The Homestake Project is represented in the Colorado River Decision Support System (CRDSS) and documented in the Upper Colorado River Surface Water Model User's Manual and Upper Colorado Basin Information Report.
- Additional information on Fry-Ark Project and operations of Turquoise Reservoir and Twin Lakes Reservoir is included in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum.

8. Physical Information – Twin Lakes System

Colorado Springs Utilities owns 54.7 percent of the Twin Lakes Reservoir and Canal Company. As shown in Figure 6 above, the Company owns and maintains a network of transbasin diversion structures on the upper Roaring Fork River in the Colorado River basin (WD 38). Water is diverted water through the Twin Lakes Tunnel (TWITUNCO) under the continental divide to a location upstream from Twin Lakes Reservoir (WD 11). Once stored in Twin Lakes Reservoir, water is typically delivered to CS-U using the Otero Pump Station as described in the Homestake Project section above. Up to 3,000 acre-feet of Twin Lakes Reservoir and Canal Company can also be delivered through Boustead Tunnel to Turquoise Reservoir under an exchange with the Fry-Ark Project.

The project yields about 20,100 acre-feet per year to CS-U, and is fully consumable. CS-U tracks and reuses return flows to ensure available supplies are fully put to beneficial use. In addition to the transbasin supplies, Twin Lakes Reservoir also stores in priority native water. The CS-U portion averages about 4,700 acre-feet per year, but is quite variable. The native Twin Lakes water rights are not considered fully consumable.

The history, operations, and current specifications of the Twin Lakes System infrastructure are summarized below. Further discussion of the operations of these units with respect to the CS-U's demand is included in the Operational Information section.

Twin Lakes Tunnel (1104617)

The Twin Lakes Tunnel is a transmountain diversion that carries water from the upper Roaring Fork watershed to Lake Creek in the upper Arkansas watershed above Twin Lakes Reservoir. The tunnel has a rated capacity of 625 cfs; however, peak flows have exceeded 625 cfs on a number of occasions. Approximately 55 percent of the flow measured through the tunnel is associated with CS-U's interest in the Twin Lakes System. Diversions through the tunnel are measured on the eastern portal and maintained by DWR via TWITUNCO gage.

DWR records are complete from 1950 to present.

Where to find more information:

- The Twin Lakes west slope facilities are represented in the Colorado River Decision Support System (CRDSS) and documented in the Upper Colorado River Surface Water Model User's Manual and Upper Colorado Basin Information Report.
- Additional information on the Twin Lakes System is included in the ArkDSS Colorado Canal Operations memorandum.
- Additional information on the operations of Twin Lakes Reservoir is included in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum.

9. Physical Information – Blue River System

The Blue River Project is a transbasin diversion system that diverts water from the upper Blue River in the Colorado basin (WD 36) into the upper South Platte (WD 23), as shown in Figure 7

below. The Blue River collection system diverts water under the continental divide via the Con-Hoosier Tunnel (3604699) and into Montgomery Reservoir. When in-priority, Montgomery Reservoir stores available native South Platte River water supplies. Due to decreed use restrictions for Blue River supplies, South Platte River supplies are preferentially stored in Montgomery Reservoir over potential Blue River imports.

From Montgomery Reservoir, Blue River and South Platte water supplies are conveyed through the 28.6 cfs Blue River Pipeline to North Catamount Reservoir. Although water is typically delivered to the North Slope System, deliveries can be made to the Northfield System if needed via the Twin Rocks Pump Station Connection.

The Blue River System is 100 percent owned and operated by CS-U. The system delivers an average of about 10,000 acre-feet per year to CS-U. Water supplies originating from the Blue River System are fully consumable. CS-U tracks and reuses return flows to ensure available supplies are fully put to beneficial use.

The history, operations, and current specifications of the Blue River System infrastructure are summarized below. Further discussion of the operations of these units with respect to the Colorado Springs Utilities' demand is included in the Operational Information section.

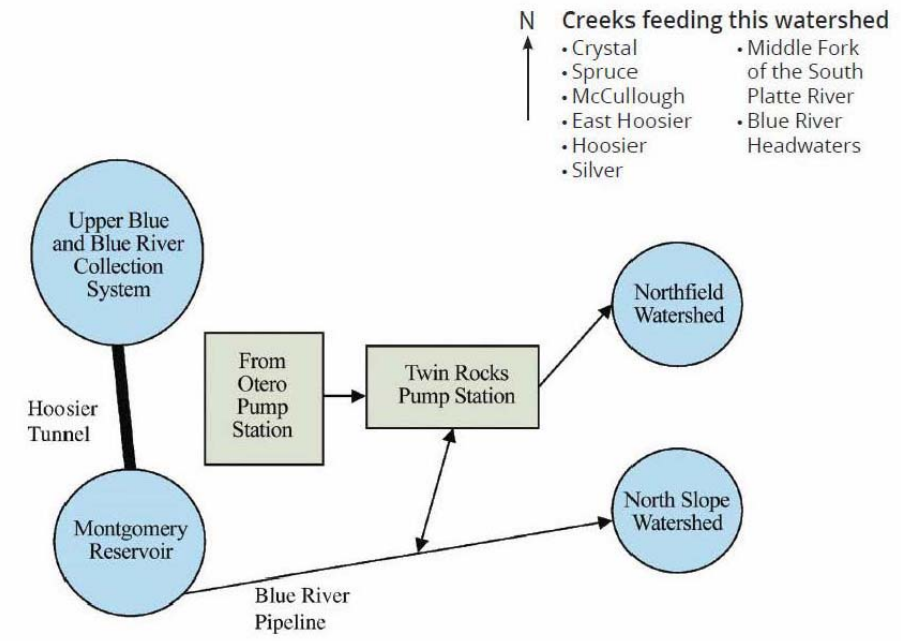

Figure 7: Colorado Springs Utilities – Blue River System

Blue River Pipeline (1004676)

The Blue River Pipeline has a capacity of 28.6 cfs and delivers Blue River water and native South Platte water stored in Montgomery Reservoir to North Catamount Reservoir via gravity. The Blue River Pipeline intersects the Homestake Pipeline at the Twin Rock Pump station. At this

location, Blue River water carried in the Blue River Pipeline can be relayed through the Homestake pipeline for delivery to Rampart Reservoir.

Diversions records are complete in HydroBase from 1991 to present. CS-U has earlier diversion records that will be reviewed for inclusion in HydroBase.

Where to find more information:

- The Blue River System is represented in the Colorado River Decision Support System (CRDSS) and documented in the Upper Colorado River Surface Water Model User's Manual and Upper Colorado Basin Information Report.
- Additional information on Montgomery Reservoir is included in the South Platte River DSS Water District 23 memorandum.

10. Physical Information – Fryingpan-Arkansas Project

Colorado Springs Utilities participates in the Fryingpan-Arkansas Project (Fry-Ark Project) through the Fountain Valley Authority. The Fry-Ark Project is a U.S. Bureau of Reclamation project that diverts water from the headwaters of the Roaring Fork River in the Colorado River Basin (WD 38) into the upper Arkansas River (WD 11), as shown in Figure 8. The Fry-Ark Project began diverting water in 1972. The Project brings water under the continental divide via the Boustead Tunnel to a location upstream of Turquoise Reservoir. The Southeastern Colorado Water Conservancy District (SECWCD) is the managing entity that handles Project share allocation and return flow accounting.

CS-U receives Fry-Ark water via the Fountain Valley Conduit (1000859) and, more recently, from the Southern Delivery System Pipeline (1000925) shown in Figure 9 below. The Fountain Valley Conduit and the Southern Delivery System Pipeline pump water from Pueblo Reservoir north for delivery into CS-U's southern service area. This supply currently provides about 5,000 acre-feet per year to CS-U, but deliveries will increase as demands increase. Return flows resulting from CS-U initial use of Fry-Ark Project deliveries are frequently purchased back by CS-U and used to extinction. Alternatively, CS-U may elect to receive Fry-Ark water via the Otero Pump and Homestake Pipeline as described above.

HydroBase contains diversions through the Southern Delivery System Pipeline since it first began delivery water in 2016. Diversions through the Fountain Valley Conduit began in 1985, Reclamation records were provided to DWR for inclusion in HydroBase.

The history, operations, and current specifications of the Fry-Ark Project infrastructure are summarized below. Further discussion of the operations of these units with respect to the Colorado Springs Utilities' demand is included in the Operational Information section.

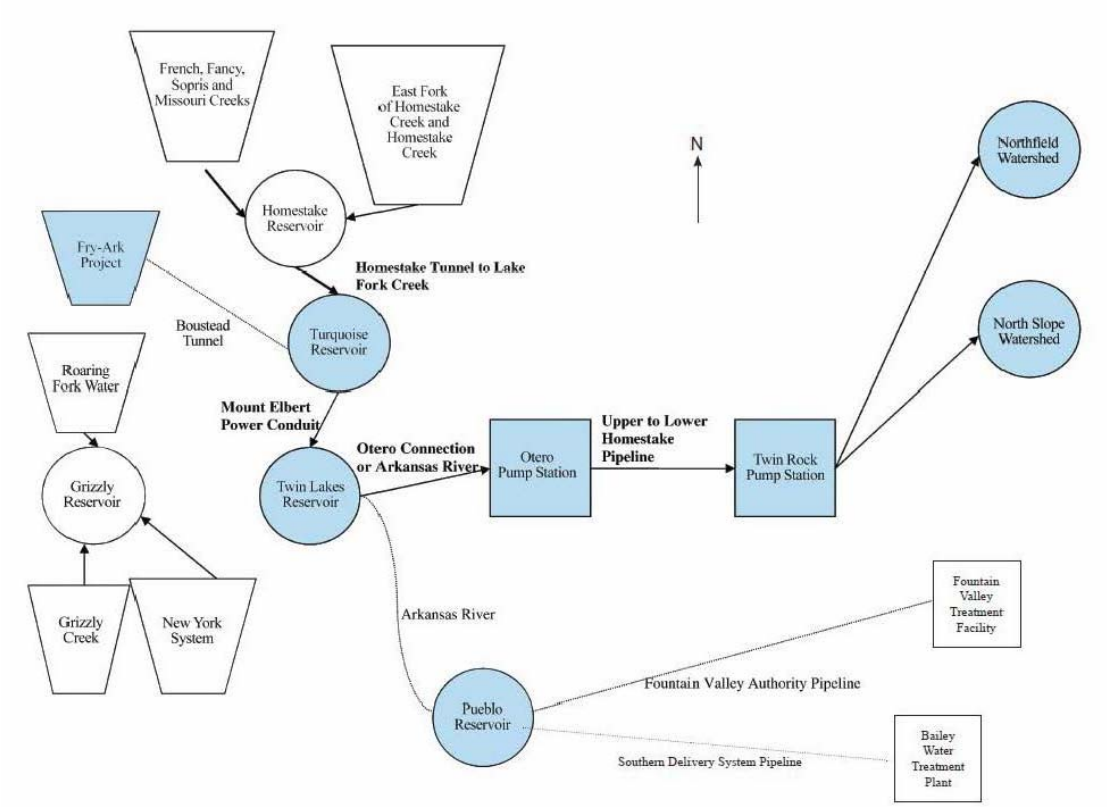

Figure 8: Colorado Springs Utilities – Fry-Ark Project System

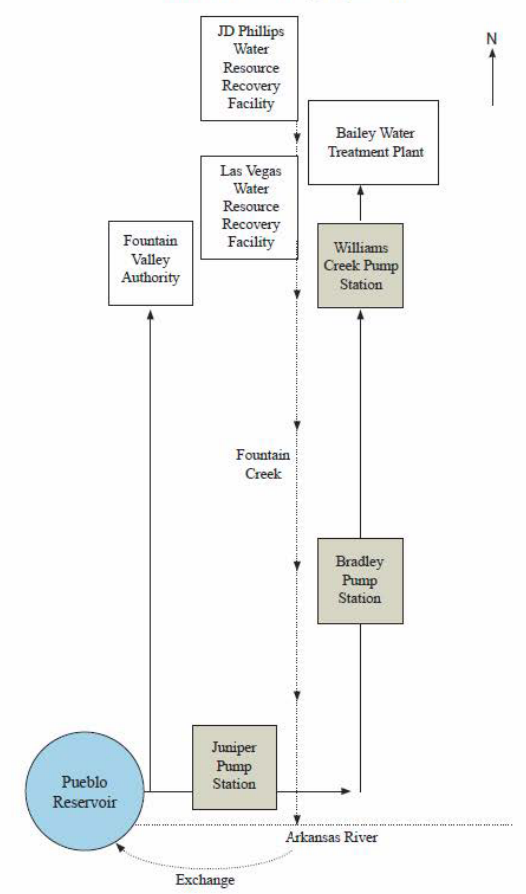

Figure 9: Colorado Springs Utilities
Fountain Valley Authority Conduit and Southern Delivery System (SDS)

Where to find more information:

- Additional information on the Fry-Ark Project and Southern Delivery System is included in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum.

11. Physical Information – Colorado Canal System

Colorado Springs Utilities owns 56.4 percent of the Colorado Canal Company, 51.9 percent of the Lake Meredith Company, and 77.2 percent of the Lake Henry Company. These companies were originally formed to provide irrigation water to lands east of Pueblo. Much of the original water rights have since been changed from irrigation to municipal uses. CS-U is able to incorporate the consumptive use of these water rights into its water supply portfolio. In addition, both Lake Henry and Lake Meredith are positioned to store extra historical use credits that may be generated from the Colorado Canal water rights, or excess return flow water that cannot be exchanged from Fountain Creek into Pueblo Reservoir. However, diversion and storage of return flows through the Colorado Canal System typically occur when the canal is

operating. Typical return flow rates are not large enough to justify the large Colorado Canal transit loss assessment.

When conditions allow, water stored in Lake Meredith and Lake Henry is exchanged into Pueblo Reservoir or higher up the Arkansas River to allow the water to be delivered into the CS-U system via the Otero Pump Station. On average, Colorado Canal water rights yield about 16,000 acre-feet per year to CS-U.

Diversions through Colorado Canal were recorded in HydroBase under WDID 1400540 through 1999. Since then, they are recorded under WDID 1700540. CS-U provides daily accounting for their diversions and use.

HydroBase has relatively complete storage records for both Lake Meredith and Lake Henry from 1987 to present.

Where to find more information:

- Additional information on the Colorado Canal is included in the ArkDSS Colorado Canal Operations memorandum.

WATER RIGHTS

Colorado Springs Utilities owns numerous water rights in the Colorado River, South Platte River, and Arkansas River basins for direct flow, storage, ground water, and exchange use. The following discussion and tabulation of water rights is not meant to be a complete catalogue of CS-U's rights but is intended to focus on the major water rights used with the key structures identified in the CS-U system in the Arkansas River basin.

Direct Flow Water Rights

Tables 1 through 4 list direct flow water rights owned by CS-U and used at the key CS-U structures in the Arkansas River basin, grouped by the primary water system. The water rights are based on the State Engineer's Office water rights tabulation, as listed in HydroBase. Several of the transferred rights have volumetric or seasonal limitations and/or terms and conditions associated with the transfers. These limitations are not specified in the following tables.

Table 1
Direct Flow Water Rights Diverted through the South Slope System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No.	Decreed Rate (cfs)	Comments
St. Johns Tunnel 1200539	Beaver Creek	03/30/1861	4107.00000	CA2637	1.8	TF Conley Ditch ID 879
		04/15/1861	4123.00000	W4528	0.147	APD Beaver Park Ditch ID 537
		04/15/1861	4123.00000	CA2637	0.638	TF Glendale Ditch ID 881
		05/20/1861	4158.00000	W4528	0.014	APD Beaver Park Ditch ID 537
		03/31/1864	5204.00000	CA2637	1.6	TF Baltiff Ditch ID 885
		05/20/1864	5254.00000	W4528	0.125	APD Beaver Park Ditch ID 537
		05/01/1865	5600.00000	W4528	0.36	APD Beaver Park Ditch ID 537
		05/24/1865	5623.00000	W4528	1.9	APD Beaver Park Ditch ID 537
		04/15/1871	7775.00000	W4528	0.1085	APD Beaver Park Ditch ID 537
		04/15/1871	7775.00000	CA2637	1	TF Thomas Patton No 2 ID 895
		05/02/1871	7792.00000	W4528	0.125	APD Beaver Park Ditch ID 537
		12/20/1871	8024.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		01/02/1872	8037.00000	CA2637	0.355	TF McClure Ditch ID 546
		01/02/1872	8037.00000	W4528	0.485	APD Beaver Park Ditch ID 537
		04/15/1872	8141.00000	W4528	0.392	APD Beaver Park Ditch ID 537
		01/02/1873	8403.00000	W4528	0.78	APD Beaver Park Ditch ID 537
		01/31/1873	8432.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		05/31/1873	8552.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		02/28/1874	8825.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		04/15/1875	9236.00000	W4528	0.007	APD Beaver Park Ditch ID 537
		01/03/1876	9499.00000	W4528	0.12	APD Beaver Park Ditch ID 537
		05/15/1876	9632.00000	W4528	0.8	APD Beaver Park Ditch ID 537
		05/31/1876	9648.00000	W4528	0.125	APD Beaver Park Ditch ID 537
		04/16/1877	9968.00000	CA2637	1	TF Hight Ditch ID 1017
		04/18/1877	9970.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		05/01/1878	10348.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		12/31/1880	11323.00000	W4528	0.14	APD Beaver Park Ditch ID 537
		02/28/1881	11382.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		03/14/1881	11396.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		01/19/1882	11707.00000	W4528	3.1	APD Beaver Park Ditch ID 537
Ruxton Creek Pipeline 1000581	Ruxton Creek	02/20/1860	3703.00000	CA13801	4.00	TF Toof Ditch ID 858
		04/30/1860	3773.00000	CA13801	0.74	TF Flanagan Ditch ID 814
		03/20/1861	4097.00000	CA13801	0.07	TF Harmes Ditch ID 587
		03/21/1864	5194.00000	CA37643	8.82	APD El Paso Co Canal ID 601
		12/31/1872	8401.00000	CA13801	0.27	TF Harmes Ditch ID 587
		01/17/1903	19374.00000	CA13801	34.00	Original Right

Table 2
Direct Flow Water Rights Diverted through the North Slope System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No.	Decreed Rate (cfs)	Comments
Cascade Creek Diversion 1000572	Cascade Creek	03/20/1861	4097.00000	91CW0044	0.3533	APD Cascade Water Works ID 668
		09/21/1861	4282.00000	CA19303	2.7	TF Lincoln No 5 ID 729
		12/31/1864	5479.00000	CA19303	2.25	TF Lincoln No 5 ID 729
		12/31/1872	8401.00000	91CW0044	1.7	APD Cascade Water Works ID 668
Crystal Creek Div 1000573	Crystal Creek	09/21/1861	4282.00000	CA19305	2.4	TF Lincoln No 5 ID 729
		12/31/1864	5479.00000	CA19305	2	TF Lincoln No 5 ID 729
French Creek Diversion 1000574	French Creek	03/20/1861	4097.00000	CA37641	1.58000	APD El Paso County Canal ID 601
		09/21/1861	4282.00000	CA19304	0.90000	TF Lincoln No 5 ID 729
		04/01/1862	4474.00000	CA13801-S	1.12500	TF N. Catamount Diversion ID 576
		12/31/1864	5479.00000	CA19304	0.75000	TF Lincoln No 5 ID 729
North Catamount Creek Diversion 1000575	North Catamount Creek	12/31/1861	4383.00000	CA22955	2.905	TF Stubbs & Miller Ditch ID 567
		02/01/1863	4780.00000	CA22955	4	TF Fountaine Ditch No 11 ID 699
South Catamount Creek Diversion 1000576	South Catamount Creek	12/31/1861	4383.00000	CA13801	0.1767	TF Ute Pass Land & Water ID 607
		01/01/1862	4384.00000	CA22956	3.27	TF Eder Ditch ID 749
		03/15/1862	4457.00000	CA22956	0.73	TF Whipple Ditch ID 781
		12/31/1872	8401.00000	CA13801	1.2467	TF Ute Pass Land & Water ID 607
Ute Pass Land & Water PL 1000607	North Catamount Creek	08/06/1889	14463.00000	CA10146	4.06	Original Right
N. Slope Conduit 1000884	Fountain Creek	12/31/1901	18992.00000	CA13801	35	Original Right

Table 3
Direct Flow Water Rights Diverted through the Rosemont System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No.	Decreed Rate (cfs)	Comments
Rosemont Reservoir Pipeline 1200538	East Beaver Creek	04/15/1861	4123.00000	W4528	0.147	APD Beaver Park Ditch ID 537
		05/20/1861	4158.00000	W4528	0.014	APD Beaver Park Ditch ID 537
		05/20/1864	5254.00000	W4528	0.125	APD Beaver Park Ditch ID 537
		03/31/1865	5569.00000	CA6693	0.3	TF Broadmoor Intake 4 ID 1117
		04/15/1865	5584.00000	CA5128	0.36	TF Johnson and Merit D ID 1028
		05/24/1865	5623.00000	W4528	1.9	APD Beaver Park Ditch ID 537
		05/02/1871	7792.00000	W4528	0.125	APD Beaver Park Ditch ID 537
		10/01/1871	7944.00000	CA6693	0.3	TF Broadmoor Intake 4 ID 1117
		12/20/1871	8024.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		01/02/1872	8037.00000	CA5128	0.31	TF McClure Ditch ID 546
		01/02/1872	8037.00000	W4528	0.485	APD Beaver Park Ditch ID 537
		01/02/1873	8403.00000	W4528	0.78	APD Beaver Park Ditch ID 537
		01/31/1873	8432.00000	CA5128	0.12	TF Johnson and Merit D ID 102
		01/31/1873	8432.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		04/01/1873	8492.00000	CA5128	0.6	TF Morey Ditch ID 886
		05/31/1873	8552.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		11/01/1873	8706.00000	CA5128	0.8	TF Darlington ditch ID 955
		02/28/1874	8825.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		04/15/1875	9236.00000	W4528	0.007	APD Beaver Park Ditch ID 537
		01/03/1876	9499.00000	W4528	0.12	APD Beaver Park Ditch ID 537
		05/15/1876	9632.00000	W4528	0.8	APD Beaver Park Ditch ID 537
		05/31/1876	9648.00000	W4528	0.125	APD Beaver Park Ditch ID 537
		04/18/1877	9970.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		05/01/1878	10348.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		02/28/1881	11382.00000	W4528	0.25	APD Beaver Park Ditch ID 537
		03/14/1881	11396.00000	W4528	0.5	APD Beaver Park Ditch ID 537
		01/19/1882	11707.00000	W4528	3.1	APD Beaver Park Ditch ID 537
		04/15/1886	13254.00000	CA7396	9.5	TF Kelly Ditch ID 919
		010/1/1906	21173.20454	CA5128	0.8	TF Morey Ditch ID 886

Table 4
Direct Flow Water Rights Diverted through the South Suburban System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No.	Decreed Rate (cfs)	Comments
North Cheyenne Pipeline 1000608	North Cheyenne Creek	03/01/1890	14670.00000	CA10146	0.9	Original Right
Mesa Pipeline 1000609	North Cheyenne Creek	09/01/1860	3897.00000	CA13801	1.9	TF North Cheyenne PL ID 608
		09/21/1861	4282.00000	CA13801	4.59	TF Lowry Ditch ID 819
		12/31/1862	4748.00000	CA13801	1.25	TF North Cheyenne PL ID 608
		03/01/1863	4808.00000	CA13801	9.55	TF Harris Ditch ID 801
		03/21/1863	4828.00000	CA13801	6.52	TF Wolf Ditch ID 536
		05/10/1863	4878.00000	CA13801	1.14	TF Alvord Ditch ID 707
		12/31/1863	5113.00000	CA13801	4.59	TF Lowry Ditch ID 819
		12/31/1864	5479.00000	CA13801	2	TF John Wolf Ditch ID 821
		06/21/1872	8208.00000	CA13801	0.9	TF North Cheyenne PL ID 608
		04/16/1928	28595.00000	CA13801	17.3	Original Right
South Cheyenne Pipeline 1000437	South Cheyenne Creek	09/01/1860	3897.00000	CA16307	1.25	TF Cheyenne Ditch ID 705
		09/21/1861	4282.00000	CA13801	3	TF Lowry Ditch ID 819
		12/31/1862	4748.00000	CA16307	0.85	TF Cheyenne Ditch ID 705
		03/01/1863	4808.00000	CA13801	6.35	TF Harris Ditch ID 801
		03/21/1863	4828.00000	CA13801	6	TF Wolf Ditch ID 586
		12/31/1863	5113.00000	CA13801	3	TF Lowry Ditch ID 819
		09/21/1865	5743.00000	CA16305	1.55	TF Dixon Ditch ID 541
		06/21/1872	8208.00000	CA16306	0.6	TF Harlan Ditch ID 708
		05/10/1898	17662.00000	CA10146	1.25	Original Right

Table 5
Direct Flow Water Rights Diverted through the Local Fountain Creek Watershed System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No.	Decreed Rate (cfs)	Comments
33rd Street Pump Station 1000883	Fountain Creek	03/20/1861	4097.00000	90CW0029	1.58	APD El Paso County Canal ID 601
		03/21/1861	4098.00000	90CW0029	22.4	APD El Paso County Canal ID 601
		12/31/1863	5113.00000	90CW0029	8.37	APD El Paso County Canal ID 601
		03/21/1864	5194.00000	90CW0029	8.82	APD El Paso County Canal ID 601
		09/21/1871	7934.00000	90CW0029	59.5	APD El Paso County Canal ID 601
		04/30/1881	11443.00000	90CW0029	3.54	APD El Paso County Canal ID 601
Bear Creek Pipeline 1000535	Bear Creek	12/31/1861	4383.00000	CA13801	5.34	TF Bear Creek Ditch No 1 ID 534
		03/21/1863	4828.00000	CA13801	5	TF Matthews Ditch ID 962
		09/21/1866	6108.00000	CA13801	6	TF Wellesley & Howbert D ID 791
		03/21/1875	9211.00000	CA13801	8	TF Wellesley & Fisher D ID 792
		04/15/1889	14350.00000	CA13801	9.4	Original Right
		03/15/1907	20892.00000	CA13801	4.2	Original Right
Stubbs & Miller Ditch WDID 1000567	Fountain Creek	12/31/1861	4383.00000	CA0751	2.455	Original Right
Owen & Hall Ditch 1000577	Fountain Creek	12/31/1862	4748.00000	CA0751	15.325	Original Right
		02/18/1891	44194.15024	W0115	31	Original Right
El Paso County Canal 1000601	Fountain Creek	03/20/1861	4097.00000	CA13801	1.58	TF Harmes Ditch (33rd St) ID 587
		03/21/1861	4098.00000	CA13801	22.4	TF Bley Ditch (33rd St) ID 823
		12/31/1863	5113.00000	CA13801	8.37	TF Sheldon Ditch (33rd St) ID 825
		03/21/1864	5194.00000	CA13801	8.82	Anthony Bott & chambers (33rd St) ID 716
		09/21/1871	7934.00000	CA0751	59.5	Original Right
		04/30/1881	11443.00000	CA13801	3.54	TF Anthony Bott & chambers (33rd St) ID 716
Austin Bluffs Pipeline 1000659	West Monument Creek	12/31/1861	4383.00000	CA20155	1	TF Stubbs & Miller ID 567
		12/31/1861	4383.00000	CA16066	0.35	TF Harmes Ditch ID 587
		04/01/1862	4474.00000	CA37642	4	APD Monument Creek PL ID 506
		03/21/1869	7020.00000	CA13801	6.36	TF W W Jones No 1 D ID 710
		03/21/1872	8116.00000	CA13801	4.2	TF Blodgett Ditch ID 711
		12/31/1872	8401.00000	CA16066	2.4933	TF Harmes Ditch ID 587
		09/21/1873	8665.00000	CA13801	7.95	TF Lennox Ditch ID 712
		12/31/1876	9862.00000	CA13801	1.66	TF Clarkes No 1 Ditch ID 953
		12/31/1876	9862.00000	CA13801	2.01	TF Head of Creek Ditch ID 958
		01/03/1882	12155.11691	CA13801	13.7	TF Polar Star Ditch ID 802
		10/16/1889	14534.00000	CA13801	5.2	Original Right
Monument Creek Pipeline 1000506	Monument Creek	04/01/1862	4474.00000	CA19317	4.00	TF Banning Ditch ID 714
		06/01/1867	6361.00000	CA13801	1.00	TF Welty Ditch ID 524
		06/01/1871	7822.00000	CA13801	16.43	TF Monument 2 1/2 Ditch ID 698
		03/03/1894	16133.00000	CA13801,	8.63	Original Right

Storage Rights

Tables 5 through 9 list storage rights owned by CS-U and used at the key CS-U reservoirs in the Arkansas River basin, grouped by the primary water system. The water rights are based on the State Engineer's Office water rights tabulation, as listed in HydroBase.

Table 6
Storage Water Rights for the South Slope System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No	Decreed Volume (af)
Bighorn Reservoir 1203816	West Beaver Creek	06/10/1890	14771.00000	CA2637	191.1039
Wilson Reservoir 1203817	Beaver Creek	06/10/1890	14771.00000	CA2637	668.7823
Boehmer Reservoir 1203813	Beaver Creek	09/18/1911	22540.00000	CA2637	265.5434
	Beaver Creek	09/01/1893	15950.00000	CA2637	275.4821
McReynolds Reservoir 1203815	Beaver Creek	08/26/1903	19595.00000	CA2637	2,049.583
Mason Reservoir 1203814	Beaver Creek	08/26/1903	19595.00000	CA2637	2,653.371
Lake Moraine Reservoir 1003654	Ruxton Creek	12/31/1888	14245.00000	CA13801	824.1506
Bigtooth Reservoir 1203668	South Ruxton Creek	11/24/1916	24434.00000	CA13801	648

Table 7
Storage Water Rights for the North Slope System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No	Decreed Volume (af)
North Catamount Reservoir 1003674	North Catamount Creek	07/31/1889	14457.00000	83CW0057	25.2525
	North Catamount Creek	12/31/1958	39811.00000	CA13801-S	10,500
South Catamount Reservoir 1003644	South Catamount Creek	12/31/1933	30680.00000	CA13801-S	2,604
Crystal Creek Reservoir 1003667	Crystal Creek	12/31/1933	30680.00000	CA13801-S	3,479

Table 8
Storage Water Rights for the Northfield System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No	Decreed Volume (af)
Rampart Reservoir 1003670	West Monument Creek	06/19/1913	23180.00000	CA13801	891
Nichols Reservoir 1003674 (Northfield Res No 4)	West Monument Creek	11/19/1908	21507.00000	CA13801	349.8184
Northfield Reservoir 1003671 (Northfield Res No 1)	Crystal Creek	10/16/1889	14534.00000	CA13801	276.220

Table 9
Storage Water Rights for the Rosemont System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No	Decreed Volume (af)
Rosemont Reservoir 1203820 [1)]	East Beaver Creek	08/20/1930	29451.00000	CA6913	1,229.01
		10/01/1960	40451.00000	CA8757	1,198.70
Penrose Reservoir 1003682	Fountain Creek	03/22/1917	24552.00000	CA13801	26.60
		09/08/1919	25452.00000	CA13801	13.13
		09/05/1925	27641.00000	CA13801	16.50

1) Conditional exchanges exist for storage of sewered and non-sewered transmountain and Colorado Canal return flows for 2,345.04 acre-feet

Table 10
Storage Water Rights for the South Suburban System

Name and WDID	Water Source	Approp. Date	Admin. No.	Case No	Decreed Volume (af)
Gold Camp Reservoir 1003646	North Cheyenne Creek	14336.00000	04/01/1889	83CW0091	229.57
South Suburban Reservoir 1003645	North Cheyenne Creek	28610.00000	05/01/1928	CA13801	208.40

Ground Water Rights

Colorado Springs Utilities owns ground water rights that withdraw water from the shallow alluvium and rights from non-tributary Denver Basin aquifer. CS-U's well water rights are primarily used to supply cooling water at the Nixon Power Plant at Clear Spring Ranch. In addition, CS-U has ownership in several other wells throughout the service area that are primarily decreed for commercial and irrigation use and deliver on a smaller scale. In total annual diversions are estimated at about 4,000 acre-feet with 2,500 acre-feet occurring at Clear Springs Ranch. The well water rights are not included because of their limited use within the CS-U system.

Exchange Rights

CS-U operates relatively senior exchanges on the Arkansas River, Fountain Creek, and other smaller tributaries in the basin. These exchanges allow CS-U to move available water supplies to upstream locations where the water can be diverted into the CS-U delivery system. Exchanged water typically includes fully consumable return flows that originate in Monument Creek and lower Fountain Creek at the Waste Water Treatment Plants and historical consumptive use credits associated with their Colorado Canal holdings. As described above, CS-U has significant water right holdings in the lower Arkansas River. These consumptive use credits must be exchanged to upstream locations including Pueblo Reservoir, South Slope System, and Otero Pump Station in order to be made available for use by CS-U. When possible, CS-U partners with other water users in the Arkansas River basin to operate contract exchanges. This involves one entity trading water stored in and upstream reservoir, such as Twin Lakes Reservoir, with a second entity that has water in a downstream reservoir such as Meredith Reservoir. This type of trade is common and benefits both parties, as the entity with upstream water does not have to pay transit losses and the entity with downstream supplies does not have to rely on available exchange potential to operate a river exchange.

CS-U operates river exchanges on the mainstem of the Arkansas River pursuant to Case No. 84CW203. Local river exchanges within the Fountain Creek watershed are decreed in Case Nos. 84CW202A and 84CW202B. These are the most senior exchanges decreed by CS-U and are outlined in Table 10 below. In addition, CS-U has decreed more junior exchanges to allow flexibility within their system.

In recent years, CS-U has exchanged 20,000 to 35,000 acre-feet annually. These include both local system exchanges, mainstem river exchanges, and contract exchanges. Exchanges are an important component of CS-U operations as they allow for the reuse of transbasin and historical consumptive use credit water supplies.

Exchanges are made into Twin Lakes Reservoir, where water can be released directly to the pipeline to the Otero Pump Station. Prior to the 1980s, CS-U operated an intake on the Arkansas River at the Otero Pump Station, but due to increased efficiencies, the intake was moved to Twin Lakes Reservoir. CS-U is working towards constructing a new intake that can provide redundancy and increased operational flexibility at the Otero Pump Station; allowing water to be diverted directly from the Arkansas River.

Exchanges between the mouth of Fountain Creek and Pueblo Reservoir are frequently limited by the Pueblo Flow Management Program that requires specific flow rates below Pueblo Reservoir. In addition, the Arkansas River Voluntary Flow Management Flow Program (VFMP) operated by Colorado Parks and Wildlife to maximize recreation on the Arkansas River during the July through August 15 period, is also a constraint to exchanges upstream of Pueblo Reservoir.

Where to find more information:

- Additional information on the Pueblo Flow Management Program and the Arkansas River Voluntary Flow Management Program are included in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum.

Table 11
Principal Exchange Decrees

Name and WDID	Case Nos.	Comments
North Slope System Exchange 1002802	84CW0202A 84CW0202B 86CW0118A 86CW0118B 04CW0132 07CW0122	Decrees include sewered and non-sewered transmountain and Colorado Canal return flows exchanged through the Fountain Creek watershed for storage and direct use in North Slope System reservoirs. Portions of the conditional decreed exchanges have been made absolute.
33rd Street Exchange 1002800	84CW202A 84CW0202B 86CW0118A 86CW0118B 04CW0132	Decrees include sewered and non-sewered transmountain and Colorado Canal return flows exchanged through the Fountain Creek watershed for diversion at the 33rd Street Pump Station. The exchanges remain conditional.
Bear Creek Exchange 1002801	84CW0202B 86CW0118A 04CW0132	Decrees include sewered and non-sewered transmountain and Colorado Canal return flows exchanged through the Fountain Creek watershed for diversion through the Bear Creek Pipeline. The exchanges remain conditional.
Northfield System Exchange 1002803	84CW0202A 84CW0202B 86CW0118A 86CW0118B 04CW0132 07CW0122	Decrees include sewered and non-sewered Transmountain and Colorado Canal return flows exchanged through the Fountain Creek watershed for storage and direct use in the Northfield System. Portions of the conditional decreed exchanges have been made absolute.
Pikeview System Exchange	84CW0202A 84CW0202B 86CW0118A 86CW0118B 04CW0132 07CW0122	Decrees include sewered and non-sewered transmountain and Colorado Canal return flows exchanged through the Fountain Creek watershed for storage and direct use for non-potable use and delivery to Mesa Treatment Plant. Portions of the conditional decreed exchanges have been made absolute.
Ruxton Creek System Exchange 1002805	84CW0202A 84CW0202B 86CW0118A 86CW0118B 04CW0132 07CW0122	Decrees include sewered and non-sewered transmountain and Colorado Canal return flows exchanged through the Fountain Creek watershed for storage and direct use on Ruxton Creek.
South Suburban Exchange 1002806	84CW202A 84CW0202B 86CW0118A 86CW0118B 04CW0132 07CW0122	Decrees include sewered and non-sewered transmountain and Colorado Canal return flows exchanged through the Fountain Creek watershed for storage and direct use on Cheyenne Creek. Portions of the conditional decreed exchanges have been made absolute.
Colorado Springs Arkansas River Exchanges 1007044, 1007045	84CW0203A 84CW0203B 86CW0118A 86CW0118B 89CW0036	Decrees include sewered and non-sewered transmountain and Colorado Canal return flows exchanged to Pueblo Reservoir then upstream to Twin Lakes Reservoir, Turquoise Reservoir, Otero Pump Station, and the South Slope System. Portions of the conditional decreed exchanges have been made absolute.
Colorado Springs South Slope System Exchange 1203545	84CW0203A 84CW0203B 86CW0118A 86CW0118B	Decrees allow change of transmountain and Colorado Canal return flows to the South Slope System. Portions of the conditional decreed exchanges have been made absolute.

OPERATIONAL INFORMATION

Water Demands

CS-U's total demand was approximately 67,200 acre-feet in 2015, corresponding with a population of about 470,500 million in the City and surrounding service area. This demand level corresponds to around 128 gallons per capita per day (gpcd). Based on the 2017 Integrated Water Resources Plan, CS-U is planning for a 2040 population of 570,300 people and a future water demand of 165 gpcd.

Approximately 65 percent of the annual demand is delivered to satisfy a typical, year-round municipal demand. The remaining 35 percent of the annual demand is delivered to satisfy commercial, industrial, and other uses.

Consumptive Use

The average annual consumptive use of CS-U's potable demands is 43.5 percent of water deliveries. Indoor consumptive use is estimated to be 10 percent of delivery. CS-U's monthly consumptive use varies throughout the year due to industrial uses and outdoor uses. Estimates of monthly consumptive use percentages are included in **Table 12**.

Table 12
Municipal Consumptive Use Rates

Month	Percent of Water Consumed
Jan	22
Feb	22
Mar	26
Apr	45
May	61
Jun	70
Jul	73
Aug	71
Sep	65
Oct	45
Nov	24
Dec	21

Source: Colorado Springs Utilities, consumptive use rates include municipal, industrial, and outdoor use consumptive rates

Lawn irrigation return flows (LIRFs) associated with diversions have been quantified by CS-U and the ability to reuse fully consumable transmountain and Colorado Canal consumptive use credits are decreed in Case No. 89CW36. These return flows are tracked and used by CS-U to extinction.

Since the drought of 2002, consumptive use by CS-U customers has decreased. This is primarily due to the removal of outdoor irrigation. CS-U estimates that outdoor irrigation has decreased about 25 percent from pre-2002 conditions.

Water Supply

The CS-U system has a varied water rights and water supply portfolio that is managed on a daily basis to ensure demands are met and to allow operational flexibility to address various infrastructure needs, repairs, down time, etc. CS-U's goal is to first use available Arkansas River supplies before using its supplies from the western slope. Although complexities of a system this large require constant monitoring, the general order of operations used to meet demands is as follows:

1) Operate local exchanges to maximize use of fully consumable return flows
2) Move available water supplies to Twin Lakes Reservoir and Turquoise Reservoir for delivery to Otero Pump Station
3) Maintain water levels in Rampart Reservoir via Homestake Pipeline operations
4) Supplement native North Slope and South Slope System supplies with Blue River Pipeline deliveries

South Slope System

South Slope reservoirs typically come into priority after the irrigation season and fill through winter. The Big Horn and Wilson reservoirs fill in-priority or by exchange in most years. Limited water supplies prevent other South Slope System reservoirs (Boehmer Reservoir, Mason Reservoir, and McReynolds Reservoir) from filling each year and, as a result, water in storage is frequently carried over from one year to the next. Boehmer Reservoir is operated to maintain storage levels and is not typically drawn down. CS-U has a contract with Victor Gold mine to take up to 600 acre-feet of annual water deliveries from Big Horn, Wilson and/or Mason Reservoirs. South Slope System water is delivered for use by CS-U via St. Johns Tunnel and Ruxton Creek pipeline(s).

The upper most reservoirs in the system, Big Horn and Wilson, are operated such that all storage is released by fall of each year to avoid excess stress on the dam embankments due to the harsh environmental conditions above 11,000 feet elevation.

North Slope System

North Catamount, South Catamount and Crystal Reservoirs are primarily operated as terminal storage for the Blue River System. The Blue River Pipeline connects Montgomery Reservoir in the upper South Platte River to North Catamount Reservoir. North Slope reservoirs store native water when in priority, or by exchange. However, native water supplies are high in fluoride and require blending with west slope water supplies. North Slope Reservoirs have direct flow water rights that are more senior than storage water rights and come into priority more often.

North Slope System water is delivered to the Ute Pass Water Treatment Plant that serves the areas outside Colorado Springs City limits. On average only about 500 acre-feet of native water is supplied.

Northfield System

Rampart Reservoir is the major storage facility in the Northfield System and is operated to supply water at the Pine Valley and McCullough water Treatment Plants. Water is typically delivered to Rampart Reservoir from the Homestake Pipeline. The reservoir is typically kept full through the summer months with imported water while the Homestake Pipeline is operated at full, or near full capacity. Reservoir levels draw down during the fall and winter as the Otero Pump/Pipeline and Homestake Pipeline deliveries are reduced to about 59 cfs. This is the maximum gravity flow rate (without operating Twin Rocks Pumping Station). Very little native water supplies are available in this system. Nearly all water supplies into the Northfield System are sourced from Homestake Pipeline imports.

Rosemont System

Rosemont Reservoir and Pipeline are the major infrastructure components of the Rosemont System and are operated mainly to provide non-potable irrigation water to the Broadmoor Hotel. Accordingly, this system mostly delivers water during the irrigation season. In most years, the supply is sufficient to provide all irrigation water demands at the Broadmoor golf courses and grounds. However, in June and July of dryer than average years, CS-U must supplement the Rosemont System with water supplies sourced from the South Suburban System.

South Suburban System

The South Suburban System is primarily operated as a raw water supply to the Mesa Water Treatment Plant. However, as mentioned above, during below average water years, the system can be used supplement the Rosemont Water System. Water is diverted from North and South Cheyenne Canyons and pumped directly to Mesa Water Treatment Plant or held in storage at Gold Camp Reservoir or South Suburban Reservoir. Direct diversions are limited by agreement with the North Cheyenne Canyon neighbors. This agreement prevents CS-U from depleting North Cheyenne Creek below 1.0 cfs during the summer months.

Local Fountain Creek Watershed System

The 33rd St. pump station directly diverts water from Fountain Creek and is the primary component of the Local Fountain Creek Watershed System. Diversions are conveyed directly to Mesa Water Treatment Plant. The senior water rights at the pump station are typically always in priority for the 13.93 cfs pumping capacity. The pump station operates year-round; however, diversions can be less than 13.93 cfs due to reduced demands and stipulated decree limitations. Due to increased sediment loading resulting from recent fires, the pump station diversions have been less in recent years compared to historical operations. However, improvements are planned to allow pump station operations with reduced water quality.

Homestake Project System

Water from the Homestake Project is typically stored in Homestake Reservoir then brought through the Homestake tunnel during the late winter and early spring months of each year. This is done in preparation of the coming snowmelt runoff that occurs in May and June.

Homestake Tunnel typically carries water from Homestake Reservoir to Turquoise Reservoir in February and March. Occasionally, water is delivered in the fall depending on available space in east slope reservoirs. Homestake Water is generally delivered to CS-U at Rampart Reservoir via the Otero Pump and Homestake Pipeline. Water is released from Rampart Reservoir to supply water at Pine Valley and McCullough Treatment Plants.

Twin Lakes System

The Twin Lakes water system does not have significant storage on the west slope. Therefore, water is diverted to the Arkansas River basin via the Twin Lakes Tunnel as it becomes physically and legally available. Water is generally delivered to CS-U at Rampart Reservoir via the Otero Pump and Homestake Pipeline. The majority of the Twin Lakes water is delivered beginning late spring and continues into September. Water is released from Rampart Reservoir to supply water at Pine Valley and McCullough Treatment Plants.

Blue River System

By decree, Blue River return flows must be fully utilized by exchange, or other means. Diversions from the Blue River System are delivered to North Catamount Reservoir in CS-U's North Slope System via the Blue River Pipeline. The pipeline is operated to draw down Montgomery Reservoir storage to 400 acre-feet by April 1 of each year; however, some water is continually diverted through the pipeline during winter to prevent ice forming in the alignment. Generally, imports from the Blue River Pipeline are largest during the snowmelt runoff June and July.

Fry-Ark System

Fountain Valley Authority operates the Fountain Valley Conduit to provide water supplies to CS-U among other participating members north of Pueblo Colorado. The conduit is operated year-round to deliver water stored in Pueblo Reservoir. Typically, CS-U takes delivery of Fry-Ark Project water in Pueblo Reservoir and it is treated and pumped to the southern portion of CS-U's service area near Ft. Carson via the Conduit. CS-U's share of the Fountain Valley Conduit is 10.6 MGD.

The newly constructed Southern Delivery System (SDS) has a capacity of 50 MGD and will allow increased deliveries from Pueblo Reservoir.

Colorado Canal System

Water rights owned by CS-U in the Colorado Canal System are delivered into Lake Meredith and Lake Henry in the form of fully consumable historical use credits. These credits can be used by CS-U via exchange. Often, contract exchanges will be executed between CS-U and other water users in the basin, which effectively moves Colorado Canal credits to higher locations in the basin where CS-U can make use of the water in their system. If sufficient exchange potential exists, then a river exchange will be operated to move the water upstream. CS-U will also exchange the Colorado Canal System water up to Twin Lakes Reservoir or Turquoise Reservoir

before taking delivery via the Otero Pump and Homestake Pipeline. However, typical operations include selling excess water to downstream agricultural water users. In the last 10 years, more water has been sold than has been exchanged upstream for use by CS-U.

Fully consumable Supplies

CS-U operates two waste water treatment plants. The largest is the Las Vegas Waste Water Treatment Plant (WWTP), located in Southeast Colorado Springs. A newer waste water treatment plant, known as the J.D. Phillips WWTP, was constructed in 2007 and serves the north/northeast portion of the CS-U service area. From these locations, fully consumable return flows are typically generated at a rate of about 80 acre-feet per day. These supplies are either exchanged upstream to allow out of priority depletions within the local water systems or allowed to flow downstream and exchanged into Pueblo Reservoir or picked up in the Colorado Canal. CS-U maintains daily accounting and if the supplies cannot be directly used or stored by the Utility, then the excess supplies are sold to a downstream water user.

Water supplies delivered to U.S. Air Force Academy are treated and reusable supplies are fully consumed by the Air Force. Deliveries to Ft. Carson are also treated on-site; however, not all water is used to extinction. Return flows accrue to Fountain Creek and become available by CS-U again.

Modeling Considerations

The following descriptions provide the framework for how individual water systems will be prioritized and operated in the ArkDSS surface water allocation model. Note that transmountain water will be imported to the surface water model based on historical records.

Demand

The CS-U water supply system will be modeled with one key municipal demand. Water will be delivered to the demand by way of four key systems constrained by water availability and capacity: the Mesa Water Treatment Plant, a combined Pine and McCullough Treatment Plant system, the Fountain Valley Conduit, and Southern Delivery System. Each of these key systems uses available raw water supplies in the following order of priority:

1. Re-divert fully consumable effluent from waste water plants
    a. Exchange to upstream storage (tributaries to Fountain Creek)
    b. Exchange to Pueblo Reservoir, Twin Lakes Reservoir, Turquoise Reservoir, or South Slope reservoirs
    c. Track and divert in Colorado Canal and store in Lake Meredith or Lake Henry

2. Divert direct local water rights in-priority
    a. Operate Fountain Creek Watershed System
    b. Operate South Suburban System
    c. Operate South Slope System
        i. Operate direct flow water rights
        ii. Use WD 10 Storage

3. Operate Otero Pump Station/Homestake Pipeline to fill Rampart Reservoir System
    a. Pump available Twin Lakes Project imports
    b. Exchange fully consumable water/HCU credits from Colorado Canal to Pueblo Reservoir
    c. Exchange fully consumable water/HCU credits from Pueblo Reservoir to Twin Lakes Reservoir/Turquoise Reservoir

4. Operate Blue River Pipeline to fill Catamount Reservoir System

5. Operate Fountain Valley Conduit/ Southern Delivery System

Rosemont system will have a separate demand for outdoor irrigation at the Broadmoor. This demand will be supplemented using the South Suburban System as necessary.

South Slope System

The South Slope System will be modeled with two reservoir systems with a capacity of the combined individual reservoirs:

1. WD 12 Storage System – The five associated reservoirs are located in the headwaters of West Beaver Creek and have no intervening water rights. The reservoirs are operated in a similar fashion to convey water through St. John's Tunnel (Structure ID 1200539) to WD 10. Water delivered from the WD 12 Storage System is constrained by customer demand and the capacity of St John's Tunnel.
    - Big Horn Reservoir (Structure ID 1203816)
    - Wilson Reservoir (Structure ID 1203817)
    - Boehmer Reservoir (Structure ID 1203813)
    - McReynolds Reservoir (Structure ID 1203815)
    - Mason Reservoir (Structure ID 1203814)
2. WD 10 Storage System – The two reservoirs are located in the headwaters of Ruxton Creek and have no intervening water rights that are not controlled by CS-U. The reservoirs are operated in a similar fashion to regulate diversions via pipeline to Ruxton Hydroelectric Plant, Manitou Hydroelectric Plant and Mesa Water Treatment Plant.
    - Lake Moraine Reservoir (Structure ID 1003654)
    - Big Tooth Reservoir (Structure ID 1203668)

Neither Ruxton Hydroelectric Plant nor Manitou Hydroelectric Plant (Structure ID 1000874) will be modeled explicitly, as power is generated when water is delivered for municipal demand. The WD 10 Storage System reservoir releases will be delivered to the CS-U demand carried through the Mesa Water Treatment Plant. The Mesa Water Treatment Plant capacity will further constrain the amount of demand met through the South Slope System.

North Slope System

The North Slope reservoirs will be combined and modeled as the Catamount Reservoir System. The three reservoirs are located in the headwaters of Fountain Creek and have no intervening water rights that are not controlled by CS-U. The reservoirs are operated in a similar fashion to store imports from the Blue River Pipeline and in-priority native water supplies.

- North Catamount Reservoir (1003673)
- South Catamount Reservoir (1003644)
- Crystal Creek Reservoir (1003667)

The Blue River Pipeline (1004676) will be modeled as an import to the system based on historical diversion records. Water stored in the Catamount Reservoir System will be delivered to meet CS-U demand through the Mesa Treatment Plant. The Mesa Water Treatment Plant capacity will further constrain the amount of demand met through the North Slope System.

Northfield System

The Northfield System reservoirs will be combined and modeled as the Rampart Reservoir System. The three reservoirs are located on West Monument Creek and have no intervening water rights. These reservoirs are operated in a similar fashion to store imports from the Homestake Pipeline and in-priority native water supplies.

- Rampart Reservoir (1003670)
- Nichols Reservoir (1003674)
- Northfield Reservoir (1003671)

Homestake Pipeline (1004615) will be modeled as an import to the system based on historical diversion records. The McCullough and Pine Valley Treatment Plants will be combined in the modeling effort. Water stored in the Rampart Reservoir System will be delivered to meet CS-U demand through the combined McCullough and Pine Valley Treatment Plant System, constrained by their combined capacity.

South Suburban System

The South Suburban System reservoirs will be combined and modeled as the South Suburban Reservoir System. The two reservoirs are located off channel from North Cheyenne Creek. These reservoirs are operated in a similar fashion to store South Suburban System direct flow diversions and primarily deliver water to Mesa Water Treatment Plant.

- Gold Camp Reservoir (1003646)
- South Suburban Reservoir (1003645)

Rosemont Water System

The Rosemont Water System reservoirs in Water District 10 will be combined and modeled as the Water District 10 Rosemont Reservoir System. Rosemont Reservoir (1203820), located on East Beaver Creek in Water District 12, will be modeled explicitly. Stored water is delivered to the WD10 Rosemont Water System.

- Penrose Reservoir (1003682)

- Fisher Canon Reservoir (1003688)

These reservoirs are operated in a similar fashion to deliver irrigation water to the Broadmoor. Broadmoor irrigation demand will be modeled separately from CS-U demand.

Transbasin Supplies

CS-U maintains a large portfolio of transmountain diversion water rights as described above. For modeling purposes, the following describes the priority of moving the transmountain supplies to CS-U's system. Note that local storage and delivery to demands for water delivered via the Blue River Pipeline and the Homestake Pipeline was described under the individual systems above. Imports will be simulated based on historical deliveries. Transbasin basin and other CS-U water supplies stored in Pueblo Reservoir are exchanged upstream for storage and delivery through the Otero Pipeline or delivered directly to CS-U demands via the Fountain Valley Conduit or the Southern Delivery System Pipeline.

- Twin Lakes Project
    1. Divert directly through Otero Pipeline
    2. Store in Twin Lakes Reservoir
    3. Store in Clear Creek Reservoir or Pueblo Reservoir
- Homestake Project
    1. Divert directly through Otero Pipeline
    2. Store in Twin Lakes Reservoir or Turquoise Reservoir
    3. Store in Clear Creek Reservoir or Pueblo Reservoir
- Blue River Project
    1. Use directly to meet CS-U Demand via Mesa Water Treatment Plant
    2. Store in North Slope System Reservoirs (North Catamount, South Catamount, Crystal)

Where to find more information:

- The final model representation of Colorado Springs Utilities facilities and associated operations will be documented in the Arkansas River Surface Water Model User's Manual.

REFERENCES

1) Colorado Springs Utilities 2016 Water Tour Handout
2) Colorado Springs Utilities 2018 Water Master Plan