



— BUREAU OF —
RECLAMATION

Annual Operating Plans

Sixty-eighth Annual Report Colorado – Big Thompson Project And Western Division Systems Power Operations

Water Year 2019
Summary of Actual Operations

Water Year 2020
Annual Operating Plans

February 2019: Charles Hansen Feeder Canal 550 Section and Eden Valley Siphon

**Eastern Colorado Area Office
Missouri Basin Region**

Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Preface

The purpose of the Annual Report for the Colorado-Big Thompson Project (C-BT) is to inform interested parties of the coordinated operation of the project. The report has two main parts. The first describes the actual operation of the project during the previous water year and the plan of operation for the upcoming water year. The second presents the hydropower operations for the previously completed water year and the forecast for the next.

This report in part fulfills requirements included within decree stipulations. These include the Stipulation dated October 5, 1955, as amended October 12, 1955, and filed with the United States District Court for the District of Colorado in Civil Action Nos. 2782, 5016, and 5017 for an annual report of the Green Mountain Reservoir Operations and the Agreements in the Stipulation and Agreement of the Orchard Mesa Check Case (Colo. Water Div. 5, 91CW247) dated September 6, 1996, to produce a Historic Users Pool (HUP) Annual Operating Plan (AOP).

Executive Summary

Collection System and East Slope Reservoirs started Water Year 2019 (WY 2019) with average storages and ended WY 2019 with greater than average storage. Snowpack was generally greater than average for the water year and runoff mirrored snowpack. Peak runoff, although not exceptionally large in magnitude, was later than typical. Daily air temperatures were generally average throughout the water year, except for the July – September period, when temperatures were higher than average. Precipitation was marginally above average for the water year, except for May and June 2019 which were slightly higher than average.

Colorado – Big Thompson (C-BT) Project diversions totaled 288,724 acre-feet (AF) through Adams Tunnel for water year 2019. Deliveries of C-BT water totaled 191,792 acre-feet. Green Mountain Reservoir delivered a total of 60,844 acre-feet from storage in WY 2019.

The natural inflow to Lake Estes reached its WY 2019 peak flow with a daily average flow of 955 cubic feet per second (cfs) on July 1. The maximum mean daily release from Olympus Dam was 709 cfs, occurring on June 8.

Green Mountain Reservoir achieved a physical fill in WY 2019. Granby Reservoir achieved a fill in WY 2019. Horsetooth Reservoir and Carter Lake achieved a fill in WY 2019. Carter Lake was filled a total of three times in WY 2019. Sufficient storage in Horsetooth Reservoir and Carter Lake existed to satisfy all demands for WY 2019.

Grand Lake clarity goals were met for the 2019 clarity season. At Shadow Mountain Reservoir during the final week of the clarity season, diel pH values oscillated above and below the adaptive management threshold of 8.0 but no operational action was taken, because the clarity goal qualifiers were being met and there was no concurrent indications of any increase in algal production.

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General Description of the Colorado-Big Thompson Project

The Colorado-Big Thompson Project (C-BT) is one of the largest and most complex natural resource developments undertaken by the Bureau of Reclamation. It consists of over 100 structures integrated into a trans-mountain water diversion and delivery system which provides water and power benefits across the state of Colorado from the Nebraska to the Utah state lines. The project was authorized for construction in the 1930's and completed in the 1950's.

C-BT project facilities span over approximately 100 miles within north-central Colorado. The project stores, regulates, and diverts water from the Colorado River west of the Continental Divide to provide supplemental irrigation water for 640,000 acres of land east of the Rocky Mountains. It supplements municipal and industrial water supply while providing water-oriented recreation for a growing population of approximately 960,000. Approximately 3,000 feet of elevation drop allows for hydroelectric generation of the electricity required for project pumping and produces enough surplus electricity for nearly 68,000 households. Additionally, the project provides water storage within the upper Colorado River basin for agricultural, municipal, industrial, recreation, and environmental uses. Major features of the C-BT include; dams, dikes, reservoirs, powerplants, pumping plants, pipelines, tunnels, transmission lines, substations, and other associated structures.

Historically, the C-BT diverts approximately 230,000 acre-feet (AF) of water, annually, (310,000 acre-feet maximum) from the Colorado River headwaters on the western slope to the South Platte River basin on the eastern slope, for distribution to project lands and communities. The Northern Colorado Water Conservancy District (Northern Water) apportions the water used for irrigation to more than 120 ditches and 60 reservoirs. Twenty-nine communities receive municipal and industrial water from the C-BT. The Western Area Power Administration (WAPA) markets and transmits the electric power produced at the six powerplants associated with the project.

Collection System and East Slope Colorado-Big Thompson Project

Overview¹

The C-BT is often grouped by which side of the Continental Divide a sub-system is located. Facilities within the Colorado River Basin (on the west slope) include a replacement and compensatory storage reservoir and a water collection and diversion system. East slope facilities are located within the South Platte River Basin and include a power and delivery system and a water distribution system.

Green Mountain Reservoir provides replacement water for out-of-priority collection system diversion and storage water for other beneficial uses. Green Mountain Reservoir is located on the Blue River, a tributary of the Colorado River approximately 30 miles southwest and downstream of the collection system. This reservoir allows for year-round diversion at the collection system by providing

¹ A diagram and map of the C-BT system can be found in Appendix C.1 and Appendix C.2.

replacement water during periods when senior downstream water users would otherwise require the collection system to bypass inflow. Green Mountain Reservoir also provides water storage for the benefit of water users within the Colorado River basin. Green Mountain Dam includes a powerplant for hydropower generation.

The Colorado River collection and diversion system captures snowmelt runoff from the high mountains and diverts water to the eastern slope. The system stores, regulates, and conveys Colorado River water through Grand Lake to a trans-mountain diversion tunnel for delivery to the east slope. This system includes three reservoirs, two pumping stations, conveyance canals and the trans-mountain diversion tunnel.

Authorization of the project included improvements and operational requirements to mitigate anticipated lower flows downstream of the collection system. The project included installation of pumping systems for existing irrigators upstream of the Blue River confluence. The project also required a release schedule downstream of the collection system in order to maintain the Colorado River fishery downstream of Granby Dam.



A summer release through the spillway at Green Mountain Dam and Reservoir. Green Mountain Powerplant, located just below the dam, is also generating power.

The west slope water collection system for the project is comprised of three reservoirs (Lake Granby, Willow Creek and Shadow Mountain Reservoirs), one natural lake (Grand Lake) and two pumping plants (Farr and Willow Creek Pumping Plants). Lake Granby Reservoir is located on the Colorado River and is the largest reservoir within the C-BT. Lake Granby provides multi-year storage of Colorado River water. The Farr Pumping Plant lifts water from Lake Granby to Shadow Mountain Reservoir. Shadow Mountain Reservoir impounds the Colorado River upstream of Lake Granby and allows for gravity conveyance of Colorado River water through Grand Lake to the Adams Tunnel. The largest natural lake in Colorado, Grand Lake is hydraulically connected to Shadow Mountain Reservoir. The two are operated as a single regulatory reservoir. Willow Creek Reservoir is used to

regulate and divert water from Willow Creek, a tributary of the Colorado River. Willow Creek Pumping Plant lifts water diverted from Willow Creek Reservoir for storage in Lake Granby.

Completed in 1950, Granby Dam is located on the upper Colorado River. The dam's river outlet is comprised of a 30-inch jet valve and a 12-inch gate; and has a combined capacity of 430 cubic feet per second (cfs). The dam spillway is controlled by two radial gates with a combined total release capacity of 11,500 cfs. The reservoir stores the flow of the Colorado River and water pumped from Willow Creek Reservoir. The reservoir has a total storage capacity of 539,800 acre-feet.

Farr Pump Plant lifts water from Lake Granby to Granby Pump Canal for conveyance to Shadow Mountain Reservoir. The Farr Pump Plant has three 6,000 horsepower units with a combined installed capacity of 600 cfs when lifting the maximum head of 186 feet. The lifting head depends upon the storage level in Lake Granby and ranges between 88 feet to 186 feet. The combined lifting capacity for the 88 feet head differential is 1,200 cfs. The Granby Pump Canal conveys pumped water 1.8 miles to Shadow Mountain Reservoir and with a maximum capacity of 1,100 cfs.

Completed in 1953, Willow Creek Dam is located on Willow Creek, a tributary to the Colorado River below Lake Granby Willow Creek Dam stores and diverts water to Lake Granby Reservoir. The dam has a river outlet with a capacity of 2,080 cfs, a diversion outlet capacity of 400 cfs and an uncontrolled spillway located on the left abutment with a maximum flow capacity of 3,200 cfs. The reservoir has a total storage capacity of 10,600 acre-feet. The Willow Creek Pumping Plant has two 5,000 horsepower units that lift water 175 feet with a combined capacity of 400 cfs.

Completed in 1946, Shadow Mountain Dam impounds the Colorado River upstream of Lake Granby. The dam has an outlet with 50 cfs capacity and a radial gate controlled spillway with a capacity of 10,000 cfs. The reservoir provides regulatory storage and the hydraulic head necessary for gravity conveyance to the Adams Tunnel. The reservoir has a total storage capacity of 18,400 acre-feet including 1 foot of regulatory storage in Grand Lake. The dam maintains the reservoir water surface elevation within the historic water surface elevation of Grand Lake as required under the project authorization.

Completed in 1947, the Adams Tunnel was constructed to divert water from the Colorado River to the Big Thompson River. The 13.1 mile, 9.75 foot diameter tunnel is concrete lined with a capacity of 550 cfs. Tunnel flow is control by a radial gate inlet at a diversion structure called Adams Tunnel West Portal on the east end of Grand Lake. The tunnel passes under the Continental Divide and Rocky Mountain National Park and daylights at East Portal Reservoir approximately 4.5 miles southwest of Estes Park.

The east slope power and delivery system includes four regulatory reservoirs, five powerplants, one pumping station, multiple conveyance and diversions structures and two terminal storage reservoirs². The system is typically divided into three components including an Upper Power Arm above Olympus Dam, a Lower Power Arm above Flatiron Dam and the terminal storage reservoirs. Water delivery

² Significant delivery occurs from these terminal storage reservoirs through various Colorado-Big Thompson Project transferred works. These transferred works are operated and cared for by Northern Colorado Water Conservancy District and are not a focus of this operational report.

may occur at multiple delivery points between Adams Tunnel and the two terminal storage reservoirs. Primary delivery to the terminal reservoirs occurs through the power arm.

The Upper Power Arm begins at the Adams Tunnel East Portal and ends at Olympus Dam. East Portal Dam is constructed on Wind River. It directs a portion of the natural runoff from Wind River and C-BT water exiting Adams Tunnel into a siphon under Aspen Creek and a tunnel under Rams Horn Mountain. Below Rams Horn Tunnel a penstock conducts pressurized flow to Marys Lake Powerplant and Marys Lake.

Marys Lake Powerplant and Marys Lake is the first powerplant and regulatory reservoir on the Upper Power Arm. The powerplant has a single generator with a nameplate capacity of 8.1 megawatts at 210 feet of head. The powerplant is a “run-of-the-river” type generator that follows flow diverted at East Portal Dam between 200 cfs and 550 cfs. All flow bypasses the powerplant over a flip-bucket spillway when generation is not available or when flows are below generation capacity. Marys Lake is a natural lake that was enhanced by construction of dikes. Marys Lake has a storage of 927 acre-feet and regulatory capacity of 593 acre-feet. The outlet has a capacity of 1,300 cfs and no spillway. The reservoir serves as the afterbay for Marys Lake Powerplant and the forebay for Estes Park Powerplant. Prospect Mountain Conduit and Tunnel convey water from Marys Lake to Estes Park Powerplant.

Estes Park Powerplant and Lake Estes is the second powerplant and regulatory reservoir on the Upper Power Arm. The powerplant has three generators with a combined nameplate capacity of 45 megawatts at 572 feet of head. The powerplant is a “peaking plant” which allows load demand following by balancing storage contents between Marys Lake and Lake Estes. Olympus Dam impounds the Big Thompson River east of the town of Estes Park to form Lake Estes. Olympus Dam includes a gated river outlet, a gated diversion outlet and radial-gated spillway. Lake Estes has a total capacity of 3,100 acre-feet and a regulatory capacity of 740 acre-feet. The reservoir regulates discharge from Estes Park Powerplant and natural runoff from the Big Thompson River and Fish Creek. Olympus Dam diverts up to 550 cfs to the Lower Power Arm via Olympus Tunnel and controls release to the Big Thompson River.



Olympus Dam and Lake Estes, along with the Big Thompson River gage below Olympus Dam. Part of the Town of Estes Park and Rocky Mountain National Park can be seen in the background.

The Lower Power Arm begins at Olympus Dam and ends at Flatiron Reservoir. Water from Lake Estes and the Big Thompson River is conveyed by Olympus Siphon and Tunnel to Pole Hill Tunnel and Canal and on to the Pole Hill Powerplant forebay.

The Pole Hill Powerplant is the first powerplant in the Lower Power Arm. The powerplant is a single unit with a net head of 815 feet. The unit nameplate generation is 33.25 megawatts. The powerplant discharges into a small afterbay that diverts water into Rattlesnake Siphon and Tunnel to Pinewood Reservoir. The powerplant forebay has no storage, and generation follows release from Olympus Dam to Olympus Tunnel. When required, flow from the Pole Hill forebay can bypass the powerplant by falling into Little Hell Creek Canyon where it flows until it is re-diverted to the Pole Hill Afterbay.

Rattlesnake Tunnel conveys water from the Pole Hill Afterbay to Pinewood Reservoir. Rattlesnake Dam impounds water from Rattlesnake Tunnel in Pinewood Reservoir. The reservoir has a storage capacity of 2,180 acre-feet with regulatory capacity of 1,422 acre-feet and provides regulatory storage for Flatiron Powerplant. Rattlesnake Dam has an outlet for releasing native flow to Cottonwood Creek and an uncontrolled spillway. The Bald Mountain Pressure Tunnel inlet supplies water from Pinewood Reservoir to the two Flatiron Penstocks and Flatiron Powerplant.

Flatiron Powerplant is the second powerplant on the Lower Power Arm. The powerplant includes three units. Two units have nameplates of 31.5 Megawatts with a maximum head of 1,118 feet. They receive water from Pinewood Reservoir. The two turbines discharge into Flatiron Reservoir. Flatiron Powerplant Unit 1 and 2 are operated as load-following generators. The third unit is a pump-generator connected to Carter Lake Reservoir, and has a 13 KHp motor with a maximum lift of 297 feet. When generating, Unit 3 is rated at 8.5 megawatts.

Flatiron Reservoir is a regulatory reservoir that regulates flow to the Charles Hansen Feeder Canal and maintains head as an afterbay for Flatiron Powerplant generation and a forebay for Unit 3 pumping to Carter Lake Reservoir. Flatiron Dam impounds Chimney Hollow and the ephemeral tributary of Dry Creek. The reservoir stores 760 acre-feet of water with 399 acre-feet of regulatory storage. The dam has an uncontrolled spillway with 23,600 cfs capacity and an outlet to the Charles Hansen Feeder Canal with a design capacity of 930 cfs.

The terminal storage and delivery component of the C-BT conveys water for user delivery and provides water storage for high demand periods. The two terminal reservoirs that have not been transferred to Northern Colorado Water Conservancy District are Carter Lake Reservoir and Horsetooth Reservoir. Under typical operation they receive water from Flatiron Reservoir. Carter Lake Reservoir supplies water to the project service area south of the Big Thompson River. Horsetooth Reservoir supplies water to the Cache La Poudre River project service area. The Charles Hansen Feeder Canal conveys water to Horsetooth Reservoir and delivers water to the Big Thompson River at the mouth of the Big Thompson Canyon and water users along the canal.

The Dille Diversion Dam and Tunnel, located one mile upstream from the Big Thompson Canyon mouth, provides a redundant feature for rediverting project water from the Big Thompson River when the Lower Power Arm is unavailable. Additionally, non-project water from the Big Thompson River can be diverted into the tunnel. Tunnel water is conveyed to the Charles Hansen Feeder Canal and used for power generation at Big Thompson Powerplant or conveyed by the Charles Hansen Feeder Canal toward Horsetooth Reservoir.

Carter Lake Reservoir is impounded by three dams on ephemeral streams. Carter Lake Reservoir has a storage capacity of 112,200 acre-feet with an active capacity of 108,900 acre-feet. Carter Lake Reservoir receives water either from Flatiron Powerplant Unit 3 or a bypass gravity conduit. Deliveries are made through outlet works located in Dam number 1 to the Saint Vrain Supply Canal or to Flatiron Reservoir through the Flatiron Powerplant.

The Charles Hansen Feeder Canal (CHFC) transports water from Flatiron Reservoir to the Big Thompson River and Horsetooth Reservoir. CHFC has a nominal capacity of 930 cfs from Flatiron Reservoir to the Big Thompson River. The CHFC can make water deliveries at the Big Thompson River and several turnouts along the canal. Deliveries from the canal to the river are made through a controlled wasteway or the Big Thompson Powerplant. The CHFC has a nominal capacity of 550 cfs from the Big Thompson River to Horsetooth Reservoir.

Big Thompson Powerplant is the last federal powerplant in the C-BT system. The powerplant is used to make deliveries from the CHFC or to return non-project Big Thompson River water used for skim power operations to the river. The powerplant's nameplate is 4.5 megawatts with an operational head of 183 feet. The powerplant has a maximum flow rate of about 400 cfs. The CHFC wasteway makes river deliveries when demand exceeds 400 cfs or when the powerplant is unavailable. It has a maximum flow rate of 600 cfs and is also used to deliver water to users between the wasteway outfall and powerplant tailrace. Big Thompson Powerplant is typically operated only during the snowmelt runoff and delivery season.

Horsetooth Reservoir is located west of Fort Collins, Colorado. The reservoir includes four dams and a dike with a storage capacity of 151,800 acre-feet and an active capacity of 143,500 acre-feet. Outlet works are located in two of the dams, Horsetooth Dam and Soldier Canyon Dam. Dixon and Spring Canyon Dams and Satanka Dike do not have outlet works. The reservoir has no spillway. The Soldier Canyon Dam outlet supplies water to the city of Fort Collins, three rural water districts, Colorado State University, and the Dixon Feeder Canal for irrigation. Horsetooth Dam outlet discharges to the Charles Hansen Supply Canal for water delivery to the Cache La Poudre River and water users north of the Cache la Poudre River.

Additional water delivery and power transmission features were constructed under the project authorization. These features include supply canals, diversion structures, transmission lines and substations. All water delivery features below Horsetooth Reservoir and Carter Lake Reservoir were transferred to Northern Water Conservancy District upon repayment. Northern Water maintains and operates these features. Power transmission features are maintained and operated by Western Area Power Administration (WAPA). These features are not further described in this document.

Planning and Control

The C-BT was authorized, constructed and is operated to provide supplemental municipal and industrial water supply, irrigation water supply, and hydroelectric power production.

The integrated operation of the C-BT is planned and coordinated by the Water Resources Group at Eastern Colorado Area Office (ECAO) in Loveland, Colorado. Staff collects and analyzes information daily and makes the decisions necessary for successful operation of the C-BT. This continuous water

management function involves coordination between the Colorado Division of Water Resources, Northern Colorado Water Conservancy District (Northern Water), WAPA, Reclamation's Upper Colorado and Missouri Basin Regions, other Reclamation groups, and many other local, state, and Federal agencies.

Experience has proven that proper use of the available water resource in a multi-purpose project, such as the C-BT, can be achieved only through careful budgeting and management of the anticipated water supply. One product of this budgeting and management process is an Annual Operating Plan (AOP).

The C-BT water operations are routinely planned on a 12-month basis. The first AOP of the new water year (WY) is prepared in early October and covers the October 1 to September 30 period. AOPs are prepared for reasonable maximum, most probable and reasonable minimum runoff conditions of water supply and associated requirements. The C-BT is operated to optimize the most probable water supply, without jeopardizing the operational position should either the reasonable maximum or the reasonable minimum water supply conditions occur. The plan is reviewed and revised monthly, or as needed during the year as new information becomes available or conditions change. Computer programs and models are used by ECAO to develop the AOPs and water supply forecasts. Tables B-5, B-6 and B-7 include the first AOP for the upcoming water year for the most probable, minimum reasonable and maximum reasonable plans, respectively. Appendix B-8 also provides a summary view of particular features of interest within the project for the planned C-BT operations in the upcoming water year.

Irrigation Requirements

The amount of C-BT water made available each water year for irrigation is determined by Northern Water. This determination is subject to change by agreement throughout the remainder of the irrigation season. Adaptations may occur as a result of substantial changes in the prevailing climatic demand or operational conditions. Irrigation requirements for the three runoff conditions; 1) most probable, 2) reasonable maximum and 3) reasonable minimum, are estimated by analyzing actual use under a variety of actual runoff conditions.

Estimated supplemental irrigation deliveries from Green Mountain Reservoir to irrigators in the Colorado River Basin are included in the release from Green Mountain Reservoir, according to the "Operating Criteria for Green Mountain Reservoir."



North Inlet near Grand Lake. Stream gaging house is shown on left side of photo.

East Slope Diversion Operations

Olympus Dam, East Portal Dam and the Dille Diversion Dam can divert Big Thompson River water for beneficial use. These operations include carriage contracts for decreed water, diversion and storage of decreed east slope project water and non-consumptive diversion for power generation. Carriage Contracts allow for the project to divert and deliver decreed water for water users when unused capacity within the system is available. The C-BT will divert and store Big Thompson water rights when those rights are in priority as long as doing so does not adversely impact attainment of the project's objectives. The project also diverts Big Thompson River water that is obligated downstream of the Big Thompson Powerplant for non-consumptive power generation. This diversion operation is referred to as a "Skim" operation. Big Thompson River water availability for diversion depends on the flow in the Big Thompson River and its tributaries above Lake Estes, C-BT water diverted through the Adams Tunnel, and its power arm capacity. Skim operations and determination of unused system capacity is managed according to the AOP and as prescribed by the ECAO Water Resources Group staff.

Flow Requirements Below Project Facilities

Many of the C-BT dams include downstream flow recommendations or requirements. Release of water from project dams for maintaining downstream river flow was one of the primary purposes included within the project authorization and a stipulation of the project's water rights. This obligation for instream flow requirements preceded recognition of instream flow as a beneficial use within the State of Colorado. Granby Dam, Green Mountain Dam, Willow Creek Dam, Shadow Mountain Dam, East Portal Dam and Olympus Dam operations include some guidance or actual obligations for meeting stream flow targets.

The Secretary of the Department of Interior issued a release schedule for Granby and Willow Creek dams to define monthly flows for the time of the year, location and hydrology. This schedule, titled “Principles to Govern the Release of Water at Granby Dam to Provide Fishery Flows Immediately Downstream in the Colorado River,” was signed on January 19, 1961, by the Secretary of the Department of the Interior as directed by the project authorization. During the irrigation season, Colorado River flow is maintained downstream of senior irrigation diversions below Granby Dam. During the remainder of year, flow is maintained immediately below Granby Dam. Scheduled flows for the Colorado River range between 20 cfs and 75 cfs. Willow Creek Dam only releases water for this purpose during the non-irrigation season, between October and April. Willow Creek Dam release is limited to the lesser of 7 cfs or reservoir inflow. The schedule also allows for flow adjustments based on revised forecasts and consideration of actual flows during May through July. A copy of the document is included in the Standard Operating Procedures (SOP) for Granby Dams and Reservoir, as Appendix A, Exhibit 4 in the SOP.

In accordance with the SOP for Shadow Mountain Reservoir, Chapter 4 Section D, minimum releases from Shadow Mountain Lake are to be whichever is less between inflow and the following seasonal flows: September through October -- 35 cfs; November through December -- 45 cfs; January through May -- 20 cfs; June through July -- 50 cfs; and August -- 40 cfs. The purpose of these flows is to maintain the fishery within the Colorado River above Lake Granby.

The Green Mountain Reservoir minimum release is determined by senior adjudicated water rights downstream from the reservoir. Inflow to Green Mountain Reservoir is released, as required, to meet these downstream rights. The State of Colorado has established instream flow rights for the Blue River downstream of Green Mountain Dam including a 60 cfs flow from May 1 through July 15 and an 85 cfs flow from July 16 through April 30. Instream flow rights are junior to the Project. The State Engineer has determined that Green Mountain Reservoir must bypass 60 cfs to meet downstream senior irrigation water rights during the irrigation season from May 1 through October 31.

The United States Fish and Wildlife Service and the State of Colorado Department of Natural Resources, Parks and Wildlife Division have recommended a minimum release schedule for Lake Estes, shown in Table 1 below. Although no official decision record (i.e. contract, memorandum of understanding, intergovernmental agreement) is available, Reclamation has cooperatively adopted the recommendations when inflow to Lake Estes meets or exceeds these values. Releases in excess of inflows are not required. When the minimum release objective conflicts with service of Carriage Contracts, recent practice has prioritized meeting the minimum release flows over diverting water into Olympus Tunnel in service of the contracts. Likewise, diversion of flows from the Big Thompson River at Olympus Dam for power production (skim operation) is of lower priority than meeting the recommended minimum flows.

Table 1: Recommended minimum release schedule for Lake Estes

Period	Minimum Releases (cfs)
November 1 - April 15	25
April 16 - April 30	50
May 1 - May 15	100
May 16 - August 15	125
August 16 - August 31	100
September 1 - September 15	75
September 16 - October 31	50

Minimum release schedule for Lake Estes. Recommended by the U.S. Fish and Wildlife Service and the Colorado Department of Natural Resources, Parks and Wildlife Division.

Annual Operating Plan

Beginning each water year, the C-BT Most Probable Annual Operating Plan is developed considering the effects of historical average runoff values, the expected demands and depletions of Northern Water and Denver Water, the project’s initial states (e.g. pool levels), other average values, special operations such as previously planned system outages and maintenance schedules, and an assumed Northern Water quota for their water users of 70 percent.

The operations at Granby Reservoir are highly dependent on the runoff conditions on both sides of the Continental Divide. The conditions on the east slope have a direct effect on the diversions through the Adams Tunnel. The diversions through the Adams Tunnel affect the pumping operations at the Farr Pump Plant, and consequently the reservoir levels at Granby Reservoir.

The Green Mountain Reservoir operational plan was developed considering the effects of upstream operations at Dillon Reservoir, forecasted depletions provided by Denver Water and Colorado Springs Utilities, average runoff values, anticipated system outages and planned special operations.

Green Mountain Reservoir

Reservoir Administration

Provisions guiding Green Mountain Reservoir operations are contained within multiple contractual and legally binding documents. The documents include the following:

- Manner of Operation of Project Facilities and Auxiliary Features, Senate Document No. 80, 75th Congress, 1st Session (Senate Document 80)
- Consolidated Cases Nos. 2782, 5016, and 5017, (Commonly referred to as the “Blue River Decrees”)
 - October 12, 1955, Stipulation and Decree
 - April 16, 1964, Stipulation and Decree
 - February 9, 1978, Supplement Judgement and Decree

Secretary of the Interior Directive, CERTAIN GREEN MOUNTAIN RESERVOIR STORAGE, COLORADO-BIG THOMPSON PROJECT, Reservation for Silt Project, Colorado River Storage Project, F.R Doc. 64-12867, Filed, Dec. 15, 1964
1984 Operating Policy for Green Mountain Reservoir, C-BT, published in the Federal Register, Vol. 48, No. 247, December 22, 1983,
October 15, 1993, Recovery Implementation Program Recovery Action Plan, Colorado Endangered Fish Recovery Program
September 4, 1996, Stipulation and Agreement in Colorado Water Div. 5, Case No. 91CW247 (Orchard Mesa Check Case), and attached Historic Users Pool (HUP) Operating Criteria.
February 22, 2013, Green Mountain Administrative Protocol
June 27, 2016, Shoshone Outage Protocol (ShOP), Agreement Number 13XX6C0129

Paragraph 6 of the October 1955 Decree stipulates that Reclamation periodically develop operational plans for Green Mountain Reservoir. This report partially fulfills this requirement.

Colorado Springs Utilities and Denver Water Board (“Cities”) have water projects upstream of Green Mountain Reservoir that substantially influence the timing and volume of reservoir filling and water available for power generation. The Denver Water Board’s water project includes 255 thousand-acre feet (KAF) Dillon Reservoir and a trans-basin diversion tunnel. Colorado Springs Utilities’ project includes a direct-flow collection system, small regulatory reservoirs and a trans-basin diversion tunnel. Combined, the Cities divert approximately 80 KAF annually from the basin which would otherwise be available for Green Mountain Reservoir storage and power generation. The right for these water projects to divert against Green Mountain Reservoirs senior water rights and how the Cities compensate the Project for diversions junior to the Project is stipulated within the Project’s water rights. The Cities and the Project have established agreements to fulfill these stipulations.

Green Mountain Reservoir was authorized and constructed to store and deliver two pools of water. Senate Document 80 identified a 52,000 acre-foot pool designated for the singular purpose of replacement of water diverted or stored out-of-priority by the Colorado River Collection System. The remainder of reservoir storage and refill storage are designated as the “100,000 acre-foot power pool”. This pool is primarily for power generation and can be delivered for the beneficial use of water users located within the Upper Colorado River basin above the confluence with the Gunnison River in Grand Junction. The Project water rights include these two pool within the decree.

Additional agreements and directives have further sub-divided the “100,000 acre-foot power pool”. The sub-divisions include, replacement losses for Green Mountain Reservoir, the Historic User Pool, a 5,000 acre-foot allocation for the Silt Project replacement and 20,000 acre-feet for water contracting.

Green Mountain Historic Users Pool (HUP) and the Orchard Mesa Check Case Settlement

Green Mountain Reservoir’s largest single purpose allocation is the Historic User Pool and is designated for Upper Colorado River Basin beneficiary use. The HUP allocation is composed of 66,000 acre-feet of the “100 KAC Power Pool”. This allocation is defined within the 1984 Operating Policy. The intent is that the HUP allocation is delivered in most years.

The HUP operating criteria is stipulated under the 1996 Orchard Mesa Check Case Decree. The stipulations include a variety of criteria for how and when Green Mountain Reservoir can deliver HUP. The operating criteria also identifies a group of irrigation, state and federal stakeholders responsible for cooperative manage the HUP allocation. The HUP Managing Entities include Orchard Mesa Irrigation District, Grand Valley Irrigation Company, Grand Valley Water Users Association, the Colorado Water Conservation Board, the Colorado State Engineer, the U.S Fish and Wildlife Service and the Bureau of Reclamation. Regular meetings for cooperatively managing the HUP are a requirement of the operating criteria.

A primary purpose of the HUP allocation is to provide replacement water and irrigation water for HUP beneficiaries. This water is provide at no cost from the HUP allocation. In dryer years nearly the entire HUP allocation is delivered during the irrigation season. This delivery may include both replacement water for consumptive use by a beneficiary or delivered directly to Grand Valley irrigators. 500 acre-feet of the HUP allocation is reserved for consumptive use replacement during the non-irrigation season.

Providing water for supporting the recovery of Colorado River endangered fish is a secondary beneficial use of the HUP allocation. In most years the entire HUP allocation is not required for irrigation and replacement. In these years the HUP managing entities can declare that surplus HUP allocation is available. The managing entities will collaboratively determine the timing and volume of water for delivery to the 15 mile Colorado River reach between the Grand Valley Irrigation Company diversion dam and the confluence with the Gunnison River.

The HUP managing entities have established standing weekly conference call meetings for coordination of Colorado River operations. These meeting are open to the public and provides a forum for coordination of reservoir and diversion operations within the Colorado River basin. Regular participants on the call include: the HUP managing entities, Denver Water, Northern Water, Colorado River Water Conservation District, the National Weather Service, Colorado Basin River Forecast Center and others.

Reservoir Operation

Green Mountain operations are controlled by water rights administration, authorizing documentation, litigation stipulations, agreements, facility limitations and safety of dam directives. Normal reservoir operations generally focus on three goals: not harming downstream senior water rights, maximizing power generation and conserving and enhancing the beneficial use of the waters of the Colorado River.

Reservoir operations frequently occur in response to administrative calls from senior downstream water rights. Reservoir storage is largely allocated for replacement water for consumptive use of junior water right users. Junior water diversion operations would be curtailed without this replacement water. Reservoir replacement releases cover out-of-priority diversion of the Colorado River Collection System, HUP beneficiaries, Silt Project, Green Mountain Reservoir evaporative losses and most contract release. The storage release flow rate is dependent upon the priority and location of the calling right. In addition, Green Mountain reservoir is obligated to bypass reservoir inflow as needed to not harm the senior calling right.

The reservoir is operated in a manner to maximize the power generation through Green Mountain Powerplant. The powerplant is the principal mechanism for release of all stored water and bypass of inflow. Storage releases for generation often provide other beneficial uses and include Shoshone Outage Protocol operations and direct delivery of HUP water for irrigation and HUP surplus delivery to the 15-Mile Reach for the benefit of Colorado River Endangered Fish recovery efforts. Powerplant releases are scheduled to control reservoir fill rate and minimize the volume of water that will bypass the powerplant. Coordinated Reservoir Operations (CROs) are designed to reshape powerplant release to help enhance river peak flow for the benefit of Colorado River Endangered Fish recovery efforts. The Green Mountain Powerplant direct flow water right places an administrative call on upstream water users most of the year.

Conserving and making use of Colorado River water to create the greatest benefit is one of the primary purposes of the Project. Reservoir operations are planned in a manner that increase the probability that Green Mountain Reservoir's first-fill storage water right will refill each year. In drier years this may require reduction of reservoir release below the powerplant capacity. In addition, operations avoid reservoir release exclusive for power generation.

Administration of water rights dictates reservoir operations throughout most of the year. This results in three typical operational seasons: Winter Delivery (November-April), Spring Runoff / Fill (April-August) and Irrigation Delivery (August-October).

During the Winter Delivery Season, Green Mountain Reservoir storage decreases as releases are made to avoid harming downstream senior water rights. Native winter flow within the Colorado River is typically less than the Shoshone Powerplant senior water right of 1,250 cfs. During this period reservoir storage releases replace water for the Project, HUP beneficiaries, and most Green Mountain Reservoir contractors. On average, Green Mountain Reservoir delivers 23 KAF from storage during the winter season while passing all reservoir inflow. Storage release for Colorado River Collection System Replacement constitutes the largest portion of winter storage delivery.

The Spring Runoff / Fill Season normally begins when river flow exceeds plant capacity at the Shoshone Powerplant. Colorado River flow typically exceeds 1,250 cfs between the last week of March and the second week of April. On average, Green Mountain reaches a minimum fill of 64 KAF in mid-April. Green Mountain Reservoir will exercise storage rights and adjust operation to maximize stored water while optimizing power generation once the Project water rights become in priority. Green Mountain Reservoir normally reaches its maximum fill during the first two weeks of July. After replenishing Green Mountain Reservoirs Senior Storage water right, refill storage rights and power generation direct flow rights will be used to maintain reservoir storage until an administrative call is placed on the Colorado River. A Colorado River administrative call typically occurs between the third week of August and the second week of September. Colorado River administrative calls may occur in June during drier years. Placement of an administrative call ends the Spring Runoff / Fill Season.

Irrigation Delivery Season begins once Colorado River flows decrease below water rights administrative levels. The calling right may be at the Shoshone Powerplant, a Grand Junction Area irrigation water right or both. During Irrigation Delivery Season, Green Mountain Reservoir delivers approximately 20 KAF per month. HUP deliveries constitute the largest portion of the storage releases during the Irrigation Delivery Season. Irrigation Delivery Season ends with the ceasing of irrigation operations around October 31.

Operational Summary: Water Year 2019

Summary of System-wide Conditions

Last water year's AOP was summarized in the previous Annual Operating Report of the Colorado-Big Thompson project³. The following four sub-sections summarize *actual* operational results for WY 2019.

Weather and Inflow Hydrology

Precipitation was slightly above average over the mountains in October and November 2018 and June 2019 while the remainder of the water year was near normal or slightly less than normal for July through September 2019. The monsoonal season in the northern Colorado mountains near Granby and the east slope of the project area was below normal. The monsoonal season for Green Mountain was also below normal for 2019.

Snow accumulation during the fall of WY 2019 was near normal to slightly above normal until March 2019 at which point accumulation remained well above average for the remainder of the season. The Big Thompson River drainage was above average by March 2019, the Granby Reservoir drainage was mildly above average by March 2019 and the Green Mountain Reservoir drainage remained substantially above average for snow accumulation for the entire season. The area surrounding the C-BT project largely followed the same pattern of snow accumulation. Generally, snowpack was above the seasonal median snowpack for most the area.

Table 2 provides an overview of the snowpack condition on April 1, 2019, for some of the contributing watersheds within the C-BT system. The first column in Table 2 is the average snow water equivalent (SWE) of the SNOTEL sites contributing to each reservoir on April 1, 2019. For a historical comparison to the April 1, 2019 condition, the average April 1 SWE of the same SNOTEL sites for the 1983-2018 period was calculated and then a combined site average was taken for those sites. The runoff forecast for April 1, 2019, was mildly to significantly above the typical condition over the last 33 years for most locations within the C-BT region. Table 3 provides the resulting April 1 runoff forecasts for several C-BT drainages across a range of exceedance probabilities of occurrence.

Table 2: Snow-Water Content for April 1, 2019

Watershed	Snow-Water Content		
	2019 (In.)	Avg. (In.)	Percent of Avg.
Green Mountain Reservoir	19.5	14.7	132
Willow Creek	16.5	13.9	119
Lake Granby	16.4	14.8	110
Lake Estes	18.3	16.8	109

³ Available online at https://www.usbr.gov/gp/aop/cbt/18cbt_19forecast.pdf (accessed December 13, 2019)

**Table 3:
Reclamation’s Runoff Forecast for Locations within the C-BT Area
April 1, 2019 Forecast of April-July Volume (units in KAF)**

Forecast Point	Chance of Exceeding					50 percent Most Probable (percent of avg runoff)
	90 percent Reasonable Min ^{1/}	70 percent	50 percent Most Probable	30 percent	10 percent Reasonable Max ^{1/}	
Green Mtn. Res	342	362	398	451	471	134
Willow Crk. Res	52	57	67	81	87	120
Lake Granby	209	225	257	299	315	108
Big Thompson River Above Lake Estes	57.5	63.2	75	88.7	94.4	108
Big Thompson River at Canyon Mouth	46.2	70.1	86.4	103	127	101

^{1/} The probability is estimated to be 8 chances in 10 that the actual volume will fall between the reasonable minimum and reasonable maximum.

The coldest temperatures in the project area were recorded in February 2019. Compared to the thirty-year average temperatures, December 2018 and January 2019 were slightly above average as were April, July, August and September 2019. The rest of the water year, temperatures were similar to or, in the case of the period from mid-May through the end of June 2019, slightly below the thirty-year average. By late April the area temperatures began to rise slowly, and snow at lower elevations began to melt. The northern mountains of Colorado showed signs that runoff had begun around the normal time the project experiences the start of runoff. Most locations began to experience slowly rising inflows by late of April. Willow Creek Reservoir reached peak runoff by the middle of May. By early June 2019, the snowpack at higher elevations began to melt. However, with the slightly lower than average temperatures from mid-May to the end of June, inflows to Lake Estes, Granby and Green Mountain did not actually peak until the first or second day of July 2019. The July peaks were about average in magnitude, but that timing was later than usual. In addition, the average runoff flows were higher than normal for the month of June 2019. The runoff season for 2019 was much longer in duration than typical, starting in late April and extending through early August 2019.

Most northern Colorado reservoirs throughout the spring season had below average storage contents. However, with demands for water relatively low through early August, most reservoirs filled and generally remained full starting in June to through late July. The dry and hot weather from early August through September put pressure on those reserves reducing storages to slightly above 50 percent of capacity. Most reservoirs in the area ended WY 2019 higher than they did in the previous year.

System Demands and Deliveries

Northern Water established a quota of 50 percent at the start of WY 2019. At the April 2019 Northern Water board meeting the quota was increased by 20 percent to 70 percent for the rest of WY 2019.

The quota assumed for the AOP 2019 prepared in October 2018 was 70 percent and no adjustments were made throughout the monthly updates to the AOP 2019 during WY 2019.

An accounting summary of the C-BT west slope collection system in WY 2019 shows there were 288,288 acre-feet was made available for diversion to the east slope. Adams Tunnel diversions were 288,724 acre-feet, a difference of 0.15 percent when comparing available collection system diversions versus reported diversions. That percent difference was well within the errors associated with the various measurements for the data used to create the accounting terms summarized in Table 4. The formula for determining the collection system volume available for diversion to the east slope is shown below:

West Slope Collection Made Available for Diversion

$$\begin{aligned}
 &= \text{Natural Inflow (Granby, Shadow Mountain and Grand Lake)} + \text{Windy Gap Pumping} \\
 &+ \text{Willow Creek Pumping} - \text{Change in Storage (Granby, Shadow Mountain, Grand Lake)} \\
 &- \text{Granby Spill} - \text{Granby Scheduled Release} \\
 &- \text{Net Evaporation (Granby, Shadow Mountain, Grand Lake)} - \text{Granby Seepage}
 \end{aligned}$$

Table 4: C-BT West Slope Collection Water Balance. Volume Available for Diversion from West Slope Collection System v. Reported Diversions through Adams Tunnel for WY 2019 (units in acre-feet)

	WY 2019 (acre-feet)
Combined 3 Lakes Natural Inflow	303,026
Willow Creek Pumping	61,822
Windy Gap Pumping	12,538
Combined 3 Lakes Change in Storage	22,359
Granby Spill	13,750
Granby Scheduled Release	33,152
Combined 3 Lakes Net Evaporation	15,583
Granby Seepage	4,255
Volume Available for Diversion	288,288
Reported Adams Tunnel Diversion	288,724
Percent Difference	-0.15 percent

On the east slope, total supplies were compared to total deliveries for WY 2019. Total supplies were calculated to be 217,662 acre-feet and total deliveries were calculated to be 191,792 acre-feet. The percent difference was 5.4 percent which can be explained by delivery system transit losses and measurement error of the terms that went into the calculations. The formula for determining total east slope supplies is shown below:

East Slope Supplies

- = Adams Tunnel diversions + East Slope Priority Water
- Net Evaporation (Carter and Horsetooth Reservoir)
- End of WY East Slope Reservoirs' Change in Storage
- Tridistrict Excess Capacity Account Change in Storage at Horsetooth
- Predetermined/Accounted CBT Delivery Losses

The Predetermined/Accounted C-BT Delivery Losses term in the supplies equation (above) includes any assigned delivery losses in the east slope system. For WY 2019, a 2 percent delivery loss was established for Big Thompson River deliveries from Lake Estes to demands on the river or to Dille Diversion Dam during the CHFC outage period at the end of the water year. Supply releases had to be greater than the requested deliveries by 2 percent to offset the loss and that known difference was subtracted from the supply term in Table 5.

The formula for determining total deliveries is as follows:

$$\text{Total Deliveries} = \text{Total CBT Deliveries} + \text{Total Windy Gap Deliveries} + \text{Eureka Replacement Delivery}$$

The results of the supplies versus east-slope deliveries are shown in Table 5 below.

Table 5: C-BT East Slope Water Balance, Volume Available for Supply v. Reported East Slope Deliveries for WY 2019 (units are acre-feet)

	WY 2019 (acre-feet)
Supply	
Adams Tunnel Diversion	288,724
East Slope Priority Water	10,647
Carter Lake + Horsetooth Reservoir Net Evap	7,473
Total East Slope Reservoir Change in Storage	73,562
Tridistrict Excess Capacity Change in Storage	-650
Predetermined C-BT Delivery Loss	24
Total Supply	217,662
Delivery	
Total C-BT Deliveries ⁴	191,792
Total Windy Gap Deliveries	13,843
Eureka Replacement Delivery	180
Total Deliveries	205,815
Percent Difference (of Total Supply)	5.4 percent

⁴ Includes non-charge water delivered in WY 2019

Maintenance and System Outages

Numerous inspections took place at different facilities during the fall maintenance outage period from late October through early December 2018. Water diversions from the west slope were suspended for about four and a half weeks from early November to early December 2018 to accommodate these activities. West slope diversions were able to resume on December 6, 2018. Full diversions began on December 20, 2018.

The Estes Powerplant conducted annual maintenance on Marys Powerplant for the upcoming WY 2019 season during the fall outage. The Lake Estes Powerplant units 1, 2 and 3 had their annual maintenance performed in succession from January through mid-April 2019. Two units were always available for generation during the Estes Powerplant annual maintenance period.

The Flatiron crew completed the annual maintenance of the Pole Hill Powerplant unit from November 2018 through early December 2018. Annual maintenance of Flatiron Powerplant unit 3 was completed by mid-October 2018 and crews started maintenance again during the WY 2019 in early September 2019. The annual maintenance of units 1 and 2 occurred in succession starting in mid-February 2019 and ending in mid-May 2019. The Charles Hansen Feeder Canal trifurcation wasteway and Big Thompson Powerplant were winterized on October 31, 2018. The annual maintenance of the Charles Hansen Feeder Canal 930 and 550 sections took place during the start of WY 2019 and again during the last three weeks of March 2019.

C-BT water deliveries were met throughout WY 2019 in coordination with outage work. Fall 2018 deliveries to the Charles Hansen Feeder Canal continued as planned, only using water from Carter Lake twice to refill Flatiron Reservoir to meet canal demands during the outage.

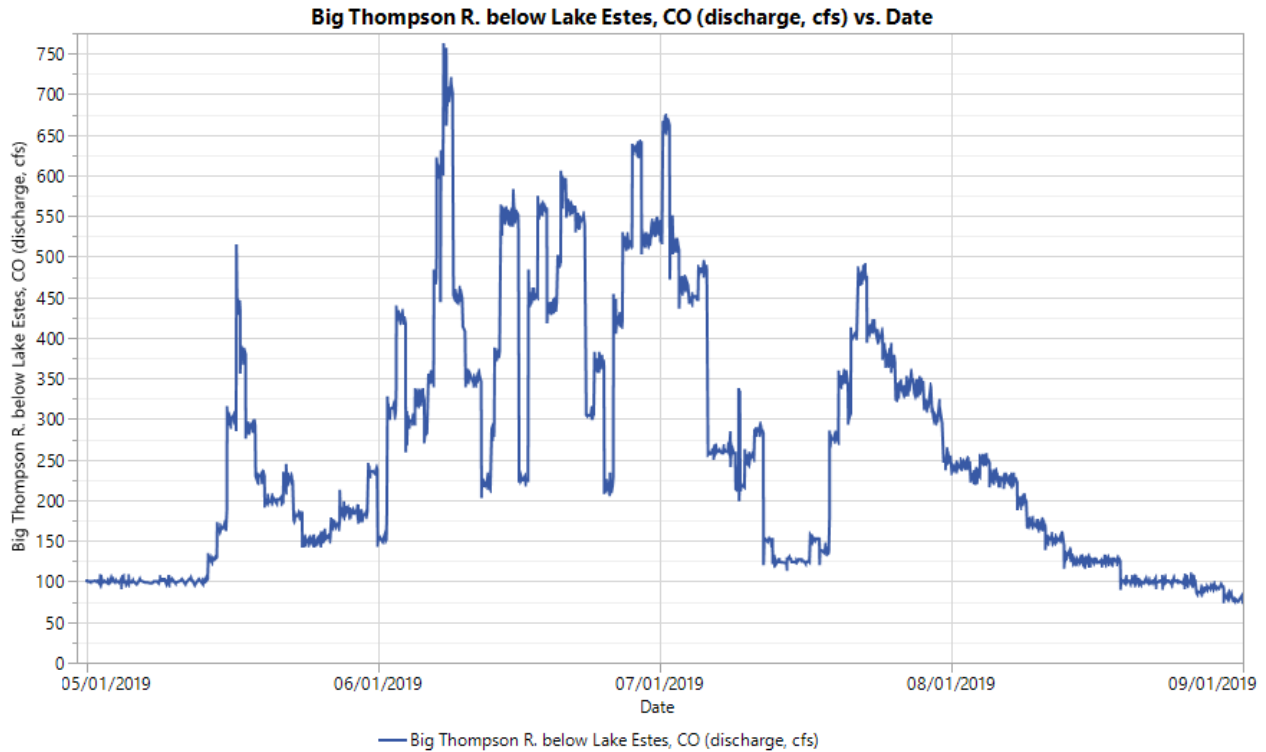
Operations and Outcomes

Typically, starting around the middle of December after fall annual outages are lifted, the project begins to divert water through Adams Tunnel at full capacity to refill Carter Lake and Horsetooth Reservoir for the upcoming season. The refill is planned prior to spring runoff when skim and priority water usually become available in mid to late May through late June to maximize use of skim and priority water by the project. This operation was implemented as planned in WY 2019. Carter Lake Reservoir was first filled by mid-April 2019 and topped off two more times by early July. Horsetooth Reservoir was filled by mid-July 2019.

By very late June, with an average carryover storage at Granby Reservoir to start the water year but greater than average runoff, it was becoming increasingly evident that Granby could spill. By July 2, a spill was clearly going to occur. With both Carter Lake Reservoir and Horsetooth Reservoir at nearly full capacity in early July, and priority water concomitantly available to the project on the east slope, Granby spilled about 12,760 acre-feet in July 2019.

Carter Lake Reservoir was initially filled on April 9, 2019. Pumping to Carter Lake Reservoir resumed on May 13 to refill it by June 4. Adams Tunnel diversions were decreased with the second fill of Carter Lake Reservoir to maximize east-slope skim. Pumping to Carter Lake Reservoir resumed in mid-June and it was refilled a third time by July 5. Horsetooth was filled by July 14 and remained nearly full until the end of July 2019 as project inflows were balanced with demand outflows from storage. These operations minimized the west-slope spill that occurred in 2019.

C-BT operations and the skimming of water from the Big Thompson River through Olympus Tunnel kept daily mean releases from Olympus Dam at or below 708 cfs during runoff. The figure below illustrates the Olympus Dam instantaneous releases during runoff from May through August 2019. The peak instantaneous release from Olympus Dam was 758 cfs, occurring on June 8, 2019.



WY 2019 mean daily release from Olympus Dam at Lake Estes to the Big Thompson River.

C-BT Operations by Facility

Collection System

Willow Creek Reservoir

October through March: Snow accumulation in the Willow Creek basin started with an average fall, then lagged slightly behind average from mid-December through early March and finally surpassed the average condition by early March 2019. The snowpack remained mildly above normal throughout the rest of the winter and during most of the spring through early to mid-June 2019.

Reservoir operations followed standing operating procedures. Willow Creek Reservoir winter draw-down pumping began on October 29th and ended on November 9th. The reservoir was lowered to the winter season pool elevation of 8,118 ft. Winter reservoir release was maintained at 7 cfs for Colorado River fishery maintenance as directed by the Secretary of Interior schedule of release.

April: The first signs of runoff in the Willow Creek watershed began in mid-April 2019. Pumping to Granby also began in mid-April 2019, with one of the two pumps operating.

May: The WY 2019 peak inflow of 653 cfs was reached on May 17, 2019. The Willow Creek Pump Canal ran continuously from April 22 to July 3. Nearly 22,500 acre-feet was pumped from Willow Creek Reservoir to Granby during the month of May.

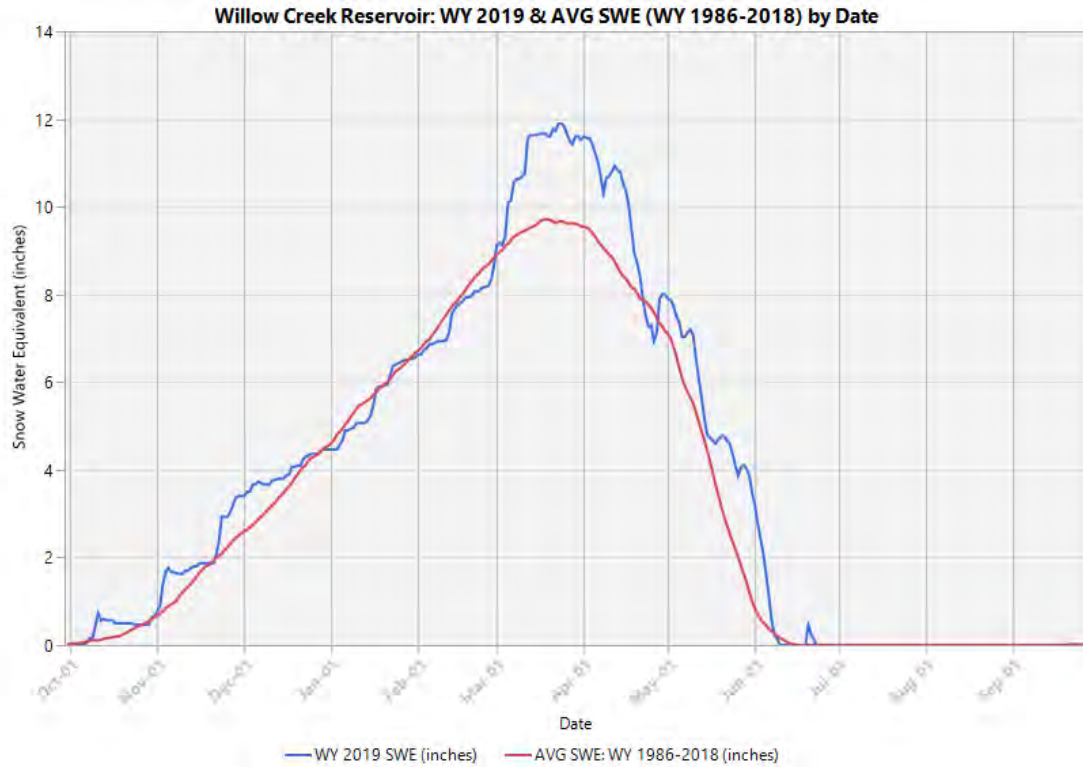
June: Willow Creek pumping continued throughout the entire month of June for a monthly total volume of nearly 25,500 acre-feet. Another slightly smaller runoff peak occurred on June 8 of 622 cfs. Substantial snow accumulation and cooler than average temperatures during May and June resulted in higher runoff volume than anticipated in the April forecast. No bypass flows were required due to the attenuated peak and delayed runoff flows.

June 7: Between 1345 and 1400 hrs on June 7, Northern Water was making a remote gate adjustment at the Willow Creek Reservoir outlet to the Willow Creek Pump Canal. This operation coincided with a lightning strike that knocked out remote control of the gates. Although Northern personnel were dispatched as soon as the issue was identified, the gate opening exceeded the canal capacity and a spill occurred at a location approximately 1,500 feet downstream of the outlet works on the canal before the gates could be manually closed (only one gate could be closed manually, but it was enough to arrest the spill from the canal). Remote control was restored to both gates by the morning of June 8. Only one pump was run while gate control was restored. Both pumps were returned to service as soon as the gate control was fixed on June 8.

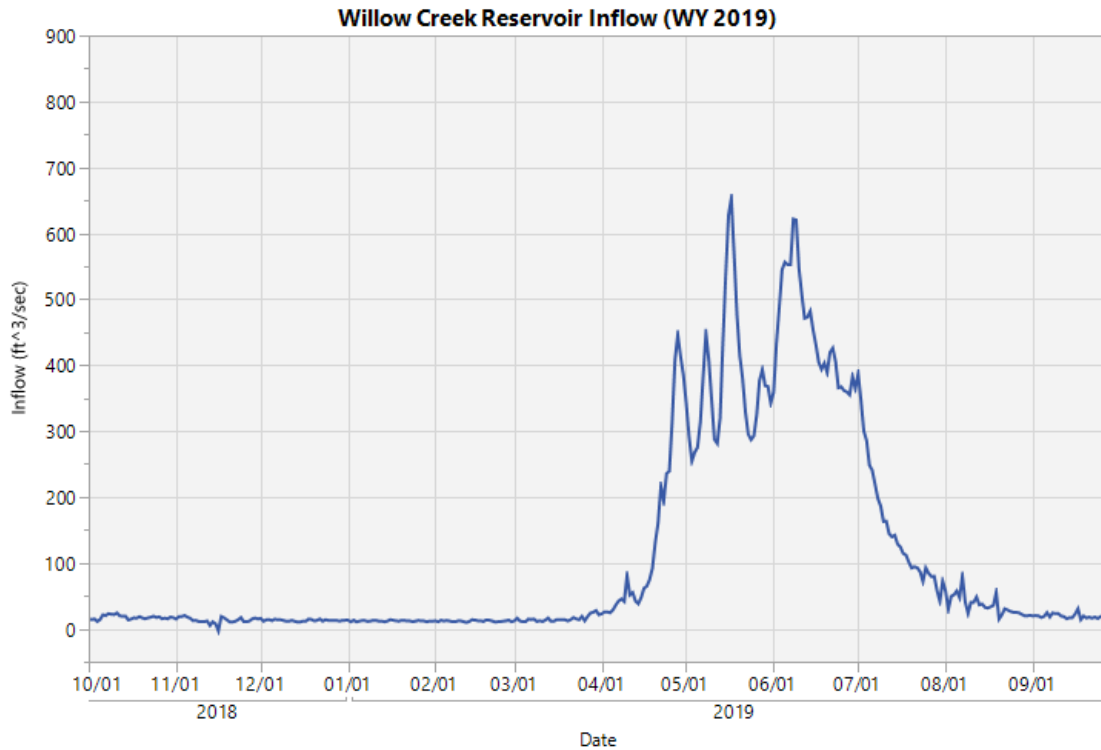
July 3 – July 31: Willow Creek Reservoir discontinued diversion to Granby Reservoir due to lack of available storage at Granby. Willow Creek flow below Willow Creek reservoir reached a peak daily average flow of 181 cfs on July 5. Willow Creek bypassed a total of 5,465 acre-feet during this period. Diversion of Willow Creek Water to Granby Reservoir resumed on July 31.

August through September: Willow Creek diversion resumed on July 31 and continued for the remainder of the water year while maintaining a pool elevation between 8,125 feet and 8,127 feet.

The observed April- July runoff to Willow Creek Reservoir was approximately 67.4 thousand acre-feet (KAF). The April 1 most probable forecast (Table 3 above) was 67.3 KAF.



WY 2019 and 34-year average snow-water equivalent for the Willow Creek Reservoir drainage area.



Inflow to Willow Creek Reservoir during WY 2019.

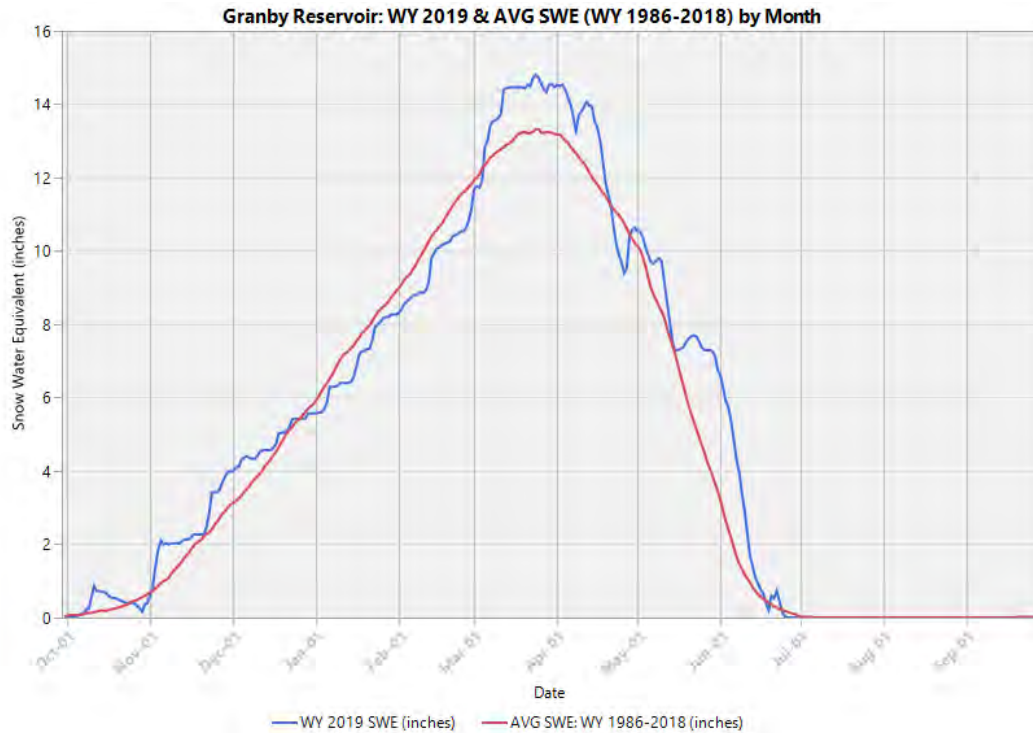
Granby Reservoir and Shadow Mountain Reservoir/Grand Lake:

Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake are located on the Upper Colorado River. Grand Lake and Shadow Mountain Reservoir are hydraulically connected and function as a single body of water with the water surface elevation controlled by Shadow Mountain Dam. Operations maintain water surface elevation between 8,366 and 8,367 feet. The two water bodies provide approximately 1,700 acre-feet of regulatory storage and functions as forebay for Adams Tunnel and an afterbay for the Farr Pump Plant. The Farr Pump Plant moves water from Lake Granby Reservoir to Shadow Mountain Reservoir as needed to augment Adams Tunnel diversion of Shadow Mountain Reservoir and Grand Lake native flow. During spring runoff, native flow usually exceeds Adams Tunnel diversion and excess water is released to the Colorado River for storage within Granby Reservoir. During WY 2019, Shadow Mountain Dam maintained minimum flows to the Colorado River and maintained water surface elevation as described within the Standing Operating Procedures.

Unless otherwise noted, the balance of this section emphasizes Granby Reservoir operations which are considerably more variable and notable than Shadow Mountain and Grand Lake.

October through January: The carryover content from WY 2018 for Granby Reservoir was 463,833 acre-feet, 111 percent of the thirty-year average (416,750 acre-feet). At full capacity Granby Reservoir is 539,758 acre-feet. The reservoir content remained above the thirty-year average content until January 6, 2019.

January through May: Granby snow accumulation was generally higher than average from the start of the water year through mid-December 2018. Accumulation then lagged slightly behind average until early March 2019 whereupon accumulations were higher than average through June 2019. As diversions through the Adams Tunnel resumed in the second week of December 2018, Granby Reservoir content began to fall steadily. The reservoir content dropped to 332,372 acre-feet on April 21, 2019 before it began a steady rise. Adams Tunnel diversions remained at or near full capacity from early December until the Charles Hansen Feeder Canal (CHFC) outage on the east slope in early March. Diversions were reduced during the March outage to the Flatiron Unit 3 pumping rate as the first fill of Carter Lake Reservoir continued during the CHFC outage. Generally, WY 2019 diversions were reduced from maximum capacity to the CHFC 550 Section capacity after each of the three Carter Lake Reservoir fills and pumping was suspended.



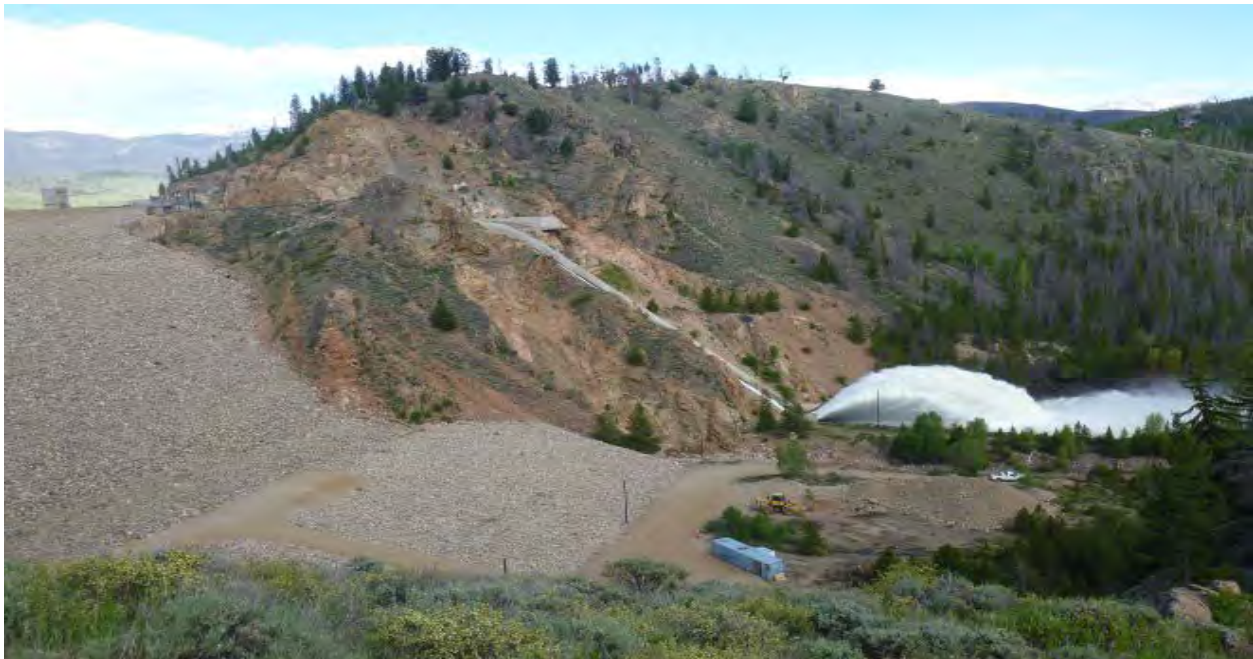
WY 2019 versus 34-year average snow-water equivalent for the Granby Reservoir drainage area.

April/May through June: Throughout April, conditions for both the west and east slopes indicated that the potential for a spill at Granby was low even with slightly above average snowpack. A snow event in late April, a smaller event in early May and another in mid-May added to the accumulation of snow. On June 1, Granby, Horsetooth and Carter Lake Reservoirs' combined storage was only 626 KAF and at the 54th percentile for the combined storage for the preceding 50 years, continuing to indicate a spill at Granby was unlikely. Cooler than average temperatures prevailed from late May into early June and the above average runoff forecast for April through July on both the west and east slopes was not materializing. Adams Tunnel diversion dropped below capacity in early June, as the second fill of Carter Lake Reservoir occurred and continued below capacity most of June 2019, to take advantage of east slope skim operations and the available priority water for the project. Full Adams Tunnel diversions were not resumed until late June.

At the end of April, the likelihood of Granby Reservoir spilling was low enough to risk pumping from Windy Gap Reservoir into Granby Reservoir. By May 8, 2019 the pumping operation from Windy Gap Reservoir into Granby Reservoir had commenced. It continued until June 6. After a break, pumping resumed June 19 and continued through June 24 as runoff slowed. Toward the end of June, temperatures and runoff increased, peaking for the water year in early July. Adams Tunnel diversions were returned to maximum capacity for three days at the end of June to minimize west slope spill but as runoff increased on the west slope at the end of June and into early July, so did runoff on the east slope. East slope priority water become available to the project in late June and Adams Tunnel diversions were reduced to take advantage of all available priority water. The likelihood of a spill at Granby rapidly increased from very late June into early July. By July 2, a spill was certain.

The volume of Windy Gap water pumped for the water year was 12,539 acre-feet. Some of that volume was delivered to customers prior to the Granby spill that occurred in July. A total of 11,789 acre-feet of Windy Gap water was spilled in WY 2019.

The observed April-July runoff to Granby and Shadow Mountain Reservoirs and Grand Lake was approximately 259 KAF. The April 1 most probable forecast (Table 3 above) was 257 KAF.



Granby Reservoir spill; approximately 2,400 cfs, June 13 through June 21, 2015.

July through September: By mid-July the combined storage of Granby, Horsetooth and Carter Lake Reservoirs was 803 KAF, over 99 percent of their combined available capacity. Adams Tunnel diversions were reduced to match Big Thompson River and Horsetooth Reservoir demands because all available storage was filled. By July 25 enough space had opened in Carter Lake Reservoir to resume pumping there. Adams Tunnel diversions were returned to near capacity at that time. Pumping to Carter Lake Reservoir was shutdown for the season in late August.

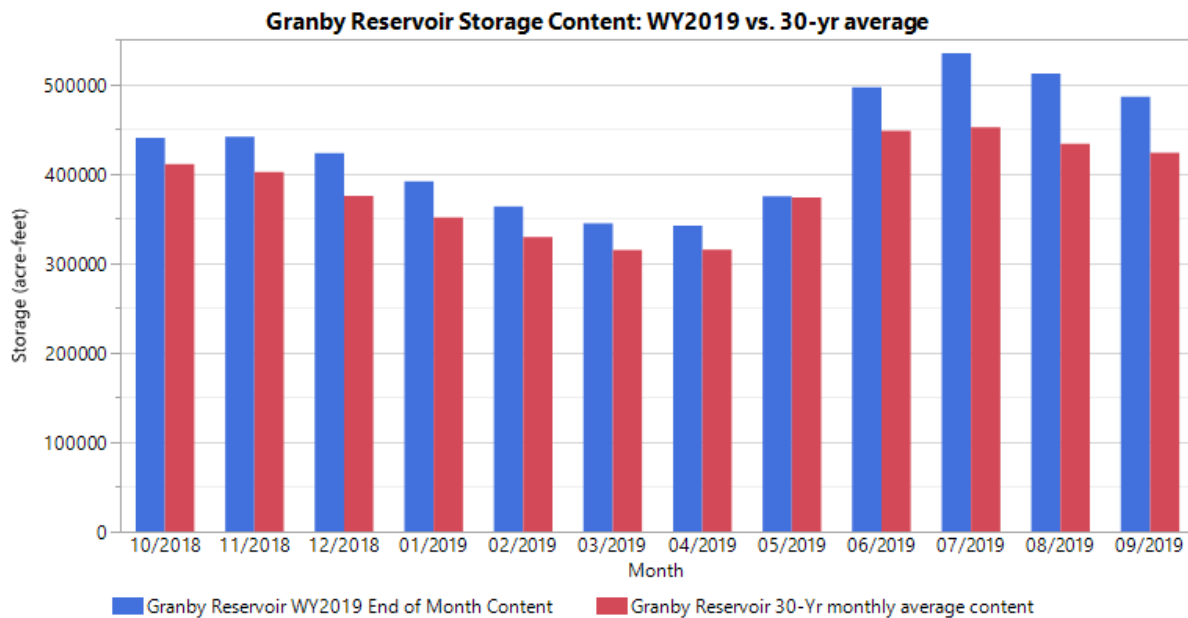
Farr Pump Plant pumping operations were limited to a total of 275 acre-feet from June 2 to July 22 due to the timing of events in WY 2019. Runoff on the west slope was greater than average in June 2019 and did not peak until early July. Sufficient natural inflow to Shadow Mountain Reservoir and Grand Lake existed to meet the required diversions for that period, given the availability of east slope skim water for power generation, east slope priority water and east slope reservoir storage space. Granby spilled a total of 12,760 acre-feet from July 5 through July 23. All but 971 acre-feet of the spill volume was Windy Gap water.

The WY 2019 clarity season was one of the most successful since the start of the Three Lakes adaptive management effort. Grand Lake clarity operational plan for WY 2019 was similar to the successful plan of WY 2018. A settling period in July was planned for Shadow Mountain Reservoir and Grand Lake followed by diverting through Adams Tunnel a relatively large volume of water throughout the remainder of the clarity season. Flow rates through Adams Tunnel began an unplanned slow decline

in early August due to aquatic plant and debris build up on the trash rack at West Portal. Diversions were shut down for four hours on August 14 so that the trash rack could be cleared. The trash rack was cleaned a second time in early September with no adjustment to diversions. The second cleaning was more successful than the first attempt. Although the clarity plan, after an initial Shadow Mountain Reservoir and Grand Lake settling period in July, was to reduce Adams Tunnel diversions on weekends and return to near capacity on weekdays, the large runoff on the west slope delayed the ability to vary Adams Tunnel diversions until mid-August. The delay probably had little impact to WY 2019 clarity, since the WY 2019 clarity season was even more successful than the WY 2018 season. For the clarity season, Adams Tunnel diversions totaled 59,865 acre-feet which is one of the largest volumes since the adaptive management process began.

A full description of the planned clarity operations and actual clarity operations for the WY 2019 clarity period can be found in the 2019 Grand Lake Clarity Adaptive Management Final Report.

September: Even after the clarity season ended on September 11, diversions through the Adams Tunnel were still cycled between approximately 500 cfs and 300 cfs until the end of the water year, continuing the weekday and weekend diversion rates used during the clarity season. This operation was found to help power generation economics by moving more water when energy demands and values were greater during the work week. Granby Reservoir finished WY 2019 with 485,699 acre-feet of water in storage.



Granby Reservoir storage content during WY 2019 versus the 30-year average.

East Slope

Adams Tunnel, Marys Lake and Lake Estes

November-January: Like previous years, the months of November and December 2018 brought multiple inspections and maintenance projects for the C-BT. All maintenance and inspection work

were completed without need for additional time. Marys Lake Powerplant Unit 1 underwent its annual maintenance and Adams Tunnel had its annual inspection. Lake Estes was lowered slowly in early November for a dive inspection of the river slide gate on November 14. The stilling basin below Olympus Dam was also inspected on the same day.

December 6: Water began to flow through the Adams Tunnel once again to refill Marys Lake and Lake Estes.

December 10: The level at Marys Lake and Lake Estes reached normal operational pool.

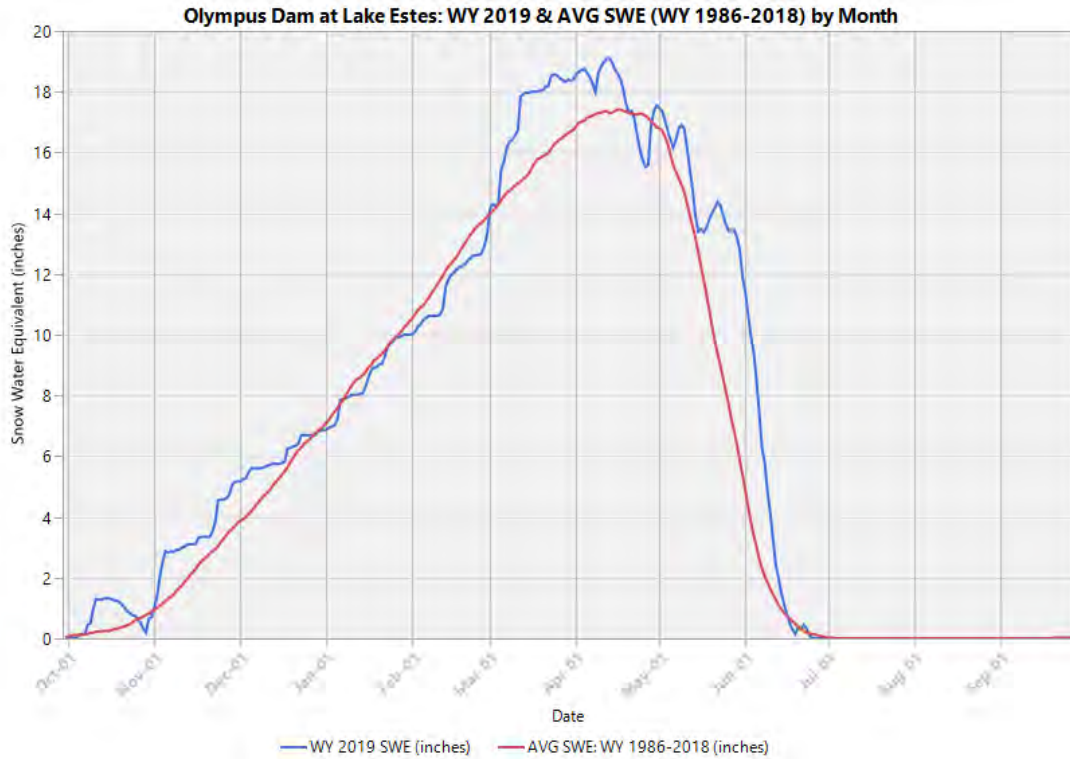
December 20: The C-BT maintenance season came to an end as the Adams Tunnel flow reached 550 cfs. Flatiron Unit 3 pumping to Carter Lake Reservoir began the previous day on December 19 at 1100 hours. Diversions through the Adams Tunnel continued at or near capacity, with minor interruptions, until April 9, 2019 with the first fill of Carter Lake Reservoir for the water year.

January 7: The annual maintenance of Estes Powerplant Unit 1, 2 and 3 began, starting with Unit 1. The maintenance of the three units occurred from January 7 to April 19 and two units were always available for generation during maintenance period.

February-March: The snowpack above Olympus Dam started the water year slightly above average but by January 2019 the snowpack had dropped below the 34-year average. However, by March 2019 that trend had reversed and snowpack remained above average for nearly the rest of the season. Flatiron switch yard work occurred on February 20 and the Charles Hansen Feeder Canal 930 and 550 Section outage occurred across three weeks in March 2019.

April: A mild warming trend in April 2019 began to melt some of the snow at the lower elevations toward the end of the month. The inflow to Lake Estes gradually increased during the second half of April. On April 9, the first fill of Carter Lake Reservoir was completed for the water year. Adams Tunnel diversions were reduced slightly and directed to Horsetooth Reservoir.

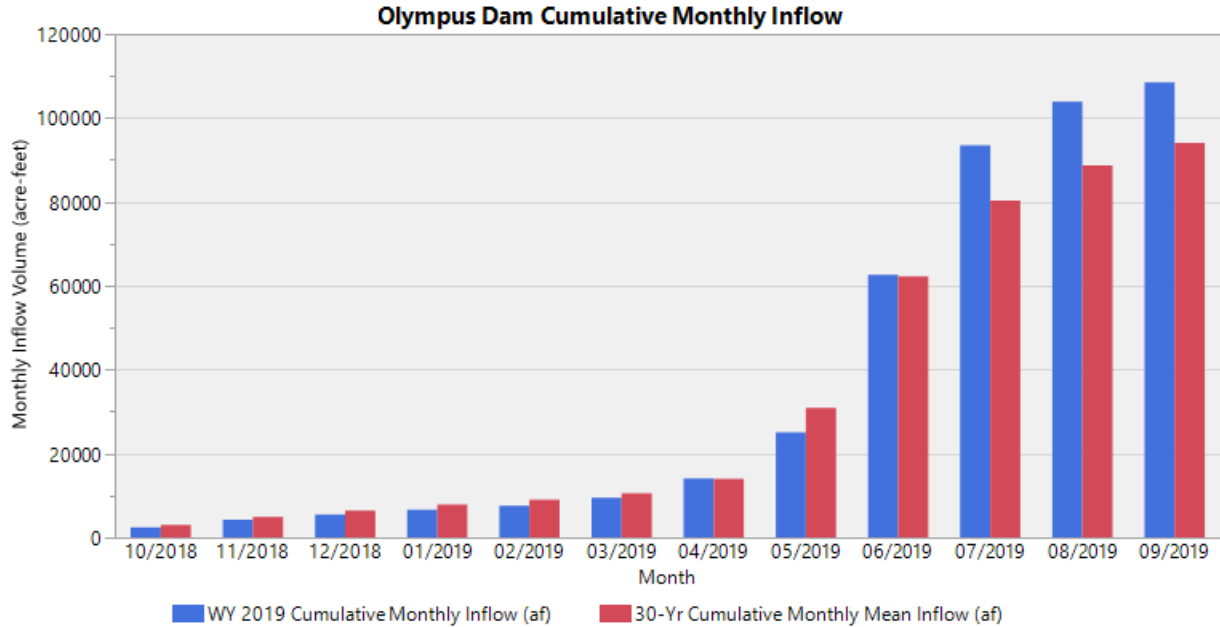
May: The last three weeks of May were cooler than normal over the east slope. The natural inflow to Lake Estes remained low throughout the month, never getting above 350 cfs. For the month of May, the inflow to Lake Estes reached a daily average peak flow of 338 cfs on May 17. More runoff and higher peaks were yet to come.



WY 2019 and 34-year average snow-water for the Olympus Dam drainage area.

May 13: Wind River skim operations began for the water year. A total of 672 acre-feet for the water year was skimmed for power generation at Marys and Estes. In addition, Adams Tunnel diversions were brought back up to near capacity as pumping to Carter Lake Reservoir resumed on May 13 to fill the reservoir for a second time in WY 2019.

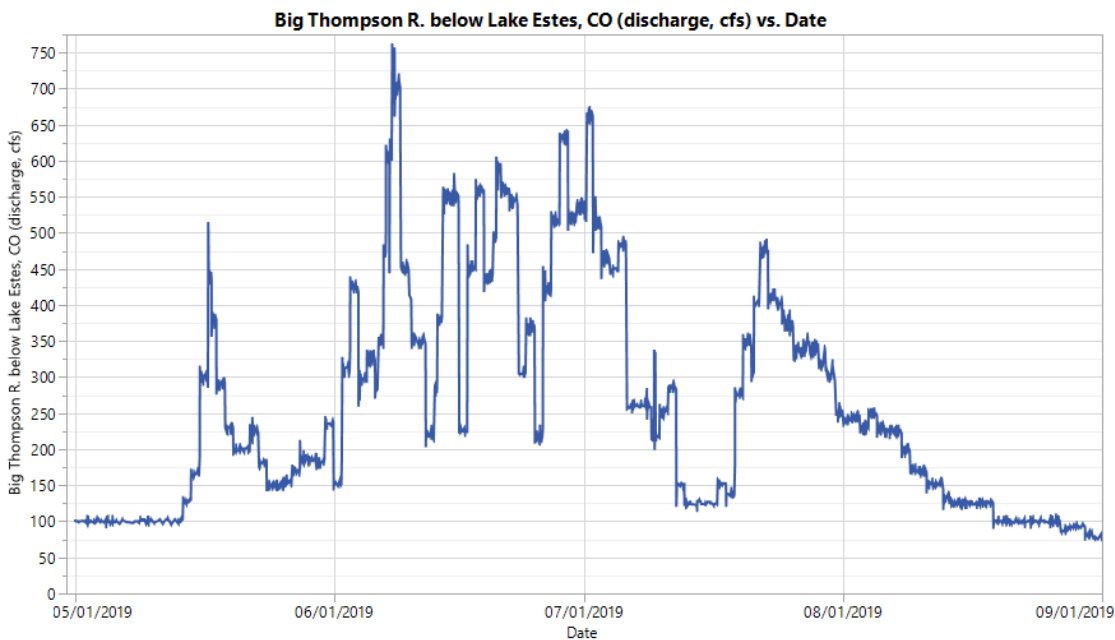
June: Temperatures over the Front Range remained slightly below normal during June 2019 with monthly precipitation being slightly above normal. Although snowpack remained through June, the cooler-than-average temperatures muted June runoff, but produced a larger-than-average monthly runoff volume.



Computed cumulative native inflow for Lake Estes during WY 2019 versus 30-year average.

June 4: Adams Tunnel diversions were reduced as Carter Lake Reservoir achieved a second refill for WY 2019. The reduction in diversions created capacity in Olympus Tunnel for more skim water through the Lower Power Arm of the project. Olympus Tunnel remained at capacity for nearly the entire month of June.

June 8: The maximum daily release from Olympus Dam to the Big Thompson River for the water year occurred on June 8 with a flow of 709 cfs. East slope priority water first became available to the project on the same day.



Releases from Olympus Dam to the Big Thompson River from May – August 2019.

July-September: For WY 2019, the peak daily flow on the Big Thompson River above Lake Estes occurred on July 1. The peak average daily flow was 955 cfs. This flow rate is not particularly large in magnitude but is significant in terms of how late the peak flow occurred during the runoff season. Average daily inflows to Lake Estes remained above 225 cfs throughout the month of July. Adams Tunnel diversions were once again increased to capacity in the last third of July as pumping to Carter Lake Reservoir resumed. These high flow diversions were interrupted temporarily on July 24 when the West Portal of Adams Tunnel was placed under clearance and Gate 2 at West Portal was repaired. The repair was successful, and diversions returned to capacity by the end of the same day.

The observed April - July runoff to Lake Estes was approximately 84 KAF. The April 1 most probable forecast (Table 3 above) was 75 KAF.

Lower Power Arm, Carter Lake and Horsetooth Reservoir

November: The Big Thompson Powerplant and Trifurcation Wasteway were winterized on October 31, 2018, just prior to the annual maintenance season which began on the Lower Power Arm on November 4, 2018. Pole Hill Powerplant underwent its annual maintenance in November. Flatiron Unit 3 was run twice in generation mode to refill Flatiron Reservoir so that the Charles Hansen Feeder Canal could meet C-BT demands and maintain sufficient flows to keep the canal from freezing during the November outage season.

December: The Pole Hill Powerplant annual maintenance was completed on schedule and its functional tests were performed on December 13 and 14. Generation began for the water year at 1200 hours on December 14.

December 19: Pumping to Carter Lake Reservoir from Flatiron Powerplant Unit 3 commenced at 1100 hours.

December 20: Both Adams Tunnel diversions and Olympus Tunnel were set to capacity.

January and February: Project operations continued at capacity throughout January. In preparation for Flatiron Powerplant Unit 1 annual maintenance beginning on February 20, Flatiron Unit 3 pump was shut down at 0700 hours on February 19 for switchyard work. Unit 3 pumping resumed at 1615 hours on the same day. While Unit 3 was down on February 19, releases from Flatiron Reservoir to the CHFC 930 and 550 Section were increased, reaching 500 cfs by 0745 hours. This operational procedure often is followed during temporary interruptions to Unit 3 pumping to avoid a reduction of Adams Tunnel diversions and interruption of power generation for the day. Between 1100 hours and 1130 hours, ECAO water scheduling was notified that the Eden Valley siphon on the 550 Section was actively spilling water from the canal. At 1130 hours releases to the CHFC were reduced to 450 cfs, while personnel were dispatched to gather more information about water levels in the 550 Section. At 1230 hours releases to the CHFC were reduced to 400 cfs. At 1445 hours releases were reduced to 350 cfs. At 1500 hours they were reduced again from 350 cfs to 250 cfs. At about 1815 hours the water surface elevation near the Eden Valley siphon dropped sufficiently to break the siphon (interrupt siphoning) and the spill ceased. The duration of spill was estimated to be from 1000 hours to 1815 hours at a rate of approximately 210 cfs, totaling about 143 acre-feet.⁵ Unit 3 resumed pumping to

⁵ The rate was probably less than 210 cfs for the last couple of hours of the spill so the 143 AF estimate should be considered a maximum volume for the spill.

Carter Lake Reservoir on that same day, February 19, at 1630 hours and releases from Flatiron Reservoir were reduced to 100 cfs by 1700 hours. Adams Tunnel diversions were reduced from planned rates on February 20 and February 21 as information about the siphon spill was collected and reviewed. By February 22, Adams Tunnel diversions and Olympus Tunnel were back to capacity.

Weekly CHFC algae treatments resumed on February 25, 2019 by Northern Water and continued throughout the remainder of the water year. The next discharge measurement on the 550 Section by the State of Colorado was on March 31, 2019. A shift of -0.11 feet was applied on the same day indicating the algae growth issue in the CHFC had been corrected.

Adams Tunnel diversions were again lowered on February 28 for a scheduled CHFC 930 and 550 section outage to begin on March 1, however a winter storm moved into the area which would have precluded any work in the canal during the first week of the outage so the canal outage was moved back one week and the system was brought back up to capacity by the end of the day on March 1.

The following information provides additional background and understanding about the Eden Valley siphoning action:

Recent historical operations of the CHFC 550 section indicated that canal capacity had been reduced from its design flow of 550 cfs to 515 or 520 cfs. ECAO has collected instantaneous rating table shift data for the gage on the CHFC 550 Section since February 2011. In addition, the State of Colorado has rating table shift data for the site back to November of 2001 and those were provided to ECAO on January 3, 2020.

On February 4, 2019, the State of Colorado measured flows at the gage on the CHFC 550 Section and applied a rating table shift of -0.81 feet. The gaging contract between USBR and the State of Colorado stipulates that measurement(s) notes recorded by the State of Colorado will be provided to USBR after each discharge measurement. No documentation of notes regarding the February 4 measurement was located within ECAO records prior to the preparation of the 2019 AOP. However, all measurement notes were supplied by the State of Colorado after ECAO submitted a measurement data request to the state. The request and the fulfillment of the data request took place on January 3, 2020, for the development of the 2019 AOP. The February 4, 2019, -0.81 foot shift to the rating curve was the second largest shift ever applied on the 550 Section gage for the period of data available for analysis. The largest shift was -0.88 feet and was based on a discharge measurement made on April 9, 2011. The measurement notes associated with April 2011 discharge measurement are "*Heavy algal growth throughout Msmt. [measurement] section.*". The measurement notes accompanying the February 2019 discharge measurement are "*Algal growth has significantly increased since the last Msmt. [measurement on January 15, 2019]. Heavy algal growth on canal slopes.*".

In layman's terms, the -0.81 foot shift means that given a measured stage, one must subtract 0.81 feet from the stage and then look up the flow rate on the rating table corresponding to the reduced stage. This flow rate is the amount flowing in the canal for the observed stage. Looking at it another way, one could look for a desired flow, say 500 cfs, in the rating table, and review its corresponding stage. Then the -0.81 foot shift would be subtracted (-1 * -0.81, or add 0.81 feet) to determine the actual stage required to pass that flow rate.

As presented within the discharge measurement notes, negative shifts are an indication of algal growth in the CHFC. Generally, the larger the shift, the greater the growth issue. Typically, the canal is treated weekly to control algal growth during periods the canal is actively being used to deliver water to Horsetooth Reservoir. The treatment has historically been performed by Northern Water Conservancy District. No documentation of canal treatment was located within ECAO records for the period of December 19, 2018 through February 19, 2019.

In retrospect, the expectation that the canal capacity was 515 cfs was incomplete. There was a specific maximum stage without spilling. The flow rate associated with that stage varies depending on the roughness of the canal, which is affected by algal growth and is represented by the rating table shift. With the rating table shift of -0.81, the canal capacity was reduced to approximately 420 cfs. When 500 cfs was put in the canal, the emergency siphon at Eden Valley was activated and a portion of that flow was siphoned out of the canal to avoid overtopping and destruction of canal infrastructure. Scheduling procedures have been revised to directly consider stage limitations instead of flow limitations and a further reduction in emphasis on the flowrates used to identify canal sections (e.g. 550-Section, 930-Section) accompanies these efforts. Additionally, facility review of the “break elevation” of the siphon is ongoing. It seems extreme to require the canal flow be reduced by half to break the siphon once it has activated.

March and April: Diversions from the west slope were reduced to match the pumping rate of Flatiron Unit 3 to Carter Lake Reservoir during the CHFC 930 and 550 Section outage from March 8 through March 29.

April 2: C-BT skim operations for the Lower Power Arm began diverting skim water into Olympus Tunnel.

April 9: Carter Lake Reservoir filled, and Unit 3 pumping ceased. Adams Tunnel diversions were reduced to match the CHFC 550 Section capacity. Horsetooth Reservoir continued to fill.

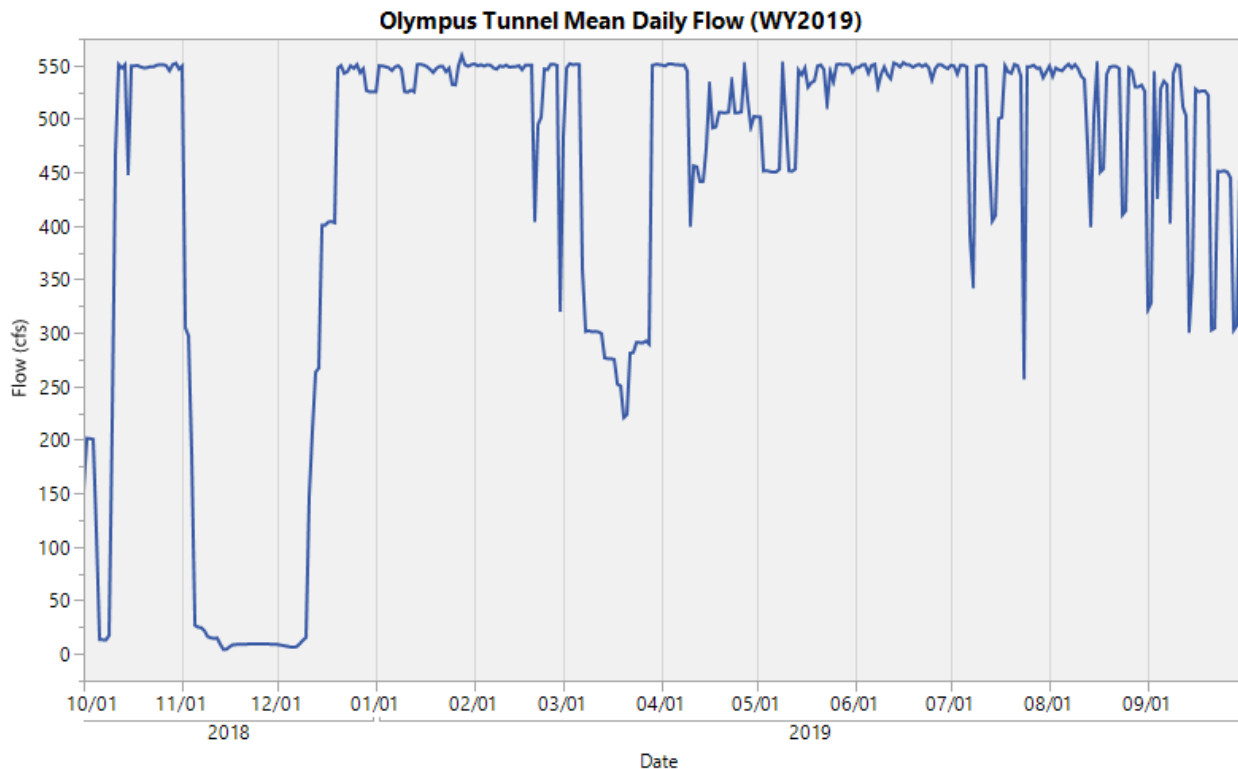
April 15: Functional testing of Flatiron Powerplant Unit 1 ended, and Unit 2 annual maintenance began.

April 25: Dille Tunnel diversion of Big Thompson River water resumed. The Big Thompson Powerplant came online.

May: Olympus Tunnel skim of excess Big Thompson River flows continued until pumping to Carter Lake Reservoir resumed in the middle of May. Gains on the Big Thompson River below Olympus Dam declined in early May but increased by the middle of the month allowing for Dille Tunnel skim to feed generation at Big Thompson Powerplant once again. Generation continued at Big Thompson Powerplant throughout much of the remainder of the water year. The annual maintenance of Flatiron Powerplant Unit 2 was completed. Both Unit 1 and 2 were available for generation by May 22.

May 13: Pumping to Carter Lake Reservoir resumed on May 13, 2019. The Adams Tunnel diversions were increased to capacity by May 15 and continued near capacity until June 3. Olympus Tunnel mirrored Adams Tunnel for the period.

May 15: Big Thompson Powerplant came online again as runoff increased throughout the month and Dille Tunnel skim water once again became available. The Powerplant continued generation until September 22, 2019 using whatever skim water was available to the project.



Olympus Tunnel mean daily flow during WY 2019.

June: With the second fill of Carter Lake Reservoir for the water year in early June, Adams Tunnel diversions were reduced to take full advantage of skim water for power generation in the Lower Power Arm of the project. Olympus Tunnel remained at full to near-full capacity throughout the month of June. The first east slope priority water became available for project use in mid-June and pumping to Carter Lake Reservoir resumed a few days after that.

June 14: East slope priority water became available and was diverted into Olympus Tunnel and through the Lower Power Arm of the project.

June 17: Pumping to Carter Lake Reservoir resumed as the project began to refill the lake for the third time in WY 2019.

June 26: East slope priority water was diverted through Dille Tunnel for the first time in the water year.

July-September: The C-BT project moved out of priority on the east slope toward the middle of July, having diverted and stored 10,647 acre-feet. Most of the priority water became available to the project in July, later than typical. The majority of the priority water was moved to Horsetooth Reservoir (6,343 acre-feet). The project often has issues with balancing the priority water equally between Horsetooth and Carter Lake Reservoir because the availability of east slope priority water is

not often known more than one day ahead of time. Still, 4,304 acre-feet of priority water was delivered to Carter Lake Reservoir, which was more than many previous years.

Pumping to Carter Lake Reservoir ceased the first week of July with its third fill of the water year. Horsetooth Reservoir was filled in mid-July, the first time it had filled since June 2017. Horsetooth Reservoir remained near capacity throughout the rest of July. Pumping to Carter Lake Reservoir resumed by the end of July and continued through the end of August. Olympus Tunnel skim water for power generation in the Lower Power Arm continued until late September. Dille Tunnel skim water for generation at Big Thompson Powerplant continued until mid-September.

July 6: Carter Lake pumping ceased with the third fill of Carter Lake Reservoir for the water year.

July 12: C-BT project moved out of priority on the east slope.

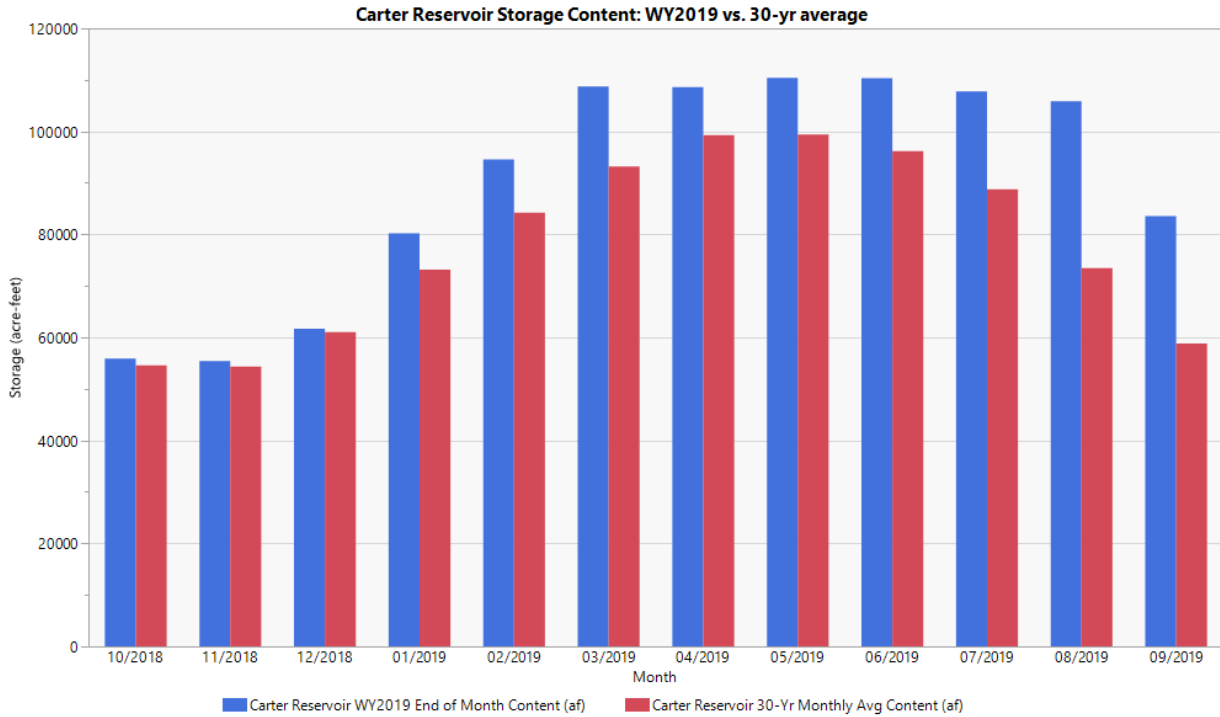
July 13: The maximum storage of Horsetooth Reservoir was achieved with 156,042 acre-feet.

July 25: Pumping to Carter Lake Reservoir resumed. Demands exceeded the pump supply by August 15, preventing the fourth fill.

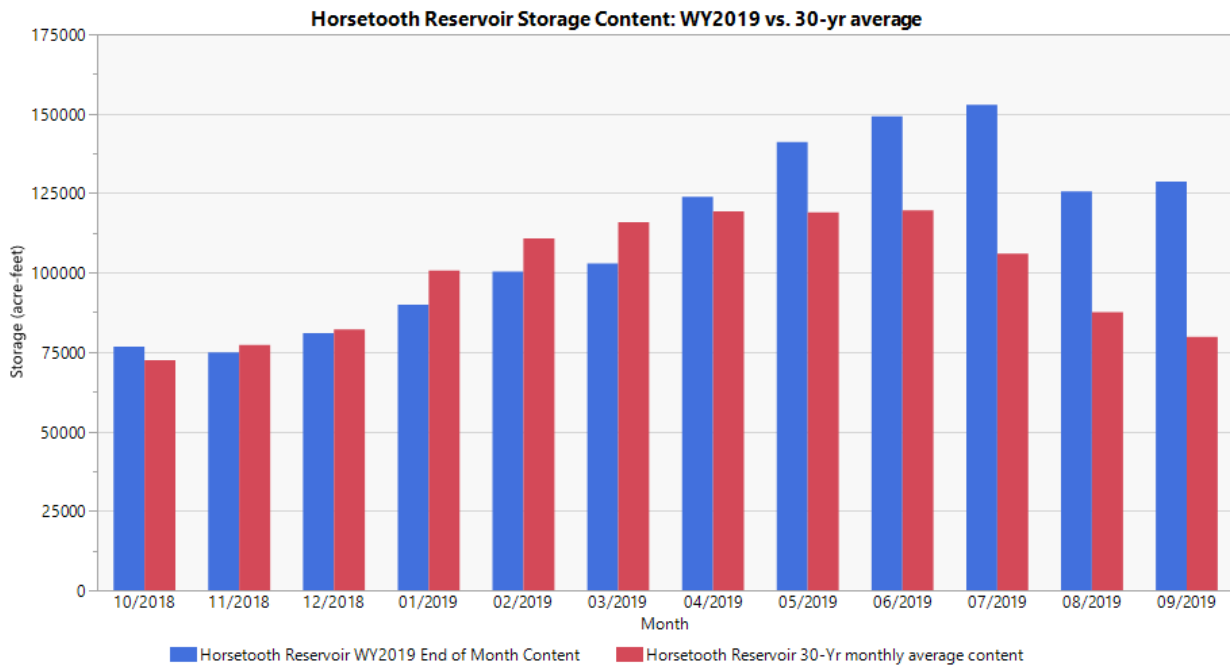
Throughout WY 2019: Carter Lake Reservoir and Horsetooth Reservoir elevations supported all boat ramps during the recreation season. Sufficient supplies met all water deliveries for the water year. A total of 131,259 acre-feet were delivered to Carter Lake Reservoir during the water year; 150,324 acre-feet were provided to Horsetooth Reservoir and customers along the CHFC 550 Section. Carter Lake and Horsetooth Reservoir ended the water year with high storage contents; Carter Lake Reservoir had 83,552 acre-feet in storage and Horsetooth Reservoir had 128,654 acre-feet in storage at the end of the water year. Horsetooth Reservoir's storage was the fourth largest end of water year storage in the last forty years.

For WY 2019, a total of 22,813 acre-feet were skimmed through Olympus Tunnel for generation on the Lower Power Arm of the project before being returned to the Big Thompson River, primarily through the Big Thompson Powerplant. A total of 30,322 acre-feet were skimmed through Dille Tunnel for generation at the Big Thompson Powerplant.

The Big Thompson Powerplant used 61,826 acre-feet for generation making WY 2019 one of the better seasons at that powerplant since 2008.



Carter Lake Reservoir storage content during WY 2019 versus its 30-year average.

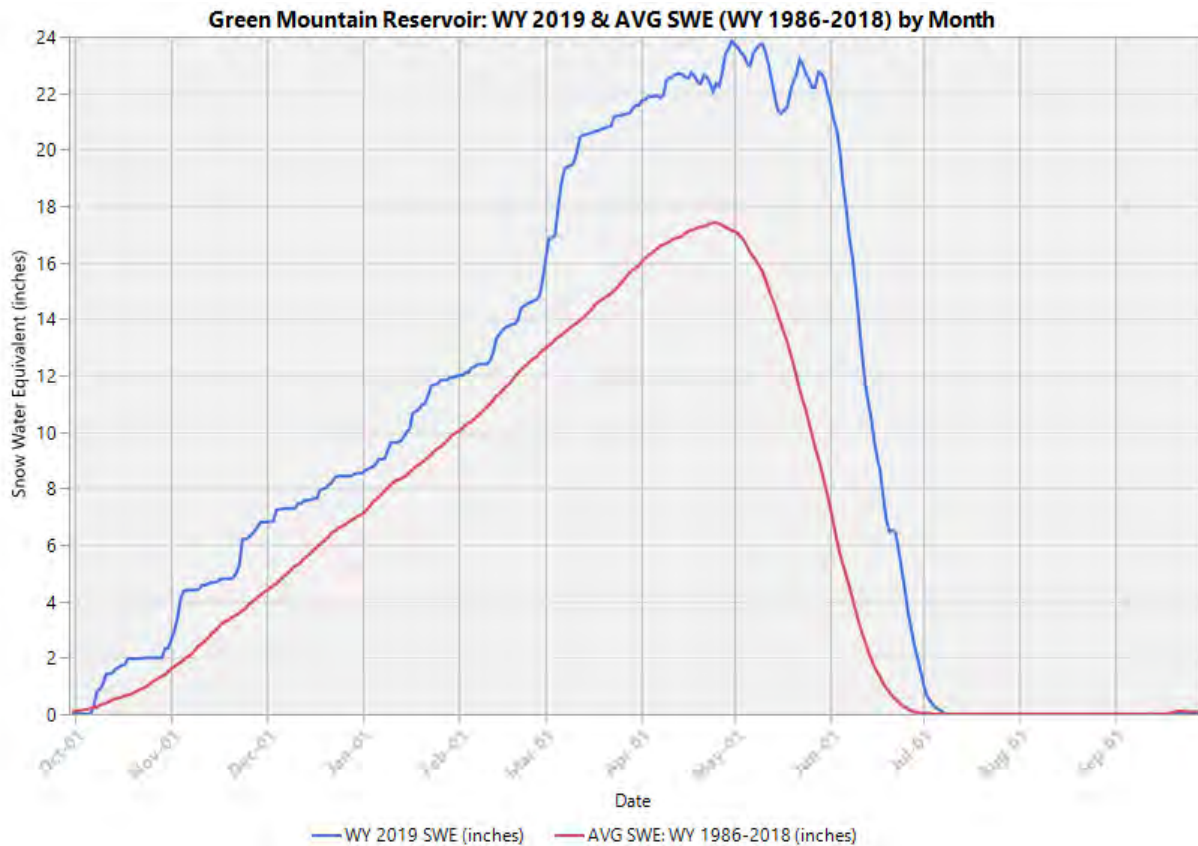


Horsetooth Reservoir storage content during WY 2019 versus its 30-year average.

Green Mountain Reservoir

Climate and Hydrology WY 2019: Hydrologic conditions within the Upper Colorado River basin challenged Green Mountain Reservoir operations during the winter delivery season. Above average

precipitation in October followed five months of well-below-average precipitation. With little remaining HUP storage for release and below-average temperatures, main stem Colorado River flow remained well below normal from October through March. October precipitation resulted in early winter snowpack. March snow accumulation added nearly 5 inches of snow water equivalent and accounted for 25% of the total accumulation for the year. Because of cool spring temperatures, snow continued to accumulate until June. Peak snow accumulation occurred on April 15, 2019, approximately 135% above the seasonal average accumulation. The April 1 runoff forecast projected an undepleted runoff volume to Green Mountain Reservoir of 398 KAF, approximately 153% of normal.



WY 2019 and 30-year average snow-water equivalent for the Green Mountain Reservoir drainage area.

Below-normal temperatures and above-normal precipitation resulted in a substantial delay in snow melt runoff. Snow water equivalent remained above 130 percent of the seasonal average accumulation till June 1. Average daily inflow to Green Mountain peaked at 3,150 cfs on July 2, 2019. The total observed April-July runoff was 389 KAF, 2 percent (9 KAF) less than the April 1 forecast for the most probable plan. Total April-July runoff volume was 150 percent of the median April-July runoff volume.

Cooler and wetter climate within the east slope reduced demand for Blue River water provided by Denver Water and Colorado Springs Utilities. South Platte Basin snow accumulation peaked at 120 percent of seasonal average accumulation. Dillon Reservoir obtained a fill, storing 78.8 KAF. Denver

Water and Colorado Spring Utilities April-July east-slope diversion was 7.4 KAF, only 20 percent of normal.

The cool and wet weather conditions were followed by abnormally dry and warm climate conditions. Mainstem Colorado River flow remained well above average during snowmelt runoff. The Colorado River at Cameo reached a runoff peak on July 2, 2019, the latest recorded peak in 85 years of record. Well-below average precipitation and well-above average temperatures started in July and continued for the remainder of the water year. The Colorado State Engineer placed the Shoshone Powerplant Water Right Call on August 23, 2019. This was earlier than previous years with similar snow accumulation.

October through April WY2019 Delivery Operations: Green Mountain Reservoir storage delivery for October was greatly impacted due to the unusually dry conditions in WY-2018. HUP delivery to the Grand Valley was exhausted by October 1. HUP storage water for other purposes contained only 1.2 KAF for the start of the water year. Green Mountain Reservoir supported a temporary water exchange for 469 acre-feet in October for stream restoration work on the Williams Fork River. Green Mountain Reservoir stored and delivered 73 acre-feet for the Colorado River Water Conservation District for the excess capacity Moser Ditch Contract.

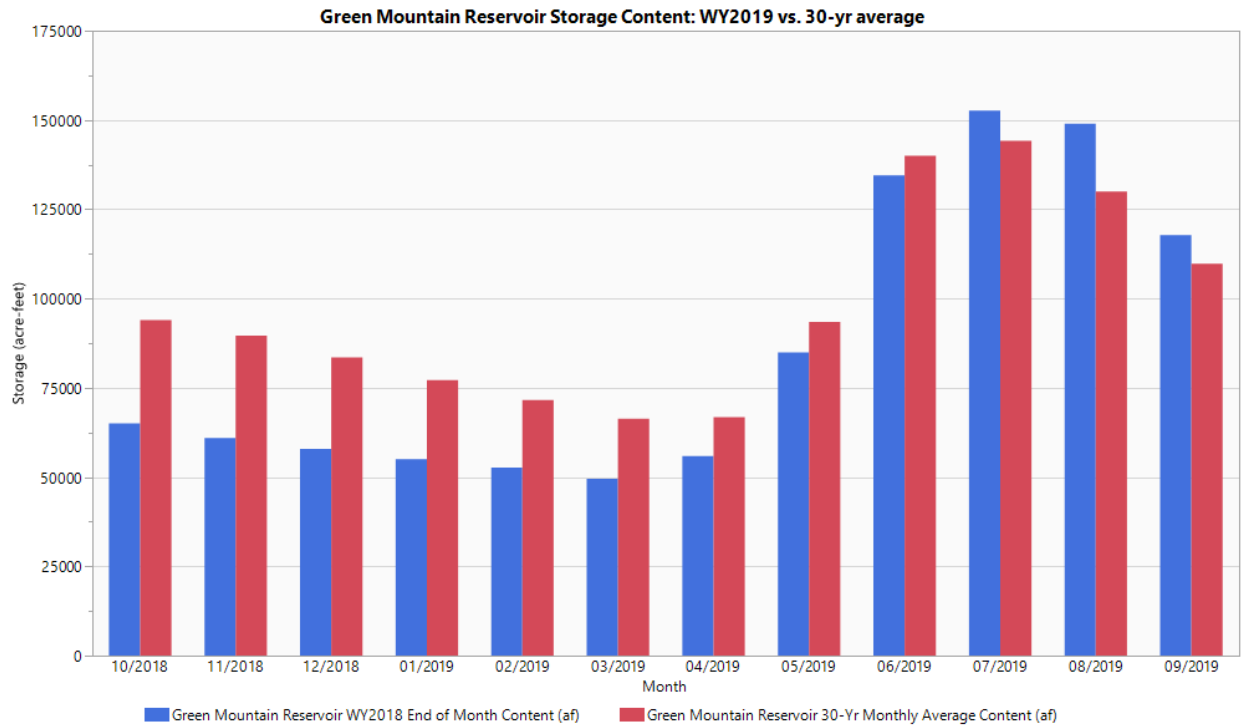
Normal reservoir operations occurred during the winter delivery season. The C-BT project remained out-of-priority for most of the period from October 1, 2018 through April 15, 2019. During this period Green Mountain Reservoir delivered 19,718 acre-feet of C-BT collection system replacement water, 1,131 acre-feet to fulfill HUP obligations, 2,653 acre-feet for contract deliveries, 0 acre-feet for the Silt Project replacement and 313 acre-feet for Green Mountain Reservoir evaporative losses. The Shoshone Outage Protocol was exercised for 7 days starting on April 8, 2019, with a storage delivery of 3.0 KAF. The Shoshone Call came into effect on April 15, 2019, lasting for 4 days before Colorado River main stem flow exceeded administrative level on April 19, 2018.

The HUP managing entities did not declare a surplus in the 66,000 acre-feet HUP allocation for the irrigation year ending November 2018. Green Mountain Reservoir did not delivery any HUP surplus water during October 2018 to support the Colorado River Endangered Fish Recovery Program.

On April 8, 2019, Green Mountain Reservoir reached the water year's minimum storage at 48,581 acre-feet, with a water surface elevation of 7,878.99 feet. Relaxation of water rights administration on the Colorado River allowed the refill storage right to resume diversion and storage in the reservoir.

Green Mountain Reservoir was not impacted by any operating restrictions during the winter delivery season. The Heeny Slide operating restriction applies below 7,865 feet (36,957 acre-feet) where drawdown cannot exceed 0.5 feet per day. End-of-the-month storage contents for the reservoir during WY 2019 are compared to the 30-year average below. There were no other operating restrictions for Green Mountain Reservoir in WY-2019.

There was no storage water available in Green Mountain Reservoir to augment flow in the Colorado River with start-up of irrigation operations in April.



Comparison between the Green Mountain Reservoir monthly content during WY 2019 and its 30-year average content.

March 13, 2019: The HUP managing entities held the 2018 HUP Operations Wrap Up meeting. The agenda included reports on total HUP deliveries and Green Mountain Reservoir Operations. Reclamation informed the entities that Green Mountain Reservoir was forecast to fill and that the HUP allocation was expected to refill the full 66,000 acre-feet. The status of the Heeney Slide operation restriction was also discussed including the expectation that it would not apply during the 2019 irrigation season.

April through July Fill Operations: Green Mountain Reservoir exercised refill storage rights from April 19, 2019, until May 07, 2019. During this period Green Mountain Reservoir stored 15,268 acre-feet. The Start-of-Fill was declared on May 7, 2019. Reservoir storage was 63,595 acre-feet, about 96% of the historical average storage for this day.

Reclamation forecasted that Green Mountain Reservoir would physically fill in WY 2019. The well-above-average May 1, 2019, runoff projections indicated a physical fill for 95 percent of possible hydrologic scenarios. The Denver Water Board and Colorado Springs Utilities were permitted to divert out of priority since all forecasts projected a substantial amount of runoff available for power generation.

The Colorado State Engineer office administered Green Mountain Reservoir operations under the Green Mountain Administrative Protocol (Protocol) for the 2019 fill season. Green Mountain Reservoir maintained the Direct Flow Power Water Right call until spillway release began on July 2, 2019.

May 7: The start of fill for Green Mountain Senior Refill Right was declared for WY 2019. Re-allocation of the carry over storage replenished the 52,000 acre-feet collection system replacement pool and partially refilled the 5,000 acre-feet Silt Project allocation.

June 16-June 22: Green Mountain increased release to the Blue River to powerplant capacity supporting the Colorado River Endangered Fish Recovery Program Coordinated Reservoir Operations (CROS) for 2019. CROS operations focused on attempting to extend peak flow at the 15-Mile Reach instead of augmenting the runoff peak due to the higher than average stream flow in the Grand Junction area.

June 19: The HUP Managing Entities held their initial meeting in Grand Junction to consider conditions and to plan for WY 2019 operations. A total of 12 meetings and conference calls were held between June 19 and October 30, 2019 to manage releases from Green Mountain, Ruedi, Granby, Wolford Mountain, and Williams Fork Reservoirs; coordinate irrigation diversions in the Grand Valley; and attempt to maintain the mean monthly target flows in the 15-Mile Reach. The U.S. Fish and Wildlife Service proposed an average year target flow of 1,240 - 1,630 cfs due to the high runoff forecast.

July 2-July 24: Green Mountain Dam augmented turbine release with spillway release. Spillway release began to control reservoir fill rate while attempting to maintain total release below 3,000 cfs. Peak release of 2,530 cfs occurred on July 4. Powerplant operated at capacity during the entire period.

July 14: Green Mountain Reservoir achieved a fill level of 7949.5 feet. Reclamation declared end of fill per the Green Mountain Administrative Protocol.

July 15: Green Mountain Reservoir obtained maximum fill level of 7949.69 feet for the 2019 fill year.

July 31: The observed April - July runoff to Green Mountain Reservoir was 388 KAF. The April 1 most probable forecast (Table 3 above) was 398 KAF.

August 23: The Colorado State Engineer places the Colorado River under administration with the Junior Shoshone Powerplant Direct Flow Water Right. Green Mountain Reservoir commences contract and HUP replacement releases.

August 28: The Colorado State Engineer places the Colorado River under administration with the Senior Shoshone Powerplant Direct Flow Water Right with a partial C-BT replacement requirement. Green Mountain Reservoir commences Colorado River Collection System and Green Mountain Reservoir Evaporative Loss replacement releases.

August 28: HUP managing entities declare HUP surplus for the 2019 operation year with GVIC objecting.

August 29-September 29: Williams Fork Reservoir released water for Green Mountain Reservoir as part of an exchange to support Williams Fork restoration work. 4956 acre-feet are exchanged into Green Mountain Reservoir.

August 30: The Colorado State Engineer places the Colorado River under administration with the Senior Shoshone Powerplant Direct Flow Water Right. The C-BT Project has full replacement obligations.

August-September: Green Mountain Reservoir made storage releases from August 23 through the end of the water year. During the fall 2019 delivery period, Green Mountain Reservoir delivered 30,202 acre-feet of HUP water including 2,978 acre-feet for beneficiary replacement and 27,225 acre-feet surplus for delivery to the 15-mile reach. During the same period, Green Mountain delivered 6,653 acre-feet of Colorado River Collection System replacement water, 1,557 acre-feet for reservoir loss replacement and 407 acre-feet for contract replacement. No Silt Project replacement release was made.

2020 Annual Operation Plan

Collection System and East Slope Colorado-Big Thompson Project

The C-BT Most-Probable Annual Operating Plan (AOP) is developed considering the effects of historical average runoff values, the expected demands and depletions of the Northern Water and Denver Water (including an assumed Northern Water quota of 70 percent), the project's initial states (e.g. pool levels), other average values, special operations such as previously planned system outages and maintenance schedules.

The 2020 AOP used a projected 275,700 acre-feet total inflow to the west slope collection system during water year 2020 (WY 2020). It simulated pumping 43,300 acre-feet of water from Willow Creek and a small 200 acre-feet spill at Granby Reservoir. Windy Gap was not expected to pump to Granby Reservoir in WY 2020.

The 2020 AOP projected diversions totaling 194,300 acre-feet through the Adams Tunnel during WY 2020. A bit over half of the project diversions were planned between December 2019 and May 2020. Sufficient capacity remained and is simulated to convey 26,400 acre-feet of Big Thompson River skim water at Olympus Tunnel and 29,900 acre-feet at Dille Tunnel for power generation. The 2020 AOP does not include priority water from the Big Thompson River.

The 2020 AOP simulated a fill of both Carter Lake and Horsetooth Reservoir. Carter was expected to fill by mid-March 2020 and demands were projected to exceed supply by mid-July, with an associated reservoir drawdown through the end of the water year. Horsetooth maximum content was achieved by late February 2020 and to remain full through early June 2020. By the end of WY 2020, Horsetooth Reservoir elevations were projected to be near 5,388 feet for an outage at Soldier Canyon Dam at the start of Water Year 2021 (which requires an elevation of not more than 5,388 feet). Total 2020 AOP deliveries from Carter Lake Reservoir were simulated as 104,200 acre-feet. Total deliveries from Horsetooth were simulated as 99,300 acre-feet. Initial content of Carter Reservoir is 84,000 acre-feet and simulated ending content is 91,900 acre-feet. Horsetooth's initial content is 129,000 acre-feet and simulated ending content is 85,500 acre-feet, corresponding to the elevation requirement of the Soldier Canyon Dam work at the end of the water year.

Also included in the 2020 AOP is a major system outage planned on the Charles Hansen Feeder Canal at the Cottonwood siphon. The siphon will be rehabilitated from mid-July 2020 to mid-November 2020. Releases from Flatiron Reservoir to the Charles Hansen Feeder Canal are precluded by the Cottonwood siphon outage. This constraint on the system had been incorporated in the 2020 AOP.

As compared with previous years plans, the 2020 AOP exhibits a preference to move water when hydropower is of greater value. Thus, Carter Lake and Horsetooth reservoirs are filled early with reduced Adams Tunnel diversion during March, April, May, and June. Additionally, pumping to Carter Lake resumes late-spring and continues through much of the summer. Such operations provide conveyance capacity to capitalize on east slope runoff water through skim operations and allow significant hydropower generation during the summer peak-value period. With the Cottonwood siphon rehabilitation, hydropower generation during the summer of 2020 would be at a minimum without pumping to Carter Lake.

Green Mountain Reservoir

The 2020 AOP used a projected 349,500 acre-feet Green Mountain Reservoir total inflow. With that inflow, plans provide for Green Mountain to fill in 2020, achieving maximum content in the first half of July. Total Green Mountain Reservoir releases are simulated as 249,900 acre-feet, all through the powerplant. The most probable scenario requires no substitution obligation for Denver and Colorado Springs because the reservoir obtains a physical fill. The 2020 AOP includes refill of all Green Mountain Reservoir allocations for delivery during the 2020-2021 delivery season. The simulated minimum reservoir water surface elevation was 7,896.82 feet in mid-April before refilling begins, well above the Heeney Slide operational restriction of 7,865.0 feet.

The 2020 AOP assumed that Denver and Colorado Springs would deplete a total of 98,900 acre-feet. Per the Blue River decree, the cities would be required to replace water obligated toward the senior storage right should a fill shortage occur in Green Mountain Reservoir due to the cities out-of-priority depletions.

APPENDICES

APPENDIX A: DAILY RECORDS

APPENDIX A - DAILY RECORDS FOR WY2019

Appendix A (1 of 38)

Green Mountain Reservoir, CO

Location. --Lat 39°52'42", long 106°19'42", Summit County, Hydrologic Unit 14010002, on Green Mountain Dam, 13 miles southeast of Kremmling, Colorado, on the Blue River.

Gage. --Water level recorder with satellite telemetry. Elevation of gage is 7960 feet (m.s.l.) from topographic map.

Remarks. -- Inflow computed daily based on change in content from midnight to midnight, and on the 24-hour average releases from Green Mountain Reservoir. Recorders were operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and fair. This record consists of operational data which could be subject to future revisions and changes.

Inflow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	119	106	132	113	112	120	162	850	808	3126	1190	263
2	130	144	106	86	107	117	205	769	895	3147	1101	266
3	132	153	126	110	129	129	104	738	963	3100	1049	265
4	111	140	106	120	127	127	168	726	1015	3031	1002	237
5	121	134	119	126	114	99	202	725	1119	2845	1034	258
6	128	162	141	130	110	126	223	741	1289	2933	965	311
7	127	120	149	120	116	135	225	768	1520	2936	924	295
8	156	108	122	130	94	132	232	798	1668	2796	911	299
9	147	118	106	124	101	138	261	754	1760	2577	887	293
10	110	119	120	123	110	130	282	715	1530	2292	852	275
11	159	142	125	137	93	101	275	672	1588	2138	899	282
12	166	134	99	131	108	122	261	662	1640	1991	923	267
13	77	108	128	102	97	157	235	665	1826	1914	819	259
14	154	139	115	112	111	154	225	720	2122	1957	766	266
15	144	125	102	111	120	130	268	808	2233	1972	680	265
16	128	138	127	122	128	132	220	878	2153	1899	626	262
17	139	133	129	131	113	136	240	948	2145	1780	694	250
18	118	126	133	142	112	148	249	884	2280	1765	564	234
19	134	118	138	133	111	146	231	817	2351	1675	515	238
20	112	128	125	123	118	133	304	817	2321	1684	495	226
21	146	129	119	120	109	156	387	810	2324	1781	454	225
22	135	129	133	123	107	139	381	771	2235	1640	433	214
23	134	139	116	117	123	141	359	767	1975	1515	394	219
24	153	138	129	119	112	149	390	742	1734	1465	376	220
25	141	141	126	129	103	161	395	734	1691	1502	359	220
26	137	133	126	121	118	134	452	736	1801	1394	360	221
27	113	118	137	112	125	164	595	766	2052	1328	311	210
28	142	147	106	121	118	196	600	792	2352	1337	287	233
29	123	142	117	110		202	733	766	2539	1277	274	234
30	145	149	126	108		205	863	766	2638	1217	273	211
31	162		134	116		166		747		1218	279	
Min	77	106	99	86	93	99	104	662	808	1217	273	210
Max	166	153	149	142	129	205	863	948	2638	3147	1190	311
Mean	134	132	123	120	112	143	324	769	1818	2039	664	250
ac-ft	8215	7836	7568	7382	6240	8817	19255	47310	108198	125382	40851	14847



Appendix A (2 of 38)

Elliot Creek Canal near Green Mountain Reservoir, CO

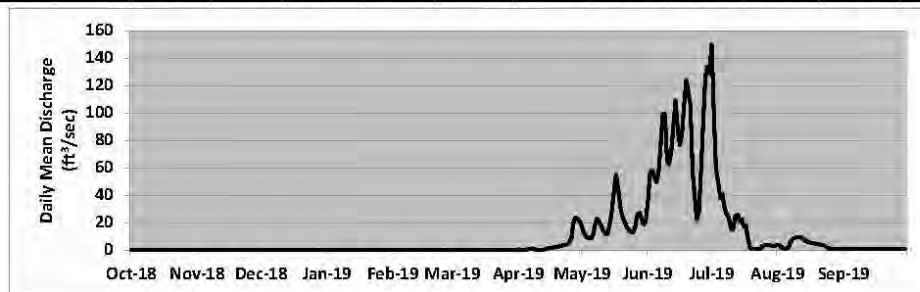
Location. --Lat 39°52'25", long 106°19'49", Summit County, Hydrologic Unit 14010002, on left bank at concrete flume structure, and 1.1 mi west of Heeneey.

Gage. --Water-stage recorder with satellite telemetry. Elevation of gage is 8050 ft (m.s.l.) from topographic map.

Remarks. --This is a diversion from Elliot Creek in the Blue River Basin to Green Mountain Reservoir. Recorder was operated from 01-Oct-2018 until 30-Oct-2018, before it was winterized. The station was put back into service from 1-Apr-2019 to 30-Sep-2019. Values for the off-season are marked as zero. Records are reliable while recorder is operated. This record contains operational data which could be subject to future revisions and changes. Official data is published by the United States Geological Survey as site #09056500.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	16	37	150	4	1
2	0	0	0	0	0	0	0	12	56	99	3	1
3	0	0	0	0	0	0	0	10	58	60	2	1
4	0	0	0	0	0	0	0	8	53	50	1	1
5	0	0	0	0	0	0	0	8	50	38	1	1
6	0	0	0	0	0	0	1	10	56	41	2	1
7	0	0	0	0	0	0	1	18	78	31	5	1
8	0	0	0	0	0	0	1	23	99	26	8	1
9	0	0	0	0	0	0	0	21	99	24	9	1
10	0	0	0	0	0	0	0	17	64	16	9	1
11	0	0	0	0	0	0	0	14	62	15	9	1
12	0	0	0	0	0	0	0	12	72	25	9	1
13	0	0	0	0	0	0	0	12	92	26	8	1
14	0	0	0	0	0	0	1	18	109	22	7	1
15	0	0	0	0	0	0	1	28	88	22	6	1
16	0	0	0	0	0	0	1	43	77	17	5	1
17	0	0	0	0	0	0	2	55	86	18	5	1
18	0	0	0	0	0	0	2	45	105	9	5	1
19	0	0	0	0	0	0	2	31	124	2	5	1
20	0	0	0	0	0	0	2	24	115	1	4	1
21	0	0	0	0	0	0	3	21	106	1	4	1
22	0	0	0	0	0	0	3	17	57	0	4	1
23	0	0	0	0	0	0	4	14	38	0	3	1
24	0	0	0	0	0	0	4	13	22	0	2	1
25	0	0	0	0	0	0	6	13	28	3	1	1
26	0	0	0	0	0	0	8	17	60	3	1	1
27	0	0	0	0	0	0	20	25	92	3	1	1
28	0	0	0	0	0	0	24	27	127	4	1	1
29	0	0	0	0	0	0	22	22	134	3	1	1
30	0	0	0	0	0	0	21	18	129	3	1	1
31	0	0	0	0	0	0	0	21	0	3	1	0
Min	0	0	0	0	0	0	0	8	22	0	1	1
Max	0	0	0	0	0	0	24	55	134	150	9	1
Mean	0	0	0	0	0	0	4	21	79	23	4	1
ac-ft	8	0	0	0	0	0	258	1263	4706	1418	248	38



Appendix A (3 of 38)
Green Mountain Reservoir, CO

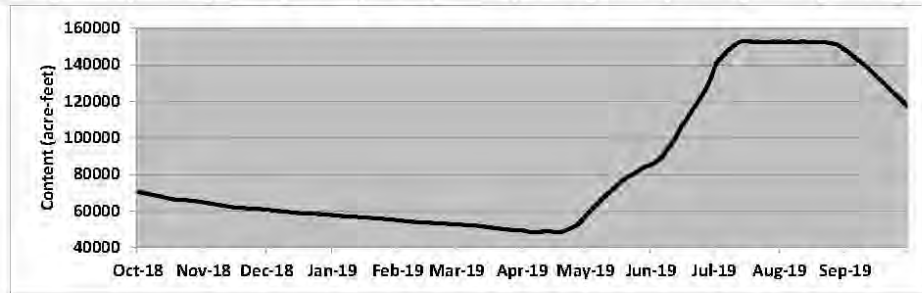
Location. --Lat 39°52'42", long 106°19'42", Summit County, Hydrologic Unit 14010002, on Green Mountain Dam, 13 miles southeast of Kremmling, Colorado, on the Blue River..

Gage. --Water level recorder with satellite telemetry. Elevation of gage is 7960 ft (m.s.l.) from topographic map.

Remarks.--Reservoir is formed by an earth-fill dam. Construction completed in 1943. Impoundment began on 16-Nov-1942. Green Mountain Reservoir provides storage used for replacement water of the C-BT diversions. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Maximum capacity is 153,639 AF at elevation 7950.00 ft, with 146,779 AF of active capacity. Records are complete and fair, but the data has not been revised. This record consists of operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	70308	64768	60811	57753	54938	52642	49379	57318	85366	138123	152666	148203
2	70211	64542	60627	57667	54799	52565	49260	58545	85943	141015	152603	147361
3	70066	64338	60476	57453	54709	52508	48865	59706	86644	142629	152603	146487
4	69799	64158	60283	57390	54610	52449	48663	60844	87464	143663	152640	145541
5	69557	63965	60112	57339	54481	52334	48608	61976	88317	144642	152666	144681
6	69329	63819	60005	57298	54371	52267	48590	63137	89276	146056	152688	143724
7	69102	63605	59952	57236	54292	52219	48581	64350	90679	147289	152624	142831
8	68923	63360	59845	57185	54163	52171	48581	65627	92391	148286	152603	141942
9	68719	63137	59706	57103	54046	52123	48617	66808	94278	149407	152603	141036
10	68433	62926	59589	57011	53948	52019	48718	67912	95708	150266	152603	140034
11	68207	62758	59482	56950	53840	51856	48801	68935	97246	151125	152730	138996
12	67995	62570	59323	56878	53781	51732	48837	69932	98898	151905	152857	137845
13	67605	62360	59228	56746	53703	51646	48847	70941	100936	152434	152709	136701
14	67369	62229	59102	56632	53644	51541	48837	72059	103377	152814	152603	135581
15	67110	62097	58976	56530	53615	51351	48801	73130	105655	152878	152561	134450
16	66820	62009	58924	56448	53595	51171	48517	74060	107224	152857	152640	133340
17	66610	61910	58871	56377	53546	51002	48318	75138	108695	152793	152518	132318
18	66424	61801	58829	56326	53487	50851	48273	76086	110437	152772	152456	131336
19	66296	61680	58797	56265	53419	50700	48372	76899	112306	152688	152370	130361
20	66180	61614	58734	56184	53350	50622	48681	77707	114042	152645	152412	129350
21	66134	61548	58660	56093	53262	50391	48148	78505	115833	152751	152412	128214
22	66076	61483	58608	56012	53175	50232	49601	79231	117519	152603	152370	127065
23	66018	61439	58534	55921	53117	50112	50069	79947	119348	152391	152264	125921
24	65972	61396	58482	55831	53040	50009	50475	80616	121216	152391	152095	124786
25	65880	61363	58419	55761	52943	49926	50955	81273	122993	152518	151884	123655
26	65765	61288	58356	55660	52875	49796	51560	81936	124953	152518	151672	122514
27	65670	61179	58314	55549	52807	49722	52449	82655	126764	152497	151482	121362
28	65433	61103	58179	55458	52720	49685	53360	83421	129047	152603	151230	120269
29	65260	61028	58065	55337		49638	54521	84136	131683	152666	150560	119078
30	65134	60952	57972	55187		49592	55932	84648	134508	152624	149785	117761
31	65042		57888	55067		49508		84938		152666	149012	
Min	65042	60952	57888	55067	52720	49508	48273	57318	85366	138123	149012	117761
Max	70308	64768	60811	57753	54938	52642	55932	84938	134508	152878	152857	148203
Mean	67334	62414	59134	56469	53724	51106	49739	72981	106624	150146	152152	133754
ac-ft	65042	60952	57888	55067	52720	49508	55932	84938	134508	152666	149012	117761



Appendix A (4 of 38)
Blue River below Green Mountain Reservoir, CO

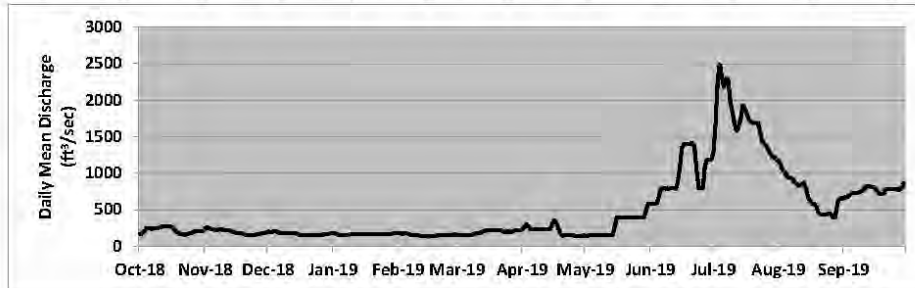
Location.--Lat 39°52'49", long 106°20'00", Summit County, Hydrologic Unit 1401.0002, on left bank 0.3 miles upstream from Elliot Creek, 0.3 miles downstream from Green Mountain Reservoir and 13 miles southeast of Kremmling.

Gage.-- Water-stage recorder with satellite telemetry. Datum of gage is 7682.66 feet (levels by U.S. Bureau of Reclamation).

Remarks.--Drainage area is 599 sq. mi. including 15.3 sq. mi. of Elliot Creek above the diversion for Elliot Creek feeder canal. Flow regulated by Green Mountain Reservoir since 1942. Diversions for irrigation of 5,000 acres upstream from station. Trans-mountain diversions upstream from station. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Recorded values are complete and reliable. This record consists of operational data which could be subject to future revisions and changes. Official record is published by the United States Geological Survey.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	166	242	203	181	177	160	227	148	586	1292	1182	667
2	176	256	198	180	177	156	265	147	588	1673	1120	678
3	202	263	202	167	174	158	303	149	588	2269	1036	684
4	245	229	203	151	177	156	269	149	590	2492	1019	708
5	243	229	205	162	179	157	229	150	677	2330	954	729
6	242	225	195	150	165	160	232	151	794	2184	941	727
7	242	226	176	162	156	159	229	152	794	2296	939	736
8	247	230	176	156	159	156	232	149	792	2278	909	732
9	246	229	176	166	160	162	233	153	789	1995	869	743
10	254	224	179	169	160	182	231	153	791	1843	837	767
11	268	224	179	168	147	183	233	151	802	1689	826	794
12	269	227	179	167	138	185	232	153	796	1679	851	825
13	269	217	176	169	136	201	230	150	785	1630	873	827
14	269	198	178	169	141	207	229	150	879	1749	800	818
15	270	190	166	163	135	226	285	260	1080	1923	681	816
16	270	180	153	164	138	222	362	401	1353	1884	621	798
17	241	181	155	167	137	221	339	397	1393	1807	586	753
18	207	179	155	168	141	224	271	398	1402	1731	585	719
19	194	177	154	164	146	222	180	399	1402	1698	539	718
20	166	159	157	164	153	223	147	401	1407	1687	459	724
21	165	160	156	166	154	222	150	398	1411	1690	436	782
22	160	160	159	164	151	220	151	396	1371	1691	435	783
23	169	169	154	163	152	201	151	396	1035	1608	435	781
24	172	158	155	164	151	201	153	395	792	1447	442	783
25	183	161	157	169	152	203	151	393	792	1412	446	779
26	191	164	158	167	152	200	145	392	798	1383	441	782
27	207	171	158	168	159	201	145	393	1117	1332	390	778
28	207	183	174	167	162	214	138	395	1181	1272	394	778
29	206	179	175	171	226	144	395	1184	1228	696	821	
30	204	185	173	184		228	148	497	1188	1222	649	873
31	204		176	176		228		590		1184	658	
Min	159	158	153	150	135	156	138	147	586	1184	390	657
Max	270	256	205	184	179	228	362	590	1411	2492	1182	873
Mean	218	199	173	166	155	196	214	290	972	1726	708	763
ac-ft	13378	11815	10629	10203	8587	12027	12761	17852	57829	106113	43538	45408



Appendix A (5 of 38)
Willow Creek Reservoir, CO

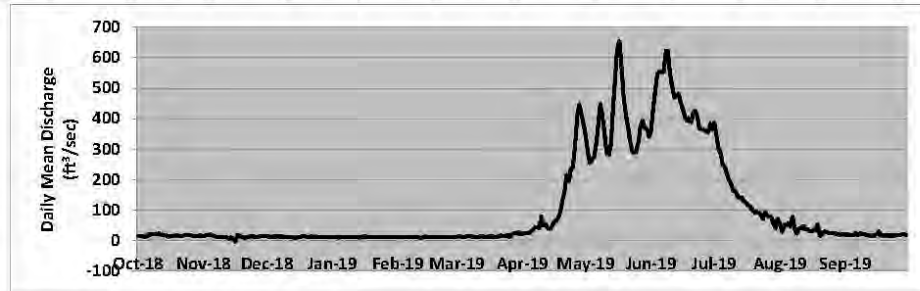
Location. — Lat 40°08'52", long 105°56'28", Grand County, Hydrologic Unit 14010001, at Willow Creek Dam, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage. — Water level recorder with satellite telemetry. Elevation of gage is 8130 ft (m.s.l.) from topographic map.

Remarks. — Inflow computed daily using change in content from midnight to midnight, plus the 24-hour average releases through the Willow Creek Pump Canal and the reservoir outlet works. Recorders were operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. This record consists of operational data which could be subject to future revisions and changes.

Inflow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	15	15	16	13	12	12	23	342	369	387	58	20
2	14	19	12	11	11	16	26	292	433	346	30	20
3	15	19	14	13	13	12	26	254	487	300	49	20
4	11	20	14	11	12	11	24	268	545	286	52	17
5	14	18	12	12	13	11	29	275	566	248	68	19
6	21	16	16	13	12	15	36	314	563	241	47	25
7	20	12	14	13	11	14	42	383	563	219	80	18
8	23	13	14	11	11	15	45	449	622	198	41	24
9	22	11	13	12	12	11	42	408	620	186	23	23
10	22	11	12	13	12	12	81	348	547	163	40	23
11	24	11	12	13	11	11	51	287	507	163	40	20
12	20	12	13	12	10	13	55	281	471	144	48	19
13	19	5	12	12	11	17	42	319	473	140	36	15
14	19	11	11	11	14	11	38	433	482	142	38	17
15	13	8	11	12	13	11	48	537	454	129	33	17
16	15	-3	12	14	12	14	62	628	431	124	32	22
17	17	19	11	13	12	14	65	653	406	114	33	30
18	16	17	15	12	11	14	75	568	394	112	36	14
19	19	14	14	12	14	14	92	476	403	101	55	19
20	17	11	12	13	13	12	131	414	389	92	15	16
21	15	10	13	13	12	14	161	380	419	94	21	18
22	17	11	16	12	11	17	217	329	426	93	30	16
23	18	14	12	12	11	15	194	295	405	87	29	18
24	19	17	14	11	11	14	236	287	366	72	27	16
25	17	11	13	12	12	19	239	293	367	93	25	19
26	18	11	13	13	12	12	313	325	361	84	25	20
27	15	12	13	12	13	19	408	376	359	79	24	18
28	16	15	13	12	11	24	447	393	355	80	22	21
29	15	16	12	11		25	413	369	383	58	20	21
30	18	15	13	12		28	385	368	364	42	20	19
31	17		13	12		21		343		72	21	
Min	11	-3	11	11	10	11	23	254	355	42	15	14
Max	24	20	16	14	14	28	447	653	622	387	80	30
Mean	18	13	13	12	12	15	135	377	450	151	36	20
ac-ft	1078	775	791	742	659	930	8018	23177	26754	9301	2199	1161



Appendix A (6 of 38)
Willow Creek Reservoir, CO

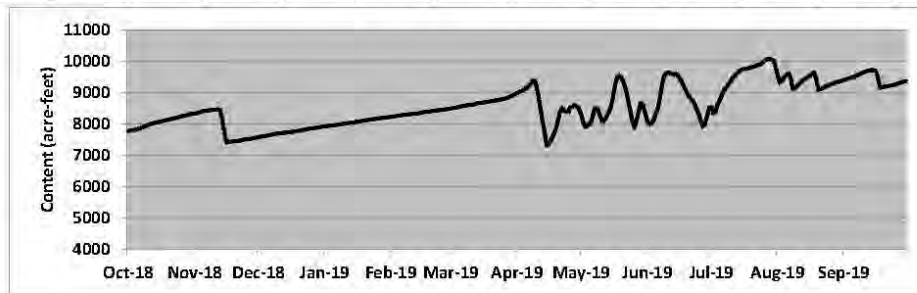
Location. —Lat 40° 08'52", long 105° 56' 28", Grand County, Hydrologic Unit 14010001, at Willow Creek Dam, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage. — Water level recorder with satellite telemetry. Elevation of gage is 8130 ft (m.s.l.) from topographic map.

Remarks. —Reservoir is formed by an earth-fill dam. Construction completed in 1953. Impoundment began on April 2, 1953. Willow Creek Reservoir stores water from Willow Creek for diversion to Granby Reservoir via the Willow Creek Canal. Maximum capacity is 10,600 AF at elevation 8,130.00 ft, with 9,100 AF of active capacity between elevations 8077.00 and 8130.00 feet. Recorder was operated from 01-Oct 2018 to 30-Sep-2019. Record is complete and fair. This record consists of operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	7785	8331	7596	7933	8239	8502	8989	8323	8100	8549	9553	9416
2	7801	8351	7603	7940	8246	8519	9025	8050	8007	8343	9326	9438
3	7817	8373	7616	7951	8258	8534	9062	7923	8024	8434	9405	9460
4	7826	8398	7630	7958	8268	8542	9096	7963	8166	8654	9487	9479
5	7837	8417	7641	7967	8278	8549	9139	8017	8336	8779	9556	9601
6	7863	8434	7657	7976	8290	8572	9194	8147	8517	8957	9631	9631
7	7886	8442	7668	7988	8297	8586	9264	8415	8898	9099	9498	9559
8	7913	8452	7682	7998	8304	8602	9340	8532	9326	9184	9126	9692
9	7942	8459	7693	8007	8314	8611	9407	8442	9553	9278	9152	9628
10	7970	8467	7703	8019	8321	8622	9256	8239	9640	9361	9213	9659
11	8000	8474	7712	8031	8328	8629	8877	8078	9669	9476	9280	9682
12	8022	8482	7723	8041	8333	8639	8504	8147	9620	9563	9368	9704
13	8041	8452	7732	8050	8341	8664	8107	8290	9600	9620	9410	9721
14	8062	8181	7739	8057	8355	8672	7700	8387	9612	9690	9462	9740
15	8071	7734	7745	8066	8368	8680	7313	8557	9575	9738	9506	9721
16	8083	7422	7755	8078	8383	8693	7395	8903	9496	9772	9551	9693
17	8100	7435	7759	8090	8393	8703	7510	9296	9369	9789	9598	9438
18	8116	7446	7773	8107	8400	8715	7644	9517	9224	9789	9651	9166
19	8135	7455	7787	8116	8413	8728	7810	9553	9096	9795	9474	9184
20	8152	7461	7796	8128	8422	8736	8054	9465	8934	9817	9094	9197
21	8166	7468	7808	8137	8432	8745	8358	9329	8843	9851	9115	9210
22	8183	7474	7821	8147	8439	8761	8521	9083	8779	9880	9152	9224
23	8200	7488	7830	8157	8446	8774	8425	8765	8672	9896	9189	9240
24	8222	7507	7847	8166	8454	8784	8410	8432	8484	9905	9221	9253
25	8239	7514	7858	8176	8461	8804	8400	8107	8311	9977	9251	9272
26	8258	7521	7870	8185	8472	8812	8537	7890	8125	10040	9278	9291
27	8273	7529	7879	8195	8484	8830	8577	8152	7937	10082	9305	9310
28	8287	7545	7890	8205	8492	8861	8611	8446	8019	10096	9329	9340
29	8302	7563	7900	8212		8895	8579	8693	8292	10064	9350	9364
30	8321	7579	7911	8222		8934	8497	8624	8534	10040	9372	9385
31	8338		7923	8229		8960		8346		9834	9396	
Min	7785	7422	7596	7933	8239	8502	7313	7890	7937	8343	9094	9166
Max	8338	8482	7923	8229	8492	8960	9407	9553	9669	10096	9651	9740
Mean	8071	7928	7760	8082	8365	8699	8520	8520	8825	9527	9364	9447
ac-ft	8338	7579	7923	8229	8492	8960	8497	8346	8534	9834	9396	9385



Appendix A (7 of 38)
Willow Creek below Willow Creek Reservoir, CO

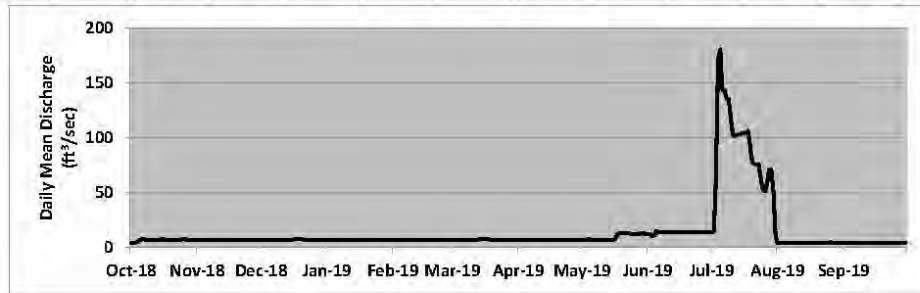
Location.--Lat 40°08'50", long 105°56'16", Grand County, Hydrologic Unit 14010001, at Willow Creek Dam, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage.--Water-stage recorder with satellite telemetry. Elevation of gage is 8040 feet (m.s.l.) from topographic map.

Remarks.-- Drainage area is 127 square miles. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. The official record is published by the Division of Water Resources, State of Colorado. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	4	7	7	7	7	7	7	7	13	14	4	5
2	4	7	7	7	7	7	7	7	13	14	4	5
3	5	7	7	7	7	7	7	7	10	62	4	5
4	5	7	7	7	7	7	7	7	12	171	4	5
5	7	7	7	7	7	7	7	7	16	181	4	4
6	8	7	7	7	7	7	7	7	14	144	4	4
7	8	7	7	7	7	7	7	7	14	144	4	4
8	7	7	7	7	7	7	7	7	14	136	4	4
9	7	7	7	7	7	7	7	7	14	136	4	4
10	7	7	7	7	7	7	7	7	14	118	4	4
11	7	7	7	7	7	7	7	7	16	102	4	4
12	7	7	7	7	7	7	7	7	14	102	4	4
13	7	7	7	7	7	7	7	7	14	103	4	4
14	7	7	7	7	7	7	7	7	14	104	5	4
15	7	7	7	7	7	7	7	7	14	104	5	4
16	7	7	7	7	7	8	7	7	14	104	5	4
17	7	7	8	7	7	8	7	10	14	105	4	4
18	7	7	8	7	7	8	7	13	14	106	4	4
19	7	7	8	7	7	7	7	13	14	94	4	4
20	7	7	8	7	7	7	7	13	14	79	4	4
21	7	7	7	7	7	7	7	13	14	76	5	4
22	7	7	7	7	7	7	7	13	14	76	5	5
23	7	7	7	7	7	7	7	13	14	76	5	4
24	7	7	7	7	7	7	7	13	14	64	5	4
25	7	7	7	7	7	7	7	13	14	63	5	5
26	8	7	7	7	7	7	7	13	14	51	5	5
27	7	7	7	7	7	7	7	13	14	58	5	4
28	7	7	7	7	7	7	7	13	14	71	4	4
29	7	7	7	7	7	7	7	13	14	71	4	4
30	7	7	7	7	7	7	7	13	14	51	4	5
31	7	7	7	7	7	7	7	13	14	13	5	4
Min	4	7	7	7	7	7	7	7	10	13	4	4
Max	8	7	8	7	7	8	7	13	16	181	5	5
Mean	7	7	7	7	7	7	7	10	14	90	4	4
ac-ft	426	419	441	436	398	445	424	606	822	6519	270	266



Appendix A (8 of 38)
Willow Creek Pump Canal, CO

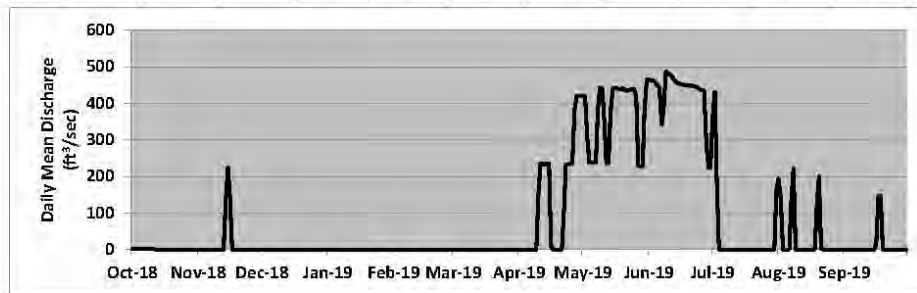
Location. —Lat 40°08'39", long 105°54'10", Grand County, Hydrologic Unit 14010001, at Willow Creek Pump Canal, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage. — Water-stage recorder with satellite telemetry at 15 foot Parshall Flume. Elevation of gage is 8300 feet (m.s.l.) from topographic map.

Remarks. — Canal is used to divert water from Willow Creek Reservoir to Granby Reservoir. Diversions are seasonal, mainly during late spring and early summer. Construction completed in 1953. Length of the canal is 3.4 miles. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. This record consists of operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	1	0	0	0	0	0	0	419	465	363	194	0
2	1	0	0	0	0	0	0	419	462	431	139	0
3	1	0	0	0	0	0	0	307	463	187	0	0
4	1	0	0	0	0	0	0	237	456	0	0	0
5	1	0	0	0	0	0	0	237	460	0	0	0
6	1	0	0	0	0	0	0	238	442	0	0	0
7	1	0	0	0	0	0	0	238	341	0	131	0
8	1	0	0	0	0	0	0	380	386	0	222	0
9	1	0	0	0	0	0	0	443	487	0	0	0
10	1	0	0	0	0	0	144	438	482	0	0	0
11	1	0	0	0	0	0	234	357	478	0	0	0
12	1	0	0	0	0	0	234	236	472	0	0	0
13	1	0	0	0	0	0	234	237	463	0	0	0
14	1	136	0	0	0	0	234	375	458	0	0	0
15	0	224	0	0	0	0	233	440	454	0	0	0
16	0	146	0	0	0	0	11	442	453	0	0	17
17	0	0	0	0	0	0	0	440	451	0	0	146
18	0	0	0	0	0	0	0	440	450	0	0	146
19	0	0	0	0	0	0	0	440	450	0	116	0
20	0	0	0	0	0	0	0	441	449	0	200	0
21	0	0	0	0	0	0	0	435	449	0	4	0
22	0	0	0	0	0	0	97	435	448	0	0	0
23	0	0	0	0	0	0	234	437	445	0	0	0
24	0	0	0	0	0	0	233	438	444	0	0	0
25	0	0	0	0	0	0	234	439	437	0	0	0
26	0	0	0	0	0	0	235	416	436	0	0	0
27	0	0	0	0	0	0	381	228	435	0	0	0
28	0	0	0	0	0	0	421	228	294	0	0	0
29	0	0	0	0	0	0	420	228	225	0	0	0
30	0	0	0	0	0	0	421	384	224	0	0	0
31	0	0	0	0	0	0	0	465	0	162	0	0
Min	0	0	0	0	0	0	0	228	224	0	0	0
Max	1	224	0	0	0	0	421	465	487	431	222	146
Mean	0	17	0	0	0	0	133	366	428	37	32	10
ac-ft	30	1003	0	0	0	0	7935	22492	25489	2266	1995	612



Appendix A (9 of 38)
Windy Gap Pumping Plant, CO

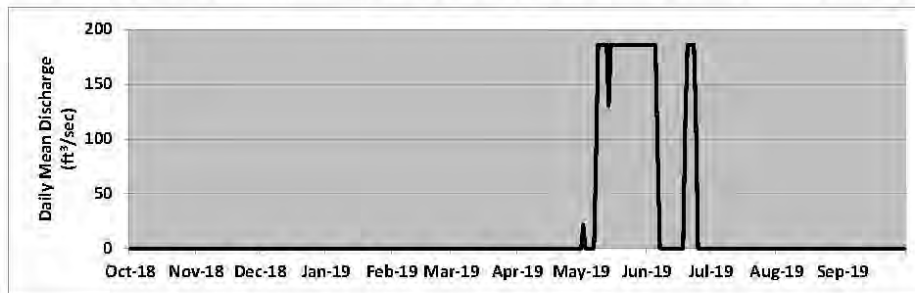
Location. --Lat 40°06'24", long 105°58'48", Grand County, Hydrologic Unit 14010001, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage. -- Reading taken directly from the pumps. Elevation of the pumping plant is 7823 (m.s.l.) from topographic map.

Remarks. -- Water is pumped from Windy Gap Reservoir to Granby Reservoir. Water is stored at Granby Reservoir before delivery through Adams Tunnel. Data was provided by Farr Pumping Plant operators each morning. Data was collected from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable, but the data has not been revised. This record consists of operational data which could be subject to future revisions and changes. Readings were provided by the Northern Water.

Windy Gap Pump Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	0	186	0	0	0
2	0	0	0	0	0	0	0	21	186	0	0	0
3	0	0	0	0	0	0	0	0	186	0	0	0
4	0	0	0	0	0	0	0	0	186	0	0	0
5	0	0	0	0	0	0	0	0	186	0	0	0
6	0	0	0	0	0	0	0	0	89	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	78	0	0	0	0
9	0	0	0	0	0	0	0	186	0	0	0	0
10	0	0	0	0	0	0	0	186	0	0	0	0
11	0	0	0	0	0	0	0	186	0	0	0	0
12	0	0	0	0	0	0	0	186	0	0	0	0
13	0	0	0	0	0	0	0	186	0	0	0	0
14	0	0	0	0	0	0	0	130	0	0	0	0
15	0	0	0	0	0	0	0	186	0	0	0	0
16	0	0	0	0	0	0	0	186	0	0	0	0
17	0	0	0	0	0	0	0	186	0	0	0	0
18	0	0	0	0	0	0	0	186	0	0	0	0
19	0	0	0	0	0	0	0	186	116	0	0	0
20	0	0	0	0	0	0	0	186	186	0	0	0
21	0	0	0	0	0	0	0	186	186	0	0	0
22	0	0	0	0	0	0	0	186	186	0	0	0
23	0	0	0	0	0	0	0	186	186	0	0	0
24	0	0	0	0	0	0	0	186	121	0	0	0
25	0	0	0	0	0	0	0	186	0	0	0	0
26	0	0	0	0	0	0	0	186	0	0	0	0
27	0	0	0	0	0	0	0	186	0	0	0	0
28	0	0	0	0	0	0	0	186	0	0	0	0
29	0	0	0	0	0	0	0	186	0	0	0	0
30	0	0	0	0	0	0	0	186	0	0	0	0
31	0	0	0	0	0	0	0	186	0	0	0	0
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	0	0	0	0	0	0	186	186	0	0	0
Mean	0	0	0	0	0	0	0	139	67	0	0	0
ac-ft	0	0	0	0	0	0	0	8671	3967	0	0	0



Appendix A (10 of 38)
Granby Reservoir, CO

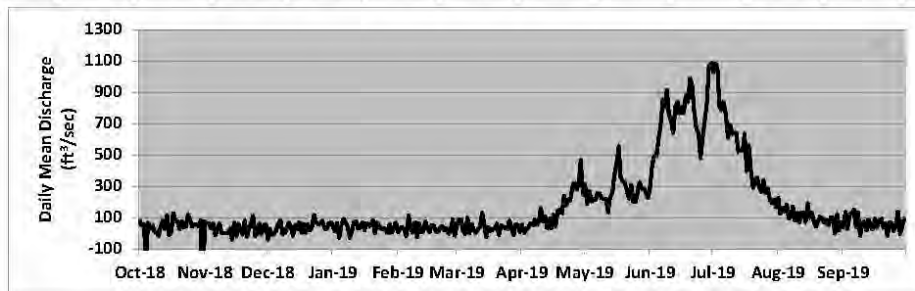
Location. --Lat 40°08'54", long 105°51'48", Grand County, Hydrologic Unit 14010001, on Granby Dam, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage. -- Water level recorder with satellite telemetry. Elevation of gage is 8300 (m.s.l.) from topographic map.

Remarks. -- Inflow computed daily based on change in content from midnight to midnight, and on the average daily releases through the reservoir outlet works. Recorders were operated from 01-Oct-2018 to 30-Sep-2019. Records are complete. Negative values are based on accounting procedures and mass balances. This record consists of operational data which could be subject to future revisions and changes.

Inflow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	78	78	-42	45	5	51	56	314	299	1029	226	35
2	48	62	26	11	33	83	-1	187	438	1085	124	136
3	58	61	-10	66	38	89	27	269	496	1060	164	24
4	-167	33	-4	-30	25	11	35	203	493	817	139	124
5	70	65	21	49	-19	-7	60	219	604	786	180	123
6	30	-15	61	91	110	99	53	212	683	838	94	149
7	48	29	84	64	26	-2	89	259	863	763	107	38
8	8	64	-6	41	2	58	53	250	803	609	172	134
9	6	-2	3	-30	71	20	74	221	914	691	82	-21
10	-18	-2	29	13	-25	1	161	222	755	634	129	67
11	43	-2	66	67	65	24	74	217	712	647	68	73
12	83	-2	36	78	8	43	109	133	640	641	134	17
13	27	30	-17	29	11	133	33	231	803	522	133	88
14	115	-41	51	43	77	56	91	253	837	635	70	48
15	-14	69	25	66	28	-25	31	368	764	523	193	22
16	13	-20	68	16	7	39	120	438	805	637	97	93
17	128	58	3	65	53	11	44	555	768	396	129	38
18	77	24	58	47	47	24	144	356	881	560	73	79
19	79	-9	2	49	11	30	151	329	842	395	44	91
20	23	81	55	82	7	60	126	322	989	288	75	39
21	74	-23	20	-1	35	-15	241	266	939	332	104	65
22	35	29	34	69	45	49	174	222	778	354	91	-19
23	41	62	117	45	21	35	217	309	669	293	71	68
24	120	111	67	26	33	35	208	199	639	264	84	66
25	84	-18	57	36	-5	28	295	203	477	340	53	13
26	42	-4	63	21	9	80	322	259	615	255	103	41
27	59	62	82	2	91	27	278	324	716	285	98	140
28	57	-5	29	55	-16	-15	320	281	831	214	-4	-7
29	44	45	28	3		57	469	284	1053	194	122	39
30	82	59	61	36		52	245	257	1086	216	18	96
31	-458		71	70		5		223		165	72	
Min	-458	-41	-42	-30	-25	-25	-1	133	299	165	-4	-21
Max	128	111	117	91	110	133	469	555	1086	1085	226	149
Mean	30	29	37	40	28	37	143	271	739	528	105	63
ac-ft	1815	1745	2260	2432	1577	2259	8530	16636	44000	32462	6440	3767



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Granby Reservoir, CO

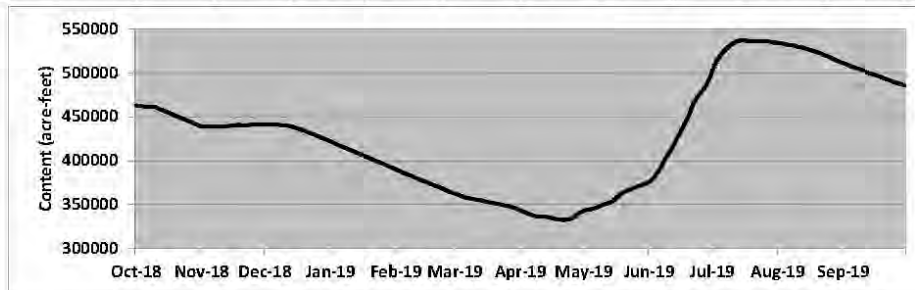
Location. --Lat 40°08'54", long 105°51'48", Grand County, Hydrologic Unit 14010001, on Granby Dam, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage. -- Water level recorder with satellite telemetry. Elevation of gage is 8300 (m.s.l.) from topographic map.

Remarks. --Reservoir is formed by an earth-fill dam and four earth-fill dikes. Construction completed in 1950. Impoundment began on 14-Sep-1949. Granby Reservoir provides west-slope storage for the C-BT project. Maximum capacity is 539,800 AF at elevation 8,280.00, with 463,300 AF of active capacity between elevations 8186.90 and 8280.00 feet. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. This record consists of operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	463151	438963	441337	421845	390160	362474	343303	343013	376739	502688	534326	510942
2	462746	438767	441403	420761	389107	361577	342267	343709	377685	508963	534110	510378
3	462476	438898	441403	419787	388058	360803	341268	344237	379945	513778	533676	509104
4	462071	438963	441403	418634	387007	359730	340280	344687	383256	517760	533024	508262
5	461733	439084	441469	417609	385836	358668	339412	345112	388822	520897	532621	507198
6	461461	439094	441602	416648	385036	358005	338486	345581	390160	523826	531875	506208
7	461188	439160	441204	416632	384052	357354	337673	346222	394010	526478	531731	505364
8	461266	439291	440808	414610	382947	356938	336761	347336	398690	528706	531658	504868
9	461266	439291	440646	413461	381966	356621	335941	348566	403585	530791	530791	503815
10	460986	439291	440347	412445	380862	356049	336114	349560	407494	532449	530144	502971
11	459970	439291	440148	411664	379884	355453	336114	350503	411428	533893	529637	501846
12	458960	439291	439760	410699	378785	354922	336056	351033	414991	536412	529207	500791
13	457880	439366	439160	409524	377746	354804	335884	351739	419595	536421	528663	499882
14	457006	439563	438636	408446	376833	354336	335711	352858	424680	536853	527844	499247
15	456994	440148	437844	407431	375860	353624	335364	354394	429088	536853	527126	498617
16	454922	440413	437057	406361	374949	353154	334672	356344	433781	536853	526117	497633
17	453980	440546	436202	405348	374038	352621	333984	358897	438307	536709	525546	496865
18	452972	440610	435679	404527	373006	352091	333407	360862	442657	536566	524903	496166
19	451972	440610	434631	403522	371917	351739	332890	362474	447566	536205	524257	495045
20	450900	440479	433781	402514	371131	351388	332487	363791	452972	536205	523327	493993
21	449897	440347	432799	401383	370222	350856	332372	365169	459430	536349	522465	493367
22	448833	440413	431758	400381	369260	350444	332372	366251	465057	536349	521753	492459
23	447832	440546	430844	399439	368294	349974	332833	367329	469621	536133	520467	491651
24	446969	440939	429865	398438	367209	349443	333234	368174	473320	536133	519469	490710
25	446970	440939	428829	397438	366070	348858	333926	369139	476210	536421	518611	489668
26	444911	440939	427982	396376	364990	348391	334844	370162	478973	536205	517333	488760
27	443916	441005	426880	395316	364029	347860	336636	370949	482018	536133	516193	487926
28	442854	441005	425846	394320	363313	347218	338668	371736	485769	536917	514912	487365
29	441801	441204	424809	393262		346280	340627	372523	491201	536484	513921	486532
30	440939	441337	423841	392206		345347	341906	373428	496377	534613	512925	485699
31	439949		422874	391213		344237		374401		534641	511860	
Min	439949	438767	422874	391213	363313	344237	332372	343013	376739	502688	511860	485699
Max	463151	441337	441602	421845	390160	362474	343303	374401	496377	536853	534326	510942
Mean	453766	439993	435185	406484	376520	353263	336516	357744	433014	531051	525171	498107
EOM	439949	441337	422874	391213	363313	344237	341906	374401	496377	534641	511860	485699



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Granby Reservoir, CO

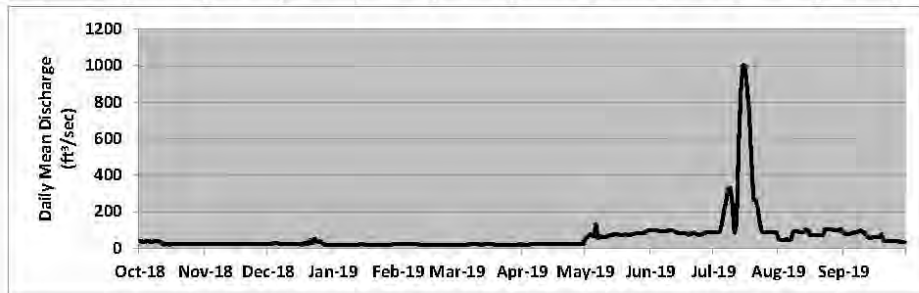
Location.—Lat 40°08'54", long 105°51'48", Grand County, Hydrologic Unit 14010001, on Granby Dam, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage.— Water level recorder with satellite telemetry. Elevation of gage is 8300 feet (m.s.l.), from topographic map.

Remarks.—Reservoir is formed by an earth-fill dam and four earth-fill dikes. Construction completed in 1950. Impoundment began on 14-Sep-1949. Granby Reservoir provides west-slope storage for the C-BT project. Data was provided by personnel from the Northern Water. The stream gage directly below the dam is used to measure flows during winter. A USGS station further downstream is used to measure flows between spring and fall. Data was recorded from 01-Oct-2018 to 30-Sep-2019. Records are complete and fair. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	40	24	24	20.0	22.5	21.5	21.6	53.2	98.6	88.6	56.0	83.3
2	37	25	24	19.9	21.9	20.9	20.9	60.7	99.9	86.8	44.4	78.5
3	35	25	27	20.3	21.9	20.9	20.9	77.0	101.5	88.0	45.0	80.2
4	38	24	27.3	20.3	21.9	20.9	20.9	72.4	98.2	86.5	47.9	80
5	38	24	27.5	20.2	21.9	20.9	22.9	66.3	94.9	134.4	48.8	83.95
6	37	24	26	20.4	21.9	20.9	23.9	131.7	95.7	203.6	46.9	87.275
7	37	24	23.9	20.9	22.3	22.6	23.9	57.6	93.6	260.6	48.8	86.306
8	38	24	24.2	20.9	21.9	21.9	23.3	69.7	93.1	326.9	94.4	92.22
9	38	23	25.6	20.9	21.9	21.9	23.0	62.4	95.6	329.1	92.5	97.89
10	38	23	25.6	20.9	21.9	21.9	23.0	59.5	96.8	239.9	92.7	86.15
11	33	23	25.6	20.9	21.4	21.9	23.7	61.6	99.6	82.6	88.9	86.4
12	21	23	25.9	21.4	21.4	21.4	23.2	71.6	96.5	136.0	87.7	66
13	22	23	25.6	21.6	21.4	21.2	21.9	70.3	88.3	546.6	89.3	58.94
14	22	22	24.6	21.8	21.4	21.7	22.0	70.9	84.2	865.2	102.5	58.76
15	21	22	25.0	21.9	21.4	21.9	23.0	80.7	82.1	1002.8	99.3	62.1
16	22	22	25.3	21.6	21.4	21.9	23.9	75.4	81.9	998.6	71.7	62.6
17	22	22	19.4	21.4	21.4	21.8	23.9	74.5	81.5	874.4	72.1	62.8
18	26	22	24.6	21.0	21.2	21.8	24.0	73.3	81.9	751.8	71.8	61.7
19	26	22	30.5	20.9	20.9	21.6	23.9	74.6	74.7	497.9	72.6	75.9
20	25	23	23.2	20.9	20.9	21.7	24.0	77.3	76.0	265.2	72.9	41.6
21	24	23	44.8	20.9	20.9	20.9	23.9	74.8	83.1	265.1	71.8	42.1
22	24	23	28.3	21.0	20.9	20.9	24.0	73.6	87.0	225.1	69.1	41.2
23	24	23	51.9	20.9	21.4	20.9	24.9	76.9	76.4	145.6	106.0	42
24	25	23	38.4	21.4	21.4	21.4	23.9	80.2	72.0	89.4	104.5	41.3
25	24	23	34.0	21.5	21.4	21.4	23.9	80.8	77.3	87.4	104.0	41.1
26	24	26	38.4	21.4	21.4	21.4	24.4	82.9	80.0	89.3	103.1	41.5
27	24	23	22.3	21.4	21.4	21.4	24.0	83.7	87.1	90.3	101.4	41.5
28	25	24	20.9	21.4	21.4	21.4	24.7	84.0	86.1	90.3	99.0	35
29	24	25	20.8	21.4	21.4	21.4	24.0	82.8	89.4	90.9	100.2	33.4
30	24	24	20.9	21.8		21.4	25.5	94.6	91.0	88.8	102.9	34.4
31	24		20.9	22.9		22.2		98.6		88.9	102.2	
Min	21	22	19.4	19.9	20.9	20.9	20.9	53.2	72.0	82.6	44.4	33.4
Max	40	26	51.9	22.9	22.5	22.6	25.5	131.7	101.5	1002.8	106.0	97.89
Mean	28	23	27	21	22	21	23	76	88	297	81	63
ac-ft	1749	1390	1679	1296	1195	1320	1390	4666	5244	18257	4977	3739



Appendix A (13 of 38)

Farr Pumping Plant, Granby Reservoir, CO

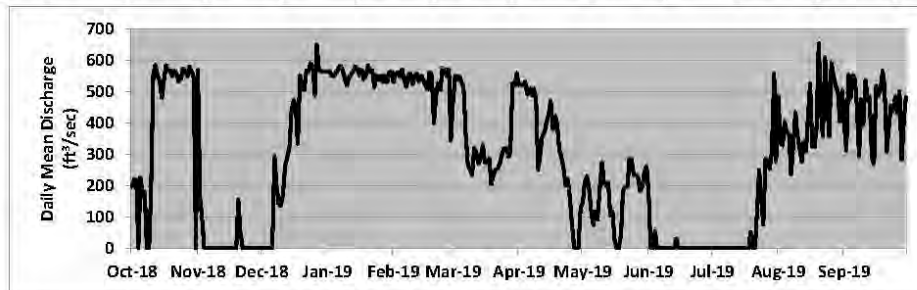
Location. --Lat 40°11'30", long 105°52'52", Grand County, Hydrologic Unit 14010001, at Farr Pumping Plant on the north end of Granby Reservoir, 8 miles northeast of Granby, Colorado, on the Colorado River.

Gage. -- Reading taken directly from the pumps, based on conduit pressure and Granby Reservoir's elevation. Elevation of the pumping plant is 8320 ft from topographic map.

Remarks. -- Water is pumped from Granby to the Granby Pump Canal which discharges into Shadow Mountain Reservoir. The operation keeps Shadow Mountain Reservoir/Grand Lake at a steady water surface level when trans-mountain diversions via Adams Tunnel are taking place. Data was provided by Farr Pumping Plant operators, Northern Water, each morning. Data was collected from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	197	571	0	564	530	471	522	145	172	0	486	402
2	221	161	0	564	558	550	522	214	0	0	337	311
3	218	89	0	551	562	540	521	230	0	0	328	555
4	0	0	0	549	549	549	531	187	55	0	404	478
5	228	0	0	562	571	530	491	119	0	0	366	552
6	164	0	0	571	538	515	512	74	0	0	366	540
7	179	0	293	584	515	361	490	119	0	0	236	456
8	0	0	202	570	554	264	510	91	0	0	329	292
9	0	0	143	544	560	255	475	188	0	0	435	476
10	189	0	136	520	525	234	251	276	0	0	365	393
11	553	0	174	545	553	320	299	209	0	0	322	539
12	586	0	261	554	558	307	362	200	0	0	277	471
13	552	0	289	565	532	270	369	209	0	0	341	482
14	537	0	325	581	552	288	404	105	32	0	307	292
15	479	0	433	572	539	329	429	118	0	0	426	268
16	535	0	474	553	522	272	470	25	0	0	526	518
17	585	0	450	570	507	276	379	0	0	0	323	488
18	568	0	333	541	553	287	424	0	0	0	323	506
19	568	0	553	551	555	204	399	45	0	52	383	566
20	549	167	510	585	399	234	315	183	0	0	655	516
21	567	50	506	564	489	252	288	196	0	0	443	307
22	559	0	567	569	526	255	257	197	0	112	356	389
23	534	0	563	515	506	271	201	284	0	250	510	456
24	542	0	591	552	577	300	221	287	0	155	458	441
25	574	0	581	538	566	320	162	232	0	76	366	485
26	565	0	488	551	550	320	74	232	0	285	591	430
27	549	0	651	531	572	292	0	228	0	282	549	501
28	580	0	567	552	342	307	0	182	0	253	514	282
29	564	0	566	531		528	0	196	0	313	505	400
30	548	0	564	563		520	133	243	0	558	404	483
31	0		565	564		560		265		277	504	
Min	0	0	0	515	342	204	0	0	0	0	236	268
Max	586	571	651	585	577	560	531	287	172	558	655	566
Mean	403	34	348	556	531	354	334	170	9	84	414	443
ac-ft	24774	2039	21392	34167	29496	21780	19857	10471	514	5183	25438	26331



Appendix A (14 of 38)
Shadow Mountain/Grand Lake, CO

Location. --Lat 40°12'26", long 105°50'28", Grand County, Hydrologic Unit 14010001, on the Colorado River at the Shadow Mountain outlet works structure, 10 miles northeast of Granby, Colorado.

Gage. --Water-stage recorder with satellite telemetry. Elevation of gage is 8375 feet (m.s.l.) from topographic map.

Remarks. --Shadow Mountain/Grand Lake was constructed between 1944 and 1946. Impoundment began in 1946. Active capacity between elevations 8,366 and 8,367 is 1,800 AF. Grand Lake is used as forebay storage for Adams Tunnel. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Some data were provided by Farr Pumping Plant personnel during down time. Records are complete and fair. This record contains operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	17684	17654	18024	17751	17714	17733	17741	17749	17286	17207	17890	17698
2	17667	17531	18019	17770	17728	17746	17741	17647	17424	17245	17894	17659
3	17686	17656	18018	17743	17733	17741	17745	17636	17682	17296	17807	17730
4	17616	17702	18005	17730	17746	17722	17778	17621	17306	17199	17927	17811
5	17447	17728	18000	17725	17796	17704	17785	17656	17126	17262	17959	17723
6	17656	17756	17820	17725	17756	17780	17778	17663	17229	17218	17959	17820
7	17891	17747	17706	17746	17756	17874	17796	17698	17276	17436	17692	17720
8	17857	17733	17843	17773	17756	17829	17796	17693	17131	17451	17649	17696
9	17771	17723	17879	17773	17751	17746	17904	17423	17226	17229	17766	17799
10	17657	17718	17861	17739	17738	17661	17817	17495	17252	17264	17788	17714
11	17677	17718	17648	17740	17738	17698	17721	17517	17168	17488	17821	17789
12	17727	17673	17630	17718	17738	17730	17756	17636	17162	17697	17716	17783
13	17715	17655	17569	17718	17724	17772	17720	17648	17156	17592	17681	17742
14	17707	17636	17675	17736	17776	17735	17719	17569	17067	17413	17612	17719
15	17739	17618	17691	17736	17778	17786	17751	17689	17117	17371	17478	17725
16	17667	17594	17606	17704	17760	17771	17761	17782	17067	17444	17554	17760
17	17686	17681	17688	17736	17704	17769	17721	17621	17060	17439	17644	17714
18	17685	17663	17546	17723	17744	17789	17706	17388	17320	17479	17499	17691
19	17685	17639	17885	17699	17747	17630	17780	17236	17333	17677	17294	17736
20	17722	17828	17830	17736	17790	17652	17794	17254	17301	17419	17625	17635
21	17736	17926	17718	17736	17805	17698	17850	17254	17151	17272	17639	17598
22	17741	17907	17704	17764	17761	17685	17849	17165	17247	17169	17277	17812
23	17691	17931	17681	17724	17673	17661	17782	17191	17219	17214	17498	17794
24	17673	17999	17723	17760	17722	17648	17823	17249	17190	17606	17646	17738
25	17691	17999	17728	17760	17723	17693	17859	17191	17198	17362	17572	17761
26	17685	17981	17590	17773	17686	17748	17953	17199	17282	17419	17723	17697
27	17667	17982	17728	17760	17723	17746	17866	17265	17371	17380	17792	17767
28	17686	17981	17733	17743	17730	17767	17809	17262	17392	17345	17783	17722
29	17686	18018	17720	17723		17746	17787	17218	17166	17336	17760	17854
30	17686	18023	17720	17741		17718	17830	17230	17303	17765	17676	17870
31	17660		17720	17747		17757		17272		17604	17673	
Min	17447	17531	17546	17699	17673	17630	17706	17165	17060	17169	17277	17598
Max	17891	18023	18024	17773	17805	17874	17953	17782	17682	17765	17959	17870
Mean	17695	17770	17762	17740	17743	17733	17790	17439	17237	17396	17674	17742
EOM	17660	18023	17720	17747	17730	17757	17830	17272	17303	17604	17673	17870



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Alva B. Adams Tunnel at East Portal, near Estes Park, CO

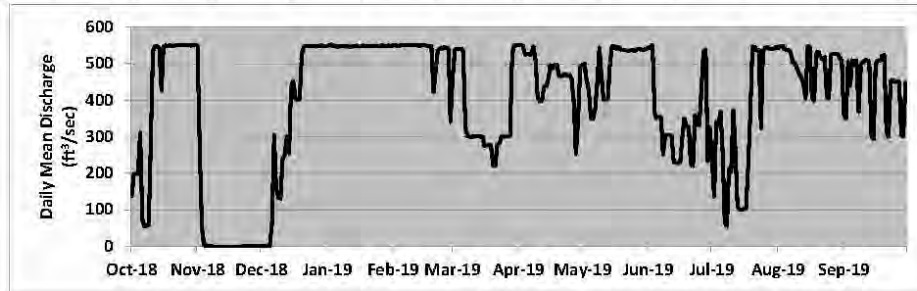
Location. --Lat 40°19'40", long 105°34'39", Larimer County, Hydrologic Unit 10190006, 4.5 miles southwest of Estes Park, Colorado.

Gage. -- Water-stage recorder with satellite telemetry at 15 foot Parshall flume. Elevation of gage is 8250 ft (m.s.l.) from topographic map.

Remarks. -- Constructed between 1940 and 1947. Tunnel is 13.1 miles long, and extends between Grand Lake and Estes Park. Its maximum capacity is 550 cfs. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. This record contains operational data which could be subject to future revisions and changes. Official record published by the Colorado Division of Water Resources.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	137	550	0	548	549	464	551	497	544	238	541	361
2	196	273	0	550	552	537	550	499	544	134	648	350
3	199	53	0	552	549	541	550	454	551	340	550	506
4	197	6	0	547	549	541	525	426	364	329	541	437
5	311	1	0	547	551	540	525	351	351	370	538	509
6	74	0	52	547	550	535	525	350	355	266	536	501
7	55	0	305	549	550	325	526	378	353	65	531	509
8	57	0	160	549	551	302	547	443	252	55	504	367
9	57	0	134	547	551	300	505	544	304	212	499	499
10	273	0	131	547	551	299	406	464	304	202	487	503
11	536	0	240	547	551	302	398	402	304	373	470	510
12	547	0	251	546	551	302	398	400	302	255	464	509
13	549	0	300	548	550	302	437	405	228	109	446	506
14	543	0	252	549	550	300	438	497	230	100	404	303
15	425	0	434	549	551	301	458	548	228	100	548	294
16	546	0	452	548	550	275	496	550	229	102	546	499
17	550	0	406	549	548	277	486	541	300	105	408	510
18	549	0	401	549	549	277	497	546	350	225	398	507
19	549	0	403	548	549	277	498	539	329	358	526	522
20	549	0	528	548	422	220	468	536	329	547	533	523
21	549	0	545	548	485	220	465	538	226	546	518	316
22	550	0	548	548	535	280	469	535	219	536	512	301
23	550	0	548	549	542	282	469	535	358	537	518	450
24	551	0	548	548	541	302	469	537	334	324	408	455
25	552	0	548	548	545	300	468	536	332	535	405	453
26	550	0	548	549	544	301	456	536	433	543	523	447
27	551	0	547	550	541	301	391	539	535	546	527	451
28	550	0	549	548	340	301	252	540	538	540	526	305
29	550	0	550	548		526	347	538	233	541	527	301
30	551	0	549	549		550	492	538	325	542	517	447
31	550		547	548		550		540		546	507	
Min	55	0	0	546	340	220	252	350	219	55	398	294
Max	552	550	550	552	552	550	551	550	551	547	550	523
Mean	418	30	338	548	534	359	469	493	343	330	500	438
ac-ft	24500	1756	19712	32630	29646	20987	27890	29240	20399	19195	29750	26086



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Marys Lake, CO

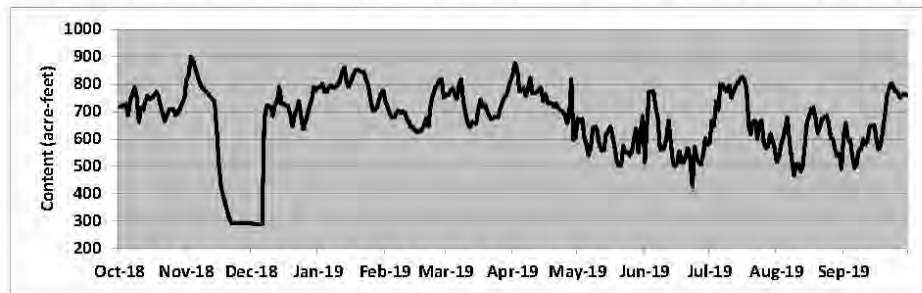
Location. --Lat 40°22'40", long 105°31'50", Larimer County, Hydrologic Unit 10190006, 2 miles southwest of Estes Park, Colorado.

Gage. -- Water-level recorder with satellite telemetry. Elevation of gage is 8060 feet (m.s.l.) from topographic map.

Remarks. -- Constructed between 1947 and 1949. Impoundment began in August, 1950. Active capacity between elevations 8,025 and 8,040 is 500 AF. Used as a forebay storage for Estes Powerplant. The only measurable inflow into the reservoir comes from Adams Tunnel. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete and reliable. The gage does not record water surface levels below elevation 8,022.62 feet, content of 322 AF. Values reported as less than 322 AF are estimates. These are operational data which could be subject to further revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	717	816	291	788	740	762	841	675	514	586	516	517
2	719	834	290	791	717	760	877	665	660	667	530	659
3	724	901	290	801	694	772	854	674	772	648	579	597
4	728	888	290	770	680	785	774	606	775	737	603	601
5	685	860	290	772	678	766	780	580	774	705	644	539
6	744	836	289	792	692	745	787	539	719	800	680	494
7	764	810	669	796	704	796	757	570	673	798	589	510
8	789	792	722	786	695	819	779	641	564	778	523	559
9	752	782	721	789	700	746	824	644	568	776	467	564
10	660	772	715	800	697	696	767	629	566	796	506	599
11	716	763	684	812	668	663	768	578	604	751	511	582
12	705	754	727	844	662	642	770	558	668	772	481	593
13	740	745	737	862	641	663	780	555	585	796	497	647
14	756	736	788	809	641	658	786	614	512	802	576	647
15	745	631	727	790	630	655	739	626	501	816	663	651
16	750	503	730	810	624	706	764	646	509	827	684	608
17	761	422	720	830	628	743	731	616	556	818	709	562
18	771	393	722	848	637	717	729	574	515	785	713	572
19	755	363	689	866	652	726	732	520	514	651	674	630
20	725	333	646	847	676	706	717	502	540	617	621	687
21	691	304	692	845	645	685	729	503	566	663	646	753
22	665	293	705	847	730	671	712	576	526	667	673	784
23	690	292	739	818	760	677	704	551	425	599	677	804
24	707	292	683	798	788	682	701	554	572	659	684	790
25	709	292	634	760	796	680	689	539	529	668	661	774
26	709	292	661	705	815	708	657	552	517	594	603	769
27	688	292	695	704	820	730	684	603	508	567	600	749
28	697	291	719	715	752	753	819	639	543	573	560	758
29	711	291	747	741		760	597	550	603	620	638	766
30	731	291	790	766		792	606	623	579	595	545	761
31	748		780	778		814		686		570	491	
Min	660	291	289	704	624	642	597	502	425	567	467	494
Max	789	901	790	862	820	819	877	686	775	827	713	804
Mean	724	562	632	795	699	725	748	593	581	700	595	654
EOM	748	291	780	778	752	814	606	686	579	570	491	761



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Big Thompson River above Lake Estes, CO

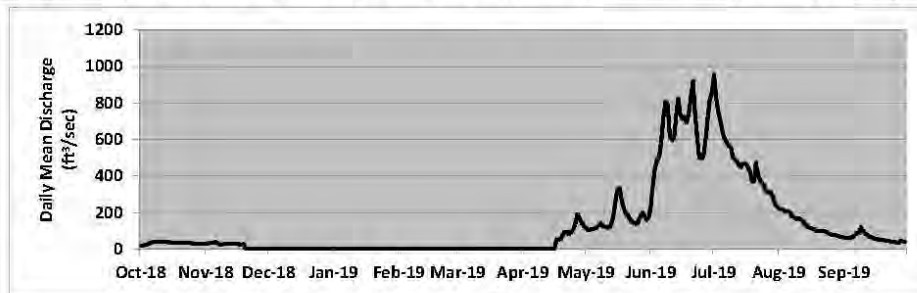
Location: --Lat 40°22'42", long 105°30'48", Larimer County, Hydrologic Unit 10190006, 600 feet downstream from bridge on state highways 7 and 36 in Estes Park, Colorado, downstream from Black Canyon Creek, and 0.3 miles northwest of Estes Powerplant.

Gage.-- Water-stage recorder with satellite telemetry. 15 foot Parshall flume with overflow weirs and supplemental outside gage. Datum of gage at 7492.5 feet.

Remarks. -- Drainage area is 137 mi2. Station consists of data collection platform as primary record with graphic chart recorder as backup. Recorder was operated from 01-Oct-2018 until 19-Nov-2018, before it was winterized. The station was put back into service from 17-Apr-2019 to 30-Sep-2019. Values for the off-season are marked as zero, but winter month flows normally fluctuate between 10 and 30 cfs. This record contains operational data which could be subject to future revisions and changes. The official record for this station is published by the Colorado Division of Water Resources.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	19	28	0	0	0	0	0	117	236	955	224	66
2	21	32	0	0	0	0	0	106	363	834	216	63
3	22	34	0	0	0	0	0	105	442	754	215	62
4	25	34	0	0	0	0	0	113	490	706	204	64
5	28	34	0	0	0	0	0	113	511	643	209	65
6	37	39	0	0	0	0	0	117	598	608	205	78
7	38	32	0	0	0	0	0	130	734	683	183	88
8	42	24	0	0	0	0	0	141	807	565	176	87
9	42	25	0	0	0	0	0	130	790	560	166	120
10	42	30	0	0	0	0	0	122	624	504	168	99
11	41	31	0	0	0	0	0	120	598	490	166	85
12	41	27	0	0	0	0	0	117	610	481	157	77
13	40	32	0	0	0	0	0	132	727	460	142	69
14	41	32	0	0	0	0	0	175	825	450	130	63
15	34	31	0	0	0	0	0	250	736	471	119	69
16	37	29	0	0	0	0	0	321	711	468	113	56
17	36	26	0	0	0	0	48	338	728	453	112	53
18	34	25	0	0	0	0	52	276	693	430	107	62
19	34	29	0	0	0	0	57	224	744	380	101	51
20	33	0	0	0	0	0	77	197	830	369	97	49
21	34	0	0	0	0	0	93	184	919	474	98	46
22	35	0	0	0	0	0	95	165	750	401	102	45
23	35	0	0	0	0	0	84	151	615	376	98	43
24	35	0	0	0	0	0	93	143	494	361	91	41
25	33	0	0	0	0	0	110	139	494	342	83	39
26	31	0	0	0	0	0	135	152	516	314	79	38
27	29	0	0	0	0	0	193	180	590	311	79	37
28	29	0	0	0	0	0	164	201	715	312	76	46
29	29	0	0	0	0	0	145	176	812	289	72	43
30	32	0	0	0	0	0	128	161	858	249	68	40
31	31	0	0	0	0	0	0	175	0	234	66	0
Min	19	0	0	0	0	0	0	105	236	234	66	37
Max	42	39	0	0	0	0	193	338	919	955	224	120
Mean	34	19	0	0	0	0	49	167	652	478	133	61
ac-ft	2061	1139	0	0	0	0	2925	10258	38795	29406	8172	3613



Appendix A (18 of 38)
Olympus Dam, CO

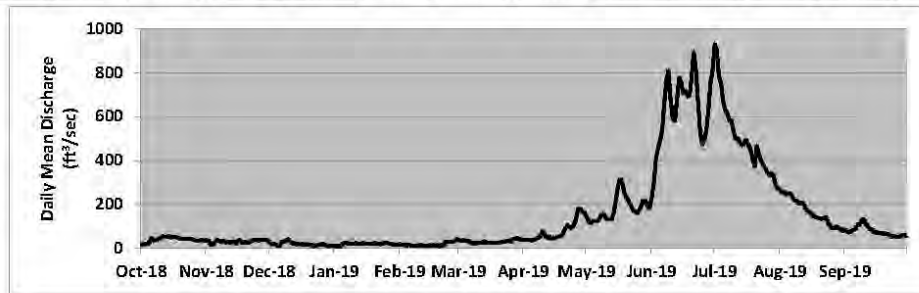
Location. --Lat 40°22'31", long 105°29'15", Larimer County, Hydrologic Unit 10190006, 1.5 miles east of Estes Park, Colorado, on the Big Thompson River.

Gage. --Water-stage recorders with satellite telemetry. Inflow computed daily based on the change in content from midnight to midnight at Marys Lake and Lake Estes, daily average releases from Olympus Dam, and daily average discharge at Olympus Tunnel and Adams Tunnel.

Remarks. -- Olympus dam was constructed between 1947 and 1949. Impoundment began on November 1948. Total capacity at maximum water surface elevation of 7475.0 feet is 3,070 AF. Computed inflows for 07-Dec-2018 were adjusted to account for errors introduced in the computation during system startup. This record contains operational data which could be subject to future revisions and changes.

Computed Inflow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	15	37	29	12	20	38	37	142	229	930	268	87
2	15	35	16	6	17	35	39	120	297	903	254	76
3	21	15	21	11	17	37	38	114	403	780	259	71
4	19	16	18	7	10	36	37	122	454	756	246	78
5	28	26	12	20	14	33	35	124	491	670	246	83
6	46	38	12	26	14	34	37	123	541	629	251	85
7	36	33	30	25	11	21	42	134	662	614	237	112
8	39	31	29	20	11	25	49	152	765	581	218	105
9	40	35	37	21	11	22	55	157	810	584	219	130
10	44	26	42	22	12	26	76	138	681	530	204	132
11	54	31	29	23	15	26	65	132	592	496	206	110
12	52	25	22	23	11	23	48	131	581	499	207	99
13	52	28	25	21	12	33	54	131	671	482	188	86
14	57	31	13	22	12	25	44	164	777	469	173	85
15	48	20	21	23	14	24	44	220	756	481	164	71
16	51	31	18	21	11	25	48	287	709	495	158	73
17	53	37	18	19	14	26	50	316	717	467	147	68
18	51	24	14	21	11	26	54	297	692	454	141	71
19	45	28	20	20	15	25	58	251	697	409	138	64
20	42	26	14	23	7	25	70	231	777	372	136	67
21	43	24	15	22	14	27	91	215	893	465	134	64
22	44	28	7	21	10	28	104	194	824	428	136	62
23	42	38	12	18	31	28	94	175	679	399	142	53
24	42	39	17	21	29	34	95	170	531	383	111	55
25	41	37	15	24	31	34	107	160	474	366	103	54
26	39	35	21	24	31	28	131	173	491	350	92	51
27	34	40	14	21	31	43	181	188	530	333	94	52
28	34	38	14	21	42	42	179	219	637	342	99	61
29	37	37	8	15		48	156	214	761	329	91	61
30	37	37	9	18		43	161	192	812	288	87	55
31	36		11	17		37		185		273	79	
Min	15	15	7	6	7	21	35	114	229	273	79	51
Max	57	40	42	26	42	48	181	316	893	930	268	132
Mean	40	31	19	19	17	31	76	180	631	502	169	77
ac-ft	2451	1838	1159	1198	944	1895	4541	11056	37532	30859	10367	4604



Appendix A (19 of 38)
Olympus Dam, CO

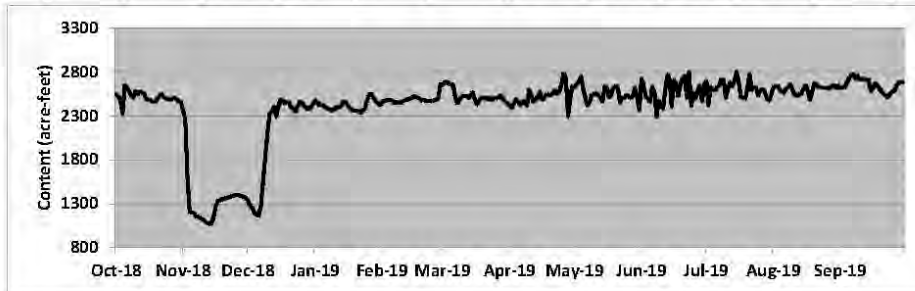
Location. --Lat 40°22'31", long 105°29'19", Larimer County, Hydrologic Unit 10190006, 1.5 miles east of Estes Park, Colorado, on the Big Thompson River.

Gage. -- Water-level recorder with satellite telemetry. Elevation of gage is 7490 feet (m.s.l.) from topographic map.

Remarks. -- Constructed between 1947 and 1949. Impoundment began in November, 1948. Active capacity between elevations 7,450.25 and 7,474.00 is 2,476 AF. Used as afterbay storage for Estes Powerplant and forebay for Olympus Tunnel. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2549	2363	1327	2481	2459	2652	2418	2625	2727	2699	2623	2616
2	2519	2265	1281	2447	2473	2686	2395	2664	2640	2423	2642	2626
3	2488	1600	1248	2427	2480	2691	2442	2689	2622	2626	2642	2633
4	2325	1212	1201	2432	2484	2669	2491	2754	2492	2608	2597	2674
5	2652	1195	1173	2418	2484	2664	2459	2621	2464	2692	2582	2720
6	2623	1195	1164	2394	2467	2642	2427	2514	2638	2631	2568	2768
7	2584	1165	1281	2386	2450	2492	2448	2424	2671	2650	2613	2775
8	2541	1157	1561	2378	2462	2447	2476	2455	2291	2716	2633	2723
9	2513	1134	1845	2357	2452	2484	2416	2542	2476	2720	2662	2761
10	2587	1122	2117	2378	2467	2522	2603	2546	2445	2506	2582	2716
11	2549	1100	2320	2405	2476	2532	2537	2563	2384	2608	2561	2715
12	2579	1077	2352	2397	2481	2532	2465	2536	2608	2681	2525	2732
13	2567	1071	2405	2415	2497	2508	2494	2515	2771	2637	2544	2708
14	2653	1073	2296	2459	2501	2541	2517	2470	2715	2699	2563	2713
15	2489	1142	2408	2467	2513	2569	2572	2638	2408	2803	2620	2584
16	2486	1268	2486	2426	2525	2488	2488	2618	2708	2694	2648	2618
17	2478	1336	2480	2395	2514	2432	2517	2516	2674	2519	2577	2670
18	2459	1336	2448	2371	2499	2488	2542	2542	2530	2506	2488	2650
19	2464	1353	2462	2360	2478	2509	2546	2618	2664	2497	2575	2611
20	2492	1361	2453	2362	2481	2506	2542	2642	2733	2613	2672	2580
21	2525	1364	2394	2354	2478	2499	2553	2625	2757	2778	2657	2556
22	2549	1376	2389	2336	2475	2503	2596	2452	2513	2596	2630	2527
23	2517	1383	2349	2365	2472	2484	2566	2503	2803	2623	2625	2517
24	2501	1392	2405	2384	2467	2486	2584	2504	2415	2620	2625	2554
25	2494	1396	2460	2470	2481	2511	2657	2536	2661	2537	2620	2680
26	2483	1400	2447	2553	2483	2501	2784	2524	2499	2596	2618	2591
27	2504	1398	2415	2553	2506	2509	2735	2509	2679	2606	2613	2647
28	2504	1388	2386	2513	2667	2534	2293	2525	2647	2579	2645	2686
29	2486	1379	2392	2478		2486	2480	2621	2468	2503	2654	2682
30	2467	1366	2386	2445		2468	2643	2517	2662	2478	2621	2688
31	2455		2435	2426		2443		2365		2536	2648	
Min	2325	1071	1164	2336	2450	2432	2293	2365	2291	2423	2488	2617
Max	2652	2363	2486	2553	2667	2691	2784	2754	2803	2803	2672	2775
Mean	2516	1345	2089	2420	2488	2532	2523	2554	2579	2609	2608	2654
EOM	2455	1366	2435	2426	2667	2443	2643	2365	2662	2536	2648	2688



Appendix A (20 of 38)
Big Thompson River below Olympus Dam, CO

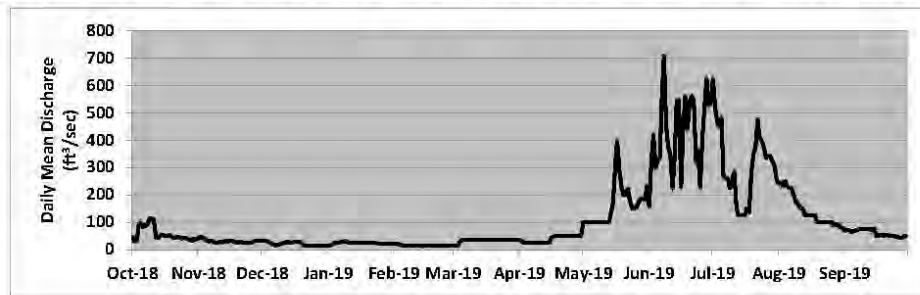
Location. --Lat 40°22'35", long 105°29'06", Larimer County, Hydrologic Unit 10190006, 620 feet downstream from Olympus Dam and 100 feet upstream of Dry Gulch, 2.0 miles east in Estes Park.

Gage. -- Water-stage recorder with satellite telemetry. 15 foot Parshall flume with overflow weirs in a concrete shelter with a supplemental outside gage. Datum of gage at 7422.50 feet.

Remarks. -- Drainage area is 155 mi². Area at site used between 29-Jan-1934 and 21-Mar-1951 was 162 mi². Station consists of data collection platform and digital recorder as primary record. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete. Flow calculations during peak runoff could lose accuracy as the water begins to flow over the outside boards. This record contains operational data which could be subject to future revisions and changes. The official record for this station is published by the Colorado Division of Water Resources.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	47	42	33	14	20	13	36	100	167	623	240	69
2	27	48	32	14	21	13	29	100	315	621	245	70
3	33	43	32	18	20	13	26	100	421	467	230	70
4	94	40	27	26	18	28	26	100	298	450	249	66
5	98	32	24	26	15	36	25	100	324	481	231	68
6	81	31	20	27	15	36	25	100	334	267	226	68
7	88	34	15	27	15	36	25	99	570	260	225	73
8	93	29	17	29	15	36	25	100	709	261	200	74
9	113	26	18	32	16	35	25	101	462	224	171	75
10	113	24	22	28	15	36	25	100	370	249	170	75
11	109	30	27	26	15	36	25	100	349	285	162	75
12	42	26	27	26	15	36	25	101	222	163	162	75
13	43	29	27	26	15	36	25	102	342	124	133	73
14	50	32	27	26	13	36	25	131	545	125	125	75
15	56	30	27	26	13	36	25	171	546	125	126	74
16	49	32	27	26	13	36	43	307	227	125	125	60
17	49	31	28	26	13	36	48	398	448	162	125	60
18	53	29	27	26	13	36	50	289	568	137	125	63
19	49	24	28	26	13	36	49	229	439	270	101	61
20	44	27	20	26	13	36	51	199	541	348	100	62
21	43	28	15	26	13	36	50	201	561	375	99	62
22	46	25	14	26	13	36	50	222	544	477	100	61
23	46	25	14	26	13	36	49	180	319	411	100	60
24	41	25	15	23	13	36	49	151	366	396	100	49
25	43	25	15	21	13	36	50	150	225	374	100	48
26	42	25	14	21	13	36	50	155	409	335	100	45
27	37	30	14	21	13	36	51	172	512	343	88	43
28	34	33	14	21	13	36	50	185	626	339	93	42
29	33	33	14	21		36	49	186	526	321	93	49
30	40	33	14	20		36	53	183	535	305	82	51
31	37		14	20		36		232		254	78	
Min	27	24	14	14	13	13	25	99	167	124	78	42
Max	113	48	33	32	21	36	53	398	709	623	249	75
Mean	57	31	21	24	15	34	38	163	426	309	145	61
ac-ft	3520	1824	1314	1482	819	2063	2248	10002	25372	19000	8894	3607



Appendix A (21 of 38)
Olympus Tunnel near Estes Park, CO

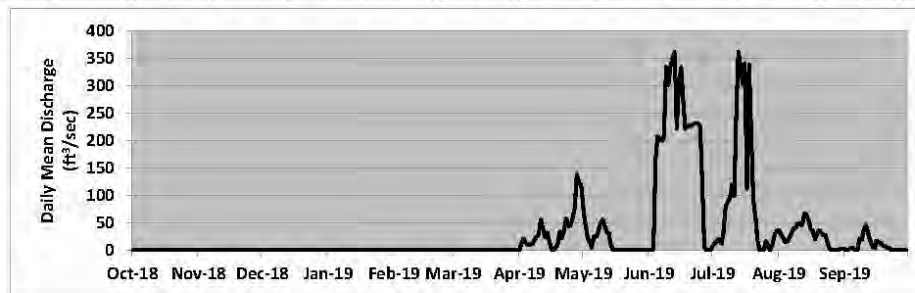
Location. --Lat 40°22'24", long 105°29'00", Larimer County, Hydrologic Unit 10190006, southeast of Estes Park, Colorado.

Gage. -- Water-stage recorder and satellite telemetry. Elevation of gage is 7460 ft (m.s.l.) from topographic map.

Remarks. -- Constructed between 1949 and 1952. The tunnel is 7.2 miles long, between Estes Park and the Pole Hill Canal. Its diameter is 9.75 feet and maximum capacity is 550 cfs. The hydropower diversion operation, also known as the skim operation, diverts water from the Big Thompson River through Olympus Tunnel for power generation at three power plants down the foothills, before returning it to the Big Thompson River near the canyon mouth. The skim daily value is determined based on the data from the stream gages in the system. Period of record includes 01-Oct-2018 through 30-Sep-2019. Records are complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Hydropower Diversion (Skim), cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	75	0	8	37	1
2	0	0	0	0	0	0	13	48	0	14	28	1
3	0	0	0	0	0	0	20	24	0	17	22	1
4	0	0	0	0	0	0	13	15	168	21	14	4
5	0	0	0	0	0	0	10	5	208	12	16	3
6	0	0	0	0	0	0	10	25	202	34	23	0
7	0	0	0	0	0	0	11	24	200	80	30	0
8	0	0	0	0	0	0	18	33	208	89	39	19
9	0	0	0	0	0	0	24	48	336	93	42	19
10	0	0	0	0	0	0	28	56	301	120	50	38
11	0	0	0	0	0	0	56	46	334	98	49	45
12	0	0	0	0	0	0	38	33	349	261	46	31
13	0	0	0	0	0	0	23	31	361	362	66	17
14	0	0	0	0	0	0	32	9	222	334	65	7
15	0	0	0	0	0	0	17	0	302	303	54	4
16	0	0	0	0	0	0	2	0	334	341	38	16
17	0	0	0	0	0	0	0	0	270	112	35	15
18	0	0	0	0	0	0	5	0	222	339	20	12
19	0	0	0	0	0	0	10	0	226	216	30	8
20	0	0	0	0	0	0	34	0	228	90	36	7
21	0	0	0	0	0	0	22	0	227	60	31	4
22	0	0	0	0	0	0	36	0	231	17	27	3
23	0	0	0	0	0	0	58	0	231	0	27	0
24	0	0	0	0	0	0	44	0	231	0	11	0
25	0	0	0	0	0	0	45	0	226	0	1	0
26	0	0	0	0	0	0	57	0	116	16	1	0
27	0	0	0	0	0	0	78	0	5	5	0	0
28	0	0	0	0	0	0	138	0	0	0	0	0
29	0	0	0	0	0	0	124	0	0	9	0	0
30	0	0	0	0	0	0	119	0	0	29	3	0
31	0	0	0	0	0	0	0	0	0	35	3	0
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	0	0	0	0	0	138	75	361	362	66	45
Mean	0	0	0	0	0	0	36	15	191	100	27	9
ac-ft	0	0	0	0	0	0	2152	932	11377	6173	1669	509



Appendix A (22 of 38)
Olympus Tunnel, CO

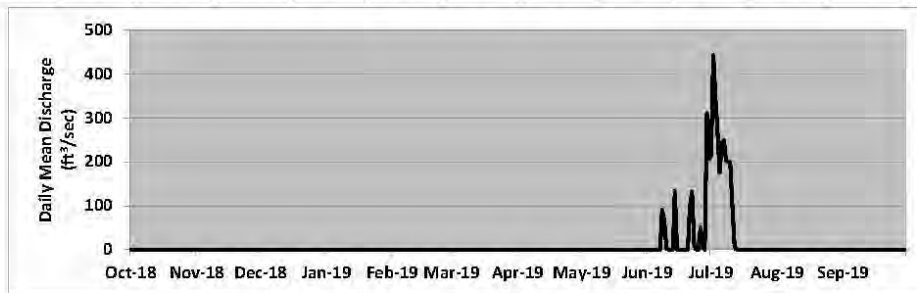
Location. --Lat 40°22'24", long 105°29'00", Larimer County, Hydrologic Unit 10190006, southeast of Estes Park, Colorado.

Gage. -- Water-stage recorder and satellite telemetry. Elevation of gage is 7460 ft (m.s.l.) from topographic map.

Remarks. -- Constructed between 1949 and 1952. The tunnel is 7.2 miles long, between Estes Park and the Pole Hill Canal. Its diameter is 9.75 feet and maximum capacity is 550 cfs. The right to divert native run-off is determined by the Colorado Division of Water Resources. Period of record from 01-Oct-2018 through 30-Sep-2019. Record is complete and reliable.

Priority Diversion Flow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	0	0	216	0	0
2	0	0	0	0	0	0	0	0	0	445	0	0
3	0	0	0	0	0	0	0	0	0	365	0	0
4	0	0	0	0	0	0	0	0	0	272	0	0
5	0	0	0	0	0	0	0	0	0	175	0	0
6	0	0	0	0	0	0	0	0	0	240	0	0
7	0	0	0	0	0	0	0	0	0	250	0	0
8	0	0	0	0	0	0	0	0	92	203	0	0
9	0	0	0	0	0	0	0	0	65	200	0	0
10	0	0	0	0	0	0	0	0	3	200	0	0
11	0	0	0	0	0	0	0	0	0	97	0	0
12	0	0	0	0	0	0	0	0	0	6	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	134	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	96	0	0	0
22	0	0	0	0	0	0	0	0	133	0	0	0
23	0	0	0	0	0	0	0	0	12	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	50	0	0	0
27	0	0	0	0	0	0	0	0	5	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	312	0	0	0
30	0	0	0	0	0	0	0	0	206	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	0	0	0	0	0	0	0	312	445	0	0
Mean	0	0	0	0	0	0	0	0	37	86	0	0
ac-ft	0	0	0	0	0	0	0	0	2195	5271	0	0

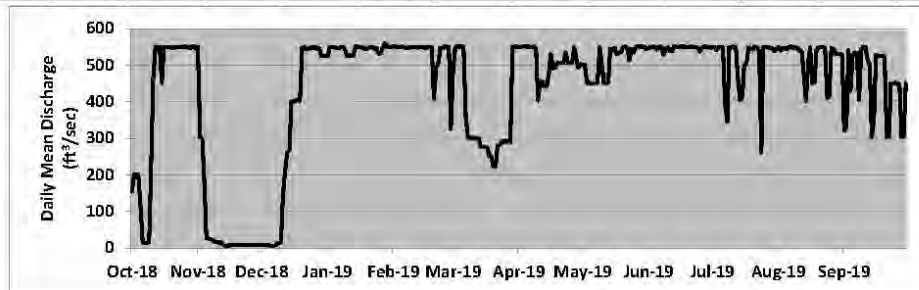


Appendix A (23 of 38)
Olympus Tunnel, CO

Location. --Lat 40°22'24", long 105°29'00", Larimer County, Hydrologic Unit 10190006, southeast of Estes Park, Colorado, on the Big Thompson River.
Gage. -- Water-stage recorder with satellite telemetry. Elevation of gage is 7460 ft (m.s.l.) from topographic map.
Remarks. -- Constructed between 1949 and 1952. The tunnel is 7.2 miles long, between Estes Park and the Pole Hill Canal. Its diameter is 9.75 feet and maximum capacity is 550 cfs. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Records are complete and reliable. This record contains operational data which could be subject to future revisions and changes. Official record is published by the Colorado Division of Water Resources.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	154	550	9	525	552	485	550	502	548	550	549	322
2	202	305	8	550	550	548	550	502	548	549	640	328
3	201	297	8	550	551	552	551	451	551	542	548	541
4	201	187	7	549	549	551	551	452	551	550	546	430
5	114	27	7	548	551	551	551	451	543	550	545	528
6	13	25	6	545	550	551	551	450	550	549	549	535
7	13	25	7	549	548	359	550	451	551	391	551	532
8	13	22	9	550	547	301	551	453	530	346	548	406
9	17	16	13	547	550	302	545	549	542	549	551	543
10	219	15	15	525	549	301	403	501	549	550	547	551
11	468	14	148	525	550	301	456	452	542	551	540	550
12	551	15	209	527	548	301	455	451	538	549	537	511
13	548	9	253	525	549	299	442	453	552	463	477	503
14	551	4	267	551	549	277	442	546	551	405	403	304
15	452	5	401	551	550	276	474	541	549	410	503	355
16	550	7	401	550	546	276	531	548	553	500	550	528
17	550	9	404	549	550	275	492	530	551	501	451	525
18	550	9	404	547	550	252	493	534	551	550	454	526
19	549	9	403	543	550	250	506	536	548	544	542	526
20	548	9	548	547	408	221	506	550	550	543	549	522
21	548	9	550	549	495	224	506	551	551	551	549	303
22	549	9	543	549	502	281	506	546	549	550	549	305
23	549	9	544	544	547	282	535	514	551	540	547	451
24	550	9	550	548	546	291	506	545	548	251	411	451
25	551	9	547	532	551	291	506	535	537	549	414	452
26	551	9	551	532	551	291	507	551	547	549	548	450
27	550	9	543	550	550	293	549	551	551	550	545	445
28	545	9	547	559	324	290	518	551	551	547	530	303
29	551	9	527	551		550	492	551	549	548	530	307
30	552	9	525	549		551	502	551	547	539	532	452
31	547		525	551		551		544		544	525	
Min	13	4	6	525	324	221	403	450	530	251	403	303
Max	552	550	551	559	552	552	551	551	553	551	551	551
Mean	403	55	306	544	533	359	509	513	548	512	521	449
ac-ft	24803	3272	18822	33458	29578	22063	30300	31516	32580	31480	32048	26746



Appendix A (24 of 38)
Pinewood Reservoir near Loveland, Colorado, CO

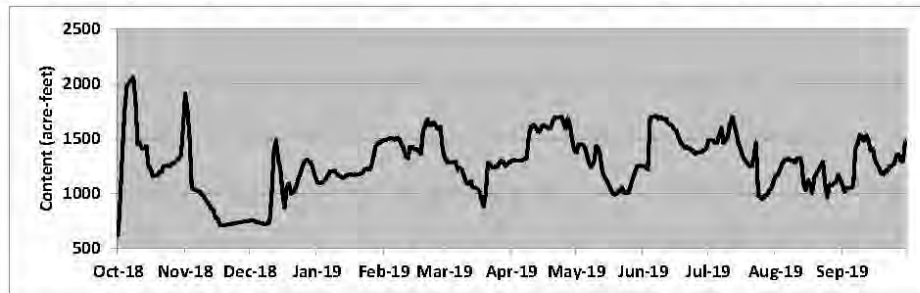
Location. --Lat 40°22', long 105°17.9', Larimer County, Hydrologic Unit 10190006, 10 miles southwest of Loveland, Colorado.

Gage. -- Water-level recorder with satellite telemetry. Elevation of gage is 6,600 feet (m.s.l.) from topographic map.

Remarks. -- Constructed between 1951 and 1952. Impoundment began in January 4, 1954. Active capacity between elevations 6,550.00 and 6,580.00 is 1,570 AF. The gage is capable of measuring the water surface elevation down to 6555.70 feet, a content of 604 AF. Used as the forebay storage for Flatiron Powerplant. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	614	1912	749	1103	1486	1321	1296	1374	1241	1482	1152	1075
2	1009	1763	761	1093	1486	1298	1307	1448	1241	1491	1171	1011
3	1394	1614	761	1099	1499	1278	1296	1446	1217	1483	1211	1061
4	1768	1048	737	1107	1506	1286	1295	1442	1673	1460	1268	1061
5	1986	1042	734	1133	1500	1283	1299	1414	1699	1463	1297	1046
6	2009	1031	726	1164	1487	1290	1305	1330	1698	1535	1311	1073
7	2034	1022	723	1201	1511	1217	1315	1258	1708	1598	1312	1414
8	2060	1010	718	1204	1497	1233	1328	1246	1677	1457	1302	1453
9	1864	983	727	1206	1449	1222	1543	1286	1696	1490	1298	1530
10	1448	956	742	1182	1414	1154	1607	1432	1676	1514	1278	1614
11	1467	923	984	1162	1340	1101	1625	1418	1687	1635	1312	1479
12	1404	899	1374	1152	1316	1084	1608	1340	1652	1699	1328	1630
13	1410	859	1484	1140	1422	1114	1566	1194	1632	1623	1298	1474
14	1436	853	1312	1154	1425	1067	1563	1155	1619	1545	1083	1389
15	1264	771	1217	1169	1399	1048	1615	1111	1589	1450	1028	1411
16	1224	768	995	1174	1404	1043	1619	1073	1576	1397	1119	1308
17	1158	707	870	1167	1378	1025	1606	1033	1522	1330	1072	1265
18	1168	706	1059	1169	1364	941	1590	994	1470	1303	1005	1223
19	1162	709	1087	1170	1566	879	1601	988	1448	1269	1140	1186
20	1196	713	998	1175	1618	988	1660	1008	1414	1248	1183	1167
21	1191	716	1012	1177	1675	1286	1691	1031	1425	1240	1212	1209
22	1248	719	1050	1185	1619	1266	1690	1054	1410	1330	1248	1204
23	1263	723	1105	1220	1627	1232	1694	1005	1400	1464	1292	1252
24	1247	727	1166	1223	1646	1240	1701	1009	1381	980	1090	1256
25	1251	730	1233	1215	1616	1242	1640	1003	1359	972	963	1272
26	1274	734	1281	1245	1585	1263	1593	1074	1369	944	1080	1347
27	1279	737	1308	1321	1610	1298	1687	1132	1379	977	1072	1366
28	1293	741	1294	1428	1408	1289	1612	1189	1376	983	1090	1293
29	1320	743	1288	1450		1249	1488	1237	1394	1026	1104	1283
30	1347	747	1233	1466		1266	1390	1260	1413	1042	1167	1472
31	1619		1160	1479		1283		1247		1095	1125	
Min	614	706	718	1093	1316	879	1296	988	1217	944	963	1011
Max	2060	1912	1484	1479	1675	1321	1701	1448	1708	1699	1328	1630
Mean	1399	917	1028	1211	1495	1186	1528	1201	1501	1339	1181	1287
EOM	1619	747	1160	1479	1408	1283	1390	1247	1413	1095	1125	1472



Appendix A (25 of 38)
Flatiron Reservoir, CO

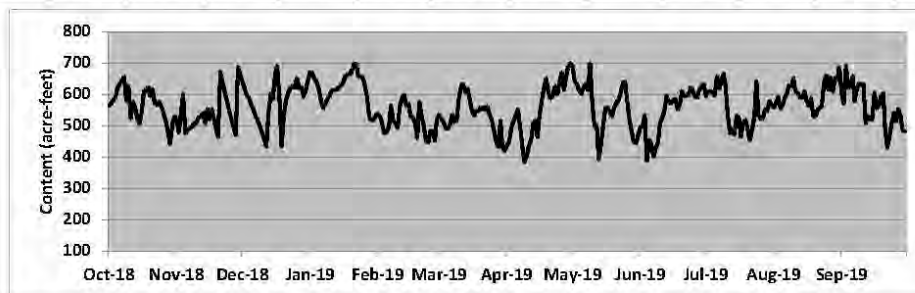
Location. --Lat 40°22.1', long 105°13.3', Larimer County, Hydrologic Unit 10190006, 8 miles southwest of Loveland, Colorado.

Gage. -- Water-level recorder with satellite telemetry. Elevation of gage is 5,600 feet (m.s.l.) from topographic map.

Remarks. -- Constructed between 1951 and 1953. Impoundment began in January, 1954. Active capacity between elevations 5,462.00 and 5,472.80 is 436 AF. Used as the afterbay storage for Flatiron Powerplant. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	561	516	639	671	538	534	436	690	494	694	557	604
2	570	477	619	668	530	620	446	641	496	610	673	570
3	579	536	597	661	503	512	494	632	533	611	590	691
4	592	599	589	641	474	492	514	614	388	603	554	622
5	619	476	568	614	480	490	531	600	463	598	665	629
6	632	486	562	579	493	504	551	621	439	657	589	658
7	644	491	531	566	564	534	498	633	401	618	604	578
8	655	496	518	571	516	511	433	613	428	644	630	619
9	579	504	498	586	610	517	384	699	446	664	626	632
10	625	611	476	597	493	585	403	568	510	627	551	630
11	523	524	467	613	563	625	435	496	523	534	609	631
12	576	530	433	613	589	631	455	502	548	475	604	508
13	559	541	544	613	597	606	505	392	595	486	591	530
14	520	508	601	622	563	616	515	438	575	471	589	518
15	508	552	584	627	570	583	462	498	572	531	609	521
16	544	519	666	632	530	550	540	556	579	526	578	605
17	612	552	691	656	525	533	580	557	585	465	662	556
18	610	524	593	663	509	548	623	547	553	507	589	555
19	621	493	434	663	460	547	650	530	567	517	530	593
20	595	462	530	673	576	558	603	567	609	489	530	603
21	615	671	580	693	531	555	586	571	596	453	550	484
22	572	640	607	698	498	550	597	581	596	486	558	428
23	566	607	618	657	449	561	625	608	599	524	563	469
24	575	578	627	656	447	536	599	637	621	642	636	510
25	563	548	621	663	480	618	639	638	611	633	661	541
26	540	520	650	630	482	486	668	574	593	522	613	514
27	514	495	619	593	453	449	612	522	590	522	654	553
28	482	469	622	528	519	432	653	482	615	549	608	527
29	440	687	591	516		514	686	447	625	546	651	482
30	504	664	612	519		431	699	445	632	577	648	482
31	528		645	530		419		469		566	687	
Min	440	462	433	516	447	419	384	392	388	463	530	428
Max	655	687	691	698	697	631	699	699	632	664	687	691
Mean	568	539	578	619	516	531	547	560	546	553	599	562
EOM	528	664	645	530	519	419	699	469	632	566	687	482



Appendix A (26 of 38)
Flatiron Powerplant Unit #3 Pump, CO

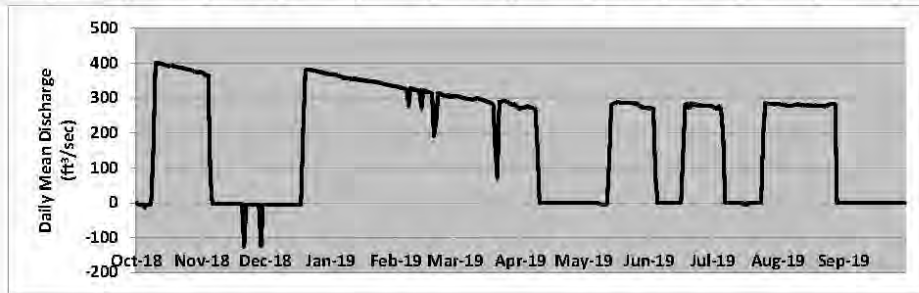
Location. --Lat 40°21'53", long 105°14'09", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado

Gage. -- There is a flow meter in place.

Remarks. -- Constructed between 1951 and 1953. The Powerplant consists of three generating units. Unit #3 can be used to pump water from Flatiron Reservoir to Carter Lake, or to generate power. For the purpose of this table, any negative values indicate power generation or leakage through the conduit from Carter Lake into Flatiron Reservoir. The maximum capacity of the pump is approximately 480 cfs, but the efficiency varies according to the water surface levels at Carter Lake and Flatiron Reservoir. Discharges are measured using a flow meter inside the pressure conduit. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	373	-5	369	333	306	271	0	271	276	284	0
2	-4	370	-5	369	332	305	271	0	271	273	281	0
3	-4	365	-5	368	331	304	272	0	269	269	281	0
4	-4	365	-5	367	329	301	277	0	70	277	282	0
5	-13	77	-5	363	327	300	274	0	0	271	279	0
6	-5	-3	-5	362	325	299	272	0	0	192	279	0
7	-5	-3	-5	367	277	296	271	0	0	0	278	0
8	-5	-3	-5	359	328	297	265	-2	0	0	278	0
9	148	-3	-5	367	326	295	153	-5	0	0	282	0
10	401	-3	-5	356	324	296	0	-4	0	0	279	0
11	401	-3	-5	354	322	300	0	-4	0	0	283	0
12	398	-3	-5	355	324	300	0	-4	0	0	279	0
13	398	-3	-5	365	271	297	0	124	0	0	280	0
14	396	-3	-5	353	322	295	0	280	0	0	278	0
15	393	-3	-5	352	319	292	0	284	0	0	280	0
16	391	-3	-5	362	319	290	0	287	0	-5	279	0
17	392	-3	-5	349	316	290	0	289	134	-5	278	0
18	395	-3	-5	351	314	285	0	288	280	0	279	0
19	390	-3	210	348	191	281	0	287	283	0	279	0
20	389	-3	378	348	232	163	0	286	271	0	278	0
21	387	-127	381	347	315	68	0	286	285	0	279	0
22	388	-4	381	346	312	289	0	287	280	0	278	0
23	386	-4	380	345	310	288	0	287	283	0	277	0
24	384	-5	379	344	305	293	0	286	278	0	277	0
25	383	-5	378	344	308	291	0	284	279	200	281	0
26	382	-5	377	341	307	288	0	286	279	285	282	0
27	380	-5	375	339	303	284	0	280	277	284	286	0
28	378	-5	375	337	305	280	0	276	277	283	282	0
29	376	-125	371	336		282	0	273	278	285	0	0
30	374	-5	369	335		275	0	273	278	282	0	0
31	375		369	334		270		271		284	0	
Min	-13	-127	-5	334	191	68	0	-5	0	-5	0	0
Max	401	373	381	369	333	306	277	289	285	285	285	0
Mean	279	-40	150	351	308	281	78	165	166	111	253	0
ac-ft	17148	2409	9202	21603	17113	17263	4616	10304	9211	6845	15546	0



Appendix A (27 of 38)
CHFC 930 Section, CO

Location. --Lat 40°22'26", Long 105°13'52", Larimer County, Hydrologic Unit 10190006, 8 miles southwest of Loveland, Colorado.

Gage. -- Water-stage recorder with satellite telemetry. Elevation of gage is 5470 feet from topographic map.

Remarks. -- Constructed between 1949 and 1953. The canal is 3.8 miles long and has a maximum capacity of 930 cfs. The canal is used to move C-BT water and diverted native water to the Big Thompson River and/or Horsetooth Reservoir. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Data from this station has been questioned in the past for its low accuracy, due to algae growth issues. The record is complete and fair. This record contains operational data which could be subject to future revisions and changes.

Flow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	20	25	171	220	190	243	537	260	262	220	370
2	0	25	24	178	237	252	255	506	261	268	221	341
3	0	25	24	180	241	261	256	468	261	271	222	436
4	0	25	24	180	233	243	255	473	306	286	229	444
5	0	25	25	180	226	240	256	489	492	272	232	515
6	0	25	25	180	225	232	256	498	548	283	231	498
7	0	26	25	181	220	77	291	500	549	371	246	378
8	0	26	25	176	250	2	299	488	514	386	243	341
9	0	26	25	175	250	0	300	509	500	510	256	480
10	0	26	26	175	251	0	360	520	500	551	245	565
11	69	26	26	176	233	0	439	520	501	525	240	573
12	130	25	24	175	226	0	467	512	517	530	240	546
13	142	25	151	176	222	0	445	470	509	475	209	526
14	146	25	327	178	247	0	449	262	543	422	220	329
15	146	26	450	188	244	0	488	252	540	405	225	307
16	141	25	476	191	248	0	496	251	530	501	225	532
17	140	24	466	191	251	0	489	265	403	539	192	575
18	139	26	354	195	250	0	495	271	284	520	180	537
19	140	25	245	197	289	0	508	263	238	531	208	525
20	140	25	150	196	87	0	528	246	264	547	230	519
21	140	26	129	196	161	0	533	242	266	540	235	327
22	140	26	120	197	230	0	540	241	266	455	236	300
23	152	26	119	208	249	0	546	240	266	426	237	384
24	155	27	127	215	226	0	521	241	265	425	187	411
25	156	26	128	204	236	0	523	248	273	374	171	411
26	155	26	130	201	251	0	525	258	275	246	220	410
27	163	25	160	200	239	0	540	261	277	230	236	410
28	165	26	172	214	84	10	561	261	270	226	255	328
29	166	25	170	216		198	565	262	268	226	409	301
30	122	25	170	211		260	577	258	266	214	522	301
31	10		170	211		236		260		214	532	
Min	0	20	24	171	84	0	243	240	238	214	171	300
Max	166	27	476	216	289	260	577	537	549	551	532	575
Mean	92	25	145	191	226	71	433	357	374	388	250	431
ac-ft	5670	1501	8933	11717	12546	4347	25774	21965	22236	23845	16380	25626



Appendix A (28 of 38)
Dille Tunnel near Drake, CO

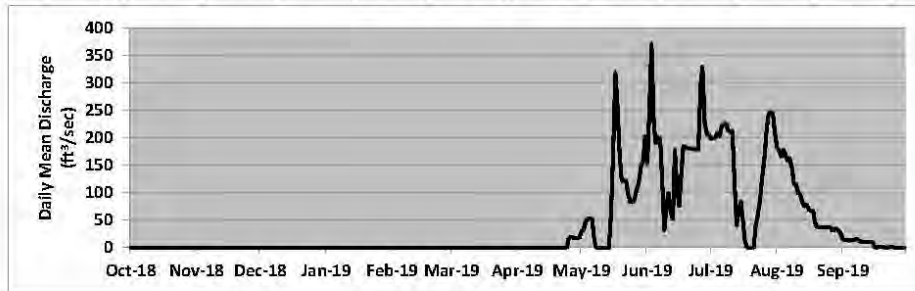
Location. --Lat 40°25'02", long 105°14'35", Larimer County, Hydrologic Unit 10190006, 11 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- Water-stage recorder with satellite telemetry at Parshall Flume. Elevation of gage is 5520 feet (m.s.l.) from topographic map.

Remarks. -- Constructed in 1950. Maximum capacity is 600 cfs. Dille Tunnel diverts water from the Big Thompson River for power generation and water supply. The hydropower diversion operation, also known as the skim operation, diverts water from the Big Thompson River through Dille Tunnel for power generation at the Big Thompson Power Plant, where the diverted water is returned to the river. The skim daily value is determined based on the data from the gage. Record is complete and accurate.

Hydropower Diversion Flow (Skim), cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	30	153	199	183	15
2	0	0	0	0	0	0	0	33	253	200	177	13
3	0	0	0	0	0	0	0	47	372	200	167	16
4	0	0	0	0	0	0	0	53	230	210	179	13
5	0	0	0	0	0	0	0	53	190	204	168	13
6	0	0	0	0	0	0	0	53	201	222	160	14
7	0	0	0	0	0	0	0	14	200	225	163	16
8	0	0	0	0	0	0	0	0	127	226	145	16
9	0	0	0	0	0	0	0	0	32	214	116	12
10	0	0	0	0	0	0	0	0	75	210	116	11
11	0	0	0	0	0	0	0	0	100	212	100	11
12	0	0	0	0	0	0	0	0	65	118	96	10
13	0	0	0	0	0	0	0	0	52	40	82	10
14	0	0	0	0	0	0	0	0	178	69	75	10
15	0	0	0	0	0	0	0	67	108	84	78	10
16	0	0	0	0	0	0	0	186	76	49	70	1
17	0	0	0	0	0	0	0	319	139	9	67	0
18	0	0	0	0	0	0	0	258	186	0	67	1
19	0	0	0	0	0	0	0	166	183	0	44	1
20	0	0	0	0	0	0	0	122	181	0	38	1
21	0	0	0	0	0	0	0	123	181	0	37	0
22	0	0	0	0	0	0	0	123	181	39	37	0
23	0	0	0	0	0	0	0	98	180	60	37	1
24	0	0	0	0	0	0	0	84	179	87	38	1
25	0	0	0	0	0	0	15	83	178	126	38	0
26	0	0	0	0	0	0	20	89	296	158	38	0
27	0	0	0	0	0	0	18	105	330	211	31	0
28	0	0	0	0	0	0	18	120	229	242	33	0
29	0	0	0	0	0	0	18	149	207	247	35	0
30	0	0	0	0	0	0	18	157	206	245	31	0
31	0	0	0	0	0	0	0	203	0	211	25	0
Min	0	0	0	0	0	0	0	0	32	0	25	0
Max	0	0	0	0	0	0	20	319	372	247	183	16
Mean	0	0	0	0	0	0	4	88	176	139	86	7
ac-ft	0	0	0	0	0	0	213	5420	10446	8561	5294	388



Appendix A (29 of 38)
Dille Tunnel near Drake, CO

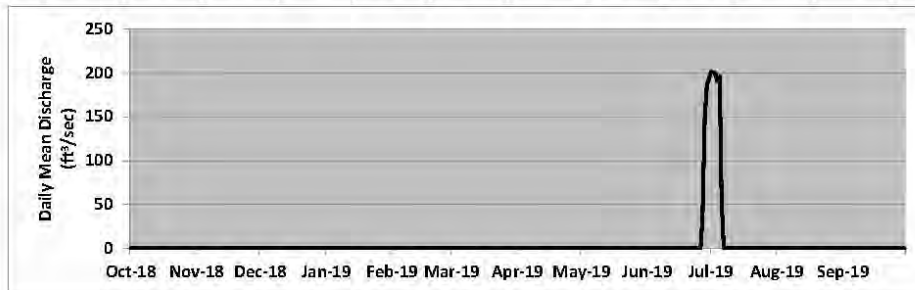
Location. --Lat 40°25'02", long 105°14'35", Larimer County, Hydrologic Unit 10190006, 11 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- None.

Remarks. -- Constructed in 1950. Maximum capacity is 600 cfs. Dille Tunnel diverts water from the Big Thompson River for power generation and water supply. The right to divert native run-off is determined by the State of Colorado. The numbers presented in this table are based on gaged flows and available priority water. Record is complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Priority Diversion Flow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	0	0	201	0	0
2	0	0	0	0	0	0	0	0	0	200	0	0
3	0	0	0	0	0	0	0	0	0	200	0	0
4	0	0	0	0	0	0	0	0	0	190	0	0
5	0	0	0	0	0	0	0	0	0	196	0	0
6	0	0	0	0	0	0	0	0	0	54	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	35	0	0	0
28	0	0	0	0	0	0	0	0	147	0	0	0
29	0	0	0	0	0	0	0	0	186	0	0	0
30	0	0	0	0	0	0	0	0	194	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	0	0	0	0	0	0	0	194	201	0	0
Mean	0	0	0	0	0	0	0	0	19	34	0	0
ac-ft	0	0	0	0	0	0	0	0	1115	2066	0	0



Appendix A (30 of 38)
Dille Tunnel near Drake, CO

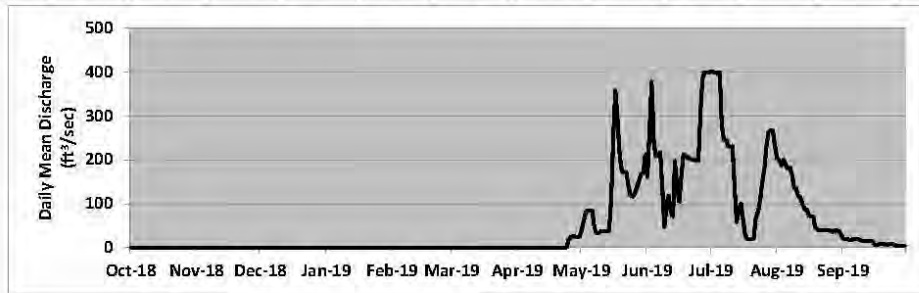
Location. --Lat 40°25'02", long 105°14'35", Larimer County, Hydrologic Unit 10190006, 11 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- Water-stage recorder with satellite telemetry at Parshall Flume. Elevation of gage is 5520 feet from topographic map.

Remarks. -- Constructed in 1950. The Dille Tunnel has a maximum capacity is 600 cfs, but only 400 cfs can be measured accurately. Dille Tunnel diverts water from the Big Thompson River for power generation and water supply. Record is complete and reliable. This record contains operational data which could be subject to future revisions and changes. The official record is published by the Colorado Division of Water Resources.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
1	0	0	0	0	0	0	0	39	160	401	204	21	
2	0	0	0	0	0	0	0	60	264	400	198	19	
3	0	0	0	0	0	0	0	80	379	399	188	20	
4	0	0	0	0	0	0	0	85	241	398	200	18	
5	0	0	0	0	0	0	0	85	208	401	189	18	
6	0	0	0	0	0	0	0	85	213	282	181	19	
7	0	0	0	0	0	0	0	45	217	245	184	21	
8	0	0	0	0	0	0	0	34	142	246	166	20	
9	0	0	0	0	0	0	0	33	47	233	137	17	
10	0	0	0	0	0	0	0	37	96	230	134	15	
11	0	0	0	0	0	0	0	38	118	231	117	16	
12	0	0	0	0	0	0	0	38	81	135	113	15	
13	0	0	0	0	0	0	0	38	71	57	98	15	
14	0	0	0	0	0	0	0	38	197	86	88	15	
15	0	0	0	0	0	0	0	112	134	101	88	15	
16	0	0	0	0	0	0	0	262	105	66	74	6	
17	0	0	0	0	0	0	0	359	167	29	70	5	
18	0	0	0	0	0	0	0	290	212	21	70	8	
19	0	0	0	0	0	0	0	207	208	21	47	8	
20	0	0	0	0	0	0	0	175	206	21	41	7	
21	0	0	0	0	0	0	0	172	203	21	40	7	
22	0	0	0	0	0	0	0	172	201	67	40	7	
23	0	0	0	0	0	0	0	144	200	81	40	8	
24	0	0	0	0	0	0	0	120	199	108	40	7	
25	0	0	0	0	0	0	0	17	116	198	147	40	7
26	0	0	0	0	0	0	0	24	123	316	179	40	4
27	0	0	0	0	0	0	0	26	137	388	232	36	4
28	0	0	0	0	0	0	0	25	151	399	263	39	4
29	0	0	0	0	0	0	0	25	167	400	268	41	5
30	0	0	0	0	0	0	0	25	170	399	266	37	5
31	0	0	0	0	0	0	0	212	212	232	31		
Min	0	0	0	0	0	0	0	33	47	21	31	4	
Max	0	0	0	0	0	0	26	369	400	401	204	21	
Mean	0	0	0	0	0	0	5	123	212	189	97	12	
ac-ft	0	0	0	0	0	0	282	7684	12633	11631	5967	707	



Appendix A (31 of 38)
Big Thompson Power Plant, CO

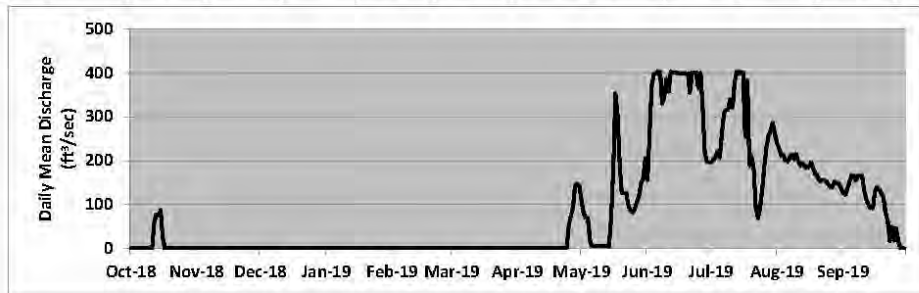
Location. --Lat 40°25'16", long 105°13'26", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- Flow meter with satellite telemetry. Elevation of gage is 5280 feet (m.s.l.) from topographic map.

Remarks. -- Initial operation in 1959. Maximum capacity is 400 cfs. Power plant returns hydropower diversions to the Big Thompson River downstream of the Big Thompson River canyon mouth. The plant is also used to deliver C-BT project and Windy Gap Project water to the Big Thompson River. The plant is winterized from November through April, each year. This record contains data recorded between 01-Oct-2018 and 30-Sep-2019. Record is complete and fair. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	105	155	197	239	126
2	0	0	0	0	0	0	0	81	253	203	227	123
3	0	0	0	0	0	0	0	70	370	207	211	135
4	0	0	0	0	0	0	0	68	398	221	213	151
5	0	0	0	0	0	0	0	18	398	207	200	166
6	0	0	0	0	0	0	0	5	402	257	199	167
7	0	0	0	0	0	0	0	5	403	306	208	155
8	0	0	0	0	0	0	0	5	329	317	212	168
9	0	0	0	0	0	0	0	5	348	316	203	163
10	0	0	0	0	0	0	0	5	387	341	214	166
11	0	0	0	0	0	0	0	5	357	322	197	132
12	61	0	0	0	0	0	0	5	402	379	190	111
13	77	0	0	0	0	0	0	5	401	403	194	100
14	76	0	0	0	0	0	0	4	400	403	188	93
15	88	0	0	0	0	0	0	73	400	397	183	91
16	28	0	0	0	0	0	0	192	400	401	187	127
17	0	0	0	0	0	0	0	354	399	254	196	140
18	0	0	0	0	0	0	0	305	399	384	181	135
19	0	0	0	0	0	0	0	187	400	190	170	124
20	0	0	0	0	0	0	0	126	399	210	164	118
21	0	0	0	0	0	0	0	126	365	180	154	80
22	0	0	0	0	0	0	0	127	401	94	155	63
23	0	0	0	0	0	0	0	100	400	69	156	16
24	0	0	0	0	0	0	0	87	400	94	152	50
25	0	0	0	0	0	0	0	50	82	365	132	147
26	0	0	0	0	0	0	0	75	89	401	187	140
27	0	0	0	0	0	0	0	93	105	325	231	140
28	0	0	0	0	0	0	0	143	120	219	255	152
29	0	0	0	0	0	0	0	147	150	198	269	150
30	0	0	0	0	0	0	0	142	157	197	287	148
31	0	0	0	0	0	0	0	205	0	261	138	0
Min	0	0	0	0	0	0	0	4	155	69	138	0
Max	88	0	0	0	0	0	147	354	403	403	239	168
Mean	11	0	0	0	0	0	22	96	355	257	181	99
ac-ft	650	0	0	0	0	0	1287	5895	21145	15808	11127	5914



Appendix A (32 of 38)
CHFC Wasteway, CO

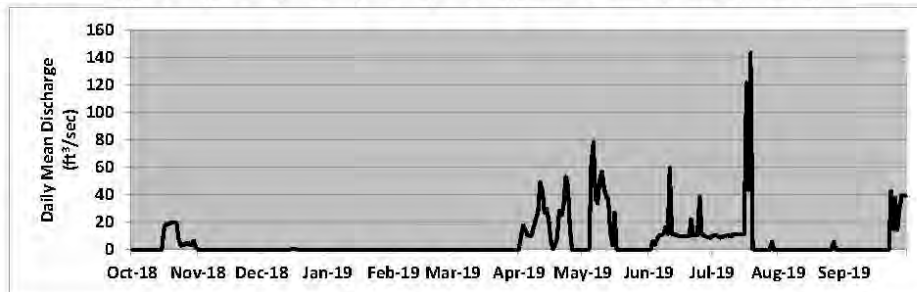
Location. --Lat 40°25'13", long 105°13'28", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- Water-stage recorder with satellite telemetry at 15 foot Parshall Flume. Elevation of gage is 5465 feet (m.s.l.) from Designer's Operating Criteria.

Remarks. -- Constructed between 1949 and 1953. Maximum capacity is 400 cfs. The structure is used to return diverted water and to deliver C-BT and Windy Gap Project water to the Big Thompson River. The facility is winterized between November and April. Recorder was operated during October 2018 and also between April 2019 and September 2019. Record is complete and reliable. These data are provisional operations data and are subject to further revision and change. The official record is published by the Colorado Division of Water Resources.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	0	0	10	0	0
2	0	0	0	0	0	0	10	0	0	11	0	0
3	0	0	0	0	0	0	18	0	6	10	0	0
4	0	0	0	0	0	0	15	0	4	9	0	0
5	0	0	0	0	0	0	11	61	8	9	0	0
6	0	0	0	0	0	0	10	78	11	10	0	0
7	0	0	0	0	0	0	11	37	10	10	0	0
8	0	0	0	0	0	0	17	34	12	10	0	0
9	0	0	0	0	0	0	23	51	16	10	0	0
10	0	0	0	0	0	0	27	57	11	10	0	0
11	0	0	0	0	0	0	49	45	60	11	0	0
12	0	0	0	0	0	0	43	39	11	11	0	0
13	0	0	0	0	0	0	27	37	11	11	0	0
14	0	0	0	0	0	0	30	13	11	11	0	0
15	0	0	0	0	0	0	21	3	10	11	0	0
16	15	0	0	0	0	0	7	27	10	11	0	0
17	19	0	0	0	0	0	0	0	10	122	0	0
18	19	0	0	0	0	0	4	0	10	43	0	0
19	19	0	0	0	0	0	8	0	10	144	0	0
20	20	0	0	0	0	0	29	0	10	0	0	0
21	20	0	0	0	0	0	25	0	22	0	0	0
22	20	0	0	0	0	0	31	0	10	0	0	0
23	7	0	0	0	0	0	53	0	10	0	0	43
24	3	0	0	0	0	0	47	0	10	0	0	15
25	5	0	0	0	0	0	16	0	39	0	0	38
26	4	0	0	0	0	0	0	0	11	0	0	14
27	5	0	0	0	0	0	0	0	10	0	6	29
28	4	0	0	0	0	0	0	0	9	0	0	40
29	3	0	0	0	0	0	0	0	9	6	0	40
30	6	0	0	0	0	0	0	0	9	0	0	39
31	2	0	0	0	0	0	0	0	0	0	0	0
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	20	0	0	0	0	0	53	78	60	144	6	43
Mean	5	0	0	0	0	0	18	16	12	16	0	9
ac-ft	335	0	3	0	0	0	1053	961	736	958	12	511



Appendix A (33 of 38)
CHFC 550 Section, CO

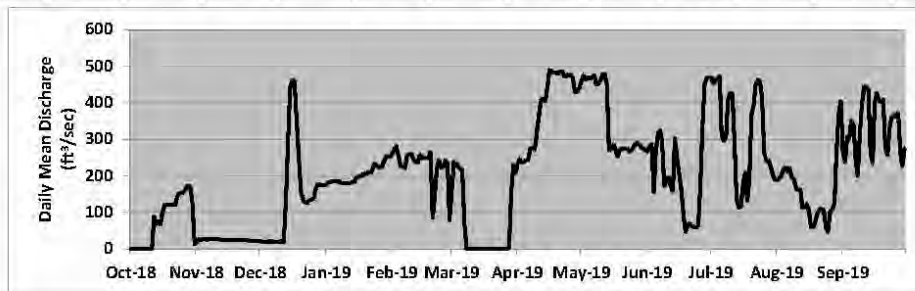
Location. --Lat 40°25'25", long 105°13'34", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado.

Gage. -- Water-stage recorder with satellite telemetry. Elevation of gage is 5460 feet (m.s.l.) from topographic map.

Remarks. -- Constructed between 1949 and 1953. The canal is 9.4 miles long and has a maximum capacity of 550 cfs. The canal is used to move C-BT water and Big Thompson River priority water to Horsetooth Reservoir. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	17	20	175	261	158	232	460	266	469	187	267
2	0	26	20	181	273	236	245	473	280	454	193	237
3	0	26	20	184	281	232	237	463	286	458	199	307
4	0	26	20	184	252	225	238	470	155	465	217	301
5	0	26	20	184	224	219	243	466	262	473	224	361
6	0	26	20	184	226	215	244	468	315	309	213	338
7	0	26	20	184	221	68	273	474	323	297	220	245
8	0	26	20	180	256	0	278	450	290	305	195	200
9	0	26	20	179	258	0	272	453	173	409	189	319
10	0	27	20	180	260	0	315	462	187	428	166	398
11	0	26	20	179	246	0	365	476	195	425	169	443
12	90	25	19	181	239	0	408	478	173	288	160	442
13	68	25	134	181	235	0	410	446	158	136	111	436
14	74	24	302	183	256	0	404	270	302	111	114	262
15	66	25	439	193	248	0	443	274	249	117	122	235
16	101	24	462	197	249	0	490	284	206	171	106	398
17	121	24	457	198	250	0	485	273	159	208	59	427
18	121	24	360	202	248	0	482	253	94	131	59	403
19	120	24	257	206	265	0	484	271	46	186	74	403
20	120	23	166	207	85	0	478	275	68	367	96	407
21	120	24	138	210	143	0	484	274	70	393	109	270
22	120	24	127	208	222	0	486	273	62	449	109	257
23	144	24	126	222	242	0	471	272	60	461	107	334
24	153	24	133	233	223	0	471	265	58	458	59	359
25	152	24	136	226	225	0	477	274	62	416	46	365
26	155	23	136	222	241	0	475	285	185	261	100	361
27	166	22	163	224	235	0	467	288	336	242	109	373
28	172	22	177	237	77	2	430	288	450	241	124	261
29	170	22	175	251		154	430	279	469	227	264	226
30	126	21	174	251		231	441	273	469	202	371	275
31	14		175	253		207		271		190	404	
Min	0	17	19	175	77	0	232	253	46	111	46	200
Max	172	27	462	253	281	236	490	478	469	473	404	443
Mean	77	24	144	203	230	63	389	354	214	314	157	330
ac-ft	4707	1436	8856	12457	12776	3861	23120	21783	12712	19336	9646	19637



Appendix A (34 of 38)
Horsetooth Reservoir near Fort Collins, CO

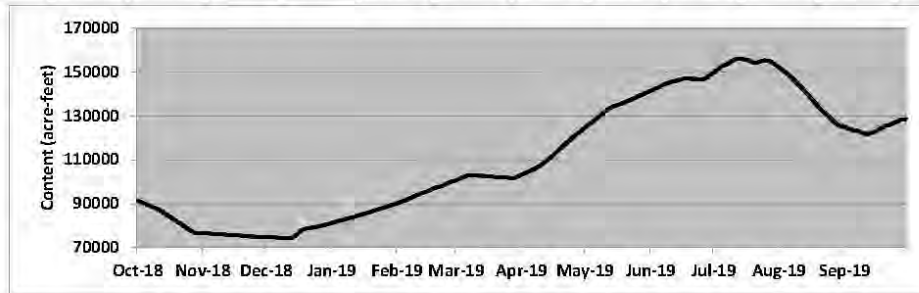
Location. —Lat 40°36'00", long 105°10'05", Larimer County, Hydrologic Unit 10190007, at Horsetooth Dam outlet works, 4.8 miles west of Fort Collins, Colorado.

Gage. — Water level recorder with satellite telemetry. Elevation of gage is 5300 feet (m.s.l.) from topographic map.

Remarks. — Reservoir is formed by four earth-fill dams. Construction completed in 1949. Impoundment began in 1951. Horsetooth Reservoir is one of two terminal reservoirs for C-BT diversions. Trans-mountain diversions are stored at Horsetooth Reservoir before final delivery. Maximum capacity is 156,735 AF at elevation 5430.00 ft, with 142,038 AF of active storage. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	91477	76654	74818	81234	90220	100581	103296	124769	141500	149904	152082	126220
2	91047	76767	74804	81452	90586	101180	103673	125455	141886	150601	151360	124643
3	90694	76541	74734	81728	90939	101585	104084	126160	142465	151340	150661	124103
4	90266	76471	74720	81991	91308	102067	104512	126941	142678	152042	149924	123816
5	89837	76387	74678	82311	91694	102512	104940	127689	143086	152806	149129	123683
6	89395	76288	74539	82487	92079	102970	105337	128490	143706	153248	148335	123476
7	89015	76232	74511	82839	92435	103149	105883	129185	144261	153611	147407	123314
8	88621	76105	74483	83102	92838	103036	106381	130031	144738	153975	146422	122902
9	88197	76077	74414	83362	93258	102986	106864	130842	144914	154601	145461	122955
10	87804	75993	74386	83632	93709	102904	107647	131636	145324	155189	144623	122028
11	87412	75979	74275	83966	94037	102822	108333	132415	145639	155778	143689	121814
12	86841	75894	74234	84222	94490	102740	109072	133197	145774	156002	142662	121796
13	86242	75824	74372	84473	94835	102773	109814	133905	145911	156042	141480	122188
14	85542	75726	74859	84740	95195	102891	110507	134243	146382	156981	140403	122474
15	84858	75684	75628	85022	95573	102859	111270	134618	146658	156839	139313	122706
16	84252	75600	76513	85304	96030	102545	112208	134955	146875	155758	138207	123188
17	83676	75670	77361	85632	96489	102480	113046	135219	147072	155737	137163	123816
18	82999	75656	78029	85900	96916	102431	113956	135501	147170	155169	136028	124337
19	82311	76390	78485	86198	97329	102301	114852	135934	147013	154581	134899	124869
20	81670	75362	78685	86527	97456	102252	115718	136443	146953	154439	133925	125491
21	81248	75334	78885	86721	97694	102138	116656	136821	146894	154237	132973	125671
22	80553	75236	79042	87127	98061	102106	117546	137181	146855	154500	132025	125907
23	79788	75180	79171	87367	98556	102008	118386	137598	146973	154864	131211	126306
24	79142	75041	79344	87834	98908	101894	119247	138054	146737	155209	130288	126741
25	78499	76110	79516	88076	99341	101877	120069	138416	146559	155432	129240	127169
26	77872	76041	79688	88378	99936	101780	120891	138873	146697	155330	128271	127669
27	77333	76041	79948	88621	100274	101715	121690	139332	147131	155189	127286	128199
28	76782	74985	80163	88954	100306	101472	122349	139809	147742	154783	126360	128381
29	76782	74957	80452	89258		101894	123153	140250	148473	154217	125635	128453
30	76824	74929	80654	89593		102398	123888	140633	149188	153630	125437	128654
31	76725		80944	89883		102888		141076		152825	125509	
Min	76725	74929	74234	81234	90220	100581	103296	124769	141500	149904	125437	121796
Max	91477	76767	80944	89883	100306	103149	123888	141076	149188	156042	152082	128654
Mean	83990	75705	76978	85416	95375	102285	112509	134053	145771	154283	138294	124706
EOM	76725	74929	80944	89883	100306	102888	123888	141076	149188	152825	125509	128654



Appendix A (35 of 38)
Charles Hansen Supply Canal below Horsetooth Reservoir, CO

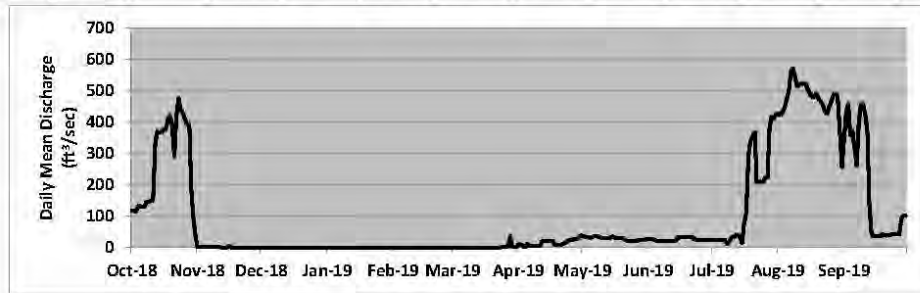
Location. --Lat 40°36'01", long 105°10'18", Larimer County, Hydrologic Unit 10190007, 4 miles west of Fort Collins, Colorado.

Gage. -- Two flow meters with satellite telemetry measure the flow for each conduit leading toward the hollow jet valves.

Remarks. -- Constructed between 1950 and 1952. The canal is 5.1 miles long and has a maximum capacity of 1500 cfs. The canal is used to deliver C-BT and Windy Gap Project water stored at Horsetooth Reservoir. Recorder was operated from 01-Oct-2018 to 30-Sep-2019 by the Northern Water and the Colorado Division of Water Resources. Record is complete and fair. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	119	1	0	0	0	0	11	37	28	25	427	340
2	116	1	0	0	0	0	10	35	28	25	423	430
3	116	1	0	0	0	0	5	33	28	25	432	459
4	133	1	0	0	0	0	1	32	23	25	446	359
5	132	1	0	0	0	0	13	32	20	26	473	372
6	132	1	0	0	0	0	7	35	20	26	500	315
7	131	1	0	0	0	0	7	36	20	26	561	262
8	147	1	0	0	0	0	7	38	21	10	672	402
9	147	1	0	0	0	0	6	33	21	20	642	459
10	150	1	0	0	0	0	5	31	21	31	614	459
11	151	1	0	0	0	0	5	31	21	35	523	427
12	333	1	0	0	0	0	20	31	21	39	621	368
13	370	1	0	0	0	0	22	31	21	39	626	133
14	369	1	0	0	0	0	22	31	23	38	621	42
15	368	1	0	0	0	0	22	36	33	15	905	38
16	376	6	0	0	0	0	22	32	34	76	492	37
17	377	0	0	0	0	0	22	31	34	109	482	37
18	410	0	0	0	0	0	10	31	34	289	482	36
19	422	0	0	0	0	0	8	31	34	342	492	43
20	390	0	0	0	0	0	9	31	34	356	477	41
21	290	0	0	0	0	0	9	24	34	370	466	38
22	416	0	0	0	0	0	12	21	31	210	457	40
23	479	0	0	0	0	1	14	21	26	214	435	42
24	440	0	0	0	0	1	22	20	25	208	427	42
25	430	0	0	0	0	1	25	21	25	210	446	42
26	410	0	0	0	0	1	24	21	25	222	465	42
27	394	0	0	0	0	1	28	23	25	224	488	42
28	394	0	0	0	0	36	28	25	25	378	490	93
29	188	0	0	0	0	1	30	25	25	419	487	102
30	92	0	0	0	0	1	39	25	25	412	374	102
31	32	0	0	0	0	1	27	27	27	425	266	266
Min	32	0	0	0	0	0	1	20	20	10	256	36
Max	479	6	0	0	0	36	39	38	34	425	672	459
Mean	273	1	0	0	0	1	15	29	26	157	474	188
ac-ft	16767	41	0	0	0	91	920	1806	1560	9656	29159	11191



Appendix A (36 of 38)
Carter Lake near Berthoud, Colorado, CO

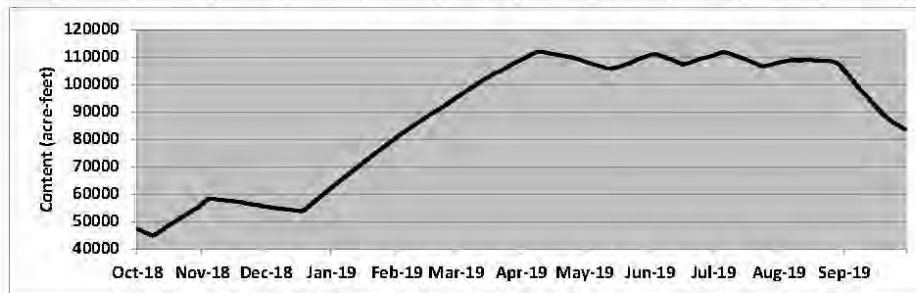
Location. --Lat 40°19' 28" , long 105°12' 41" , Larimer County, Hydrologic Unit 10190006, on Dam #1, 7 miles northwest of Berthoud, Colorado, and 10 miles west of Loveland, Colorado.

Gage. --Water level recorder with satellite telemetry. Elevation of gage is 5770 feet (m.s.l.) from topographic map.

Remarks. --Reservoir is formed by three earth-fill dams. Construction completed in 1952. Carter Lake is one of two terminal reservoirs for C-BT water diversions. Trans-mountain water diversions are stored at Carter Lake before final delivery. Maximum capacity is 112,200 AF at elevation 5759.00 feet, with 108,900 AF of active capacity. Recorder was operated from 01-Oct-2018 to 30-Sep-2019. Record is complete and fair. This record contains operational data which could be subject to future revisions and changes.

Storage, AF, 2400-hour Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	47344	56524	55323	62301	80810	95099	109076	108341	110677	110620	107991	105015
2	46956	57120	55251	62957	81333	95629	109450	108059	110893	110905	108149	104145
3	46586	57745	55144	63598	81941	96128	109858	107822	111155	111144	108353	103233
4	46191	58264	55046	64192	82508	96639	110256	107563	110962	111418	108477	102268
5	45824	58373	54948	64817	82910	97117	110642	107315	110677	111623	108623	101261
6	45499	58273	54797	65388	83469	97673	111007	107090	110403	111771	108748	100280
7	45124	58137	54779	65999	84008	98142	111395	106831	110120	111566	108884	99325
8	44850	58018	54645	66543	84464	98656	111737	106674	109635	111349	108782	98426
9	44950	57917	54574	67167	85036	99105	111932	106449	109552	111076	108827	97640
10	45415	57818	54485	67764	85557	99588	111863	106203	109314	110825	108816	96823
11	45899	57763	54334	68401	86100	100105	111771	105899	109031	110585	108816	96030
12	46401	57636	54281	69011	86622	100589	111646	105643	108691	110267	108827	95175
13	46964	57563	54166	69594	87052	101140	111486	105620	108364	109949	108953	94375
14	47538	57491	54104	70149	87535	101626	111395	105810	108025	109688	108940	93515
15	48072	57410	54015	70862	88145	102102	111212	106012	107697	109450	108918	92679
16	48642	57301	53926	71460	88566	102567	111053	106169	107383	109178	108850	91791
17	49138	57229	53855	72069	89168	103010	110950	106315	107371	108839	108793	90970
18	49610	57120	53715	72621	89665	103600	110802	106460	107551	108499	108725	90131
19	50022	57020	54060	73195	90131	104022	110699	106752	107720	108195	108770	89369
20	50523	56921	54681	73820	90513	104246	110471	107090	107935	107856	108646	88682
21	50991	56897	55376	74367	90938	104302	110403	107383	108262	107574	108691	87945
22	51477	56806	55959	74946	91492	104804	110210	107664	108533	107247	108657	87304
23	51974	56899	56597	75526	91994	105295	110086	108025	108793	106932	108646	86686
24	52464	56255	57265	76098	92518	105732	109915	108421	109053	106596	108612	86142
25	52965	56174	57899	76682	93000	106225	109699	108770	109325	106618	108575	85682
26	53396	56075	58546	77266	93558	106696	109541	109110	109575	106764	108341	85213
27	53882	55976	59187	77803	94009	107124	109348	109416	109767	106943	108205	84797
28	54316	55851	59822	78432	94591	107484	109053	109688	109892	107124	108036	84319
29	54788	55519	60403	78990		107856	108873	109903	110108	107360	107450	83956
30	55206	55412	61042	79571		108330	108623	110165	110358	107563	106563	83552
31	55905		61694	80246		108713		110414		107788	105843	
Min	44850	55412	53715	62301	80810	95099	108623	105620	107371	106596	105843	83552
Max	55905	58373	61694	80246	94591	108713	111932	110414	111155	111771	108963	105015
Mean	49320	57080	55933	71349	87773	102237	110482	107519	109234	109139	108439	92891
EOM	55905	55412	61694	80246	94591	108713	108623	110414	110358	107788	105843	83552



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Saint Vrain Canal below Carter Reservoir, CO

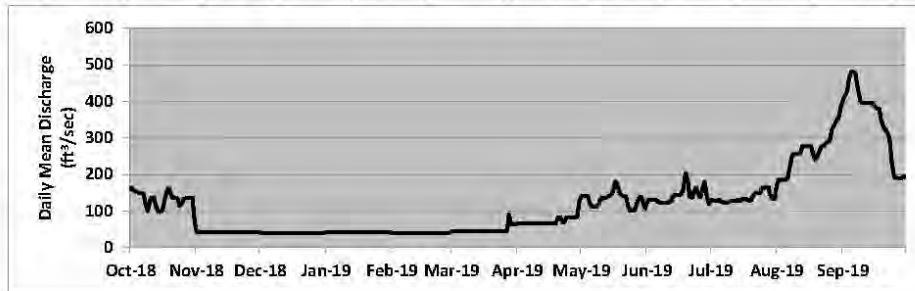
Location. --Lat 40°19'27", long 105°12'35", Larimer County, Hydrologic Unit 10190006, downstream from Carter Reservoir Dam #1, 7 miles northwest of Berthoud, Colorado, and 10 miles west of Loveland, Colorado.

Gage. -- Water-stage recorder with telephone telemetry. Data provided by the Northern Water. Elevation of gage is 5,590 feet from topographic map.

Remarks. -- Constructed between 1952 and 1954. The canal is 9.8 miles long and has a maximum capacity of 625 cfs. The canal is used to deliver C-BT and Windy Gap Project water, as well as diverted native water from conveyance contract holders. Record was provided by the Northern Water for the period 01-Oct-2018 to 30-Sep-2019. Record is complete and fair. This record contains operational data which could be subject to future revisions and changes.

Flow, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	165	44	41	41	39	44	65	141	128	131	173	402
2	158	44	41	41	39	44	65	141	131	131	188	417
3	166	44	41	41	39	44	65	141	131	127	186	429
4	162	44	41	41	39	44	65	141	131	129	184	464
5	160	44	41	41	39	44	65	121	131	131	187	481
6	160	44	41	41	39	44	65	111	126	125	189	481
7	147	44	41	41	39	44	65	111	123	123	219	474
8	119	44	41	41	39	44	65	111	123	123	250	437
9	99	44	41	41	39	44	65	118	123	123	256	404
10	126	44	41	41	39	44	65	132	123	126	256	396
11	137	44	41	41	39	44	65	137	123	128	256	396
12	136	44	41	41	39	44	65	137	127	128	260	396
13	112	44	41	41	39	44	65	137	139	130	277	396
14	100	44	41	41	39	44	65	142	144	129	277	396
15	97	44	41	41	39	44	65	144	144	127	277	396
16	103	44	41	41	39	44	65	158	144	134	277	386
17	131	44	41	41	39	44	65	181	147	135	277	381
18	167	44	41	41	39	44	65	172	162	131	255	381
19	164	44	41	41	39	44	65	150	204	129	241	347
20	145	44	41	41	39	44	83	144	182	131	249	331
21	136	44	41	41	39	44	83	141	139	145	266	321
22	136	44	41	41	39	44	70	139	137	161	277	314
23	136	44	41	41	39	44	70	114	164	151	279	296
24	116	44	41	41	39	44	83	101	164	150	286	233
25	122	44	41	41	39	44	83	101	146	163	289	196
26	133	44	41	41	39	44	83	101	137	163	296	191
27	136	44	41	41	39	44	83	120	164	166	326	191
28	136	44	41	41	39	91	83	136	179	166	336	191
29	136	44	41	41		64	83	139	139	142	348	191
30	136	44	41	41		64	126	126	119	133	354	195
31	73		41	41		64		107		136	384	
Min	73	44	41	41	39	44	65	101	119	123	173	191
Max	166	44	41	41	39	91	126	181	204	166	384	481
Mean	132	44	41	41	39	47	72	132	142	137	264	350
ac-ft	8112	2590	2512	2533	2146	2906	4313	8140	8456	8398	16219	20845



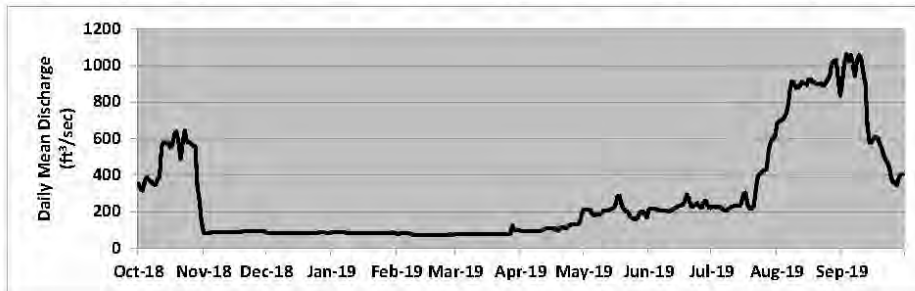
Appendix A (38 of 38)
Colorado-Big Thompson Project, CO

Location. -- Larimer , Grand, Summit, Boulder, Weld counties in Colorado, hydrologic units 14010001, 14010002 and 10190006, 10190007, on the Colorado River, Big Thompson River and Cache La Poudre River basins.

Remarks. -- This table presents a summation of all the daily deliveries of C-BT and Windy Gap Project water through the Saint Vrain Canal, the Charles Hansen Supply Canal, the Dixon Canal, the Charles Hansen Feeder Canal and small deliveries upstream from Flatiron Reservoir. These values include metered water. The C-BT is a trans-mountain water diversion system. The water diverted is used for agricultural, municipal and industrial purposes, to generate hydroelectric power and to provide recreation for the public. This record contains operational data which could be subject to future revisions and changes. Period of record is between 01-Oct-2018 and 30-Sep-2019. Data was provided by the Northern Water. Record is complete and reliable.

Total Daily Water Deliveries, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	352	83	84	86	79	79	93	213	214	226	680	905
2	324	83	84	86	79	79	95	210	217	228	694	1011
3	316	83	84	86	80	79	96	209	217	224	701	1065
4	370	83	84	86	80	79	92	207	214	225	706	1023
5	387	88	84	86	80	79	93	187	211	226	732	1059
6	373	88	84	86	80	79	95	180	206	212	760	1017
7	365	86	84	86	80	79	95	182	203	205	860	941
8	350	86	84	84	75	79	95	184	203	205	913	1020
9	344	87	84	83	73	79	95	188	203	215	907	1059
10	378	89	84	83	73	79	95	201	203	223	875	1035
11	391	90	84	83	73	79	95	208	203	229	879	964
12	554	90	84	83	73	79	103	208	207	231	892	903
13	584	90	84	83	73	79	109	208	219	233	910	678
14	571	90	84	83	73	79	109	212	224	231	903	579
15	579	90	84	83	73	79	109	220	230	246	894	575
16	551	90	84	83	73	79	109	231	233	290	923	602
17	562	90	84	83	73	79	109	281	236	306	927	608
18	617	90	84	83	73	79	98	285	251	238	907	602
19	638	90	84	83	73	79	95	237	293	214	906	565
20	587	92	84	83	73	79	115	214	272	217	898	542
21	488	92	84	83	73	79	117	203	228	231	898	498
22	572	92	84	83	73	79	107	199	226	335	903	478
23	546	92	84	83	73	79	109	175	238	397	887	460
24	584	92	84	83	73	79	126	162	247	406	897	403
25	581	92	84	83	73	79	129	168	229	420	923	359
26	573	92	84	83	75	79	130	157	220	427	938	359
27	561	92	89	83	74	79	132	178	247	433	1005	346
28	558	92	86	83	73	126	133	196	262	535	1026	385
29	341	92	84	83		98	134	200	232	584	1030	401
30	261	92	84	85		98	186	186	217	597	940	404
31	146		84	84		98		169		612	834	
Min	146	83	84	83	73	79	92	157	203	205	680	346
Max	646	92	89	86	80	126	186	285	293	612	1030	1065
Mean	468	89	85	83	75	82	110	202	227	310	875	695
ac-ft	28761	5314	5199	5134	4154	5061	6530	12398	13499	19043	53831	41348



APPENDIX B—TABLES

B-1: WESTERN DIVISION—PICK-SLOAN MISSOURI BASIN PROGRAM PERTINENT RESERVOIR DATA

WESTERN DIVISION – PICK-SLOAN MISSOURI BASIN PROGRAM PERTINENT RESERVOIR DATA

(Data in acre-feet)

Reservoir	Dead Storage^{1/}	Active Storage^{2/}	Total Storage	Normal Minimum Storage	Limitation on normal minimum storage
Green Mountain	6,860	146,779	153,639	47,684	Minimum elevation for rated power output
Willow Creek	1,486	9,779	10,553	6,675	Elevation of pump canal head-works
Lake Granby	74,190	465,568	539,758	74,190	Lowest outlet elevation
Shadow Mountain	506	16,848	17,354	16,026	Minimum permissible Grand Lake elevation; 8,366 ft.
Grand Lake	NA ^{3/}	511	1,015	504	Legislation limits fluctuation
Marys Lake	42	885	927	308	Minimum elevation for power generation
Lake Estes	409	2,659	3,068	740	Minimum elevation to release 550 cfs
Pinewood Lake	416	1,765	2,181	613	Minimum elevation for power generation
Flatiron	125	635	760	324	Minimum elevation to release 550 cfs
Carter Lake	3,306	108,924	112,230	306	Lowest outlet elevation
Horsetooth	7,003	149,732	156,735	17,600	Elevation on highest delivery works
Total	94,343	903,373	998,220	167,970	

1/ Storage capacity below elevation of lowest outlet

2/ Total storage minus dead storage

3/ Not determined

B-2: C-BT MONTHLY SUMMARY OF BLUE RIVER OPERATIONS

C-BT MONTHLY SUMMARY OF BLUE RIVER OPERATIONS

WATER YEAR 2019

(AF)

	INITIAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
UNDEPLETED RUNOFF ABOVE GREEN MNT RESV		11,161	9,955	8,627	8,705	7,575	10,237	25,389	49,627	172,348	141,257	42,697	18,875	506,451
UNDEPLETED RUNOFF ABOVE DILLON RESV.		6,573	5,559	4,584	4,836	4,320	5,991	12,852	26,960	109,675	82,578	21,684	10,193	295,804
PERCENT OF TOTAL UNDEPLETED RUNOFF ABV DILLON RESV.		0.589	0.558	0.531	0.556	0.570	0.585	0.506	0.543	0.636	0.585	0.508	0.540	0.584
DEPLETIONS BY 1929 COLORADO SPRINGS RIGHT		0	0	0	0	0	0	12	71	671	755	150	0	1660
DEPLETIONS BY 1948 COLORADO SPRINGS RIGHT		1,268	0	0	0	0	0	34	399	2,490	938	1,099	0	6,229
INFLOW TO DILLON RESV.		6,627	5,658	4,584	4,836	4,320	5,991	12,806	26,489	104,881	80,415	20,448	10,193	287,249
DILLON RESV. STORAGE (1,000 acre-feet)	203.1	193.4	188.2	185.9	184.0	182.3	182.3	188.4	189.9	248.6	261.1	256.9	244.9	---
ROBERTS TUNNEL DIVERSIONS		11,990	6,748	3,420	3,195	2,997	1,468	0	1	0	0	3,410	14,741	47,970
DILLON RESV. OUTFLOW TO THE RIVER		3,402	3,330	3,523	3,513	2,984	4,571	6,717	24,644	45,526	66,703	19,838	6,165	190,915
TOTAL DEPLETIONS BY DENVER		3,225	2,329	1,061	1,324	1,335	1,420	6,088	1,846	59,355	13,713	610	4,028	96,334
RUNOFF BETWEEN DILLON RESV. & GREEN MTN RESV.		4,720	4,494	4,052	3,857	3,260	4,283	12,712	22,672	63,140	58,312	20,792	8,653	210,947
ACTUAL INFLOW TO GREEN MTN RESERVOIR		8,215	7,836	7,568	7,382	6,240	8,817	19,255	47,310	108,198	125,382	40,851	14,847	401,900
GREEN MOUNTAIN END OF MONTH STORAGE (1,000 acre-feet)	70.4	65.0	61.0	57.9	55.1	52.7	49.5	55.9	84.9	134.5	152.7	149.0	117.8	---
TOTAL GREEN MOUNTAIN OUTFLOW		13,378	11,815	10,629	10,203	8,587	12,027	12,761	17,852	57,829	106,113	43,538	45,408	350,139

B-3: PICK-SLOAN MISSOURI BASIN PROGRAM 2019 SUMMARY ACTUAL OPERATIONS

2019 Actual Operations. Water in 1,000 Acre-Feet. Energy in Giga-Watt Hours

	INITIAL OR TOTAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
GREEN MOUNTAIN RESERVOIR													
Depleted Watershed Inflow	401.9	8.2	7.8	7.6	7.4	6.2	8.8	19.3	47.3	108.2	125.4	40.9	14.8
Turbine Release	323.3	6.5	11.8	10.6	10.2	8.6	12.0	12.6	17.7	57.8	86.5	43.5	45.4
Bypass	8.2	6.9	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	1.0	0.0	0.0
Spill	18.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	0.0	0.0
End of Month Content	70.4	65.0	61.0	57.9	55.1	52.7	49.5	55.9	84.9	134.5	152.7	149.0	117.8
Kwh/AF		1038.6	242.1	162.0	187.2	188.2	169.5	230.7	57.8	1.9	76.9	234.5	56.2
Generation	40.4	6.8	2.9	1.7	1.9	1.6	2.0	2.9	1.0	0.1	6.6	10.2	2.6
WILLOW CREEK RESERVOIR													
Inflow	75.6	1.1	0.8	0.8	0.7	0.7	0.9	8.0	23.2	26.8	9.3	2.2	1.2
Release to River	10.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.8	5.5	0.3	0.3
Pumped to Granby	61.9	0.0	1.0	0.0	0.0	0.0	0.0	8.0	22.5	25.5	2.3	2.0	0.6
End of Month Content	7.8	8.3	7.6	7.9	8.2	8.5	9.0	8.5	8.3	8.5	9.8	9.4	9.4
Pump Energy	5.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	3.0	0.9	0.1	0.0	0.2
GRANBY - SHADOW MOUNTAIN - GRAND LAKE													
Natural Watershed Inflow	306.7	5.5	4.8	4.1	3.7	3.2	4.6	19.6	38.4	121.4	79.4	15.3	6.7
Total Inflow into Granby	306.6	4.5	5.3	4.8	3.7	2.8	3.6	18.8	49.5	130.1	65.6	11.3	6.6
Granby Fish Release	33.2	1.7	1.4	1.4	1.3	1.2	1.3	1.3	4.5	5.2	5.5	4.8	3.6
Granby Seepage	4.3	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.5	0.6	0.6
Granby Spill	13.7	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.1	12.8	0.1	0.2
Adams Tunnel	289.3	25.7	1.8	20.8	33.7	29.6	22.1	27.9	30.3	20.4	20.3	30.8	26.1
Granby End of Month content	463.6	439.9	441.3	422.9	391.2	363.3	344.2	341.9	374.4	496.4	534.5	511.9	485.7
SM-GL End of Month Content	17.7	17.7	18.0	17.7	17.7	17.7	17.8	17.8	17.3	17.3	17.6	17.6	17.9
Pumped from Granby	221.4	24.8	2.0	21.4	34.2	29.5	21.8	19.9	10.5	0.5	5.2	25.4	26.3
Granby Pump Kwh/AF		5.3	131.4	76.8	93.7	146.5	233.2	182.8	56.3	948.0	545.5	136.0	77.6
Granby Pump Energy	27.7	0.1	0.3	1.6	3.2	4.3	5.1	3.6	0.6	0.5	2.8	3.5	2.0

2019 Actual Operations. Water in 1,000 Acre-Feet. Energy in Giga-Watt Hours

	INITIAL OR TOTAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MARYS LAKE – ESTES – FLATIRON													
Adams Tunnel Water	289.3	25.7	1.8	20.8	33.7	29.6	22.1	27.9	30.3	20.4	20.3	30.8	26.1
Marys Lake Generation		0.0	0.0	1.6	3.6	5.2	6.0	5.1	5.4	2.9	3.2	3.9	1.7
Estes Generation		1.3	0.7	4.9	10.5	14.1	15.8	14.4	14.9	8.5	9.1	10.9	5.6
Divertible Big-Thompson	43.4	4.6	0.7	2.8	6.8	5.7	6.0	1.7	3.7	3.3	2.5	5.6	0.0
Diverted Big-Thompson Water	22.8	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.9	11.4	6.2	1.7	0.5
Olympus Tunnel	316.7	24.8	3.3	18.8	33.5	29.6	22.1	30.3	31.5	32.6	31.5	32.0	26.7
Pole Hill Generation		0.0	0.0	0.0	0.3	20.9	24.6	19.7	22.8	18.7	12.9	15.9	6.9
Flatiron 1 & 2 Generation		0.0	0.0	7.4	18.5	25.5	29.5	26.0	30.5	25.0	16.9	21.1	9.9
Flatiron 3 Turbine Release		0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flatiron 3 Kwh/AF Gen.		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flatiron 3 Generation		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flatiron 3 Pumping	129.9	15.9	2.4	9.4	21.6	17.0	17.1	4.7	10.2	9.2	6.8	15.5	0.0
Flatiron 3 Kwh/AF Pump		0	0	0	313.1	334.2	353.2	364.6	361.0	362.9	362.5	0.0	0.0
Flatiron 3 Pump Energy	43.4	4.6	0.708	2.8	6.8	5.7	6.0	1.7	3.7	3.3	2.5	5.6	0.0
CARTER LAKE													
Pumped from Flatiron	129.9	15.9	2.4	9.4	21.6	17.0	17.1	4.7	10.2	9.2	6.8	15.5	0.0
Release to Flatiron	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation Delivery	129.9	15.9	2.4	9.4	21.6	17.0	17.1	4.7	10.2	9.2	6.8	15.5	0.0
Evaporation & Seepage	2.8	0.1	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.4	0.6	0.5	0.3
End of Month Content	47.7	55.9	55.4	61.7	80.2	94.6	108.7	108.6	110.4	110.4	107.8	105.8	83.6
BIG THOMPSON POWERPLANT													
Diverted Dille Tunnel Water	38.8	0.0	0.0	0.0	0.0	0.0	0.0	0.3	7.6	12.6	11.6	6.0	0.7
Irrigation Delivery	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turbine Release	62.0	0.8	0.0	0.0	0.0	0.0	0.0	1.3	5.9	21.1	15.8	11.1	5.9
Generation	1.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.1	0.2	0.4
HORSETOOTH RESERVOIR													
Hansen Feeder Canal Inflow	142.3	4.7	1.0	8.3	12.0	12.7	3.9	23.0	19.8	11.7	18.1	8.4	18.8
Irrigation Delivery	96.5	18.5	2.3	2.1	2.1	1.9	2.1	2.2	3.9	4.9	9.7	32.7	14.0
Evaporation	4.7	0.2	0.1	0.0	0.0	0.0	0.2	0.5	0.5	0.8	1.0	0.9	0.6
End of Month Content	91.9	76.7	74.9	80.9	89.9	100.3	102.9	123.9	141.1	149.2	152.8	125.5	128.7
TOTAL CBT DELIVERY *	226.4	34.5	4.7	11.5	23.8	18.9	19.2	6.8	14.1	14.1	16.5	48.2	14.0

* May include Windy Gap and/or carriage contract water.

	INITIAL OR TOTAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
BASE GENERATION													
Green Mountain	59.1	0.9	1.5	1.2	1.1	0.9	1.4	1.5	2.8	11.2	18.7	9.2	8.7
Flatiron 3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Big Thompson	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	3.1	2.3	1.5	0.7
TOTAL	67.6	0.9	1.6	1.2	1.1	0.9	1.4	1.6	3.5	14.3	21.0	10.7	9.4
LOAD FOLLOWING GENERATION													
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Marys Lake	48.5	4.0	0.3	3.1	5.8	5.2	3.7	4.8	5.3	3.4	3.2	5.3	4.4
Estes	136.1	12.0	0.8	9.3	16.5	14.2	10.5	13.5	14.2	9.4	9.4	14.4	11.9
Pole Hill	220.3	16.9	1.7	12.2	24.2	21.4	14.9	22.0	22.8	22.4	22.1	21.5	18.2
Flatiron 1 & 2	277.0	20.9	3.4	16.0	29.3	26.5	19.4	27.6	28.8	28.2	27.4	27.3	22.2
TOTAL	681.9	53.8	6.2	40.6	75.8	67.3	48.5	67.9	71.1	63.4	62.1	68.5	56.7
PUMP ENERGY													
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Willow Creek	13.0	0.0	0.2	0.0	0.0	0.0	0.0	1.7	4.8	5.3	0.5	0.4	0.1
Granby	33.8	3.8	0.3	3.2	5.2	4.7	3.5	3.3	1.7	0.1	0.7	3.6	3.7
Flatiron 3	44.1	5.0	0.9	2.8	6.8	5.7	6.1	1.7	3.7	3.3	2.5	5.6	0.0
TOTAL	90.9	8.8	1.4	6.0	12.0	10.4	9.6	6.7	10.2	8.7	3.7	9.6	3.8
TOTAL GENERATION	749.5	54.7	7.8	41.8	76.9	68.2	49.9	69.5	74.6	77.7	83.1	79.2	66.1
TOTAL GENERATION MINUS PUMP	658.6	45.9	6.4	35.8	64.9	57.8	40.3	62.8	64.4	69.0	79.4	69.6	62.3

B-4: 2019 FLOOD DAMAGE PREVENTED

**C-BT
FLOOD DAMAGE PREVENTED IN WATER YEAR 2019**

	Cumulative Total Prior to WY 2019	WY 2019	Cumulative Total Current
Granby, Willow Creek, Shadow Mountain and Grand Lake	\$595,887	\$90,687	\$686,574
Green Mountain	\$264,894	\$57,513	\$322,407
Total	\$860,781	\$148,200	\$1,008,981

B-5: C-BT OCTOBER 2019 MOST PROBABLE PLAN FOR WATER YEAR 2020



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HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Dillon Inflow	kaf	8.1	7.3	6.4	5.6	4.7	4.9	8.8	37.0	61.6	28.4	14.8	9.6	197.2
DL to GM Gain	kaf	5.9	5.1	4.6	4.2	3.7	4.8	9.2	25.6	42.8	19.6	12.9	7.0	145.4

Green Mountain Reservoir

Init Cont: 118.00 kaf **Maximum Cont:** 154.60 kaf **Minimum Cont:** 8.00 kaf
Elev: 7931.6 ft **Elev:** 7950.4 ft **Elev:** 7804.7 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Undepleted Inflow	kaf	14.0	12.4	11.1	9.8	8.4	9.7	18.1	63.9	107.4	49.8	28.3	16.6	349.5
Depletion	kaf	1.9	1.3	0.3	-0.5	-1.1	-1.3	1.7	30.5	42.4	11.5	8.6	3.6	98.9
Depleted Inflow	kaf	12.1	11.1	10.8	10.3	9.4	11.0	16.4	33.4	65.0	38.3	19.8	13.0	250.6
Turbine Release	kaf	33.9	16.3	16.3	16.3	15.3	16.4	12.4	9.3	10.4	33.9	26.9	42.5	249.9
Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	cfs	551	274	265	266	266	267	209	151	174	551	437	715	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	33.9	16.3	16.3	16.3	15.3	16.4	12.4	9.3	10.4	33.9	26.9	42.5	249.9
Evaporation	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.7	0.6	0.4	3.2
End-Month Targets	kaf	95.0	67.0	67.0	67.0	67.0	67.0	95.0	95.0	149.0	152.7	145.0	115.0	
End-Month Contents	kaf	95.7	90.4	84.9	78.9	73.0	67.5	71.3	95.0	149.0	152.7	145.0	115.0	
End-Month Elevation	ft	7918.25	7914.68	7910.80	7906.35	7901.75	7897.22	7900.36	7917.78	7947.79	7949.55	7945.85	7930.06	

Willow Creek Reservoir

Init Cont: 9.00 kaf **Maximum Cont:** 10.20 kaf **Minimum Cont:** 7.20 kaf
Elev: 8126.0 ft **Elev:** 8128.8 ft **Elev:** 8116.9 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	1.2	1.1	1.0	0.9	0.8	1.1	3.6	18.6	12.6	3.9	1.8	1.2	47.8
Minimum Release	kaf	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.8
Pumped to Granby	kaf	1.1	1.1	0.0	0.0	0.0	0.0	5.5	17.8	12.3	3.4	1.3	0.8	43.3
Evaporation	kaf	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7
End-Month Targets	kaf	9.0	7.4	7.7	8.0	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	
End-Month Contents	kaf	9.0	8.5	9.1	9.6	9.9	10.5	8.2	8.5	8.2	8.2	8.2	8.2	
End-Month Elevation	ft	8124.50	8122.68	8124.91	8126.61	8127.89	8129.97	8121.32	8122.51	8121.32	8121.32	8121.32	8121.32	

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Granby Reservoir		Init Cont: 486.00 kaf			Maximum Cont: 539.80 kaf					Minimum Cont: 76.50 kaf				
		Elev: 8272.4 ft			Elev: 8280.0 ft					Elev: 8186.9 ft				
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	2.5	2.3	2.0	1.8	1.5	2.0	4.8	20.6	37.8	13.9	5.4	3.2	97.8
Release from Shadow Mtn	kaf	2.2	2.9	2.8	1.2	1.2	1.2	2.4	15.6	31.3	5.1	2.5	2.1	70.5
Pump from Windy Gap	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump from Willow Creek	kaf	1.1	1.1	0.0	0.0	0.0	0.0	5.5	17.8	12.3	3.4	1.3	0.8	43.3
Total Inflow	kaf	5.8	6.3	4.8	3.0	2.7	3.2	12.7	54.0	81.5	22.4	9.1	6.1	211.6
Minimum River Release	kaf	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4.6	4.5	4.6	2.5	1.2	25.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	3.2	5.4
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2
Total River Release	kaf	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4.6	4.5	4.6	4.6	4.4	31.1
Pumped to Shadow Mtn	kaf	18.1	0.0	17.5	32.6	21.4	13.6	0.7	0.0	0.0	5.5	18.8	10.7	138.9
Evaporation	kaf	1.6	0.7	0.0	0.0	0.0	0.9	1.5	2.3	3.1	2.9	2.3	2.1	17.4
Seepage loss	kaf	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	3.6
End-Month Contents	kaf	470.3	474.4	460.2	429.1	409.0	396.2	405.3	452.0	525.6	534.4	517.6	506.2	
End-Month Elevation	ft	8270.14	8270.75	8268.66	8263.97	8260.83	8258.80	8260.24	8267.44	8278.03	8279.27	8276.91	8275.31	
Shadow Mountain Reservoir		Init Cont: 17.00 kaf			Maximum Cont: 18.40 kaf					Minimum Cont: 16.60 kaf				
		Elev: 8366.8 ft			Elev: 8367.0 ft					Elev: 8366.0 ft				
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	3.3	3.1	2.7	2.4	2.1	2.7	6.3	26.9	49.5	19.7	7.1	4.3	130.1
Pumped from Granby	kaf	18.1	0.0	17.5	32.6	21.4	13.6	0.7	0.0	0.0	5.5	18.8	10.7	138.9
Total Inflow	kaf	21.5	3.1	20.3	35.0	23.4	16.2	7.0	26.9	49.5	25.2	25.9	15.0	269.0
Minimum River Release	kaf	2.2	2.7	2.8	1.2	1.2	1.2	1.2	1.2	3.0	3.1	2.5	2.1	24.4
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.2	2.9	2.8	1.2	1.2	1.2	2.4	15.6	31.3	5.1	2.5	2.1	70.5
Adams Tunnel Flow	kaf	19.1	0.0	17.5	33.8	22.3	14.8	4.2	10.6	17.4	19.4	22.8	12.4	194.3
Evaporation	kaf	0.3	0.1	0.0	0.0	0.0	0.2	0.3	0.5	0.6	0.5	0.4	0.4	3.3
End-Month Contents	kaf	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.8	16.8	16.8	
End-Month Elevation	ft	8366.62	8366.62	8366.62	8366.62	8366.63	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	
Adams Tunnel		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Tunnel Capacity	kaf	25.0	2.3	17.5	33.8	26.2	22.7	30.0	26.4	28.2	33.8	33.8	32.7	312.4
Actual Diversion	kaf	19.1	0.0	17.5	33.8	22.3	14.8	4.2	10.6	17.4	19.4	22.8	12.4	194.3
% Maximum Delivery	%	76	0	100	100	85	65	14	40	62	57	68	38	



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Lake Estes

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Big Thompson Inflow	kaf	1.8	0.8	0.4	0.3	0.2	1.2	4.7	16.7	22.8	13.2	6.1	2.9	71.1
Minimum River Release	kaf	3.1	1.5	1.5	1.5	1.4	1.5	2.2	6.9	7.4	7.7	6.9	3.7	45.3
Actual River Release	kaf	2.0	0.8	0.5	0.3	0.2	1.2	4.7	7.8	8.8	11.4	12.3	8.1	58.1
Max Diversion Available	kaf	0.0	0.0	0.0	0.0	0.0	0.2	2.4	9.7	15.4	5.5	0.1	0.0	33.3
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	14.0	3.6	0.0	0.0	26.4
% Maximum Diversion	%	0	0	0	0	0	0	0	91	91	66	0	0	
Irrigation Demand	kaf	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.0	1.5
Irrigation Delivery	kaf	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.0	1.3
Total River Release	kaf	2.0	0.8	0.5	0.3	0.2	1.2	4.7	7.8	8.8	11.4	12.3	8.1	58.1

Olympus Tunnel

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Tunnel Capacity	kaf	33.8	32.7	33.8	33.8	31.6	33.8	32.7	33.8	32.7	33.8	33.8	32.7	399.0
Actual Delivery	kaf	18.8	0.0	17.4	33.7	22.2	14.7	4.1	19.2	31.2	20.9	16.4	7.0	205.6
% Maximum Delivery	%	56	0	51	100	70	43	13	57	95	62	48	22	
Inflow to Flatiron	kaf	18.8	2.3	19.4	33.7	22.2	14.7	4.1	19.2	31.2	20.9	16.4	7.0	209.9

Carter Lake

Init Cont: 84.00 kaf **Maximum Cont:** 112.20 kaf **Minimum Cont:** 6.00 kaf
Elev: 5732.7 ft **Elev:** 5759.0 ft **Elev:** 5626.8 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Pumped from Flatiron	kaf	0.0	0.0	10.8	19.2	16.3	11.9	0.0	8.5	15.4	15.8	16.4	7.0	121.3
Flatiron Bifurcation	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carter to Flatiron	kaf	0.0	2.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Evaporation Loss	kaf	0.2	0.1	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.5	0.4	0.3	2.9
Seepage Loss	kaf	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
End-Month Targets	kaf	112.0	20.0	112.0	112.0	112.0	10.0	112.0	112.0	112.0	112.0	112.0	112.0	
End-Month Contents	kaf	73.7	68.2	73.8	89.9	103.0	111.0	105.3	106.0	111.7	108.2	101.4	91.9	
End-Month Elevation	ft	5722.94	5717.33	5723.05	5738.23	5750.29	5757.94	5752.88	5753.07	5758.11	5755.03	5748.84	5740.63	
Priority Water Diverted to Carter	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation Demand	kaf	9.0	2.4	2.6	2.4	2.7	3.0	5.0	6.6	7.8	17.6	21.6	15.5	96.2
Metered Demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Windy Gap Demand	kaf	0.5	0.6	0.5	0.5	0.4	0.5	0.3	0.6	1.3	1.1	1.2	0.5	8.0
Total Demand	kaf	9.5	3.0	3.1	2.9	3.1	3.5	5.3	7.2	9.1	18.7	22.8	16.0	104.2
Total Delivery	kaf	9.5	3.0	3.1	2.9	3.1	3.5	5.3	7.2	9.1	18.7	22.8	16.0	104.2
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



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Hansen Canal 930

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Minimum Flow	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Flow	kaf	57.2	55.3	57.2	57.2	53.5	57.2	55.3	57.2	55.3	57.2	57.2	55.3	675.1
Actual Flow	kaf	18.8	2.3	8.6	14.5	5.9	2.8	4.1	10.7	15.8	5.1	0.0	0.0	88.6

Dille Tunnel

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Big Thompson River Below Lake Estes	kaf	2.0	0.8	0.5	0.3	0.2	1.2	4.7	7.8	8.8	11.4	12.3	8.1	58.1
North Fork Big Thompson River at Drake	kaf	1.2	0.8	0.7	0.6	0.4	0.4	0.6	2.1	2.9	1.8	1.1	0.7	13.3
Dille Skim Water Diverted	kaf	0.5	0.0	0.0	0.0	0.0	0.0	0.0	6.8	8.0	8.8	4.7	1.1	29.9
Dille Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
water available	kaf	3.2	1.7	1.1	0.8	0.6	1.6	5.3	9.9	11.7	13.1	13.4	8.8	71.2
water diverted	kaf	0.8	0.0	0.0	0.0	0.0	0.0	0.0	6.8	8.0	10.7	11.0	6.4	43.7
% Diverted	%	14	0	0	0	0	0	0	125	148	197	203	119	
Big T @ Canyon Mouth	kaf	2.4	1.7	1.1	0.8	0.6	1.6	5.3	3.2	3.7	2.5	2.5	2.4	27.8

Trifurcation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Release from Flatiron	kaf	18.8	2.3	8.6	14.5	5.9	2.8	4.1	10.7	15.8	5.1	0.0	0.0	88.6
Release to 550 Canal	kaf	17.8	2.2	8.5	14.4	5.8	2.7	3.9	1.5	1.5	1.5	1.5	1.5	62.8
Dille Tunnel	kaf	0.8	0.0	0.0	0.0	0.0	0.0	0.0	6.8	8.0	10.7	11.0	6.4	43.7
Total release to river	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	3.5	9.7
Irrigation demand	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	3.5	9.7
Windy Gap demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total requirement	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	3.5	9.7
Total delivery	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	3.5	9.7
% Required Delivery	%	100	100	100	0	0	0	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



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Hansen Canal 550

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow from Flatiron	kaf	17.8	2.2	8.5	14.4	5.8	2.7	3.9	1.5	1.5	1.5	1.5	1.5	62.8
Maximum flow	kaf	23.3	21.4	30.1	30.1	28.2	30.1	29.1	30.1	29.1	30.1	30.1	29.1	340.8
Irrigation demand	kaf	0.5	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.6	0.7	0.3	3.5
Irrigation delivery	kaf	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.6	0.7	0.3	3.3
Minimum flow	kaf	3.1	3.0	4.6	4.6	4.3	4.6	4.5	1.5	1.5	1.5	1.5	1.5	36.2
Rel's to Horsetooth	kaf	17.8	2.2	8.5	14.4	5.8	2.7	3.9	1.5	1.5	1.5	1.5	1.5	62.8

Horsetooth Reservoir

Init Cont: 129.00 kaf
Elev: 5415.5 ft
Maximum Cont: 157.00 kaf
Elev: 5430.0 ft
Minimum Cont: 13.00 kaf
Elev: 5316.8 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow	kaf	17.8	2.2	8.5	14.4	5.8	2.7	3.9	1.5	1.5	1.5	1.5	1.5	62.8
Total irrigation delivery	kaf	11.6	1.9	2.1	2.2	2.0	2.2	3.3	5.5	6.1	26.0	29.5	6.9	99.3
Evaporation loss	kaf	0.4	0.2	0.0	0.0	0.0	0.3	0.5	0.7	0.9	0.8	0.5	0.4	4.7
Seepage loss	kaf	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.4
End-Month Targets	kaf	138.0	95.0	156.0	156.0	156.0	156.0	149.0	149.0	145.0	80.0	80.0	80.0	
End-Month Content	kaf	134.2	134.1	140.4	152.3	156.0	156.0	151.2	145.5	120.1	91.5	85.5		
End-Month Elevation	ft	5418.49	5418.45	5421.74	5427.83	5429.63	5429.64	5429.64	5427.26	5424.38	5410.75	5393.44	5389.46	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation demand	kaf	8.5	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.8	17.9	22.0	4.3	54.4
Metered Demand	kaf	2.5	1.5	1.7	1.8	1.7	1.8	2.4	4.3	4.6	7.4	6.3	2.0	38.0
Windy Gap demand	kaf	0.6	0.4	0.4	0.4	0.3	0.4	0.6	0.6	0.8	0.7	1.2	0.6	7.0
Total demand	kaf	11.6	1.9	2.1	2.2	2.0	2.2	3.3	5.5	6.1	26.0	29.5	6.9	99.3
Total irrigation	kaf	11.6	1.9	2.1	2.2	2.0	2.2	3.3	5.5	6.1	26.0	29.5	6.9	99.3
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CBT Project Summary

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total CBT Delivery	kaf	21.5	4.0	4.4	4.5	4.6	5.0	8.0	12.0	13.6	44.9	54.7	25.7	202.9



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Windy Gap

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Pumping	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Losses	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-10.5	0.0	0.0	-10.5
Total Delivery	kaf	1.1	1.0	0.9	0.9	0.7	0.9	0.9	1.2	2.1	1.8	2.4	1.2	15.1
Account Balance	kaf	-1.1	-2.1	-3.0	-3.9	-4.6	-5.5	-6.4	-7.6	-9.6	-0.7	-3.1	-4.3	



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PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Generation	gwh	18.600	18.000	18.600	18.600	17.400	18.600	18.000	18.600	18.000	18.600	18.600	18.000	219.600
Generation	gwh	6.400	3.000	2.900	2.800	2.600	2.700	2.000	1.600	2.100	7.200	5.700	8.600	47.600
% Maximum Generation	%	35	16	16	15	15	15	11	9	11	39	30	48	
Average	kwh/af	190	182	178	174	170	165	164	173	198	212	210	202	

Willow Creek Pumping

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	24.6	12.7	0.0	0.0	0.0	0.0	23.8	24.6	23.8	24.6	24.6	23.8	182.5
Actual Pumping	kaf	1.1	1.1	0.0	0.0	0.0	0.0	5.5	17.8	12.3	3.4	1.3	0.8	43.3
Pump Energy	gwh	0.200	0.200	0.000	0.000	0.000	0.000	1.200	3.800	2.600	0.700	0.300	0.200	9.200
% Maximum Pumping	%	4	9	0	0	0	0	23	72	52	14	5	3	182
Average	kwh/af	213	213	0	0	0	0	213	213	213	213	213	213	

Lake Granby Pumping

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	36.9	35.7	36.9	36.9	34.5	36.9	35.7	36.9	35.7	36.9	36.9	35.7	435.6
Actual Pumping	kaf	18.1	0.0	17.5	32.6	21.4	13.6	0.7	0.0	0.0	5.5	18.8	10.7	138.9
Pump Energy	gwh	2.600	0.000	2.500	4.700	3.100	2.000	0.100	0.000	0.000	0.800	2.600	1.500	19.900
% Maximum Pumping	%	49	0	48	88	62	37	2	0	0	15	51	30	
Average	kwh/af	143	143	143	145	146	147	147	0	0	140	140	141	



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Marys Lake Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Adams Tunnel Flow	kaf	19.1	0.0	17.5	33.8	22.3	14.8	4.2	10.6	17.4	19.4	22.8	12.4	194.3
Maximum Generation	gwh	6.400	0.600	3.700	6.400	6.000	6.400	6.200	6.400	6.200	6.400	6.400	6.200	67.300
Generation	gwh	3.500	0.000	3.300	6.400	4.000	2.500	0.000	1.700	3.000	3.400	4.100	1.700	33.600
% Maximum Generation	%	18	0	19	19	18	17	0	16	17	18	18	14	
Average	kwh/af	182	0	189	189	181	166	0	158	174	175	180	135	

Lake Estes Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Adams Tunnel Flow	kaf	19.1	0.0	17.5	33.8	22.3	14.8	4.2	10.6	17.4	19.4	22.8	12.4	194.3
Maximum Generation	gwh	16.000	15.500	16.000	16.000	15.000	16.000	15.500	16.000	15.500	16.000	16.000	15.500	189.000
Generation	gwh	8.900	0.000	8.300	16.000	10.200	6.300	1.100	4.300	7.500	8.500	10.100	5.100	86.300
% Maximum Generation	%	56	0	52	100	68	39	7	27	48	53	63	33	
Average	kwh/af	467	9	473	473	457	427	254	404	429	440	441	415	

Pole Hill Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Olympus Tunnel Flow	kaf	33.8	32.7	33.8	33.8	31.6	33.8	32.7	33.8	32.7	33.8	33.8	32.7	399.0
Maximum Generation	gwh	25.800	2.500	15.000	25.800	24.100	25.800	25.000	25.800	25.000	25.800	25.800	25.000	271.400
Generation	gwh	14.200	0.000	13.300	25.700	16.200	9.700	0.000	12.400	23.800	15.300	11.300	4.900	146.800
% Maximum Generation	%	55	0	89	100	67	38	0	48	95	59	44	20	
Average	kwh/af	419	0	393	761	513	288	0	365	728	452	335	149	



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Flatiron Units 1 and 2 Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow to Flatiron	kaf	18.8	2.3	19.4	33.7	22.2	14.7	4.1	19.2	31.2	20.9	16.4	7.0	209.9
Maximum Generation	gwh	32.200	31.200	32.200	32.200	30.200	32.200	31.200	32.200	31.200	32.200	32.200	31.200	380.400
Generation	gwh	16.500	0.000	16.600	32.100	19.000	11.600	2.300	16.800	28.900	17.300	12.900	5.600	179.600
% Maximum Generation	%	51	0	51	100	63	36	7	52	93	54	40	18	
Average	kwh/af	880	0	853	951	856	788	565	874	926	825	787	790	

Flatiron Unit 3 Pump/Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	0.0	0.0	12.2	19.2	16.3	16.0	15.5	16.5	15.4	15.8	16.4	7.0	150.3
Pump from Flatiron	kaf	0.0	0.0	10.8	19.2	16.3	11.9	0.0	8.5	15.4	15.8	16.4	7.0	121.3
Pump Energy	gwh	0.000	0.000	3.400	6.300	5.600	4.300	0.000	3.000	5.600	5.700	5.800	2.500	42.200
% Maximum Pumping	%	0	0	89	100	100	74	0	52	100	100	100	100	
Average	kwh/af	0	0	311	327	345	360	0	355	362	363	356	351	
Maximum Turbine release	kaf	0.0	17.1	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.1
Carter to Flatiron	kaf	0.0	2.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Maximum Generation	gwh	0.000	3.500	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.500
Actual Generation	gwh	0.000	0.500	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.900
% Maximum Generation	%	0	13	20	0	0	0	0	0	0	0	0	0	
Average	kwh/af	0	203	200	0	0	0	0	0	0	0	0	0	

Big Thompson Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total release	kaf	1.5	0.0	0.0	0.0	0.0	0.0	0.0	15.6	22.0	13.6	8.7	4.7	66.1
Turbine release	kaf	1.5	0.0	0.0	0.0	0.0	0.0	0.0	15.6	22.0	13.6	8.7	4.7	66.1
Wasteway release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Generation	gwh	3.800	1.900	0.000	0.000	0.000	0.000	0.000	3.600	3.700	3.800	3.800	3.700	24.500
Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.300	3.500	2.000	1.100	0.400	9.300
% Maximum Generation	%	0	0	0	0	0	0	0	61	94	54	30	11	
Average	kwh/af	0	0	0	0	0	0	0	150	158	151	130	83	



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Project Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total Generation	gwh	49,500	3,400	44,700	83,000	52,100	32,800	5,400	39,100	68,700	53,700	45,200	26,200	503,800
Total Max Generation	gwh	102,900	73,200	87,600	99,100	92,700	99,100	95,900	102,900	99,600	102,900	102,900	99,600	1,158,400

Project Pump Energy

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Granby	gwh	2,600	0,000	2,500	4,700	3,100	2,000	0,100	0,000	0,000	0,800	2,600	1,500	19,900
Willow Creek	gwh	0,200	0,200	0,000	0,000	0,000	0,000	1,200	3,800	2,600	0,700	0,300	0,200	9,200
Flatiron Unit 3	gwh	0,000	0,000	3,400	6,300	5,600	4,300	0,000	3,000	5,600	5,700	5,800	2,500	42,200
Total Pump Energy	gwh	2,800	0,200	5,900	11,000	8,800	6,300	1,300	6,800	8,200	7,200	8,700	4,200	71,400

B-6: C-BT OCTOBER 2019 MINIMUM REASONABLE PLAN FOR WATER YEAR 2020



COLORADO - BIG THOMPSON MONTHLY OPERATIONS
 United States Bureau of Reclamation
 Eastern Colorado Area Office
 Loveland, Colorado



CBT October 2019 Min Reasonable: 01-OCT-2019

HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Dillon Inflow	kaf	8.0	6.8	6.2	5.5	4.6	4.6	5.3	16.1	24.9	12.9	7.2	5.6	107.7
DL to GM Gain	kaf	5.7	4.8	4.5	4.1	3.5	3.9	6.1	15.3	23.2	13.4	10.2	5.7	100.4

Green Mountain Reservoir

Init Cont: 118.00 kaf **Maximum Cont:** 154.60 kaf **Minimum Cont:** 8.00 kaf
Elev: 7931.6 ft **Elev:** 7950.4 ft **Elev:** 7804.7 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Undepleted Inflow	kaf	13.7	11.6	10.7	9.6	8.1	8.4	11.4	32.6	51.0	28.1	18.0	11.3	214.5
Depletion	kaf	1.8	0.8	0.1	-0.8	-1.1	0.9	1.7	13.7	24.3	11.1	4.1	2.0	58.8
Depleted Inflow	kaf	11.9	10.7	10.6	10.2	9.3	7.5	9.7	18.9	26.7	17.1	13.9	9.3	155.8
Turbine Release	kaf	33.7	15.0	14.9	14.9	14.0	15.0	9.0	3.7	3.6	4.9	31.7	30.7	191.1
Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	cfs	548	251	242	242	243	243	152	60	60	79	516	515	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	33.7	15.0	14.9	14.9	14.0	15.0	9.0	3.7	3.6	4.9	31.7	30.7	191.1
Evaporation	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.6	0.5	0.3	2.8
End-Month Targets	kaf	95.0	67.0	67.0	67.0	67.0	67.0	95.0	95.0	120.0	120.0	80.0	80.0	
End-Month Contents	kaf	95.7	91.4	87.2	82.5	77.8	70.3	70.8	85.7	108.3	120.0	101.7	80.0	
End-Month Elevation	ft	7918.26	7915.39	7912.43	7909.06	7905.52	7899.56	7899.97	7911.39	7926.18	7932.87	7922.12	7907.20	

Willow Creek Reservoir

Init Cont: 9.00 kaf **Maximum Cont:** 10.20 kaf **Minimum Cont:** 7.20 kaf
Elev: 8126.0 ft **Elev:** 8128.8 ft **Elev:** 8116.9 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	1.2	1.0	1.0	0.9	0.7	0.8	1.7	4.9	2.9	1.4	1.0	0.8	16.3
Minimum Release	kaf	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.8
Pumped to Granby	kaf	1.1	1.1	0.0	0.0	0.0	0.0	3.1	4.4	2.4	0.9	0.4	0.3	13.7
Evaporation	kaf	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7
End-Month Targets	kaf	9.0	7.4	7.7	8.0	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	
End-Month Contents	kaf	9.0	8.5	9.0	9.5	9.8	10.1	8.2	8.2	8.2	8.2	8.2	8.2	
End-Month Elevation	ft	8124.50	8122.49	8124.57	8126.23	8127.48	8128.64	8121.32	8121.32	8121.32	8121.32	8121.32	8121.32	

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Granby Reservoir														
	Init Cont:	486.00 kaf			Maximum Cont:	539.80 kaf			Minimum Cont:	76.50 kaf				
	Elev:	8272.4 ft			Elev:	8280.0 ft			Elev:	8186.9 ft				
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	2.5	2.1	2.0	1.8	1.5	1.6	2.4	9.9	16.9	6.2	3.1	2.3	52.3
Release from Shadow Mtn	kaf	2.2	2.7	2.8	1.2	1.2	1.2	1.2	2.9	5.2	3.1	2.5	2.1	28.3
Pump from Windy Gap	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump from Willow Creek	kaf	1.1	1.1	0.0	0.0	0.0	0.0	3.1	4.4	2.4	0.9	0.4	0.3	13.7
Total Inflow	kaf	5.7	5.9	4.7	3.0	2.7	2.8	6.8	17.1	24.4	10.1	6.0	4.7	93.9
Minimum River Release	kaf	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4.6	4.5	4.6	2.5	1.2	25.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4.6	4.5	4.6	2.5	1.2	25.8
Pumped to Shadow Mtn	kaf	18.2	0.1	18.9	30.3	19.8	15.2	3.2	2.0	3.8	19.7	23.0	22.0	176.2
Evaporation	kaf	1.6	0.7	0.0	0.0	0.0	0.9	1.5	2.3	2.9	2.6	2.0	1.8	16.3
Seepage loss	kaf	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	3.6
End-Month Contents	kaf	470.1	473.7	458.0	429.2	410.7	396.0	396.7	404.7	417.7	400.7	378.9	358.4	
End-Month Elevation	ft	8270.12	8270.65	8268.34	8263.99	8261.11	8258.77	8258.88	8260.15	8262.20	8259.52	8256.00	8252.59	
Shadow Mountain Reservoir														
	Init Cont:	17.00 kaf			Maximum Cont:	18.40 kaf			Minimum Cont:	16.60 kaf				
	Elev:	8366.8 ft			Elev:	8367.0 ft			Elev:	8366.0 ft				
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	3.3	2.8	2.6	2.4	2.0	2.1	3.2	12.7	23.9	8.9	4.1	3.0	71.0
Pumped from Granby	kaf	18.2	0.1	18.9	30.3	19.8	15.2	3.2	2.0	3.8	19.7	23.0	22.0	176.2
Total Inflow	kaf	21.5	2.9	21.5	32.6	21.8	17.3	6.4	14.7	27.7	28.6	27.2	25.0	247.2
Minimum River Release	kaf	2.2	2.7	2.8	1.2	1.2	1.2	1.2	1.2	3.0	3.1	2.5	2.1	24.4
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.2	2.7	2.8	1.2	1.2	1.2	1.2	2.9	5.2	3.1	2.5	2.1	28.3
Adams Tunnel Flow	kaf	19.1	0.0	18.7	31.4	20.6	15.8	4.8	11.1	21.7	24.7	24.1	22.4	214.4
Evaporation	kaf	0.3	0.1	0.0	0.0	0.0	0.2	0.3	0.5	0.6	0.5	0.4	0.4	3.3
End-Month Contents	kaf	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.8	16.8	16.8	16.8	
End-Month Elevation	ft	8366.62	8366.62	8366.62	8366.62	8366.63	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	
Adams Tunnel														
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Tunnel Capacity	kaf	25.0	2.3	19.6	33.8	24.9	20.8	32.4	31.6	28.2	33.8	33.8	32.7	318.9
Actual Diversion	kaf	19.1	0.0	18.7	31.4	20.6	15.8	4.8	11.1	21.7	24.7	24.1	22.4	214.4
% Maximum Delivery	%	76	0	95	93	83	76	15	35	77	73	71	68	

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Lake Estes

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Big Thompson Inflow	kaf	1.7	0.8	0.4	0.2	0.1	0.2	1.8	8.6	10.9	5.9	2.7	1.4	34.7
Minimum River Release	kaf	3.1	1.5	1.5	1.5	1.4	1.5	2.2	6.9	7.4	7.7	6.9	3.7	45.3
Actual River Release	kaf	1.9	0.8	0.4	0.2	0.1	0.2	1.8	6.0	7.4	7.8	10.0	7.4	44.0
Max Diversion Available	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	3.5	0.1	0.0	0.0	6.2
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	3.5	0.0	0.0	0.0	6.1
% Maximum Diversion	%	0	0	0	0	0	0	0	100	99	56	0	0	
Irrigation Demand	kaf	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.6
Irrigation Delivery	kaf	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.4
Total River Release	kaf	1.9	0.8	0.4	0.2	0.1	0.2	1.8	6.0	7.4	7.8	10.0	7.4	44.0

Olympus Tunnel

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Tunnel Capacity	kaf	33.8	32.7	33.8	33.8	31.6	33.8	32.7	33.8	32.7	33.8	33.8	32.7	399.0
Actual Delivery	kaf	18.8	0.0	18.7	31.3	20.6	15.7	4.6	13.5	25.0	22.6	16.7	16.3	203.8
% Maximum Delivery	%	56	0	55	93	65	47	14	40	76	67	49	50	
Inflow to Flatiron	kaf	18.8	2.3	20.6	31.3	20.6	15.7	4.6	13.5	25.0	22.6	16.7	16.3	208.0

Carter Lake

Init Cont: 84.00 kaf **Maximum Cont:** 112.20 kaf **Minimum Cont:** 6.00 kaf
Elev: 5732.7 ft **Elev:** 5759.0 ft **Elev:** 5626.8 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Pumped from Flatiron	kaf	0.0	0.0	11.4	19.2	16.2	11.1	0.0	9.0	15.0	15.9	16.7	16.3	130.8
Flatiron Bifurcation	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carter to Flatiron	kaf	0.0	2.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Evaporation Loss	kaf	0.2	0.1	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.5	0.4	0.3	2.9
Seepage Loss	kaf	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
End-Month Targets	kaf	112.0	20.0	112.0	112.0	112.0	10.0	10.0	112.0	112.0	112.0	112.0	112.0	
End-Month Contents	kaf	73.7	68.2	74.5	90.6	103.6	110.9	105.3	106.6	112.0	106.9	97.7	104.5	
End-Month Elevation	ft	5722.94	5717.36	5723.76	5738.84	5750.83	5757.84	5752.83	5753.58	5758.52	5753.80	5745.45	5751.69	
Priority Water Diverted to Carter	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation Demand	kaf	9.0	2.3	2.5	2.4	2.7	2.9	4.9	6.5	7.7	19.3	24.2	8.5	92.9
Metered Demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Windy Gap demand	kaf	0.5	0.6	0.5	0.5	0.4	0.5	0.3	0.6	1.3	1.1	1.2	0.5	8.0
Total Demand	kaf	9.5	2.9	3.0	2.9	3.1	3.4	5.2	7.1	9.0	20.4	25.4	9.0	100.9
Total Delivery	kaf	9.5	2.9	3.0	2.9	3.1	3.4	5.2	7.1	9.0	20.4	25.4	9.0	100.9
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



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Hansen Canal 930

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Minimum Flow	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Flow	kaf	57.2	55.3	57.2	57.2	53.5	57.2	55.3	57.2	55.3	57.2	57.2	55.3	675.1
Actual Flow	kaf	18.8	2.3	9.2	12.2	4.3	4.6	4.6	4.5	10.0	6.7	0.0	0.0	77.2

Dille Tunnel

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Big Thompson River Below Lake Estes	kaf	1.9	0.8	0.4	0.2	0.1	0.2	1.8	6.0	7.4	7.8	10.0	7.4	44.0
North Fork Big Thompson River at Drake	kaf	1.2	0.8	0.7	0.6	0.4	0.4	0.3	1.0	1.1	0.8	0.5	0.4	8.2
Dille Skim Water Diverted	kaf	0.5	0.0	0.0	0.0	0.0	0.0	0.0	4.5	6.2	4.1	0.8	0.0	16.1
Dille Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
water available	kaf	3.1	1.6	1.1	0.8	0.6	0.6	2.2	7.0	8.6	8.5	10.5	7.8	52.4
water diverted	kaf	0.7	0.0	0.0	0.0	0.0	0.0	0.0	4.5	6.2	6.1	8.1	6.1	31.7
% Diverted	%	13	0	0	0	0	0	0	84	114	112	149	112	
Big T @ Canyon Mouth	kaf	2.4	1.6	1.1	0.8	0.6	0.6	2.2	2.5	2.4	2.5	2.4	1.7	20.8

Trifurcation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Release from Flatiron	kaf	18.8	2.3	9.2	12.2	4.3	4.6	4.6	4.5	10.0	6.7	0.0	0.0	77.2
Release to 550 Canal	kaf	17.8	2.2	9.1	12.1	4.2	4.5	4.5	1.5	6.2	6.6	1.5	1.5	71.7
Dille Tunnel	kaf	0.7	0.0	0.0	0.0	0.0	0.0	0.0	4.5	6.2	6.1	8.1	6.1	31.7
Total release to river	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	4.9	4.3	11.6
Irrigation demand	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	4.9	4.2	11.5
Windy Gap demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total requirement	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	4.9	4.3	11.6
Total delivery	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	4.9	4.3	11.6
% Required Delivery	%	100	100	100	0	0	0	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



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Hansen Canal 550

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow from Flatiron	kaf	17.8	2.2	9.1	12.1	4.2	4.5	4.5	1.5	6.2	6.6	1.5	1.5	71.7
Maximum flow	kaf	23.3	21.4	30.1	30.1	28.2	30.1	29.1	30.1	29.1	30.1	30.1	29.1	340.8
Irrigation demand	kaf	0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.7	0.8	0.3	3.6
Irrigation delivery	kaf	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.7	0.8	0.3	3.4
Minimum flow	kaf	3.1	3.0	4.6	4.6	4.3	4.6	4.5	1.5	1.5	1.5	1.5	1.5	36.2
Rel's to Horsetooth	kaf	17.8	2.2	9.1	12.1	4.2	4.5	4.5	1.5	6.2	6.6	1.5	1.5	71.7

Horsetooth Reservoir

Init Cont: 129.00 kaf
Elev: 5415.5 ft
Maximum Cont: 157.00 kaf
Elev: 5430.0 ft
Minimum Cont: 13.00 kaf
Elev: 5316.8 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow	kaf	17.8	2.2	9.1	12.1	4.2	4.5	4.5	1.5	6.2	6.6	1.5	1.5	71.7
Total irrigation delivery	kaf	11.6	1.9	2.0	2.2	2.0	2.2	3.2	5.4	6.0	30.6	35.3	8.0	110.4
Evaporation loss	kaf	0.4	0.2	0.0	0.0	0.0	0.3	0.5	0.7	0.9	0.8	0.5	0.4	4.7
Seepage loss	kaf	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.4
End-Month Targets	kaf	138.0	95.0	156.0	148.0	148.0	148.0	149.0	149.0	149.7	83.3	83.3	80.0	
End-Month Content	kaf	134.2	134.2	141.1	150.8	152.9	154.8	155.4	150.7	149.8	124.9	90.4	83.3	
End-Month Elevation	ft	5418.49	5418.47	5422.09	5427.04	5428.09	5429.02	5429.34	5426.99	5426.54	5413.39	5392.73	5388.00	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation demand	kaf	8.5	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.8	22.6	27.8	5.4	66.0
Metered Demand	kaf	2.5	1.5	1.6	1.8	1.7	1.8	2.4	4.2	4.5	7.3	6.3	2.0	37.6
Windy Gap demand	kaf	0.6	0.4	0.4	0.4	0.3	0.4	0.6	0.6	0.8	0.7	1.2	0.6	7.0
Total demand	kaf	11.6	1.9	2.0	2.2	2.0	2.2	3.2	5.4	6.0	30.6	35.3	8.0	110.4
Total irrigation	kaf	11.6	1.9	2.0	2.2	2.0	2.2	3.2	5.4	6.0	30.6	35.3	8.0	110.4
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CBT Project Summary

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total CBT Delivery	kaf	21.5	3.9	4.3	4.4	4.6	4.9	7.9	11.8	13.4	51.5	64.1	20.4	212.7



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Windy Gap

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Pumping	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Losses	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delivery	kaf	1.1	1.0	0.9	0.9	0.7	0.9	0.9	1.2	2.1	1.8	2.4	1.2	15.1
Account Balance	kaf	-1.1	-2.1	-3.0	-3.9	-4.6	-5.5	-6.4	-7.6	-9.6	-11.4	-13.8	-15.0	



CBT October 2019 Min Reasonable: 01-OCT-2019

PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Generation	gwh	18.600	18.000	18.600	18.600	17.400	18.600	18.000	18.600	18.000	18.600	18.600	18.000	219.600
Generation	gwh	6.400	2.700	2.700	2.600	2.400	2.500	1.500	0.600	0.700	0.900	6.100	5.500	34.600
% Maximum Generation	%	34	15	14	14	14	14	8	3	4	5	33	31	
Average	kwh/af	190	182	179	176	173	168	164	171	185	195	192	180	

Willow Creek Pumping

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	24.6	12.7	0.0	0.0	0.0	0.0	23.8	24.6	23.8	24.6	24.6	23.8	182.5
Actual Pumping	kaf	1.1	1.1	0.0	0.0	0.0	0.0	3.1	4.4	2.4	0.9	0.4	0.3	13.7
Pump Energy	gwh	0.200	0.200	0.000	0.000	0.000	0.000	0.700	0.900	0.500	0.200	0.100	0.100	2.900
% Maximum Pumping	%	4	9	0	0	0	0	13	18	10	4	2	1	61
Average	kwh/af	213	213	0	0	0	0	213	213	213	213	213	213	

Lake Granby Pumping

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	36.9	35.7	36.9	36.9	34.5	36.9	35.7	36.9	35.7	36.9	36.9	35.7	435.6
Actual Pumping	kaf	18.2	0.1	18.9	30.3	19.8	15.2	3.2	2.0	3.8	19.7	23.0	22.0	176.2
Pump Energy	gwh	2.600	0.000	2.700	4.400	2.900	2.200	0.500	0.300	0.600	2.900	3.400	3.300	25.800
% Maximum Pumping	%	49	0	51	82	57	41	9	5	11	53	62	62	
Average	kwh/af	143	143	143	145	146	147	147	147	146	147	148	149	



CBT October 2019 Min Reasonable: 01-OCT-2019

Marys Lake Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Adams Tunnel Flow	kaf	19.1	0.0	18.7	31.4	20.6	15.8	4.8	11.1	21.7	24.7	24.1	22.4	214.4
Maximum Generation	gwh	6.400	0.600	3.700	6.400	6.000	6.400	6.200	6.400	6.200	6.400	6.400	6.200	67.300
Generation	gwh	3.500	0.000	3.500	5.900	3.700	2.500	0.000	1.800	3.900	4.500	4.400	4.000	37.700
% Maximum Generation	%	18	0	19	19	18	16	0	16	18	18	18	18	18
Average	kwh/af	182	0	188	188	179	158	0	160	179	182	181	180	

Lake Estes Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Adams Tunnel Flow	kaf	19.1	0.0	18.7	31.4	20.6	15.8	4.8	11.1	21.7	24.7	24.1	22.4	214.4
Maximum Generation	gwh	16.000	15.500	16.000	16.000	15.000	16.000	15.500	16.000	15.500	16.000	16.000	15.500	189.000
Generation	gwh	8.900	0.000	8.800	14.700	9.100	6.800	1.400	4.500	9.600	11.200	10.800	10.000	95.800
% Maximum Generation	%	56	0	55	92	61	42	9	28	62	70	67	64	
Average	kwh/af	467	9	471	468	443	429	285	406	443	454	446	445	

Pole Hill Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Olympus Tunnel Flow	kaf	33.8	32.7	33.8	33.8	31.6	33.8	32.7	33.8	32.7	33.8	33.8	32.7	399.0
Maximum Generation	gwh	25.800	2.500	15.000	25.800	24.100	25.800	25.000	25.800	25.000	25.800	25.800	25.000	271.400
Generation	gwh	14.200	0.000	14.100	23.800	14.900	10.000	0.000	9.300	18.800	16.500	11.600	11.300	144.500
% Maximum Generation	%	0	0	0	0	0	0	0	0	0	0	45	0	
Average	kwh/af	419	0	417	702	471	296	0	276	575	487	342	345	



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Flatiron Units 1 and 2 Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow to Flatiron	kaf	18.8	2.3	20.6	31.3	20.6	15.7	4.6	13.5	25.0	22.6	16.7	16.3	208.0
Maximum Generation	gwh	32,200	31,200	32,200	32,200	30,200	32,200	31,200	32,200	31,200	32,200	32,200	31,200	380,400
Generation	gwh	16,500	0,000	17,700	29,200	16,900	12,500	2,700	10,700	21,400	19,700	13,200	12,900	173,400
% Maximum Generation	%	0	0	0	90	0	0	0	0	0	0	41	0	
Average	kwh/af	880	0	857	930	824	795	591	795	854	873	789	791	

Flatiron Unit 3 Pump/Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	0.0	0.0	12.1	19.2	16.2	16.0	15.5	16.5	15.4	15.9	16.7	16.3	159.8
Pump from Flatiron	kaf	0.0	0.0	11.4	19.2	16.2	11.1	0.0	9.0	15.0	15.9	16.7	16.3	130.8
Pump Energy	gwh	0,000	0,000	3,600	6,300	5,600	4,000	0,000	3,200	5,500	5,800	5,900	5,700	45,600
% Maximum Pumping	%	0	0	94	100	100	70	0	55	98	100	100	100	
Average	kwh/af	0	0	312	328	346	361	0	356	363	362	352	351	
Maximum Turbine release	kaf	0.0	17.1	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.1
Carter to Flatiron	kaf	0.0	2.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Maximum Generation	gwh	0,000	3,500	2,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	5,500
Actual Generation	gwh	0,000	0,500	0,400	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,900
Average	kwh/af	0	203	200	0	0	0	0	0	0	0	0	0	

Big Thompson Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total release	kaf	1.4	0.0	0.0	0.0	0.0	0.0	0.0	7.1	9.7	5.5	5.7	4.3	33.7
Turbine release	kaf	1.4	0.0	0.0	0.0	0.0	0.0	0.0	7.1	9.7	5.5	5.7	4.3	33.7
Wasteway release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Generation	gwh	3,800	1,900	0,000	0,000	0,000	0,000	0,000	3,800	3,700	3,800	3,800	3,700	24,500
Generation	gwh	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,900	1,300	0,500	0,600	0,300	3,600
% Maximum Generation	%	0	0	0	0	0	0	0	23	36	13	15	8	
Average	kwh/af	0	0	0	0	0	0	0	125	138	94	100	73	



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Project Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total Generation	gwh	49.500	3.200	47.200	76.100	47.100	34.300	5.600	27.900	55.700	53.400	46.500	44.000	490.500
Total Max Generation	gwh	102.900	73.200	87.600	99.100	92.700	99.100	95.900	102.900	99.600	102.900	102.900	99.600	1158.400

Project Pump Energy

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Granby	gwh	2.600	0.000	2.700	4.400	2.900	2.200	0.500	0.300	0.600	2.900	3.400	3.300	25.800
Willow Creek	gwh	0.200	0.200	0.000	0.000	0.000	0.000	0.700	0.900	0.500	0.200	0.100	0.100	2.900
Flatiron Unit 3	gwh	0.000	0.000	3.600	6.300	5.600	4.000	0.000	3.200	5.500	5.800	5.900	5.700	45.600
Total Pump Energy	gwh	2.800	0.200	6.300	10.700	8.500	6.200	1.100	4.400	6.500	8.800	9.400	9.100	74.000

B-7: C-BT OCTOBER 2019 MAXIMUM REASONABLE PLAN FOR WATER YEAR 2020



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HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Dillon Inflow	kaf	9.6	8.5	6.9	5.8	4.9	6.7	15.3	61.8	124.1	66.9	28.9	15.8	355.2
DL to GM Gain	kaf	6.8	6.0	5.1	4.4	4.0	6.7	13.5	42.8	78.7	49.9	21.2	10.5	249.6

Green Mountain Reservoir

		Init Cont: 118.00 kaf Elev: 7931.6 ft			Maximum Cont: 154.60 kaf Elev: 7950.4 ft				Minimum Cont: 8.00 kaf Elev: 7804.7 ft					
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Undepleted Inflow	kaf	16.5	14.5	12.0	10.2	8.9	13.4	28.8	105.8	205.8	118.6	50.7	26.2	611.4
Depletion	kaf	3.5	2.5	0.8	-0.3	-0.9	0.5	5.8	25.4	33.4	14.4	9.1	9.8	104.0
Depleted Inflow	kaf	13.0	12.0	11.2	10.5	9.8	12.9	23.0	80.4	172.4	104.3	41.6	16.4	507.5
Turbine Release	kaf	34.8	19.4	19.6	19.6	18.4	19.7	19.1	69.0	87.3	80.4	49.2	46.0	482.5
Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5	0.0	0.0	0.0	24.5
Total River Release	cfs	566	327	319	320	320	320	320	1123	1880	1307	801	773	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	34.8	19.4	19.6	19.6	18.4	19.7	19.1	69.0	111.9	80.4	49.2	46.0	507.1
Evaporation	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.7	0.6	0.4	3.1
End-Month Targets	kaf	95.0	55.0	55.0	55.0	55.0	55.0	60.0	70.0	130.0	152.7	145.0	115.0	
End-Month Contents	kaf	95.7	88.1	79.7	70.6	62.0	55.1	58.9	70.0	130.0	153.2	145.0	115.0	
End-Month Elevation	ft	7918.24	7913.11	7906.98	7899.82	7892.38	7885.84	7889.49	7899.33	7938.26	7949.80	7945.85	7930.06	

Willow Creek Reservoir

		Init Cont: 9.00 kaf Elev: 8126.0 ft			Maximum Cont: 10.20 kaf Elev: 8128.8 ft				Minimum Cont: 7.20 kaf Elev: 8116.9 ft					
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	1.4	1.3	1.1	0.9	0.9	2.1	7.8	36.9	39.2	8.7	3.5	2.1	105.9
Minimum Release	kaf	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	1.3	0.0	10.8	16.5	0.0	0.0	0.0	28.6
Total River Release	kaf	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.8
Pumped to Granby	kaf	1.3	1.3	0.0	0.0	0.0	0.0	9.7	23.0	23.8	9.1	3.0	1.6	72.8
Evaporation	kaf	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7
End-Month Targets	kaf	9.0	7.4	7.7	8.0	8.4	8.3	8.2	8.2	8.2	8.2	8.2	8.2	
End-Month Contents	kaf	9.0	8.6	9.3	9.8	10.3	10.6	8.2	10.7	9.1	8.2	8.2	8.2	
End-Month Elevation	ft	8124.50	8123.02	8125.62	8127.48	8129.16	8130.11	8121.32	8130.55	8124.97	8121.32	8121.32	8121.32	

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Granby Reservoir														
	Init Cont:	486.00 kaf			Maximum Cont:	539.80 kaf			Minimum Cont:	76.50 kaf				
	Elev:	8272.4 ft			Elev:	8280.0 ft			Elev:	8186.9 ft				
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	3.0	2.9	2.2	1.9	1.7	3.3	10.5	32.7	70.6	36.0	10.6	5.4	180.8
Release from Shadow Mtn	kaf	2.6	3.7	2.9	1.2	1.2	1.4	11.7	27.6	68.0	24.9	2.7	2.6	150.5
Pump from Windy Gap	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump from Willow Creek	kaf	1.3	1.3	0.0	0.0	0.0	0.0	9.7	23.0	23.8	9.1	3.0	1.6	72.8
Total Inflow	kaf	6.9	7.9	5.2	3.1	2.8	4.7	31.9	83.3	162.4	70.1	16.4	9.6	404.3
Minimum River Release	kaf	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4.6	4.5	4.6	2.5	1.2	25.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	136.1	64.1	4.8	0.0	205.0
Total River Release	kaf	1.2	1.2	1.2	1.2	1.2	1.2	1.2	4.6	4.5	4.6	2.5	1.2	25.8
Pumped to Shadow Mtn	kaf	17.3	0.0	16.5	22.7	19.6	12.8	0.0	0.0	0.0	0.0	9.3	9.7	107.9
Evaporation	kaf	1.6	0.7	0.0	0.0	0.0	0.9	1.5	2.5	3.2	2.9	2.3	2.1	17.7
Seepage loss	kaf	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	3.6
End-Month Contents	kaf	472.2	477.9	465.0	444.0	425.8	415.3	444.2	520.2	538.5	536.6	533.7	530.1	
End-Month Elevation	ft	8270.42	8271.26	8269.37	8266.24	8263.46	8261.83	8266.27	8277.28	8279.82	8279.56	8279.17	8278.67	
Shadow Mountain Reservoir														
	Init Cont:	17.00 kaf			Maximum Cont:	18.40 kaf			Minimum Cont:	16.60 kaf				
	Elev:	8386.8 ft			Elev:	8367.0 ft			Elev:	8366.0 ft				
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Native Inflow	kaf	4.5	3.9	3.0	2.5	2.2	4.4	14.0	40.3	86.6	45.0	15.6	8.1	230.1
Pumped from Granby	kaf	17.3	0.0	16.5	22.7	19.6	12.8	0.0	0.0	0.0	0.0	9.3	9.7	107.9
Total Inflow	kaf	21.8	3.9	19.5	25.2	21.9	17.2	14.0	40.3	86.6	45.0	24.9	17.8	338.1
Minimum River Release	kaf	2.2	2.7	2.8	1.2	1.2	1.2	1.2	1.2	3.0	3.1	2.5	2.1	24.4
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.6	3.7	2.9	1.2	1.2	1.4	11.7	27.6	68.0	24.9	2.7	2.6	150.5
Adams Tunnel Flow	kaf	19.1	0.0	16.5	23.9	20.7	15.5	1.9	12.0	17.8	19.4	21.6	14.7	183.1
Evaporation	kaf	0.3	0.1	0.0	0.0	0.0	0.2	0.3	0.5	0.6	0.5	0.4	0.4	3.3
End-Month Contents	kaf	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.8	16.9	
End-Month Elevation	ft	8366.62	8366.62	8366.62	8366.62	8366.63	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	
Adams Tunnel														
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Tunnel Capacity	kaf	25.0	2.3	19.6	24.5	28.4	19.4	22.3	20.9	28.2	33.8	33.8	32.7	290.9
Actual Diversion	kaf	19.1	0.0	16.5	23.9	20.7	15.5	1.9	12.0	17.8	19.4	21.6	14.7	183.1
% Maximum Delivery	%	76	0	84	98	73	80	8	57	63	57	64	45	

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CBT October 2019 Max Reasonable: 01-OCT-2019

Lake Estes

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Big Thompson Inflow	kaf	2.5	1.7	1.1	0.8	0.7	4.8	12.8	31.4	49.5	32.5	13.8	5.7	157.3
Minimum River Release	kaf	3.1	1.5	1.5	1.5	1.4	1.5	2.2	6.9	7.4	7.7	6.9	3.7	45.3
Actual River Release	kaf	2.7	1.5	1.1	0.8	0.7	4.8	2.2	14.7	34.4	27.7	19.3	9.7	119.6
Max Diversion Available	kaf	0.0	0.2	0.0	0.0	0.0	3.2	10.6	24.4	42.0	24.8	6.9	1.9	114.0
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skim Water Diverted	kaf	0.0	0.1	0.0	0.0	0.0	0.0	10.6	16.7	15.0	6.6	0.0	0.0	49.0
% Maximum Diversion	%	105	59	0	0	0	0	100	68	36	27	0	0	
Irrigation Demand	kaf	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.0	1.3
Irrigation Delivery	kaf	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.0	1.2
Total River Release	kaf	2.7	1.5	1.1	0.8	0.7	4.8	2.2	14.7	34.4	27.7	19.3	9.7	119.6

Olympus Tunnel

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Tunnel Capacity	kaf	33.8	32.7	33.8	33.8	31.6	33.8	32.7	33.8	32.7	33.8	33.8	32.7	399.0
Actual Delivery	kaf	18.8	0.1	16.5	23.9	20.6	15.4	12.3	28.5	32.7	23.9	16.0	10.7	219.4
% Maximum Delivery	%	56	0	49	71	65	46	38	84	100	71	47	33	
Inflow to Flatiron	kaf	18.8	2.4	18.5	23.9	20.6	15.4	12.3	28.5	32.7	23.9	16.0	10.7	223.7

Carter Lake

Init Cont: 84.00 kaf Maximum Cont: 112.20 kaf Minimum Cont: 6.00 kaf
Elev: 5732.7 ft Elev: 5759.0 ft Elev: 5626.8 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Pumped from Flatiron	kaf	0.0	0.0	11.4	19.1	16.2	10.8	0.0	9.1	15.4	15.7	16.0	10.7	124.4
Flatiron Bifurcation	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carter to Flatiron	kaf	0.0	2.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Evaporation Loss	kaf	0.2	0.1	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.5	0.4	0.3	2.9
Seepage Loss	kaf	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
End-Month Targets	kaf	112.0	20.0	112.0	112.0	112.0	10.0	10.0	112.0	112.0	112.0	112.0	10.0	
End-Month Contents	kaf	73.7	68.2	74.5	90.7	103.7	110.8	105.2	106.2	111.4	110.4	106.5	109.8	
End-Month Elevation	ft	5722.94	5717.40	5723.82	5738.93	5750.94	5757.75	5752.79	5753.21	5757.83	5756.93	5753.50	5756.85	
Priority Water Diverted to Carter	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation Demand	kaf	9.0	2.3	2.5	2.3	2.7	2.9	4.9	6.9	8.3	15.0	18.1	6.4	81.3
Metered Demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Windy Gap demand	kaf	0.5	0.6	0.5	0.5	0.4	0.5	0.3	0.6	1.3	1.1	1.2	0.5	8.0
Total Demand	kaf	9.5	2.9	3.0	2.8	3.1	3.4	5.2	7.5	9.6	16.1	19.3	6.9	89.3
Total Delivery	kaf	9.5	2.9	3.0	2.8	3.1	3.4	5.2	7.5	9.6	16.1	19.3	6.9	89.3
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Hansen Canal 930

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Minimum Flow	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Flow	kaf	57.2	55.3	57.2	57.2	53.5	57.2	55.3	57.2	55.3	57.2	57.2	55.3	675.1
Actual Flow	kaf	18.8	2.4	7.0	4.7	4.4	4.6	12.3	19.4	17.3	8.2	0.0	0.0	99.1

Dille Tunnel

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Big Thompson River Below Lake Estes	kaf	2.7	1.5	1.1	0.8	0.7	4.8	2.2	14.7	34.4	27.7	19.3	9.7	119.6
North Fork Big Thompson River at Drake	kaf	1.2	0.9	0.7	0.6	0.4	0.6	1.3	4.5	7.9	6.0	3.4	1.8	29.3
Dille Skim Water Diverted	kaf	1.2	0.1	0.0	0.0	0.0	0.0	0.0	6.8	8.2	15.5	13.6	5.0	50.4
Dille Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
water available	kaf	3.9	2.4	1.8	1.4	1.2	5.4	3.6	19.1	42.3	33.7	22.7	11.4	148.9
water diverted	kaf	1.4	0.1	0.0	0.0	0.0	0.0	0.0	6.8	8.2	17.4	19.1	9.1	62.1
% Diverted	%	26	1	0	0	0	0	0	125	152	321	354	168	
Big T @ Canyon Mouth	kaf	2.5	2.4	1.8	1.4	1.2	5.4	3.6	12.3	34.0	16.3	3.7	2.4	87.0

Trifurcation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Release from Flatiron	kaf	18.8	2.4	7.0	4.7	4.4	4.6	12.3	19.4	17.3	8.2	0.0	0.0	99.1
Release to 560 Canal	kaf	17.8	2.2	8.9	4.6	4.3	4.5	1.5	1.5	1.5	1.5	1.5	1.5	49.3
Dille Tunnel	kaf	1.4	0.1	0.0	0.0	0.0	0.0	0.0	6.8	8.2	17.4	19.1	9.1	62.1
Total release to river	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.5	1.4	3.4	2.3	9.7
Irrigation demand	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.5	1.4	3.4	2.3	9.7
Windy Gap demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total requirement	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.5	1.4	3.4	2.3	9.7
Total delivery	kaf	1.1	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.5	1.4	3.4	2.3	9.7
% Required Delivery	%	100	100	100	0	0	0	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Hansen Canal 550

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow from Flatiron	kaf	17.8	2.2	6.9	4.6	4.3	4.5	1.5	1.5	1.5	1.5	1.5	1.5	49.3
Maximum flow	kaf	23.3	21.4	30.1	30.1	28.2	30.1	29.1	30.1	29.1	30.1	30.1	29.1	340.8
Irrigation demand	kaf	0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.5	0.6	0.2	3.0
Irrigation delivery	kaf	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.5	0.6	0.2	2.8
Minimum flow	kaf	3.1	3.0	4.6	4.6	4.3	4.6	1.5	1.5	1.5	1.5	1.5	1.5	33.2
Rel's to Horsetooth	kaf	17.8	2.2	6.9	4.6	4.3	4.5	1.5	1.5	1.5	1.5	1.5	1.5	49.3

Horsetooth Reservoir

Init Cont: 129.00 kaf
Elev: 5415.5 ft
Maximum Cont: 157.00 kaf
Elev: 5430.0 ft
Minimum Cont: 13.00 kaf
Elev: 5316.8 ft

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow	kaf	17.8	2.2	6.9	4.6	4.3	4.5	1.5	1.5	1.5	1.5	1.5	1.5	49.3
Total irrigation delivery	kaf	11.6	1.9	2.0	2.2	1.9	2.2	3.2	7.7	7.6	19.7	22.1	5.1	87.2
Evaporation loss	kaf	0.4	0.2	0.0	0.0	0.0	0.3	0.5	0.7	0.8	0.7	0.5	0.4	4.5
Seepage loss	kaf	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.4
End-Month Targets	kaf	138.0	95.0	138.2	138.2	83.3	83.3	83.3	83.3	83.3	83.3	83.3	83.3	
End-Month Content	kaf	134.2	134.2	138.9	141.2	143.4	145.2	142.9	135.9	128.8	109.8	88.5	84.3	
End-Month Elevation	ft	5418.49	5418.47	5420.97	5422.14	5423.28	5424.24	5423.05	5419.39	5415.56	5404.73	5391.46	5388.67	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation demand	kaf	8.5	0.0	0.0	0.0	0.0	0.0	0.3	2.9	2.4	12.0	15.0	2.5	43.6
Metered Demand	kaf	2.5	1.5	1.6	1.8	1.6	1.8	2.4	4.1	4.5	7.1	6.0	1.9	36.8
Windy Gap demand	kaf	0.6	0.4	0.4	0.4	0.3	0.4	0.6	0.6	0.8	0.7	1.2	0.6	7.0
Total demand	kaf	11.6	1.9	2.0	2.2	1.9	2.2	3.2	7.7	7.6	19.7	22.1	5.1	87.2
Total irrigation	kaf	11.6	1.9	2.0	2.2	1.9	2.2	3.2	7.7	7.6	19.7	22.1	5.1	87.2
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CBT Project Summary

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total CBT Delivery	kaf	21.5	3.9	4.3	4.3	4.5	4.9	7.9	15.4	16.0	36.2	43.1	13.4	175.4



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Windy Gap

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Pumping	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Losses	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spill	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-7.8	0.0	0.0	0.0	-7.8
Total Delivery	kaf	1.1	1.0	0.9	0.9	0.7	0.9	0.9	1.2	2.1	1.8	2.4	1.2	15.1
Account Balance	kaf	-1.1	-2.1	-3.0	-3.9	-4.6	-5.5	-6.4	-7.6	0.0	0.0	-1.2	-2.3	



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PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Generation	gwh	18,600	18,000	18,600	18,600	17,400	18,600	18,000	18,600	18,000	18,600	18,600	18,000	219,600
Generation	gwh	6,600	3,500	3,400	3,300	3,000	3,100	3,000	11,200	15,600	16,900	10,400	9,300	89,300
% Maximum Generation	%	36	20	19	18	17	17	16	60	87	91	56	52	
Average	kwh/af	190	181	176	169	163	157	155	162	179	210	211	202	

Willow Creek Pumping

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	24.6	12.7	0.0	0.0	0.0	0.0	23.8	24.6	23.8	24.6	24.6	23.8	182.5
Actual Pumping	kaf	1.3	1.3	0.0	0.0	0.0	0.0	9.7	23.0	23.8	9.1	3.0	1.6	72.8
Pump Energy	gwh	0.300	0.300	0.000	0.000	0.000	0.000	2.100	4.900	5.100	1.900	0.600	0.300	15.500
% Maximum Pumping	%	5	10	0	0	0	0	41	94	100	37	12	7	306
Average	kwh/af	213	213	0	0	0	0	213	213	213	213	213	213	

Lake Granby Pumping

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	36.9	35.7	36.9	36.9	34.5	36.9	35.7	36.9	35.7	36.9	36.9	35.7	435.6
Actual Pumping	kaf	17.3	0.0	16.5	22.7	19.6	12.8	0.0	0.0	0.0	0.0	9.3	9.7	107.9
Pump Energy	gwh	2.500	0.000	2.400	3.300	2.800	1.900	0.000	0.000	0.000	0.000	1.300	1.400	15.600
% Maximum Pumping	%	47	0	45	61	57	35	0	0	0	0	25	27	
Average	kwh/af	143	0	143	144	145	146	0	0	0	0	140	140	



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Marys Lake Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Adams Tunnel Flow	kaf	19.1	0.0	16.5	23.9	20.7	15.5	1.9	12.0	17.8	19.4	21.6	14.7	183.1
Maximum Generation	gwh	6.400	0.600	3.700	6.400	6.000	6.400	6.200	6.400	6.200	6.400	6.400	6.200	67.300
Generation	gwh	3.500	0.000	3.000	4.300	3.700	2.500	0.000	1.900	3.100	3.400	3.900	2.400	31.700
% Maximum Generation	%	18	0	18	18	18	16	0	16	17	18	18	16	
Average	kwh/af	182	0	185	181	179	160	0	156	175	175	179	162	

Lake Estes Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Adams Tunnel Flow	kaf	19.1	0.0	16.5	23.9	20.7	15.5	1.9	12.0	17.8	19.4	21.6	14.7	183.1
Maximum Generation	gwh	16.000	15.500	16.000	16.000	15.000	16.000	15.500	16.000	15.500	16.000	16.000	15.500	189.000
Generation	gwh	8.900	0.000	7.700	10.700	9.200	6.600	0.200	4.900	7.700	8.500	9.500	6.300	80.200
% Maximum Generation	%	56	0	48	67	61	41	2	30	50	53	60	41	
Average	kwh/af	467	11	464	448	443	428	126	405	434	440	442	429	

Pole Hill Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Olympus Tunnel Flow	kaf	33.8	32.7	33.8	33.8	31.6	33.8	32.7	33.8	32.7	33.8	33.8	32.7	399.0
Maximum Generation	gwh	25.800	2.500	15.000	25.800	24.100	25.800	25.000	25.800	25.000	25.800	25.800	25.000	271.400
Generation	gwh	14.200	0.000	12.400	17.800	15.000	9.900	5.900	21.400	25.000	17.600	11.000	7.100	157.300
% Maximum Generation	%	0	0	0	0	0	0	0	0	0	0	43	0	
Average	kwh/af	419	0	368	527	474	293	179	633	763	520	326	216	

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Flatiron Units 1 and 2 Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Inflow to Flatiron	kaf	18.8	2.4	18.5	23.9	20.6	15.4	12.3	28.5	32.7	23.9	16.0	10.7	223.7
Maximum Generation	gwh	32.200	31.200	32.200	32.200	30.200	32.200	31.200	32.200	31.200	32.200	32.200	31.200	380.400
Generation	gwh	16.600	0.000	14.900	19.900	17.000	12.300	9.300	25.900	31.200	21.300	12.500	8.300	189.200
% Maximum Generation	%	0	0	0	62	0	0	0	0	0	0	39	0	
Average	kwh/af	880	2	806	832	824	794	751	910	953	891	783	780	

Flatiron Unit 3 Pump/Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Maximum Pumping	kaf	0.0	0.0	12.1	19.1	16.2	15.9	15.5	16.5	15.4	15.7	16.0	15.3	157.7
Pump from Flatiron	kaf	0.0	0.0	11.4	19.1	16.2	10.8	0.0	9.1	15.4	15.7	16.0	10.7	124.4
Pump Energy	gwh	0.000	0.000	3.600	6.300	5.600	3.900	0.000	3.200	5.600	5.700	5.800	3.900	43.600
% Maximum Pumping	%	0	0	94	100	100	68	0	55	100	100	100	69	
Average	kwh/af	0	0	312	328	346	361	0	355	362	364	361	362	
Maximum Turbine release	kaf	0.0	17.1	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.1
Carter to Flatiron	kaf	0.0	2.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Maximum Generation	gwh	0.000	3.500	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.500
Actual Generation	gwh	0.000	0.500	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.900
Average	kwh/af	0	203	200	0	0	0	0	0	0	0	0	0	

Big Thompson Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total release	kaf	2.2	0.2	0.0	0.0	0.0	0.0	10.7	24.4	23.8	23.5	17.0	7.3	109.1
Turbine release	kaf	2.2	0.2	0.0	0.0	0.0	0.0	0.0	24.1	23.8	23.5	17.0	7.3	98.1
Wasteway release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	10.7	0.3	0.0	0.0	0.0	0.0	11.0
Maximum Generation	gwh	3.800	1.900	0.000	0.000	0.000	0.000	0.000	3.800	3.700	3.800	3.800	3.700	24.500
Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.800	3.700	3.700	2.600	0.900	14.700
% Maximum Generation	%	0	0	0	0	0	0	0	98	100	97	69	24	
Average	kwh/af	2	0	0	0	0	0	0	156	156	158	156	121	



CBT October 2019 Max Reasonable: 01-OCT-2019

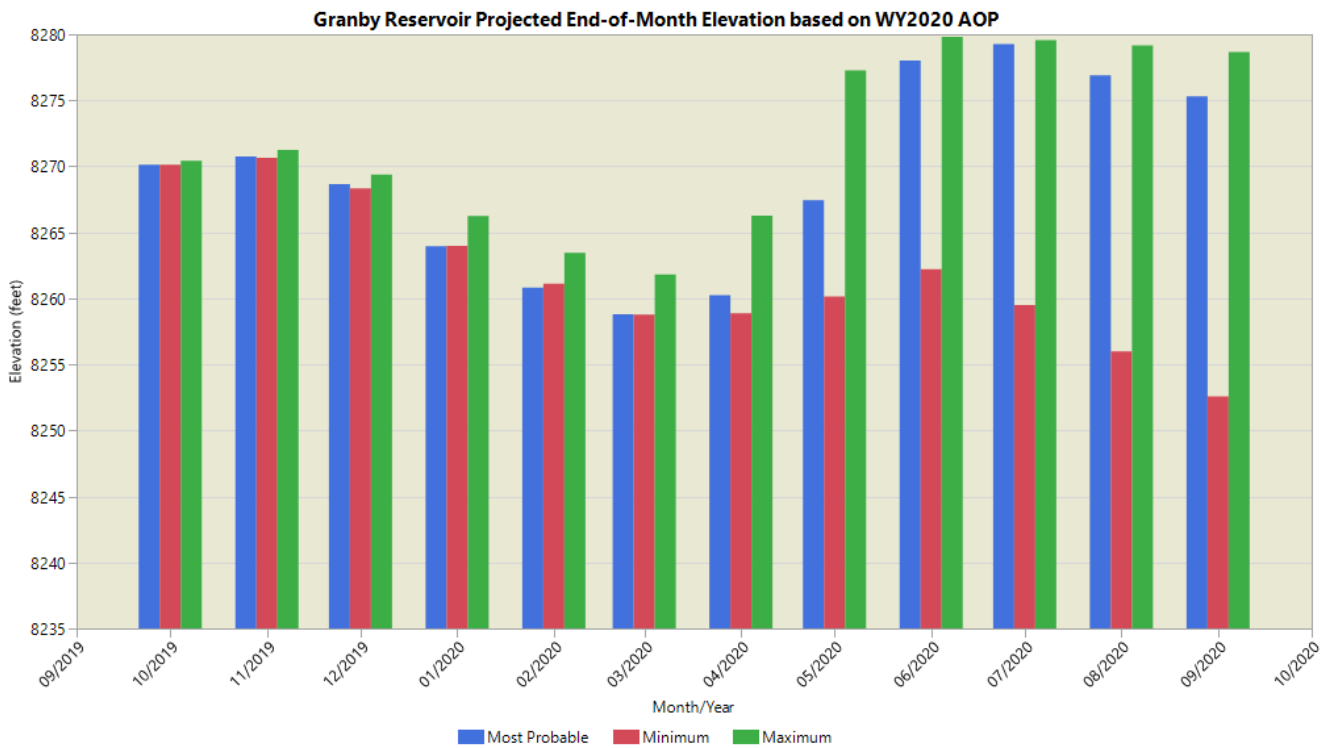
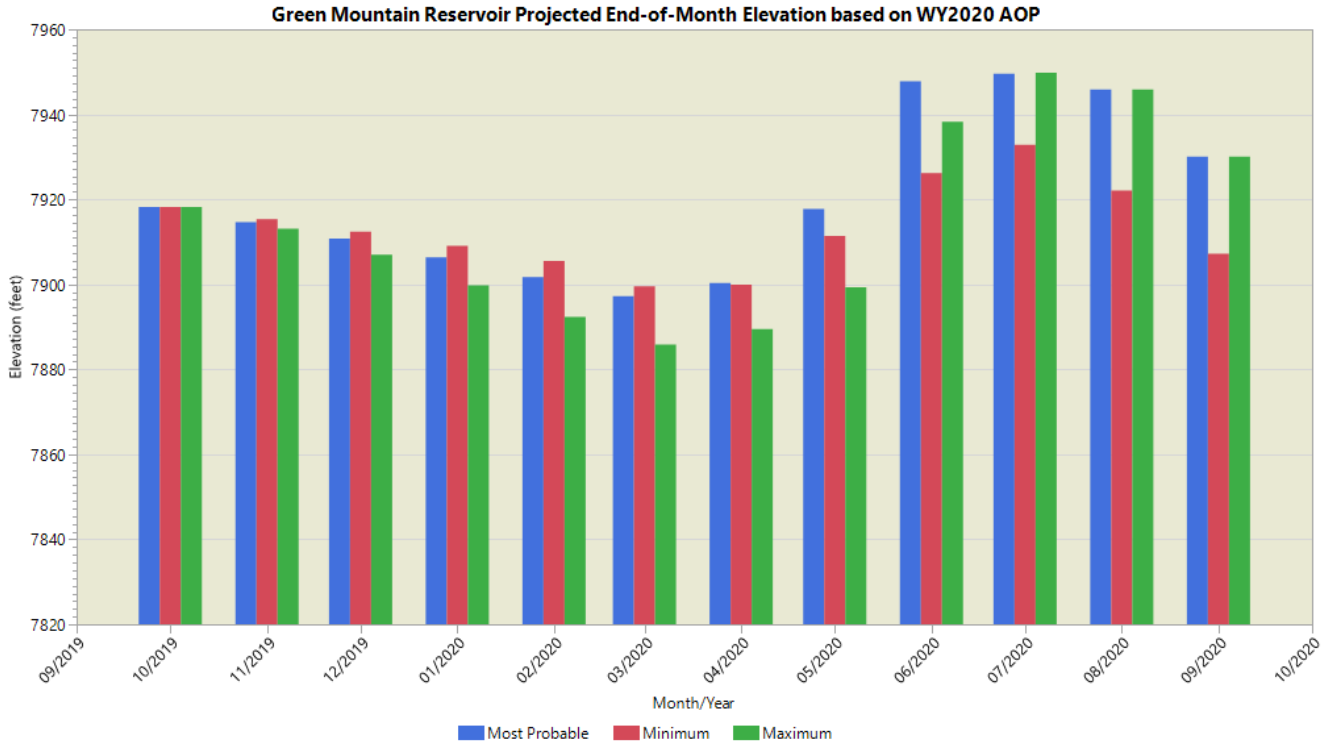
Project Generation

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Total Generation	gwh	49.800	4.000	41.900	56.100	47.900	34.400	18.300	69.000	86.300	71.400	50.000	34.200	563.300
Total Max Generation	gwh	102.900	73.200	87.600	99.100	92.700	99.100	95.900	102.900	99.600	102.900	102.900	99.600	1158.400

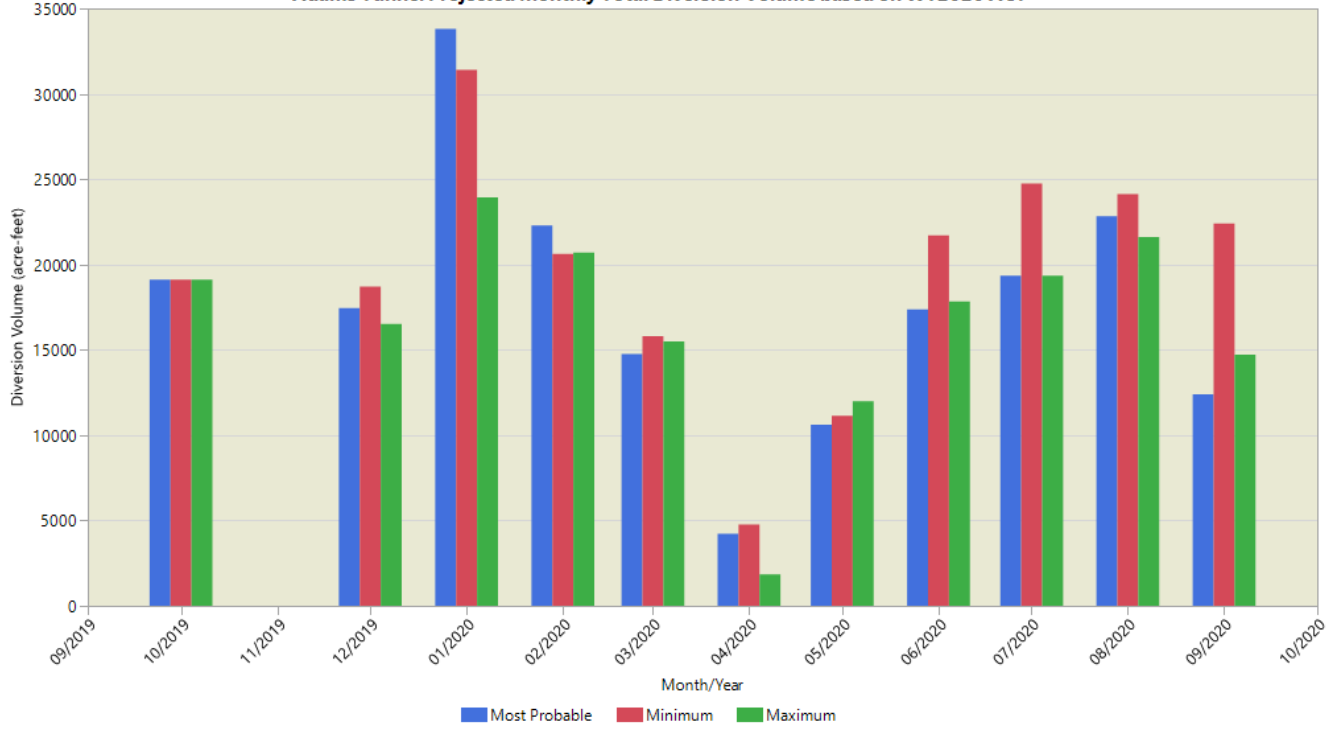
Project Pump Energy

		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Total
Granby	gwh	2.500	0.000	2.400	3.300	2.800	1.900	0.000	0.000	0.000	0.000	1.300	1.400	15.600
Willow Creek	gwh	0.300	0.300	0.000	0.000	0.000	0.000	2.100	4.900	5.100	1.900	0.600	0.300	15.500
Flatiron Unit 3	gwh	0.000	0.000	3.600	6.300	5.600	3.900	0.000	3.200	5.600	5.700	5.800	3.900	43.600
Total Pump Energy	gwh	2.800	0.300	5.900	9.500	8.500	5.800	2.100	8.100	10.700	7.700	7.700	5.600	74.700

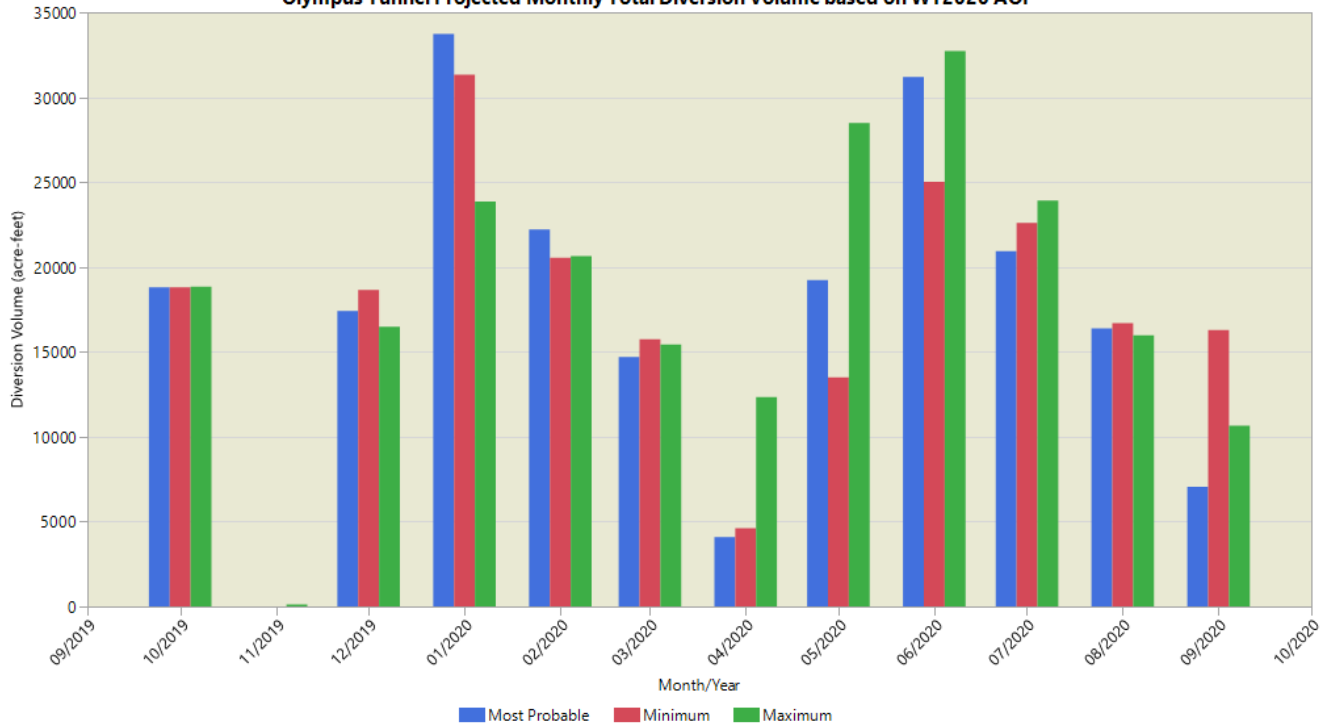
B-8: WATER YEAR 2020 PLAN SUMMARY CHARTS



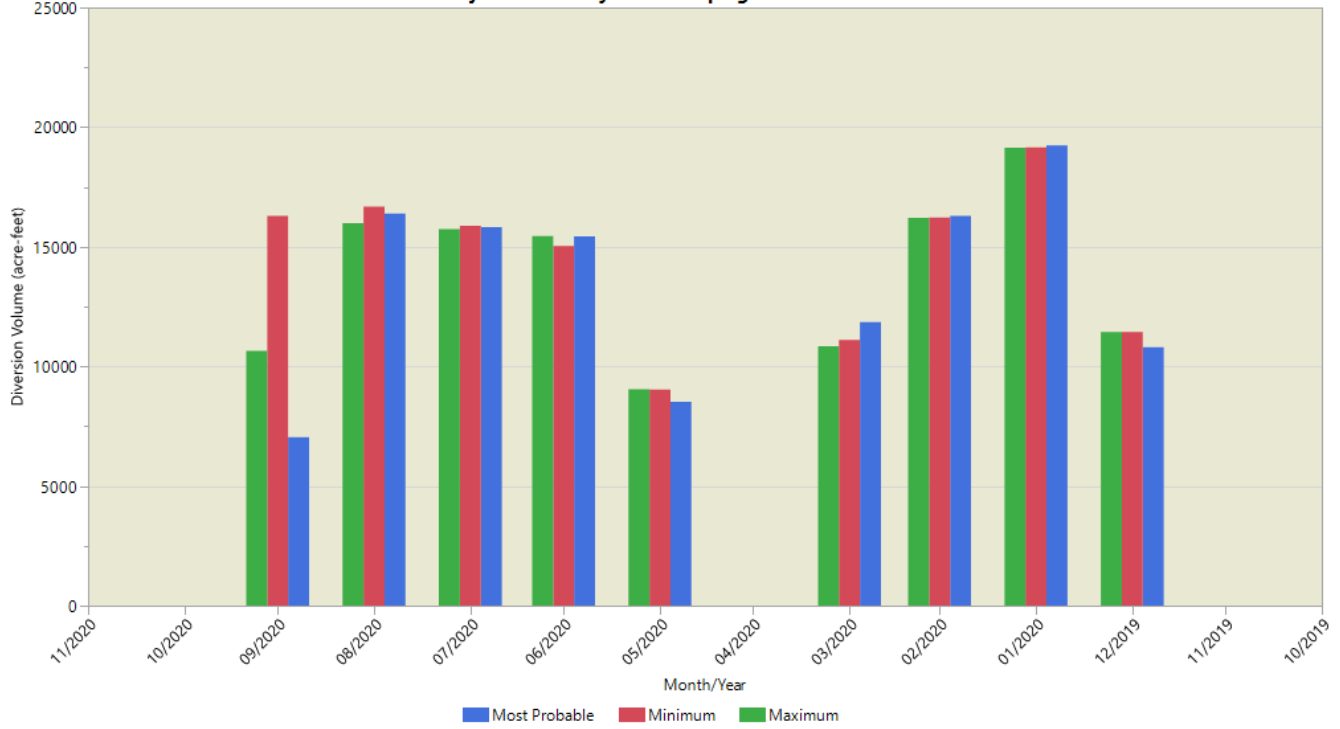
Adams Tunnel Projected Monthly Total Diversion Volume based on WY2020 AOF



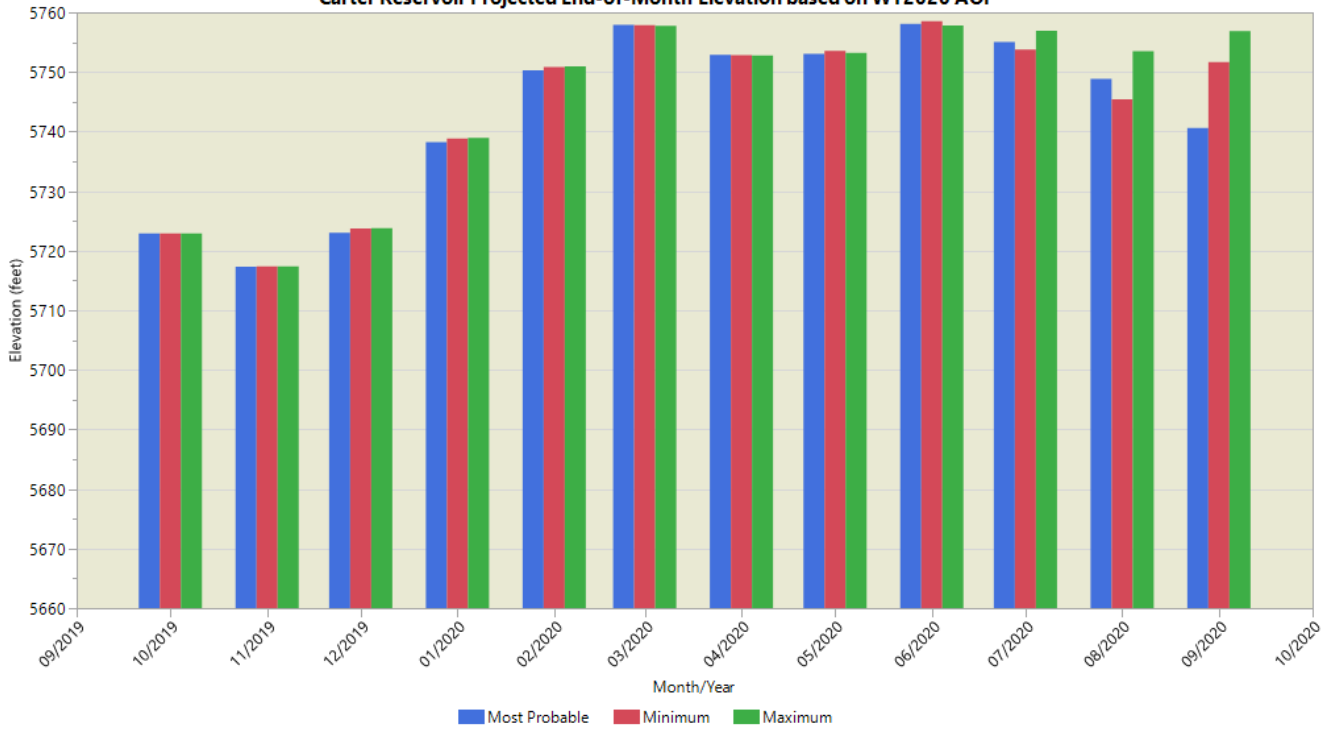
Olympus Tunnel Projected Monthly Total Diversion Volume based on WY2020 AOF



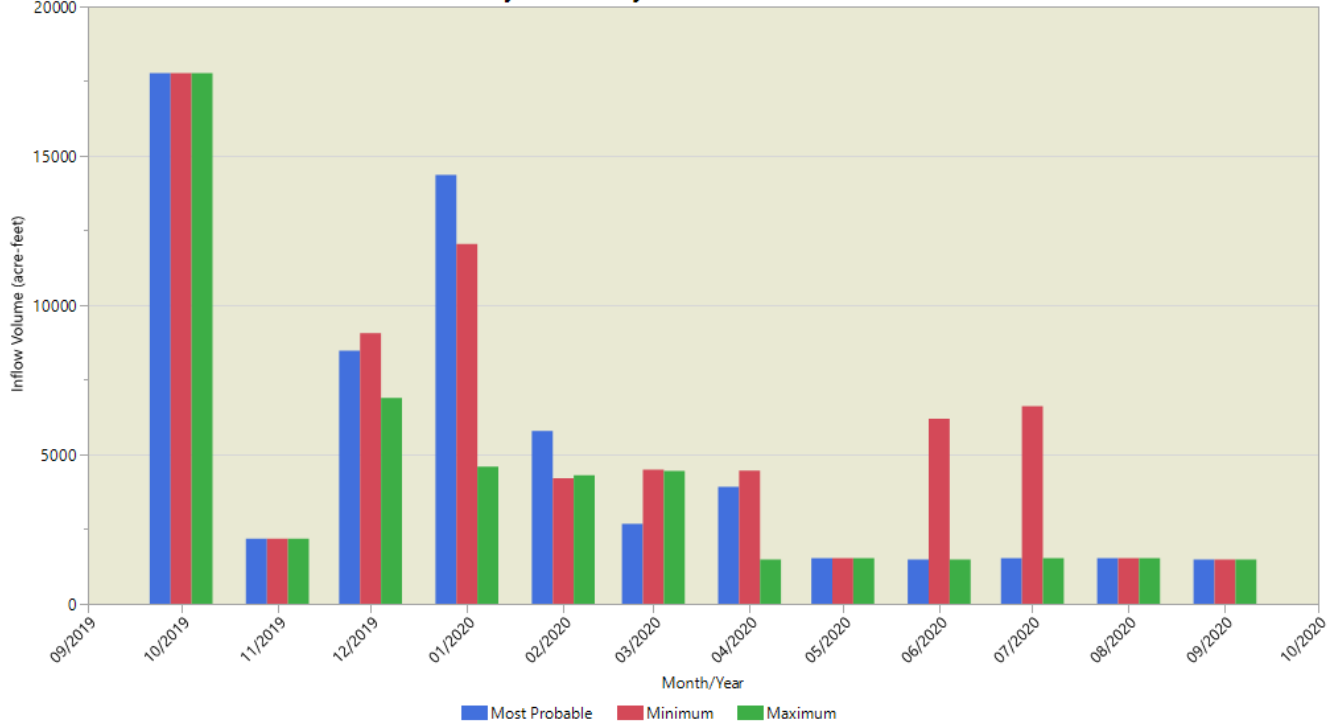
Carter Reservoir Projected Monthly Total Pumping Volume based on WY2020 AOP



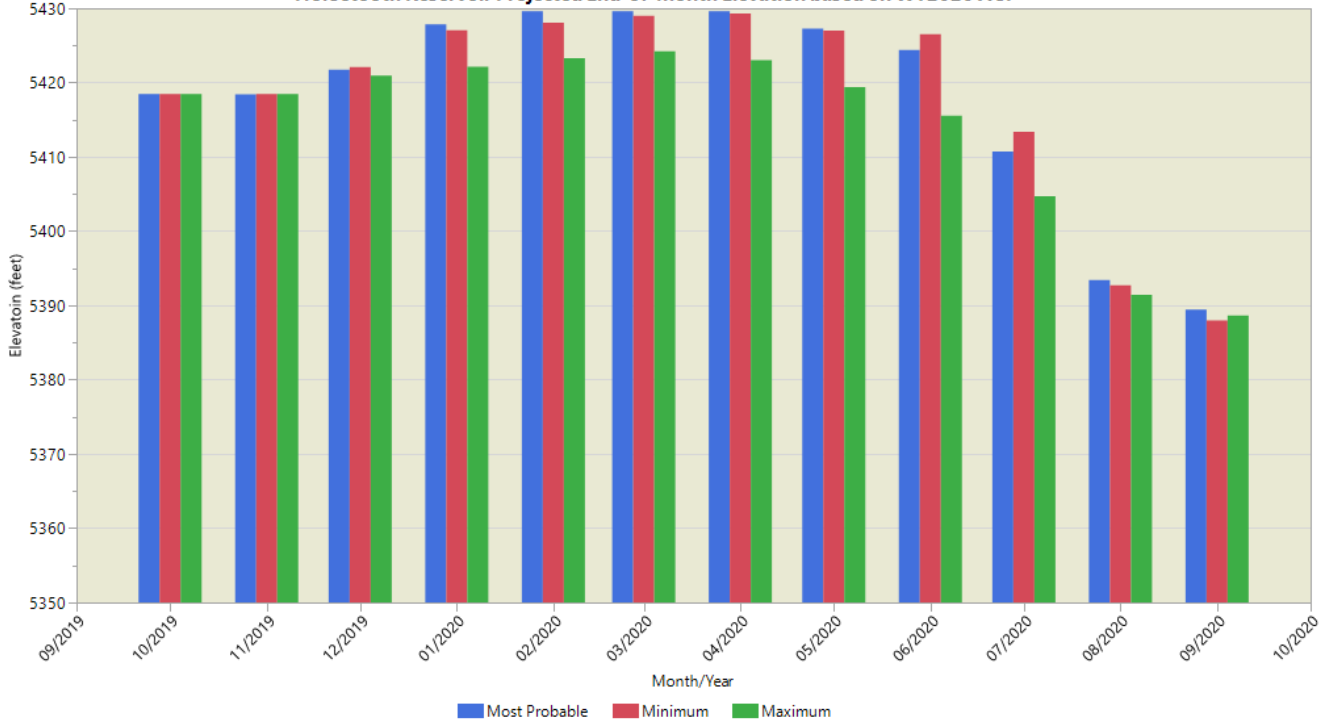
Carter Reservoir Projected End-of-Month Elevation based on WY2020 AOP



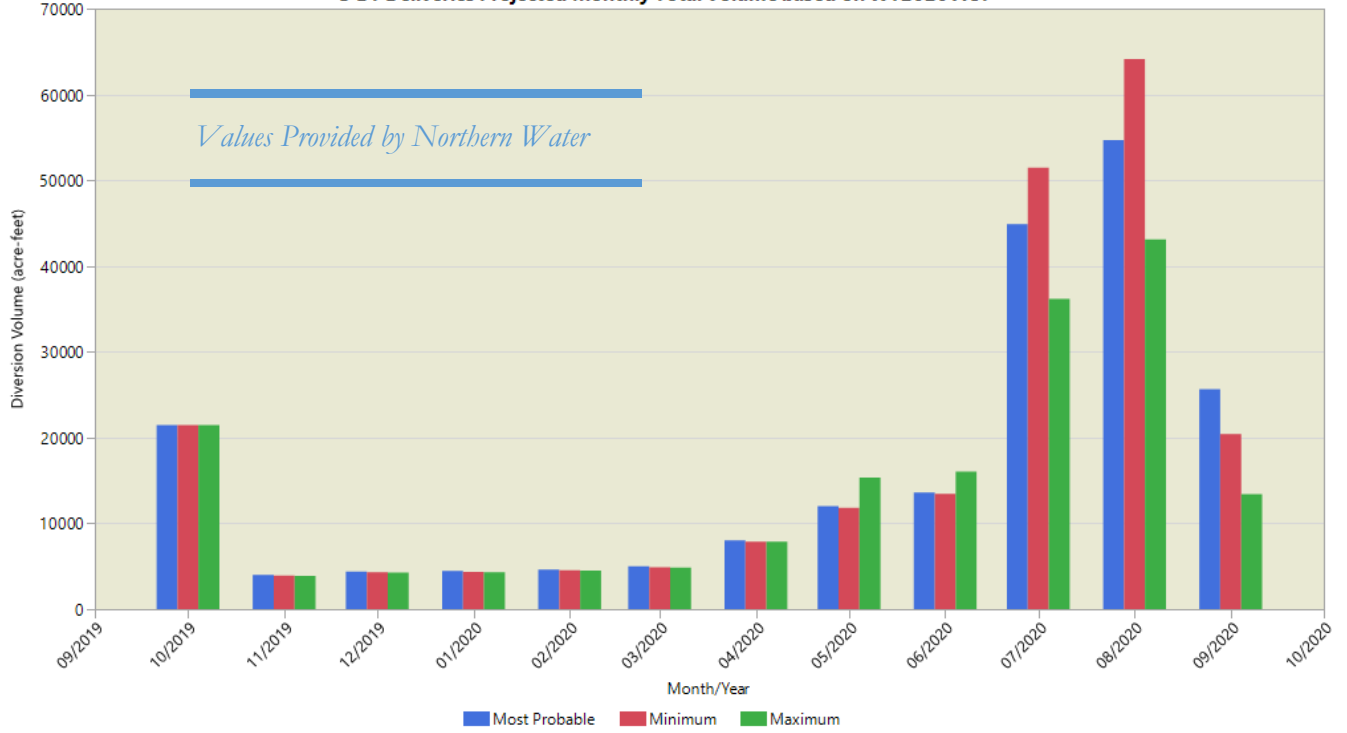
Horsetooth Reservoir Projected Monthly Total Inflow Volume based on WY2020 AOP



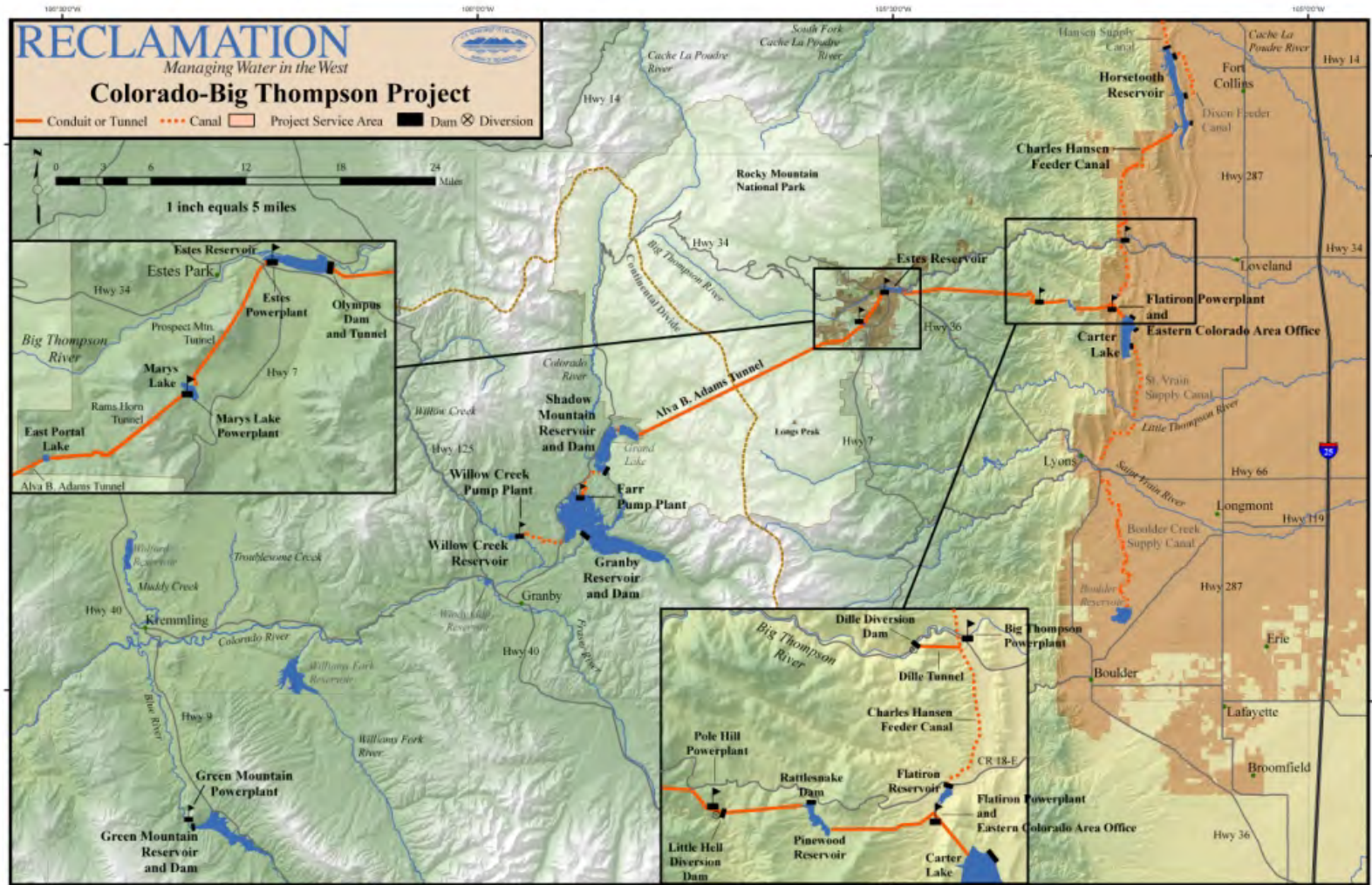
Horsetooth Reservoir Projected End-of-Month Elevation based on WY2020 AOP



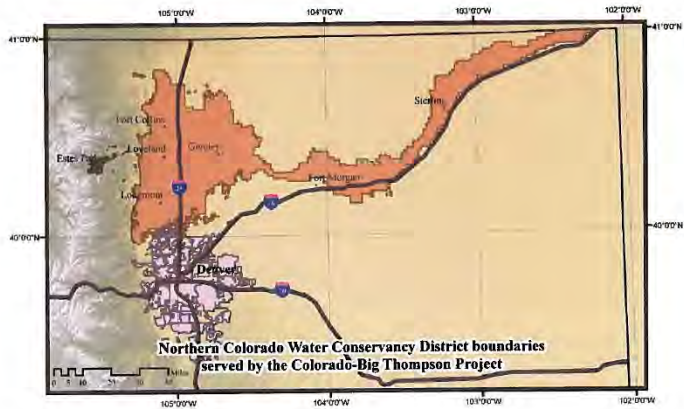
C-BT Deliveries Projected Monthly Total Volume based on WY2020 AOF



C-1: PUBLICITY MAP, EXTENTS, FACTS AND CONNECTIVITY SCHEMATIC OF THE COLORADO-BIG THOMPSON PROJECT

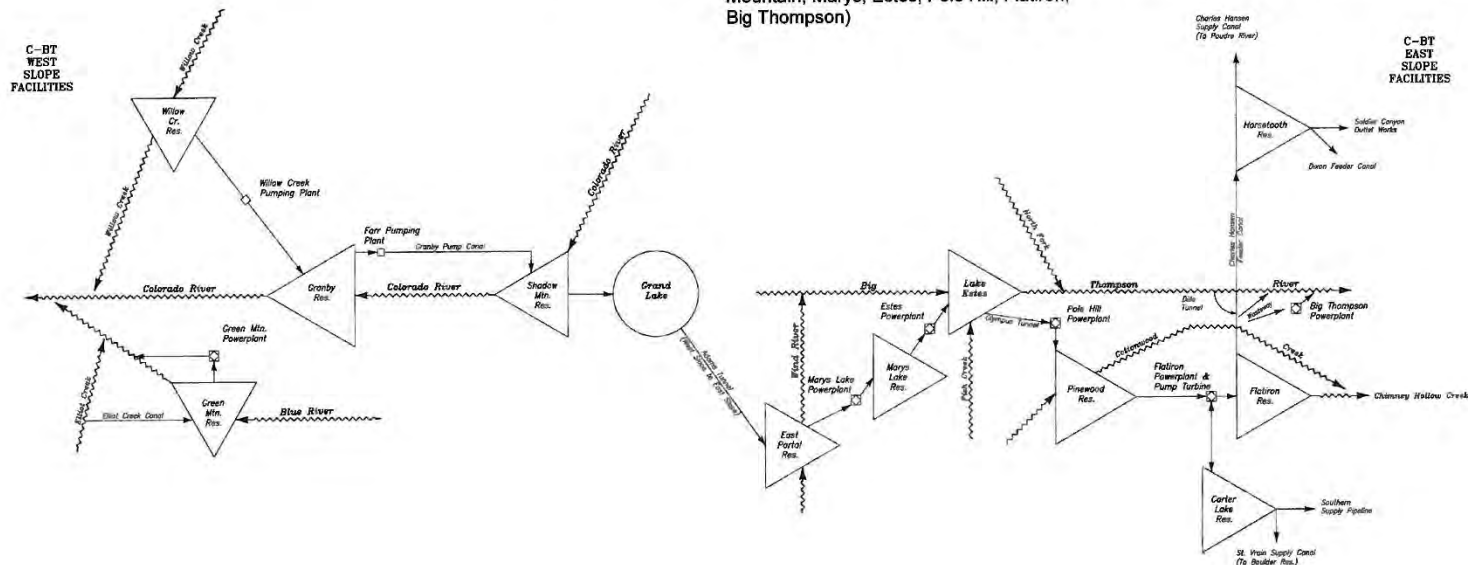


The [narrative overview of the C-BT project](#) begins on page 4 of this report.

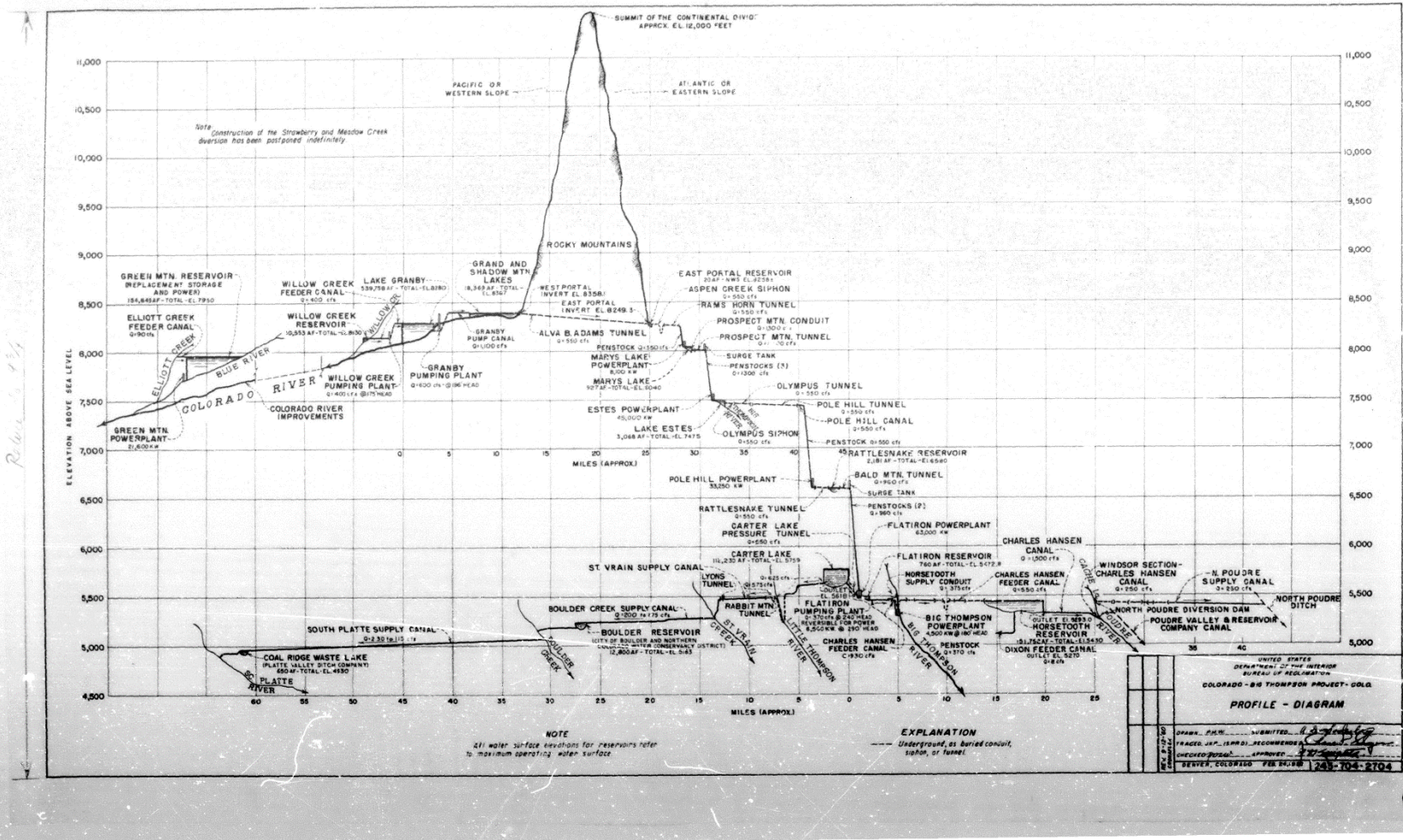


Colorado-Big Thompson Facts

- A trans-mountain, trans-basin water diversion, storage, and delivery project
- Signed into law by President Roosevelt in 1937
- Construction period: 1938-1952
- Ten major reservoirs (Green Mountain, Willow Creek, Granby, Shadow Mountain, Marys Lake, Estes, Pinewood, Carter, Flatiron and Horsetooth)
- Twenty major dams and dikes
- Twenty-two tunnels, canals and other conduits covering about 130 miles
- Six hydroelectric powerplants (Green Mountain, Marys, Estes, Pole Hill, Flatiron, Big Thompson)
- Water right allows for diversion of up to 310,000 acre-feet of water a year
- Average annual diversion over life of project is 260,000 acre-feet
- Water falls over 2000 feet from Continental Divide to Colorado's eastern Plains, providing for hydroelectric power generation.
- Together, all six powerplants generate approximately 759 million kilo-Watt hours of electricity a year—enough to power 58,300 American homes for a year.
- The C-BT provides water to 29 cities and towns, including 620,000 irrigated acres and a population of 725,000 people



C-2: PROFILE VIEW OF THE COLORADO-BIG THOMPSON PROJECT



SIXTY-EIGHTH ANNUAL REPORT OF THE WESTERN DIVISION SYSTEM POWER OPERATIONS

PREFACE

This is the sixty-eighth annual report for the Pick-Sloan Missouri Basin Program, Western Division System (System) power operations. For the purpose of this report, the System also includes the Yellowtail Powerplant Units 1 and 2 and the generating facilities of the Fryngpan Arkansas (Fry Ark) Project. The purpose of the report is to inform interested parties of the generation and pump energy requirements of the hydropower system. The report consists of two parts: One part describes the actual generation and pumping operations for water year 2019 (WY 2019) and the other part presents the plan of generation and pumping operations for WY 2020.

An update on the System generation and pumping operations is included in the "Water Supply and Utilization" report, which is issued separately, monthly.

WATER YEAR 2019—GENERATION AND PUMP ENERGY SUMMARY

Power generation for the C-BT and the Fry Ark projects was well above average for WY 2019 and greater than WY 2018, while much of the rest of the Western Division System during WY 2019 was higher than average but slightly less than WY 2018. With the exception of the Big Thompson Powerplant, most of the plants in the C-BT and Fry Ark projects produced significantly greater than average power, while most of the plants in Wyoming and Montana were above average in production. The exceptions were Yellowtail, Alcove and Fremont Canyon powerplant which were near to less than average for the water year.

In the case of the C-BT, demands for water were slightly less than average for WY 2019. The declared quota was 70% for the WY 2019, which is average, but the slightly wetter than average June and early July reduced actual demands in those months and that translated into increased storage in the terminal reservoirs of project, and above average power generation for much of the water year.

The C-BT powerplants produced an accumulated gross generation total of 749.7 gigawatt-hours (GWh) of electricity representing 125 percent of its thirty-year average and 26.9 percent of gross System generation. The gross generation produced by the entire System was 2,784.8 GWh or 105 percent of the thirty-year average. Gross generation includes one-half of the Yellowtail generation. Net generation is the gross generation less the energy used for pumping at Farr Plant, Willow Creek Pump, Flatiron Unit 3 and the two Mount Elbert units. The System net generation for WY 2019 was 2,410.5 GWh. The average for a water year is 2,400.5 GWh. The total System load includes firm energy deliveries, C-BT use-energy, support-energy, plant station service, and an estimate of transmission-system losses.

The System boundaries are illustrated in Appendix B-1. Table A-1 in Appendix A includes the gross generation for every powerplant in the System. Table A-3 shows monthly generation and pumping energy, by plant, and monthly System loads. Figure B-2 graphically summarizes Table A-3 including the C-BT contribution to the System. Table A-2 reports the total energy required to operate the pumps in the System. Some of the numbers included in this section were provided by WAPA.

In WY 2019, the Willow Creek Pumping Station pumped to Granby well over twice the volume pumped during WY 2018. The Willow Creek Pumping Station used 13.0 GWh of power during its WY 2019 operation. Meanwhile, the Farr Pumping Plant and the Flatiron Powerplant Unit 3 required 33.7 and 44.1 GWh, respectively. The Farr Pumping Plant required slightly above average energy, while Flatiron Powerplant Unit 3 operations required substantially more than average. Their combined power requirement was 90.8 GWh, 144 percent of the thirty-year average, 3.2 percent of gross system generation. The electrical demand is defined primarily by how much water is pumped and secondarily by how high the pump lifts that water.

According to the numbers provided by WAPA, sales of electric power in the Western Division System totaled 2,945.9 GWh during WY 2019, with a revenue of \$75,532,210, an increase from the previous year. Energy deficits were covered by a combination of scheduled interchange energy, use of the Mount Elbert pumped storage plant, and power purchases. The power purchases totaled 369.8 GWh during WY 2019 for which WAPA paid a total of \$11,029,791 a decrease from the previous water year.

WATER YEAR 2020—GENERATION AND PUMP ENERGY FORECAST

Under the most-probable runoff condition plan (2020 AOP), the gross generation for the C-BT powerplants is projected to be 651.7 GWh during WY 2020 (Table A-4), while pump energy requirements from the C-BT Power System are expected to reach 74.2 GWh. The gross generation for the entire System is expected to be 2,070.9 GWh, with a total load of 2,162.5 GWh, leaving a power deficit of 91.6 GWh. The System generation includes one-half of the total Yellowtail Powerplant generation and the Mount Elbert Powerplant generation resulting from Fry Ark Project water deliveries. The total load includes energy deliveries under firm contracts, seasonal support energy deliveries, energy dedicated for C-BT use, estimates of station service energy, and estimates of transmission System losses.

Table A-4 summarizes the projected monthly System generation, pump energy, and loads for the most probable forecasted runoff conditions for WY 2020. Figure B-3 is a graphical summary of the System gross generation less pumping, including the C-BT contribution for the most probable inflow conditions. Table A-5 lists the scheduled maintenance for the various facilities in the C-BT as anticipated when the AOP simulation was completed. Tables A-6 and A-7 summarize the capacity data for the powerplants and pumping plants within the System, including the Yellowtail and Mount Elbert Units.

APPENDICES

APPENDIX A—TABLES

A-1: WESTERN DIVISION SYSTEM GENERATION FOR WATER YEAR 2019

WESTERN DIVISION SYSTEM GENERATION FOR WY 2019

Powerplant	Accum. Gross Generation ^{1/}		
	WY 2019 (GWH)	Avg ^{2/} (GWH)	Percent of Avg
Green Mtn.	59.2	51.9	114
Marys Lake	48.4	37.2	130
Estes	136.1	100.3	136
Pole Hill	220.5	172.3	128
Flatiron 1&2	277.1	226.9	122
Big Thompson	8.4	10.9	77
Seminole	141.2	132.5	107
Kortes	151.9	140.4	108
Freemont C.	186.1	239.6	78
Alcova	94.7	118.0	80
Glendo	85.9	80.1	107
Guernsey	20.5	19.4	105
Boysen	70.5	69.3	102
Heart Mtn.	22.6	15.8 ^{3/}	143
Buffalo Bill	91.9	68.3 ^{3/}	135
Shoshone	20.0	20.2 ^{3/}	99
Spirit Mtn.	17.7	14.7 ^{3/}	120
Mt. Elbert	235.5	169 ^{4/}	139
Yellowtail	896.5	959 ^{5/}	93
Total	2784.8	2645.8	105

^{1/} Oct-Sep

^{2/} 1976-2005 average

^{3/} 1995-2012 average

^{4/} 1990-1999 average

^{5/} 1971-1990 average; in general, half of Yellowtail energy is dedicated to the Western Division System through marketing arrangement. The other half is marketed in Eastern Division System.

A-2: PUMP ENERGY USED DURING WATER YEAR 2019

Pumping Plant	October 2018-September 2019 Pump Energy		
	WY2019 (GWH)	Avg ^{1/} (GWH)	Percent of Avg
Willow Cr	13.0	5.8	224
Farr	33.7	30.7	110
Flatiron 3	44.1	26.7	165
Mt. Elbert	283.6	182.1 ^{2/}	156
Total	374.3	245.3	153

^{1/} 1976-2005 average

^{2/} 1990-1999 average

A-3: GROSS GENERATION LESS PUMPING FOR WATER YEAR 2019

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM WATER YEAR 2019 OPERATIONS GROSS GENERATION LESS PUMPING IN GIGAWATT-HOURS

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Mt. Elbert *	0.3	2.7	4.5	5.5	5.6	7.7	4.8	2.7	6.4	4.3	0.0	0.1	44.6
Green Mtn.	0.9	1.5	1.2	1.1	0.9	1.4	1.5	2.8	11.2	18.7	9.2	8.7	59.1
Willow Cr. pump	0.0	0.2	0.0	0.0	0.0	0.0	1.7	4.8	5.3	0.5	0.4	0.1	13.0
Farr pump	3.8	0.3	3.2	5.2	4.7	3.5	3.3	1.7	0.1	0.7	3.6	3.7	33.8
Marys Lake	4.0	0.3	3.1	5.8	5.2	3.7	4.8	5.3	3.4	3.2	5.3	4.4	48.5
Estes	12.0	0.8	9.3	16.5	14.2	10.5	13.5	14.2	9.4	9.4	14.4	11.9	136.1
Pole Hill	16.9	1.7	12.2	24.2	21.4	14.9	22.0	22.8	22.4	22.1	21.5	18.2	220.3
Flatiron 1&2	20.9	3.4	16.0	29.3	26.5	19.4	27.6	28.8	28.2	27.4	27.3	22.2	277.0
Flatiron 3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Flatiron 3 pump	5.0	0.9	2.8	6.8	5.7	6.1	1.7	3.7	3.3	2.5	5.6	0.0	44.1
Big Thompson	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	3.1	2.3	1.5	0.7	8.4
Seminole	4.2	4.5	4.3	4.2	3.6	4.1	13.8	28.2	29.4	29.8	9.3	6.0	141.4
Kortes	5.5	5.4	5.7	5.2	4.7	5.2	15.4	30.0	28.8	28.4	10.5	7.3	152.1
Fremont Canyon	0.0	0.0	0.0	0.8	6.2	8.2	17.3	8.0	25.3	48.3	46.9	25.2	186.2
Alcova	3.3	3.3	3.5	3.5	3.2	3.9	4.7	3.2	10.5	24.7	21.6	9.3	94.7
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.7	17.6	23.9	23.6	13.8	85.9
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.2	4.2	2.6	4.4	3.9	20.4
Pilot Butte **	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boysen	2.6	5.2	5.0	5.1	4.6	4.9	4.8	9.4	9.5	4.5	9.0	5.9	70.5
Shoshone	1.7	1.6	1.7	1.7	1.0	0.0	1.6	1.6	1.8	2.1	2.0	1.8	18.6
Buffalo Bill	4.8	4.4	1.7	1.8	2.0	5.5	12.9	13.6	13.3	13.6	11.7	3.4	88.7
Spirit Mtn.	1.7	0.0	0.0	0.0	0.0	0.0	1.5	2.2	2.8	3.3	3.1	3.1	17.7
Diamond Cr. pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heart Mtn.	1.9	0.0	0.0	0.0	0.0	0.0	3.4	3.6	3.4	3.4	3.6	3.4	22.7
Yellowtail***	70.4	65.7	67.4	65.0	53.1	58.8	67.5	81.9	99.6	103.6	86.1	77.3	896.4
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fry-Ark	0.3	2.7	4.5	5.5	5.6	7.7	4.8	2.7	6.4	4.3	0.0	0.1	44.6
CBT	45.9	6.4	35.8	64.9	57.8	40.3	62.8	64.4	69.0	79.4	69.6	62.3	658.6
North Platte	13.0	13.2	13.5	13.7	17.7	21.4	53.6	79.3	115.8	157.7	116.3	65.5	680.7
Bighorn	47.9	44.1	42.1	41.1	34.2	39.8	58.0	71.4	80.6	78.7	72.5	56.3	666.4
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
TOTAL GEN	107.1	66.4	95.9	125.2	115.3	109.2	179.2	217.8	271.8	320.1	258.4	184.2	2050.3
TOTAL LOAD	162.4	162.2	177.1	172.6	137	149.3	176.4	184.7	211	262	211.2	156.6	2162.5
SURPLUS/DEFICIT	-55.3	-95.9	-81.2	-47.4	-21.8	-40.1	2.8	33.1	60.8	58.1	47.2	27.6	-112.2

* projected values are historic average flow through energy

** projected values are marketed energy

*** Total Yellowtail reported in row but only half of total generation of Yellowtail used for Bighorn and Total Gen row of Western Division Power Generation Calculations. In general, half of Yellowtail energy is dedicated to the Western Division System through marketing arrangement. The other half is marketed in Eastern Division System.

A-4: MOST PROBABLE INFLOW PROJECTED GROSS GENERATION AND PUMPING FOR WATER YEAR 2020

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM

WATER YEAR 2020 FORECASTED OPERATIONS

MOST PROBABLE WATER SUPPLY CONDITION

GROSS GENERATION AND PUMPING IN GIGAWATT-HOURS

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Mt. Elbert *	1.3	2.4	2.4	2.5	3.1	2.5	3.5	3.9	4.7	4.4	2.0	1.0	33.7
Green Mtn.	2.2	1.4	1.4	1.4	1.3	1.4	1.1	0.6	0.7	2.4	4.9	9.5	28.3
Willow Cr. pump	0.0	0.3	0.0	0.0	0.0	0.0	0.4	3.3	2.5	0.7	0.2	0.1	7.5
Farr pump	3.7	1.0	2.9	4.9	4.5	3.2	4.5	1.8	0.0	0.3	1.4	1.4	29.6
Marys Lake	4.6	0.8	3.5	6.4	5.8	4.0	6.2	5.6	3.6	2.3	2.3	0.8	45.9
Estes	11.8	2.4	8.9	16.0	14.4	9.9	15.4	14.1	8.8	6.3	6.4	5.1	119.5
Pole Hill	18.1	3.3	14.1	25.7	23.2	15.8	24.8	25.6	24.8	13.7	9.3	3.3	201.7
Flatiron 1&2	22.3	5.0	18.0	32.1	29.0	18.9	30.9	31.8	30.8	15.5	10.5	8.1	252.9
Flatiron 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Flatiron 3 pump	5.0	0.9	3.6	6.4	5.6	5.9	3.4	2.8	3.5	0.0	0.0	0.0	37.1
Big Thompson	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.9	2.1	1.2	1.2	8.8
Seminole	5.4	5.2	5.4	5.4	4.8	11.1	15.7	26.8	26.9	28.1	21.0	8.2	164
Kortes	5.6	5.4	5.6	5.6	5.0	11.6	16.4	27.6	26.7	27.6	21.2	8.4	166.7
Fremont Canyon	0.0	0.0	0.0	0.0	6.4	12.2	18.4	27.8	45.3	46.6	44.4	17.8	218.9
Alcova	4.3	4.1	4.2	4.2	3.8	6.7	6.6	13.3	23.1	23.3	21.0	8.4	123
Glendo	0.0	0.0	0.0	0.0	0.0	0.6	1.9	16.3	19.1	24.3	20.0	5.9	88.1
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.8	3.7	3.8	3.8	3.4	19.1
Pilot Butte**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Boysen	5.4	5.2	5.3	5.2	4.7	5.1	7.3	10.2	10.5	11.8	9.0	7.0	86.7
Shoshone	1.1	1.1	1.1	1.1	0.3	1.1	1.1	1.1	1.1	1.2	1.1	1.1	12.5
Buffalo Bill	8.0	4.1	4.2	4.2	3.7	4.2	4.0	13.0	12.7	13.1	13.2	12.9	97.3
Spirit Mtn.	1.6	0.0	0.0	0.0	0.0	0.0	1.8	2.7	2.8	3.0	2.8	2.6	17.3
Diamond Cr. pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Heart Mtn.	1.7	0.0	0.0	0.0	0.0	0.0	0.0	2.7	4.0	2.9	1.9	0.4	13.6
Yellowtail***	65.7	67.3	69.0	68.0	59.8	67.6	84.5	95.5	99.8	70.1	76.7	70.2	894.2
Fry-Ark	1.3	2.4	2.4	2.5	3.1	2.5	3.5	3.9	4.7	4.4	2.0	1.0	33.7
CBT	50.5	10.7	39.4	70.3	63.6	40.9	70.1	71.0	65.6	41.3	33.0	26.5	582.9
North Platte	15.3	14.7	15.2	15.2	20.0	42.2	59.6	115.6	144.8	153.7	131.4	52.1	779.8
Bighorn	50.7	44.1	45.1	44.5	38.6	44.2	56.5	77.5	81.0	67.1	66.4	59.1	674.5
TOTAL GEN	117.8	71.9	102.1	132.5	125.3	129.8	189.7	268.0	296.1	266.5	232.8	138.7	2070.9
TOTAL LOAD	156.6	162.4	162.2	177.1	172.6	137.0	149.3	176.4	184.7	211.0	262.0	211.2	2162.5
SURPLUS/DEFICIT	-38.9	-90.6	-60.1	-44.6	-47.3	-7.2	40.4	91.6	111.4	55.5	-29.3	-72.5	-91.6

* PROJECTED VALUES ARE HISTORIC AVERAGE FLOW THROUGH ENERGY

** PROJECTED VALUES ARE MARKETED ENERGY

*** Total Yellowtail generation reported in row but only half of total generation of Yellowtail used for Bighorn and Total Gen row of Western Division Power Generation Calculations. In general, half of Yellowtail energy is dedicated to the Western Division System through marketing arrangement. The other half is marketed in Eastern Division System.

A-5: ESTIMATED MAINTENANCE SCHEDULE FOR WATER YEAR 2020—COLORADO-BIG THOMPSON AND FRYINGPAN-ARKANSAS PROJECTS

COLORADO-BIG THOMPSON AND FRYINGPAN-ARKANSAS PROJECTS ESTIMATED MAINTENANCE SCHEDULE FOR WATER YEAR 2020

Feature	Task Name	Start	Finish
Big T Unit 1	2020 Annual Maintenance	Wed 1/6/20	Fri 1/31/20
Big T XFMR KW1A	2020 Annual Maintenance	Mon 1/13/20	Fri 1/24/20
Big T Unit 1	WAPA Meter Replacement Work	Mon 10/28/19	Thu 10/31/19
Adams Tunnel	2019 Annual Inspection	Mon 11/4/19	Fri 12/13/19
Adams Tunnel	Tri-State Contractor Comms/Equip	Sun 10/6/19	Tue 10/8/19
Adams Tunnel 69 kV Line	2019 Annual Inspection & Tri-State Work	Thu 10/31/19	Mon 12/16/19
Marys Powerplant	Unbalanced Headgate Testing	Tue 10/1/19	Wed 10/2/19
Marys Powerplant	2019 Annual Maintenance	Mon 11/4/19	Fri 12/13/19
Estes Unit 1	2020 Annual Maintenance	Mon 1/6/20	Fri 2/7/20
Estes Unit 2	2020 Annual Maintenance	Mon 2/17/20	Fri 3/20/20
Estes Unit 3	2020 Annual Maintenance	Mon 3/30/20	Fri 5/1/20
Flatiron XMFR KW1A	2020 Annual Maintenance	Mon 2/24/20	Fri 3/13/20
Flatiron XMFR KW2A	2020 Annual Maintenance	Mon 4/20/20	Thu 5/7/20
Flatiron Unit 1	2020 Annual Maintenance	Tue 2/18/20	Thu 3/26/20
Flatiron Unit 2	2020 Annual Maintenance	Mon 4/13/20	Thu 5/21/20
Flatiron Unit 3	2019 Annual Maintenance	Mon 9/9/19	Fri 10/18/19
Flatiron Unit 3	2020 Annual Maintenance	Tues 9/8/20	Fri 10/16/20
Green Mtn. Unit 1	2020 Annual Maintenance	Mon 1/6/20	Thu 2/13/20
Green Mtn. SWYD KZ1A	2020 Annual Maintenance	Mon 1/27/20	Thu 1/30/20
Green Mtn. Unit 2	2020 Annual Maintenance	Mon 2/24/20	Thu 4/2/20
Green Mtn. SWYD KZ2A	2020 Annual Maintenance	Mon 3/16/20	Thu 3/19/20
Pole Hill Unit G1	2019 Unit Annual Maintenance	Mon 11/4/19	Fri 12/13/19
Pole Hill XFMR K1A	2019 Annual Maintenance	Mon 11/12/19	Wed 11/27/19
Pole Hill Unit G1	2020 Unit Annual Maintenance	Mon 11/2/20	Fri 12/10/20
Pole Hill XFMR K1A	2020 Annual Maintenance	Mon 11/9/20	Wed 11/25/20
Mt Elbert Unit 1	2019 Annual Maintenance	Mon 9/16/19	Fri 11/8/19
Mt Elbert Unit 1	2020 Annual Maintenance	Mon 9/14/20	Fri 10/30/20
Mt Elbert Unit 2	2020 Annual Maintenance	Mon 2/17/20	Fri 4/10/20
CHFC 930 & 550 Sections	2019 Annual Maintenance	Wed 10/25/19	Mon 11/8/19
CHFC 930 Section	2020 Cottonwood Siphon Repair	Wed 7/15/20	Wed 11/18/20

A-6: POWER PLANT DATA

WESTERN DIVISION - PICK-SLOAN MISSOURI BASIN PROGRAM POWERPLANT DATA

Facility	No. Units	Capacity Each Unit (kWh)	Total Installed Capacity (kWh)	Normal Operating Head (ft)	Output at Rated Head (ft ³ /s)
Green Mountain	2	13,000	26,000	192-262	1,660
Marys Lake	1	8,100	8,100	202-217	550
Estes	3	16,500	49,500	551-571	1,300
Pole Hill	1	33,250	33,250	830-838	550
Flatiron units 1 & 2	2	43,000	86,000	1,096 - 1,118	1,070
(Flatiron 1/)	1	8,500	8,500	158-287	440
Big Thompson	1	5,300	5,300	183- 184	350
Seminole	3	15,000	45,000	97-227	2,850
Kortes	3	12,000	36,000	192-204	2,700
Fremont Canyon	2	33,000	66,000	247-363	2,200
Alcova	2	18,000	36,000	153-165	2,200
Glendo	2	19,000	38,000	73-156	2,800
Guernsey	2	2,400	4,800	89-91	820
Pilot Butte	2	800	1,600	-- --	---
Boysen	2	7,500	15,000	72-112	2,415
Shoshone	1	3,000	3,000	--- --	---
Buffalo Bill	3	6,000	18,000	-- --	---
Heart Mountain	1	5,000	5,000	265-275	355
Mt. Elbert	2	103,000	206,000	447-477	6,400
Yellowtail	4	72,000	288,000	327-440	8,500
TOTAL	34	-----	979,050	-----	-----

1/ Pumping plant which may be operated in reverse to generate energy

A-7: PUMPING PLANT DATA

WESTERN DIVISION - PICK-SLOAN MISSOURI BASIN PROGRAM

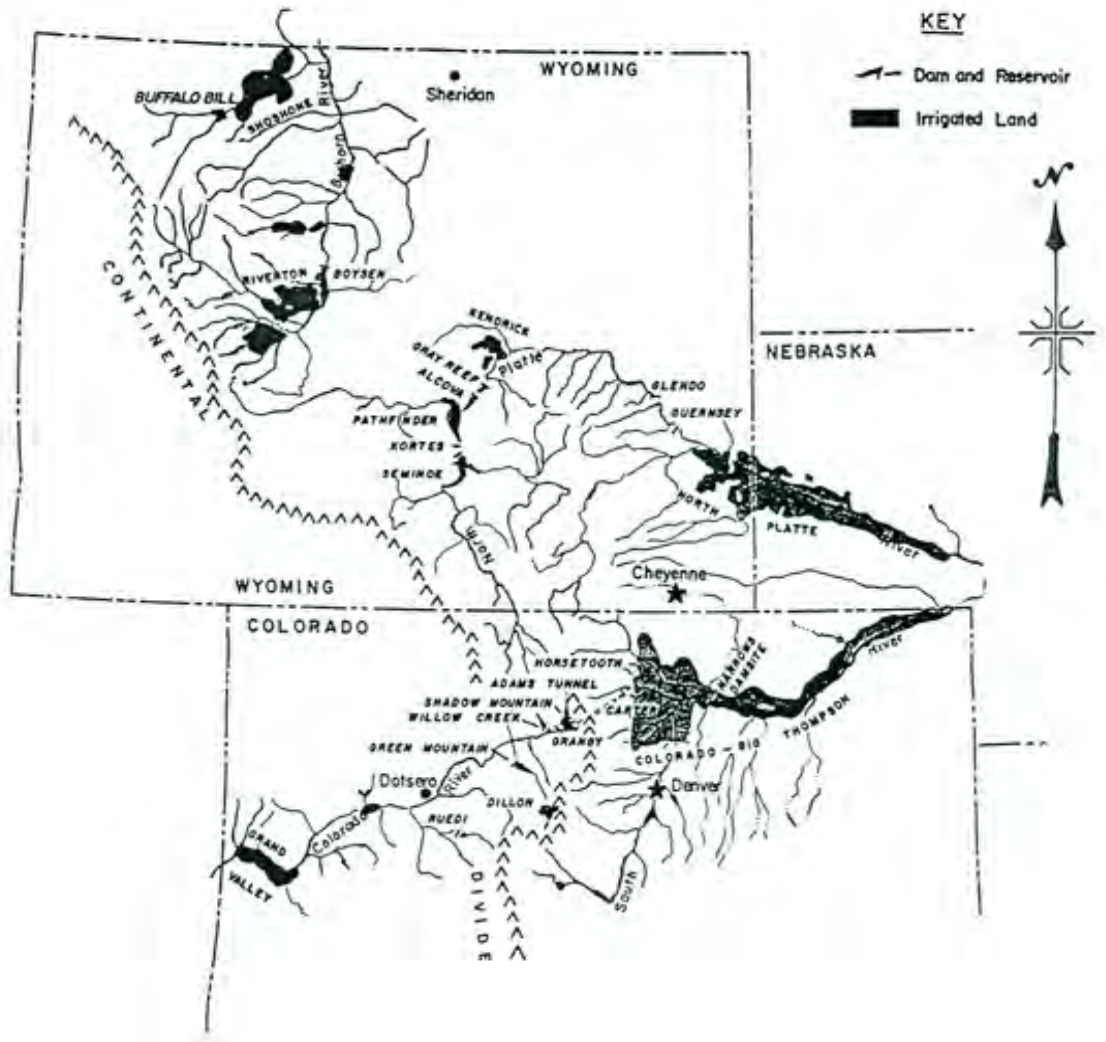
PUMPING PLANT DATA

Facilities	Number	Capacity (ft³/s)	Normal Operating Head (ft)	Installed (Hp)	Kwh to Pump 1 acre-feet at Maximum Head
Granby	3	600	92-186	18,000	227
Willow Creek	2	400	167-169	18,000	227
Flatiron	1 <u>1</u> /	440	173-287	13,000	391
Mt. Elbert	2	5,690	447-477	340,000	620

1/ Pumping plant which may be operated in reverse to generate energy

APPENDIX B—EXHIBITS

B-1: WESTERN DIVISION WATER RESOURCE MAP

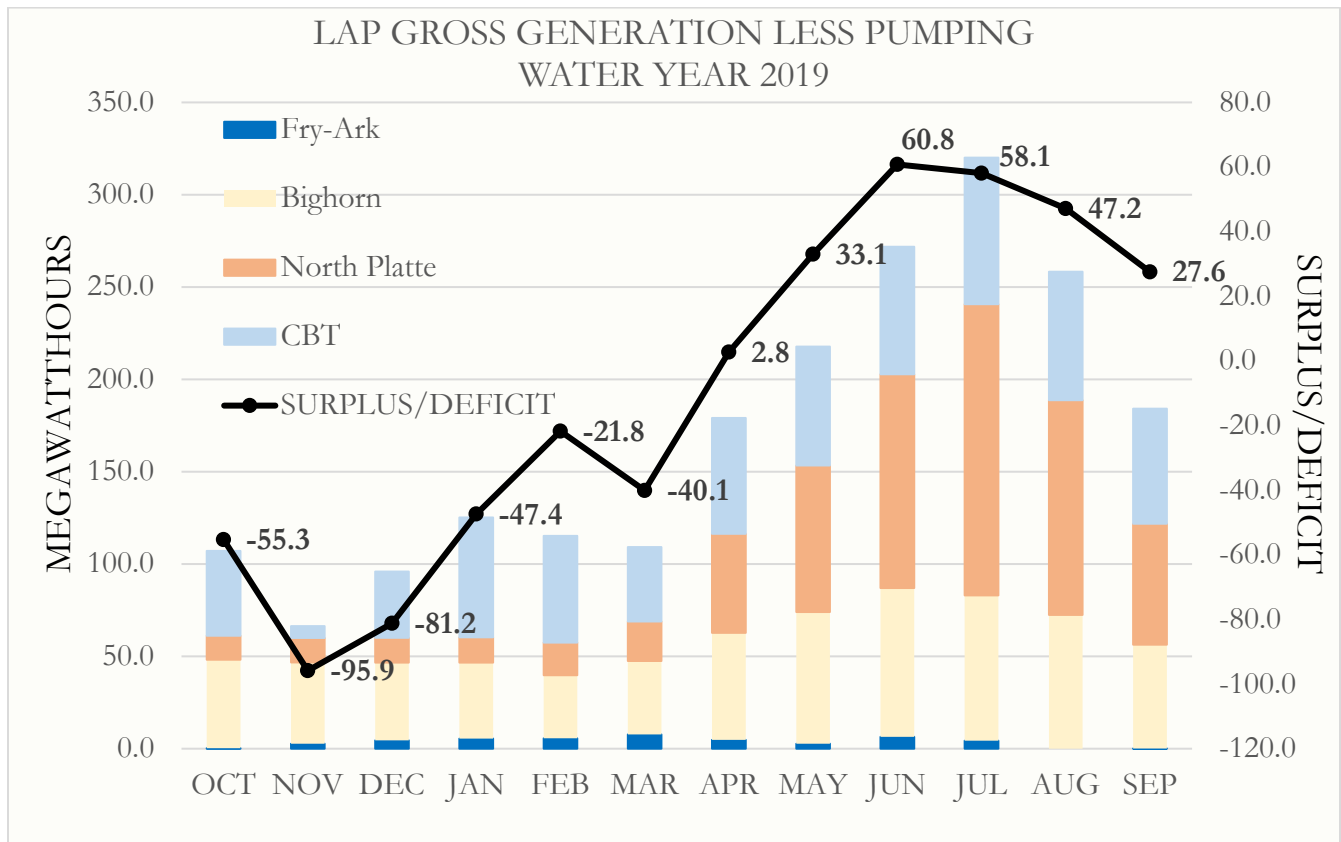


PICK-SLOAN MISSOURI BASIN PROJECT
WESTERN DIVISION
 WATER RESOURCE MAP

50 0 50 100
 SCALE OF MILES

MAP NO. X-700-121
 JUNE 1, 1976

B-2: LAP GROSS GENERATION LESS PUMPING FOR WATER YEAR 2019



B-3: MOST PROBABLE INFLOW PROJECTED LAP GROSS GENERATION LESS PUMPING FOR WATER YEAR 2020

