

RECLAMATION

Managing Water in the West

Annual Operating Plan

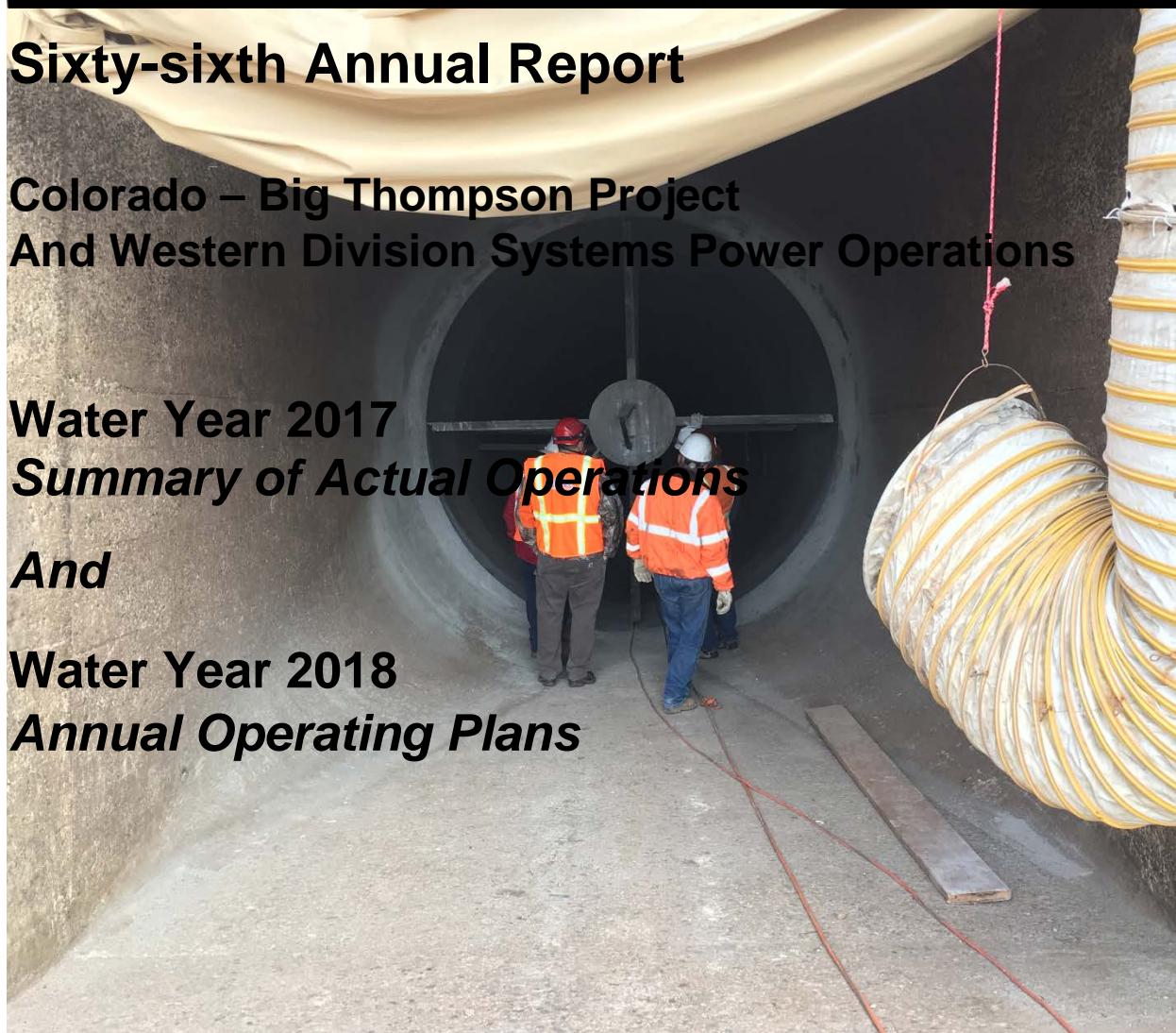
Sixty-sixth Annual Report

Colorado – Big Thompson Project
And Western Division Systems Power Operations

Water Year 2017
Summary of Actual Operations

And

Water Year 2018
Annual Operating Plans



U.S. Department of the Interior
Bureau of Reclamation
Great Plains Region

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 current water year (WY) and the plan of operation for the next water year. The second presents the hydropower operations for the current water year and the forecast for the next water year.

This report meets the requirement of 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).

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GENERAL DESCRIPTION OF THE C-BT

The 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 system through which multiple benefits are provided.

The C-BT spreads over approximately 250 miles in the state of Colorado. It stores, regulates, and diverts water from the Colorado River west of the Rocky Mountains, providing supplemental water for irrigation of 720,000 acres of land east of the Rocky Mountains. It provides water for municipal use, industrial use, hydroelectric power, and water-oriented recreation. The C-BT provides storage of replacement water to the west slope for agricultural, recreation, and environmental uses including supplemental fish flow. This replacement water ensures that senior water rights on the west slope are not impacted by diversions to the east slope. 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 has diverted approximately 230,000 acre-feet (AF) of water annually (310,000 AF 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 the electric power produced at the six powerplants associated with the project.

COLLECTION SYSTEM AND EAST SLOPE C-BT PROJECT

Overview

The western portion of the C-BT consists of a series of reservoirs forming a runoff collection system. This system captures runoff from the high mountains and stores, regulates, and conveys the water to Adams Tunnel for delivery to the east slope, passing under the Continental Divide. Green Mountain Reservoir, a C-BT west slope feature, is a repayment facility used to regulate flows in the Colorado River. Pursuant to authorities in Senate Document 80, (which authorized the C-BT), the 1984 Green Mountain Operating Policy and the agreements in the September 1996 Stipulation and Agreement of the Orchard Mesa Check Case settlement (Case No. 91CW247, Colorado Water Div. 5), the content of the HUP in Green Mountain Reservoir is evaluated during the summer to determine the availability of water surplus for the needs of historic beneficiaries. If it is determined that surplus water is available, it may be delivered based upon need, first to the federal Grand Valley Powerplant, and then to other uses based on a priority system or on specific agreements.

Irrigation systems on the Colorado River, above the Blue River confluence, were improved to enable continued use of existing rights. Releases are made from Lake Granby to maintain the fishery in the Colorado River.

The C-BT's principal Colorado River storage facilities on the west slope are Lake Granby, Grand Lake, Shadow Mountain Reservoir, and Willow Creek Reservoir.

Completed in 1953, Willow Creek Reservoir has a total storage capacity of 10,600 AF. The uncontrolled spillway, located at the left abutment, has a maximum flow capacity of 3,200 cubic feet per second (cfs). Excess inflow of water into the reservoir is transferred by the Willow Creek Feeder Canal and pumped to Lake Granby for storage. Willow Creek Pumping Plant lifts the water 175 feet, it then flows by gravity via the Willow Creek Feeder Canal to Granby Reservoir. The Willow Creek Feeder Canal has a capacity of 400 cfs.

Completed in 1950, Granby Reservoir is located on the upper Colorado River. The reservoir stores the flow of the Colorado River and water pumped from Willow Creek Reservoir and has a total storage capacity of 539,800 AF. Flows through the spillway are controlled by two radial gates with a total release capacity of 11,500 cfs.

Farr Pump Plant lifts the water 99 feet from Lake Granby to Granby Pump Canal. The canal conveys the water 1.8 miles to Shadow Mountain Lake, which also intercepts flows from the North Fork of the Colorado River. Shadow Mountain Lake is hydraulically connected with Grand Lake to make a single body of water, from which diversions flow into Adams Tunnel to be conveyed to the eastern slope. The Farr Pump Plant has three units with a combined installed capacity of 1,200 cfs.

Emerging from Adams Tunnel into the East Portal Reservoir, the water flows across Aspen Creek Valley in a siphon and then under Rams Horn Mountain through a tunnel. At this point, it enters a steel penstock and falls 205 feet to Mary's Lake Powerplant located on the west shore of Mary's Lake. The water is conveyed between Mary's Lake and Estes Powerplant, through Prospect Mountain Conduit and Prospect Mountain Tunnel.

Completed in 1949, Lake Estes is formed by Olympus Dam which is located on the Big Thompson River and serves as an afterbay for the Estes Powerplant. The storage in Lake Estes and the forebay storage in Mary's Lake enable the Estes Powerplant to meet daily variations in energy demand. Lake Estes has a total capacity of 3,100 AF. It captures the discharge of Estes Powerplant, and inflow coming from the Big Thompson River. It also regulates normal river flows below Olympus Dam, and releases water to the Southern Arm of the Foothills Power System (lower power arm) via Olympus Tunnel which has a capacity of 550 cfs. The Estes Powerplant has three hydroelectric units with a total capacity of 45 megawatts. The combined flow capacity for the three units is 1,300 cfs. The spillway, located on the right abutment, has five radial gates with a total discharge capacity of approximately 21,200 cfs. The center gate has been automated, and is operated remotely from the Casper Control Center (CCC). During the winter months, C-BT water is diverted through Adams and Olympus Tunnels and routed through the Foothills Power System to terminal storage at Carter and Horsetooth Reservoirs. This entire operation is controlled remotely from the CCC.

Water from Lake Estes and the Big Thompson River is conveyed by Olympus Siphon and Tunnel and Pole Hill Tunnel and Canal to a penstock through which the water drops 815 feet to Pole Hill Powerplant. The flow is then routed through Pole Hill Powerplant afterbay, Rattlesnake Tunnel to Pinewood Lake. Pinewood Lake, impounded by Rattlesnake Dam, has a storage capacity of 2,180 AF. Acting as forebay for Flatiron Powerplant, Pinewood Reservoir discharges C-BT water to the Bald Mountain Pressure Tunnel where it is dropped 1,055 feet through two penstocks to

Flatiron Powerplant. The Flatiron Powerplant discharges into Flatiron Reservoir, which regulates the water for release to the foothills storage and distribution system. The afterbay storage in Flatiron Reservoir and the forebay storage in Pinewood Lake enable Flatiron Powerplant to regulate power releases to meet daily power loads.

Flatiron Reservoir pump and turbine lifts water as much as 297 feet, delivering it through Carter Lake Reservoir Pressure Conduit and Tunnel to Carter Lake Reservoir. When the flow is reversed, the unit acts as a turbine generator and produces electricity, discharging back into the reservoir.

The Saint Vrain Supply Canal delivers water from Carter Lake Reservoir to the Little Thompson River, St. Vrain Creek and Boulder Creek Supply Canal. Boulder Creek Supply Canal delivers water to Boulder Creek and Boulder Reservoir. Diverting from Boulder Creek, the South Platte Supply Canal delivers water to the South Platte River.

The Charles Hansen Feeder Canal (CHFC) transports water from Flatiron Reservoir to the Big Thompson River and Horsetooth Reservoir. The canal crosses the Big Thompson River in a siphon above the river and canyon highway. Water from the Big Thompson River can be diverted into the canal by Dille Diversion Dam one mile up the canyon mouth and used for power generation at Big Thompson Powerplant or conveyed north in the CHFC toward Horsetooth Reservoir.

C-BT water deliveries to the Big Thompson River and water diverted from the Big Thompson River for power generation purposes are returned to the river near the canyon mouth. Flows are either dropped through a chute from the feeder canal ahead of the siphon crossing or passed through the Big Thompson Powerplant to convert the available head to electricity.

Horsetooth Reservoir is located west of Fort Collins, Colorado. It is formed by Horsetooth Dam at the north end; Soldier, Dixon, and Spring Canyon Dams on the east; and Satanka Dike. An outlet at Soldier Canyon Dam supplies water to the city of Fort Collins, three rural water districts, Colorado State University, and the Dixon Feeder Canal for irrigation. The principal outlet is located in Horsetooth Dam, discharging the Charles Hansen Supply Canal. This canal delivers water to a chute flowing into the Cache La Poudre River and to a siphon crossing the river to supply the Windsor Reservoir and Canal Company. A turnout from the supply canal also supplies the city of Greeley municipal water works. Water delivered to the river is often exchanged for water diverted to the North Poudre Supply Canal from the Cache La Poudre River upstream which conveys it to the North Poudre Irrigation Company System.

Planning and Control

The C-BT is operated for the purpose for which it was authorized and constructed: 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 Water, WAPA, Upper Colorado and Great Plains regions of Reclamation, 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 AOP.

The C-BT water operations are routinely planned on a 12 month basis. The first AOP of the water year is prepared in early October and it 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 AOP 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 view of the planned C-BT operations for the upcoming water year.

Irrigation Requirements

The amount of water made available to the C-BT for irrigation is determined by Northern Water. This determination is subject to change by agreement throughout the remainder of the irrigation season. Changes may occur as a result of substantial changes in the prevailing climatic demand or operational conditions. Irrigation requirements for the three runoff conditions, most probable, reasonable maximum and 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 Green Mountain Reservoir HUP Operating Criteria (Operating Criteria).

Operational Skim

Big Thompson River water in excess of the minimum instream flow requirements is diverted at Olympus Dam into the Southern Power Arm of the Foothills System to be used for power generation known as “Operational Skim”. The amount diverted depends on the flow in the Big Thompson River and its tributaries above Lake Estes, C-BT water imported through the Adams Tunnel, and the Foothills System capacity.

The water taken from the Big Thompson River can be used for power generation immediately. It can also be held in storage and replaced to the river with water from other facilities, depending on power requirements. In general, water taken from the Big Thompson River at a variable rate, on a given date, is returned to the river at a flat rate on the following day. This operation provides incidental benefits to the tourist and fishing industries in the Big Thompson Canyon by reducing high flows, and by maintaining a steady stream during the runoff season. Operational Skim and

storage of surplus water from the Big Thompson River in C-BT reservoirs are managed according to the AOP and as prescribed by the ECAO Water Resources staff.

Flow Requirement Below Granby Dam

On January 19, 1961 the Secretary of the Interior established specific guidelines for water releases out of Lake Granby to satisfy fish habitat requirements. *“Principles to Govern the Release of Water at Granby Dam to Provide Fishery Flows immediately Downstream in the Colorado River”*. A release from Lake Granby of 20 cfs is required from October through April of each year. During the remaining months of the year the control point is almost 3 miles downstream from the dam at the YMCA gauging station.

The flow requirement at the YMCA gauge downstream of Lake Granby from May through July is 75 cfs, August is 40 cfs, and September is 20 cfs. The flow requirement from May through September can be progressively reduced when the advance forecast of inflow to Shadow Mountain, Grand Lake, and Granby Reservoirs (less the decreed irrigation rights in the reach of the Colorado River between Granby Dam and the mouth of the Fraser River), and the water capable of being pumped from Willow Creek Reservoir in that year is 230,000 AF or less, for the year ending the following October 1. The following reduction of fishery flows below Lake Granby will apply on the basis of a forecast to be made by Reclamation during the last week in April using information from all available sources.

Forecast Inflow (in AF)	Percentage Reduction in Flow Requirement (May – September)
220,000 - 230,000	15
210,000 - 220,000	20
195,000 - 210,000	25
Less than 195,000	30

Adjustments will be made in the reductions, when appropriate, 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, Appendix A, Exhibit 4. Also according to the SOP, Willow Creek below Willow Creek Reservoir is not considered a fishery resource since an irrigation ditch a short distance below the dam typically uses the entire flow in the late summer months so no minimum instream flow requirements for Willow Creek were provided. However, a release of 7 cfs or inflow (whichever is less) from Willow Creek Reservoir is required between October 1 through April 30 to augment fish habitat flows in the Colorado River.

In accordance with the SOP for Shadow Mountain Reservoir, Chapter 4 Section D, minimum releases from Shadow Mountain Lake of 35 cfs during September and October, 45 cfs during November and December, 20 cfs from January through May, 50 cfs in June and July, and 40 cfs

in August or inflow (whichever is less) must be maintained to protect fish and wildlife in the Colorado River above Lake Granby.

The minimum release required out of Green Mountain Reservoir 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. Releases are maintained at all times to be adequate for the preservation of fish habitat.

The State of Colorado Department of Natural Resources, Parks and Wildlife Division, and the United States Fish and Wildlife Service have recommended the following minimum release schedule for Lake Estes. Although no official decision record (i.e. contract, memorandum of understanding, intergovernmental agreement) is available, Reclamation has cooperatively adopted the recommendations when inflow meets or exceeds these values. Releases in excess of inflows are not required. This schedule meets the flow requirements of native fish along the Big Thompson River.

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

Diversion of flows from the Big Thompson River at Olympus Dam for power production is generally restricted to the May 15 through September 15 period, since runoff during the remaining period of the year usually is less than the recommended minimum flows.

AOP

Beginning each water year, the C-BT most probable AOP is developed considering the effects of historical average runoff values, the expected demands and depletions of the 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 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, average runoff values, anticipated system outages and planned special operations.

Green Mountain Reservoir

Green Mountain Reservoir Operation

Paragraph 6 of the October 5, 1955 Stipulation in the decree for the Consolidated Cases Nos. 2782, 5016, and 5017 in the United States District Court for the District of Colorado (Blue River Decree), calls for periodic plans for the operation of Green Mountain Reservoir to be developed. This plan addresses this requirement.

Provisions guiding the operations of Green Mountain Reservoir are contained in the following documents. Operations will be consistent with the applicable provisions in the following documents:

Manner of Operation of Project Facilities and Auxiliary Features, Senate Document No. 80,
75th Congress, 1st Session
Consolidated Cases Nos. 2782, 5016, and 5017
October 12, 1955, Stipulation and Decree
April 16, 1964, Stipulation and Decree
Operating Policy for Green Mountain Reservoir, C-BT, published in the Federal Register, Vol.
48, No. 247, December 22, 1983,
September 4, 1996, Stipulation and Agreement in Colorado Water Div. 5, Case No. 91CW247
(Orchard Mesa Check Case), and attached HUP Operating Criteria.

The General Operations Guided by These Provisions are Given Below:

1. Winter Operation (November-March)

- a. Bypass inflow to supply downstream vested senior rights.
- b. Make releases to replace water diverted or stored out of priority by the C-BT collection system, as required.
- c. Make releases for west slope irrigation and domestic uses per Green Mountain Operating Policy and the HUP Operating Criteria.
- d. Make releases for water service contracts pursuant to the Operating Policy.
- e. Maximize power generation, while maintaining:
 - i. Adequate storage to meet the anticipated needs under the guiding documents.
 - ii. A minimum power head consistent with the integrated system power operations.

2. Operation during Snowmelt Period (April-July)

- a. Bypass inflow to supply downstream vested senior rights.
- b. Make releases to replace water diverted or stored out of priority by the C-BT collection system, as required.
- c. Make releases for west slope irrigation and domestic uses per Green Mountain Operating Policy and the HUP Operating Criteria.
- d. Make releases for water service contracts pursuant to the Operating Policy.
- e. Participate in the Colorado River Endangered Fish Recovery Program Coordinated Reservoir Operations (CROS) to enhance peak flows for the Colorado River Endangered Fishes. Reduce releases from traditional levels before and after the peak flow period on

the Colorado River in the Grand Junction area. During peak flow period, release the lesser of inflows or turbine capacity for approximately a 10-day period.

- f. Fill without spilling to maximize power generation by using the storage and power rights concurrently.
- g. On or before June 30 each year, meet with the Grand Valley Water Users Association, the OMID, the GVIC, Division 5 Engineer, the Colorado Water Conservation Board, and Fish and Wildlife Service (Managing Entities) established under the settlement of the Orchard Mesa Check Case to assess availability of surplus water in the HUP.
- h. Confer with Managing Entities on a regular basis through the irrigation season to assess availability of surplus water in the HUP.
- i. If a surplus condition is declared, make releases up to the amount of surplus, under agreements, to:
 - i. the Grand Valley Powerplant up to its need or capacity; then to
 - ii. the Grand Valley under the Municipal Recreation contract in excess of that needed by the powerplant
- j. Maximize power operation consistent with 1.e.
- k. Make releases as outlined in the above referenced documents.¹

3. Operation after Snowmelt Period (August-October)

- a. Bypass inflow to supply downstream vested senior rights.
- b. Make releases to replace water diverted or stored out of priority by the C-BT collection system, as required.
- c. Make releases for west slope irrigation and domestic uses per Green Mountain Operating Policy and the HUP Operating Criteria.
- d. Make releases for water service contracts pursuant to the Operating Policy.
- e. Confer with Managing Entities on a regular basis through the irrigation season to assess availability of surplus water in the HUP.
- f. If a surplus condition is declared, make releases up to the amount of surplus, under agreements, to:
 - i. the Grand Valley Powerplant up to its need or capacity; then to
 - ii. the Grand Valley under the Municipal Recreation contract in excess of that needed by the powerplant
- g. Maximize power operation consistent with 1.e.
- h. Make releases as outlined in the above referenced documents.²

Green Mountain HUP and the Orchard Mesa Check Case Settlement

Background and Authority

The Orchard Mesa Check (Check) is a structure below the common afterbay of the Orchard Mesa Irrigation District (OMID) Pumping Plant and the federal Grand Valley Powerplant in the Grand

¹ By the use of these criteria for current operating purposes, the United States does not intend to imply any definition of rights and obligations. The order in which these criteria are listed does not reflect any intended priority.

² By the use of these provisions for current operating purposes, the United States does not intend to imply any definition of rights and obligations. The order in which these criteria are listed does not reflect any intended priority.

Valley of Colorado. The purpose of the Check is to raise the water level in the common afterbay, allowing water to flow through the bypass channel to support hydropower operations and return to the Colorado River upstream of the Grand Valley Irrigation Company (GVIC) diversion dam. Operation of the Check was determined to constitute an exchange of water whereby water destined for the senior GVIC irrigation water rights is borrowed for pumping and hydroelectric power generation purposes and returned to GVIC for irrigation use. Operation of the Check influences the operation of the following: Grand Valley irrigation systems; Grand Valley Powerplant; Green Mountain Reservoir releases; and the 15-Mile Reach of the Colorado River. The 15-Mile Reach is the section of the Colorado River from the GVIC diversion dam to the confluence of the Gunnison River and has been designated critical habitat by the Upper Colorado River Endangered Fish Recovery Program.

The Check has been operated on an informal basis without a decreed right since approximately 1926 to manage flows in the Colorado River for the benefit of the United States, Grand Valley Water Users Association, and OMID. In the late 1980s, a hydropower development was proposed in a reach of the Colorado River between the Grand Valley Diversion Dam, the point where the exchange water is diverted, and the GVIC diversion dam where the exchange water is returned. The OMID was concerned that a water right awarded for this development could interfere with the exchange of water. In response the OMID filed an application in State Water Court on December 30, 1991 for approval of an exchange of water. This case (Water Division 5, Case No. 91CW247) was informally known as the Orchard Mesa Check Case. Resolution of the case resulted in a negotiated Stipulation and Agreement entered into the District Court, Water Division No. 5, State of Colorado, on September 4, 1996.

Overview of the Stipulated Settlement

The settlement contains two major components: the Stipulation and Agreement and the Operating Criteria. The Operating Criteria further defines operation of the Green Mountain Reservoir HUP consistent with Senate Document 80 and the 1984 Operating Policy. The parts of the Stipulation and Agreement pertinent to the operation of the HUP are summarized below.

As part of the Stipulation and Agreement the OMID and GVIC agree not to exercise their irrigation rights against any upstream HUP beneficiary provided that the Check is physically operable; there is at least 66,000 AF of water in storage in the Green Mountain Reservoir HUP, or approved substitute storage reservoir, when Green Mountain Reservoir storage rights cease to be in priority; and the water rights for the Shoshone Powerplant continue to be exercised in a manner consistent with their historical operation. (Section 3.b. of the Stipulation and Agreement).

The Stipulation and Agreement also provides that Reclamation will declare surplus water which is in excess of the needs of HUP beneficiaries for a given water year. Water declared surplus might be delivered through agreements for beneficial uses in western Colorado. This is to be done in accordance with the provisions of the HUP Operating Criteria, which are summarized below.

Management of the HUP under the Operating Criteria

The management of the HUP is accomplished through the process defined in Sections 3.d and 3.e of the Operating Criteria. This process requires the development of this Annual HUP Operating Plan on or before June 30 of each year.

The Annual HUP Operating Plan is developed by Reclamation in consultation with the Managing Entities. The Managing Entities agree to make a good faith effort to develop an Annual HUP Operating Plan that is unanimously supported. However, Reclamation reserves the right to establish a release schedule should unanimous consent proves unattainable.

The Annual HUP Operating Plan is based upon actual HUP storage conditions, projected runoff forecasts, operational and climatological conditions, projected irrigation demands, and 15-Mile Reach flow needs. It is expressly recognized that, in some years, release of the entire HUP by the end of the irrigation season will not be necessary or possible.

On or before June 30 of each year Reclamation assembles initial information on storage in the HUP and comparative runoff years. Based upon the information assembled a meeting is held with the other Managing Entities. During this meeting a review of the forecasts is analyzed and initial determinations are made of the level of “checking” required to preserve water in the HUP, and of water surplus available for HUP beneficiaries.

The HUP operations are reviewed and modified by the Managing Entities as necessary to respond to changing conditions. Subsequent meetings or conference calls are held as needed to reconsider prevailing conditions including HUP storage conditions, runoff forecasts, climatological conditions, irrigation demands, 15-Mile Reach flow needs, and other operational conditions. The Managing Entities adjust the checking as warranted by the examination of prevailing conditions, and determine the water surplus and release schedule for HUP beneficiaries. During periods of below average river flows the Managing Entities may meet as frequently as every week.

This mechanism provides a way to integrate management of releases from the HUP with operation of the Check to accomplish the purposes of the Operating Criteria. The mechanism is also used to integrate releases from the HUP with releases for the endangered fish from other reservoirs including Ruedi and Wolford Mountain.

Operational Summary WY 2017

Summary of System-Wide Conditions

The AOP for WY 2017 was summarized last year in the previous Annual Report of the Colorado-Big Thompson project. The following four sub-sections summarize *actual* operational results for WY 2017.

Weather and Inflow Hydrology

Snow accumulation during the Fall of WY 2017 was below average. However, snowfall picked up during the month of December and resulted in above average snow pack through March. The snowpack remained near average throughout the season after being bolstered by a significant late snowfall in May. The area surrounding the C-BT project followed the same pattern of snow accumulation. The coldest temperatures were recorded in early January, but WY 2017 was not an extremely cold winter. Snow pack equaled or exceeded the median snow pack for much of the area during the season.

A warming trend in mid-February 2017 caused some snow melt after which temperatures followed a normal pattern. By mid-April snow began to melt at lower elevations. The runoff season in the northern mountains of Colorado started early in WY 2017. Most locations experienced slowly rising inflows by early to mid-April. By early May 2017, the snowpack at higher elevations began to melt. The runoff season was reaching its peak at some locations just before mid-May 2017. Once the temperatures over the region began to warm up in April, they remained above average to average through June. Snowfall in late May added to the melting snowpack.

Table 1 provides a view of the snowpack condition on April 1, 2017 in select watersheds within the C-BT system. The runoff forecast for April 1, 2017 was about average. Table 2 provides the runoff forecasts for several C-BT facilities.

Precipitation was above average over the mountains in May, below average in June and average for the remainder of WY 2017. The monsoonal season, mid-July through late-August, in northern Colorado was average. Dry and hot weather characterized August and September 2017.

Seasonal temperatures and precipitation impact system demands on reservoir storages. Most reservoirs across northern Colorado began the spring season with high storage contents. With demands for water low until late July 2017 most reservoirs remained full during the spring and early summer of WY 2017. With the dry and hot weather in the summer months putting pressure on the reserves, most reservoirs in the area ended WY 2017 about where they started and some reservoirs ended higher than where they began.

Table 1: Snow-Water Content for April 1, 2017

Watershed	Snow-Water Content		
	2017 (In.)	Avg. (In.)	Percent of Avg.
Green Mountain Reservoir	16.1	14.0	115
Willow Creek	15.2	14.8	103
Lake Granby	13.1	13.5	97
Lake Estes	15.7	13.9	113

**Table 2: Runoff Forecast for Several Locations within the C-BT Area
April 1, 2016 Forecast of Apr-Jul Volume**

	Chance of Exceeding					
Forecast Point	90 percent Reasonable Min 1/	70 percent	50 percent Most Probable	30 percent	10 percent Reasonable Max 1/	Most Probable percent of avg
Green Mtn. Res	257	295	320	345	383	114
Willow Crk. Res	47	58	65	72	83	138
Lake Granby	181	213	235	256	288	116
Big Thompson River Above Lake Estes	55	67	76	84	96	110
Big Thompson River at Canyon Mouth	61	83	97	112	133	108

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

System Demands and Deliveries

Northern Water declared a quota of 50 percent in November 2016, which was held until May 2017 when it was increased to 80 percent until the end of WY 2017. The quota used for the monthly updates to AOP 2017 followed the Northern Water modeling-assumed quotas which were slightly different. These began at 70 percent in November, reduced to 60 percent in February, and then increased to 80 percent in May, which matched the Northern Water declared quota by that time.

An accounting summary of the C-BT west slope collection system in WY 2017 shows there was 242,559 AF available for diversion to the east slope. Adams Tunnel diversions were 240,413 AF, a difference of 0.9 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 3. The formula for determining the collection system volume available for diversion to the east slope is shown below:

$$\begin{aligned}
 &\text{West Slope Collection Available for Diversion} \\
 &= \text{Natural Inflow (Granby, Shadow Mountain and Grand Lake)} \\
 &+ \text{Willow Creek Pumping} \\
 &- \text{Change in Storage (Grandby, Shadow Mountain and Grand Lake)} \\
 &- \text{Granby Spill – Granby Scheduled Release} \\
 &- \text{Net Evaporation (Granby, Shadow Mountain and Grand Lake)} \\
 &- \text{Granby Seepage}
 \end{aligned}$$

Table 3: C-BT West Slope Collection Water Balance. Volume Available for Diversion from West Slope Collection System v. Reported Diversions through Adams Tunnel for WY 2017 (units are AF; values in parentheses represent volumes unavailable for diversion)

WY 2017	
	(AF)
Combined 3 Lakes Natural Inflow	292,590
Willow Creek Pumping	52,452
Combined 3 Lakes Change in Storage	(31,623)
Granby Spill	(18,413)
Granby Scheduled Release	(30,478)
Combined 3 Lakes Net Evaporation	(19,103)
Granby Seepage	(2,867)
Volume Available for Diversion	242,559
Reported Adams Tunnel Diversion	240,413
Percent Difference	0.9

On the east slope, total supplies were compared to total deliveries for WY 2017. Total supplies were calculated to be 262,320 AF and total deliveries were calculated to be 252,815 AF. The percent difference was 3.4 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

- = West Slope Diversions through Adams Tunnel + Priority Water
- Net Evaporation (Carter and Horsetooth)
- Total East Slope Reservoirs' Change in Storage
- Tridistrict Excess Capacity Account Change in Storage at Horsetooth
- Predetermined/Accounted C-BT Delivery Losses

The predetermined/accounted C-BT delivery losses term in the supplies equation includes any assigned delivery losses in the east slope system. For WY 2017, 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 Maitland outage period. Supply releases had to be greater than the requested deliveries to offset the loss, so that difference was subtracted from the supply term.

The formula for determining total deliveries is as follows:

$$\text{Total Deliveries} = \text{Total C-BT Deliveries} + \text{Total Windy Gap Deliveries}$$

The results of the supplies versus east-slope deliveries are shown in Table 4 below.

Table 4: C-BT East Slope Water Balance, Volume Available for Supply v. Reported East Slope Deliveries for WY 2017 (units are AF)

	WY 2017
Supply	(AF)
Adams Tunnel Diversion	240,413
East Slope Priority Water	6,652
Carter + Horsetooth Net Evap	7,166
Total East Slope Reservoir Ch. in Storage	-23,131
Tridistrict EC Ch. In Storage	710
Predetermined C-BT Delivery Loss	547
Total Supply	261,773
Delivery	
Total C-BT Deliveries	239,850
Total Winday Gap Deliveries	12,964
Total Demand	252,815
Percent Difference	3.4

Maintenance and System Outages

The Maitland siphon outage on the 930 Section of the CHFC was an unusual and significant event. The outage was scheduled to repair a canal siphon and began on August 1, 2017 and ended on November 8, 2017, 8 days ahead of schedule. Stop logs were placed upstream of the Dille diversion confluence in the 930 Section, allowing the Dille Diversion from the Big Thompson River to be used during the outage. The outage prevented the use of most of the 930 Section of the canal during the period. The 930 Section was shut down on July 25, 2017 and returned to service November 8, 2017. The Pole Hill Powerplant was out of commission from July 31, 2017, through mid-January 2018 due to WAPA switchyard work. The combination of those two outages removed the lower power arm of the C-BT project from operation for the last quarter of WY 2017.

Numerous inspections took place at different facilities during the outage from late October through early December 2016. Water diversions from the west slope were suspended for just over 4 weeks, during November 2016, in order to accommodate all the inspections and maintenance activities.

In addition to that work, the Estes Powerplant crew conducted the annual maintenance for Marys Powerplant from November to early December 2016 and again in August to early September 2017. The Lake Estes Powerplant units 1, 2 and 3 had their annual maintenance performed in succession from January through the end of April 2017 leaving two units available for generation.

The Flatiron crew completed the annual maintenance of the Pole Hill Powerplant unit November through early December 2016. Flatiron Powerplant annual maintenance of unit 3 was completed by mid-November 2016 and the annual maintenance of units 1 and 2 occurred in succession starting in late February 2017 and ending in late May 2017. These outages did not impact water operations, but they had an impact on peaking power generation at the powerplant. The CHFC

trifurcation was winterized during the first week of November 2016. The annual maintenance of the CHFC 550 section for WY 2017 took place during the first half of November 2016.

The Adams Tunnel diversions were slowed for a couple of days in early April 2017 so that the CHFC 930 Section could be lowered to facilitate de-winterizing activities at the the Big Thompson Powerplant and Trifurcation. The pumping operation to Carter Reservoir was not affected by the Adams Tunnel reduction. The annual maintenance for the Big Thompson Powerplant occurred in the off-season between January and early February 2017, therefore its outage had no impact on operations. The second annual maintenance of Flatiron unit 3 was conducted between early September and late October 2017, taking advantage of the Maitland siphon outage. This work did not have any impact in water or power operations.

The fall outage work did not impact C-BT water deliveries during WY 2017. Deliveries to the CHFC continued as planned without using any water from Carter Reservoir. Imports were sent through the canyon and picked up at Dille Diversion Dam. Water stored within the east slope reservoirs and the conveyance system using the Big Thompson River canyon was sufficient to satisfy the demands during the fall outage.

Operations and Outcomes

By early spring, the relatively high carryover storage content at Granby Reservoir along with an above average runoff began to create the picture of another potential spill. With Carter Reservoir at full capacity by the end of April and Horsetooth Reservoir rapidly approaching full capacity by mid-May, coupled with low demands for C-BT water in May, the Adams Tunnel diversions were suspended by late May 2017. At Willow Creek, the inflows exceeded the reservoir storage and pump capacity in mid- May 2017. Granby Reservoir began to pass inflow over the spillway during mid-June 2017, just as the peak of the runoff was passing through on the east slope.

After Carter Reservoir was filled in late April 2017, pumping to Carter Reservoir resumed in mid- May to refill it toward the end of May. A third fill of Carter Reservoir began on June 12, 2017 and was completed by July 15, 2017. With the final commencement of pumping to Carter in mid-June, the Adams Tunnel diversion gradually increased to 550 cfs by June 23, 2017. That, combined with a receding inflow hydrograph for Granby Reservoir, allowed for a reduction in the releases from Granby Reservoir toward late June. Releases from Granby Reservoir began to drop soon after the June pumping to Carter Lake resumed. Horsetooth and Carter Reservoirs remained near their full capacities from early May through mid-July, 2017.

C-BT operations including the skimming of water from the Big Thompson River kept daily releases from Olympus Dam below 790 cfs during the peak of the runoff season. The higher than average snow packs and higher precipitation in May extended the runoff at most locations into late-July, in spite of below average precipitation in June. Free river conditions existed along the Big Thompson River for 21 days; 4 days in late May and 17 days in June. The C-BT was out of priority to capture and store east slope water by June 22, 2017.

OPERATIONS BY FACILITY

Collection System

Willow Creek Reservoir

October through March: In terms of snow accumulation, Willow Creek started with a below average fall and then surpassed average by mid-winter. The snowpack remained higher than average throughout the rest of the winter and during most of the spring.

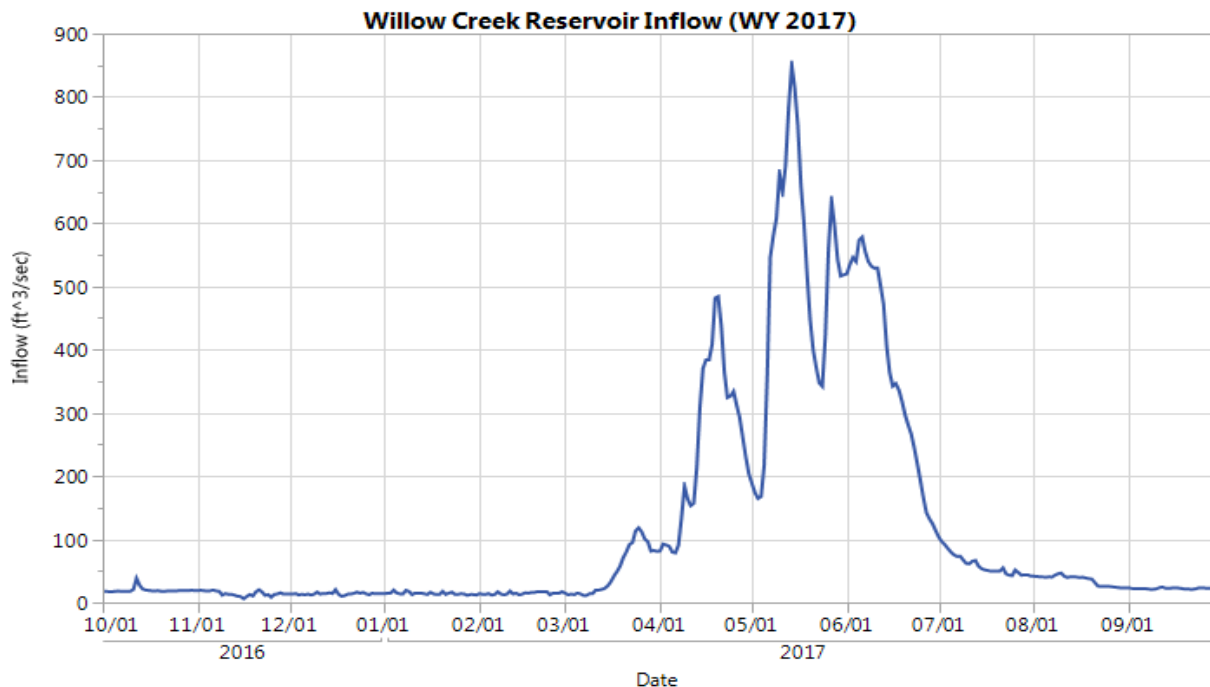
April, May: The first signs of runoff in the Willow Creek watershed began in late March 2017. Pumping to Granby began in early April 2016, with one pump. Toward the middle of April two pumps were used for eight days, then pumping returned to a single pump until May. Two pumps were used for most of May and into early June 2017.

May: The peak inflow of 807 cfs was reached on May 14, 2017. This was about 10 percent higher than the peak inflow for WY 2016.

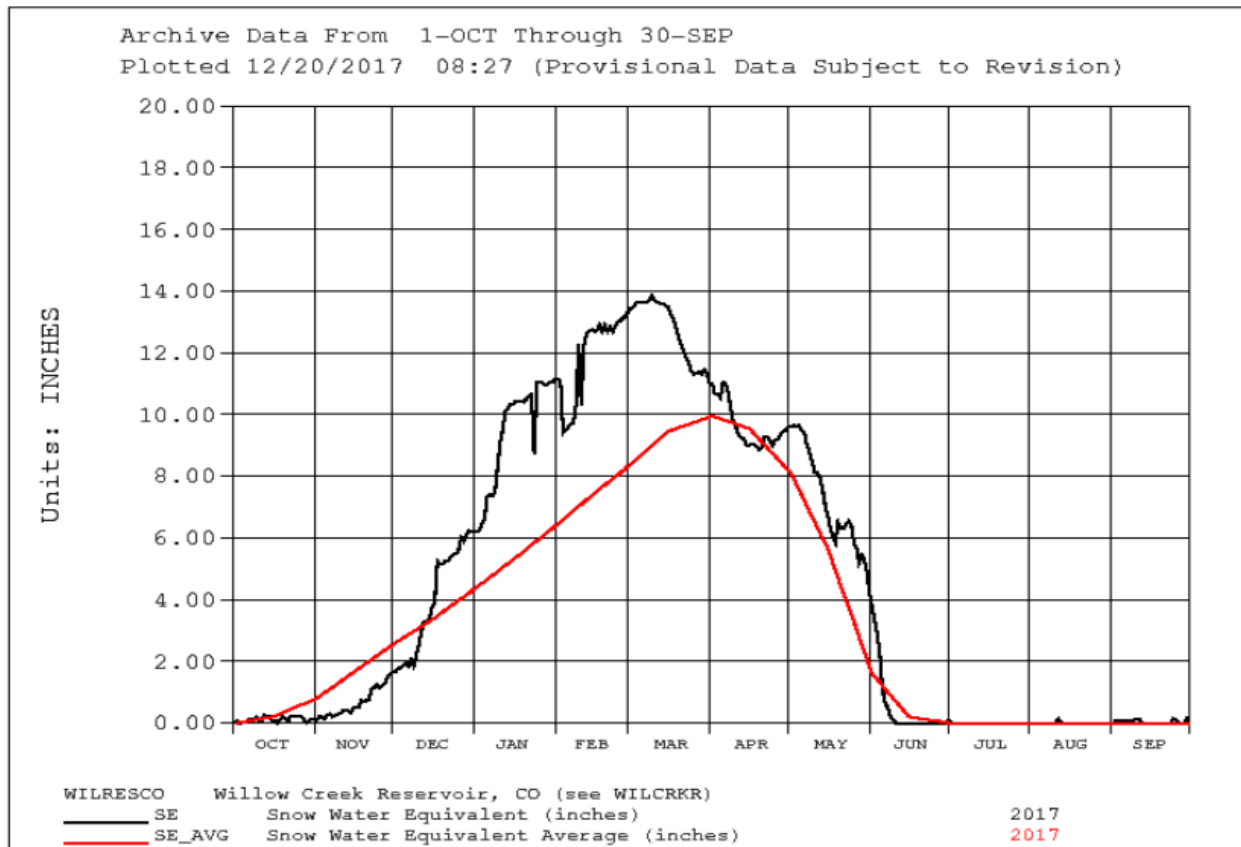
June: The highest release from Willow Creek Reservoir into Willow Creek was 497 cfs, occurring on June 7, 2017.

August and September: Willow Creek Reservoir was pumped down to winter levels starting in late August with completion by the end of September 2017.

May through September: Operations at Willow Creek Reservoir were normal for WY 2017, with no incidents reported.



Inflow to Willow Creek Reservoir during WY 2017.



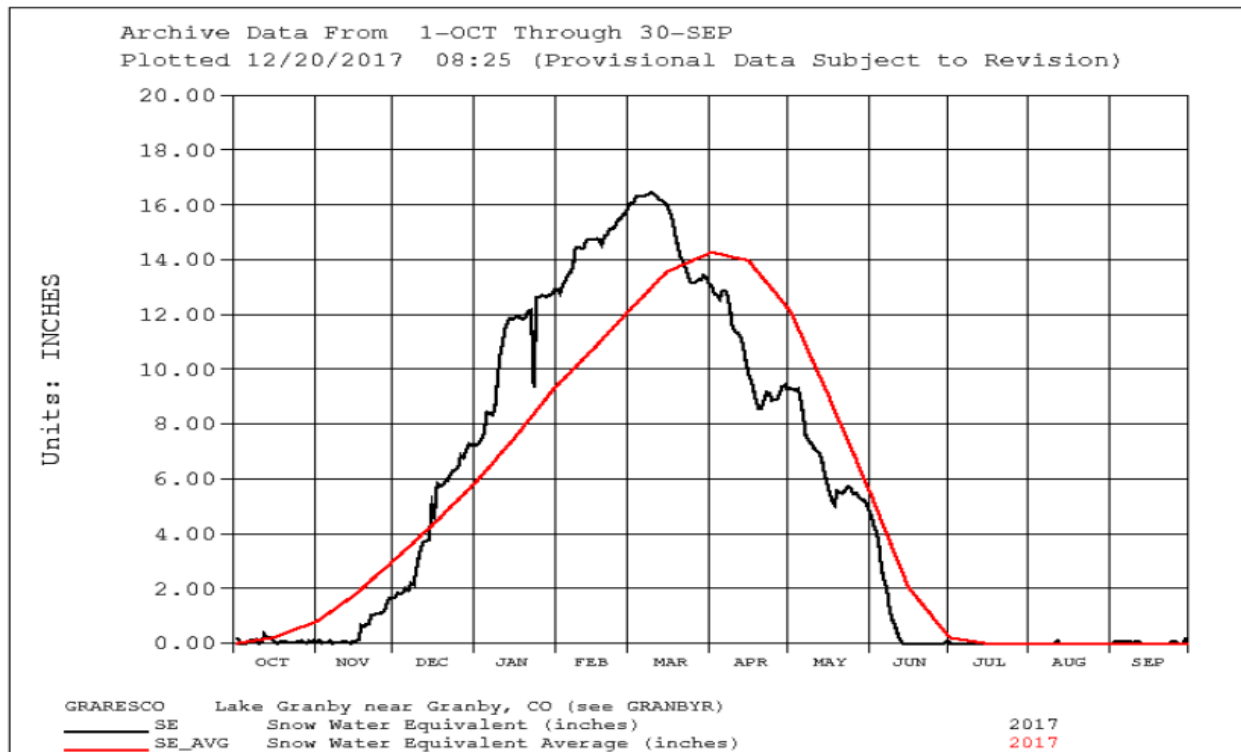
WY 2017 and 30-year average snow-water equivalent for the Willow Creek Reservoir drainage area.

Granby Reservoir and Shadow Mountain Reservoir/Grade Lake

Shadow Mountain Reservoir and Grand Lake are hydraulically connected which makes them function operationally much like a single body of water. Elevations are maintained between 8,366 and 8,367 feet. Thus, their combined storage changes very little. Farr Pump Plant is used to move water from Granby Reservoir to Shadow Mountain Reservoir to maintain the prescribed elevations. Grand Lake functions as forebay storage for Adams Tunnel. Unless otherwise noted, the balance of this section will emphasize Granby Reservoir operations which are considerably more variable and notable than Shadow Mountain and Grand Lake.

October through December: The carryover content from WY 2016 for Granby Reservoir was 486,601 AF which represents 117 percent of the 30 year average (416,750 AF). At full capacity Granby Reservoir is 539,758 AF. The reservoir content remained steady until the middle of December 2016.

December through April: As diversions through the Adams Tunnel resumed, Granby Reservoir content began to fall steadily. The reservoir content dropped to 378,785 AF by April 11, 2017, before it began a steady rise. By early April 2017 the Adams Tunnel diversions were only about 85 percent of full capacity due to the high levels of Carter and Horsetooth Reservoirs.



WY 2017 versus 30-year average snow-water equivalent for the Granby Reservoir drainage area.

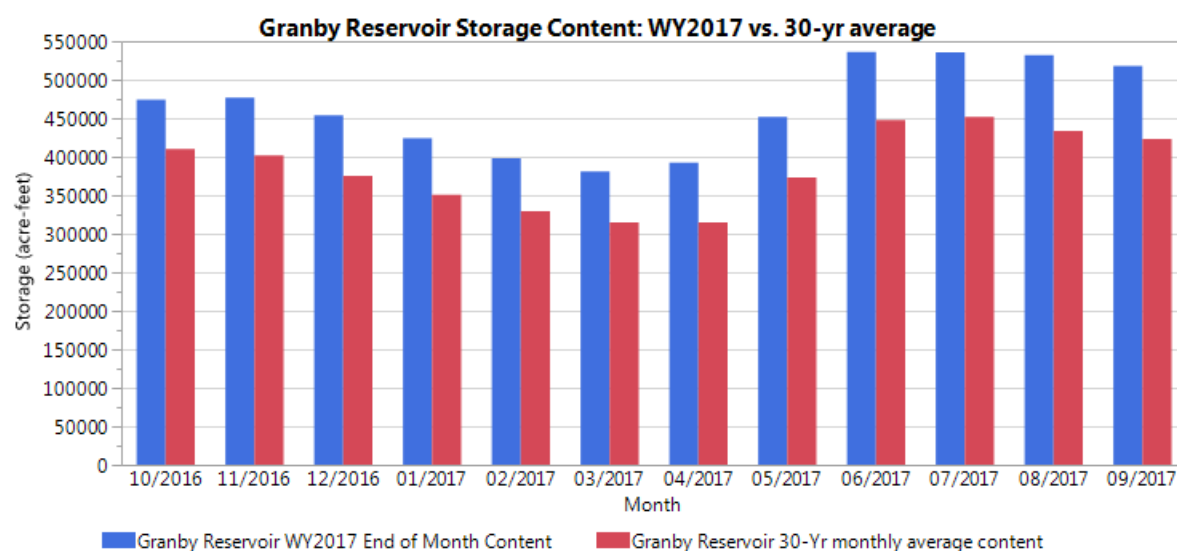
May through June: Hydrologic conditions for both the west and east slope indicated that the project would likely bypass surplus project water to the Colorado River. By May 1, 2017, Granby, Horsetooth and Carter Lake Reservoirs' combined storage was 651 KAF which is above the 80 percentile of combined storage for the preceding 50 years. Additionally, the above average runoff forecast for April through July on both the west and east slopes indicated a likely chance that water conservation operations protecting project water yield would require high Adams Tunnel diversion volumes at the beginning of the west slope clarity period.

With the high content levels at the two terminal reservoirs on the east slope, diversions through the Adams Tunnel were curtailed by late May 2017. Full Adams Tunnel diversions were not resumed until June 22, 2017. In early June, confidence was high enough in the runoff forecasts to conclude with a high degree of certainty that Granby Reservoir was going to face a spill during June and July 2017. At that point, the decision was reached not to pump from the Windy Gap Reservoir into Granby Reservoir. By June 6, 2017, the pumping operation from Willow Creek Reservoir into Granby Reservoir had also been suspended. Granby preemptive releases began on June 14 and continued through July 3, 2017, reducing the magnitude of the required spill peak there. The peak spill at Granby, 1,083 cfs, occurred on June 22, 2017. Those releases did not cause any flood damages downstream. As the peak inflow passed, the releases over the spillway were lowered accordingly to maintain a full reservoir.

July: By July 4, 2017 the threat of high releases and potential flooding had passed. Granby Reservoir releases had been reduced back to the normal, non-bypass release rate. Assisted by diversions through the Adams Tunnel which reduced inflow to Granby, the reservoir level stabilized at an elevation of 8279.50 feet and remained near that level until early August 2017.

July through September: Because of the Maitland siphon outage on the east slope, Farr Plant pumping operations were not able to accommodate Grand Lake Clarity operations until July 21, 2017. To complicate clarity operations further, in late July 2017 it was determined some essential repairs needed to be completed at Horsetooth Reservoir's Soldier Canyon Dam Outlet works. The repairs required Horsetooth to be lowered to approximately 5,388 feet by October 30, 2017. A combination of the Maitland siphon outage, the Pole Hill outage which also began at the end of July and the need to curtail Horsetooth Reservoir C-BT water deliveries created another smaller spill at Granby Reservoir from August 11 through August 23, 2017.

By August 1, 2017 Adams Tunnel imports had to be reduced to east slope Big Thompson River demands, CHFC 550 Section demands, plus the water necessary to meet the October 30, 2017 Horsetooth Reservoir elevation target. Non-river demands were fed via diversion at the Dille diversion structure in the river canyon.



Granby Reservoir storage content during WY 2017 versus the 30-year average.

The Farr pumping operation was modified on August 21 and 22, 2016, in response to water quality degradation in Shadow Mountain Reservoir. This experimental, adaptive management operation involved pumping cooler water from Granby Reservoir up to Shadow Mountain, in an attempt to mix and destabilize the water column, hoping to disrupt algal productivity in Shadow Mountain. In parallel, an equivalent amount of water would be released from Shadow Mountain Reservoir to the Colorado River and returned to Granby, flushing poorer water quality water from Shadow Mountain but resulting in no net gain of water to Shadow Mountain. The change in pump operation could potentially reduce algal productivity in Shadow Mountain without moving water into Grand Lake which would adversely impact clarity goals there. The inflow of water from Granby may also improve dissolved oxygen levels at the bottom of Shadow Mountain Reservoir. The effectiveness of the operation was not substantiated by water quality observations. A full description of the planned clarity operations and actual clarity operations for the WY 2017 clarity period can be found in the 2017 Grand Lake Clarity Adaptive Management Final Report.

September: After the clarity season ended on September 11, 2017 diversions through the Adams Tunnel remained set on the goal of meeting Big Thompson River demands, CHFC 550 Section

demands and meeting the Horsetooth target elevation for October 30, 2017. Granby Reservoir finished WY 2017 with 518,185 AF of water in storage.

East Slope

Adams Tunnel, Marys Lake and Lake Estes

November: November 2016 brought multiple inspections and maintenance projects for the C- BT. Marys Lake and Lake Estes were lowered in late October through late November to do inspections and annual maintenance of Marys Lake Unit 1. The Lake Estes water surface was lowered down to the spillway crest level in early November 2016 to inspect the Olympus Tunnel intake facility, and to test and recalibrate all the radial gates at Olympus Dam.

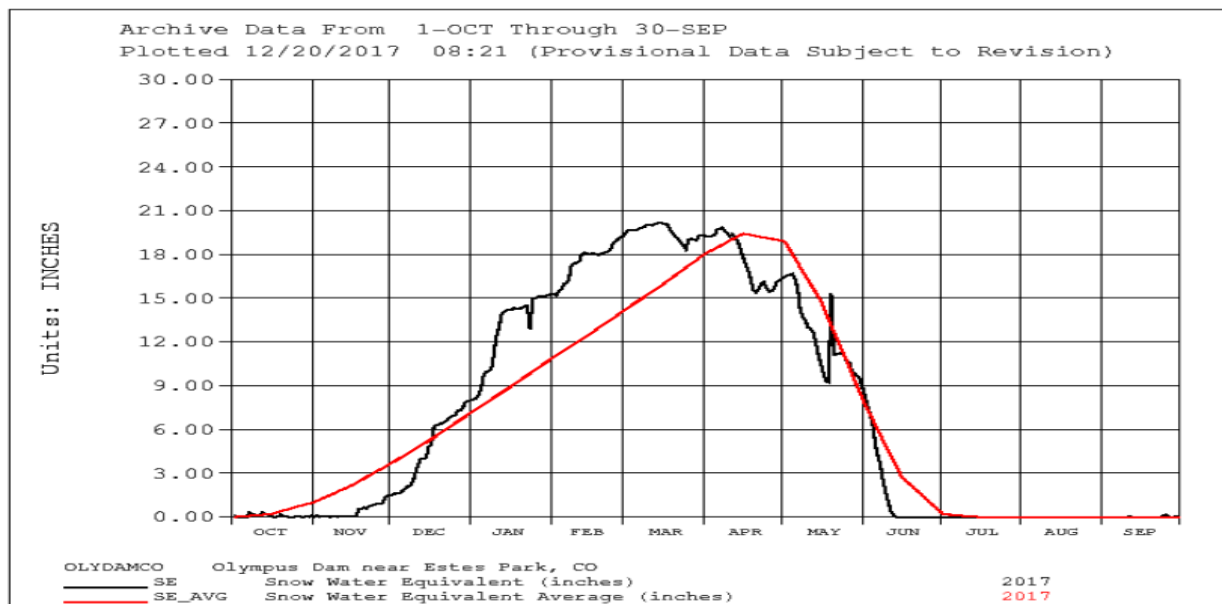
November 28: Water began to flow through the Adams Tunnel once again after the drawdown of Marys and Lake Estes.

December 1: The level at Marys lake reached its normal operational pool.

December 8: Lake Estes reaches its operational pool.

December 12: The C-BT maintenance season came to an end as the Adams Tunnel flow reached 550 cfs as recommended by the C-BT AOP for WY 2016. Diversions through the Adams Tunnel continued, uninterrupted, until April 4, 2017.

February and March: The snowpack above Olympus Dam remained above the 30-year average during the late winter and early spring. The late addition of a substantial snowfall event in late May, produced above-average inflow for Lake Estes during WY 2017. The C-BT skim operation began on March 10, 2017, generating power at Pole Hill and Flatiron Powerplants.



WY 2017 and 30-year average snow-water for the Olympus Dam drainage area.

April: A mild warming trend in mid-April 2017 began to melt some of the snow at the lower elevations. The inflow to Lake Estes began to rise soon after. A cool end to April slowed snow melt and returned inflows back to normal.

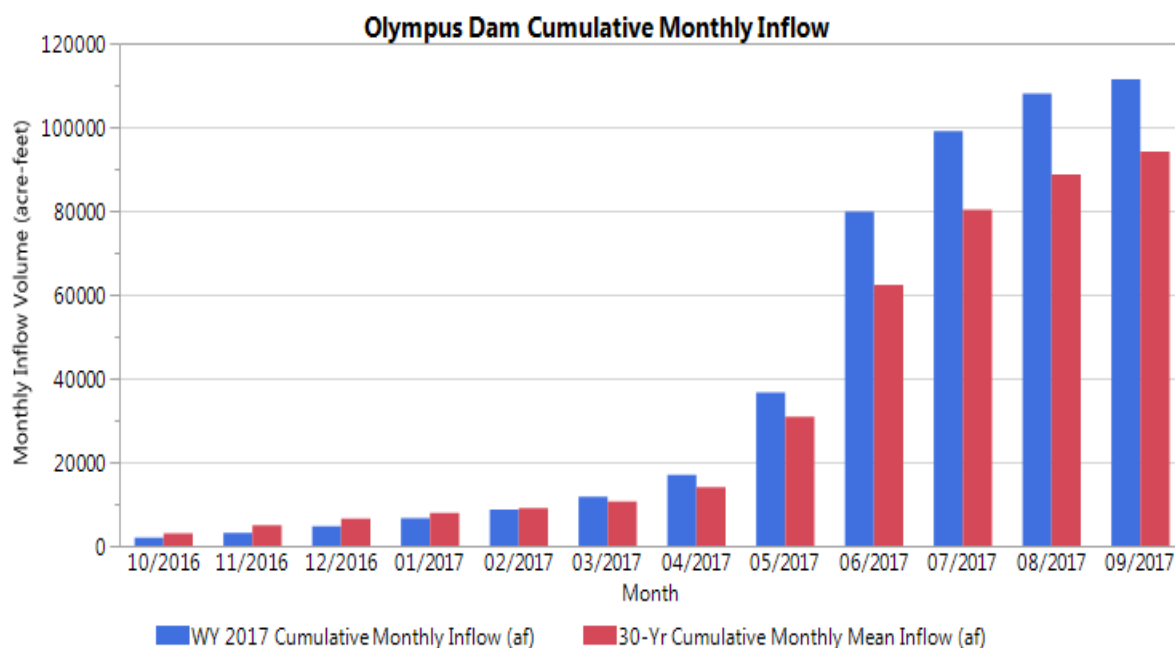
April 22: Carter Reservoir reached its maximum storage capacity on April 22, 2017 and pumping to Carter Reservoir was suspended temporarily and Adams Tunnel imports were directed to filling Horsetooth Reservoir for the remainder of the month.

May: The month of May was relatively cool over the east slope. With the exception of another warming trend toward the middle of the month, the natural inflow to Lake Estes remained fairly low. The inflow to Lake Estes reached a daily average peak flow of 284 cfs on May 15, 2017 but had dropped back to 127 cfs by the end of the month.

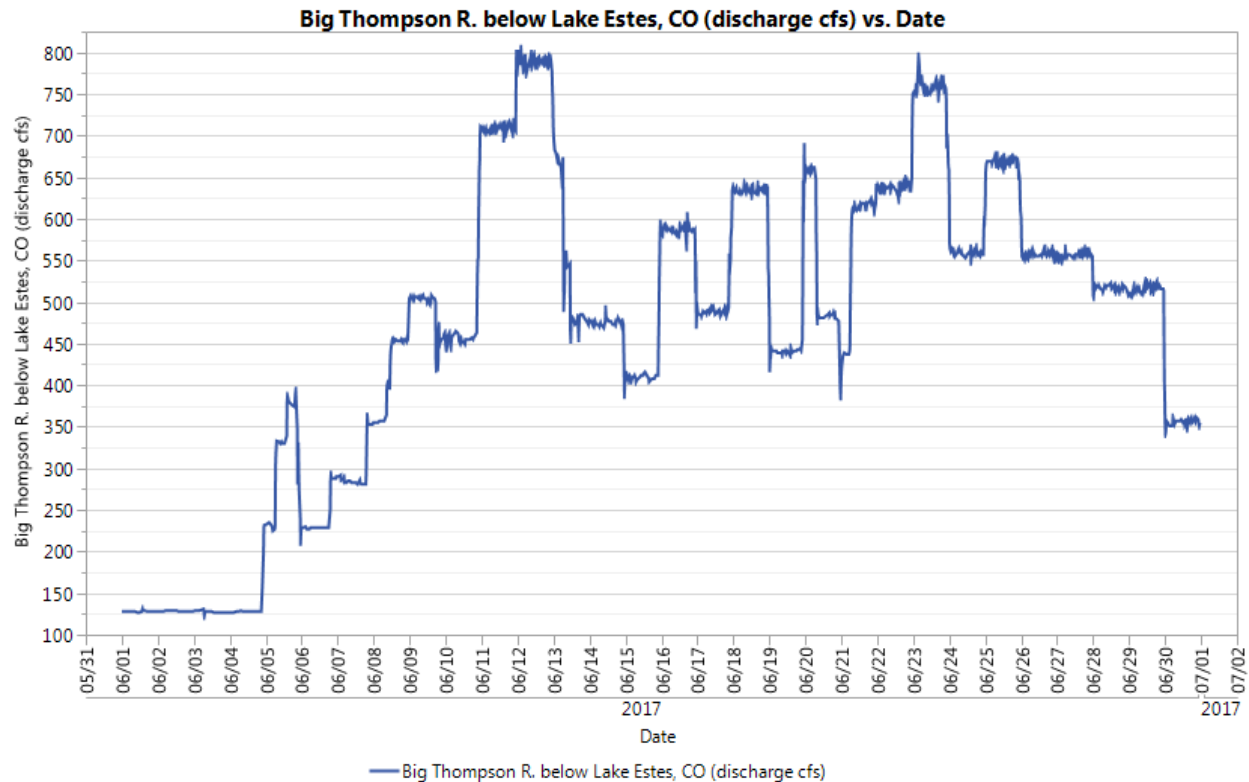
May 18: Pumping to Carter Reservoir resumed on May 12, 2017. The reservoir approached its maximum capacity by May 24, 2017 when pumping was again suspended. The strategy was to keep Carter Reservoir as full as possible throughout the summer until the Maitland siphon outage. Horsetooth Reservoir had also reached near-full capacity by mid-May.

May 24: Adams Tunnel diversions were reduced significantly due to the lack of storage space on the east slope. Pumping to Carter Reservoir was suspended. The Olympus Tunnel continued to divert skim water generating power at Pole Hill and Flatiron Powerplants.

June: Temperatures over the Front Range remained normal while precipitation was above normal, keeping C-BT demands lower than anticipated. The warm and wetter conditions contributed to increasing the Big Thompson River runoff peak slightly and hastening it a couple of days earlier than normal. Enough space remained in Horsetooth and Carter Reservoirs to capture all of the east slope priority water available to the project in WY 2017.



Computed cumulative native inflow for Lake Estes during WY 2017 versus its 30-year average.



Releases from Olympus Dam to the Big Thompson River during June 2017.

June 9: Pumping to Carter Reservoir resumed on June 9, 2017 to take advantage of priority water available in the system. Pumping continued until July 15 when Carter was refilled for the third and final time for WY 2017. Adams Tunnel diversions recommenced on June 10, 2017. Adams Tunnel diversions were adjusted daily based on available priority water, Carter Reservoir pumping and remaining space available at Horsetooth Reservoir.

June 12: The peak runoff for the Big Thompson River occurred on June 11, 2017. The daily average inflow for Lake Estes that day was estimated at 1,000 cfs. This day also recorded the peak release from Lake Estes, 788 cfs.

June 22: Adams Tunnel diversions returned to 550 cfs as priority water became unavailable for the rest of WY 2017. Diversions remained near 550 cfs until July 20, 2017 as the system was adjusted for the Maitland siphon outage.

July-September: Beginning July 20, 2017 with initiation of the shutdown of the lower power arm for the Maitland siphon outage at the end of July, the Adams Tunnel diversions were reduced from 550 cfs to an average of 215 cfs for the balance of WY 2017 as diversions were shifted toward meeting only Big Thompson River demands, CHFC 550 Section demands and positioning Horsetooth toward the elevation drawdown target for the Soldier Canyon outlet work which started on October 30, 2017.

Foothill Power Arm, Carter Lake and Horsetooth Reservoir

October: Some emergency repairs on concrete panels in the CHFC 930 Section were necessary between October 8 and 14, 2016, requiring a shutdown of the lower power arm. Outside of that period, Olympus Tunnel flows averaged 375 cfs for October, keeping Horsetooth at a relatively constant elevation for the month. By the end of October, Olympus Tunnel flows were shutting down for the annual maintenance period.

November: Pinewood Reservoir began November 2016 relatively full when compared to other years. The Pole Hill Powerplant annual maintenance began on November 1, 2016, and continued until the middle of December 10, 2016. Flatiron Reservoir was lowered below operational levels in early November for gate inspection and maintenance. Flatiron was returned to operational levels by the middle of November using water from Pinewood storage. Olympus Tunnel was not used in November. The CHFC was down for maintenance and inspections between November 4 and November 18, 2016. There was sufficient water stored at Pinewood and Flatiron Reservoir to supply the CHFC outside the maintenance period, therefore no water from Carter Reservoir was needed to continue deliveries in November and December 2016.

December 12: Normal operations resumed on December 12, 2016 as the Adams Tunnel diversions were increased to 550 cfs, and pumping to Carter Reservoir began for WY 2017. The difference between Adams Tunnel imports and Flatiron Unit 3 pumping began the refill of Horsetooth for the season.

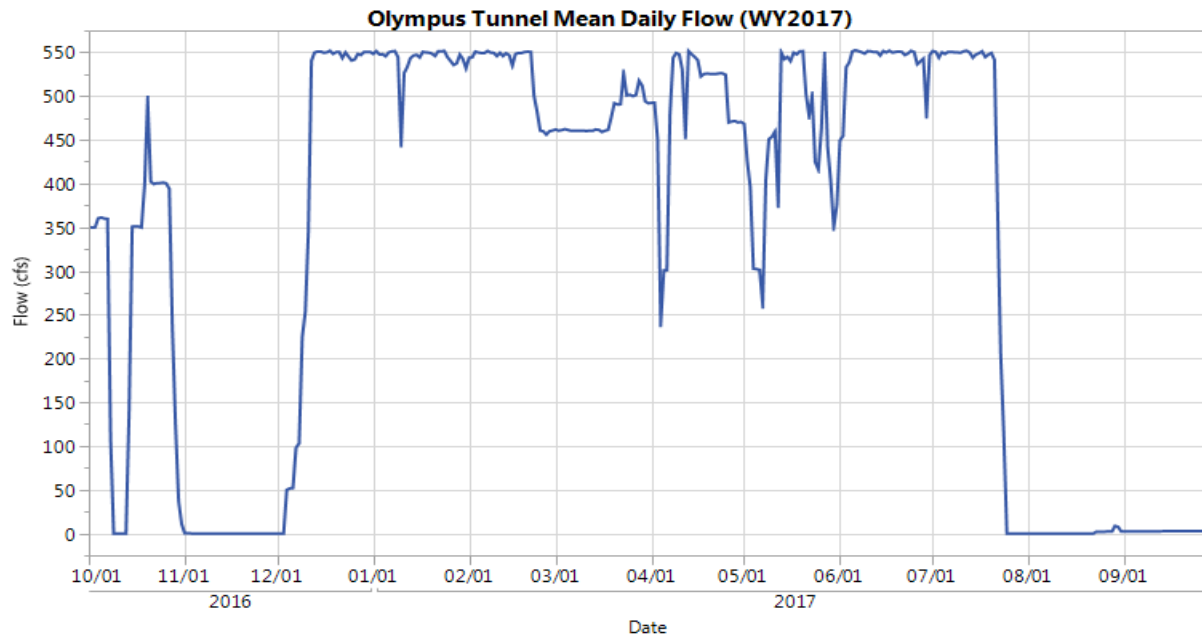
January through March: Diversions from the west slope continued uninterrupted at full capacity through February 22, 2017. Then deliveries were reduced to an average of 475 cfs through the end of March to modestly slow the rate of Horsetooth fill during the period. Skim water became available on March 10, 2017.

April 3: The annual maintenance for the CHFC began on April 3, 2017 and continued until April 6, 2017. During this period, pumping to Carter Reservoir continued. By April 8, 2017 Olympus Tunnel flows were returned to 550 cfs taking full advantage of skim water that was available.

April 12: Big Thompson Powerplant was brought online for the season, one of the earliest dates for the start of that powerplant since the project began. By April 16, 2017 water also began to flow through the Dille Tunnel for the first time. For WY 2017, Dille Tunnel water was considered strictly skim and C-BT water, meaning all priority water was taken through Olympus Tunnel. Dille Tunnel skim water fueled hydropower generation at the Big Thompson Powerplant.

April 22: Pumping to Carter Reservoir ceased on April 22, 2017 as the reservoir reached its full capacity. The Adams Tunnel diversions were maintained at about 450 cfs with the water flowing north towards Horsetooth Reservoir. This operation kept the powerplants in the Foothills system generating power for three weeks until Horsetooth Reservoir approached its maximum capacity. The system then transitioned toward using more and more skim in its operation for WY 2017.

May 12-24: Pumping to Carter produced the reservoir's second fill for the season.



Olympus Tunnel 24-hour average flow during WY 2017.

May 29: Horsetooth had reached its target capacity on May 29, 2017. From this point on the CHFC flows were adjusted daily in order to maintain that reservoir level.

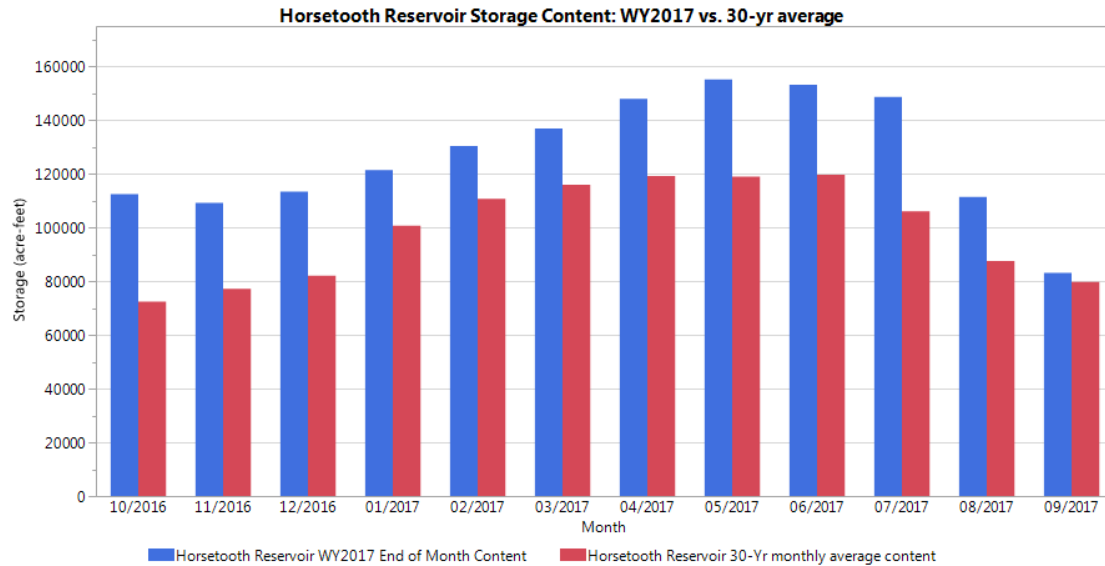
June 9: Pumping to Carter Reservoir resumed on June 9, 2017 in order to reduce the spill at Granby Reservoir, and to maximize the storage of C-BT water. Demands for C-BT water increased in late June through mid-July 2017 at Carter Reservoir but did not outpace pumping.

July 15: Pumping to Carter Reservoir ceased as a third refill for the season was achieved. Adams Tunnel imports and the Olympus Tunnel remained near capacity until July 20, 2017 for Horsetooth supplies. By July 24, 2017 the lower power arm was shut down for the Maitland siphon outage beginning at the end of the month. Olympus Tunnel, the CHFC 930 Section above the Dille Tunnel confluence, Pole Hill and Flatiron Powerplant Units 1 and 2 remained off the rest of WY 2017. Flatiron was drained to the bottom of its operational pool and Pinewood Reservoir was set to the middle of its operational pool.

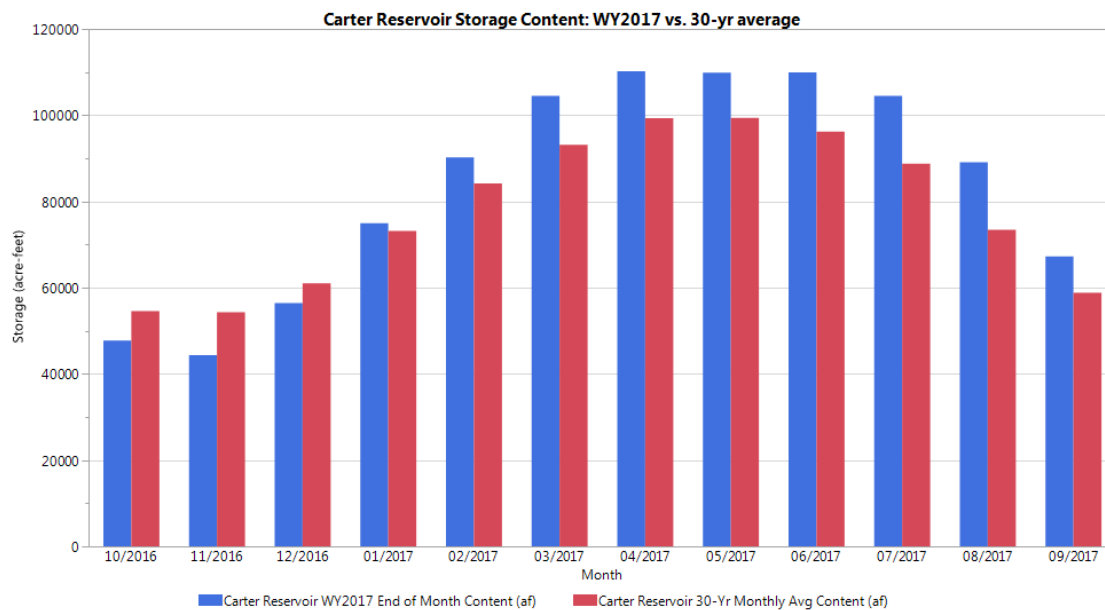
July 31: The Maitland siphon outage began.

August - September: Adams Tunnel diversions were adjusted to meet daily Big Thompson River and CHFC 550 Section demands, and to adjust the rate of Horsetooth Reservoir declines to meet the target elevation for the Horsetooth Reservoir Soldier Canyon Dam Outlet work repair in late October 2017. Dille Tunnel remained open through the end of WY 2017 to divert Adams Tunnel diversions which were released to the Big Thompson River through Olympus Dam.

Throughout WY 2017: Although Horsetooth Reservoir had to be lowered for the Soldier Canyon repair starting in late August, Carter and Horsetooth Reservoir levels remained above average for the balance of the recreation season of WY 2017. The boat ramps were in the water the entire recreational season.



Horsetooth Reservoir storage content during WY 2017 versus its 30-year average.

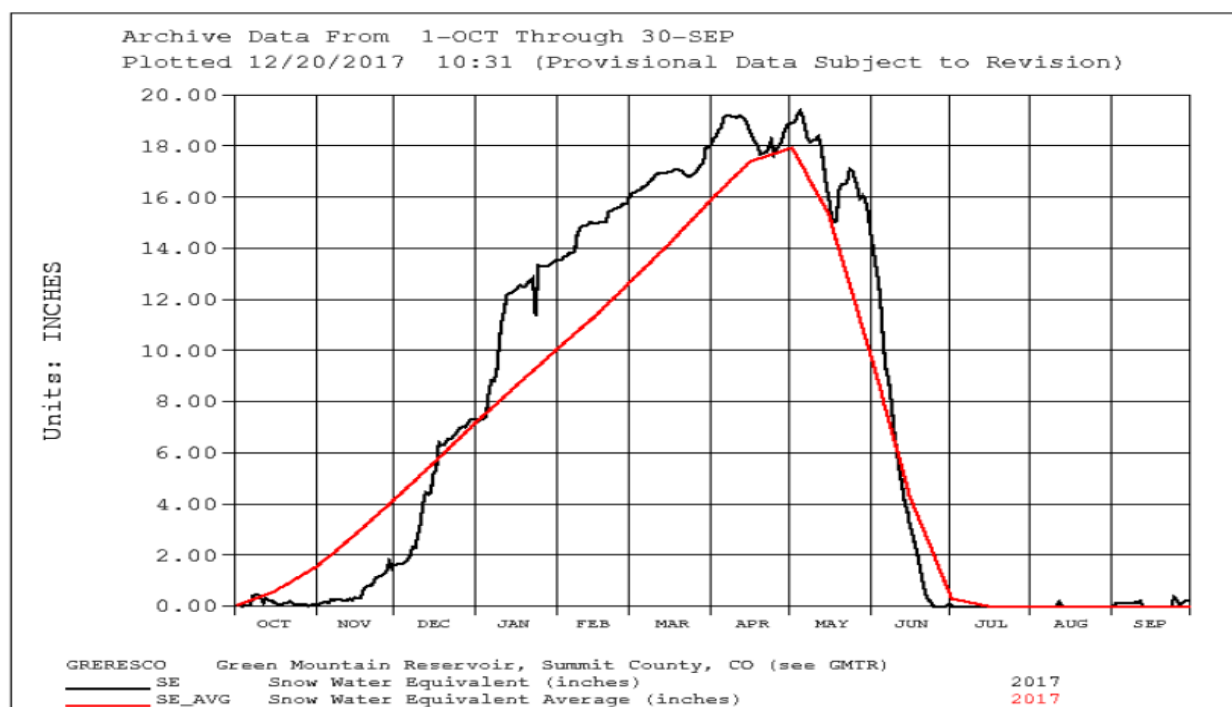


Carter Reservoir storage content during WY 2017 versus its 30-year average.

Green Mountain Reservoir

Fall, winter and spring hydrology WY 2017: Green Mountain Reservoir contributing watershed experienced above average snowpack accumulation and runoff during WY 2017. A late start of measurable accumulation followed by near record winter accumulation and ending with variable late spring precipitation created difficult conditions for forecasting reservoir operations. Peak snow accumulation occurred on April 7, 2017 almost two weeks earlier than the median peak accumulation. Late spring cooler temperatures did delay snowmelt runoff slightly with a peak reservoir inflow of 2,887 cfs occurring on June 11, 2017. The total observed April-July runoff was 306 KAF. This represented 14 KAF or 5 percent less than the April 1 forecast for the most probable plan. Total runoff volume was 109 percent of the long term average.

The above average runoff coupled with higher than average release from Dillon Reservoir influenced reservoir inflow. On April 1, 2017 Denver Water Board's South Platte storage system was at 90 percent capacity. Dillon Reservoir had only 40,000 AF of remaining available storage. Even with above average east slope diversion, Green Mountain Reservoir inflow represented 70 percent of the basin runoff. By July 1, 2017 reservoir inflow had dropped well below powerplant capacity without requiring a bypass of water through the dam spillway during the fill.



WY 2017 and 30-year average snow-water equivalent for the Green Mountain Reservoir drainage area.

October through April Delivery Operations: Green Mountain Reservoir operation was normal during the fall and winter delivery season. The Colorado Big Thompson project was out of priority for most of this period. A cameo call was in effect from October 1 until October 12, 2016. The Shoshone Outage Protocol was exercised from October 12 until October 28, 2016 due to a maintenance outage at the Shoshone Powerplant. The Shoshone Powerplant returned to operation on October 28, 2016, and the Shoshone Senior Direct Flow Water Right for power generation call remained in effect until March 22, 2017. Colorado River main stem flows exceeded administrative levels on April 6, 2017. During this period Green Mountain Reservoir delivered 16,987 AF of C- BT collection system replacement water, 24,055 AF to fulfill HUP obligations, 1,932 AF for contract deliveries, 14 AF for the Silt Project replacement and 470 AF for Green Mountain Reservoir evaporative losses. Green Mountain Reservoir released 1,260 AF in support of the Shoshone Outage Protocol.

Green Mountain Reservoir obtained a minimum storage of 63,572 AF on March 22, 2017 with a water surface level of 7893.83 feet. On this date the reservoir commenced storing water using the refill right while following relaxation of water rights administration on the Colorado River. The reservoir supported the Shoshone Outage Protocol for two days beginning April 7, 2017 by passing storable inflow.

The HUP Managing Entities declared a surplus of 66,000 AF allocation in August 09, 2017. Green Mountain Reservoir released 22,235 AF of HUP surplus water during October 2016 to support the Colorado River Endangered Fish Recovery Program. This water was delivered to the 15-Mile Reach downstream of the GVIC's Colorado River diversion.

Green Mountain Reservoir did not experience any operating restrictions during the delivery period. The only existing operating restriction was a maximum drawdown rate of 0.5 feet per day when the surface water elevation drops below 7,865 feet (36,957 AF). This restriction is always in place to alleviate landslide concerns. The available supply and demands for WY 2017 were such that the reservoir water surface elevation remained above the restriction threshold during the delivery season. Figure 3 illustrates the end of the month storage contents for the reservoir during WY 2017 compared to the 30-year average.

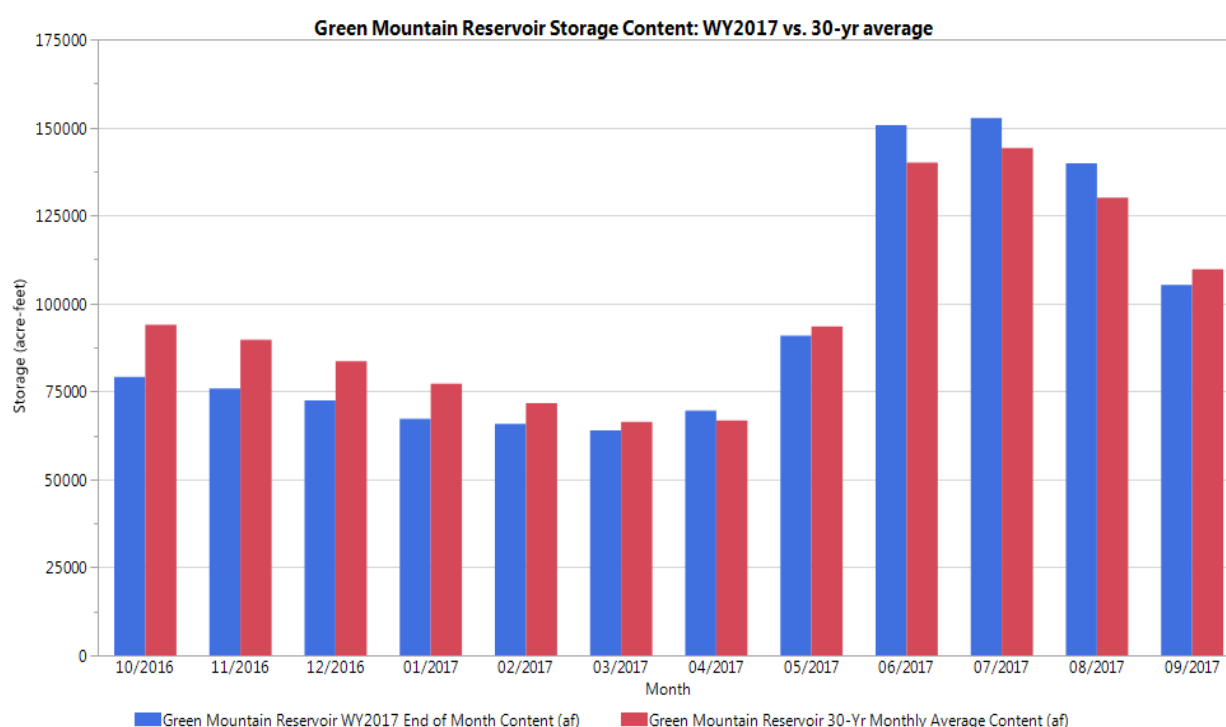


Figure 3: Comparison between the Green Mountain Reservoir monthly content during WY 2017 and its 30-year average content.

May 10: The HUP Managing Entities held the 2016 HUP Operations Wrap Up meeting where Victor Lee reported on total HUP deliveries and Green Mountain Reservoir Operations. Mr. Lee also informed the entities that Green Mountain Reservoir was forecast to fill and that the HUP allocation was expected to refill the full 66,000 AF. Mr. Lee discussed the status of the Heeney Slide operation restriction, and stated that the restriction was not expected to become in effect for WY 2017 irrigation season.

April through July Fill Operations: Green Mountain Reservoir exercised refill storage rights from March 22, 2017 until May 15, 2017. During this period Green Mountain Reservoir stored 12,140 AF. Start-of-Fill storage was 75,712 AF on May 15, 2017, which is 103 percent of the 30 year average.

Reclamation forecasted that Green Mountain Reservoir would fill in WY 2017. The good carryover storage conditions and average May 1, 2017 streamflow projections indicated a physical fill in all but the 5 percent exceedance case. The Denver Water Board and Colorado Springs Utilities (Cities) 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 WY 2017. Green Mountain Reservoir maintained the Direct Flow Power Water Right call with a priority of June 23, 1946 during the entire year.

April: The HUP Managing Entities held coordination calls to monitor low flow conditions in the 15-Mile Reach and identify corrective actions to assure minimum flows were maintained as irrigation commenced. Spring runoff continued to develop with no significant drop in flows.

March 22: The project came into priority with stream flows at the Shoshone Powerplant exceeding the 1,230 cfs direct flow senior water right. Green Mountain Reservoir reduced releases to begin storing water under the 1935 Senior Refill Right and the 1985 Junior Refill Right as per the Protocol. The full 6,316 AF senior refill right was utilized in addition to 5,824 AF toward the junior right.

May 15: The start of fill for Green Mountain Senior Refill Right was declared for WY 2017. Re-allocation of the carry over storage of 75,712 AF replenished the 52,000 AF collection system replacement pool, 5,000 AF for the Silt Project allocation, and 9,854 AF for HUP allocation.

June 3 through June 11: Denver Water Board, Colorado River Conservation District and Reclamation agreed to participate in CROS for 2017. Stream flows at the 15 Mile Reach were forecast to remain below flood stage and all reservoirs were projected to have surplus water. Reclamation made contributions from Green Mountain Reservoir in coordination with Williams Fork, Wolford, Willow Creek and Ruedi Reservoirs. Green Mountain Reservoir increased releases up to powerplant capacity in support of the CROS program. This operation lasted a total of seven days releasing a total of 8,421 AF in an attempt to enhance flows at the 15-Mile Reach.

June 27: Green Mountain Reservoir achieved a paper fill with a storage of 154,645 AF toward the 1935 Senior Refill Storage Right. On that date Denver Water and Cities had depleted a total of 7,463 AF against the Green Mountain Reservoir First Fill Storage Right. Green Mountain Reservoir had a physical fill of 147,351 AF. A provision of the Protocol allows Green Mountain Reservoir to continue storing its inflow under a 1955 priority date after paper filling to reduce the amount of water owed by the Cities. Under this provision Green Mountain Reservoir stored sufficient water between June 24 and July 6, 2017 to fully eliminate the amount owed by the Cities.

June 28: The HUP Managing Entities held their initial meeting in Grand Junction to consider conditions and plan for WY 2017 operations. A total of 16 meetings and or conference calls were held between June 28 and October 25, 2016 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 United States Fish and Wildlife Service proposed an average year target flow of 1,240 cfs.

July 4: Green Mountain Reservoir achieved a physical fill with a fill level of 7,949.60 feet. Reclamation declared July 5, 2016 as the official end of fill date. Because the reservoir achieved a paper fill water was available to fully satisfy each of the following: the 52,000 AF C-BT replacement pool; the 5,000 AF Silt Project reservation; the 66,000 AF HUP allocation; and the 20,000 AF set aside for contracts. Upstream depletions by Green Mountain Reservoir beneficiaries junior to Green Mountain Reservoir were not charged against this year's HUP allocation. Therefore, the entire 66,000 AF HUP allocation remained available when the reservoir achieved its paper fill on June 27, 2016.

July-August: The C-BT project remained in priority for all of July through August 26, 2017. Green Mountain Reservoir obtained a peak pool elevation level of 7949.76 feet on July 26, 2017. The HUP Managing Entities declared HUP surplus on August 3, 2016. Green Mountain Reservoir increased releases on August 10, 2016 to commence delivery of surplus water to the 15-Mile Reach. Colorado River administration commenced on August 21, 2017 with the Junior Shoshone Direct Flow Right. Division 5 placed a 1935 C-BT swing call with partial project replacement release on August 26, 2016.

August 26, 2017: The C-BT Project went out of priority with the Colorado River placed under administration from the Senior Shoshone Direct Flow Right. Division 5 required partial curtailment with a 1935 C-BT swing right on this date. Native Colorado River at Shoshone Powerplant decreased below 1,230 cfs on August 30, 2017 requiring that Green Mountain Reservoir fully replace project out of priority diversion. Green Mountain remained out of priority for the remainder of WY 2017.

WY 2017: Green Mountain Reservoir operations did not require any operating restrictions during delivery and filling. All releases were passed through the outlet works and power was generated from all releases to the Blue River in WY 2017. Green Mountain Reservoir delivered a total of 100,105 AF from storage in WY 2017. These deliveries included 64,025 AF for HUP allocation, 21,645 AF for C-BT collection system replacement, 3,296 AF for contract obligations and 881 AF for Silt Project replacement. Green Mountain Reservoir released 50,748 AF of HUP Surplus releases for the benefit of the Colorado Endangered Fish Recovery Program and 1,260 AF was released from storage to support the Shoshone Outage Protocol.

AOP 2018

Collection System and East Slope Colorado-Big Thompson Project

The 2018 C-BT most-probable 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 AOP 2018 projected a total inflow to the west slope collection system of 266,600 AF during WY 2018. It simulated 46,000 AF of water pumped from Willow Creek and Granby fill during the first half of July 2018, with no spill. No Windy Gap water was expected for AOP 2018.

The AOP 2018 projected diversions through the Adams Tunnel totaling 259,600 AF during WY 2018. Just over half of that water was planned to be diverted between January and May 2018, while leaving sufficient capacity within the system to convey Big Thompson River skim water used for power generation, and possibly Big Thompson River priority water during the late spring and early summer months. The skim operation, according to the AOP 2018, could convey a total estimated volume of 4,900 AF of water through the Olympus Tunnel. The Dille Tunnel diversion was expected to be available by late April 2018 and able to participate in skim operations with an estimated volume of 35,000 AF. Total priority water for AOP 2018 was expected to be 12,400 AF.

AOP 2018 projected a fill of Carter and Horsetooth Reservoirs. Carter was expected to fill by mid-April 2018 and demands were projected to exceed supply in early July, causing reservoir draft. Horsetooth fill was expected in early June 2018 with initial storage draft occurring in the first half of July 2018. Total AOP 2018 deliveries from Carter were projected to be 112,300 AF; total deliveries from Horsetooth were projected to be 116,100 AF.

Green Mountain Reservoir

The AOP 2018 for Green Mountain Reservoir inflow was expected to be 380,000 AF. Projected fill date was in the first half of July 2018. Total Green Mountain Reservoir releases for AOP 2018 were expected to be 258,300 AF all though releases were projected to be through the powerplant. The reservoir was forecast to physically fill with no substitution obligation for Denver and Colorado Springs. Green Mountain Reservoir forecast had all allocations refilled for delivery during the 2018-2019 delivery season. The minimum reservoir water surface elevation was projected to reach 7,892 feet before start of fill and remain well above the Heeney Slide operational restriction of 7,865.0 feet.

Green Mountain Reservoir fill assumed that Denver and Colorado Springs would deplete a total of 118,000 AF. The cities would not require substitution storage and release for out-of-priority diversion under this plan.

APPENDIX A – DAILY RECORDS

APPENDIX A - DAILY RECORDS FOR WY2017

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.

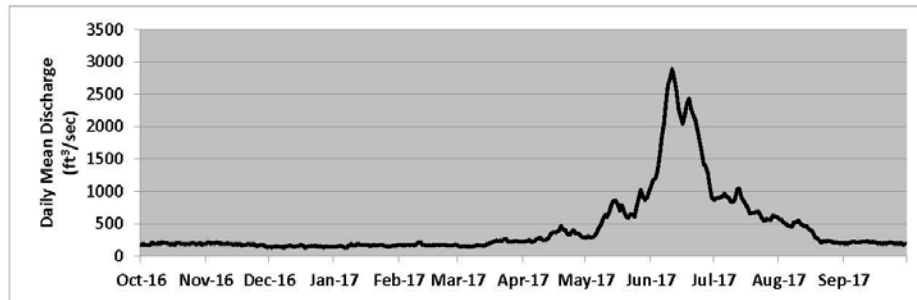
Gage. --Water level recorder with satellite telemetry. Elevation of gage is 7960 from topographic map.

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-2016 to 30-Sep-2017. 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	181	194	144	142	184	168	227	288	1091	876	569	200
2	189	218	141	149	176	148	234	312	1183	889	568	199
3	183	195	145	159	175	150	239	294	1196	898	518	200
4	181	203	149	162	174	159	254	295	1319	910	507	215
5	175	199	149	152	183	145	220	317	1559	930	481	224
6	215	215	148	131	175	157	229	358	1825	964	462	222
7	190	199	143	133	179	138	252	436	2050	922	458	215
8	191	199	133	169	175	157	270	482	2362	897	524	213
9	203	192	160	190	187	161	291	573	2651	836	525	226
10	188	194	161	167	209	178	254	635	2742	840	557	228
11	222	197	170	166	222	170	253	609	2887	893	509	230
12	201	193	152	197	178	166	254	683	2729	1034	486	237
13	205	192	144	184	181	163	282	785	2561	1052	461	219
14	194	181	160	183	167	176	340	862	2270	908	466	220
15	184	189	159	183	176	194	364	861	2162	857	421	222
16	193	184	184	184	172	200	370	803	2044	800	404	209
17	180	196	163	181	174	215	373	700	2171	745	364	195
18	205	164	132	158	173	229	392	791	2356	662	301	209
19	203	184	145	170	186	245	468	687	2441	674	275	182
20	194	184	156	181	173	241	412	621	2269	677	252	206
21	195	197	164	164	183	245	406	593	2178	683	209	195
22	185	182	155	174	183	241	348	645	2111	690	243	206
23	193	186	166	182	180	262	326	644	1946	634	221	213
24	185	187	147	175	166	264	369	608	1783	569	243	206
25	201	161	157	160	167	226	402	757	1618	545	235	195
26	202	167	143	153	166	230	350	903	1419	573	230	197
27	187	183	139	142	178	226	364	1028	1384	569	198	194
28	191	180	150	160	186	241	326	921	1282	561	222	203
29	206	153	143	165		238	302	889	1060	632	203	181
30	183	141	142	161		229	290	902	890	616	199	196
31	191		144	176		231		1002		610	200	
Min	175	141	132	131	166	138	220	288	890	545	198	181
Max	222	218	184	197	222	264	468	1028	2887	1052	569	237
Mean	193	187	151	166	180	200	315	654	1918	772	371	209
ac-ft	11869	11102	9288	10203	9957	12261	18729	40126	113925	47416	22790	12386



Appendix A (2 of 38)
Elliot Creek Canal near Green Mountain Reservoir, CO

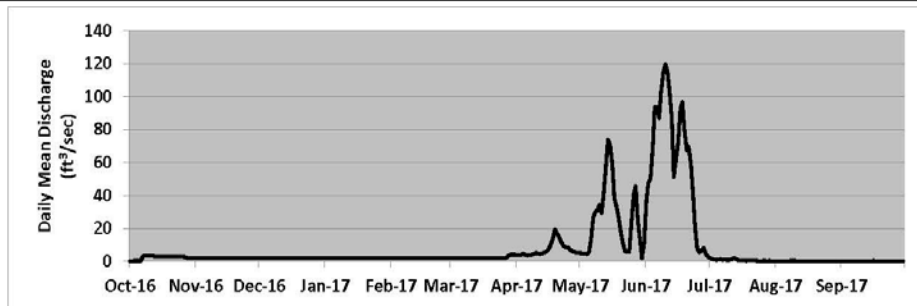
Location. --Lat 39°52'25", long 106°19'49", Summit County, Hydrologic Unit 14010002, on left bank at concrete flume structure, and 1.1 mi west of Heeney.

Gage.--Water-stage recorder with satellite telemetry. Elevation of gage is 8050 ft from topographic map.

Remarks.—This is a diversion from Elliot Creek in the Blue River Basin to Green Mountain Reservoir. Recorders were operated from 01-Oct-2016 to 30-Sep-2017. Records are complete and 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.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	2	2	2	2	2	4	5	37	2	0	0
2	0	2	2	2	2	2	4	5	48	1	0	0
3	0	2	2	2	2	2	4	5	50	1	0	0
4	0	2	2	2	2	2	5	5	69	1	0	0
5	0	2	2	2	2	2	4	5	93	1	0	0
6	0	2	2	2	2	2	4	14	94	1	0	0
7	3	2	2	2	2	2	4	27	87	1	0	0
8	4	2	2	2	2	2	4	30	103	1	0	0
9	4	2	2	2	2	2	5	31	114	1	0	0
10	4	2	2	2	2	2	5	35	120	1	0	0
11	4	2	2	2	2	2	5	29	115	1	0	0
12	3	2	2	2	2	2	5	42	103	2	0	0
13	3	2	2	2	2	2	5	58	86	2	0	0
14	3	2	2	2	2	2	5	74	51	1	0	0
15	3	2	2	2	2	2	6	71	62	1	0	0
16	3	2	2	2	2	2	7	59	72	1	0	0
17	3	2	2	2	2	2	10	39	93	1	0	0
18	3	2	2	2	2	2	14	34	97	0	0	0
19	3	2	2	2	2	2	19	26	80	1	0	0
20	3	2	2	2	2	2	17	18	67	1	0	0
21	3	2	2	2	2	2	15	11	70	1	0	0
22	3	2	2	2	2	2	12	6	59	1	0	0
23	3	2	2	2	2	2	10	6	40	0	0	0
24	3	2	2	2	2	2	9	6	21	0	0	0
25	3	2	2	2	2	2	9	24	8	0	0	0
26	3	2	2	2	2	2	7	40	6	0	0	0
27	3	2	2	2	2	2	6	46	7	0	0	0
28	2	2	2	2	2	3	6	25	8	0	0	0
29	2	2	2	2		4	5	13	5	0	0	0
30	2	2	2	2		4	5	2	3	0	0	0
31	2		2	2		4		11		0	0	
Min	0	2	2	2	2	2	4	2	3	0	0	0
Max	4	2	2	2	2	4	19	74	120	2	0	0
Mean	2	2	2	2	2	2	7	26	62	1	0	0
ac-ft	151	119	123	123	111	139	437	1586	3697	50	17	17



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

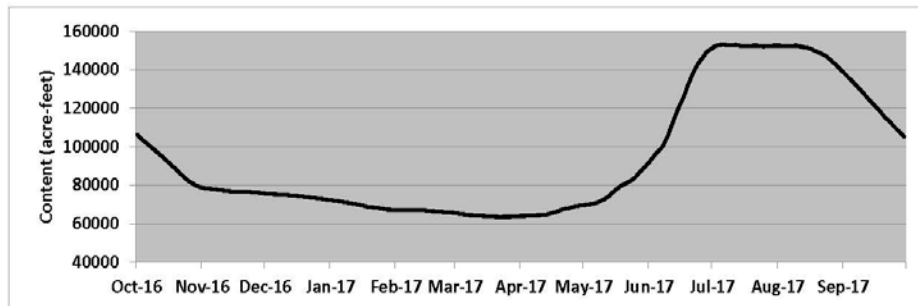
Location. --Lat 39°52'42", long 106°19'42", Summit County, Hydrologic Unit 14010002, on Green Mountain Dam, 13 miles southeast of Kremmling, Colorado, on the Blue River..

Gage. --Water level recorder with satellite telemetry. Elevation of gage is 7960 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-2016 to 30-Sep-2017. 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	106427	78822	75687	72259	67204	65593	64033	69654	92112	151398	152539	138737
2	105393	78624	75598	72122	67216	65398	64101	69824	93592	152137	152518	137628
3	104348	78425	75534	72010	67216	65203	64147	69957	94924	152560	152433	136504
4	103328	78281	75470	71899	67216	65019	64203	70090	96210	152793	152391	135345
5	102350	78138	75406	71752	67228	64836	64192	70272	97493	152962	152328	134196
6	101472	78020	75343	71519	67181	64723	64203	70539	98479	153089	152307	133109
7	100542	77864	75279	71285	67146	64610	64260	70954	99646	152983	152307	132029
8	99615	77707	75190	71126	67099	64531	64350	71322	101456	152835	152455	130839
9	98712	77550	75151	70990	67088	64463	64486	71826	103862	152751	152603	129635
10	97785	77446	75113	70782	67123	64418	64542	72445	106460	152751	152582	128441
11	96925	77328	75100	70564	67181	64373	64599	72993	109335	152899	152328	127252
12	95997	77211	75011	70357	67146	64316	64655	73695	112255	152920	152053	126089
13	94999	77093	74871	70127	67099	64226	64769	74603	115374	152814	151841	124879
14	93979	76964	74768	69896	66983	64135	64996	75662	118054	152497	151672	123655
15	92954	76874	74628	69666	66878	64079	65272	76719	120524	152328	151419	122459
16	91936	76848	74552	69437	66762	64011	65559	77655	122772	152349	151105	121253
17	90897	76848	74438	69198	66657	63932	65857	78386	125250	152412	150707	120034
18	89897	76783	74262	68947	66553	63852	66192	79297	128100	152328	150204	118826
19	88861	76757	74111	68792	66471	63807	66681	80001	131125	152370	149700	117573
20	87804	76732	73972	68660	66367	63729	67053	80576	133807	152560	149200	116415
21	86757	76719	73859	68493	66285	63628	67417	81098	136308	152645	148660	115233
22	85692	76680	73733	68350	66204	63550	67665	81719	138797	152624	148223	114094
23	84648	76641	73632	68220	66122	63584	67865	82341	141015	152455	147704	112962
24	83640	76564	73494	68078	66018	63628	68161	82888	142912	152285	146898	111823
25	82792	76435	73355	67901	65949	63639	68517	83736	144519	152243	146055	110659
26	81976	76318	73205	67712	65880	63662	68768	84870	145829	152285	145110	109469
27	81206	76228	73043	67499	65823	63684	69043	86251	147434	152307	144050	108274
28	80536	76138	72906	67358	65731	63785	69246	87422	149116	152307	143013	107224
29	79974	75996	72744	67287		63864	69402	88489	150078	152455	141942	106131
30	79495	75828	72582	67216		63920	69533	89622	150686	152582	140875	105212
31	79112		72420	67181		63977		90810		152645	139814	
Min	79112	75828	72420	67181	65731	63550	64033	69654	92112	151398	139814	105212
Max	106427	78822	75687	72259	67228	65593	69533	90810	150686	153089	152603	138737
Mean	91937	77129	74337	69570	66708	64199	66126	77926	121584	152534	149259	121866
ac-ft	79112	75828	72420	67181	65731	63977	69533	90810	150686	152645	139814	105212



Appendix A (4 of 38)

Blue River below Green Mountain Reservoir, CO

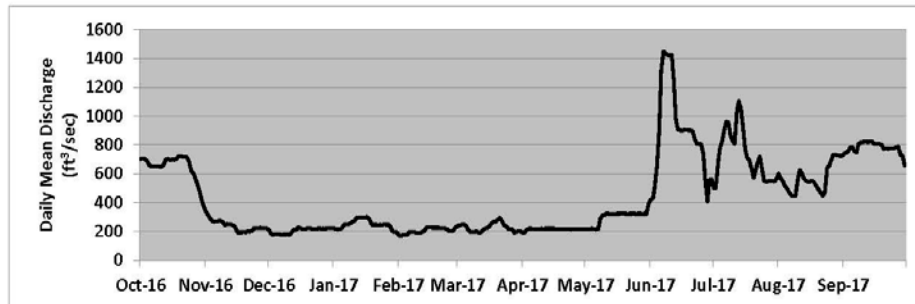
Location.--Lat 39°52'49", long 106°20'00", Summit County, Hydrologic Unit 14010002, on left bank 0.3 miles upstream from Elliot Creek, 0.3 miles downstream from Green Mountain Reservoir and 13 miles southeast of Kremmling.

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 mi² including 15.3 mi² 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-2016 to 30-Sep-2017; a missing daily values on 08-22-2017 was interpolated from available observed data. 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	704	338	215	223	173	238	195	220	423	501	602	735
2	709	315	185	218	170	246	195	219	426	502	567	747
3	704	293	176	215	175	248	211	220	513	669	548	754
4	889	273	181	218	174	252	221	221	659	775	514	783
5	662	269	181	226	177	237	221	218	901	829	497	788
6	652	272	179	249	199	214	219	216	1316	900	472	757
7	653	276	175	250	196	195	219	220	1449	962	451	748
8	653	276	178	249	198	197	220	290	1437	958	449	806
9	653	268	179	259	193	195	218	312	1426	867	450	817
10	649	244	179	272	191	201	221	315	1420	827	557	819
11	651	254	176	276	193	193	220	326	1425	809	626	825
12	663	250	197	301	195	195	221	322	1244	1023	608	821
13	702	249	214	300	204	208	220	320	975	1106	567	823
14	703	244	211	299	226	221	220	320	906	1051	552	827
15	695	232	229	299	229	222	221	321	904	919	547	815
16	701	195	222	299	231	234	221	324	897	774	548	807
17	698	194	220	302	227	254	218	323	907	708	554	809
18	704	194	220	285	226	269	219	324	905	693	540	807
19	720	195	221	248	227	268	218	325	901	640	514	803
20	721	195	226	247	226	281	219	323	902	571	490	771
21	718	201	222	248	224	296	218	322	899	626	469	778
22	717	200	218	246	224	280	218	324	841	685	448	771
23	714	203	217	247	221	245	220	322	809	720	473	777
24	688	224	217	246	219	241	216	325	808	635	641	776
25	623	224	227	249	202	220	217	321	807	553	654	777
26	608	223	219	249	201	218	219	323	741	545	695	789
27	571	226	220	249	207	215	220	323	560	549	733	789
28	524	223	219	232	232	190	219	322	409	549	732	728
29	484	223	225	201		198	219	323	558	552	728	727
30	419	223	224	197		201	219	323	565	549	726	659
31	379		225	194		200		395		569	725	
Min	379	194	175	194	170	190	195	216	409	501	448	659
Max	721	338	229	302	232	296	221	395	1449	1106	733	827
Mean	649	240	206	251	206	228	217	300	898	729	570	781
ac-ft	39864	14251	12666	15433	11405	14007	12914	18415	53329	44775	35000	46399



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

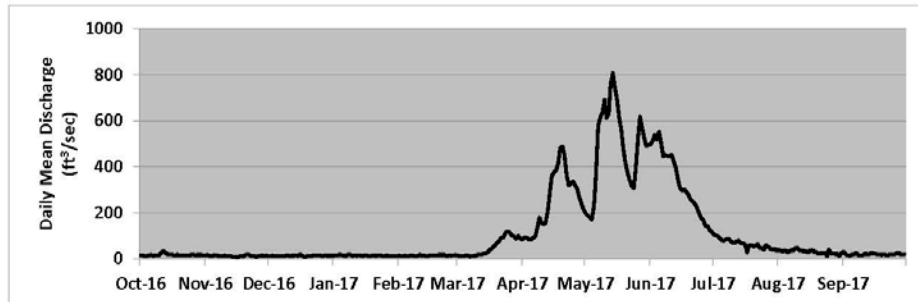
Location. — Lat 40°08'52", long 105°56'28", Grand County, Hydrologic Unit 14010001, at Willow Creek Dam, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage. — Water level recorder with satellite telemetry. Elevation of gage is 8130 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-2016 to 30-Sep-2017. 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	17	13	14	14	15	83	199	498	106	38	31
2	15	18	13	15	13	12	94	189	515	103	36	19
3	14	14	14	15	13	14	91	178	540	96	32	16
4	13	12	12	20	14	13	82	170	519	90	38	14
5	15	18	13	15	12	15	82	229	553	80	30	18
6	17	16	12	14	13	14	92	363	506	78	31	20
7	14	15	14	14	17	11	96	579	444	84	38	25
8	15	13	12	19	14	12	132	612	450	87	37	17
9	16	12	13	18	12	14	179	635	448	77	46	17
10	16	14	17	13	13	14	156	691	443	71	48	16
11	27	13	13	15	18	20	151	613	452	68	36	21
12	33	13	14	15	14	20	155	629	422	76	36	21
13	24	12	14	15	15	21	207	759	396	79	34	18
14	20	10	16	14	12	23	293	807	347	68	32	25
15	18	10	14	13	13	27	360	748	310	66	29	24
16	18	6	21	16	16	34	377	693	296	63	35	22
17	16	10	13	14	15	43	383	614	304	28	38	19
18	17	13	10	13	16	50	417	565	293	58	30	19
19	17	11	11	13	16	58	483	477	279	59	29	18
20	16	17	13	18	17	72	490	419	259	53	21	18
21	15	20	14	13	17	81	446	374	249	56	24	18
22	16	17	15	15	17	92	364	344	241	63	25	16
23	15	12	17	17	17	95	319	317	225	46	26	19
24	16	13	15	13	12	113	326	308	198	46	12	20
25	17	8	16	13	15	118	336	396	179	40	40	18
26	18	13	14	14	15	112	321	526	171	59	23	22
27	16	14	13	14	15	101	306	617	145	51	23	28
28	17	16	15	12	17	96	267	570	144	43	21	20
29	17	13	14	13		86	242	521	127	40	21	20
30	17	14	14	13		99	215	490	119	43	13	19
31	16		14	12		87		494		36	26	
Min	13	6	10	12	12	11	82	170	119	28	12	14
Max	33	20	21	20	18	118	490	807	553	106	48	31
Mean	17	13	14	14	15	51	251	488	336	65	31	20
ac-ft	1066	792	859	888	820	3130	14939	29946	19943	3986	1875	1184



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

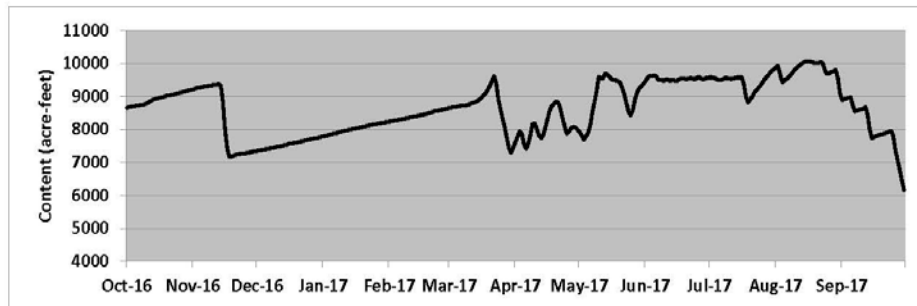
Location.—Lat 40° 08'52", long 105° 56'28", Grand County, Hydrologic Unit 14010001, at Willow Creek Dam, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage.— Water level recorder with satellite telemetry. Elevation of gage is 8130 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 2016 to 30-Sep-2017. 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	8661	9224	7352	7789	8244	8654	7610	7925	9471	9578	9888	8892
2	8677	9245	7365	7803	8256	8664	7782	7819	9581	9578	9925	8918
3	8687	9259	7378	7819	8268	8674	7949	7691	9628	9564	9668	8939
4	8698	9267	7389	7844	8282	8685	7886	7780	9612	9540	9435	8955
5	8710	9286	7402	7860	8292	8700	7559	7895	9651	9498	9482	8978
6	8725	9302	7413	7874	8302	8712	7411	8128	9606	9496	9534	8718
7	8736	9315	7426	7886	8321	8720	7583	8499	9493	9523	9598	8552
8	8749	9326	7435	7911	8333	8728	7828	8812	9496	9556	9662	8574
9	8764	9334	7448	7933	8343	8741	8169	9171	9487	9556	9740	8594
10	8779	9345	7468	7944	8355	8756	8200	9606	9490	9545	9825	8614
11	8814	9356	7481	7960	8375	8782	8007	9556	9517	9534	9885	8644
12	8864	9367	7496	7974	8387	8807	7819	9561	9485	9542	9943	8677
13	8895	9375	7510	7991	8403	8833	7736	9696	9487	9572	9998	8429
14	8918	9340	7527	8005	8413	8864	7828	9670	9496	9578	10032	7998
15	8939	8820	7543	8017	8425	8903	8052	9598	9465	9578	10058	7736
16	8957	7956	7570	8036	8439	8955	8309	9517	9485	9578	10070	7771
17	8973	7406	7583	8047	8454	9025	8581	9498	9534	9367	10061	7796
18	8991	7183	7590	8059	8472	9107	8710	9485	9553	8996	10035	7821
19	9009	7190	7599	8071	8489	9207	8779	9482	9545	8822	10018	7844
20	9025	7209	7612	8093	8509	9334	8843	9419	9529	8916	10009	7865
21	9038	7235	7626	8105	8527	9471	8814	9267	9545	9015	10021	7888
22	9054	7254	7641	8118	8547	9620	8629	9056	9561	9131	10032	7909
23	9067	7260	7659	8137	8567	9394	8358	8795	9551	9207	10021	7935
24	9083	7271	7675	8149	8577	8882	8102	8517	9517	9286	9783	7965
25	9101	7273	7693	8161	8592	8617	7867	8432	9570	9353	9676	7803
26	9120	7284	7707	8176	8604	8338	7921	8589	9600	9460	9710	7372
27	9136	7297	7718	8188	8619	8038	8038	8913	9540	9551	9743	7071
28	9154	7313	7734	8197	8639	7745	8081	9139	9529	9623	9772	6767
29	9173	7326	7748	8209		7419	8071	9253	9548	9693	9800	6466
30	9192	7339	7762	8222		7301	8012	9313	9572	9766	9551	6173
31	9205		7775	8232		7459		9391		9825	9123	
Min	8661	7183	7352	7789	8244	7301	7411	7691	9465	8822	9123	6173
Max	9205	9375	7775	8232	8639	9620	8843	9696	9651	9825	10070	8978
Mean	8932	8298	7559	8026	8430	8682	8084	8951	9538	9446	9810	8055
ac-ft	9205	7339	7775	8232	8639	7459	8012	9391	9572	9825	9123	6173



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

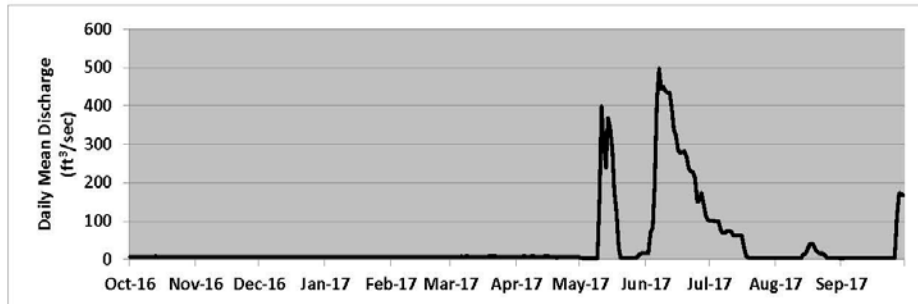
Location.--Lat 40°08'50", long 105°56'16", Grand County, Hydrologic Unit 14010001, at Willow Creek Dam, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage.--Water-stage recorder with satellite telemetry. Elevation of gage is 8040 feet from topographic map.

Remarks.-- Drainage area is 127 square miles. Recorder was operated from 01-Oct-2016 to 30-Sep-2017. 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	7	7	7	7	7	7	7	5	16	101	4	4
2	7	6	7	7	7	7	7	4	16	101	4	4
3	7	7	7	7	7	7	7	4	70	100	4	4
4	7	7	7	7	7	7	8	4	83	100	4	4
5	7	7	7	7	7	7	8	4	195	99	4	4
6	7	7	7	7	7	8	7	4	413	79	4	4
7	7	7	7	7	7	7	7	4	497	69	4	4
8	7	7	7	7	7	8	8	4	446	69	5	4
9	7	7	7	7	7	8	8	4	449	75	5	4
10	7	7	7	7	7	7	7	169	438	75	5	5
11	7	7	7	7	7	7	7	398	436	73	4	5
12	7	7	7	7	7	7	7	298	435	63	4	5
13	8	7	7	7	7	7	7	241	393	63	4	5
14	7	7	7	7	7	7	8	369	339	63	14	5
15	7	7	7	7	7	7	8	343	323	63	16	5
16	7	7	7	7	7	7	8	286	283	62	27	5
17	7	7	7	7	7	7	7	177	277	32	40	5
18	7	7	7	7	7	7	7	124	280	8	41	5
19	7	7	7	7	7	8	7	32	281	6	35	5
20	7	7	7	7	7	8	5	4	266	4	23	5
21	7	7	7	7	7	8	7	4	238	4	17	5
22	7	7	7	7	7	8	7	4	231	4	16	5
23	7	7	7	7	7	7	7	4	227	4	16	5
24	7	7	7	7	7	7	7	4	212	4	11	5
25	7	7	7	7	7	7	7	4	150	4	5	5
26	7	7	7	7	7	7	7	4	153	5	5	5
27	7	7	7	7	7	7	7	4	174	4	5	113
28	7	7	7	7	7	7	7	8	145	4	5	173
29	7	7	7	7		7	7	15	115	4	5	172
30	7	7	7	7		7	7	16	104	4	4	166
31	7		7	7		7		16		4	4	
Min	7	6	7	7	7	7	5	4	16	4	4	4
Max	8	7	7	7	7	8	8	398	497	101	41	173
Mean	7	7	7	7	7	7	7	83	256	44	11	25
ac-ft	438	417	414	421	402	449	429	5077	15217	2679	685	1468



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

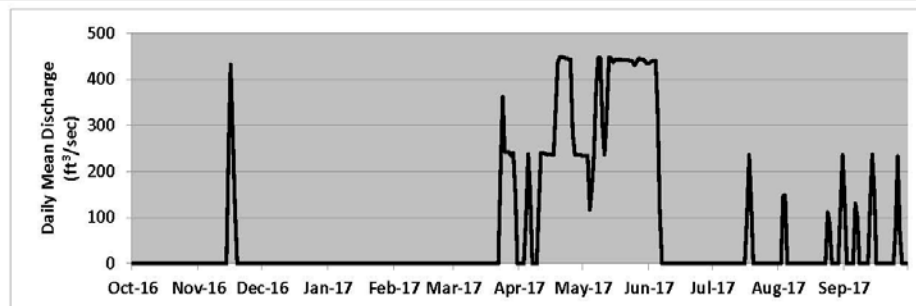
Location. —Lat 40°08'39", long 105°54'10", Grand County, Hydrologic Unit 14010001, at Willow Creek Pump Canal, 4 miles north of Granby, Colorado, on Willow Creek, a tributary of the Colorado River.

Gage. — Water-stage recorder with satellite telemetry at 15 foot Parshall Flume. Elevation of gage is 8300 feet 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-2016 to 30-Sep-2017. 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	0	0	0	0	0	0	0	233	436	0	0	141
2	0	0	0	0	0	0	0	234	438	0	0	0
3	0	0	0	0	0	0	0	234	440	0	147	0
4	0	0	0	0	0	0	95	117	440	0	148	0
5	0	0	0	0	0	0	237	162	333	0	0	0
6	0	0	0	0	0	0	157	238	111	0	0	130
7	0	0	0	0	0	0	0	384	0	0	0	102
8	0	0	0	0	0	0	0	446	0	0	0	0
9	0	0	0	0	0	0	0	446	0	0	0	0
10	0	0	0	0	0	0	117	298	0	0	0	0
11	0	0	0	0	0	0	240	236	0	0	0	0
12	0	0	0	0	0	0	241	324	0	0	0	0
13	0	0	0	0	0	0	238	447	0	0	0	124
14	0	0	0	0	0	0	236	445	0	0	0	236
15	0	257	0	0	0	0	237	437	0	0	0	149
16	0	432	0	0	0	0	236	442	0	0	0	0
17	0	277	0	0	0	0	235	442	0	101	0	0
18	0	117	0	0	0	0	342	443	0	235	0	0
19	0	0	0	0	0	0	436	442	0	140	0	0
20	0	0	0	0	0	0	448	442	0	0	0	0
21	0	0	0	0	0	0	448	442	0	0	0	0
22	0	0	0	0	0	0	446	441	0	0	0	0
23	0	0	0	0	0	198	445	440	0	0	0	0
24	0	0	0	0	0	362	444	439	0	0	111	0
25	0	0	0	0	0	242	443	430	0	0	88	82
26	0	0	0	0	0	242	283	438	0	0	0	233
27	0	0	0	0	0	242	236	445	0	0	0	65
28	0	0	0	0	0	234	235	444	0	0	0	0
29	0	0	0	0		240	235	444	0	0	0	0
30	0	0	0	0		149	234	439	0	0	118	0
31	0			0		0		434		0	235	
Min	0	0	0	0	0	0	0	117	0	0	0	0
Max	0	432	0	0	0	362	448	447	440	235	235	236
Mean	0	36	0	0	0	62	231	378	73	15	27	42
ac-ft	3	2144	0	0	0	3779	13749	23217	4351	942	1677	2498



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

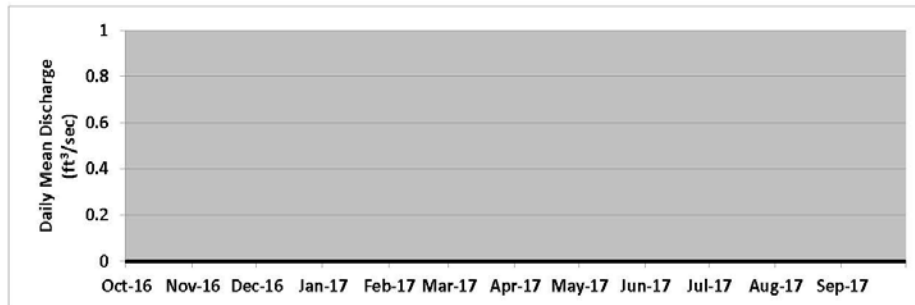
Location. --Lat 40°06'24", long 105°58'48", Grand County, Hydrologic Unit 14010001, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage.-- Reading taken directly from the pumps. Elevation of the pumping plant is 7823 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-2016 to 30-Sep-2017. 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	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	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	0	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	0	0	0
30	0	0	0	0		0	0	0	0	0	0	0
31	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	0	0	0	0
Mean	0	0	0	0	0	0	0	0	0	0	0	0
ac-ft	0	0	0	0	0	0	0	0	0	0	0	0



Appendix A (10 of 38)
Granby Reservoir, CO

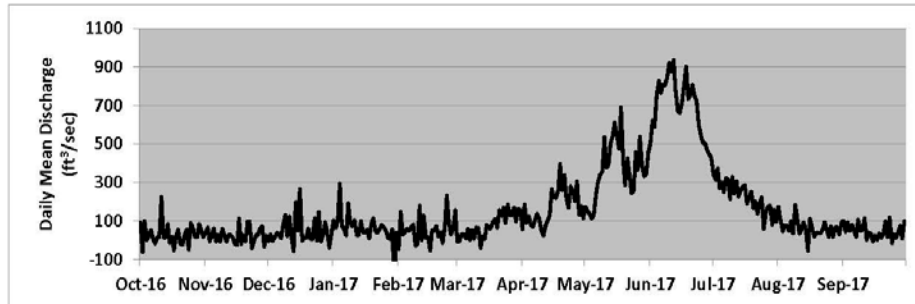
Location. --Lat 40°08'54", long 105°51'48", Grand County, Hydrologic Unit 14010001, on Granby Dam, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage.-- Water level recorder with satellite telemetry. Elevation of gage is 8300 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-2016 to 30-Sep-2017. 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	92	37	-5	104	-45	-9	59	175	501	340	174	103
2	-60	68	31	64	148	-4	185	150	625	317	107	43
3	101	-6	-4	98	28	30	92	136	589	373	46	95
4	1	28	14	296	41	31	126	113	757	273	78	48
5	25	63	41	77	61	9	82	133	830	300	76	82
6	54	-6	28	58	50	60	69	231	766	250	48	51
7	5	28	10	25	69	0	108	303	808	325	100	17
8	-18	-7	78	191	83	53	138	340	806	311	36	108
9	16	62	132	89	-29	7	110	355	850	215	182	47
10	16	27	23	72	-19	67	56	537	923	329	109	54
11	226	-7	123	106	180	65	25	377	876	243	34	115
12	15	27	8	27	1	-39	73	392	936	307	57	2
13	15	27	-56	27	128	21	102	501	778	227	94	40
14	85	16	198	100	11	6	134	543	673	261	56	35
15	-16	-19	51	43	18	82	265	612	663	280	-54	-7
16	19	-24	267	40	-52	64	221	543	715	285	111	26
17	-50	114	-2	55	53	64	220	477	801	190	66	1
18	23	-19	13	9	51	96	259	691	903	223	19	37
19	56	28	13	88	74	110	396	405	735	254	39	14
20	-20	-6	62	116	20	66	260	285	754	166	39	33
21	-23	99	5	45	43	158	339	427	808	202	36	99
22	22	98	5	39	-15	126	215	348	753	138	56	18
23	57	-41	116	61	67	170	170	244	723	187	94	120
24	-48	-7	-1	80	234	91	282	258	597	224	55	-16
25	90	27	147	67	90	185	256	459	548	60	17	32
26	61	27	-7	47	30	131	205	368	505	143	74	13
27	16	63	28	13	64	131	306	539	505	177	18	40
28	16	73	96	6	155	170	133	390	469	180	67	76
29	86	-32	43	57		99	178	332	449	82	67	8
30	52	25	-37	-247		160	115	346	427	159	30	99
31	17		37	42		155		459		97	92	
Min	-60	-41	-56	-247	-52	-39	25	113	427	60	-54	-16
Max	226	114	267	296	234	185	396	691	936	373	182	120
Mean	30	25	47	61	55	76	173	370	702	230	65	48
ac-ft	1835	1501	2887	3749	3040	4661	10253	22708	41725	14099	4011	2838



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Granby Reservoir, CO

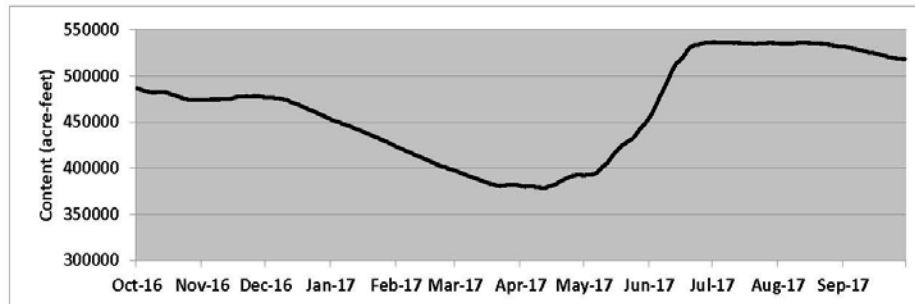
Location. --Lat 40°08'54", long 105°51'48", Grand County, Hydrologic Unit 14010001, on Granby Dam, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage.-- Water level recorder with satellite telemetry. Elevation of gage is 8300 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. 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-2016 to 30-Sep-2017. 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	486601	474079	476828	453039	423067	397127	380617	392206	454922	536421	535267	532090
2	485699	474216	476759	451972	422232	396251	380252	392580	458691	536493	534758	531513
3	485071	474216	476553	451100	421265	395379	379884	392950	462948	536205	534758	531006
4	484237	474284	476416	450500	420234	394444	380130	393012	467778	535989	534830	530361
5	483472	474421	476141	449630	419212	393575	380313	393199	473114	535917	534830	529782
6	483057	474421	475867	448634	418183	392765	380435	393948	478140	535989	534830	529422
7	482435	474489	475524	447566	417223	391831	380007	395128	482435	535989	534903	528921
8	482018	474489	475317	446969	416393	391028	379638	397438	487017	536133	534903	528491
9	482018	474626	475040	446168	415182	390098	379211	399565	491968	535989	535267	527771
10	482018	474695	474216	445308	414034	389294	378907	401762	496865	535917	535700	527196
11	482435	474695	473803	444510	413271	388488	378785	403522	501846	535773	535917	526695
12	482435	474763	472772	443518	412254	387566	378785	405474	506846	535845	535845	526045
13	482435	474832	471470	442459	411428	386760	378968	408319	511154	535773	535917	525117
14	482573	474901	470718	441602	410409	385835	379700	411871	513778	535556	535989	525117
15	481808	475386	469758	440742	409461	385036	380435	415055	515765	535339	535773	524974
16	481116	476210	469281	439750	408256	384361	381293	417737	517760	535267	535700	524473
17	480282	477036	468257	438767	407242	383500	382148	420042	520682	535049	535484	523612
18	479593	477244	467166	437713	406298	382947	383070	422617	523969	535267	535267	523184
19	478973	477314	466074	436727	405286	382209	384668	424423	527844	535267	535121	522681
20	478072	477314	465057	435810	404212	381599	386021	425910	530071	534903	534976	521895
21	477036	477522	463968	434828	403271	381170	387318	427530	532018	534613	534830	521326
22	476347	477728	462948	433781	402201	380678	388488	429153	533024	534830	534685	520682
23	475729	477659	462139	432799	401383	380924	389294	430584	533458	535049	534397	520252
24	474901	477659	461053	431954	401006	381170	390285	432149	533748	535267	534326	519612
25	474353	477728	460242	430973	400318	381416	391275	434631	534326	535267	534110	519182
26	473803	477797	459161	429930	399439	381782	391831	437713	534976	535484	533748	519038
27	473803	477934	458083	428894	398627	381782	392268	441005	535628	535773	533240	518682
28	473803	477728	457140	427788	397999	381843	392580	443718	536061	535917	532809	518469
29	473941	477244	456128	426814		381782	392580	446301	536349	535773	532377	518185
30	474010	477036	454922	425265		381660	392268	448833	536349	535700	532090	518185
31	474010		453913	424230		381232		451772		535484	532162	
Min	473803	474079	453913	424230	397999	380678	378785	392206	454922	534613	532090	518185
Max	486601	477934	476828	453039	423067	397127	392580	451772	536349	536493	535989	532090
Mean	479616	475989	467829	439346	409978	386307	384048	417101	508984	535620	534671	524465
EOM	474010	477036	453913	424230	397999	381232	392268	451772	536349	535484	532162	518185



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Granby Reservoir, CO

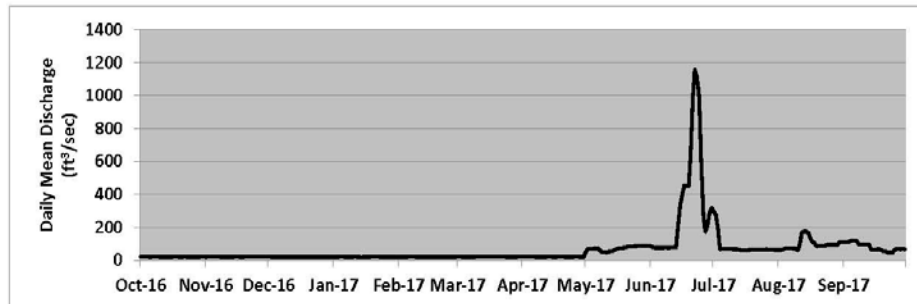
Location. --Lat 40°08'54", long 105°51'48", Grand County, Hydrologic Unit 14010001, on Granby Dam, 5.5 miles northeast of Granby, Colorado, on the Colorado River.

Gage.-- Water level recorder with satellite telemetry. Elevation of gage is 8300 feet, 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. Data was provided by personnel from the Northern Water. Releases were made through the outlet works valve. 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-2016 to 30-Sep-2017. 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	22	20	21	20	20	21	21	49	86	293	62	111
2	21	21	20	20	20	21	21	68	80	276	62	111
3	21	21	20	20	20	20	21	69	76	189	66	111
4	21	21	20	21	20	20	21	70	76	66	73	117
5	20	21	20	21	20	20	21	71	76	69	73	121
6	20	21	20	20	21	20	21	71	76	69	73	121
7	21	21	20	20	21	20	20	71	76	68	73	120
8	21	20	20	20	21	20	20	58	79	68	71	100
9	21	20	20	20	20	20	20	49	76	68	72	98
10	20	20	20	20	20	21	20	49	76	67	59	98
11	20	20	20	21	20	21	20	48	77	66	98	98
12	20	20	20	20	20	21	20	52	77	66	173	98
13	20	20	20	20	20	21	22	54	78	64	174	97
14	20	20	20	19	20	21	21	57	213	61	175	65
15	20	21	20	20	20	21	20	63	333	61	169	63
16	20	21	20	20	20	21	20	70	399	61	134	65
17	21	20	20	20	20	21	20	75	454	61	112	67
18	21	20	20	20	20	21	21	75	452	62	104	67
19	20	20	20	21	20	21	21	76	448	63	86	60
20	20	21	20	21	20	21	21	78	646	63	87	54
21	20	21	20	21	20	21	20	83	988	63	88	54
22	21	21	20	21	20	21	20	83	1158	64	89	46
23	20	21	20	20	20	21	20	82	1114	63	89	48
24	20	21	20	20	20	20	20	85	989	64	95	43
25	20	21	20	20	20	20	20	86	606	63	95	60
26	20	21	20	20	20	20	21	87	279	67	95	69
27	20	21	20	20	20	20	21	87	173	63	95	68
28	20	21	20	20	20	20	20	87	213	63	95	67
29	20	21	20	20		20	20	87	286	63	95	68
30	21	21	20	20		21	20	87	318	62	111	66
31	21		20	20		21		87		62	111	
Min	20	20	20	19	20	20	20	48	76	61	59	43
Max	22	21	21	21	21	21	22	87	1158	293	175	121
Mean	20	21	20	20	20	21	20	71	336	83	99	81
ac-ft	1253	1226	1230	1239	1115	1263	1216	4384	19954	5065	6047	4813



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Farr Pumping Plant, Granby Reservoir, CO

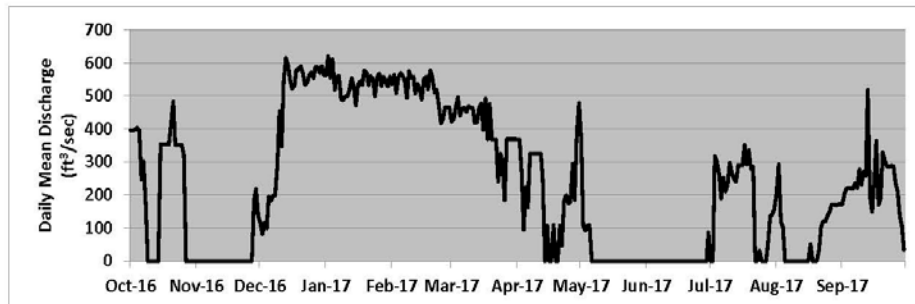
Location. --Lat 40°11'30", long 105°52'52", Grand County, Hydrologic Unit 14010001, at Farr Pumping Plant on the north end of Granby Reservoir, 8 miles northeast of Granby, Colorado, on the Colorado River.

Gage. -- Reading taken directly from the pumps, based on conduit pressure and Granby Reservoir's elevation. Elevation of the pumping plant is 8320 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-2016 to 30-Sep-2017. 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	396	0	116	564	536	423	368	371	0	0	205	172
2	396	0	81	621	564	431	368	108	0	0	292	205
3	398	0	116	556	510	464	276	93	0	318	121	220
4	404	0	99	611	555	496	95	108	0	301	103	222
5	395	0	195	518	570	441	225	109	0	260	0	221
6	247	0	182	558	561	462	163	0	0	190	0	220
7	302	0	199	560	546	465	325	0	0	253	0	235
8	177	0	199	489	494	452	325	0	0	211	0	223
9	0	0	287	488	575	470	325	0	0	231	0	278
10	0	0	454	499	554	465	325	0	0	298	0	232
11	0	0	347	500	559	464	325	0	0	266	0	271
12	0	0	543	520	508	419	325	0	0	248	0	257
13	0	0	616	554	538	420	246	0	0	241	0	518
14	0	0	593	527	518	465	0	0	0	291	0	194
15	354	0	551	471	490	478	107	0	0	291	0	149
16	353	0	523	534	550	398	0	0	0	291	0	237
17	353	0	530	545	558	492	0	0	0	351	51	364
18	353	0	580	534	521	369	110	0	0	292	0	170
19	353	0	580	578	578	476	0	0	0	335	0	191
20	418	0	591	571	555	368	0	0	0	279	0	329
21	483	0	570	533	511	368	108	0	0	285	34	303
22	352	0	535	560	519	368	46	0	0	0	102	286
23	352	0	540	551	473	241	182	0	0	0	121	286
24	352	0	562	500	418	325	200	0	0	31	121	289
25	351	0	571	555	430	299	174	0	0	0	137	288
26	322	0	554	568	467	184	180	0	0	0	149	239
27	0	0	588	530	467	369	294	0	0	0	171	211
28	0	184	588	558	466	369	185	0	0	49	171	136
29	0	219	569	543		369	387	0	0	135	168	108
30	0	136	591	529		369	479	0	87	141	172	34
31	0		564	559		369		0		158	172	
Min	0	0	81	471	418	184	0	0	0	0	0	34
Max	483	219	616	621	578	496	479	371	87	351	292	518
Mean	229	18	439	541	521	405	205	25	3	185	74	236
ac-ft	14080	1067	26956	33232	28890	24845	12163	1562	172	11377	4534	14034



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Shadow Mountain/Grand Lake, CO

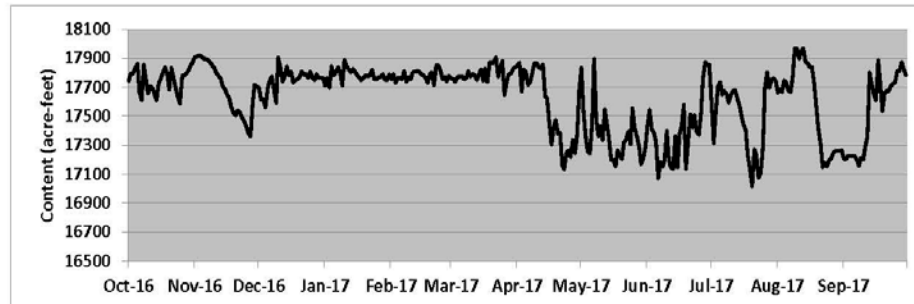
Location. --Lat 40°12'26", long 105°50'28", Grand County, Hydrologic Unit 14010001, on the Colorado River at the Shadow Mountain outlet works structure, 10 miles northeast of Granby, Colorado.

Gage.--Water-stage recorder with satellite telemetry. Elevation of gage is 8375 feet 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-2016 to 30-Sep-2017. 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	17748	17910	17695	17712	17754	17761	17848	17835	17436	17598	17664	17206
2	17798	17915	17616	17767	17791	17756	17871	17532	17544	17317	17684	17206
3	17795	17924	17621	17699	17730	17738	17674	17367	17409	17546	17671	17225
4	17835	17915	17561	17846	17767	17774	17826	17256	17384	17706	17750	17225
5	17863	17897	17690	17786	17767	17774	17808	17243	17323	17735	17731	17225
6	17666	17897	17745	17804	17754	17779	17716	17451	17072	17651	17676	17225
7	17614	17892	17776	17841	17814	17756	17738	17897	17185	17674	17671	17201
8	17855	17873	17684	17804	17741	17764	17798	17474	17152	17656	17773	17159
9	17763	17855	17596	17714	17772	17811	17866	17364	17194	17596	17971	17214
10	17658	17837	17905	17890	17754	17774	17866	17432	17399	17646	17971	17201
11	17708	17800	17840	17846	17804	17793	17843	17340	17195	17674	17897	17288
12	17695	17782	17741	17827	17809	17788	17830	17548	17147	17679	17952	17362
13	17658	17763	17772	17804	17814	17751	17858	17439	17137	17627	17971	17803
14	17611	17708	17846	17827	17809	17788	17637	17345	17364	17577	17879	17726
15	17729	17690	17786	17809	17791	17824	17624	17198	17148	17504	17865	17656
16	17758	17653	17809	17786	17786	17746	17454	17198	17373	17443	17842	17611
17	17803	17626	17736	17767	17767	17830	17306	17153	17440	17401	17842	17887
18	17840	17566	17749	17749	17730	17738	17422	17267	17579	17231	17731	17740
19	17785	17524	17754	17767	17791	17871	17477	17235	17140	17136	17571	17537
20	17685	17506	17772	17786	17804	17871	17380	17206	17313	17017	17419	17656
21	17835	17542	17809	17772	17717	17871	17385	17322	17514	17272	17322	17674
22	17761	17529	17791	17791	17851	17908	17162	17340	17424	17235	17148	17674
23	17688	17492	17791	17822	17851	17774	17136	17395	17506	17075	17180	17711
24	17632	17469	17767	17754	17819	17835	17246	17309	17395	17111	17156	17724
25	17587	17432	17809	17754	17756	17882	17265	17555	17372	17290	17193	17735
26	17782	17382	17767	17772	17774	17651	17218	17416	17519	17695	17211	17813
27	17782	17364	17749	17772	17743	17743	17338	17361	17763	17805	17243	17813
28	17800	17598	17791	17791	17779	17793	17247	17295	17873	17695	17262	17873
29	17818	17721	17767	17754		17798	17378	17172	17855	17745	17262	17829
30	17855	17703	17767	17749		17830	17674	17208	17855	17763	17262	17787
31	17873		17767	17791		17843		17292		17745	17267	
Min	17587	17364	17561	17699	17717	17651	17136	17153	17072	17017	17148	17159
Max	17873	17924	17905	17890	17851	17908	17871	17897	17873	17805	17971	17887
Mean	17751	17692	17751	17786	17780	17794	17563	17369	17400	17511	17582	17533
EOM	17873	17703	17767	17791	17779	17843	17674	17292	17855	17745	17267	17787



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

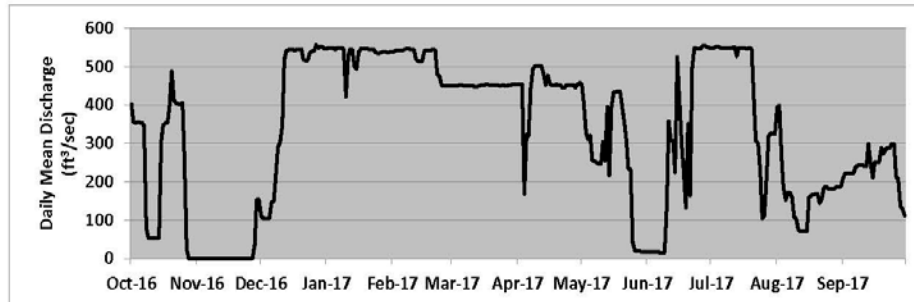
Location. --Lat 40°19'40", long 105°34'39", Larimer County, Hydrologic Unit 10190006, 4.5 miles southwest of Estes Park, Colorado.

Gage.-- Water-stage recorder with satellite telemetry at 15 foot Parshall flume. Elevation of gage is 8250 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-2016 to 30-Sep-2017. 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	403	0	112	547	538	450	455	454	17	549	393	210
2	356	0	104	549	540	451	455	405	17	549	399	223
3	353	0	105	548	543	451	454	328	17	551	265	223
4	356	0	104	548	543	451	169	310	18	554	186	223
5	354	0	104	544	544	452	324	322	18	550	152	223
6	354	0	146	549	544	451	319	256	18	550	172	223
7	346	0	150	549	546	450	444	253	15	548	173	239
8	79	0	212	549	546	449	494	250	15	549	160	242
9	54	0	291	544	545	450	502	247	16	549	107	243
10	54	0	303	422	545	450	502	247	135	549	103	243
11	55	0	347	526	545	449	502	304	359	550	75	240
12	55	0	518	546	519	449	502	254	307	550	71	240
13	55	0	542	544	515	448	482	396	307	527	71	299
14	55	0	544	500	515	450	452	216	225	549	71	248
15	304	0	546	494	515	452	478	395	526	548	71	212
16	349	0	544	537	541	451	455	433	411	549	159	251
17	352	0	542	546	544	455	451	434	295	547	165	252
18	355	0	545	547	543	453	451	436	228	547	167	251
19	397	0	544	547	543	453	453	436	133	549	168	289
20	489	0	545	546	545	452	452	398	351	546	170	273
21	413	0	519	545	543	452	452	359	164	415	144	284
22	405	0	517	546	480	452	446	308	497	307	154	289
23	403	0	518	545	476	451	447	234	549	300	185	288
24	401	0	535	537	451	450	452	232	547	229	188	300
25	406	0	540	534	450	452	453	43	547	104	183	299
26	262	0	540	535	451	450	451	20	547	113	183	214
27	25	0	557	537	450	450	452	21	555	213	183	207
28	0	34	548	538	451	452	446	20	555	318	184	135
29	0	154	554	537		453	453	18	551	327	187	131
30	0	155	552	537		454	458	18	549	325	187	112
31	0		546	538		454		18		325	187	
Min	0	0	104	422	450	448	169	18	15	104	71	112
Max	489	155	557	549	546	455	502	454	555	554	399	300
Mean	242	12	412	536	518	451	444	260	283	450	170	237
ac-ft	14851	697	24250	31886	28779	26838	26393	15957	16839	26996	10070	14091



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Marys Lake, CO

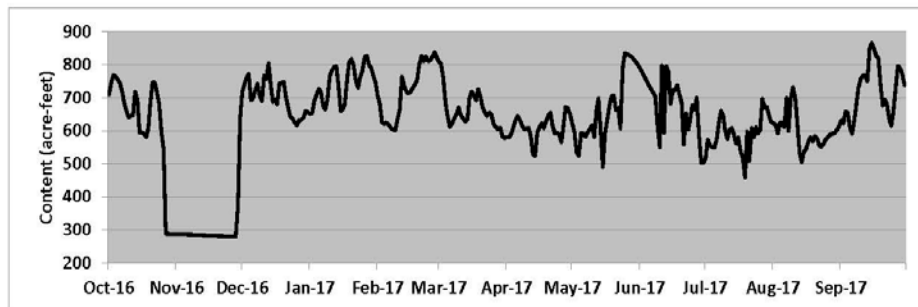
Location. --Lat 40°22'40", long 105°31'50", Larimer County, Hydrologic Unit 10190006, 2 miles southwest of Estes Park, Colorado.

Gage.-- Water-level recorder with satellite telemetry. Elevation of gage is 8060 feet 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-2016 to 30-Sep-2017. Record is complete and reliable. The gage does not record water surface levels below elevation 8,022.62 feet, content of 322 AF. 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	710	287	721	652	707	810	581	623	789	516	622	632
2	745	287	741	653	680	804	580	597	778	574	619	622
3	768	287	761	690	626	759	589	535	764	556	592	658
4	765	287	773	710	620	687	610	524	751	551	624	656
5	755	286	692	728	625	642	632	592	738	550	624	609
6	746	286	700	718	619	612	646	592	727	572	611	591
7	723	286	723	675	608	622	634	583	715	621	700	628
8	684	286	742	665	603	638	616	595	704	662	599	679
9	662	285	704	698	603	651	604	606	610	647	698	732
10	641	285	690	766	635	671	608	617	551	601	733	758
11	645	285	767	782	663	647	609	582	798	575	702	767
12	647	284	757	794	764	639	582	660	595	603	624	767
13	720	284	805	796	738	628	531	699	797	608	535	750
14	695	283	739	736	721	636	523	604	778	588	505	848
15	595	283	687	660	713	699	593	491	682	561	538	866
16	596	283	696	665	718	720	611	592	723	580	545	849
17	591	282	680	682	731	706	622	633	723	538	569	827
18	582	282	742	756	740	692	608	675	739	520	580	820
19	608	282	746	811	753	727	628	706	712	459	568	739
20	685	281	749	817	802	702	647	707	684	597	584	676
21	746	281	703	797	827	671	655	662	559	510	578	696
22	746	281	671	750	812	655	614	670	653	608	555	681
23	717	281	643	731	826	645	592	608	604	581	553	639
24	682	280	639	763	812	656	594	790	639	611	560	615
25	599	280	625	785	814	649	589	834	677	592	576	661
26	546	280	617	824	825	621	565	832	665	603	581	733
27	289	280	632	829	838	611	621	830	700	697	590	798
28	288	280	633	800	823	604	673	826	589	670	591	789
29	288	375	641	790		610	668	818	502	673	592	771
30	287	639	661	768		584	651	810	504	647	603	739
31	287		656	747		579		801		627	611	
Min	287	280	617	652	603	579	523	491	502	459	505	591
Max	768	639	805	829	838	810	673	834	798	697	733	866
Mean	614	298	701	743	723	664	609	667	682	590	599	720
EOM	287	639	656	747	823	579	651	801	504	627	611	739



Appendix A (17 of 38)

Big Thompson River above Lake Estes, CO

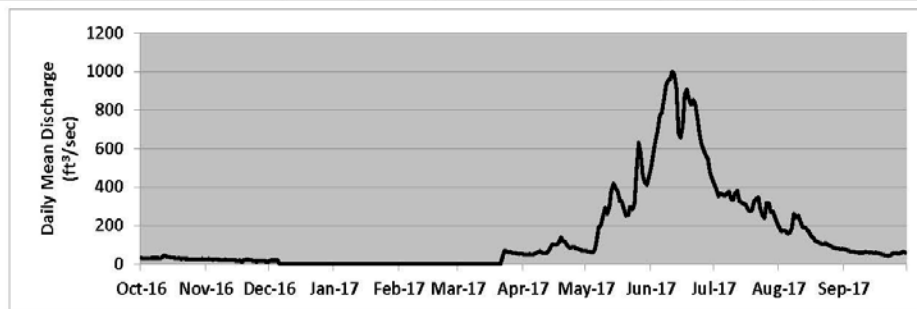
Location. --Lat 40°22'42", long 105°30'48", Larimer County, Hydrologic Unit 10190006, 600 feet downstream from bridge on state highways 7 and 36 in Estes Park, Colorado, downstream from Black Canyon Creek, and 0.3 miles northwest of Estes Powerplant.

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-2016 until 06-Dec-2016, before it was winterized. The station was put back into service from 22-Mar-2017 to 30-Sep-2017. 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	32	25	16	0	0	0	52	69	503	415	190	77
2	30	27	19	0	0	0	49	65	577	391	171	73
3	30	26	19	0	0	0	50	64	639	354	176	70
4	29	24	19	0	0	0	52	62	687	368	171	67
5	29	25	20	0	0	0	48	74	773	360	160	66
6	32	25	0	0	0	0	52	122	785	354	165	64
7	31	24	0	0	0	0	58	195	853	367	189	62
8	32	23	0	0	0	0	63	201	924	377	263	60
9	32	23	0	0	0	0	70	249	957	340	243	60
10	31	23	0	0	0	0	60	294	960	334	254	60
11	34	22	0	0	0	0	58	262	1000	369	225	64
12	47	21	0	0	0	0	57	295	982	380	193	63
13	40	21	0	0	0	0	67	381	917	329	189	60
14	37	20	0	0	0	0	90	419	678	323	183	61
15	34	20	0	0	0	0	104	396	658	314	169	59
16	33	19	0	0	0	0	102	379	718	310	151	60
17	31	19	0	0	0	0	105	327	882	286	139	58
18	31	14	0	0	0	0	112	325	909	277	125	54
19	31	22	0	0	0	0	141	285	854	280	117	50
20	28	24	0	0	0	0	120	253	829	328	112	48
21	29	23	0	0	0	0	115	256	852	337	109	46
22	28	23	0	0	0	29	98	300	834	347	105	44
23	28	18	0	0	0	70	87	284	761	287	110	47
24	27	17	0	0	0	68	88	316	673	256	103	54
25	26	14	0	0	0	62	92	484	621	240	97	58
26	27	19	0	0	0	63	83	631	591	321	91	56
27	25	19	0	0	0	58	79	577	565	317	87	54
28	26	18	0	0	0	58	74	457	545	269	84	58
29	26	16	0	0		54	70	423	478	273	82	65
30	28	11	0	0		52	69	413	445	244	79	60
31	26		0	0		56		464		212	80	
Min	25	11	0	0	0	0	48	62	445	212	79	44
Max	47	27	20	0	0	70	141	631	1000	415	263	77
Mean	31	21	3	0	0	18	79	301	748	321	149	59
ac-ft	1887	1245	184	0	0	1134	4689	18489	44529	19753	9143	3531



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. Inflow is computed based on change-in-storage, flow through the Adams Tunnel and outflow. Records are complete and reliable, except for a few some questionable values during October, November and December 2016, during periods when the reservoir was drained and filled. 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	49	29	13	27	35	31	63	82	514	429	192	80
2	40	31	25	31	30	30	58	76	566	393	179	76
3	38	30	24	27	34	31	58	74	646	359	174	72
4	33	27	15	29	32	38	62	73	679	365	181	69
5	35	27	14	34	27	35	51	72	771	363	161	66
6	35	27	0	32	32	36	71	107	803	356	172	64
7	39	26	0	30	31	25	68	180	848	352	230	59
8	33	25	18	31	33	30	73	219	883	389	233	56
9	34	24	26	35	34	31	77	233	937	355	235	56
10	32	26	27	45	36	34	70	283	933	339	240	59
11	33	24	29	31	56	39	70	284	1001	354	229	64
12	46	23	29	37	52	43	72	287	988	375	203	63
13	43	23	29	39	47	35	75	343	981	339	192	61
14	30	22	31	36	38	35	86	403	740	315	189	64
15	22	21	35	38	34	32	104	392	639	316	173	54
16	38	20	30	34	39	39	110	379	653	317	153	52
17	35	20	39	34	40	46	111	351	777	297	142	53
18	41	17	29	30	39	56	118	347	886	271	125	49
19	36	18	43	32	39	59	138	321	847	266	112	45
20	31	28	33	33	36	66	144	278	803	316	105	43
21	0	26	32	33	34	71	135	275	813	322	104	37
22	0	25	30	35	37	74	117	306	812	343	96	38
23	34	21	32	32	38	78	97	329	779	296	97	35
24	30	19	29	38	35	79	92	315	701	256	97	55
25	33	11	34	25	32	72	97	449	606	238	95	60
26	20	17	28	30	32	72	95	661	560	267	93	54
27	58	20	22	29	33	73	91	676	532	313	87	48
28	41	12	23	31	36	74	84	569	515	263	85	60
29	-1	-78	26	34		65	80	491	477	250	81	68
30	12	-8	24	28		63	75	471	456	259	80	65
31	21		27	26		65		488		220	78	
Min	-1	-78	0	25	27	25	51	72	456	220	78	35
Max	58	31	43	45	56	79	144	676	1001	429	240	80
Mean	31	18	26	32	36	50	88	317	738	319	149	57
ac-ft	1921	1096	1579	1994	2023	3081	5235	19433	43847	19584	9137	3415



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Olympus Dam, CO

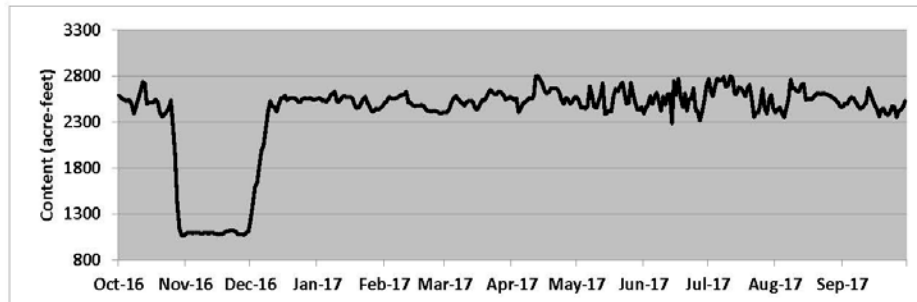
Location. --Lat 40°22'31", long 105°29'19", Larimer County, Hydrologic Unit 10190006, 1.5 miles east of Estes Park, Colorado, on the Big Thompson River.

Gage. -- Water-level recorder with satellite telemetry. Elevation of gage is 7490 feet 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-2016 to 30-Sep-2017. 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	2584	1086	1239	2556	2506	2402	2563	2571	2391	2771	2402	2467
2	2566	1097	1411	2563	2525	2403	2537	2529	2462	2643	2439	2497
3	2547	1097	1597	2534	2572	2445	2558	2450	2488	2579	2457	2492
4	2530	1093	1645	2534	2561	2514	2405	2462	2580	2691	2391	2534
5	2534	1094	1812	2522	2549	2559	2445	2445	2494	2775	2354	2571
6	2537	1095	1986	2542	2558	2580	2497	2472	2577	2750	2448	2563
7	2484	1094	2042	2596	2567	2551	2521	2689	2618	2756	2554	2524
8	2395	1091	2229	2611	2582	2522	2534	2591	2517	2787	2762	2481
9	2468	1092	2408	2628	2596	2503	2566	2468	2423	2686	2664	2443
10	2554	1094	2529	2524	2599	2480	2554	2453	2575	2699	2659	2452
11	2633	1093	2476	2524	2630	2516	2582	2516	2491	2797	2635	2480
12	2737	1093	2460	2559	2513	2530	2792	2592	2604	2785	2635	2514
13	2715	1094	2411	2582	2509	2532	2803	2721	2604	2609	2706	2667
14	2492	1093	2489	2574	2484	2514	2762	2386	2290	2606	2711	2604
15	2514	1090	2558	2569	2475	2447	2718	2400	2744	2677	2539	2532
16	2514	1078	2566	2574	2480	2437	2642	2427	2596	2669	2549	2481
17	2517	1087	2584	2566	2480	2484	2609	2411	2769	2628	2549	2437
18	2542	1084	2534	2496	2483	2537	2621	2580	2572	2579	2549	2363
19	2516	1098	2561	2450	2480	2532	2664	2660	2464	2665	2579	2439
20	2407	1112	2561	2455	2440	2566	2662	2633	2609	2705	2609	2448
21	2363	1119	2563	2494	2419	2613	2664	2689	2426	2554	2614	2392
22	2381	1123	2551	2549	2416	2652	2657	2733	2547	2357	2601	2376
23	2410	1119	2522	2575	2413	2618	2606	2625	2556	2405	2616	2408
24	2442	1110	2519	2513	2426	2608	2537	2501	2664	2402	2606	2473
25	2534	1085	2549	2468	2415	2606	2496	2504	2426	2504	2599	2460
26	2279	1081	2561	2416	2407	2631	2564	2727	2419	2660	2585	2355
27	1962	1080	2551	2413	2391	2621	2541	2613	2319	2445	2569	2419
28	1424	1072	2559	2448	2403	2596	2497	2521	2411	2392	2563	2432
29	1147	1098	2558	2437		2542	2525	2439	2532	2544	2537	2465
30	1066	1109	2539	2448		2559	2569	2432	2694	2592	2509	2529
31	1059		2546	2472		2572		2459		2448	2467	
Min	1059	1072	1239	2413	2391	2402	2405	2386	2290	2357	2354	2355
Max	2737	1123	2584	2628	2630	2652	2803	2733	2769	2797	2762	2667
Mean	2318	1095	2326	2522	2496	2538	2590	2539	2529	2618	2563	2477
EOM	1059	1109	2546	2472	2403	2572	2569	2459	2694	2448	2467	2529



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Big Thompson River below Olympus Dam, CO

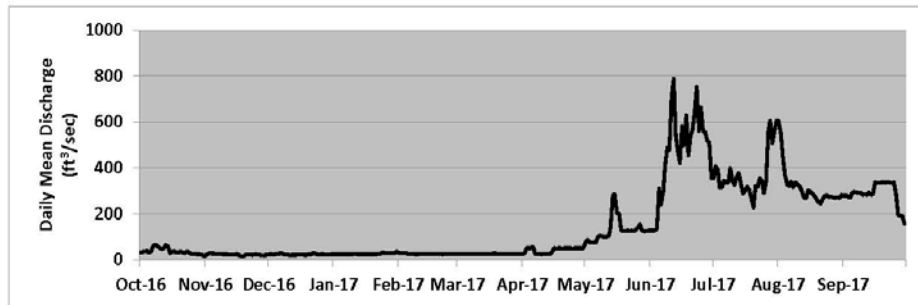
Location. --Lat 40°22'35", long 105°29'06", Larimer County, Hydrologic Unit 10190006, 620 feet downstream from Olympus Dam and 100 feet upstream of Dry Gulch, 2.0 miles east in Estes Park.

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-2016 to 30-Sep-2017. 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	33	18	24	24	31	26	26	75	128	356	605	275
2	34	26	26	24	29	26	30	87	128	408	553	284
3	36	29	23	24	30	25	51	76	128	390	447	275
4	39	28	24	24	30	26	51	77	135	314	372	269
5	30	27	25	24	28	26	51	75	310	315	329	291
6	37	27	26	24	25	26	56	76	241	344	322	296
7	61	26	31	24	25	26	25	103	298	335	340	294
8	67	26	26	24	26	26	26	104	414	337	316	291
9	60	25	22	24	25	25	26	102	489	399	336	291
10	53	25	23	24	24	25	25	101	478	346	327	283
11	48	25	20	27	25	25	26	102	712	326	320	283
12	49	24	21	25	25	26	27	103	788	360	300	283
13	65	22	21	24	26	26	27	142	543	379	272	292
14	58	23	21	24	26	26	26	282	472	332	266	281
15	30	23	21	24	26	26	33	284	421	288	303	288
16	35	25	22	24	26	26	51	201	582	300	298	336
17	38	18	22	24	26	27	51	199	500	319	286	335
18	33	17	21	25	26	27	51	129	631	305	279	335
19	32	17	21	25	26	27	51	127	454	270	265	336
20	37	20	24	25	25	26	50	127	535	227	250	337
21	33	23	23	25	25	26	51	128	569	320	245	334
22	29	23	27	25	25	26	51	128	641	316	265	338
23	37	21	28	25	25	26	51	128	753	354	277	335
24	33	22	25	31	25	26	51	125	561	345	281	336
25	27	24	24	30	26	26	50	133	666	291	273	336
26	26	21	24	30	26	26	52	140	558	339	275	278
27	25	21	24	30	26	26	51	155	557	557	271	196
28	24	20	23	30	26	26	51	127	517	604	268	190
29	24	18	24	30		26	51	125	513	507	272	191
30	23	23	24	30		26	52	127	356	559	267	156
31	17		24	35		26		128		607	283	
Min	17	17	20	24	24	25	25	75	128	227	245	156
Max	67	29	31	35	31	27	56	284	788	607	605	338
Mean	38	23	24	26	26	26	42	130	469	369	315	288
ac-ft	2325	1360	1450	1605	1448	1598	2516	7955	27869	22667	19325	17124



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

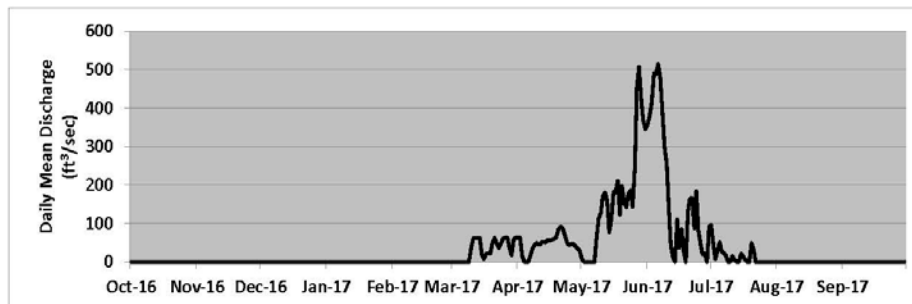
Location. --Lat 40°22'24", long 105°29'00", Larimer County, Hydrologic Unit 10190006, southeast of Estes Park, Colorado.

Gage. -- Water-stage recorder and satellite telemetry. Elevation of gage is 7460 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-2016 through 30-Sep-2017. 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	63	9	358	97	0	0
2	0	0	0	0	0	0	63	0	379	43	0	0
3	0	0	0	0	0	0	17	0	414	7	0	0
4	0	0	0	0	0	0	0	0	492	29	0	0
5	0	0	0	0	0	0	0	0	488	51	0	0
6	0	0	0	0	0	0	0	0	515	27	0	0
7	0	0	0	0	0	0	19	0	479	23	0	0
8	0	0	0	0	0	0	37	59	395	15	0	0
9	0	0	0	0	0	0	46	113	302	0	0	0
10	0	0	0	0	0	37	50	128	257	0	0	0
11	0	0	0	0	0	61	44	171	149	15	0	0
12	0	0	0	0	0	62	51	181	41	4	0	0
13	0	0	0	0	0	62	52	159	12	0	0	0
14	0	0	0	0	0	62	50	78	0	0	0	0
15	0	0	0	0	0	18	58	111	110	21	0	0
16	0	0	0	0	0	7	56	182	38	16	0	0
17	0	0	0	0	0	21	58	181	85	5	0	0
18	0	0	0	0	0	22	60	211	30	0	0	0
19	0	0	0	0	0	21	63	123	0	0	0	0
20	0	0	0	0	0	49	85	198	131	50	0	0
21	0	0	0	0	0	63	92	156	165	30	0	0
22	0	0	0	0	0	49	90	143	168	0	0	0
23	0	0	0	0	0	37	73	176	89	0	0	0
24	0	0	0	0	0	49	51	187	185	0	0	0
25	0	0	0	0	0	61	44	144	80	0	0	0
26	0	0	0	0	0	63	47	245	46	0	0	0
27	0	0	0	0	0	63	48	452	19	0	0	0
28	0	0	0	0	0	39	43	507	23	0	0	0
29	0	0	0	0		17	36	422	0	0	0	0
30	0	0	0	0		60	30	370	91	0	0	0
31	0		0	0		63		346		0	0	
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	0	0	0	0	63	92	507	515	97	0	0
Mean	0	0	0	0	0	32	47	163	185	14	0	0
ac-ft	0	0	0	0	0	1951	2819	10001	10966	856	0	0



Appendix A (22 of 38)
Olympus Tunnel, CO

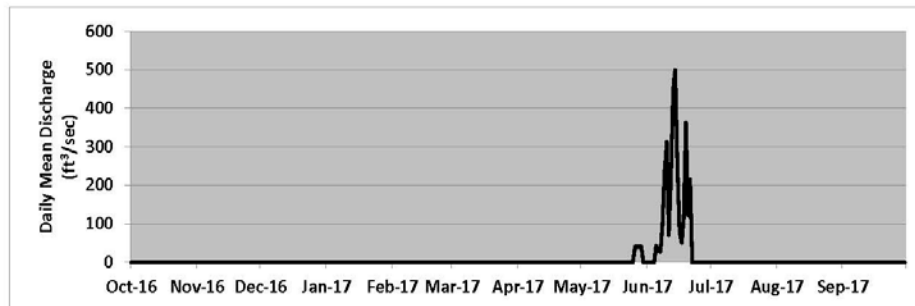
Location. --Lat 40°22'24", long 105°29'00", Larimer County, Hydrologic Unit 10190006, southeast of Estes Park, Colorado.

Gage. -- Water-stage recorder and satellite telemetry. Elevation of gage is 7460 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-2016 through 30-Sep-2017. 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	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	42	0	0	0
6	0	0	0	0	0	0	0	0	29	0	0	0
7	0	0	0	0	0	0	0	0	28	0	0	0
8	0	0	0	0	0	0	0	0	98	0	0	0
9	0	0	0	0	0	0	0	0	238	0	0	0
10	0	0	0	0	0	0	0	0	313	0	0	0
11	0	0	0	0	0	0	0	0	71	0	0	0
12	0	0	0	0	0	0	0	0	228	0	0	0
13	0	0	0	0	0	0	0	0	450	0	0	0
14	0	0	0	0	0	0	0	0	500	0	0	0
15	0	0	0	0	0	0	0	0	252	0	0	0
16	0	0	0	0	0	0	0	0	79	0	0	0
17	0	0	0	0	0	0	0	0	50	0	0	0
18	0	0	0	0	0	0	0	0	116	0	0	0
19	0	0	0	0	0	0	0	0	363	0	0	0
20	0	0	0	0	0	0	0	0	122	0	0	0
21	0	0	0	0	0	0	0	0	215	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	40	0	0	0	0
27	0	0	0	0	0	0	0	40	0	0	0	0
28	0	0	0	0	0	0	0	40	0	0	0	0
29	0	0	0	0		0	0	40	0	0	0	0
30	0	0	0	0		0	0	0	0	0	0	0
31	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	40	500	0	0	0
Mean	0	0	0	0	0	0	0	5	106	0	0	0
ac-ft	0	0	0	0	0	0	0	317	6324	0	0	0

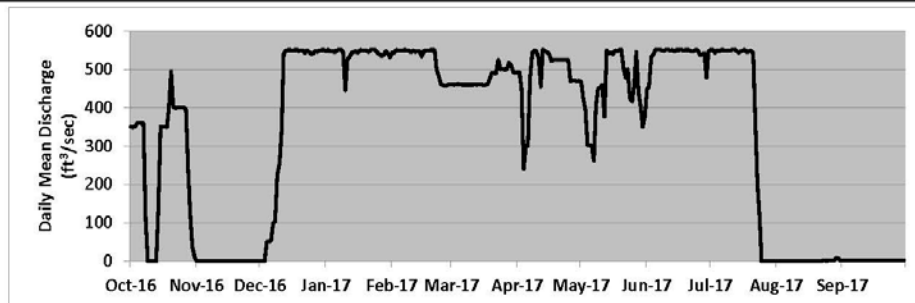


Appendix A (23 of 38)
Olympus Tunnel, CO

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 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-2016 to 30-Sep-2017. 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	350	0	0	548	544	462	492	468	449	552	0	2
2	350	0	0	551	544	461	493	426	455	551	0	2
3	350	0	0	548	551	461	451	396	533	544	0	2
4	360	0	50	548	550	462	240	303	539	550	0	2
5	361	0	52	546	549	461	301	302	551	548	0	3
6	360	0	52	550	549	460	301	301	552	551	0	3
7	360	0	98	551	552	461	479	262	551	551	0	2
8	108	0	103	552	550	460	544	405	550	550	0	2
9	0	0	224	545	549	460	549	451	549	550	0	2
10	0	0	254	446	546	460	548	454	552	550	0	2
11	0	0	344	527	550	460	530	460	551	551	0	2
12	0	0	540	533	546	461	455	377	550	552	0	2
13	0	0	550	543	549	460	552	550	551	550	0	3
14	140	0	551	546	547	462	548	542	547	544	0	3
15	351	0	551	547	535	461	545	545	552	548	0	3
16	351	0	550	544	548	459	541	540	550	549	0	3
17	351	0	550	551	550	461	523	550	552	551	0	3
18	350	0	552	550	549	462	525	548	550	545	0	3
19	398	0	548	550	551	476	526	551	551	548	0	3
20	496	0	550	549	551	492	526	551	551	549	0	3
21	402	0	550	546	551	491	525	503	551	541	0	3
22	400	0	544	551	501	491	525	478	547	374	0	3
23	401	0	550	551	482	526	526	501	549	206	2	3
24	401	0	545	552	461	501	526	425	552	114	2	3
25	401	0	541	545	460	502	524	416	550	0	2	3
26	400	0	542	540	456	500	470	463	537	0	2	3
27	394	0	548	536	460	501	471	546	540	0	2	3
28	234	0	547	537	461	518	472	442	543	0	2	3
29	124	0	550	547		512	470	403	479	0	9	3
30	37	0	551	542		494	471	350	547	0	8	3
31	11		551	532		492		376		0	2	
Min	0	0	0	446	456	459	240	262	449	0	0	2
Max	496	0	552	552	552	526	552	551	552	552	9	3
Mean	266	0	392	542	528	477	488	448	539	394	1	3
ac-ft	16318	3	24034	33275	29285	29285	29004	27490	32034	24191	63	156



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

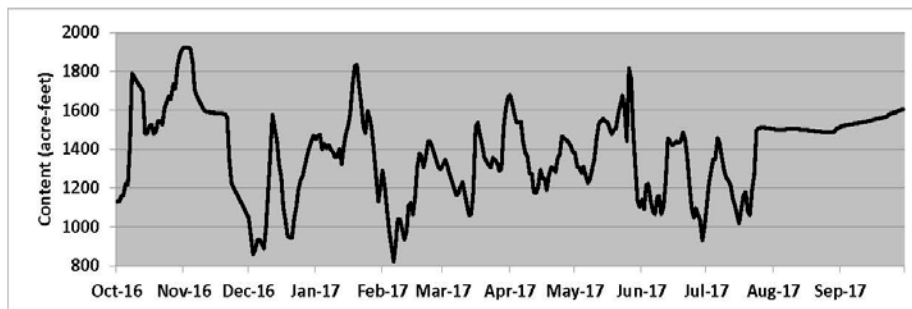
Location. --Lat 40°22', long 105°17.9', Larimer County, Hydrologic Unit 10190006, 10 miles southwest of Loveland, Colorado.

Gage. -- Water-level recorder with satellite telemetry. Elevation of gage is 6,600 feet 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-2016 to 30-Sep-2017. 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	1131	1922	1047	1451	1290	1321	1678	1381	1139	1111	1502	1515
2	1133	1923	951	1467	1206	1345	1635	1312	1093	1216	1501	1521
3	1155	1922	860	1475	1090	1310	1581	1303	1213	1286	1500	1522
4	1163	1914	886	1398	980	1272	1535	1279	1220	1347	1500	1524
5	1223	1847	931	1428	905	1235	1535	1311	1139	1350	1500	1525
6	1217	1706	937	1405	823	1200	1542	1265	1081	1457	1499	1528
7	1432	1671	916	1421	904	1164	1442	1228	1065	1428	1503	1530
8	1790	1650	888	1396	1040	1169	1382	1247	1151	1359	1502	1532
9	1771	1628	999	1385	1040	1206	1361	1300	1160	1296	1504	1534
10	1752	1607	1197	1356	988	1230	1275	1353	1066	1254	1504	1536
11	1734	1594	1371	1362	936	1171	1273	1446	1102	1238	1502	1538
12	1716	1591	1576	1402	975	1112	1179	1527	1232	1217	1502	1540
13	1697	1590	1509	1323	1108	1061	1172	1546	1456	1148	1502	1542
14	1481	1587	1449	1418	1122	1065	1209	1556	1438	1114	1501	1545
15	1480	1586	1318	1479	1064	1182	1293	1543	1421	1067	1500	1548
16	1517	1584	1258	1518	1152	1512	1252	1539	1428	1019	1499	1551
17	1526	1584	1102	1583	1312	1535	1245	1510	1440	1090	1498	1554
18	1479	1584	1034	1726	1376	1472	1189	1478	1432	1163	1497	1556
19	1492	1582	954	1826	1362	1425	1270	1498	1445	1177	1495	1558
20	1545	1580	947	1833	1306	1359	1305	1507	1484	1082	1494	1560
21	1543	1563	945	1736	1363	1340	1303	1581	1453	1062	1491	1563
22	1525	1339	1045	1641	1438	1316	1282	1628	1359	1189	1491	1566
23	1611	1225	1098	1521	1439	1306	1357	1676	1219	1271	1489	1574
24	1644	1201	1193	1481	1405	1356	1373	1608	1099	1498	1487	1582
25	1673	1180	1238	1597	1372	1342	1466	1444	1047	1509	1487	1585
26	1659	1158	1265	1557	1337	1330	1457	1816	1096	1510	1487	1588
27	1733	1136	1317	1499	1303	1288	1445	1759	1064	1511	1488	1591
28	1713	1114	1369	1383	1299	1300	1434	1500	1030	1509	1488	1598
29	1831	1091	1405	1253		1515	1421	1310	931	1508	1490	1602
30	1884	1068	1443	1132		1612	1386	1133	1006	1506	1504	1604
31	1913		1469	1213		1666		1102		1505	1509	
Min	1131	1068	860	1132	823	1061	1172	1102	931	1019	1487	1515
Max	1913	1923	1576	1833	1439	1666	1678	1816	1484	1511	1509	1604
Mean	1554	1524	1159	1473	1176	1313	1376	1441	1217	1290	1497	1554
EOM	1913	1068	1469	1213	1299	1666	1386	1102	1006	1505	1509	1604



Appendix A (25 of 38)
Flatiron Reservoir, CO

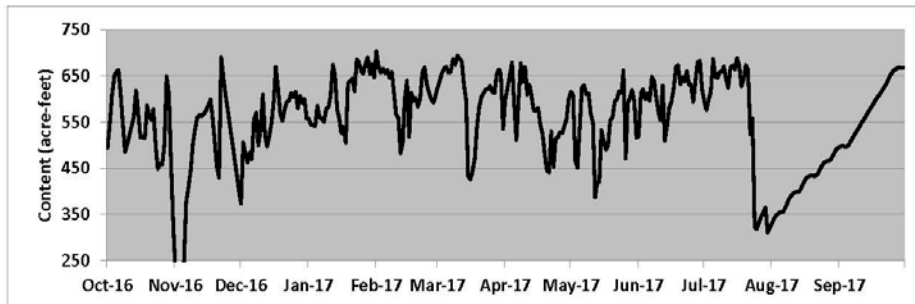
Location. --Lat 40°22.1', long 105°13.3', Larimer County, Hydrologic Unit 10190006, 8 miles southwest of Loveland, Colorado.

Gage. -- Water-level recorder with satellite telemetry. Elevation of gage is 5,600 feet 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-2016 to 30-Sep-2017. 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	495	229	374	559	703	625	599	616	520	595	332	497
2	549	189	506	546	671	640	625	609	612	576	342	498
3	608	148	484	544	657	656	651	468	621	600	349	497
4	649	148	463	542	666	666	679	451	600	615	353	496
5	658	247	484	586	656	670	593	537	612	687	355	501
6	663	378	470	561	663	657	512	625	596	650	355	509
7	613	408	557	557	646	658	596	631	649	645	364	516
8	547	444	570	551	658	687	678	610	639	658	375	525
9	486	502	500	578	613	674	637	612	602	658	385	532
10	502	534	535	582	567	695	669	569	572	671	392	540
11	522	561	610	608	559	688	610	549	555	644	396	549
12	542	565	521	674	484	681	631	387	629	625	399	556
13	562	564	497	652	508	632	607	418	510	668	399	564
14	619	568	522	576	599	597	576	421	544	673	405	572
15	570	575	549	557	640	434	574	532	580	664	415	580
16	517	586	599	526	519	425	580	509	595	689	424	587
17	519	600	670	540	614	444	545	491	623	672	431	595
18	514	564	624	505	597	470	524	500	668	628	433	603
19	586	511	570	636	602	539	482	555	674	642	434	609
20	565	454	553	638	584	582	445	560	632	674	434	617
21	555	430	577	645	603	604	442	594	648	663	434	623
22	578	690	594	618	657	613	530	599	638	524	439	630
23	500	645	596	686	669	621	453	617	661	559	448	641
24	449	608	613	680	633	623	514	613	631	322	457	651
25	460	575	604	661	614	629	517	662	632	319	463	658
26	457	541	616	656	600	616	529	472	594	332	466	663
27	503	507	580	678	592	614	527	589	640	344	466	666
28	650	473	607	690	605	653	541	603	680	355	470	668
29	612	438	592	654		664	557	620	683	366	479	668
30	465	403	601	676		654	599	596	622	311	488	668
31	325		558	648		536		516		322	494	
Min	325	148	374	505	484	425	442	387	510	311	332	496
Max	663	690	670	690	703	695	679	662	683	689	494	668
Mean	543	470	555	607	613	611	567	553	615	560	415	583
EOM	325	403	558	648	605	536	599	516	622	322	494	668



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

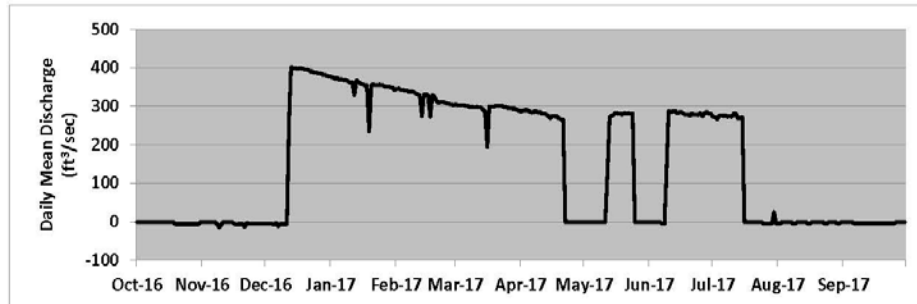
Location. --Lat 40°21'53", long 105°14'09", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado

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. 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-2016 to 30-Sep-2017. 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	0	-5	377	345	305	287	0	0	273	-4	0
2	0	0	-5	374	346	304	289	0	0	272	-4	0
3	0	0	-5	372	343	303	290	0	0	266	0	0
4	0	0	-5	373	343	303	290	0	0	276	0	0
5	0	0	-8	369	342	302	287	0	0	277	0	0
6	0	0	-2	370	341	301	284	0	0	276	0	-4
7	0	0	-12	368	337	300	285	0	-5	276	0	-4
8	0	-6	-6	368	339	297	288	0	-5	274	-4	-4
9	0	-14	-6	366	337	299	284	0	126	275	-4	-4
10	0	-7	-6	362	334	297	285	0	287	274	0	-4
11	0	0	-6	363	331	298	280	0	285	282	0	-4
12	0	0	264	329	328	297	281	127	286	280	0	-4
13	0	0	402	368	275	296	279	273	287	269	0	-4
14	0	0	399	363	330	292	276	276	283	271	0	-4
15	0	0	400	359	332	287	269	279	284	272	-4	-4
16	0	-5	397	357	327	194	276	283	286	0	-4	-4
17	0	-7	399	354	274	300	274	281	281	0	0	-4
18	0	-5	399	355	329	300	275	281	279	0	0	-4
19	-6	-6	396	235	326	299	269	279	279	0	0	-4
20	-6	-6	395	356	313	301	267	282	277	0	0	-4
21	-6	-13	395	357	308	301	266	281	281	0	0	-4
22	-6	-3	391	355	312	301	0	282	279	0	0	-4
23	-6	-5	391	355	311	301	0	281	279	0	-4	-4
24	-6	-5	388	356	309	298	0	281	278	0	-4	-4
25	-6	-5	387	356	308	298	0	0	283	-4	0	-4
26	-6	-5	386	354	306	295	0	0	274	-4	0	0
27	-6	-5	385	351	305	295	0	0	281	-4	0	0
28	-6	-5	383	351	303	294	0	0	286	-4	0	0
29	-6	-5	382	350		294	0	0	282	-4	-4	0
30	-6	-5	380	349		291	0	0	281	25	-4	0
31	0		378	343		288		0		-4	0	
Min	-6	-14	-12	235	274	194	0	0	-5	-4	-4	-4
Max	0	0	402	377	346	305	290	283	287	282	0	0
Mean	-2	-4	246	355	323	294	196	113	201	133	-1	-2
ac-ft	-137	-220	15108	21808	17888	18075	11646	6907	11949	8144	-79	-148



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

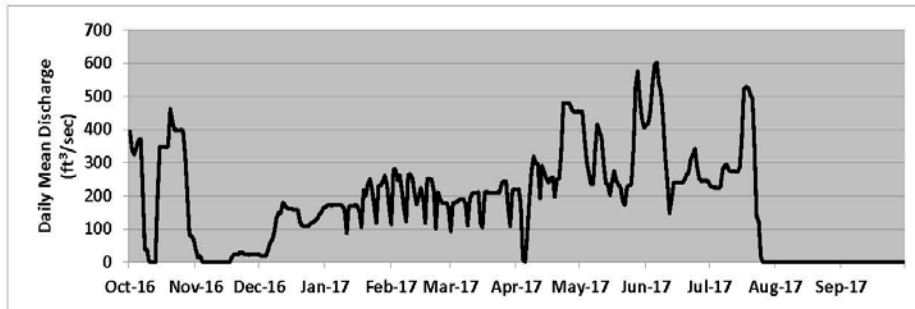
Location. --Lat 40°22'26", long 105°13'52", Larimer County, Hydrologic Unit 10190006, 8 miles southwest of Loveland, Colorado.

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-2016 to 30-Sep-2017. Data from this station has been question 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	394	38	22	168	115	93	220	454	414	232	0	0
2	337	15	20	170	279	180	220	453	417	226	0	0
3	325	19	19	172	279	181	175	371	458	225	0	0
4	346	3	19	171	247	182	8	303	542	225	0	0
5	368	0	36	172	262	189	1	270	593	224	0	0
6	372	0	58	172	218	191	76	237	602	225	0	0
7	223	0	69	172	162	191	184	234	538	279	0	0
8	39	0	91	172	124	173	273	337	516	291	0	0
9	38	0	134	170	264	112	320	416	430	294	0	0
10	3	0	149	159	266	191	299	392	315	277	0	0
11	0	0	150	87	251	205	297	379	244	274	0	0
12	0	0	180	168	209	210	193	296	149	275	0	0
13	0	0	171	170	174	210	291	238	192	274	0	0
14	198	0	162	170	200	211	270	235	239	273	0	0
15	348	0	161	172	225	117	252	202	240	285	0	0
16	347	0	161	171	193	104	240	246	241	365	0	0
17	348	0	159	153	118	211	253	275	240	522	0	0
18	346	17	159	106	251	212	256	244	240	529	0	0
19	351	24	159	218	252	210	198	233	248	527	0	0
20	462	25	122	202	250	210	250	226	265	506	0	0
21	421	24	110	235	214	210	252	184	269	494	0	0
22	399	30	110	251	102	210	323	172	312	353	0	0
23	399	28	109	216	211	211	480	225	325	138	0	0
24	398	25	108	172	190	211	479	233	342	122	0	0
25	399	24	117	118	180	236	479	234	285	18	0	0
26	397	23	120	230	179	246	479	344	252	0	0	0
27	323	24	125	231	179	244	459	527	245	0	0	0
28	196	24	130	243	163	170	455	575	247	0	0	0
29	83	24	143	262		109	453	489	247	0	0	0
30	78	24	149	231		217	455	435	246	0	0	0
31	68		163	168		220		407		0	0	
Min	0	0	19	87	102	93	1	172	149	0	0	0
Max	462	38	180	262	279	246	480	575	602	529	0	0
Mean	258	13	116	183	206	189	286	318	330	240	0	0
ac-ft	15852	777	7099	11227	11399	11611	17010	19535	19590	14754	0	0



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

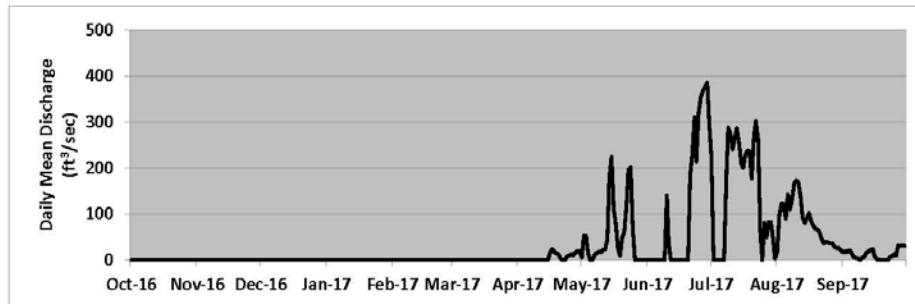
Location. --Lat 40°25'02", long 105°14'35", Larimer County, Hydrologic Unit 10190006, 11 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- Water-stage recorder with satellite telemetry at Parshall Flume. Elevation of gage is 5520 feet 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	6	0	227	18	18
2	0	0	0	0	0	0	0	53	0	0	98	18
3	0	0	0	0	0	0	0	52	0	0	123	18
4	0	0	0	0	0	0	0	13	0	0	122	22
5	0	0	0	0	0	0	0	0	0	0	90	16
6	0	0	0	0	0	0	0	0	0	0	143	7
7	0	0	0	0	0	0	0	12	0	0	110	5
8	0	0	0	0	0	0	0	15	0	177	133	4
9	0	0	0	0	0	0	0	18	0	288	167	1
10	0	0	0	0	0	0	0	17	141	275	173	5
11	0	0	0	0	0	0	0	22	35	241	168	8
12	0	0	0	0	0	0	0	23	0	265	136	17
13	0	0	0	0	0	0	0	45	0	286	92	19
14	0	0	0	0	0	0	0	179	0	256	80	22
15	0	0	0	0	0	0	0	224	0	210	93	24
16	0	0	0	0	0	0	15	112	0	200	102	8
17	0	0	0	0	0	0	24	80	0	229	84	2
18	0	0	0	0	0	0	18	26	0	238	74	2
19	0	0	0	0	0	0	15	10	0	237	68	1
20	0	0	0	0	0	0	13	48	0	177	67	0
21	0	0	0	0	0	0	4	60	182	270	59	0
22	0	0	0	0	0	0	0	118	229	302	45	0
23	0	0	0	0	0	0	0	195	311	263	36	7
24	0	0	0	0	0	0	8	202	215	64	40	9
25	0	0	0	0	0	0	10	68	321	0	38	13
26	0	0	0	0	0	0	13	0	354	81	35	11
27	0	0	0	0	0	0	11	0	368	50	36	32
28	0	0	0	0	0	0	17	0	376	83	29	30
29	0	0	0	0		0	19	0	387	83	26	34
30	0	0	0	0		0	18	0	301	46	27	31
31	0		0	0		0		0		3	21	
Min	0	0	0	0	0	0	0	0	0	0	18	0
Max	0	0	0	0	0	0	24	224	387	302	173	34
Mean	0	0	0	0	0	0	6	52	107	147	82	13
ac-ft	0	0	0	0	0	0	363	3164	6367	9009	5012	744



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

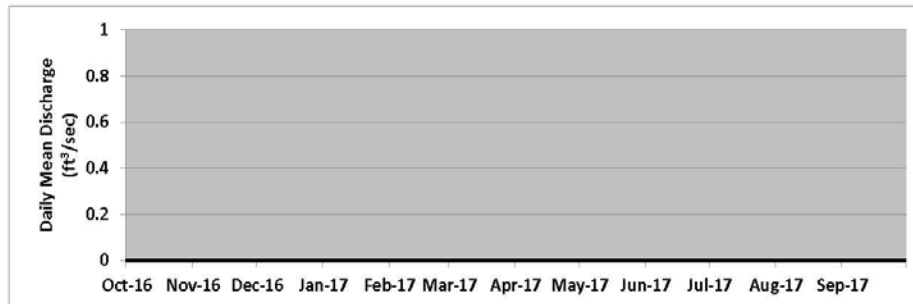
Location. --Lat 40°25'02", long 105°14'35", Larimer County, Hydrologic Unit 10190006, 11 miles west of Loveland, Colorado, on the Big Thompson River.

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 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	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	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	0	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	0	0	0
30	0	0	0	0		0	0	0	0	0	0	0
31	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	0	0	0	0
Mean	0	0	0	0	0	0	0	0	0	0	0	0
ac-ft	0	0	0	0	0	0	0	0	0	0	0	0



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

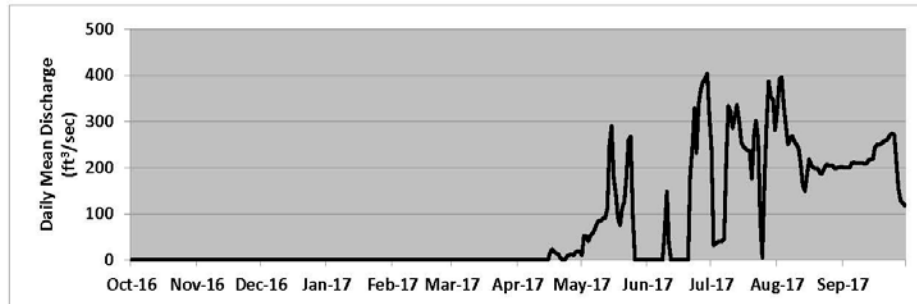
Location. --Lat 40°25'02", long 105°14'35", Larimer County, Hydrologic Unit 10190006, 11 miles west of Loveland, Colorado, on the Big Thompson River.

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	10	0	244	325	200
2	0	0	0	0	0	0	0	53	0	32	391	200
3	0	0	0	0	0	0	0	52	0	36	396	200
4	0	0	0	0	0	0	0	41	0	40	338	200
5	0	0	0	0	0	0	0	53	0	41	292	210
6	0	0	0	0	0	0	0	58	0	41	251	211
7	0	0	0	0	0	0	0	66	0	45	261	210
8	0	0	0	0	0	0	0	78	0	223	269	210
9	0	0	0	0	0	0	0	86	62	334	257	210
10	0	0	0	0	0	0	0	85	149	321	251	210
11	0	0	0	0	0	0	0	90	38	287	242	209
12	0	0	0	0	0	0	0	91	0	311	208	209
13	0	0	0	0	0	0	0	113	0	335	163	217
14	0	0	0	0	0	0	0	247	0	303	150	218
15	0	0	0	0	0	0	0	290	0	256	186	219
16	0	0	0	0	0	0	15	177	0	246	218	243
17	0	0	0	0	0	0	24	145	0	241	206	251
18	0	0	0	0	0	0	18	91	0	238	200	250
19	0	0	0	0	0	0	15	75	0	236	199	253
20	0	0	0	0	0	0	13	113	0	177	199	256
21	0	0	0	0	0	0	4	125	182	270	189	259
22	0	0	0	0	0	0	0	183	242	302	186	262
23	0	0	0	0	0	0	0	260	328	263	196	270
24	0	0	0	0	0	0	8	267	232	81	207	273
25	0	0	0	0	0	0	10	93	338	6	206	272
26	0	0	0	0	0	0	13	0	371	174	205	218
27	0	0	0	0	0	0	11	0	385	303	205	155
28	0	0	0	0	0	0	17	0	393	386	198	129
29	0	0	0	0		0	19	0	404	353	199	125
30	0	0	0	0		0	18	0	318	348	201	118
31	0		0	0		0		0		281	202	
Min	0	0	0	0	0	0	0	0	0	6	150	118
Max	0	0	0	0	0	0	24	290	404	386	396	273
Mean	0	0	0	0	0	0	6	95	115	218	232	216
ac-ft	0	0	1	0	0	0	363	5830	6817	13379	14252	12805



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

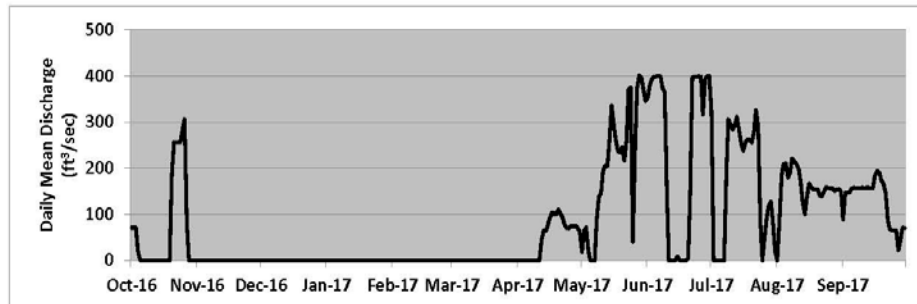
Location. --Lat 40°25'16", long 105°13'26", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- Flow meter with satellite telemetry. Elevation of gage is 5280 feet 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-2016 and 30-Sep-2017. 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	71	0	0	0	0	0	0	19	353	322	0	89
2	71	0	0	0	0	0	0	63	380	0	87	146
3	71	0	0	0	0	0	0	72	394	0	185	147
4	21	0	0	0	0	0	0	20	398	0	209	147
5	0	0	0	0	0	0	0	0	399	0	210	156
6	0	0	0	0	0	0	0	0	400	0	179	158
7	0	0	0	0	0	0	0	0	399	0	190	158
8	0	0	0	0	0	0	0	87	373	189	221	158
9	0	0	0	0	0	0	0	138	365	307	214	158
10	0	0	0	0	0	0	0	146	144	295	209	158
11	0	0	0	0	0	0	0	194	0	284	200	158
12	0	0	0	0	0	0	44	205	0	293	169	158
13	0	0	0	0	0	0	65	205	0	312	125	158
14	0	0	0	0	0	0	63	258	0	283	100	157
15	0	0	0	0	0	0	78	336	8	252	141	157
16	0	0	0	0	0	0	92	295	0	237	167	183
17	0	0	0	0	0	0	104	261	0	256	158	194
18	0	0	0	0	0	0	101	237	0	263	154	191
19	0	0	0	0	0	0	101	233	0	263	154	173
20	188	0	0	0	0	0	110	246	4	255	154	167
21	256	0	0	0	0	0	100	216	145	280	140	146
22	256	0	0	0	0	0	93	261	397	326	140	88
23	256	0	0	0	0	0	76	371	399	291	149	67
24	257	0	0	0	0	0	70	375	399	83	159	65
25	286	0	0	0	0	0	69	41	400	0	157	65
26	306	0	0	0	0	0	75	245	399	48	156	65
27	81	0	0	0	0	0	74	373	316	94	156	22
28	0	0	0	0	0	0	75	401	393	118	150	47
29	0	0	0	0		0	70	396	400	127	153	71
30	0	0	0	0		0	63	370	400	79	154	70
31	0		0	0		0		346		19	148	
Min	0	0	0	0	0	0	0	0	0	0	0	22
Max	306	0	0	0	0	0	110	401	400	326	221	194
Mean	68	0	0	0	0	0	51	207	242	170	158	129
ac-ft	4196	0	0	0	0	0	3016	12690	14389	10443	9681	7671



Appendix A (32 of 38)
CHFC Wasteway, CO

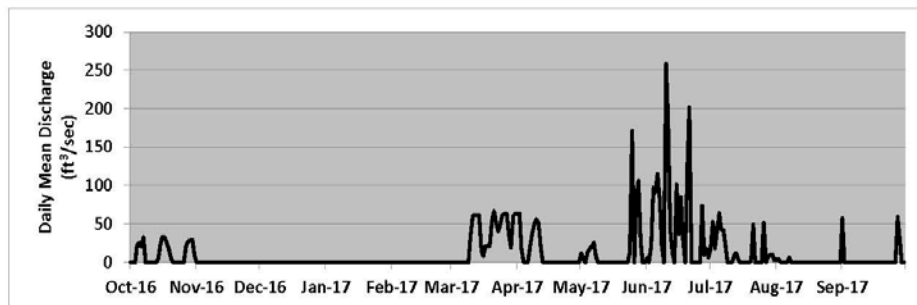
Location. --Lat 40°25'13", long 105°13'28", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado, on the Big Thompson River.

Gage. -- Water-stage recorder with satellite telemetry at 15 foot Parshall Flume. Elevation of gage is 5465 feet 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 2016 and also between March 2017 and September 2017. 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	63	12	5	19	4	57
2	0	0	0	0	0	0	63	4	0	53	4	0
3	0	0	0	0	0	0	17	0	22	18	0	0
4	22	0	0	0	0	0	0	13	97	41	0	0
5	26	0	0	0	0	0	0	17	91	64	0	0
6	21	0	0	0	0	0	0	21	116	43	0	0
7	33	0	0	0	0	0	20	26	81	42	7	0
8	0	0	0	0	0	0	38	8	23	21	0	0
9	0	0	0	0	0	0	51	0	0	0	0	0
10	0	0	0	0	0	36	56	0	258	0	0	0
11	0	0	0	0	0	61	51	0	186	0	0	0
12	0	0	0	0	0	62	19	0	42	9	0	0
13	0	0	0	0	0	62	0	0	13	12	0	0
14	5	0	0	0	0	62	0	0	0	3	0	0
15	25	0	0	0	0	16	0	0	102	0	0	0
16	34	0	0	0	0	8	0	0	38	0	0	0
17	33	0	0	0	0	21	0	0	85	0	0	0
18	25	0	0	0	0	22	0	0	30	0	0	0
19	18	0	0	0	0	21	0	0	0	0	0	0
20	5	0	0	0	0	54	0	0	127	1	0	0
21	0	0	0	0	0	67	0	0	202	50	0	0
22	0	0	0	0	0	52	0	0	0	0	0	0
23	0	0	0	0	0	40	0	0	0	0	0	0
24	0	0	0	0	0	51	0	14	0	0	0	0
25	0	0	0	0	0	61	0	171	0	0	0	0
26	0	0	0	0	0	63	0	0	0	52	0	0
27	21	0	0	0	0	63	0	79	74	0	0	59
28	28	0	0	0	0	37	0	106	10	7	0	30
29	29	0	0	0		19	0	26	18	10	0	0
30	30	0	0	0		61	0	0	6	10	0	0
31	8		0	0		63		0		3	0	
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	34	0	0	0	0	67	63	171	258	64	7	59
Mean	12	0	0	0	0	32	13	16	54	15	0	5
ac-ft	715	0	0	0	0	1982	749	987	3222	909	27	291



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

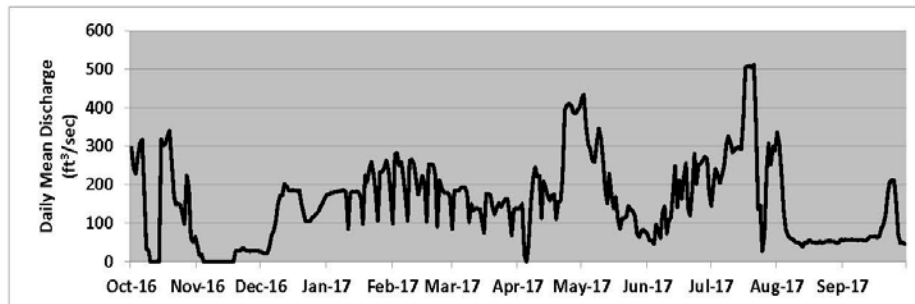
Location. --Lat40°25'25", long 105°13'34", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado.

Gage. -- Water-stage recorder with satellite telemetry. Elevation of gage is 5460 feet 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-2016 to 30-Sep-2017. 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	296	44	26	174	100	84	138	426	70	145	336	55
2	245	17	23	176	278	185	139	434	54	203	305	58
3	228	19	22	179	283	185	150	352	54	241	224	56
4	273	0	22	180	250	186	18	305	46	226	137	56
5	307	0	38	181	259	192	0	293	97	205	84	58
6	317	0	69	182	223	194	44	263	80	225	68	57
7	196	0	81	183	171	193	148	260	61	247	62	56
8	33	0	105	185	107	178	212	305	127	303	59	56
9	31	0	151	187	263	103	246	346	144	326	52	56
10	0	0	172	179	266	150	220	320	73	310	51	56
11	0	0	173	84	253	133	224	268	107	285	50	55
12	0	0	202	178	215	139	114	190	116	292	44	55
13	0	0	197	182	175	138	208	152	185	296	39	62
14	0	0	186	181	200	137	192	227	248	298	49	64
15	317	0	186	182	224	103	169	174	141	293	48	65
16	301	0	187	181	204	74	159	139	210	362	56	66
17	306	0	185	166	104	177	173	168	164	505	52	63
18	327	0	184	98	254	177	175	111	218	506	50	65
19	341	28	185	225	253	174	112	85	256	508	50	87
20	257	29	150	209	252	140	155	112	137	505	49	97
21	171	28	129	239	226	123	159	113	120	512	52	121
22	149	34	105	259	91	139	221	117	186	370	49	178
23	150	34	104	225	212	152	393	144	281	136	50	207
24	148	29	104	182	193	142	408	136	202	147	53	212
25	121	28	114	107	180	153	410	131	253	28	53	211
26	99	27	118	233	180	163	407	118	256	68	53	156
27	224	29	124	233	180	163	388	74	264	238	53	70
28	194	28	130	243	167	125	386	63	273	307	51	47
29	62	28	143	264		68	393	80	266	253	49	50
30	52	28	151	236		135	401	83	180	300	50	45
31	64		165	177		139		78		289	58	
Min	0	0	22	84	91	68	0	63	46	28	39	45
Max	341	44	202	264	283	194	410	434	281	512	336	212
Mean	168	14	127	190	206	147	219	196	162	288	79	85
ac-ft	10312	849	7787	11667	11407	8995	12989	12017	9645	17679	4827	5028



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

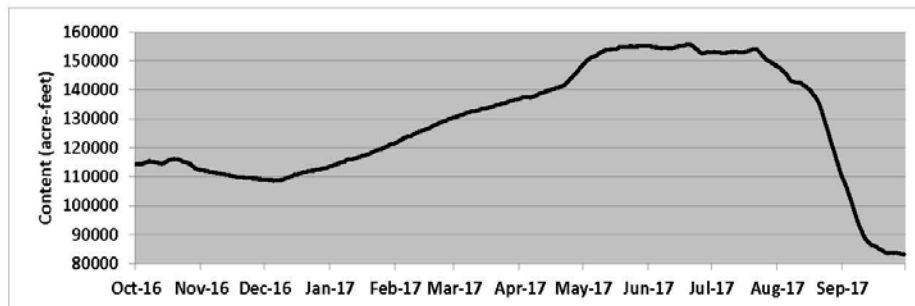
Location. —Lat 40°36'00", long 105°10'05", Larimer County, Hydrologic Unit 10190007, at Horsetooth Dam outlet works, 4.8 miles west of Fort Collins, Colorado.

Gage. — Water level recorder with satellite telemetry. Elevation of gage is 5300 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-2016 to 30-Sep-2017. 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	114386	112310	109022	113595	121690	130528	137125	148771	155128	153107	148196	109308
2	114386	112242	108988	113784	122099	130768	137314	149624	155067	153147	147703	107681
3	114420	112088	108904	114214	122617	131081	137504	150421	154946	153047	147013	105966
4	114541	111968	109005	114334	122956	131285	137541	150881	154803	152987	146323	103722
5	114818	111832	108652	114714	123368	131543	137447	151280	154763	152866	145755	101504
6	115094	111662	108770	114921	123709	131896	137371	151581	154621	152825	144562	99164
7	115423	111508	108804	115198	124085	132062	137655	151841	154500	152785	143453	96964
8	115301	111373	108787	115406	124013	132304	137921	152282	154601	152906	142989	94835
9	115215	111236	109022	115873	124391	132583	138226	152866	154702	153047	142678	92791
10	115007	111083	109241	115960	124769	132657	138663	153308	154561	153147	142542	91047
11	114887	110930	109460	116030	125274	132824	138968	153652	154520	153187	142484	89349
12	114766	110828	109662	116203	125581	132992	139179	153793	154540	153228	142465	88363
13	114541	110659	110034	116447	125708	133253	139446	153854	154662	153187	141905	87623
14	114680	110592	110303	116742	126033	133459	139695	153975	154946	153107	141346	86886
15	115146	110320	110845	116882	126396	133552	139924	154116	155027	153007	140788	86347
16	115510	110303	110659	117161	126668	133589	140154	154096	155108	153067	140174	86123
17	115839	110135	111049	117423	126868	133850	140403	154257	155270	153288	139427	85795
18	115978	109865	111287	117493	127286	134149	140653	154844	155412	153450	138530	85274
19	116151	109899	111542	117826	127779	134337	140730	154864	155636	153652	137655	84858
20	116065	109814	111781	118141	128034	134562	140922	154885	155676	153854	136368	84385
21	115926	109713	111866	118508	128417	134730	141269	154925	155616	154136	134843	83985
22	115648	109679	111986	118895	128563	134880	141654	154986	155148	154136	132676	83735
23	115353	109595	112105	119177	129040	135219	142388	155067	154561	153530	130306	83764
24	115163	109562	112157	119459	129314	135331	143202	155088	153874	152765	127870	83794
25	114921	109460	112344	119511	129608	135557	144095	154966	153248	151761	125509	83735
26	114697	109427	112600	119882	129921	135840	144817	155088	152604	150901	123206	83794
27	114179	109443	112634	120235	130067	136084	145539	155088	152704	150341	120802	83720
28	113595	109207	112771	120589	130417	136349	146323	155108	152886	149984	118421	83544
29	112892	109207	113080	121050		136424	147170	155209	153187	149525	116030	83308
30	112583	109140	113165	121369		136746	147979	155209	153127	149109	113664	83175
31	112412		113388	121387		136878		155148		148593	111253	
Min	112412	109140	108652	113595	121690	130528	137125	148771	152604	148593	111253	83175
Max	116151	112310	113388	121387	130417	136878	147979	155209	155676	154136	148196	109308
Mean	114823	110503	110771	117368	126238	133784	140709	153583	154515	152505	135708	90151
EOM	112412	109140	113388	121387	130417	136878	147979	155148	153127	148593	111253	83175



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

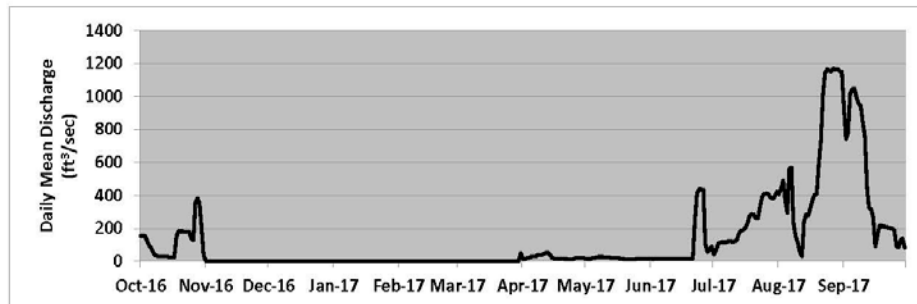
Location. --Lat 40°36'01", long 105°10'18", Larimer County, Hydrologic Unit 10190007, 4 miles west of Fort Collins, Colorado.

Gage. -- Two flow meters with satellite telemetry measure the flow for each conduits 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-2016 to 30-Sep-2017 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	155	0	0	0	0	0	14	14	16	42	408	938
2	155	0	0	0	0	0	14	13	14	66	438	741
3	155	0	0	0	0	0	21	13	15	104	491	779
4	125	0	0	0	0	0	22	20	16	115	377	1017
5	97	0	0	0	0	0	28	21	16	116	296	1046
6	79	0	0	0	0	0	29	25	16	116	560	1049
7	51	0	0	0	0	0	30	27	16	116	572	994
8	35	0	0	0	0	0	38	27	16	123	235	957
9	31	0	0	0	0	0	38	27	17	124	154	946
10	31	0	0	0	0	0	38	26	17	118	114	838
11	31	0	0	0	0	0	46	25	17	123	59	762
12	31	0	0	0	0	0	53	26	17	128	29	443
13	31	0	0	0	0	0	52	22	17	169	236	325
14	27	0	0	0	0	0	40	21	17	189	286	317
15	25	0	0	0	0	0	22	21	17	192	280	263
16	25	0	0	0	0	0	17	20	17	201	322	91
17	24	0	0	0	0	0	17	19	17	228	374	163
18	154	0	0	0	0	0	17	15	17	272	403	216
19	182	0	0	0	0	0	17	13	17	286	408	216
20	182	0	0	0	0	0	17	12	17	284	576	212
21	182	0	0	0	0	0	14	12	19	262	725	210
22	182	0	0	0	0	0	13	12	239	259	1019	206
23	181	0	0	0	0	0	13	12	413	328	1141	202
24	181	0	0	0	0	0	13	12	438	393	1165	198
25	140	0	0	0	0	0	13	14	436	409	1155	191
26	127	0	0	0	0	0	19	16	435	412	1153	94
27	354	0	0	0	0	0	22	16	106	409	1171	83
28	383	0	0	0	0	0	21	16	55	389	1164	126
29	349	0	0	0		0	20	16	74	379	1165	140
30	190	0	0	0		0	20	16	90	392	1154	84
31	36		0	0		50		16		423	1151	
Min	24	0	0	0	0	0	13	12	14	42	29	83
Max	383	0	0	0	0	50	53	27	438	423	1171	1049
Mean	127	0	0	0	0	2	25	18	88	231	606	462
ac-ft	7790	14	6	9	13	118	1464	1127	5209	14192	37188	27416



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

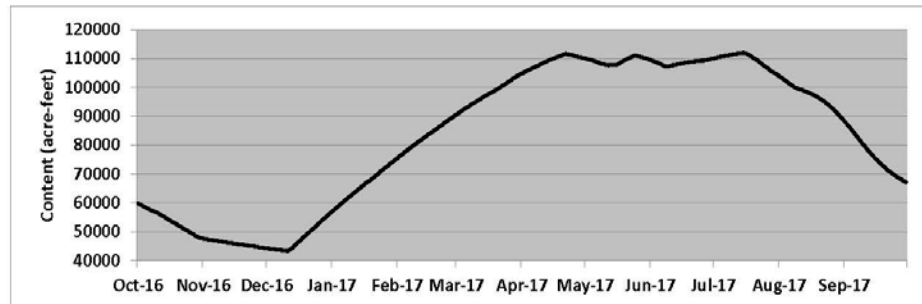
Location. --Lat 40°19' 28", long 105°12' 41", Larimer County, Hydrologic Unit 10190006, on Dam #1, 7 miles northwest of Berthoud, Colorado, and 10 miles west of Loveland, Colorado.

Gage. --Water level recorder with satellite telemetry. Elevation of gage is 5770 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-2016 to 30-Sep-2017. 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	59785	47623	44329	57084	75667	90641	104882	110108	109541	110131	103989	88282
2	59435	47505	44213	57709	76227	91205	105262	109858	109245	110324	103455	87451
3	59032	47395	44123	58364	76783	91706	105631	109677	108974	110471	102966	86581
4	58638	47285	44048	58958	77367	92229	106046	109484	108679	110642	102401	85682
5	58264	47175	43925	59619	77934	92732	106359	109245	108353	110802	101869	84745
6	57908	47057	43809	60246	78513	93149	106685	108997	108036	110927	101294	83810
7	57545	46922	43719	60802	79041	93644	107011	108748	107664	111076	100710	82869
8	57219	46830	43653	61470	79602	94128	107416	108454	107371	111235	100269	81941
9	56930	46670	43539	62058	80195	94591	107731	108195	107281	111361	99874	80994
10	56642	46552	43424	62704	80707	94991	108104	108059	107472	111509	99599	80072
11	56210	46410	43342	63324	81282	95423	108522	107856	107619	111668	99358	79204
12	55779	46309	43809	63814	81827	95954	108850	107720	107799	111748	99105	78360
13	55349	46216	44395	64420	82291	96399	109166	107776	107912	111852	98810	77499
14	54868	46142	45099	65046	82848	96921	109484	107867	108070	111909	98481	76672
15	54405	46016	45757	65636	83407	97357	109790	107844	108240	112011	98142	75857
16	53909	45874	46477	66266	83987	97651	110063	107935	108398	111943	97837	75086
17	53450	45790	47150	66870	84412	98066	110380	108262	108544	111543	97520	74407
18	53132	45657	47843	67455	84943	98514	110631	108805	108702	111110	97139	73691
19	52719	45582	48549	67822	85494	98919	110893	109189	108839	110608	96725	73056
20	52298	45474	49172	68411	86006	99347	111178	109609	108963	110142	96291	72325
21	51887	45356	49842	69021	86529	99786	111543	109938	109019	109699	95824	71696
22	51433	45240	50506	69604	87031	100313	111703	110313	109076	109200	95337	70999
23	50973	45165	51172	70207	87587	100765	111520	110654	109121	108578	94797	70519
24	50532	45024	51800	70950	88124	101217	111349	111019	109189	107980	94247	70031
25	50151	44958	52421	71528	88682	101703	111167	111098	109291	107484	93579	69448
26	49739	44867	53123	72168	89126	102146	110950	110870	109359	106887	92871	68943
27	49275	44709	53838	72730	89644	102723	110722	110711	109461	106427	92186	68469
28	48821	44626	54521	73324	90216	103211	110574	110506	109620	105787	91429	68044
29	48395	44511	55117	73919		103689	110437	110324	109790	105351	90737	67648
30	47945	44395	55797	74496		104190	110222	110086	109938	104949	89972	67244
31	47741		56417	74985		104513		109846		104469	89136	
Min	47741	44395	43342	57084	75667	90641	104882	107720	107281	104469	89136	67244
Max	59785	47623	56417	74985	90216	104513	111703	111098	109938	112011	103989	88282
Mean	53884	45978	47901	66162	83052	97672	109142	109324	108652	109672	97289	76387
EOM	47741	44395	56417	74985	90216	104513	110222	109846	109938	104469	89136	67244



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Saint Vrain Canal below Carter Reservoir, CO

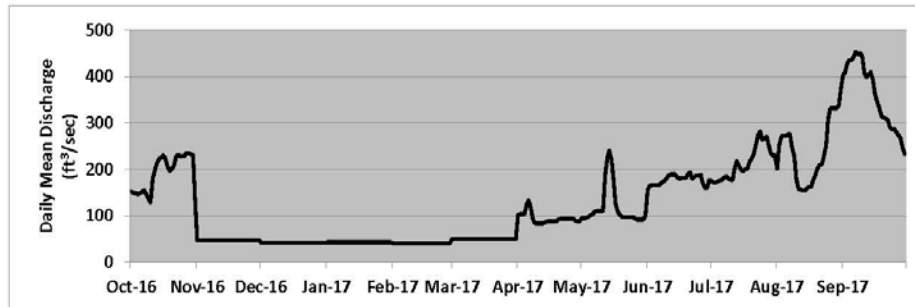
Location. --Lat 40°19'27", long 105°12'35", Larimer County, Hydrologic Unit 10190006, downstream from Carter Reservoir Dam #1, 7 miles northwest of Berthoud, Colorado, and 10 miles west of Loveland, Colorado.

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-2016 to 30-Sep-2017. 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	153	48	43	44	41	51	102	95	157	175	202	403
2	149	48	43	44	41	51	104	95	164	172	254	410
3	149	48	43	44	41	51	104	95	166	172	272	429
4	146	48	43	44	41	51	104	99	166	174	272	435
5	149	48	43	44	41	51	124	100	166	177	272	436
6	151	48	43	44	41	51	134	104	166	178	275	443
7	155	48	43	44	41	51	117	109	169	183	277	453
8	146	48	43	44	41	51	92	110	173	186	247	449
9	137	48	43	44	41	51	84	110	175	180	228	450
10	129	48	43	44	41	51	84	110	182	178	181	446
11	179	48	43	44	41	51	84	110	188	178	159	408
12	198	48	43	44	41	51	84	187	189	204	156	399
13	213	48	43	44	41	51	84	225	189	218	155	403
14	223	48	43	44	41	51	87	241	189	207	155	409
15	225	48	43	44	41	51	89	222	183	198	159	393
16	230	48	43	44	41	51	89	175	180	197	162	364
17	224	48	43	44	41	51	89	125	181	200	162	347
18	205	48	43	44	41	51	89	108	182	202	179	333
19	197	48	43	44	41	51	89	102	182	216	187	316
20	200	48	43	44	41	51	92	98	190	224	202	312
21	209	48	43	44	41	51	94	98	193	234	210	310
22	227	48	43	44	41	51	94	98	180	253	210	308
23	231	48	43	44	41	51	94	98	185	274	229	291
24	228	48	43	44	41	51	94	98	186	282	251	286
25	229	48	43	44	41	51	94	98	186	263	307	288
26	229	48	43	44	41	51	94	94	188	268	332	281
27	236	48	43	44	41	51	94	92	170	271	332	274
28	234	48	43	44	41	51	91	92	160	253	332	267
29	232	48	43	44		51	89	92	160	235	332	247
30	231	48	43	44		51	89	92	177	230	338	233
31	126		43	44		51		101		230	376	
Min	126	48	43	44	41	51	84	92	157	172	155	233
Max	236	48	43	44	41	51	134	241	193	282	376	453
Mean	193	48	43	44	41	51	95	119	177	213	239	361
ac-ft	11826	2848	2610	2680	2285	3124	5641	7278	10541	13088	14657	21421



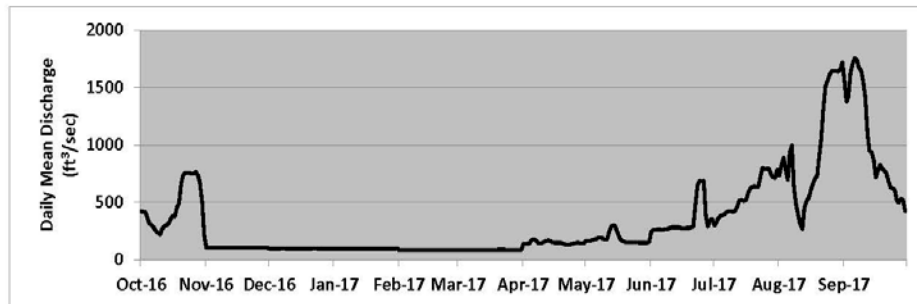
Appendix A (38 of 38)
Colorado-Big Thompson Project, CO

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-2016 and 30-Sep-2017. 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	420	106	96	96	83	85	135	167	250	300	736	1574
2	415	106	96	96	84	85	140	166	258	322	820	1374
3	416	106	96	96	84	85	141	167	262	365	890	1422
4	356	106	96	96	84	85	145	175	263	381	791	1637
5	312	106	96	96	84	85	171	178	262	386	695	1714
6	301	106	96	96	84	85	183	184	261	400	930	1758
7	277	106	99	96	84	85	166	193	263	414	996	1738
8	252	106	98	96	84	85	149	195	268	422	639	1671
9	236	106	97	96	84	85	147	184	270	419	481	1648
10	221	106	97	96	84	85	149	178	278	415	384	1546
11	271	106	97	96	84	85	157	177	282	427	305	1411
12	288	106	97	96	84	85	167	254	284	465	269	1100
13	304	106	97	96	83	85	170	289	283	516	450	948
14	311	106	97	96	83	85	162	303	283	519	511	936
15	356	106	97	96	83	85	152	284	277	511	538	874
16	381	106	97	96	83	85	148	235	274	514	603	716
17	375	106	97	96	83	85	148	184	275	574	661	778
18	458	106	97	96	83	85	150	165	276	612	707	827
19	486	106	97	96	83	85	150	158	276	634	725	795
20	659	106	97	96	83	88	141	154	283	641	890	778
21	739	106	97	96	83	89	133	154	287	632	1057	755
22	755	106	98	96	83	89	132	154	465	640	1331	688
23	759	106	98	96	83	89	132	154	646	719	1508	632
24	757	106	96	96	83	86	140	154	685	804	1560	620
25	749	106	96	96	83	85	143	154	685	790	1615	612
26	752	106	96	96	83	85	148	150	685	794	1642	511
27	766	106	96	96	83	85	151	148	382	796	1642	498
28	732	106	96	96	83	85	148	148	290	747	1641	532
29	665	106	96	96		85	145	148	341	718	1640	518
30	504	106	96	96		85	145	148	356	712	1653	425
31	222		96	100		85		157		784	1720	
Min	221	106	96	96	83	85	132	148	250	300	269	425
Max	766	106	99	100	84	89	183	303	685	804	1720	1758
Mean	468	106	96	96	84	86	150	183	342	560	969	1035
ac-ft	28701	6275	5915	5899	4634	5250	8881	11203	20296	34402	59459	61457



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 AF)					
Reservoir	Dead Storage¹ /	Active Storage² /	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	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 WATER YEAR 2017 OF BLUE RIVER OPERATIONS (AF)

	INITIAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
UNDEPLETED RUNOFF ABOVE GREEN MNT RESV		12,900	11,100	10,200	10,800	9,700	14,900	28,100	64,500	157,300	64,200	26,700	16,900	427,300
UNDEPLETED RUNOFF ABOVE DILLON RES.		7,550	6,000	5,700	6,100	5,200	7,700	15,200	37,500	97,000	36,000	16,900	10,800	251,650
PERCENT OF TOTAL UNDEPLETED RUNOFFABV DILLON		0.585	0.54	0.559	0.565	0.536	0.517	0.541	0.581	0.617	0.561	0.633	0.639	7
DEPLETIONS BY 1929 COLORADO SPRINGS RIGHT		0	0	0	0	0	0	39	120	695	239	128	286	1,507
DEPLETIONS BY 1948 COLORADO SPRINGS RIGHT		95	-111	0	0	0	0	142	1,048	7,089	2,038	1,022	0	11,323
INFLOW TO DILLON		7,400	6,100	5,600	6,100	5,200	7,700	15,000	36,300	89,200	33,700	15,700	10,800	238,800
DILLON STORAGE (1000 AF)	246.5	239.9	233.2	228.4	224	218.5	214	215.5	232.6	256.1	256.4	250.7	242	
ROBERTS TUNNEL DIVERSIONS		6,400	5,900	5,700	5,000	5,100	7,200	7,800	5,700	11,300	13,200	7,300	12,000	92,600
DILLON OUTFLOW TO THE RIVER		6,500	6,000	4,700	5,600	5,500	5,000	5,700	13,000	53,400	19,200	13,000	6,300	143,900
TOTAL DEPLETIONS BY DENVER		900	100	900	500	-300	2,600	9,200	23,100	35,500	14,400	2,700	4,400	94,000
RUNOFF BETWEEN DILLON & GREEN MTN RESV.		5,400	5,100	4,700	4,700	4,600	7,400	13,100	27,500	61,600	28,800		6,200	179,200
ACTUAL INFLOW TO GREEN MTN RESERVOIR		11,800	11,100	9,300	10,200	10,000	12,300	18,700	40,200	114,100	47,500	22,900	12,400	320,500
GREEN MOUNTAIN EOM STORAGE (1000 AF)	107.5	79.1	75.8	72.4	67.2	65.7	64	69.5	90.8	150.7	152.6	139.8	105,300	
TOTAL GREEN MOUNTAIN OUTFLOW		39,900	14,300	12,700	15,500	11,400	14,000	12,900	18,500	53,400	44,900	35,100	46,500	319,100

B-3: Pick-Sloan Missouri Basin Program 2017 Summary Actual Operations

										Table 3	1 of 3		
				PICK-SLOAN MISSOURI BASIN PROGRAM									
			WESTERN DIVISION WATER AND POWER SYSTEM										
				C-BT									
				2017 ACTUAL OPERATIONS									
													</

										Table 3				2 OF 3	
					PICK-SLOAN MISSOURI BASIN PROGRAM										
				WESTERN DIVISION WATER AND POWER SYSTEM											
				C-BT											
					2016 ACTUAL OPERATIONS										

										Table 3		3 OF 3	
				PICK-SLOAN MISSOURI BASIN PROGRAM									
				WESTERN DIVISION WATER AND POWER SYSTEM									
				C-BT									
					2016 ACTUAL OPERATIONS								
		WATER IN 1000 AF			***	***	***	***	***	***	ENERGY IN GWH		
	INITIAL												
	OR TOTAL	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
BASE GENERATION													
Green Mountain	59.2	7.7	2.0	1.6	2.2	1.5	2.0	1.8	3.2	10.8	9.7	7.7	9.0
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	0.0
Big Thompson	8.3	0.6	0.0	0.0	0.0	0.0	0.0	0.2	1.8	2.1	1.5	1.2	0.9
TOTAL	67.5	8.3	2.0	1.6	2.2	1.5	2.0	2.0	5.0	12.9	11.2	8.9	9.9
LOAD FOLLOWING GENERATION													
Mayrs Lake	32.3	2.4	0.0	0.0	4.0	5.1	4.9	4.6	2.6	2.5	4.4	0.2	1.6
Estes	113.1	7.1	0.0	11.8	16.1	13.7	13.5	12.6	7.4	7.7	12.6	4.3	6.3
Pole Hill	173.8	11.1	0.0	15.5	24.1	21.1	21.2	21.0	19.5	23.0	17.3	0.0	0.0
Flatiron 1 & 2	218.3	13.3	0.3	20.6	30.0	26.4	26.1	26.7	25.4	28.8	20.7	0.0	0.0
TOTAL	537.5	33.9	0.3	47.9	74.2	66.3	65.7	64.9	54.9	62.0	55.0	4.5	7.9
PUMP ENERGY													
Willow Creek	11.1	0.0	0.5	0.0	0.0	0.0	0.8	2.9	5.0	0.9	0.2	0.3	0.5
Granby	25.8	2.1	0.2	3.9	5.0	4.4	3.9	1.9	0.2	0.0	1.6	0.6	2.0
Flatiron 3	37.4	0.0	0.0	4.4	6.7	5.9	6.2	4.3	2.6	4.2	3.1	0.0	0.0
TOTAL	74.3	2.1	0.7	8.3	11.7	10.3	10.9	9.1	7.8	5.1	4.9	0.9	2.5
TOTAL GENERATION	605.0	42.2	2.3	49.5	76.4	67.8	67.7	66.9	59.9	74.9	66.2	13.4	17.8
TOTAL GENERATION MINUS PUMP	530.7	40.1	1.6	41.2	64.7	57.5	56.8	57.8	52.1	69.8	61.3	12.5	15.3

B-4: 2017 Flood Damage Prevented C-BT

FLOOD DAMAGE PREVENTED IN WY 2017

	Cumulative Total Prior to WY 2017	WY 2017	Cumulative Total Current
Granby, Willow Creek, Shadow Mountain and Grand Lake	\$434,700	\$68,000.00	\$502,700
Green Mountain	\$179,394	\$37,000	\$216,394
Total	\$614,094	\$105,000.00	\$719,094

B-5: C-BT October 2017 Most Probable Plan for Water Year 2018



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



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CBT October 2017 Most Probable: 01-OCT-2017

HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Dillon Inflow	kaf	11.5	8.1	6.2	5.2	4.2	4.5	8.6	43.3	70.4	32.7	16.6	10.2	221.5
DL to GM Gain	kaf	7.0	5.3	4.5	4.0	3.4	4.6	9.1	27.8	46.5	20.4	13.0	7.2	152.8

Green Mountain Reservoir		Init Cont: 105.00 kaf			Maximum Cont: 154.60 kaf			Minimum Cont: 8.00 kaf							
		Elev: 7924.3 ft			Elev: 7950.4 ft			Elev: 7804.7 ft							
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total	
Undepleted Inflow	kaf	18.5	13.2	10.7	9.2	7.6	9.2	17.8	72.1	120.3	54.2	29.8	17.4	380.0	
Depletion	kaf	5.2	2.3	1.3	0.5	-0.2	-0.6	2.9	36.3	36.8	20.7	9.5	3.9	118.6	
Depleted Inflow	kaf	13.3	10.9	9.4	8.7	7.8	9.7	14.9	35.8	83.5	33.4	20.3	13.5	261.2	
Turbine Release	kaf	39.0	13.0	12.6	12.7	11.5	12.7	15.2	20.1	19.4	21.9	19.8	60.4	258.3	
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	635	219	205	206	206	207	255	328	327	356	322	1015		
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60		
Total River Release	kaf	39.0	13.0	12.6	12.7	11.5	12.7	15.2	20.1	19.4	21.9	19.8	60.4	258.3	
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	78.4	64.0	64.0	64.0	64.0	64.0	152.6	152.6	152.6	152.6	152.6	105.3		
End-Month Contents	kaf	79.3	77.1	73.9	69.9	66.2	63.2	62.8	78.2	141.7	152.6	152.6	105.3		
End-Month Elevation	ft	7906.65	7904.96	7902.46	7899.28	7896.16	7893.48	7893.11	7905.83	7944.25	7949.51	7949.51	7924.34		

Willow Creek Reservoir		Init Cont: 6.00 kaf			Maximum Cont: 10.20 kaf			Minimum Cont: 7.20 kaf							
		Elev: 8111.7 ft			Elev: 8128.8 ft			Elev: 8116.9 ft							
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total	
Native Inflow	kaf	1.9	1.5	1.2	1.1	0.9	1.3	4.2	22.4	14.3	4.3	1.9	1.4	56.4	
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	
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	0.1	0.0	2.1	
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	0.0	1.4	0.0	0.0	0.0	0.0	5.2	19.8	15.4	0.0	3.3	0.9	46.0	
Evaporation	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.6	
End-Month Targets	kaf	9.0	7.2	7.6	8.2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5		
End-Month Contents	kaf	7.6	7.2	8.0	8.6	9.2	9.9	8.5	10.6	8.5	10.6	8.5	8.5		
End-Month Elevation	ft	8118.54	8116.90	8120.48	8123.14	8125.09	8127.95	8122.54	8130.03	8122.54	8130.09	8122.54	8122.54		

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Granby Reservoir		Init Cont:	518.00	kaf	Maximum Cont:	539.80	kaf	Minimum Cont:	76.50	kaf				
		Elev:	8277.0	ft	Elev:	8280.0	ft	Elev:	8186.9	ft				
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	4.6	2.8	2.2	1.9	1.5	2.1	5.5	25.5	44.2	16.4	5.9	3.5	116.1
Release from Shadow Mtn	kaf	2.8	2.9	2.9	1.2	1.1	1.2	1.2	6.5	37.0	3.1	2.5	2.4	64.8
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	0.0	1.4	0.0	0.0	0.0	0.0	5.2	19.8	15.4	0.0	3.3	0.9	46.0
Total Inflow	kaf	7.5	7.1	5.1	3.1	2.7	3.4	11.9	51.9	96.6	19.5	11.7	6.7	227.2
Minimum River Release	kaf	1.2	1.2	1.2	1.2	1.1	1.2	1.2	4.6	4.5	4.6	2.5	2.4	26.9
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	0.0	0.0	0.0	0.0
Total River Release	kaf	1.2	1.2	1.2	1.2	1.1	1.2	1.2	4.6	4.5	4.6	4.6	5.6	32.2
Pumped to Shadow Mtn	kaf	2.6	1.4	15.3	32.5	29.6	32.4	27.0	7.1	0.0	6.4	10.6	13.2	178.1
Evaporation	kaf	1.7	0.7	0.0	0.0	0.0	0.9	1.5	2.3	3.1	2.9	2.3	2.1	17.5
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	519.8	523.4	511.7	480.7	452.4	420.9	402.9	440.6	529.3	534.6	528.4	514.0	
End-Month Elevation	ft	8277.23	8277.73	8276.08	8271.66	8267.50	8262.71	8259.88	8265.72	8278.56	8279.29	8278.42	8276.41	
Shadow Mountain Reservoir		Init Cont:	17.00	kaf	Maximum Cont:	18.40	kaf	Minimum Cont:	16.60	kaf				
		Elev:	8366.7	ft	Elev:	8367.0	ft	Elev:	8366.0	ft				
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	6.1	3.7	2.9	2.5	2.0	2.8	7.3	33.3	55.8	21.7	7.8	4.6	150.5
Pumped from Granby	kaf	2.6	1.4	15.3	32.5	29.6	32.4	27.0	7.1	0.0	6.4	10.6	13.2	178.1
Total Inflow	kaf	8.8	5.1	18.2	35.0	31.7	35.3	34.3	40.4	55.8	28.1	18.4	17.8	328.9
Minimum River Release	kaf	2.2	2.7	2.8	1.2	1.1	1.2	1.2	1.2	3.0	3.1	2.5	2.4	24.6
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	2.8	2.9	2.9	1.2	1.1	1.2	1.2	6.5	37.0	3.1	2.5	2.4	64.8
Adams Tunnel Flow	kaf	5.7	2.0	15.3	33.8	30.5	33.8	32.7	33.3	17.9	24.3	15.4	14.9	259.6
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	16.9	16.9	
End-Month Elevation	ft	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	
Adams Tunnel		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Tunnel Capacity	kaf	7.8	2.1	15.3	33.8	30.5	33.8	32.7	33.8	32.7	24.3	15.4	14.9	277.1
Actual Diversion	kaf	5.7	2.0	15.3	33.8	30.5	33.8	32.7	33.3	17.9	24.3	15.4	14.9	259.6
% Maximum Delivery	%	74	95	100	100	100	100	100	98	55	100	100	100	

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Lake Estes

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Big Thompson Inflow	kaf	2.7	1.6	0.9	0.5	0.3	1.0	3.3	10.0	20.1	13.6	6.4	3.0	63.4
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	6.0	47.6
Actual River Release	kaf	8.4	3.5	0.9	0.5	0.3	1.0	3.2	9.3	11.2	11.7	6.2	3.0	59.2
Max Diversion Available	kaf	0.1	0.2	0.0	0.0	0.0	0.1	1.1	3.2	12.7	6.0	0.2	0.0	23.6
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	9.9	0.0	0.0	0.0	12.4
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	2.5	2.0	0.2	0.0	4.9
% Maximum Diversion	%	0	0	0	0	0	0	10	80	98	33	102	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	8.4	3.5	0.9	0.5	0.3	1.0	3.2	9.3	11.2	11.7	6.2	3.0	59.2

Olympus Tunnel

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Tunnel Capacity	kaf	33.8	32.7	33.8	33.8	30.5	33.8	32.7	33.8	32.7	33.8	33.8	32.7	397.9
Actual Delivery	kaf	0.0	0.0	15.2	33.7	30.4	33.8	32.7	33.8	26.7	26.0	15.4	14.8	262.5
% Maximum Delivery	%	0	0	45	100	100	100	100	100	82	77	46	45	
Inflow to Flatiron	kaf	0.0	0.0	15.2	33.7	30.4	33.8	32.7	33.8	26.7	26.0	15.4	14.8	262.5

Carter Lake

		Init Cont: 67.00 kaf			Maximum Cont: 112.20 kaf			Minimum Cont: 6.00 kaf						
		Elev: 5716.4 ft			Elev: 5759.0 ft			Elev: 5626.8 ft						
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Pumped from Flatiron	kaf	0.0	0.0	10.2	20.9	17.0	17.2	12.6	7.5	10.8	7.6	0.0	0.0	103.8
Carter to Flatiron	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
Evaporation Loss	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.3	0.4	0.5	0.5	0.3	0.3	2.7
Seepage Loss	kaf	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	1.8
End-Month Targets	kaf	40.0	40.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	20.0	20.0	20.0	
End-Month Contents	kaf	58.6	54.6	60.8	78.2	91.3	104.5	112.0	112.0	112.0	98.9	73.7	54.3	
End-Month Elevation	ft	5707.13	5702.72	5709.54	5727.45	5739.55	5751.70	5758.65	5758.59	5758.48	5747.05	5722.96	5702.40	
Priority Water Diverted to Carter	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8
Irrigation Demand	kaf	8.1	3.0	3.2	2.8	3.2	3.3	4.6	6.6	8.7	18.9	23.4	17.4	103.2
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	0.2	0.8	0.7	0.5	0.6	0.5	0.1	0.4	1.4	1.2	1.3	1.5	9.2
Total Demand	kaf	8.3	3.7	3.9	3.3	3.7	3.8	4.7	7.0	10.2	20.1	24.7	18.9	112.3
Total Delivery	kaf	8.3	3.7	3.9	3.3	3.7	3.8	4.7	7.0	10.2	20.1	24.7	18.9	112.3
% 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-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	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	51.6	57.2	55.3	57.2	55.3	57.2	57.2	55.3	673.2
Actual Flow	kaf	0.0	0.0	5.0	12.9	13.4	16.5	20.1	26.2	15.9	18.4	15.4	14.8	158.6

Dille Tunnel

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Big Thompson River Below Lake Estes	kaf	8.4	3.5	0.9	0.5	0.3	1.0	3.2	9.3	11.2	11.7	6.2	3.0	59.2
North Fork Big Thompson River at Drake	kaf	0.7	0.4	0.2	0.1	0.1	0.1	0.3	2.1	3.0	1.8	1.1	0.7	10.6
Dille Skim Water Diverted	kaf	1.0	0.0	0.0	0.0	0.0	0.0	1.2	7.1	8.4	11.1	4.9	1.3	35.0
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	9.1	3.9	1.1	0.6	0.4	1.1	3.5	11.4	14.2	13.5	7.3	3.6	69.7
water diverted	kaf	6.6	1.9	0.0	0.0	0.0	0.0	1.2	9.0	11.8	11.1	4.9	1.3	47.8
% Diverted	%	124	36	0	0	0	0	23	165	218	204	90	23	
Big T @ Canyon Mouth	kaf	2.5	2.0	1.1	0.6	0.4	1.1	2.3	2.5	2.4	2.5	2.5	2.4	22.3

Trifurcation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Release from Flatiron	kaf	0.0	0.0	5.0	12.9	13.4	16.5	20.1	26.2	15.9	18.4	15.4	14.8	158.6
Release to 550 Canal	kaf	1.8	1.7	4.9	12.6	13.1	16.2	19.6	27.4	16.4	14.3	10.2	6.7	144.9
Dille Tunnel	kaf	6.6	1.9	0.0	0.0	0.0	0.0	1.2	9.0	11.8	11.1	4.9	1.3	47.8
Total release to river	kaf	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	7.1	15.7
Irrigation demand	kaf	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	7.1	15.7
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	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	7.1	15.7
Total delivery	kaf	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.0	7.1	15.7
% Required Delivery	%	100	0	0	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-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow from Flatiron	kaf	1.8	1.7	4.9	12.6	13.1	16.2	19.6	27.4	16.4	14.3	10.2	6.7	144.9
Maximum flow	kaf	16.4	30.8	31.8	31.8	28.7	31.8	30.8	31.8	30.8	31.8	31.8	30.8	359.1
Irrigation demand	kaf	0.8	0.5	0.3	0.3	0.3	0.3	0.4	0.6	0.5	1.0	1.0	1.0	7.0
Irrigation delivery	kaf	0.4	0.3	0.1	0.3	0.3	0.3	0.4	0.6	0.5	1.0	1.0	1.0	6.2
Minimum flow	kaf	1.5	0.7	0.0	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	15.6
Rel's to Horsetooth	kaf	1.8	1.7	4.9	12.6	13.1	16.2	19.6	27.4	16.4	14.3	10.2	6.7	144.9

Horsetooth Reservoir

Init Cont: 83.00 kaf
Elev: 5387.9 ft
Maximum Cont: 157.00 kaf
Elev: 5430.0 ft
Minimum Cont: 13.00 kaf
Elev: 5316.8 ft

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow	kaf	1.8	1.7	4.9	12.6	13.1	16.2	19.6	27.4	16.4	14.3	10.2	6.7	144.9
Total irrigation delivery	kaf	10.3	1.6	1.9	2.8	2.1	2.8	3.2	5.7	6.2	29.3	34.1	16.1	116.1
Evaporation loss	kaf	0.3	0.1	0.0	0.0	0.0	0.2	0.4	0.7	0.9	0.8	0.6	0.5	4.5
Seepage loss	kaf	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.2
End-Month Targets	kaf	125.0	70.0	125.0	125.0	125.0	125.0	130.0	156.0	156.0	156.0	156.0	156.0	
End-Month Content	kaf	74.1	73.9	76.7	86.3	97.1	110.1	126.0	146.8	156.0	140.0	115.2	105.2	
End-Month Elevation	ft	5381.56	5381.39	5383.36	5389.98	5397.00	5404.93	5414.00	5425.06	5429.64	5421.52	5407.94	5402.01	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	7.8	0.0	0.0	0.0	10.0
Irrigation demand	kaf	7.3	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.8	21.0	26.2	10.7	66.9
Metered Demand	kaf	2.1	1.4	1.7	2.2	1.8	2.2	2.6	4.6	4.8	7.4	6.4	4.2	41.4
Windy Gap demand	kaf	0.8	0.3	0.2	0.6	0.3	0.6	0.3	0.5	0.5	1.0	1.6	1.2	7.9
Total demand	kaf	10.3	1.6	1.9	2.8	2.1	2.8	3.2	5.7	6.2	29.3	34.1	16.1	116.1
Total irrigation	kaf	10.3	1.6	1.9	2.8	2.1	2.8	3.2	5.7	6.2	29.3	34.1	16.1	116.1
% 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-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total CBT Delivery	kaf	21.6	4.6	5.1	5.4	5.4	5.9	8.0	12.5	15.0	49.7	61.1	40.5	234.8



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Windy Gap

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	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	1.0	1.0	1.0	1.1	0.9	1.1	0.4	1.0	1.9	2.2	2.9	2.7	17.2
Account Balance	kaf	-1.0	-2.0	-3.0	-4.1	-5.0	-6.0	-6.5	-7.4	-9.4	-11.6	-14.5	-17.2	

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PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Generation	gwh	18.600	18.000	18.600	18.600	16.800	18.600	18.000	18.600	18.000	18.600	18.600	18.000	219.000
Generation	gwh	7.100	2.200	2.100	2.100	1.900	2.100	2.400	3.300	3.700	4.600	4.200	12.100	47.800
% Maximum Generation	%	38	12	12	11	11	11	14	18	21	25	23	67	
Average	kwh/af	181	171	169	167	164	161	161	163	192	211	212	201	

Willow Creek Pumping

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	24.6	23.8	0.0	0.0	0.0	0.0	23.8	24.6	23.8	0.0	23.0	23.8	167.4
Actual Pumping	kaf	0.0	1.4	0.0	0.0	0.0	0.0	5.2	19.8	15.4	0.0	3.3	0.9	46.0
Pump Energy	gwh	0.000	0.300	0.000	0.000	0.000	0.000	1.100	4.200	3.300	0.000	0.700	0.200	9.800
% Maximum Pumping	%	0	6	0	0	0	0	22	81	65	0	14	4	192
Average	kwh/af	0	213	0	0	0	0	213	213	213	0	213	213	

Lake Granby Pumping

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	36.9	35.7	36.9	36.9	33.3	36.9	35.7	36.9	35.7	36.9	36.9	35.7	434.4
Actual Pumping	kaf	2.6	1.4	15.3	32.5	29.6	32.4	27.0	7.1	0.0	6.4	10.6	13.2	178.1
Pump Energy	gwh	0.400	0.200	2.200	4.600	4.200	4.700	4.000	1.000	0.000	0.900	1.500	1.900	25.600
% Maximum Pumping	%	7	4	41	88	89	88	76	19	0	17	29	37	
Average	kwh/af	141	141	141	142	143	145	147	147	0	140	140	141	

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Marys Lake Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Adams Tunnel Flow	kaf	5.7	2.0	15.3	33.8	30.5	33.8	32.7	33.3	17.9	24.3	15.4	14.9	259.6
Maximum Generation	gwh	6.400	6.200	6.400	6.400	5.800	6.400	6.200	6.400	6.200	6.400	6.400	6.200	75.400
Generation	gwh	0.000	0.000	2.900	6.400	5.800	6.400	6.200	6.300	2.800	4.400	2.600	2.500	46.300
% Maximum Generation	%	0	0	19	19	19	19	19	19	16	18	17	17	
Average	kwh/af	0	0	189	189	189	189	189	189	156	183	169	169	

Lake Estes Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Adams Tunnel Flow	kaf	5.7	2.0	15.3	33.8	30.5	33.8	32.7	33.3	17.9	24.3	15.4	14.9	259.6
Maximum Generation	gwh	16.000	15.500	16.000	16.000	14.500	16.000	15.500	16.000	15.500	16.000	16.000	15.500	188.500
Generation	gwh	2.000	0.500	7.200	16.000	14.400	16.000	15.500	15.700	8.100	11.400	7.200	7.100	121.100
% Maximum Generation	%	12	3	45	100	100	100	100	98	52	71	45	46	
Average	kwh/af	348	237	473	473	472	473	472	471	450	471	471	474	

Pole Hill Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Olympus Tunnel Flow	kaf	33.8	32.7	33.8	33.8	30.5	33.8	32.7	33.8	32.7	33.8	33.8	32.7	397.9
Maximum Generation	gwh	25.800	25.000	25.800	25.800	23.300	25.800	25.000	25.800	25.000	25.800	25.800	25.000	303.900
Generation	gwh	0.000	0.000	11.600	25.700	23.200	25.700	24.900	25.800	20.000	19.200	10.500	10.100	196.700
% Maximum Generation	%	0	0	45	100	100	100	100	100	80	75	41	40	
Average	kwh/af	0	0	344	761	759	761	762	762	610	569	311	308	

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Flatiron Units 1 and 2 Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow to Flatiron	kaf	0.0	0.0	15.2	33.7	30.4	33.8	32.7	33.8	26.7	26.0	15.4	14.8	262.5
Maximum Generation	gwh	32.200	31.200	32.200	32.200	29.100	32.200	31.200	32.200	31.200	32.200	32.200	31.200	379.300
Generation	gwh	0.000	0.000	14.500	32.100	28.900	32.100	31.200	32.100	24.100	23.400	12.000	11.400	241.800
% Maximum Generation	%	0	0	45	100	99	100	100	100	77	73	37	37	
Average	kwh/af	0	0	951	951	949	951	953	952	900	898	777	775	

Flatiron Unit 3 Pump/Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	0.0	0.0	10.2	20.9	17.0	17.2	15.4	15.6	15.1	16.1	18.6	20.9	167.0
Pump from Flatiron	kaf	0.0	0.0	10.2	20.9	17.0	17.2	12.6	7.5	10.8	7.6	0.0	0.0	103.8
Pump Energy	gwh	0.000	0.000	3.000	6.500	5.600	6.000	4.600	2.800	4.000	2.800	0.000	0.000	35.300
% Maximum Pumping	%	0	0	100	100	100	100	82	48	72	47	0	0	
Average	kwh/af	0	0	295	311	331	347	362	366	366	364	0	0	
Maximum Turbine 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
Carter to Flatiron	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Actual Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Big Thompson Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total release	kaf	4.5	0.0	0.0	0.0	0.0	0.0	1.3	7.2	10.9	14.1	9.1	8.3	55.4
Turbine release	kaf	4.5	0.0	0.0	0.0	0.0	0.0	1.3	7.2	10.9	14.1	9.1	8.3	55.4
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	0.000	0.000	0.000	0.000	0.000	3.700	3.800	3.700	3.800	3.800	3.700	26.300
Generation	gwh	0.300	0.000	0.000	0.000	0.000	0.000	0.000	0.800	1.500	2.200	1.200	1.100	7.100
% Maximum Generation	%	9	0	0	0	0	0	1	22	42	56	31	29	
Average	kwh/af	73	0	0	0	0	0	23	117	142	152	132	129	



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Project Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total Generation	gwh	9.400	2.700	38.400	82.300	74.100	82.300	80.200	84.000	60.200	65.300	37.700	44.300	660.900
Total Max Generation	gwh	102.900	95.900	99.100	99.100	89.500	99.100	99.600	102.900	99.600	102.900	102.900	99.600	1193.100

Project Pump Energy

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Granby	gwh	0.400	0.200	2.200	4.600	4.200	4.700	4.000	1.000	0.000	0.900	1.500	1.900	25.600
Willow Creek	gwh	0.000	0.300	0.000	0.000	0.000	0.000	1.100	4.200	3.300	0.000	0.700	0.200	9.800
Flatiron Unit 3	gwh	0.000	0.000	3.000	6.500	5.600	6.000	4.600	2.800	4.000	2.800	0.000	0.000	35.300
Total Pump Energy	gwh	0.400	0.500	5.200	11.100	9.900	10.700	9.600	8.000	7.200	3.700	2.200	2.000	70.500

B-6: C-BT October 2017 Minimum Reasonable Plan for Water Year 2018



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HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Dillon Inflow	kaf	10.8	7.6	5.9	5.1	4.1	4.2	5.0	19.4	33.6	17.1	8.7	6.1	127.6
DL to GM Gain	kaf	6.7	4.9	4.3	3.9	3.3	3.7	5.8	16.5	24.8	14.0	10.5	5.8	104.2

Green Mountain Reservoir

Init Cont: 105.00 kaf Maximum Cont: 154.60 kaf Minimum Cont: 8.00 kaf
Elev: 7924.3 ft Elev: 7950.4 ft Elev: 7804.7 ft

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Undepleted Inflow	kaf	17.5	12.0	10.2	9.0	7.4	7.9	10.8	36.4	59.3	31.1	19.2	11.9	232.7
Depletion	kaf	6.0	3.5	2.3	1.7	0.8	0.4	1.4	16.5	27.2	10.6	2.5	0.7	73.6
Depleted Inflow	kaf	11.5	8.5	8.0	7.3	6.5	7.5	9.4	19.8	32.0	20.5	16.7	11.2	158.9
Turbine Release	kaf	37.2	10.9	10.4	10.5	9.5	10.5	7.5	3.7	3.6	3.7	3.7	44.8	156.0
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	606	184	170	170	171	171	127	60	60	60	60	753	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	37.2	10.9	10.4	10.5	9.5	10.5	7.5	3.7	3.6	3.7	3.7	44.8	156.0
Evaporation	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.6	0.5	0.4	2.9
End-Month Targets	kaf	78.4	64.0	64.0	64.0	64.0	64.0	152.6	152.6	152.6	152.6	152.6	105.3	
End-Month Contents	kaf	79.3	76.8	74.4	71.2	68.2	65.1	66.8	82.7	110.6	126.8	139.3	105.3	
End-Month Elevation	ft	7906.65	7904.78	7902.86	7900.30	7897.83	7895.17	7896.65	7909.17	7927.52	7936.57	7943.02	7924.34	

Willow Creek Reservoir

Init Cont: 6.00 kaf Maximum Cont: 10.20 kaf Minimum Cont: 7.20 kaf
Elev: 8111.7 ft Elev: 8128.8 ft Elev: 8116.9 ft

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	1.8	1.3	1.2	1.1	0.9	1.0	1.8	7.5	3.9	1.8	1.2	0.9	24.4
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
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	0.0	1.1	0.0	0.0	0.0	0.0	2.4	7.0	3.4	1.3	0.7	0.4	16.3
Evaporation	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.6
End-Month Targets	kaf	9.0	7.2	7.6	8.2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
End-Month Contents	kaf	7.5	7.2	7.9	8.6	9.1	9.5	8.5	8.5	8.5	8.5	8.5	8.5	
End-Month Elevation	ft	8118.07	8116.90	8120.23	8122.82	8124.71	8126.53	8122.54	8122.54	8122.54	8122.54	8122.54	8122.54	

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Granby Reservoir		Init Cont:			Maximum Cont:			Minimum Cont:						
		Elev:	518.00	kaf	Elev:	539.80	kaf	Elev:	76.50	kaf				
			8277.0	ft		8280.0	ft			8186.9	ft			
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	4.1	2.4	2.1	1.8	1.5	1.6	2.5	11.5	19.1	6.9	3.4	2.4	59.3
Release from Shadow Mtn	kaf	4.2	2.9	2.8	1.2	1.1	1.2	1.2	1.2	3.0	3.1	2.5	2.1	26.5
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	0.0	1.1	0.0	0.0	0.0	0.0	2.4	7.0	3.4	1.3	0.7	0.4	16.3
Total Inflow	kaf	8.3	6.5	4.9	3.1	2.6	2.9	6.1	19.8	25.5	11.2	6.5	5.0	102.4
Minimum River Release	kaf	1.2	1.2	1.2	1.2	1.1	1.2	1.2	4.6	4.5	4.6	2.5	1.2	25.7
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	0.0	0.0	0.0	0.0
Total River Release	kaf	1.2	1.2	1.2	1.2	1.1	1.2	1.2	4.6	4.5	4.6	4.6	4.4	31.0
Pumped to Shadow Mtn	kaf	2.5	4.0	2.2	23.6	19.3	20.2	18.0	20.9	11.2	19.8	13.9	14.3	169.9
Evaporation	kaf	1.7	0.7	0.0	0.0	0.0	0.9	1.5	2.4	2.9	2.7	2.1	1.8	16.7
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	520.8	521.1	522.1	500.1	482.0	462.3	447.3	438.9	445.6	429.4	415.0	399.2	
End-Month Elevation	ft	8277.37	8277.40	8277.55	8274.44	8271.85	8268.97	8266.74	8265.47	8266.48	8264.02	8261.79	8259.28	

Shadow Mountain Reservoir		Init Cont:			Maximum Cont:			Minimum Cont:						
		Elev:	17.00	kaf	Elev:	18.40	kaf	Elev:	16.60	kaf				
			8366.7	ft		8367.0	ft			8366.0	ft			
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	5.5	3.2	2.8	2.4	2.0	2.2	3.3	14.8	25.4	8.9	4.5	3.2	78.2
Pumped from Granby	kaf	2.5	4.0	2.2	23.6	19.3	20.2	18.0	20.9	11.2	19.8	13.9	14.3	169.9
Total Inflow	kaf	7.9	7.2	5.0	26.0	21.3	22.3	21.3	35.7	36.5	28.7	18.4	17.5	247.8
Minimum River Release	kaf	2.2	2.7	2.8	1.2	1.1	1.2	1.2	1.2	3.0	3.1	2.5	2.1	24.3
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	4.2	2.9	2.8	1.2	1.1	1.2	1.2	1.2	3.0	3.1	2.5	2.1	26.5
Adams Tunnel Flow	kaf	3.6	4.1	2.2	24.8	20.2	20.9	19.7	33.8	32.7	24.9	15.4	14.9	217.2
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	16.9	16.9	
End-Month Elevation	ft	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	

Adams Tunnel														
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Tunnel Capacity	kaf	4.4	16.1	33.8	33.8	30.5	33.8	32.7	33.8	32.7	24.9	15.4	14.9	306.8
Actual Diversion	kaf	3.6	4.1	2.2	24.8	20.2	20.9	19.7	33.8	32.7	24.9	15.4	14.9	217.2
% Maximum Delivery	%	82	26	7	73	66	62	60	100	100	100	100	100	

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Lake Estes

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Big Thompson Inflow	kaf	2.1	1.1	0.6	0.3	0.3	2.3	7.7	12.6	6.9	3.2	1.8	0.9	39.8
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	5.6	2.5	0.6	0.3	0.3	2.3	2.2	12.4	6.8	3.2	1.8	0.9	38.9
Max Diversion Available	kaf	0.0	0.0	0.0	0.0	0.0	0.8	5.5	5.7	0.6	0.0	0.0	0.0	12.6
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.4	0.0	0.0	0.0	1.8
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.1	0.0	0.0	0.0	0.0	5.6
% Maximum Diversion	%	0	0	0	0	0	0	100	26	64	0	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	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.4
Total River Release	kaf	5.6	2.5	0.6	0.3	0.3	2.3	2.2	12.4	6.8	3.2	1.8	0.9	38.9

Olympus Tunnel

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Tunnel Capacity	kaf	33.8	32.7	33.8	33.8	30.5	33.8	32.7	33.8	32.7	33.8	33.8	32.7	397.9
Actual Delivery	kaf	0.0	2.7	2.2	24.7	20.1	20.8	25.0	33.8	32.6	24.6	15.2	14.8	216.5
% Maximum Delivery	%	0	8	6	73	66	61	76	100	100	73	45	45	
Inflow to Flatiron	kaf	0.0	2.7	2.2	24.7	20.1	20.8	25.0	33.8	32.6	24.6	15.2	14.8	216.5

Carter Lake

Carter Lake		Init Cont:			Maximum Cont:			Minimum Cont:						
		67.00 kaf			112.20 kaf			6.00 kaf						
		Elev:			Elev:			Elev:						
		5716.4 ft			5759.0 ft			5626.8 ft						
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Pumped from Flatiron	kaf	0.0	0.0	0.0	22.0	17.9	17.9	15.9	8.7	9.3	7.6	0.0	0.0	99.3
Carter to Flatiron	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
Evaporation Loss	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.3	0.4	0.5	0.5	0.3	0.3	2.7
Seepage Loss	kaf	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	1.8
End-Month Targets	kaf	40.0	40.0	40.0	112.0	112.0	112.0	112.0	112.0	112.0	20.0	20.0	20.0	
End-Month Contents	kaf	57.8	54.6	51.3	70.4	85.0	99.4	110.3	112.0	112.0	98.1	71.3	51.5	
End-Month Elevation	ft	5706.33	5702.77	5699.02	5719.67	5734.10	5747.06	5756.88	5758.60	5758.53	5746.37	5720.53	5699.20	
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	8.9	2.2	2.4	2.3	2.6	2.8	4.5	6.1	7.3	19.7	25.0	17.8	101.6
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	0.2	0.8	0.7	0.5	0.6	0.5	0.1	0.4	1.4	1.2	1.3	1.5	9.2
Total Demand	kaf	9.0	3.0	3.1	2.8	3.2	3.3	4.6	6.5	8.7	20.9	26.3	19.4	110.8
Total Delivery	kaf	9.0	3.0	3.1	2.8	3.2	3.3	4.6	6.5	8.7	20.9	26.3	19.4	110.8
% 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-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	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	51.6	57.2	55.3	57.2	55.3	57.2	57.2	55.3	673.2
Actual Flow	kaf	0.0	2.7	2.2	2.7	2.2	2.9	9.1	25.1	23.3	17.0	15.2	14.8	117.2

Dille Tunnel

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Big Thompson River Below Lake Estes	kaf	5.6	2.5	0.6	0.3	0.3	2.3	2.2	12.4	6.8	3.2	1.8	0.9	38.9
North Fork Big Thompson River at Drake	kaf	1.2	0.6	0.4	0.3	0.2	0.3	1.6	1.6	0.9	0.6	0.4	0.3	8.4
Dille Skim Water Diverted	kaf	0.8	0.0	0.0	0.0	0.0	0.0	1.6	10.3	5.1	1.4	0.1	0.0	19.3
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	6.8	3.1	1.0	0.6	0.5	2.6	3.9	14.0	7.8	3.8	2.2	1.2	47.5
water diverted	kaf	4.4	0.7	0.0	0.0	0.0	0.0	1.6	11.6	5.4	1.4	0.1	0.0	25.2
% Diverted	%	81	13	0	0	0	0	29	214	100	25	1	0	
Big T @ Canyon Mouth	kaf	2.5	2.4	1.0	0.6	0.5	2.6	2.3	2.5	2.4	2.5	2.1	1.2	22.6

Trifurcation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Release from Flatiron	kaf	0.0	2.7	2.2	2.7	2.2	2.9	9.1	25.1	23.3	17.0	15.2	14.8	117.2
Release to 550 Canal	kaf	0.3	3.1	1.9	2.4	2.0	2.5	3.3	25.6	23.1	14.5	8.8	4.5	92.0
Dille Tunnel	kaf	4.4	0.7	0.0	0.0	0.0	0.0	1.6	11.6	5.4	1.4	0.1	0.0	25.2
Total release to river	kaf	4.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	5.3	9.3	21.9
Irrigation demand	kaf	5.5	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	5.3	9.3	22.8
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	5.5	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	5.3	9.3	22.8
Total delivery	kaf	4.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	5.3	9.3	21.9
% Required Delivery	%	83	100	0	0	0	0	100	100	100	100	100	100	
Shortage	kaf	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0

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Hansen Canal 550

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow from Flatiron	kaf	0.3	3.1	1.9	2.4	2.0	2.5	3.3	25.6	23.1	14.5	8.8	4.5	92.0
Maximum flow	kaf	16.4	30.8	31.8	31.8	28.7	31.8	30.8	31.8	30.8	31.8	31.8	30.8	359.1
Irrigation demand	kaf	0.8	0.5	0.3	0.3	0.3	0.3	0.4	0.6	0.5	1.1	1.1	1.0	7.2
Irrigation delivery	kaf	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.6	0.5	1.1	1.1	1.0	6.6
Minimum flow	kaf	1.5	1.5	1.5	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	17.9
Rel's to Horsetooth	kaf	0.3	3.1	1.9	2.4	2.0	2.5	3.3	25.6	23.1	14.5	8.8	4.5	92.0

Horsetooth Reservoir

Init Cont: 83.00 kaf
Elev: 5387.9 ft
Maximum Cont: 157.00 kaf
Elev: 5430.0 ft
Minimum Cont: 13.00 kaf
Elev: 5316.8 ft

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow	kaf	0.3	3.1	1.9	2.4	2.0	2.5	3.3	25.6	23.1	14.5	8.8	4.5	92.0
Total irrigation delivery	kaf	14.3	1.4	1.7	2.2	1.8	2.2	2.8	5.1	5.6	33.1	38.5	17.1	125.8
Evaporation loss	kaf	0.3	0.1	0.0	0.0	0.0	0.2	0.3	0.5	0.7	0.6	0.4	0.3	3.4
Seepage loss	kaf	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.1	2.0
End-Month Targets	kaf	70.0	70.0	70.0	70.0	70.0	70.0	70.0	156.0	156.0	156.0	156.0	156.0	
End-Month Content	kaf	68.7	70.0	70.0	70.0	70.0	70.0	70.0	89.9	106.5	87.2	56.9	43.7	
End-Month Elevation	ft	5377.55	5378.57	5378.57	5378.57	5378.57	5378.57	5378.57	5392.37	5402.79	5390.58	5368.37	5356.85	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.2	0.0	0.0	0.0	1.3
Irrigation demand	kaf	11.1	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.8	25.2	30.9	12.1	81.0
Metered Demand	kaf	2.3	1.1	1.5	1.7	1.5	1.6	2.2	4.0	4.3	6.9	5.9	3.8	36.8
Windy Gap demand	kaf	0.8	0.3	0.2	0.6	0.3	0.6	0.3	0.5	0.5	1.0	1.6	1.2	7.9
Total demand	kaf	14.3	1.4	1.7	2.2	1.8	2.2	2.8	5.1	5.6	33.1	38.5	17.1	125.8
Total irrigation	kaf	14.3	1.4	1.7	2.2	1.8	2.2	2.8	5.1	5.6	33.1	38.5	17.1	125.8
% 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-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total CBT Delivery	kaf	27.3	5.0	4.3	4.3	4.5	4.8	7.5	11.5	13.0	54.5	68.5	44.2	249.4



COLORADO - BIG THOMPSON MONTHLY OPERATIONS
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Windy Gap

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	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	1.0	1.0	1.0	1.1	0.9	1.1	0.4	1.0	1.9	2.2	2.9	2.7	17.2
Account Balance	kaf	-1.0	-2.0	-3.0	-4.1	-5.0	-6.0	-6.5	-7.4	-9.4	-11.6	-14.5	-17.2	

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PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Generation	gwh	18.600	18.000	18.600	18.600	16.800	18.600	18.000	18.600	18.000	18.600	18.600	18.000	219.000
Generation	gwh	6.700	1.900	1.800	1.800	1.600	1.700	1.200	0.600	0.700	0.700	0.800	8.900	28.400
% Maximum Generation	%	36	10	10	9	9	9	7	3	4	4	4	49	
Average	kwh/af	181	171	170	168	165	163	162	168	184	197	203	198	

Willow Creek Pumping

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	24.6	23.8	0.0	0.0	0.0	0.0	23.8	24.6	23.8	24.6	24.6	23.8	193.6
Actual Pumping	kaf	0.0	1.1	0.0	0.0	0.0	0.0	2.4	7.0	3.4	1.3	0.7	0.4	16.3
Pump Energy	gwh	0.000	0.200	0.000	0.000	0.000	0.000	0.500	1.500	0.700	0.300	0.100	0.100	3.400
% Maximum Pumping	%	0	5	0	0	0	0	10	29	14	5	3	2	68
Average	kwh/af	0	213	0	0	0	0	213	213	213	213	213	213	

Lake Granby Pumping

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	36.9	35.7	36.9	36.9	33.3	36.9	35.7	36.9	35.7	36.9	36.9	35.7	434.4
Actual Pumping	kaf	2.5	4.0	2.2	23.6	19.3	20.2	18.0	20.9	11.2	19.8	13.9	14.3	169.9
Pump Energy	gwh	0.300	0.600	0.300	3.300	2.700	2.900	2.600	3.000	1.600	2.900	2.000	2.100	24.300
% Maximum Pumping	%	7	11	6	64	58	55	50	57	31	54	38	40	
Average	kwh/af	141	141	141	141	142	143	144	145	144	145	146	147	

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Marys Lake Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Adams Tunnel Flow	kaf	3.6	4.1	2.2	24.8	20.2	20.9	19.7	33.8	32.7	24.9	15.4	14.9	217.2
Maximum Generation	gwh	6.200	6.200	6.400	6.400	5.800	6.400	6.200	6.400	6.200	6.400	6.400	6.200	75.200
Generation	gwh	0.000	0.300	0.000	4.500	3.600	3.700	3.500	6.400	6.200	4.600	2.600	2.500	37.900
% Maximum Generation	%	0	8	0	18	18	18	18	19	19	18	17	17	
Average	kwh/af	0	85	0	181	179	178	177	189	189	183	169	169	

Lake Estes Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Adams Tunnel Flow	kaf	3.6	4.1	2.2	24.8	20.2	20.9	19.7	33.8	32.7	24.9	15.4	14.9	217.2
Maximum Generation	gwh	16.000	15.500	16.000	16.000	14.500	16.000	15.500	16.000	15.500	16.000	16.000	15.500	188.500
Generation	gwh	1.400	1.500	0.300	11.200	8.900	9.200	8.700	15.900	15.400	11.700	7.200	7.100	98.500
% Maximum Generation	%	9	10	2	70	62	58	56	99	100	73	45	46	
Average	kwh/af	384	370	131	452	442	443	441	471	472	471	471	474	

Pole Hill Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Olympus Tunnel Flow	kaf	33.8	32.7	33.8	33.8	30.5	33.8	32.7	33.8	32.7	33.8	33.8	32.7	397.9
Maximum Generation	gwh	25.000	25.000	25.800	25.800	23.300	25.800	25.000	25.800	25.000	25.800	25.800	25.000	303.100
Generation	gwh	0.000	1.400	0.000	18.700	14.600	14.900	18.900	25.800	24.900	18.200	10.300	10.100	157.800
% Maximum Generation	%	0	5	0	72	63	58	76	100	100	71	40	40	
Average	kwh/af	0	41	0	552	479	440	576	763	760	538	306	308	

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Flatiron Units 1 and 2 Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow to Flatiron	kaf	0.0	2.7	2.2	24.7	20.1	20.8	25.0	33.8	32.6	24.6	15.2	14.8	216.5
Maximum Generation	gwh	32.200	31.200	32.200	32.200	29.100	32.200	31.200	32.200	31.200	32.200	32.200	31.200	379.300
Generation	gwh	0.000	1.900	0.700	20.600	16.600	17.000	21.200	32.200	31.000	22.000	11.700	11.400	186.300
% Maximum Generation	%	0	6	2	64	57	53	68	100	99	68	36	37	
Average	kwh/af	0	706	345	836	825	818	849	953	950	894	774	775	

Flatiron Unit 3 Pump/Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	6.2	0.0	23.1	22.0	17.9	17.9	15.9	15.6	15.1	16.1	18.8	21.2	189.8
Pump from Flatiron	kaf	0.0	0.0	0.0	22.0	17.9	17.9	15.9	8.7	9.3	7.6	0.0	0.0	99.3
Pump Energy	gwh	0.000	0.000	0.000	6.600	5.700	6.100	5.700	3.200	3.400	2.800	0.000	0.000	33.500
% Maximum Pumping	%	0	0	0	100	100	100	100	56	62	47	0	0	
Average	kwh/af	0	0	0	301	322	340	357	366	366	364	0	0	
Maximum Turbine 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
Carter to Flatiron	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Actual Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Big Thompson Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total release	kaf	3.7	0.0	0.0	0.0	0.0	0.0	7.0	10.4	5.1	2.7	5.4	9.3	43.6
Turbine release	kaf	3.7	0.0	0.0	0.0	0.0	0.0	7.0	10.4	5.1	2.7	5.4	9.3	43.6
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	0.000	0.000	0.000	0.000	0.000	3.700	3.800	3.700	3.800	3.800	3.700	26.300
Generation	gwh	0.300	0.000	0.000	0.000	0.000	0.000	0.800	1.500	0.500	0.000	0.500	1.300	4.900
% Maximum Generation	%	9	0	0	0	0	0	22	38	12	1	13	34	
Average	kwh/af	91	0	0	0	0	0	118	139	90	17	95	135	



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Project Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total Generation	gwh	8.400	7.000	2.800	56.800	45.400	46.600	54.200	82.400	78.600	57.300	33.200	41.200	513.900
Total Max Generation	gwh	101.800	95.900	99.100	99.100	89.500	99.100	99.600	102.900	99.600	102.900	102.900	99.600	1192.000

Project Pump Energy

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Granby	gwh	0.300	0.600	0.300	3.300	2.700	2.900	2.600	3.000	1.600	2.900	2.000	2.100	24.300
Willow Creek	gwh	0.000	0.200	0.000	0.000	0.000	0.000	0.500	1.500	0.700	0.300	0.100	0.100	3.400
Flatiron Unit 3	gwh	0.000	0.000	0.000	6.600	5.700	6.100	5.700	3.200	3.400	2.800	0.000	0.000	33.500
Total Pump Energy	gwh	0.300	0.800	0.300	10.000	8.500	9.000	8.800	7.700	5.800	5.900	2.200	2.200	61.500

B-7: C-BT October 2017 Maximum Reasonable Plan for Water Year 2018



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HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Dillon Inflow	kaf	14.2	9.1	6.6	5.4	4.4	6.8	17.8	78.0	132.4	69.3	29.2	16.1	389.3
DL to GM Gain	kaf	8.4	6.1	4.8	4.2	3.7	6.8	14.6	48.3	82.5	49.2	20.9	10.3	259.8

Green Mountain Reservoir		Init Cont:			Maximum Cont:			Minimum Cont:						Total
		105.00 kaf			154.60 kaf			8.00 kaf						
		Elev:			Elev:			Elev:						
		7924.3 ft			7950.4 ft			7804.7 ft						
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	
Undepleted Inflow	kaf	22.6	15.3	11.4	9.6	8.1	13.6	32.4	126.3	220.3	120.5	51.1	26.5	657.7
Depletion	kaf	1.9	1.1	-0.2	-1.0	-1.5	-0.1	5.5	33.8	51.5	22.1	5.2	2.8	121.1
Depleted Inflow	kaf	20.7	14.2	11.6	10.6	9.7	13.7	26.9	92.5	168.7	98.4	45.8	23.8	536.6
Turbine Release	kaf	46.4	16.4	16.0	16.0	14.5	16.1	43.0	87.0	84.2	78.2	45.3	70.7	533.8
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	754	276	260	261	261	262	723	1415	1415	1272	736	1188	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	46.4	16.4	16.0	16.0	14.5	16.1	43.0	87.0	84.2	78.2	45.3	70.7	533.8
Evaporation	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.5	0.7	0.6	0.4	3.0
End-Month Targets	kaf	78.4	64.0	64.0	64.0	64.0	64.0	152.6	152.6	152.6	152.6	152.6	105.3	
End-Month Contents	kaf	79.4	77.1	72.7	67.3	62.4	60.0	43.7	49.0	133.1	152.6	152.6	105.3	
End-Month Elevation	ft	7906.71	7904.98	7901.52	7897.03	7892.76	7890.50	7873.40	7879.44	7939.86	7949.51	7949.51	7924.34	

Willow Creek Reservoir		Init Cont: 6.00 kaf			Maximum Cont: 10.20 kaf				Minimum Cont: 7.20 kaf					
		Elev: 8111.7 ft			Elev: 8128.8 ft				Elev: 8116.9 ft					
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	2.6	1.8	1.4	1.1	1.0	2.7	10.4	46.5	39.3	8.6	3.5	2.2	121.1
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
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	1.1	9.9	45.8	38.9	8.1	3.0	0.0	106.8
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	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	6.1
Evaporation	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.6
End-Month Targets	kaf	9.0	7.2	7.6	8.2	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
End-Month Contents	kaf	8.3	7.2	8.1	8.8	9.5	10.6	10.7	10.8	10.7	10.6	10.6	8.5	
End-Month Elevation	ft	8121.70	8116.90	8121.00	8123.82	8126.23	8130.17	8130.46	8130.96	8130.37	8130.19	8130.09	8122.54	

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Granby Reservoir		Init Cont:			Maximum Cont:			Minimum Cont:						
		Elev:	518.00	kaf	Elev:	539.80	kaf	Elev:	76.50	kaf				
			8277.0	ft		8280.0	ft			8186.9	ft			
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	6.3	3.5	2.4	1.9	1.7	3.7	12.9	41.1	74.6	35.8	10.4	5.5	199.8
Release from Shadow Mtn	kaf	7.0	3.9	2.8	1.2	1.1	1.2	2.9	34.3	72.8	16.7	3.0	2.1	149.0
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	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	6.1
Total Inflow	kaf	13.4	9.9	5.1	3.2	2.8	5.0	15.8	75.4	147.4	52.5	13.4	11.3	355.2
Minimum River Release	kaf	1.2	1.2	1.2	1.2	1.1	1.2	1.2	4.6	4.5	4.6	2.5	1.2	25.7
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	0.6	0.0	0.0	0.0	0.0	19.6	140.5	45.6	4.6	0.0	210.9
Total River Release	kaf	1.2	1.2	1.2	1.2	1.1	1.2	1.2	4.6	4.5	4.6	4.6	4.4	31.0
Pumped to Shadow Mtn	kaf	0.2	1.1	1.6	22.4	18.3	17.2	5.7	0.4	0.0	0.0	3.8	9.2	79.9
Evaporation	kaf	1.7	0.7	0.0	0.0	0.0	0.9	1.6	2.5	3.2	3.0	2.3	2.1	18.0
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	528.2	534.8	536.2	515.4	498.5	483.8	490.8	538.7	537.6	536.6	534.4	529.7	
End-Month Elevation	ft	8278.40	8279.31	8279.50	8276.61	8274.21	8272.11	8273.11	8279.85	8279.70	8279.57	8279.26	8278.61	
Shadow Mountain Reservoir		Init Cont:			Maximum Cont:			Minimum Cont:						
		Elev:	17.00	kaf	Elev:	18.40	kaf	Elev:	16.60	kaf				
			8366.7	ft		8367.0	ft			8366.0	ft			
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Native Inflow	kaf	8.9	4.7	3.1	2.6	2.2	4.9	17.1	51.6	89.9	42.3	15.1	8.3	250.7
Pumped from Granby	kaf	0.2	1.1	1.6	22.4	18.3	17.2	5.7	0.4	0.0	0.0	3.8	9.2	79.9
Total Inflow	kaf	9.1	5.8	4.7	24.9	20.6	22.1	22.8	52.1	89.9	42.3	19.0	17.5	330.8
Minimum River Release	kaf	2.2	2.7	2.8	1.2	1.1	1.2	1.2	1.2	3.0	3.1	2.5	2.1	24.3
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	7.0	3.9	2.8	1.2	1.1	1.2	2.9	34.3	72.8	16.7	3.0	2.1	149.0
Adams Tunnel Flow	kaf	1.8	1.7	1.9	23.7	19.5	20.6	19.5	17.2	16.3	24.9	15.4	14.9	177.4
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	16.9	16.9	16.9	16.9	
End-Month Elevation	ft	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	8366.62	
Adams Tunnel														
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Tunnel Capacity	kaf	4.4	16.1	33.8	33.8	30.5	33.8	32.7	33.8	32.7	24.9	15.4	14.9	306.8
Actual Diversion	kaf	1.8	1.7	1.9	23.7	19.5	20.6	19.5	17.2	16.3	24.9	15.4	14.9	177.4
% Maximum Delivery	%	42	11	6	70	64	61	60	51	50	100	100	100	

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Lake Estes

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Big Thompson Inflow	kaf	2.4	1.6	1.1	1.4	4.9	13.1	29.0	48.6	34.5	14.7	6.6	4.6	162.5
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	4.2	2.4	1.1	1.4	4.9	13.1	15.7	31.7	17.9	12.9	6.3	3.7	115.3
Max Diversion Available	kaf	0.0	0.2	0.0	0.3	3.5	11.5	26.8	41.6	27.0	7.0	0.3	0.9	119.1
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0	20.9	0.0	0.0	0.0	37.9
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	13.3	0.1	0.0	1.8	0.3	0.9	16.4
% Maximum Diversion	%	0	0	0	0	0	0	50	41	77	26	101	100	
Irrigation Demand	kaf	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	1.3
Irrigation Delivery	kaf	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	1.2
Total River Release	kaf	4.2	2.4	1.1	1.4	4.9	13.1	15.7	31.7	17.9	12.9	6.3	3.7	115.3

Olympus Tunnel

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Tunnel Capacity	kaf	33.8	32.7	33.8	33.8	30.5	33.8	32.7	33.8	32.7	33.8	33.8	32.7	397.9
Actual Delivery	kaf	0.0	0.9	1.8	23.7	19.4	20.6	32.7	33.8	32.7	26.5	15.5	15.7	223.3
% Maximum Delivery	%	0	3	5	70	63	61	100	100	100	78	46	48	
Inflow to Flatiron	kaf	0.0	0.9	1.8	23.7	19.4	20.6	32.7	33.8	32.7	26.5	15.5	15.7	223.3

Carter Lake

		Init Cont: 67.00 kaf			Maximum Cont: 112.20 kaf			Minimum Cont: 6.00 kaf						
		Elev: 5716.4 ft			Elev: 5759.0 ft			Elev: 5626.8 ft						
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Pumped from Flatiron	kaf	0.0	0.0	0.0	21.8	17.7	17.8	15.7	4.8	8.6	7.8	0.0	0.0	94.2
Carter to Flatiron	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
Evaporation Loss	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.3	0.4	0.5	0.5	0.3	0.3	2.7
Seepage Loss	kaf	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	1.8
End-Month Targets	kaf	40.0	40.0	40.0	112.0	112.0	112.0	112.0	112.0	112.0	20.0	20.0	20.0	
End-Month Contents	kaf	59.5	56.3	53.1	72.0	86.5	100.8	111.6	109.0	107.7	98.5	78.0	62.6	
End-Month Elevation	ft	5708.11	5704.65	5701.01	5721.28	5735.48	5748.28	5758.01	5756.02	5754.54	5746.71	5727.27	5711.48	
Priority Water Diverted to Carter	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.6
Irrigation Demand	kaf	7.2	2.2	2.4	2.2	2.5	2.7	4.4	6.4	7.8	15.2	18.7	13.5	85.2
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	0.2	0.8	0.7	0.5	0.6	0.5	0.1	0.4	1.4	1.2	1.3	1.5	9.2
Total Demand	kaf	7.4	2.9	3.1	2.7	3.1	3.2	4.5	6.8	9.3	16.4	20.0	15.0	94.4
Total Delivery	kaf	7.4	2.9	3.1	2.7	3.1	3.2	4.5	6.8	9.3	16.4	20.0	15.0	94.4
% 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

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Hansen Canal 930

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	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	51.6	57.2	55.3	57.2	55.3	57.2	57.2	55.3	673.2
Actual Flow	kaf	0.0	0.9	1.8	1.8	1.7	2.8	17.0	29.0	24.1	18.7	15.5	15.7	129.0

Dille Tunnel

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Big Thompson River Below Lake Estes	kaf	4.2	2.4	1.1	1.4	4.9	13.1	15.7	31.7	17.9	12.9	6.3	3.7	115.3
North Fork Big Thompson River at Drake	kaf	1.7	1.0	0.6	0.4	1.1	3.3	7.8	10.1	6.4	3.6	1.9	1.4	39.3
Dille Skim Water Diverted	kaf	1.7	0.0	0.0	0.0	0.0	0.0	9.5	20.9	14.8	13.8	5.8	2.7	69.2
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	6.0	3.4	1.7	1.8	6.0	16.4	23.5	41.9	24.3	16.5	8.3	5.1	154.9
water diverted	kaf	3.5	0.0	0.0	0.0	0.0	0.0	9.5	21.2	19.2	13.8	5.8	2.7	75.7
% Diverted	%	65	1	0	0	0	0	177	393	355	255	107	51	
Big T @ Canyon Mouth	kaf	2.5	3.4	1.7	1.8	6.0	16.4	13.9	20.7	5.1	2.7	2.5	2.4	79.1

Trifurcation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Release from Flatiron	kaf	0.0	0.9	1.8	1.8	1.7	2.8	17.0	29.0	24.1	18.7	15.5	15.7	129.0
Release to 550 Canal	kaf	0.0	0.7	1.5	1.5	1.4	2.5	3.2	27.7	27.5	14.6	10.8	9.1	100.5
Dille Tunnel	kaf	3.5	0.0	0.0	0.0	0.0	0.0	9.5	21.2	19.2	13.8	5.8	2.7	75.7
Total release to river	kaf	2.8	1.3	0.0	0.0	0.0	0.0	0.1	1.0	0.6	1.4	3.6	4.8	15.6
Irrigation demand	kaf	2.8	1.3	0.0	0.0	0.0	0.0	0.1	1.0	0.6	1.4	3.6	4.8	15.6
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	2.8	1.3	0.0	0.0	0.0	0.0	0.1	1.0	0.6	1.4	3.6	4.8	15.6
Total delivery	kaf	2.8	1.3	0.0	0.0	0.0	0.0	0.1	1.0	0.6	1.4	3.6	4.8	15.6
% Required Delivery	%	100	100	0	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-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow from Flatiron	kaf	0.0	0.7	1.5	1.5	1.4	2.5	3.2	27.7	27.5	14.6	10.8	9.1	100.5
Maximum flow	kaf	16.4	30.8	31.8	31.8	28.7	31.8	30.8	31.8	30.8	31.8	31.8	30.8	359.1
Irrigation demand	kaf	0.8	0.4	0.3	0.3	0.3	0.3	0.4	0.6	0.4	0.9	0.8	0.9	6.4
Irrigation delivery	kaf	0.4	0.2	0.3	0.3	0.3	0.3	0.4	0.6	0.4	0.9	0.8	0.9	5.8
Minimum flow	kaf	1.5	1.5	1.5	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	17.9
Rel's to Horsetooth	kaf	0.0	0.7	1.5	1.5	1.4	2.5	3.2	27.7	27.5	14.6	10.8	9.1	100.5

Horsetooth Reservoir

Init Cont: 83.00 kaf
Elev: 5387.9 ft
Maximum Cont: 157.00 kaf
Elev: 5430.0 ft
Minimum Cont: 13.00 kaf
Elev: 5316.8 ft

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow	kaf	0.0	0.7	1.5	1.5	1.4	2.5	3.2	27.7	27.5	14.6	10.8	9.1	100.5
Total irrigation delivery	kaf	10.1	1.4	1.7	2.2	1.8	2.2	2.7	7.8	7.4	21.9	25.0	10.9	95.1
Evaporation loss	kaf	0.3	0.1	0.0	0.0	0.0	0.2	0.3	0.5	0.7	0.7	0.5	0.4	3.7
Seepage loss	kaf	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.1	2.0
End-Month Targets	kaf	70.0	70.0	70.0	70.0	70.0	70.0	70.0	156.0	156.0	156.0	156.0	156.0	
End-Month Content	kaf	72.6	71.6	71.4	70.6	70.0	70.0	70.0	89.2	108.4	100.2	85.3	83.0	
End-Month Elevation	ft	5380.45	5379.75	5379.53	5378.96	5378.57	5378.57	5378.57	5391.94	5403.91	5398.95	5389.34	5387.75	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.8	19.9	0.0	0.0	0.0	35.7
Irrigation demand	kaf	7.1	0.0	0.0	0.0	0.0	0.0	0.3	3.4	2.8	14.3	17.9	6.1	51.9
Metered Demand	kaf	2.2	1.1	1.5	1.6	1.5	1.6	2.2	3.8	4.1	6.6	5.5	3.6	35.3
Windy Gap demand	kaf	0.8	0.3	0.2	0.6	0.3	0.6	0.3	0.5	0.5	1.0	1.6	1.2	7.9
Total demand	kaf	10.1	1.4	1.7	2.2	1.8	2.2	2.7	7.8	7.4	21.9	25.0	10.9	95.1
Total irrigation	kaf	10.1	1.4	1.7	2.2	1.8	2.2	2.7	7.8	7.4	21.9	25.0	10.9	95.1
% 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-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total CBT Delivery	kaf	19.7	4.9	4.2	4.2	4.4	4.7	7.4	15.4	15.9	38.6	46.7	28.9	195.0



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



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CBT October 2017 Max Reasonable: 01-OCT-2017

Windy Gap

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	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	-2.6	0.0	0.0	0.0	0.0	-4.2	0.0	0.0	-0.3	0.0	-7.1
Total Delivery	kaf	1.0	1.0	1.0	1.1	0.9	1.1	0.4	1.0	1.9	2.2	2.9	2.7	17.2
Account Balance	kaf	-1.0	-2.0	0.0	-1.0	-1.9	-3.0	-3.4	0.0	0.0	0.0	-0.9	-3.7	

CBT October 2017 Max Reasonable: 01-OCT-2017

PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Generation	gwh	18.600	18.000	18.600	18.600	16.800	18.600	18.000	18.600	18.000	18.600	18.600	18.000	219.000
Generation	gwh	8.400	2.800	2.700	2.700	2.300	2.600	6.600	12.200	15.100	16.400	9.600	14.200	95.600
% Maximum Generation	%	45	16	15	14	14	14	37	66	84	88	52	79	
Average	kwh/af	181	171	169	165	162	159	154	140	180	210	212	201	

Willow Creek Pumping

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	24.6	23.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.8	72.2
Actual Pumping	kaf	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	6.1
Pump Energy	gwh	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.800	1.300
% Maximum Pumping	%	0	10	0	0	0	0	0	0	0	0	0	16	26
Average	kwh/af	0	213	0	0	0	0	0	0	0	0	0	213	

Lake Granby Pumping

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	36.9	35.7	36.9	36.9	33.3	36.9	35.7	36.9	35.7	36.9	36.9	35.7	434.4
Actual Pumping	kaf	0.2	1.1	1.6	22.4	18.3	17.2	5.7	0.4	0.0	0.0	3.8	9.2	79.9
Pump Energy	gwh	0.000	0.200	0.200	3.100	2.600	2.400	0.800	0.100	0.000	0.000	0.500	1.300	11.200
% Maximum Pumping	%	1	3	4	61	55	47	16	1	0	0	10	26	
Average	kwh/af	141	140	140	140	141	142	143	142	0	0	140	140	

CBT October 2017 Max Reasonable: 01-OCT-2017

Marys Lake Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Adams Tunnel Flow	kaf	1.8	1.7	1.9	23.7	19.5	20.6	19.5	17.2	16.3	24.9	15.4	14.9	177.4
Maximum Generation	gwh	6.200	6.200	6.400	6.400	5.800	6.400	6.200	6.400	6.200	6.400	6.400	6.200	75.200
Generation	gwh	0.000	0.000	0.000	4.300	3.500	3.700	3.500	3.100	2.700	4.600	2.600	2.500	30.500
% Maximum Generation	%	0	0	0	18	18	18	18	18	17	18	17	17	
Average	kwh/af	0	0	0	181	179	178	177	180	167	183	169	169	

Lake Estes Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Adams Tunnel Flow	kaf	1.8	1.7	1.9	23.7	19.5	20.6	19.5	17.2	16.3	24.9	15.4	14.9	177.4
Maximum Generation	gwh	16.000	15.500	16.000	16.000	14.500	16.000	15.500	16.000	15.500	16.000	16.000	15.500	188.500
Generation	gwh	0.400	0.300	0.200	10.600	8.600	9.100	8.600	8.000	7.300	11.700	7.300	7.100	79.200
% Maximum Generation	%	2	2	2	66	59	57	56	50	47	73	45	46	
Average	kwh/af	211	186	131	447	442	443	442	464	448	472	474	476	

Pole Hill Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Olympus Tunnel Flow	kaf	33.8	32.7	33.8	33.8	30.5	33.8	32.7	33.8	32.7	33.8	33.8	32.7	397.9
Maximum Generation	gwh	25.000	25.000	25.800	25.800	23.300	25.800	25.000	25.800	25.000	25.800	25.800	25.000	303.100
Generation	gwh	0.000	0.000	0.000	17.600	14.000	14.700	25.000	25.800	25.000	19.700	10.600	10.800	163.200
% Maximum Generation	%	0	0	0	68	60	57	100	100	100	76	41	43	
Average	kwh/af	0	0	0	521	457	434	763	763	763	583	314	330	

CBT October 2017 Max Reasonable: 01-OCT-2017

Flatiron Units 1 and 2 Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Inflow to Flatiron	kaf	0.0	0.9	1.8	23.7	19.4	20.6	32.7	33.8	32.7	26.5	15.5	15.7	223.3
Maximum Generation	gwh	32.200	31.200	32.200	32.200	29.100	32.200	31.200	32.200	31.200	32.200	32.200	31.200	379.300
Generation	gwh	0.000	0.300	0.500	19.700	15.900	16.800	31.200	32.200	31.200	23.900	12.100	12.300	196.100
% Maximum Generation	%	0	1	1	61	55	52	100	100	100	74	37	39	
Average	kwh/af	0	304	263	832	821	817	953	953	953	903	778	785	

Flatiron Unit 3 Pump/Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Maximum Pumping	kaf	6.2	0.0	22.9	21.8	17.7	17.8	15.7	15.7	15.6	16.4	18.4	20.0	188.2
Pump from Flatiron	kaf	0.0	0.0	0.0	21.8	17.7	17.8	15.7	4.8	8.6	7.8	0.0	0.0	94.2
Pump Energy	gwh	0.000	0.000	0.000	6.600	5.700	6.100	5.600	1.800	3.100	2.800	0.000	0.000	31.700
% Maximum Pumping	%	0	0	0	100	100	100	100	31	55	48	0	0	
Average	kwh/af	0	0	0	303	324	342	358	366	360	360	0	0	
Maximum Turbine 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
Carter to Flatiron	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Actual Generation	gwh	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Big Thompson Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total release	kaf	3.1	0.0	0.0	0.0	0.0	0.0	23.0	22.0	15.4	17.0	9.7	8.5	98.7
Turbine release	kaf	3.1	0.0	0.0	0.0	0.0	0.0	23.0	22.0	15.4	17.0	9.7	8.5	98.7
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	0.000	0.000	0.000	0.000	0.000	3.700	3.800	3.700	3.800	3.800	3.700	26.300
Generation	gwh	0.100	0.000	0.000	0.000	0.000	0.000	3.600	3.400	2.400	2.600	1.300	1.100	14.500
% Maximum Generation	%	4	0	0	0	0	0	97	90	63	68	34	30	
Average	kwh/af	44	0	0	0	0	0	157	157	153	155	135	130	

CBT October 2017 Max Reasonable: 01-OCT-2017

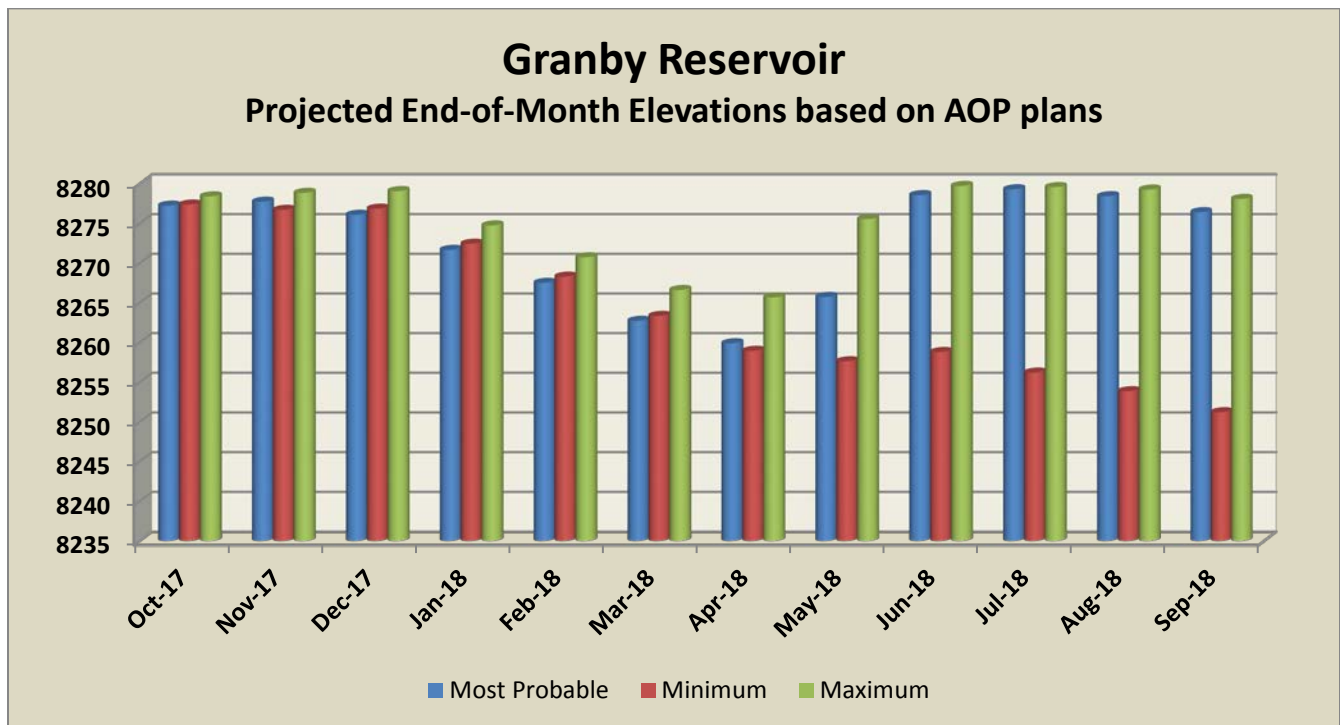
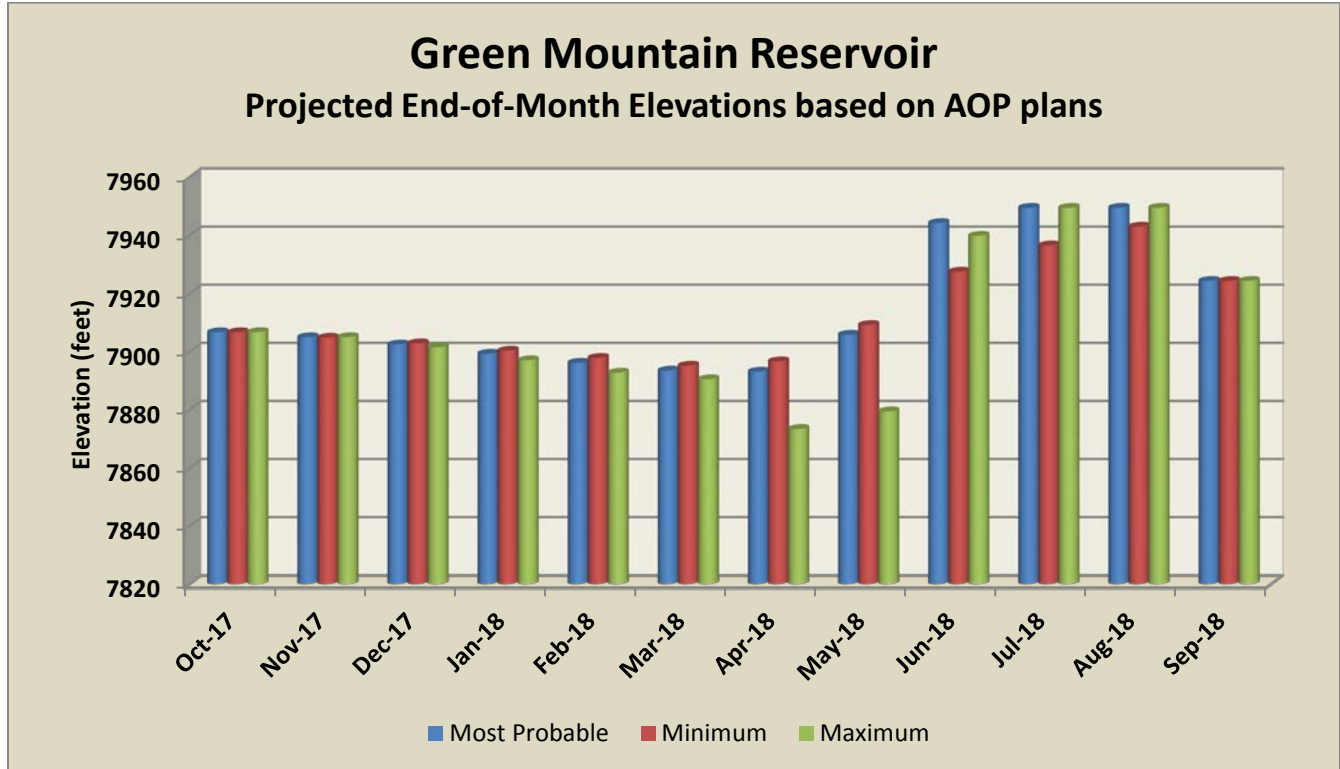
Project Generation

		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Total Generation	gwh	8.900	3.400	3.400	54.800	44.300	46.900	78.500	84.700	83.700	79.000	43.500	48.000	579.100
Total Max Generation	gwh	101.800	95.900	99.100	99.100	89.500	99.100	99.600	102.900	99.600	102.900	102.900	99.600	1192.000

Project Pump Energy

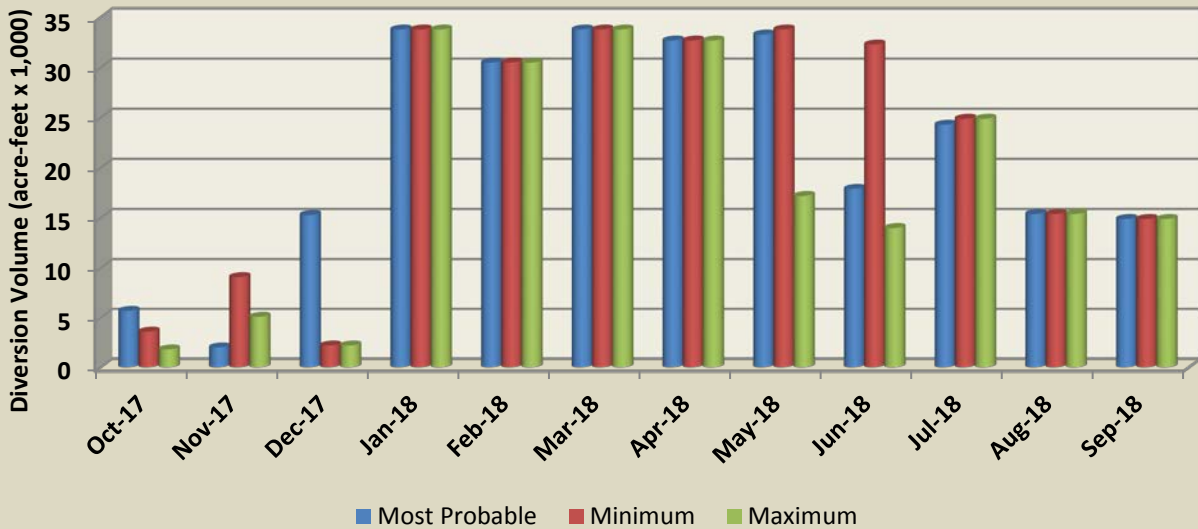
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Total
Granby	gwh	0.000	0.200	0.200	3.100	2.600	2.400	0.800	0.100	0.000	0.000	0.500	1.300	11.200
Willow Creek	gwh	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.800	1.300
Flatiron Unit 3	gwh	0.000	0.000	0.000	6.600	5.700	6.100	5.600	1.800	3.100	2.800	0.000	0.000	31.700
Total Pump Energy	gwh	0.000	0.700	0.200	9.700	8.300	8.500	6.500	1.800	3.100	2.800	0.500	2.100	44.200

B-8: Water Year 2018 Plan Summary Charts



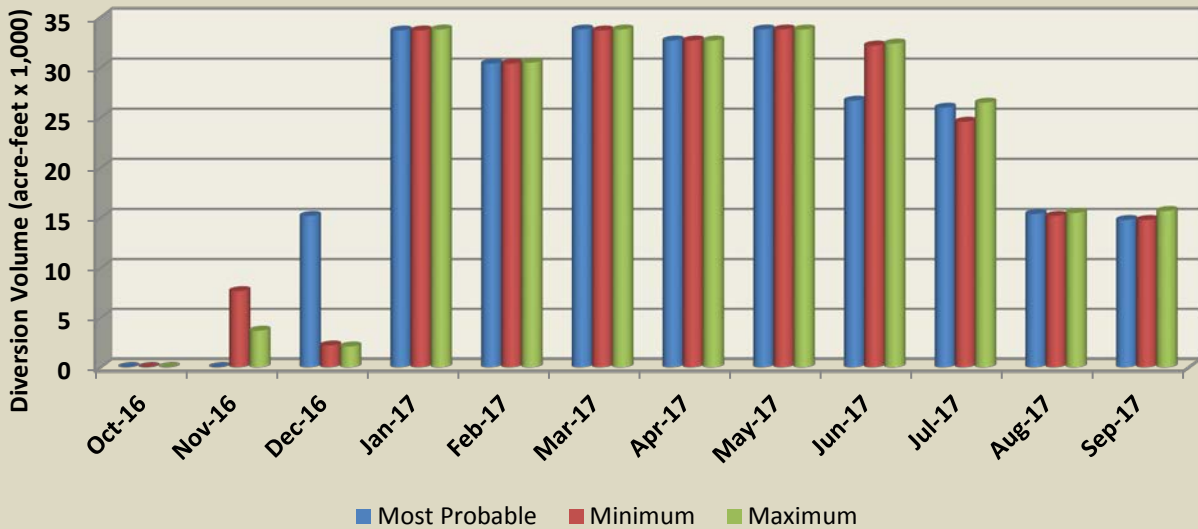
Adams Tunnel

Projected Monthly Total Diversion Volumes



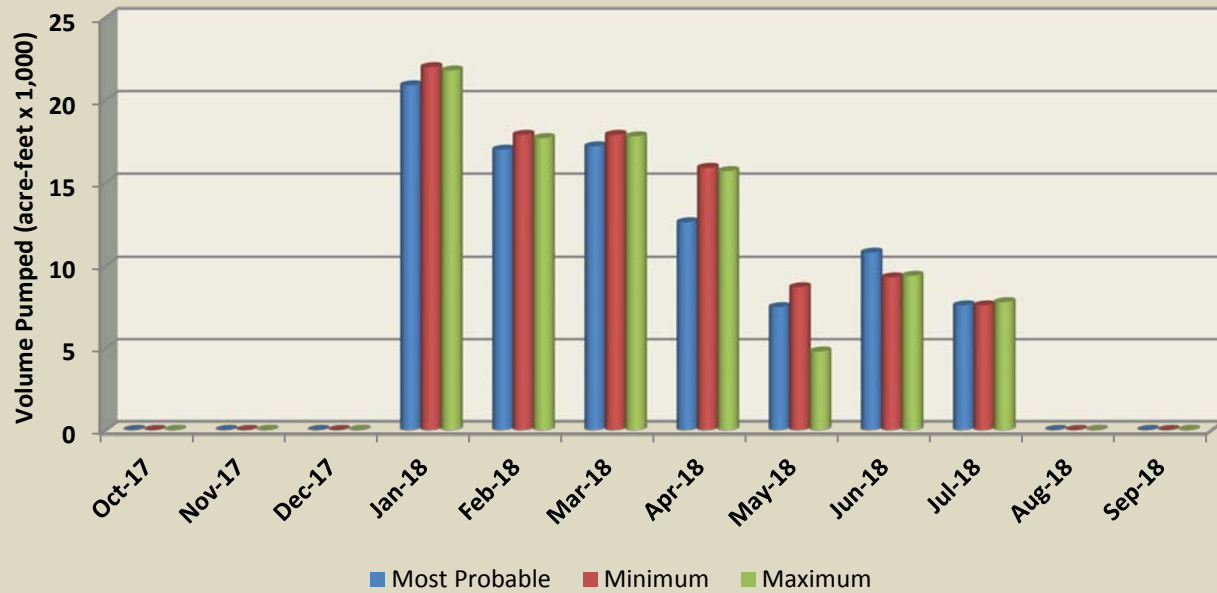
Olympus Tunnel

Projected Monthly Total Diversion Volumes



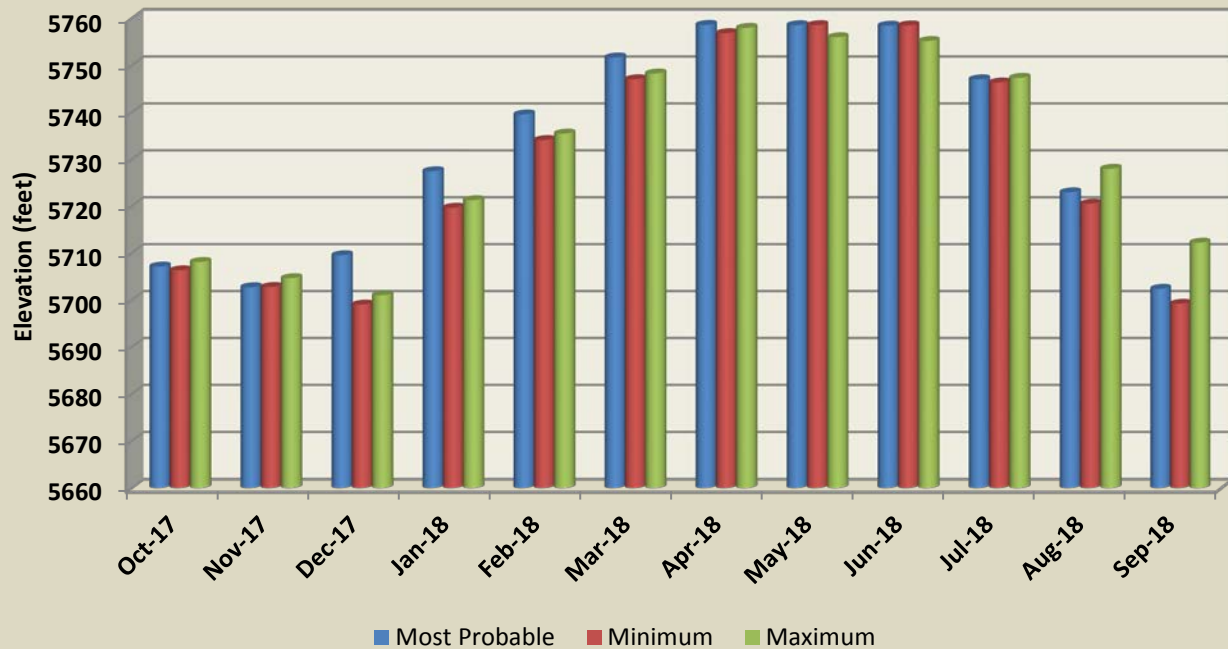
Carter Reservoir

Projected Total Monthly Pumping Volumes based on AOP plans



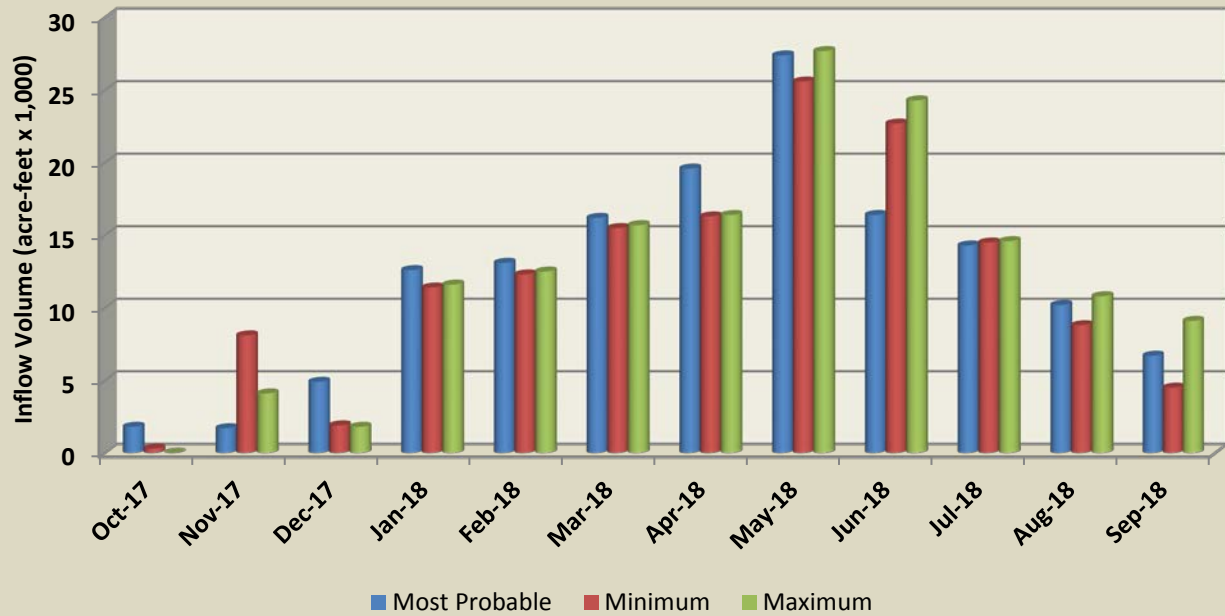
Carter Reservoir

Projected End-of-Month Elevations based on AOP plans



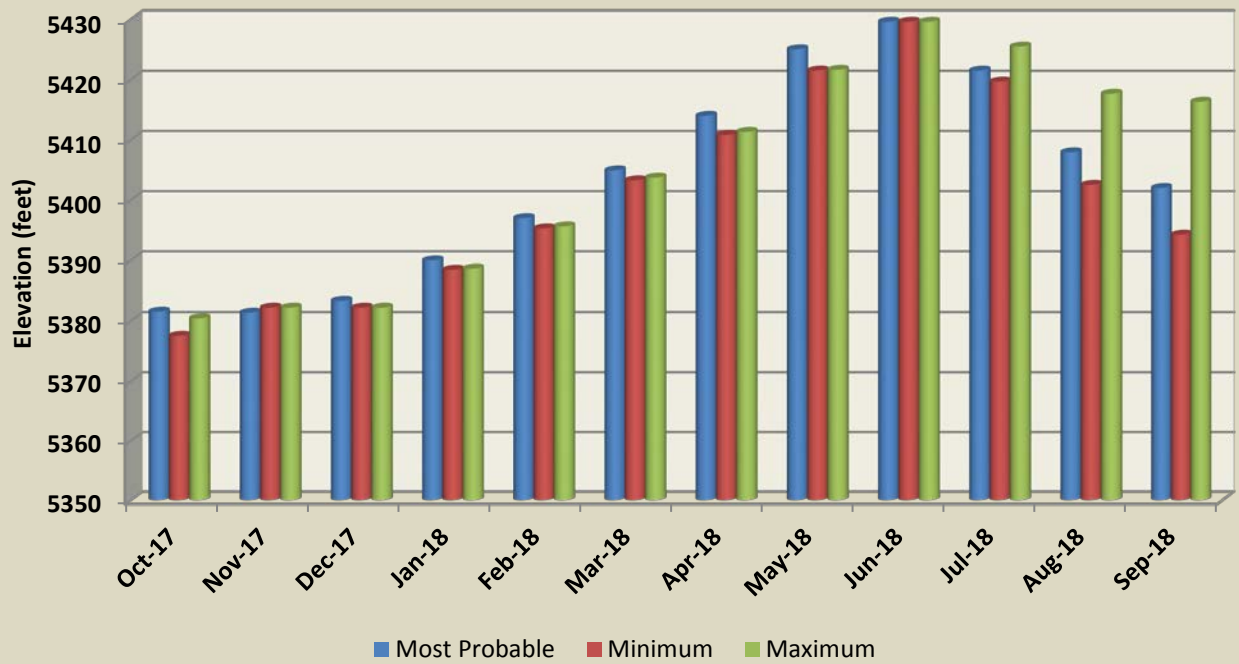
Horsetooth Reservoir

Projected Total Monthly Inflow Volumes based on AOP plans



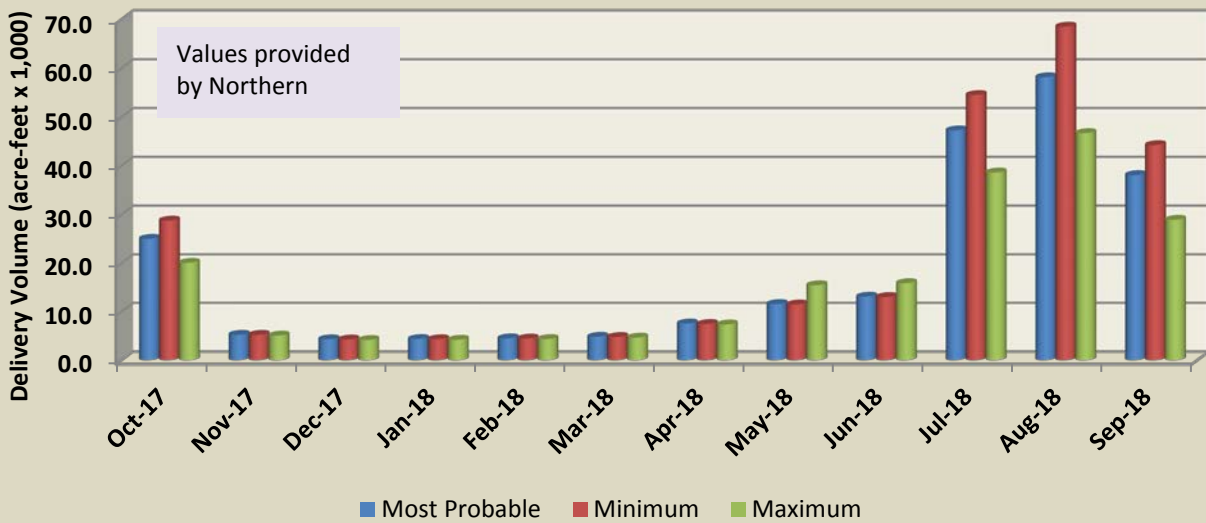
Horsetooth Reservoir

Projected End-of-Month Elevations based on AOP plans



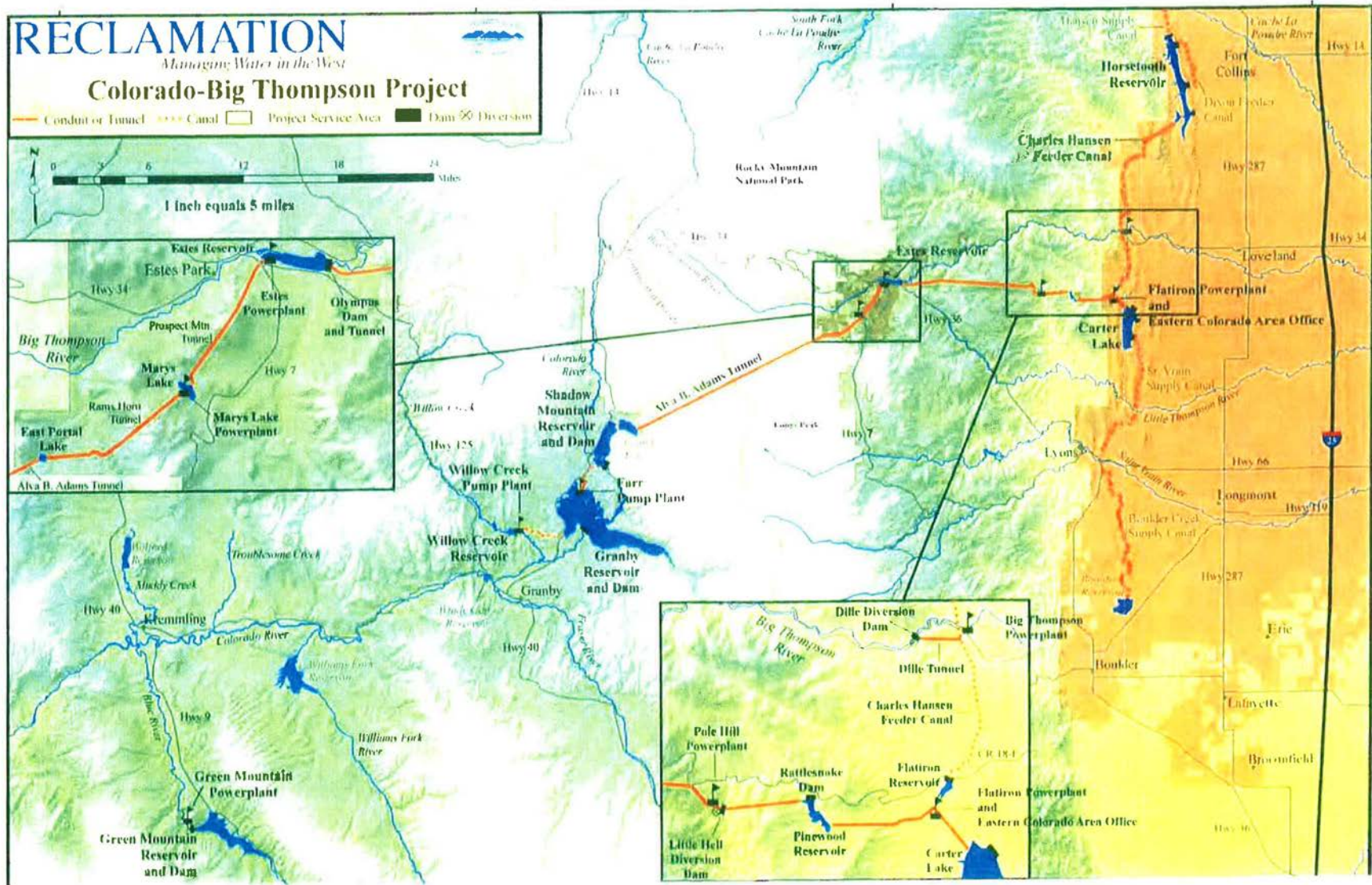
C-BT Deliveries

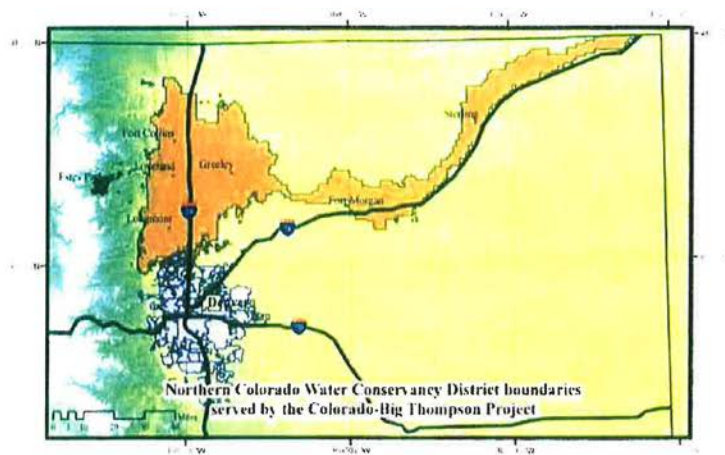
Projected Total Monthly Deliveries of C-BT water



APPENDIX C—EXHIBITS

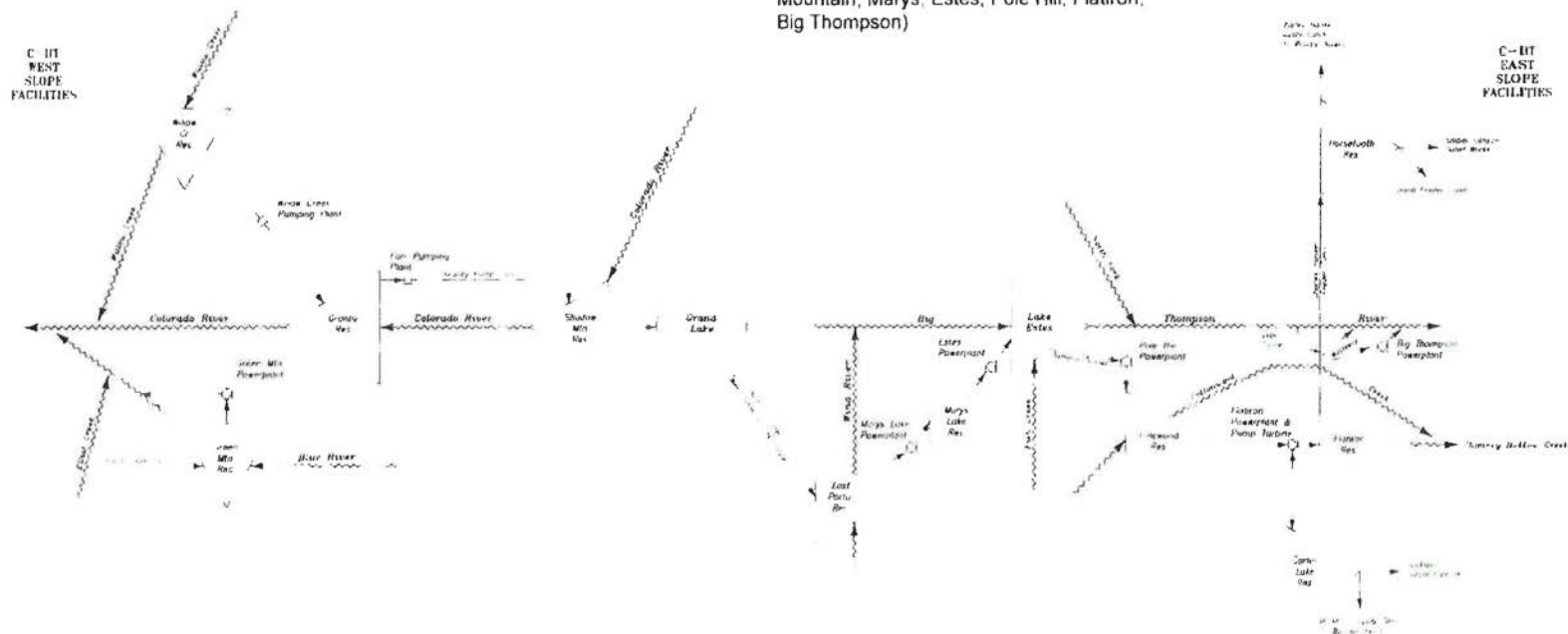
C-1: Publicity Map, Extents, Facts and Connectivity Schematic of the Colorado-Big Thompson Project



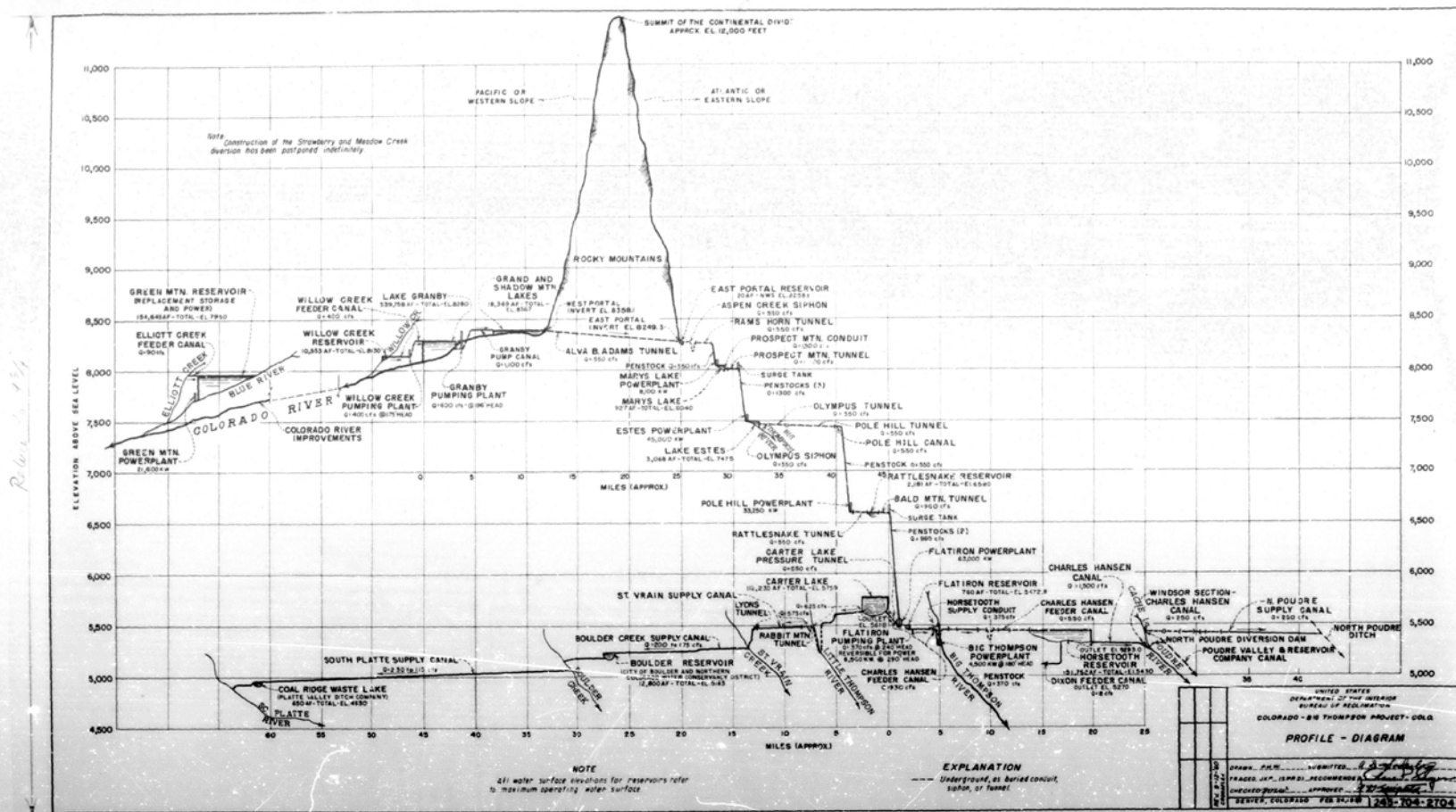


Colorado-Big Thompson Facts

- 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 Horseshoe)
- 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-SIXTH ANNUAL REPORT OF THE WESTERN DIVISION SYSTEM POWER OPERATIONS

PREFACE

This is the sixty-fifth 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 Fryingpan 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 WY 2017 and the other part presents the plan of generation and pumping operations for WY 2018.

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

WY 2017—Generation and Pump Energy Summary

Power generation for WY 2017 for the C-BT and the Fry Ark projects was average, while much of the System was above average. Most powerplants in the C-BT and Fry Ark projects produced average power, while many plants in Wyoming and Montana had above average production.

In the C-BT, demands for water were average to above average for WY 2017, and that translated into average diversions of project water, with above average power generation for the first nine months of WY 2017. The Maitland siphon repair work in the C-BT and its impact on the Foothills Power Arm caused the C-BT to end WY 2017 at average for power generation.

The C-BT powerplants produced an accumulated gross generation total of 605 gigawatt hours (GWh) of electricity representing 100 percent of its 30 year average. Meanwhile, the gross generation produced by the entire System was 2,882.2 GWh or 109 percent of the 30 year average. Gross generation includes one-half of the Yellowtail generation. Total 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 total generation for WY 2017 was 2,477 GWh. The average for a water year is 2,400.7 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 total generation for every powerplant in the system. Table A-3 shows monthly generation and pumping energy, by plant, as well as monthly System loads for WY 2017. The total energy that was required to operate the pumps in the System is included in Table A-2. Some of the numbers included in this section were provided by WAPA.

The Willow Creek Pumping Station pumped a significant volume of water to Granby and used 11.1 GWh of power during its WY 2017 operation. Meanwhile, the Farr Pumping Plant and the Flatiron Powerplant Unit 3 required 25.8 and 37.4 GWh, respectively. The Farr Pumping Plant was below average in WY 2017, while Flatiron Powerplant Unit 3 operations were above average in WY 2017. Their power requirement was 110 percent of the 30 year average.

According to the numbers provided by WAPA's office in Loveland, Colorado, sales of electric power totaled 2,623,707 megawatt hours (MWh) during WY 2017, with a revenue of \$85,955,598. 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 473,025 MWh during WY 2017 for which WAPA paid a total of \$12,614,635 a substantial reduction from the previous water year.

WY 2018—Generation and Pump Energy Forecast

Under the most probable runoff condition plan developed in October 2017, the total generation for the C-BT powerplants is projected to be 590.1 GWh while pump energy requirements from the C-BT Power System are expected to reach 70.7 GWh in WY 2018. The total generation for the entire System is expected to be 2,194.7 GWh, with a total load of 2,162.5 GWh, leaving a power surplus of 31.6 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.

Under the reasonable minimum runoff condition plan developed in October 2017, the total generation for the C-BT powerplants is projected to be 452.6 GWh while the total System generation is projected to be 1,796.7 GWh in WY 2018. Under this plan pump energy requirements for the C-BT would total 61.2 GWh. The total System load is expected to be 2,162.5 GWh leaving a total generation shortfall of 365.8 GWh. Total generation shortfalls are expected for every month except for May and June.

Under the reasonable maximum runoff condition plan developed in October 2017, the C-BT powerplants should produce 534.9 GWh of power generation, the System total generation should reach 2,628.8 GWh in WY 2018. The total C-BT pump energy requirements would be 44.2 GWh. The total System load is expected to be 2,162.5 GWh, leaving a total generation surplus of 466.2 GWh.

Tables A-4 through A-6 summarize the projected monthly System generation, pump energy, and loads for the three forecasted runoff conditions for WY 2018. Exhibits B-3 through B-5 graphically display the gross generation less pumping for the C-BT contributing to the System for the most probable, reasonable minimum, and reasonable maximum inflow conditions. Table A-7 lists the scheduled maintenance for the various facilities in the C-BT. Tables A-8 and A-9 summarize the capacity data for the powerplants and pumping plants within the System, including the Yellowtail and Mount Elbert Units.

APPENDIX A—TABLES

A-1: Western Division System Generation for Water Year 2017

WESTERN DIVISION SYSTEM GENERATION FOR WY 2017

Powerplant	Accum. Gross Generation <u>1/</u>		
	WY 2017 (GWH)	Avg <u>2/</u> (GWH)	Percent of Avg
Green Mtn.	59.2	51.9	114
Marys Lake	32.3	37.3	87
Estes	113.1	100.3	113
Pole Hill	173.8	172.3	101
Flatiron 1&2	218.3	226.7	96
Big Thompson	8.3	10.9	76
Seminole	129.6	132.5	98
Kortes	113.2	140.3	81
Fremont C.	290.7	239.6	121
Alcova	134.4	118.1	114
Glendo	108.7	80.3	135
Guernsey	12.5	19.4	64
Boysen	86.5	69.3	125
Heart Mtn.	22.8	15.7 <u>3/</u>	145
Buffalo Bill	91.6	68.3 <u>3/</u>	134
Shoshone	19.0	20.3 <u>3/</u>	94
Spirit Mtn.	15.4	14.7 <u>3/</u>	105
Mt. Elbert	261.4	169.0 <u>4/</u>	155
Yellowtail	991.4	959.0 <u>5/</u>	103
Total	2882.2	2645.9	109

1/ Oct-Sep

2/ 1976-2005 average

3/ 1995-2012 average

4/ 1990-1999 average

5/ 1971-1990 average; In general 1/2 of Yellowtail energy is dedicated to the System through marketing arrangement. The other 1/2 is marketed in Eastern Division System.

A-2: Pump Energy Used During Water Year 2017

Pumping Plant	Oct-September Pump Energy		
	WY2017 (GWH)	Avg <u>1/</u> (GWH)	Percent of Avg
Willow Crk	11.1	5.7	195
Farr	25.8	30.6	84
Flatiron 3	37.4	26.8	140
Mt. Elbert	330.7	182.1 <u>2/</u>	182
Total	405.0	245.2	165

1/ 1976-2005 average

2/ 1990-1999 average

A-3: Gross Generation Less Pumping for Water Year 2017

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM WATER YEAR 2017 OPERATIONS GROSS GENERATION LESS PUMPING IN GIGAWATT-HOURS

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mt. Elbert *	0.2	2.5	5.5	7.3	6.4	6.1	1.6	1.9	5.7	4.9	0.9	0.0	42.9
Green Mtn.	7.7	2.0	1.6	2.2	1.5	2.0	1.8	3.2	10.8	9.7	7.7	9.0	59.2
Willow Cr. pump	0.0	0.5	0.0	0.0	0.0	0.8	2.9	5.0	0.9	0.2	0.3	0.5	11.0
Farr pump	2.1	0.2	3.9	5.0	4.4	3.9	1.9	0.2	0.0	1.6	0.6	2.0	25.8
Marys Lake	2.4	0.0	0.0	4.0	5.1	4.9	4.6	2.6	2.5	4.4	0.2	1.6	32.3
Estes	7.1	0.0	11.8	16.1	13.7	13.5	12.6	7.4	7.7	12.6	4.3	6.3	113.2
Pole Hill	11.1	0.0	15.5	24.1	21.1	21.2	21.0	19.5	23.0	17.3	0.0	0.0	174.0
Flatiron 1&2	13.3	0.3	20.6	30.0	26.4	26.1	26.7	25.4	28.8	20.7	0.0	0.0	218.3
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	0.0
Flatiron 3 pump	0.0	0.0	4.4	6.7	5.9	6.2	4.3	2.6	4.2	3.1	0.0	0.0	37.4
Big Thompson	0.6	0.0	0.0	0.0	0.0	0.0	0.2	1.8	2.1	1.5	1.2	0.9	8.3
Seminole	4.5	4.5	4.8	4.9	7.1	12.0	24.6	14.3	28.5	10.1	9.5	4.8	129.5
Kortes	5.2	5.3	5.6	5.6	7.1	10.8	17.7	12.8	17.5	10.6	9.3	5.8	113.2
Fremont Canyon	0.8	7.2	7.8	7.3	6.4	19.6	41.6	42.5	46.1	47.1	41.3	23.0	290.7
Alcova	3.0	2.9	3.0	3.1	2.7	8.3	15.4	19.3	27.0	23.3	17.0	9.4	134.4
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	11.9	19.4	25.5	23.7	20.5	7.7	108.7
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.3	2.2	1.0	2.5	3.6	12.4
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	3.4	4.9	5.4	5.4	4.9	10.3	6.7	9.5	8.9	10.4	11.0	5.7	86.3
Shoshone	1.5	1.6	1.6	1.5	1.0	1.7	1.5	1.4	1.6	1.9	1.9	1.8	18.9
Buffalo Bill	0.1	0.0	0.4	0.5	3.8	12.8	13.0	13.1	13.1	13.4	8.2	13.2	91.7
Spirit Mtn.	1.2	0.0	0.0	0.0	0.0	0.1	0.6	1.9	2.4	3.2	3.3	2.7	15.5
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.	1.1	0.0	0.0	0.0	0.0	1.2	3.5	3.7	3.3	3.0	3.6	3.4	22.8
Yellowtail/2	30.0	26.9	29.8	29.2	34.7	54.2	51.2	52.8	50.1	51.7	46.0	39.0	495.7
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fry-Ark	0.2	2.5	5.5	7.3	6.4	6.1	1.6	1.9	5.7	4.9	0.9	0.0	42.9
CBT	40.2	1.6	41.2	64.8	57.5	56.8	57.9	52.1	69.9	61.4	12.5	15.3	531.2
North Platte	13.5	19.9	21.1	20.9	23.3	50.7	112.1	110.6	146.8	115.7	100.1	54.2	788.8
Bighorn	37.3	33.4	37.2	36.7	44.3	80.3	76.4	82.3	79.4	83.7	74.0	65.8	730.9
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
TOTAL GEN	91.2	57.4	104.9	129.6	131.6	193.9	248.0	246.8	301.7	265.7	187.5	135.4	2093.8
TOTAL LOAD	162.4	162.2	177.1	172.6	137.0	149.3	176.4	184.7	211.0	262.0	211.2	156.6	2162.5
SURPLUS/DEFICIT	-71.2	-104.8	-72.2	-43.0	-5.4	44.6	71.6	62.1	90.7	3.7	-23.7	-21.2	-68.7
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*	projected values are historic average flow through energy												
**	projected values are marketed energy												

A-4: Most Probable Inflow Projected Gross Generation and Pumping for Water Year 2018

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM WATER YEAR 2018 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.	7.1	2.2	2.1	2.1	1.9	2.1	2.4	3.3	3.7	4.6	4.2	12.1	47.8
Willow Cr. pump	0.0	0.3	0.0	0.0	0.0	0.0	1.1	4.2	3.3	0.0	0.7	0.2	9.8
Farr pump	0.4	0.2	2.2	4.6	4.2	4.7	4.0	1.0	0.0	0.9	1.5	1.9	25.6
Marys Lake	0.0	0.0	2.9	6.4	5.8	6.4	6.2	6.3	2.8	4.4	2.6	2.5	46.3
Estes	2.0	0.5	7.2	16.0	14.4	16.0	15.5	15.7	8.1	11.4	7.2	7.1	121.1
Pole Hill	0.0	0.0	11.6	25.7	23.2	25.7	24.9	25.8	20.0	19.2	10.5	10.1	196.7
Flatiron 1&2	0.0	0.0	14.5	32.1	28.9	32.1	31.2	32.1	24.1	23.4	12.0	11.4	241.8
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	0.0
Flatiron 3 pump	0.0	0.0	3.0	6.5	5.6	6.0	4.6	2.8	4.0	2.8	0.0	0.0	35.3
Big Thompson	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.5	2.2	1.2	1.1	7.1
Seminole	5.7	5.5	5.7	5.7	5.1	10.6	26.5	27.6	27.4	28.6	8.7	5.7	162.8
Kortes	5.6	5.4	5.6	5.6	5.1	10.6	26.6	27.6	26.7	27.6	8.5	5.6	160.5
Fremont Canyon	0.6	7.1	7.3	7.3	6.6	12.5	21.8	31.0	45.8	44.8	43.3	14.2	242.3
Alcova	4.2	4.1	4.2	4.2	3.8	6.7	8.0	14.6	23.7	20.5	19.9	6.2	120.1
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	0.7	17.5	18.8	24.7	19.8	6.4	87.9
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	0.7	3.8	3.7	3.8	3.8	3.4	19.2
Pilot Butte**	0.4	0.0	0.0	0.0	0.0	0.0	0.6	1.2	1.2	1.2	1.2	1.2	7.0
Boysen	7.1	5.4	5.8	5.8	5.1	5.6	6.1	9.9	10.2	10.9	9.6	6.6	88.1
Shoshone	2.2	1.1	1.1	1.1	1.0	2.2	2.2	1.4	2.2	2.1	1.8	1.1	19.5
Buffalo Bill	13.4	6.9	4.2	4.2	3.8	13.4	13.0	13.3	13.0	13.4	13.4	12.9	124.9
Spirit Mtn.	1.7	0.0	0.0	0.0	0.0	0.0	1.3	2.3	2.6	3.1	3.2	3.2	17.4
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.	2.2	0.0	0.0	0.0	0.0	0.0	2.2	4.5	4.3	4.5	4.5	0.2	22.4
Yellowtail/2	59.2	38.2	39.0	38.4	33.7	38.0	39.4	44.2	46.4	45.4	41.5	34.8	498.2
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
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	9.0	2.2	33.1	71.2	64.4	71.6	70.5	76.0	52.9	61.5	35.5	42.2	590.1
North Platte	16.1	22.1	22.8	22.8	20.6	40.4	84.3	122.1	146.1	150.0	104.0	41.5	792.8
Bighorn	86.2	51.6	50.1	49.5	43.6	59.2	64.8	76.8	79.9	80.6	75.2	60.0	777.5
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
TOTAL GEN	112.6	78.3	108.4	146.0	131.7	173.7	223.1	278.8	283.6	296.5	216.7	144.7	2194.1
TOTAL LOAD	162.4	162.2	177.1	172.6	137.0	149.3	176.4	184.7	211.0	262.0	211.2	156.6	2162.5
SURPLUS/DEFICIT	-49.8	-83.9	-68.7	-26.6	-5.3	24.4	46.7	94.1	72.6	34.5	5.5	-11.9	31.6
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*	PROJECTED VALUES ARE HISTORIC AVERAGE FLOW THROUGH ENERGY												
**	PROJECTED VALUES ARE MARKETED ENERGY												

**A-5: Minimum Reasonable Inflow Projected Gross Generation
and Pumping for Water Year 2018**

**PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM
WATER YEAR 2018 FORECASTED OPERATIONS
REASONABLE MINIMUM 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.	6.7	1.9	1.8	1.8	1.6	1.7	1.2	0.6	0.7	0.7	0.8	8.9	28.4
Willow Cr. pump	0.0	0.2	0.0	0.0	0.0	0.0	0.5	1.5	0.7	0.3	0.1	0.1	3.4
Farr pump	0.3	0.6	0.3	3.3	2.7	2.9	2.6	3.0	1.6	2.9	2.0	2.1	24.3
Marys Lake	0.0	0.3	0.0	4.5	3.6	3.7	3.5	6.4	6.2	4.6	2.6	2.5	37.9
Estes	1.4	1.5	0.3	11.2	8.9	9.2	8.7	15.9	15.4	11.7	7.2	7.1	98.5
Pole Hill	0.0	1.4	0.0	18.7	14.6	14.9	18.9	25.8	24.9	18.2	10.3	10.1	157.8
Flatiron 1&2	0.0	1.9	0.7	20.6	16.6	17.0	21.2	32.2	31.0	22.0	11.7	11.4	186.3
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	0.0
Flatiron 3 pump	0.0	0.0	0.0	6.6	5.7	6.1	5.7	3.2	3.4	2.8	0.0	0.0	33.5
Big Thompson	0.3	0.0	0.0	0.0	0.0	0.0	0.8	1.5	0.5	0.0	0.5	1.3	4.9
Seminole	5.7	5.5	5.6	5.6	5.1	8.4	8.2	16.9	25.3	21.7	10.1	5.1	123.2
Kortes	5.6	5.4	5.6	5.6	5.1	8.5	8.2	16.9	25.3	22.2	10.6	5.4	124.4
Fremont Canyon	0.6	7.1	7.3	7.3	6.6	12.6	18.8	46.8	44.6	45.2	43.8	14.0	254.7
Alcova	4.2	4.1	4.2	4.2	3.8	6.7	6.6	25.1	26.1	27.5	26.7	6.9	146.1
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	1.4	17.7	18.5	23.2	19.5	9.0	89.3
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	0.7	3.8	3.7	3.8	3.8	3.4	19.2
Pilot Butte **	1.2	0.5	0.0	0.0	0.0	0.0	0.8	1.9	4.0	3.8	3.7	1.7	17.6
Boysen	7.1	5.4	5.8	5.6	5.0	4.0	3.9	5.1	5.7	5.6	4.9	3.5	61.6
Shoshone	2.2	2.2	2.2	2.2	0.4	2.2	2.2	2.2	2.2	2.2	2.2	2.1	24.6
Buffalo Bill	12.4	2.1	0.0	0.0	0.0	0.0	0.0	11.2	11.1	12.9	10.9	8.4	69.0
Spirit Mtn.	1.2	0.0	0.0	0.0	0.0	0.0	1.1	3.2	3.2	3.3	3.2	3.0	18.2
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.	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	1.3	3.1
Yellowtail/2	56.6	35.1	36.0	35.6	31.4	34.8	20.2	20.4	20.4	24.1	23.8	21.0	359.4
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
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	8.1	6.2	2.5	46.9	36.9	37.5	45.5	74.7	73.0	51.2	31.0	39.1	452.6
North Platte	16.1	22.1	22.7	22.7	20.6	36.2	43.9	127.2	143.5	143.6	114.5	43.8	756.9
Bighorn	81.6	45.2	44.0	43.4	36.8	41.0	29.1	44.1	46.5	51.9	48.7	41.1	553.5
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TOTAL GEN	107.1	76.0	71.6	115.5	97.4	117.2	122.0	249.9	267.7	251.1	196.2	125.0	1796.7
TOTAL LOAD	162.4	162.2	177.1	172.6	137.0	149.3	176.4	184.7	211.0	262.0	211.2	156.6	2162.5
SURPLUS/DEFICIT	-55.3	-86.2	-105.5	-57.1	-39.6	-32.1	-54.4	65.2	56.7	-10.9	-15.0	-31.6	-365.8
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*	PROJECTED VALUES ARE HISTORIC AVERAGE FLOW THROUGH ENERGY												
**	PROJECTED VALUES ARE MARKETING ENERGY												

**A-6: Maximum Reasonable Inflow Projected Gross Generation
and Pumping for Water Year 2018**

**PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM
WATER YEAR 2018 FORECASTED OPERATIONS
REASONABLE MAXIMUM 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	3.0	2.5	3.5	3.9	4.7	4.4	2.0	1.0	33.6
Green Mtn.	8.4	2.8	2.7	2.7	2.3	2.6	6.6	12.2	15.1	16.4	9.6	14.2	95.6
Willow Cr. pump	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.3
Farr pump	0.0	0.2	0.2	3.1	2.6	2.4	0.8	0.1	0.0	0.0	0.5	1.3	11.2
Marys Lake	0.0	0.0	0.0	4.3	3.5	3.7	3.5	3.1	2.7	4.6	2.6	2.5	30.5
Estes	0.4	0.3	0.2	10.6	8.6	9.1	8.6	8.0	7.3	11.7	7.3	7.1	79.2
Pole Hill	0.0	0.0	0.0	17.6	14.0	14.7	25.0	25.8	25.0	19.7	10.6	10.8	163.2
Flatiron 1&2	0.0	0.3	0.5	19.7	15.9	16.8	31.2	32.2	31.2	23.9	12.1	12.3	196.1
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	0.0
Flatiron 3 pump	0.0	0.0	0.0	6.6	5.7	6.1	5.6	1.8	3.1	2.8	0.0	0.0	31.7
Big Thompson	0.1	0.0	0.0	0.0	0.0	0.0	3.6	3.4	2.4	2.6	1.3	1.1	14.5
Seminole	5.7	5.5	5.7	5.7	5.1	21.2	32.4	32.8	32.2	32.4	15.7	14.4	208.8
Kortes	5.6	5.4	5.6	5.6	5.1	21.2	28.1	29.1	28.1	29.1	15.2	14.0	192.1
Fremont Canyon	0.9	7.1	7.3	7.3	6.6	47.2	45.7	47.3	45.8	47.3	47.3	23.9	333.7
Alcova	4.3	4.1	4.2	4.2	3.8	25.0	25.3	27.4	26.7	27.6	27.6	11.1	191.3
Glendo	0.0	0.0	0.0	0.0	0.0	14.8	23.2	25.5	26.3	25.5	21.2	13.3	149.8
Guernsey	0.0	0.0	0.0	0.0	0.0	3.7	1.8	3.8	3.7	3.8	3.8	3.4	24.0
Pilot Butte**	1.6	0.0	0.0	0.0	0.0	0.0	0.7	1.5	3.5	4.1	3.0	1.7	16.1
Boysen	7.1	5.4	5.9	5.8	5.2	5.9	5.5	9.2	10.8	11.9	11.8	7.7	92.2
Shoshone	2.2	1.1	1.1	1.1	0.4	2.2	2.2	2.2	2.2	2.2	2.2	1.2	20.3
Buffalo Bill	13.4	8.1	4.2	4.2	3.8	13.4	13.0	13.1	13.0	13.4	13.4	12.8	125.8
Spirit Mtn.	1.7	0.0	0.0	0.0	0.0	0.0	1.3	2.1	2.5	3.2	3.3	3.1	17.2
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.	2.2	0.0	0.0	0.0	0.0	0.0	2.2	4.5	4.3	4.5	4.5	4.3	26.3
Yellowtail/2	63.0	42.2	42.8	41.8	36.5	46.1	72.9	75.4	72.9	75.4	51.9	41.8	662.6
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Fry-Ark	1.3	2.4	2.4	2.5	3.0	2.5	3.5	3.9	4.7	4.4	2.0	1.0	33.6
CBT	8.9	2.7	3.2	45.2	36.0	38.4	72.1	82.8	80.6	76.1	43.0	45.9	534.9
North Platte	16.5	22.1	22.8	22.8	20.6	133.1	156.5	165.9	162.8	165.7	130.8	80.1	1099.7
Bighorn	91.2	56.8	54.0	52.9	45.9	67.6	97.7	108.0	109.2	114.7	90.1	72.6	960.5
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TOTAL GEN	117.9	84.0	82.4	123.4	105.5	241.6	329.8	360.6	357.3	360.9	265.9	199.6	2628.7
TOTAL LOAD	162.4	162.2	177.1	172.6	137.0	149.3	176.4	184.7	211.0	262.0	211.2	156.6	2162.5
SURPLUS/DEFICIT	-44.5	-78.2	-94.7	-49.2	-31.6	92.3	153.4	175.9	146.3	98.9	54.7	43.0	466.2
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*	PROJECTED VALUES ARE HISTORIC AVERAGE FLOW THROUGH ENERGY												
**	PROJECTED VALUES ARE MARKETED ENERGY												

**A-7: Estimated Maintenance Schedule for Water Year 2017—Colorado-Big Thompson
and Fryingpan-Arkansas Projects**

**COLORADO-BIG THOMPSON AND FRYINGPAN-ARKANSAS PROJECTS
ESTIMATED MAINTENANCE SCHEDULE FOR WATER YEAR 2018**

	Task Name	Start	Finish
Big T Unit 1	2018 Annual Maintenance	Tue 1/2/18	Fri 2/9/18
Big T XFMR KW1A	2018 Annual Maintenance	Mon 1/8/18	Fri 1/19/18
Adams Tunnel	2018 Annual Inspection	Fri 11/5/18	Fri 12/14/18
Marys Powerplant	2018 Annual Maintenance	Mon 11/5/18	Fri 12/14/18
Estes Unit 1	2018 Annual Maintenance	Mon 1/8/18	Fri 2/16/18
Estes Unit 2	2018 Annual Maintenance	Mon 2/26/18	Fri 4/6/18
Estes Unit 3	2018 Annual Maintenance	Mon 4/9/18	Fri 5/18/18
Flatiron SWYD KW1A	2018 Annual Maintenance	Mon 3/5/18	Fri 3/16/18
Flatiron SWYD KW2A	2018 Annual Maintenance	Mon 4/30/18	Fri 5/11/18
Flatiron Unit 1	2018 Annual Maintenance	Tue 2/20/18	Fri 3/30/18
Flatiron Unit 2	2018 Annual Maintenance	Mon 4/16/18	Fri 5/25/18
Flatiron Unit 3	2018 Annual Maintenance	Mon 9/10/18	Fri 10/19/18
Green Mtn. Unit 1	2018 Annual Maintenance	Mon 1/8/18	Fri 2/16/18
Green Mtn. SWYD KZ1A	2018 Annual Maintenance	Mon 1/29/18	Thu 2/1/18
Green Mtn. Unit 2	2018 Annual Maintenance	Mon 2/26/18	Thu 4/5/18
Green Mtn. SWYD KZ2A	2018 Annual Maintenance	Mon 3/19/18	Thu 3/22/18
Pole Hill Unit G1	2018 Unit Annual Maintenance	Mon 11/5/18	Fri 12/14/18
Pole Hill XFMR K1A	2018 XFMR Annual Maintenance	Mon 11/19/18	Fri 11/30/18
Mt Elbert Unit 1	2018 Cable Testing and Annual Maintenance	Mon 9/18/17	Fri 1/12/18
Mt Elbert Unit 1	Electrical Testing Inspections	Wed 2/21/18	Fri 2/23/18
Mt Elbert Unit 2	2018 Annual Maintenance	Mon 2/12/18	Fri 4/20/18
Farr Pumping Plant Units 1, 2 and 3	WAPA SWYD Maintenance		
CHFC 930 Section	2018 Annual Maintenance		
CHFC 550 Section	2018 Annual Maintenance		

A-8: 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 <u>1</u> /)	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 <u>2</u> /	2	800	1,600	-- --	---
Boysen	2	7,500	15,000	72-112	2,415
Shoshone <u>3</u> /	1	3,000	3,000	-- --	---
Buffalo Bill <u>3</u> /	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	-----	-----

A-9: Pumping Plant Data

WESTERN DIVISION - PICK-SLOAN MISSOURI BASIN PROGRAM

PUMPING PLANT DATA

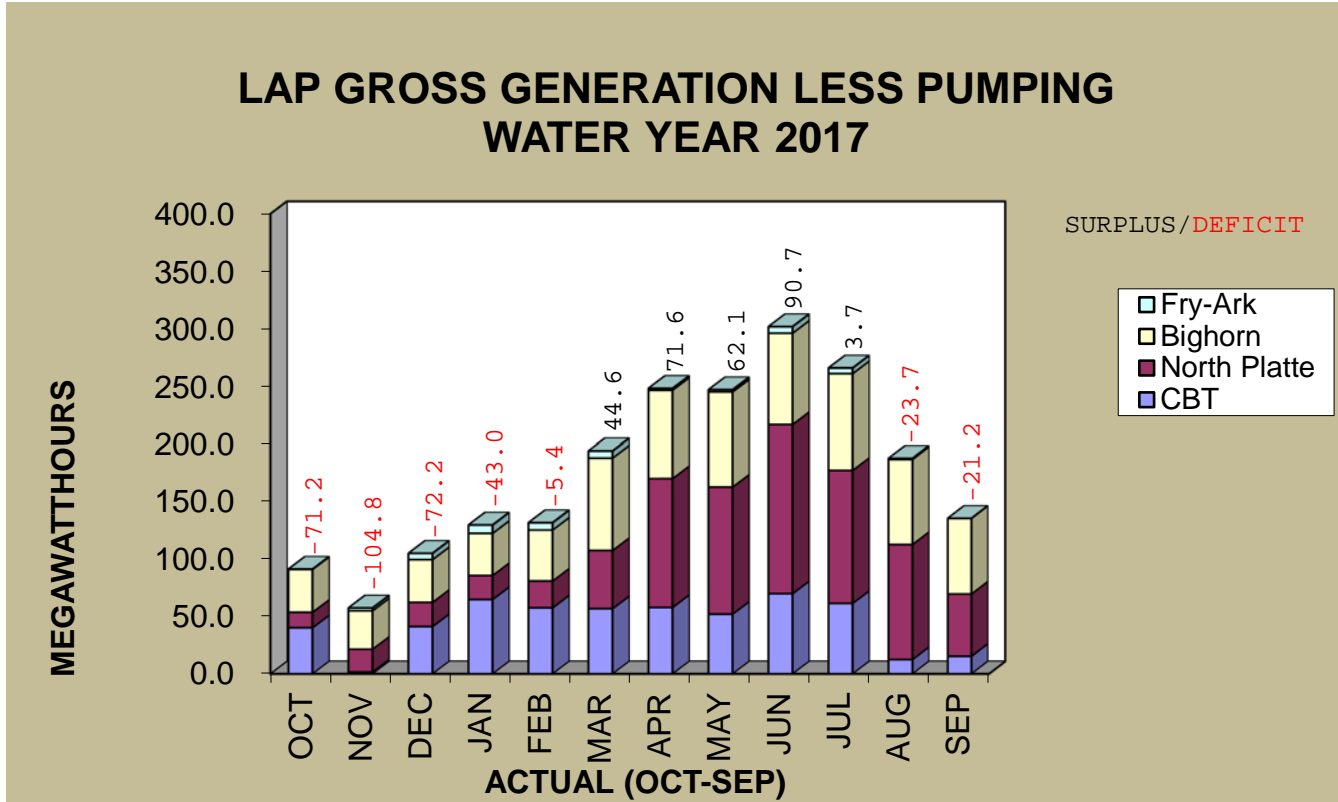
Facilities	<u>Pumping Units</u>			<u>Plant Rating</u>	
	No	Capacity (ft ³ /s)	Normal Operating Head (ft)	Installed (Hp)	Kwh to Pump 1 AF at Maximum Head
Granby	3	600	92-186	18,000	227
Willow Creek	2	400	167-169	18,000	227
Flatiron	11/	440	173-287	13,000	391
Mt. Elbert	2	5,690	447-477	340,000	620

B-1: Western Division Water Resource Map

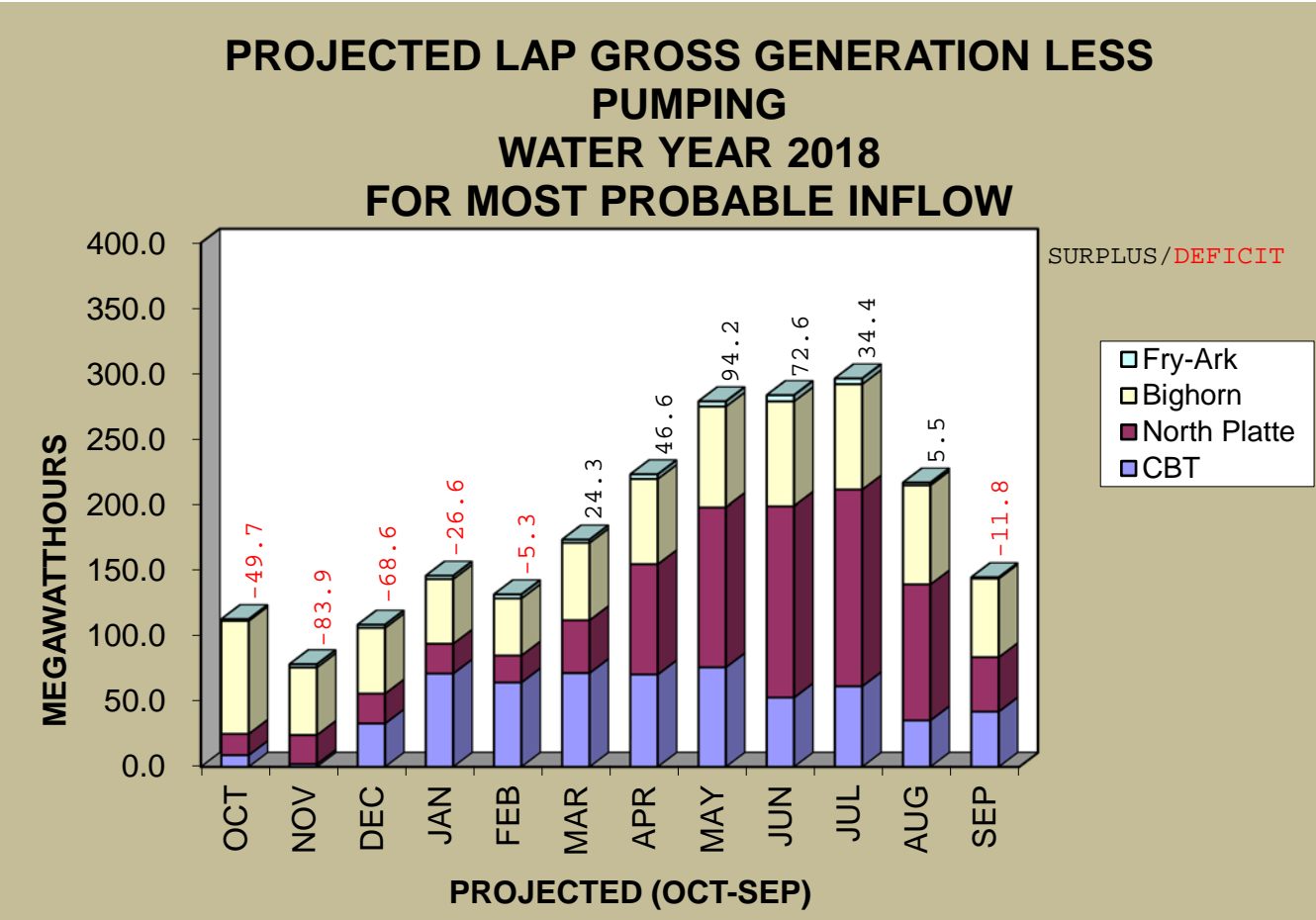


MAP NO. X-700-121
JUNE 1, 1976

B-2: Lap Gross Generation Less Pumping for Water Year 2017

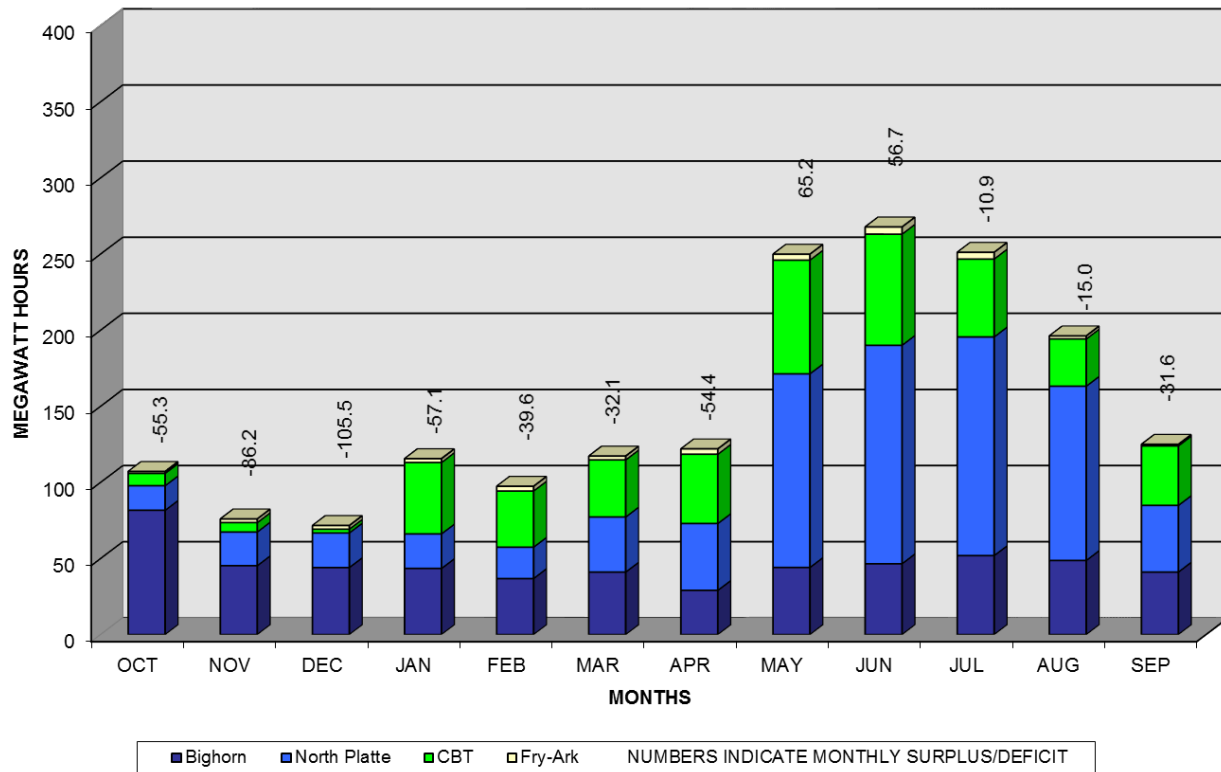


B-3: Most Probable Inflow Projected Lap Gross Generation Less Pumping for Water Year 2018



B-4: Minimum Reasonable Inflow Projected Lap Gross Generation Less Pumping for Water Year 2018

**PROJECTED LAP GROSS GENERATION LESS PUMPING
WATER YEAR 2018
FOR REASONABLE MINIMUM INFLOW**



B-5: Maximum Reasonable Inflow Projected Lap Gross Generation Less Pumping for Water Year 2018

PROJECTED LAP GROSS GENERATION LESS PUMPING WATER YEAR 2018 FOR REASONABLE MAXIMUM INFLOW

