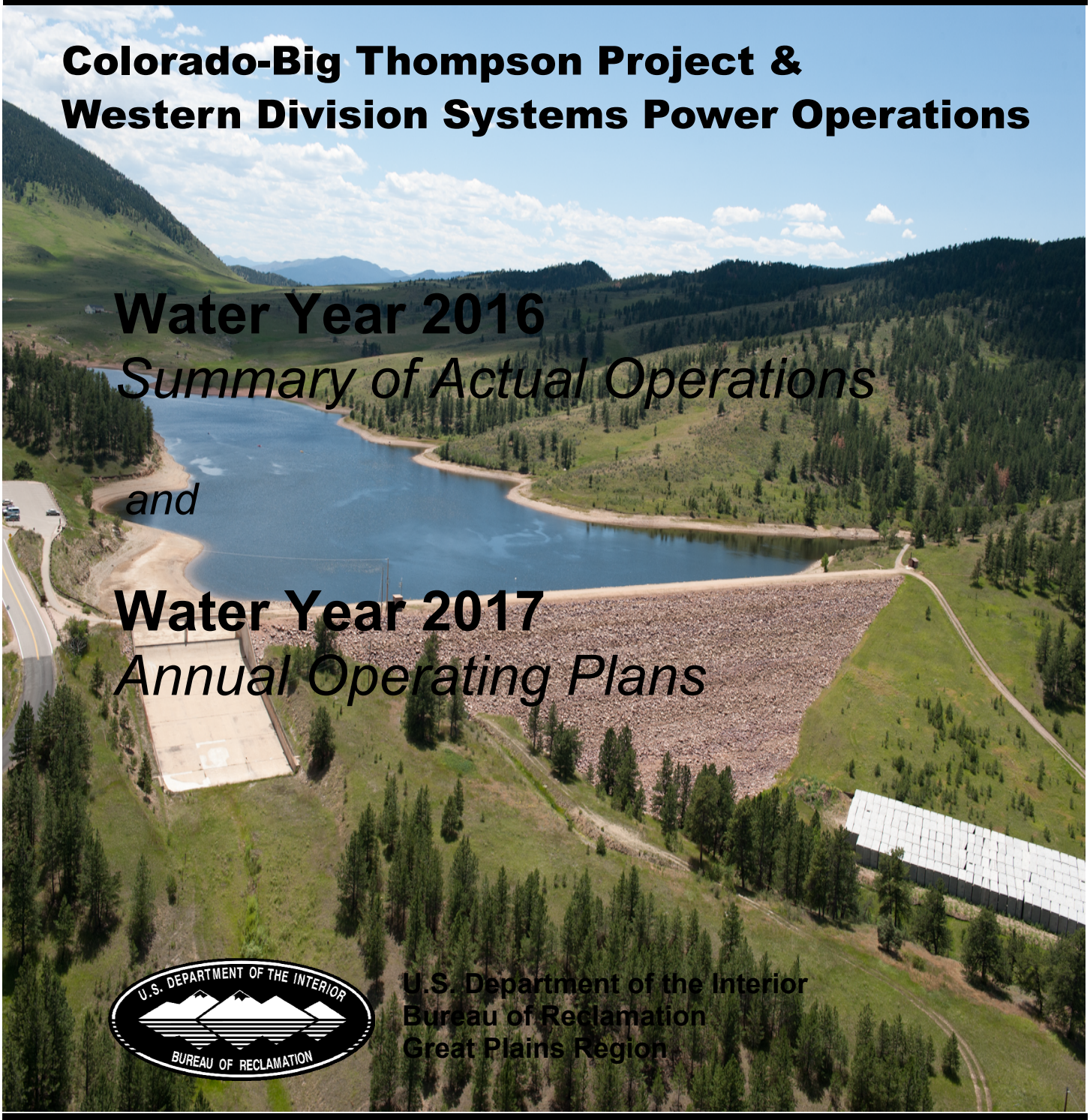
RECLAMATION

Managing Water in the West

Annual Operating Plans



Colorado-Big Thompson Project & Western Division Systems Power Operations

Water Year 2016

Summary of Actual Operations

and

Water Year 2017

Annual Operating Plans

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

SIXTY-FIFTH ANNUAL REPORT
COLORADO-BIG THOMPSON PROJECT (C-BT)

This report is the sixty-fifth Annual Report for the C-BT. Its purpose is to inform interested parties of the coordinated operation of the project. The report has two main parts: one which describes the actual operation of the project during Water Year (WY) 2016 and the plan of operation for WY 2017, while the other presents the hydropower operations for WY 2016 and the forecast for WY 2017.

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).

C-BT AOP
TABLE OF CONTENTS

SIXTY-FIFTH ANNUAL REPORT i
C-BT AOP ii
DESCRIPTION OF THE C-BT 1
SUMMARY OF OPERATIONS FOR WY 2016 4
Review of WY 2016 Most Probable Plan 4
Weather Conditions and Their Impact on C-BT Operations 6
Impact of Maintenance and Other Outages on C-BT Operations 9
Impact of the Grand Lake Water Clarity Initiative on C-BT Operations 10
Drought Impact on C-BT Operations 10
Flooding Impact on C-BT Operations 10
WY 2016 OPERATIONS BY FACILITY 11
Green Mountain Reservoir Chronological Summary of Operations 11
Willow Creek Reservoir – Chronological Summary of Operations 15
Granby Reservoir – Chronological Summary of Operations 16
Adams Tunnel, Marys Lake and Lake Estes – Chronological Summary of Operations 19
Foothill's Power Arm Plus Carter and Horsetooth–Chronological Summary of Operations 22
C-BT PLANNING AND CONTROL 25
IRRIGATION REQUIREMENTS 26
MINIMUM REQUIRED RESERVOIR RELEASES 26
GREEN MOUNTAIN RESERVOIR OPERATIONS 28
The General Operations Guided by These Provisions are Given Below: 28
GREEN MOUNTAIN HISTORIC USERS POOL (HUP) 30
Background and Authority 30
Overview of the Stipulated Settlement 30
Management of the HUP Under the Operating Criteria 31
OPERATION SKIM 32
APPENDIX A – DAILY RECORDS 33
APPENDIX B – OPERATIONS DATA 71
APPENDIX C – EXHIBITS 107

WESTERN DIVISION SYSTEM
TABLE OF CONTENTS

SIXTY-FIFTH ANNUAL REPORT i
WESTERN DIVISION POWER SYSTEM 1
Water Year 2016 – Generation and Pump Energy Summary 1
WESTERN DIVISION POWER SYSTEM 2
Water Year 2017 – Generation and Pump Energy Forecast 2
APPENDIX A - TABLES 3
Table 1 3
Table 2 4
Table 3 5
Table 4A 6
Table 4B 7
Table 4C 8
Table 5 9
Table 6 10
Table 7 11
APPENDIX B - EXHIBITS 12
Exhibit 1 12
Exhibit 2 13
Exhibit 3A 14
Exhibit 3B 15
Exhibit 3C 16

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 also provides water for municipal use, industrial use, hydroelectric power, and water-oriented recreation. Additionally, it 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.

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. Another C-BT west slope feature is Green Mountain Reservoir, 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, and Shadow Mountain Reservoir. Willow Creek Reservoir located on Willow Creek, a tributary to the Colorado River below Lake Granby, is also a principal C-BT west slope facility.

A summer spill at Green Mountain Dam and Reservoir. Green Mountain Powerplant, located just below the dam, also generating power.

Willow Creek Pumping Plant lifts the water 175 feet. It then flows by gravity via the Willow Creek Feeder Canal to Lake Granby.

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). The Willow Creek Feeder Canal begins at the left abutment and has a capacity of 400 cfs. The canal is used to transfer water to Granby Reservoir. Excess inflow of water into the reservoir is transferred by the Willow Creek Feeder Canal and pumped to Lake Granby for storage.

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

Granby Pumping 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 connects 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 Granby Pumping 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. This powerplant is 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.

Lake Estes is located on the Big Thompson River, and is formed by Olympus Dam which was completed in 1949. It 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 river flow below Olympus Dam, and releases water to the Southern Arm of the Foothills Power System 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.

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

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, Pinewood Lake, Bald Mountain Pressure Tunnel, and eventually dropped 1,055 feet through two penstocks to Flatiron Powerplant. This 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, and delivers 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 Flatiron 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. The South Platte Supply Canal, diverting from Boulder Creek, 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.

C-BT water deliveries and water diverted from the Big Thompson River for power generation purposes, are dropped through a chute from the feeder canal ahead of the siphon crossing, or are passed through the Big Thompson Powerplant to convert the available head to electricity. Horsetooth Reservoir is located west of Fort Collins and 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 from Horsetooth Reservoir is through Horsetooth Dam into the Charles Hansen Supply Canal. This canal delivers water to a chute discharging 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 supplies the city of Greeley municipal water works. Water delivered to the river replaces by exchange water diverted upstream to the North Poudre Supply Canal, which conveys it to the North Poudre Irrigation Company System.

SUMMARY OF OPERATIONS FOR WY 2016

Review of WY 2016 Most Probable Plan

The C-BT most probable AOP from October 2015 was developed considering the effects of historical average runoff values, the expected demands and depletions of the Northern Water and Denver Water pool levels recorded at the end of WY 2015, other average values, special operations such as previously planned system outages and maintenance schedules, and an assumed Northern Water quota of 70 percent.

The AOP assumed diversions through the Adams Tunnel totaling 259,500 AF during WY 2016. Most of that water was planned to be diverted between December 2015, and May 2016, 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 of WY 2016. The skim operation, according to the AOP, could convey a total estimated volume of 26,900 AF of water through the Olympus Tunnel. The Dille Tunnel diversion was expected to be available by May 2016, and was able to participate in skim operation.

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

began WY 2016 with an initial content of 109,000 AF. That content was expected to drop to 64,700 AF by late March 2016 before rebounding and reaching a full pool by early July 2016. According to the plan, the reservoir would fill in WY 2016 assuming a volume of inflow after depletions totaling 260,400 AF and depletions from Denver Water totaling 83,000 AF. The plan did not account for the Coordinated Reservoir Operations (CROS) in the spring months of WY 2016, or the Grand Lake Water Clarity Initiative between July 2016 and early September 2016.

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 Pumping Plant, and consequently the reservoir levels at Granby Reservoir. Granby Reservoir began WY 2016 with 500,098 AF in storage, one of the highest in project history. Based on the diversion plans for the Adams Tunnel presented in the AOP, the reservoir content was expected to drop to 370,000 AF by the end of April 2016 while rising to reach 481,500 AF by the end of June 2016. Granby Reservoir was expected to finish WY 2016 with a storage content of 446,700 AF. The Farr Plant pumping volume to Shadow Mountain was expected to total 212,600 AF for WY 2016 with the bulk of the pumping operation taking place between December 2015 and April 2016, with another surge in September 2016. The AOP did not account for any pumping from the Windy Gap project during WY 2016. Meanwhile, pumping from Willow Creek to Granby was planned to total 44,800 AF, mainly during May and June 2016.

Carter Reservoir began WY 2016 with 59,162 AF of water in storage. Pumping to Carter Reservoir was to resume by the middle of December 2015, and continue through early May 2016 with no interruptions. Additional pumping operations were planned for late June and late August through early September 2016. A total of 111,500 AF of water were planned to be pumped to Carter Reservoir during WY 2016. The AOP also assumed that 2,800 AF of water from Carter Reservoir were going to be used to satisfy demands at the Trifurcation along the CHFC between August and September 2016. Deliveries of C-BT water from Carter Reservoir were expected to total 103,700 AF, with an additional 10,300 AF charges to the Windy Gap Project. The boat ramps were expected to be operational for WY 2016, based on those projections.

Horsetooth Reservoir began WY 2016 with 96,347 AF of water in storage. According to the AOP inflow to Horsetooth Reservoir was expected to total 111,500 AF by the end of September 2016 with the reservoir content of 91,600 AF for the same date. Deliveries of C-BT water were anticipated to total 102,000 AF for WY 2016, with another 7,800 AF from the Windy Gap Project. The boat ramps were also expected to stay in the water during WY 2016, based on the AOP 2016 projections.

Three versions of the AOP were developed in October 2015; the maximum reasonable plan, most probable plan, and minimum reasonable plan. Only the most probable plan was considered for this report.

Weather Conditions and Their Impact on C-BT Operations

Snow storms during the fall, winter and spring seasons of WY 2016 was intermittent. The area surrounding the C-BT project began WY 2016 with an average snowpack, as early as late October 2015 along with colder than normal weather. The snow continued to accumulate, steadily during the 2015 winter and early 2016 spring months. The coldest temperatures were recorded in late December 2015. Snow storms continued to impact the high elevations until April 2016 while the snow pack continued to grow. Dry and warm temperatures settled over the northern Colorado plains during February 2016, but this pattern did not last long. Northern Colorado mountains continued to maintain average snowpack readings. By the middle of April 2016 the area temperatures began to rise slowly, and snow at lower elevations began to melt. The Northern Mountains of Colorado began to experience the early signs of runoff. Most locations began to experience rising inflows by the middle of April 2016. By the middle of May 2016 the snowpack at higher elevations began to melt. The runoff season was reaching its peak at some locations like Willow Creek Reservoir just after the middle of May 2016.

Even though the temperatures over the region began to warm up in April 2016 they remained relatively cool until mid-June 2016. Precipitation remained near average over the mountains until June 2016. By late June 2016 warmer and dryer weather moved in, and precipitation over the mountains became scarce with temperatures rising. The monsoonal season in northern Colorado was dry in the mountains with most of the precipitation impacting the plains. Area reservoir levels began to drop, as water demands increased.

Table 1 provides a view of the snowpack condition on April 1, 2016 at some of the contributing watersheds within the C-BT system. Based on the snowpack conditions, the runoff forecast for April 1, 2016 was also near-average for most locations within the C-BT region. Table 2 provides the runoff forecasts for several C-BT facilities.

Table 1: Snow-Water Content for April 1, 2016

Watershed	Snow-Water Content		
	2016 (In.)	Avg. (In.)	Percent of Avg.
Green Mountain Reservoir	15.3	14.2	108
Willow Creek	10.4	9.0	116
Lake Granby	12.0	10.6	113
Lake Estes	10.2	9.7	105

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	**95 percent Reason-able Min 1/**	**75 percent**	**50 percent Most Probable**	**25 percent**	**5 percent Reason-able Max 1/**	**Most Probable percent Avg**
Green Mtn. Res	223	279	304	329	385	108
Willow Crk. Res	31	46	54	61	77	115
Lake Granby	133	196	225	254	317	111
Big Thompson River Above Lake Estes	39	57	66	75	93	96
Big Thompson River at Canyon Mouth	38	72	88	103	137	98

1/ The probability is estimated to be 9 chances in 10 that the actual volume will fall between the Reasonable minimum and reasonable maximum.

By early spring 2016 the high carryover storage content at Granby Reservoir along with an expected near average runoff created another potential spill. Horsetooth and Carter Reservoirs were near full capacity by early May 2016. With no demands for C-BT water the Adams Tunnel diversions were discontinued in late May 2016. The already high level of Granby Reservoir forced a spill at Willow Creek Reservoir by the middle of May 2016. Granby Reservoir began to pass inflow water over the spillway during late June 2016 at the peak of the runoff season.

On June 17, 2016, pumping to Carter Reservoir resumed due to the east slope runoff fading, and the increased pumping operation at Flatiron Powerplant. On June 18, 2016 the Adams Tunnel diversions were increased. By June 23, 2016 the diversions through the Adams Tunnel were back up to 550 cfs. The receding inflow hydrograph for Granby Reservoir allowed for a reduction in the releases from Granby Reservoir by late June 2016. Releases from Granby Reservoir began to drop soon after pumping to Carter Lake resumed. Horsetooth and Carter reservoirs remained near full capacity during June and for part of July 2016.

Thanks to the C-BT operations, and the skimming of water from the Big Thompson River, releases from Olympus Dam were kept below 650 cfs during the peak of the runoff season. Figure A illustrates how the Olympus Dam releases were managed during June 2016.

The runoff at most locations in northern Colorado continued to drop through July 2016 due to the dry conditions. Free river conditions along the Big Thompson River were limited to only a few days in June 2016. The C-BT was out of priority to capture and store east slope water by June 22, 2016. The monsoonal season started in early July 2016, but most storms did not bring any significant precipitation to the mountains. The most intense storms only impacted the plains leaving the foothills dry. Dry and hot weather settled over the region after July 2016 leaving the area with almost zero precipitation for many weeks. The dry pattern continued into the fall of 2016.

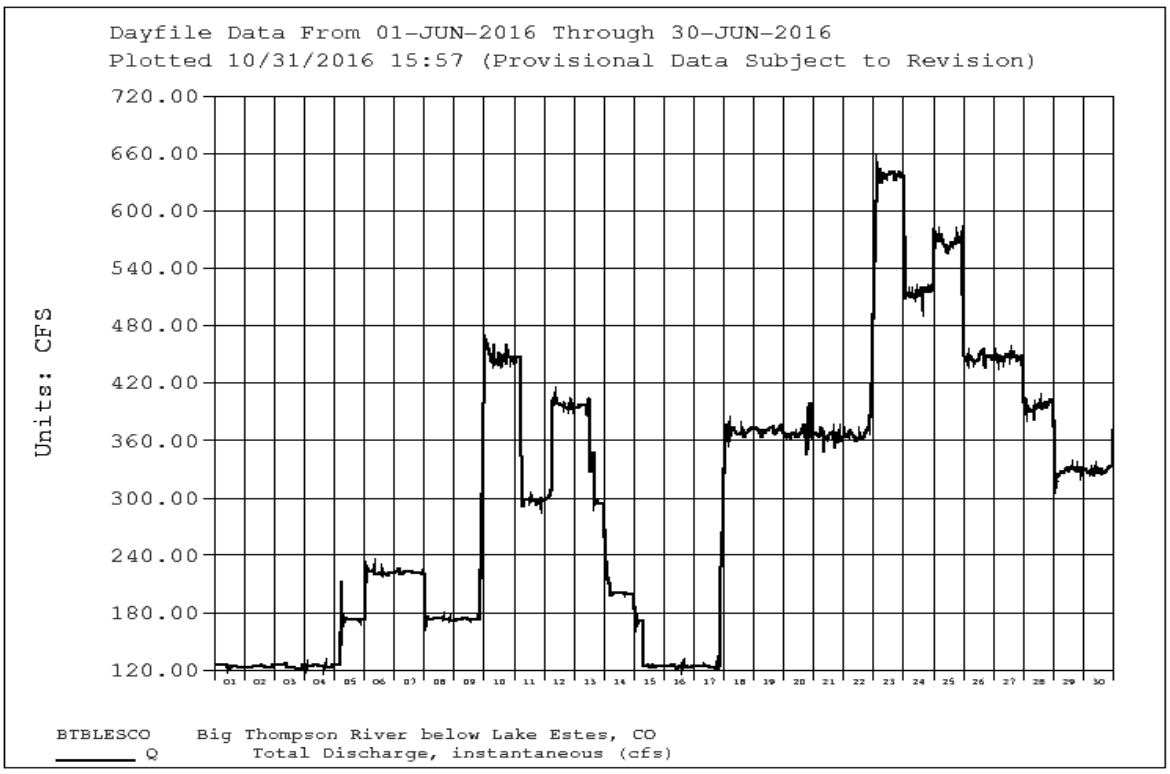


Figure A: Water releases from Olympus Dam during June 2016.

Most reservoirs across northern Colorado began the spring season with high storage contents. With demands for water relatively low until late July 2016 most reservoirs remained full during the spring and early summer of WY 2016. With the dry and hot weather in the summer months putting pressure on those reserves many reservoirs in the area ended WY 2016 lower than they did in previous years.

Thanks to the average runoff and full reservoirs over on the west slope, the Colorado River Endangered Fish Recovery Program, CROS for WY 2016 was very successful, and the runoff projections early in WY 2016 materialized. The peak flow reached 20,000 cfs at the Cameo gage of the Colorado River and over 18,000 cfs at the Palisade gage. CROS is an important component of the C-BT operations, it can be described as an initiative supported by reservoir operators over on the west slope, in an effort to augment Colorado River flows at the 15-Mile reach near Grand Junction, Colorado. The goal of the operation is to pass inflow during the peak of the runoff for the Colorado River to benefit endangered fish along that section of the river. CROS is voluntary and is planned in a way that it does not affect water supply, or filling of reservoirs. During years of extremely high runoff, CROS is often cancelled to prevent any potential flooding from occurring in vulnerable areas.

Northern Water declared a quota of 50 percent in November 2015, and then revisited that quota in April 2016, adding another 20 percent. The 70 percent quota was held for the remainder of WY 2016. The quota assumed for the AOP during October 2015 was 70 percent for WY 2016.

The Grand Lake Water Clarity Initiative plan for WY 2016 was prepared to move 250 cfs continuously between July 2016 and early September 2016 while using the Farr Pumping Plant units intermittently. The pumping operation from the Farr Pumping Plant was adjusted to maximize the storage capacity at Shadow Mountain and Grand Lake in order to minimize the pumping starts and stops. The storage capacity at Carter and Horsetooth Reservoirs, the continuous dry weather, and the expected high demands for C-BT water over on the east slope allowed for the constant flow. The constant diversions also allowed some of the powerplants in the system to continue normal power generation without interruptions. The WY 2016 Grand Lake Water Clarity Initiative was conducted between July 16 and September 11, 2016.

The skim operation was very successful during WY 2016 keeping Flatiron and Pole Hill powerplants producing critical power generation often during periods of high power demand. The Big Thompson Powerplant was also able to contribute to the skim operation due to the addition of the Dille Tunnel. The skim operation was conducted from May through August 2016. A total of 18,205 AF of water were used to generate power as part of the skim operation. This water was returned to the Big Thompson River at the CHFC trifurcation.

The Olympus and Dille tunnels were also used to capture east slope priority water. For WY 2016 they combined for a total volume of 7,081 AF of priority water which 3,098 AF was pumped to Carter Reservoir, and 3,983 AF was moved to Horsetooth Reservoir. The volume captured during the operation was limited by the high pools at Carter and Horsetooth.

Impact of Maintenance and Other Outages on C-BT Operations

Numerous inspections took place at different facilities during the fall maintenance outage period between November and December 2015. Water diversions from the west slope were suspended for almost four weeks during November 2015 in order to accommodate all the inspections and maintenance activities. The Adams Tunnel was also toured by Tri-States Generation and Transmission and their contracting bidders as part of the process to replace the fiber optics line during the fall of 2016. This fiber optics line crosses the length of the tunnel from east to west.

The Estes Powerplant crew conducted the annual maintenance for Marys Powerplant between November and December 2015. Lake Estes level was lowered to the spillway level in order to allow the testing and recalibration of the radial gates at Olympus Dam, as well as the inspection of the Olympus Tunnel siphon and Olympus Tunnel gates. There was also testing conducted on the Marys Powerplant headgate and the Prospect Mountain bulkhead gate.

The Flatiron crew completed the annual maintenance of the Pole Hill Powerplant unit along with other peripheral work around the Flatiron Powerplant. The CHFC trifurcation was winterized during the first couple of weeks of November 2015. The annual maintenance of the CHFC 550 section was done in early November 2015.

Thanks to the extensive coordination, as well as the quick progress in all the inspections and maintenance work diversions of water through the Adams Tunnel resumed almost three weeks ahead of schedule. Filling Lake Estes back to its operational level began ahead of schedule on

November 25, 2015. Normal operations for the C-BT resumed on December 15, 2015 when pumping to Carter Reservoir began.

The WY 2016 fall outage work did not impact C-BT water deliveries. Deliveries to the CHFC continued as planned without using any water from Carter Reservoir. Water stored within the conveyance system was sufficient to satisfy the demands in November 2015.

Flatiron Powerplant Units 1 and 2 had their annual maintenance done between January and May 2016. The Estes Powerplant units also had their annual maintenance done during the spring months of WY 2016. These outages did not impact water operations, but they had an impact on peaking power generation. The Adams Tunnel diversions were lowered for a few weeks in April 2016 due to the two-week annual maintenance of the CHFC, and followed by the reses of the pumping operation to Carter Reservoir. The annual maintenance for the Big Thompson Powerplant was completed in the off-season, therefore its outage had zero impact on operations. The annual maintenance of Flatiron Unit 3 was conducted between early September and late October 2016. This work did not have any impact on water or power operations.

Impact of the Grand Lake Water Clarity Initiative on C-BT Operations

The Grand Lake Water Clarity Initiative had a limited effect on C-BT operations during WY 2016. Given the high water demands expected for late July, August, and early September 2016 the needs for C-BT water were higher than during the previous two years for the same period. The decision was reached to move a constant 250 cfs through the Adams Tunnel. This flow was sufficient to provide the necessary water for the CHFC while keeping all the powerplants in the system operating daily. Over on the west slope the reservoir levels for Grand Lake and Shadow Mountain were managed, therefore making use of the entire summer pool. This approach required longer pumping sessions from the Farr Pumping Plant, but fewer sessions. No water from Carter Reservoir was used during the operation. Despite the low diversion flows from the west slope during August 2016 the reservoir levels at Carter and Horsetooth Reservoirs remained high for WY 2016. Recreation at Carter and Horsetooth Reservoirs was very successful during WY 2016. The boat ramps remained in the water the entire summer and into the fall months. The Grand Lake Water Clarity Initiative for WY 2016 was planned in order to attempt a new approach from previous years.

Drought Impact on C-BT Operations

The drought conditions that affected northern Colorado a few years ago ended after the September, 2013 flood. The combined storage content for the C-BT almost reached 100 percent of capacity by late June 2016.

Flooding Impact on C-BT Operations

The C-BT project did not experience any flooding conditions during WY 2016. The average runoff season induced some high releases from Granby and Green Mountain reservoirs in June 2016. Both reservoirs were able to limit releases of 1,200 cfs or less, significantly lower than flood stage. The Granby operation was carefully coordinated with Northern Water during the spring and

summer months of WY 2016. Over on the east slope the Olympus Dam experienced releases that did not surpass 650 cfs during the peak of the runoff season in June 2016.

WY 2016 OPERATIONS BY FACILITY

Green Mountain Reservoir Chronological Summary of Operations

Fall, winter and spring hydrology WY 2016: The Green Mountain Reservoir contributing watershed experienced average snowpack accumulation and runoff during WY 2016. Snowfall accumulation occurred at an average rate throughout the winter. Late season precipitation pushed accumulation slightly above average resulting in a peak snow water equivalent of 19.5 inches on May 2, 2016, or approximately 110 percent of average. Snowmelt runoff was slightly delayed due to cooler temperatures in early May 2016. Rate of snowmelt rapidly accelerated in June 2016 resulting in earlier than typical exhaustion of the snowpack. Figure 1 shows the basin snow-water equivalent for WY 2016 in comparison to the 30-year average.

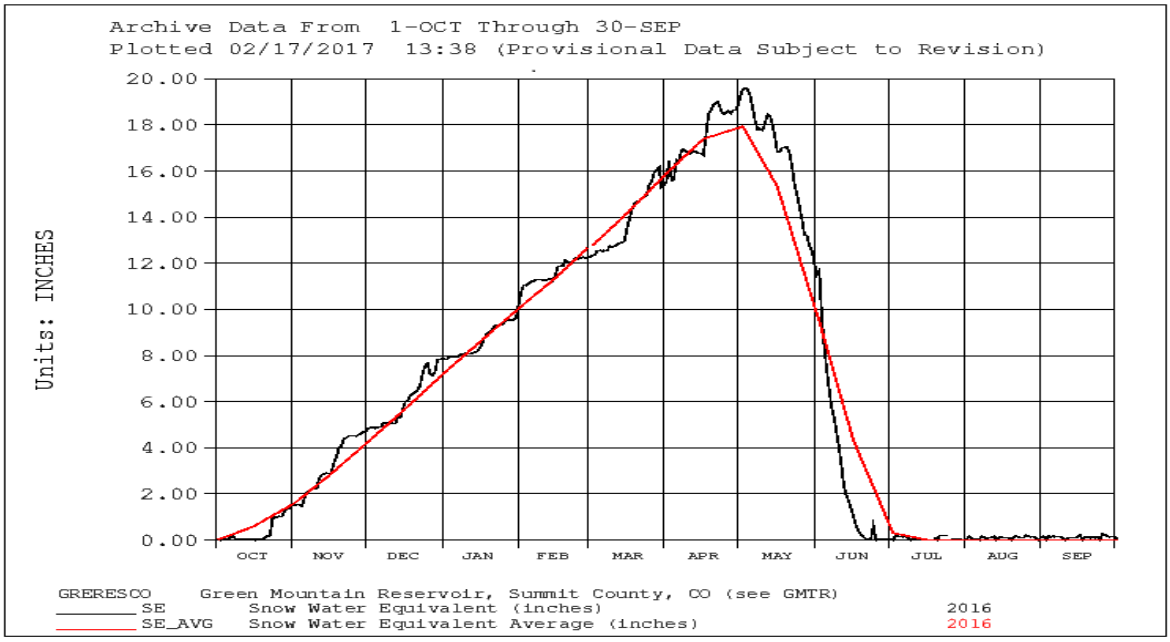


Figure 1: WY 2016 and 30-year average snow-water equivalent for the Green Mountain Reservoir drainage area.

October through April Delivery Operations: Green Mountain Reservoir operation was typical during the fall and winter delivery season. The Colorado River was under administration during the entire period. The Cameo Call was in effect from October 1, 2015 until the end of the irrigation season. The Shoshone Power Plant Senior Call was in effect until April 11, 2016. During this period Green Mountain Reservoir delivered 19,402 AF of C-BT collection system replacement water, 27,317 AF to fulfill HUP obligations, 2,385 AF for contract deliveries, 1,024 AF for the Silt Project replacement and 470 AF for Green Mountain Reservoir evaporative losses. Green Mountain Reservoir did not release water during this period to support a Shoshone Powerplant Outage as agreed within the Shoshone Outage Protocol.

Green Mountain Reservoir maintained a minimum storage of 60,432 AF on April 11, 2016, with a water surface level of 7890.97 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 HUP managing entities declared a surplus in the HUP of 66,000 AF allocation in August 2016. Green Mountain Reservoir released 25,423 AF of HUP surplus water during October 2015 to support the Colorado River Endangered Fish Recovery Program. This water was delivered to the 15-Mile Reach downstream of the Grand Valley Irrigation Company'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 7865 feet. This restriction is always in place to alleviate landslide concerns. The available supply and demands for WY 2016 were such that the reservoir water surface elevation remained above the restriction threshold during the delivery season. Figure 2 illustrates the end of the month storage contents for the reservoir during WY 2016 compared to the 30-year average.

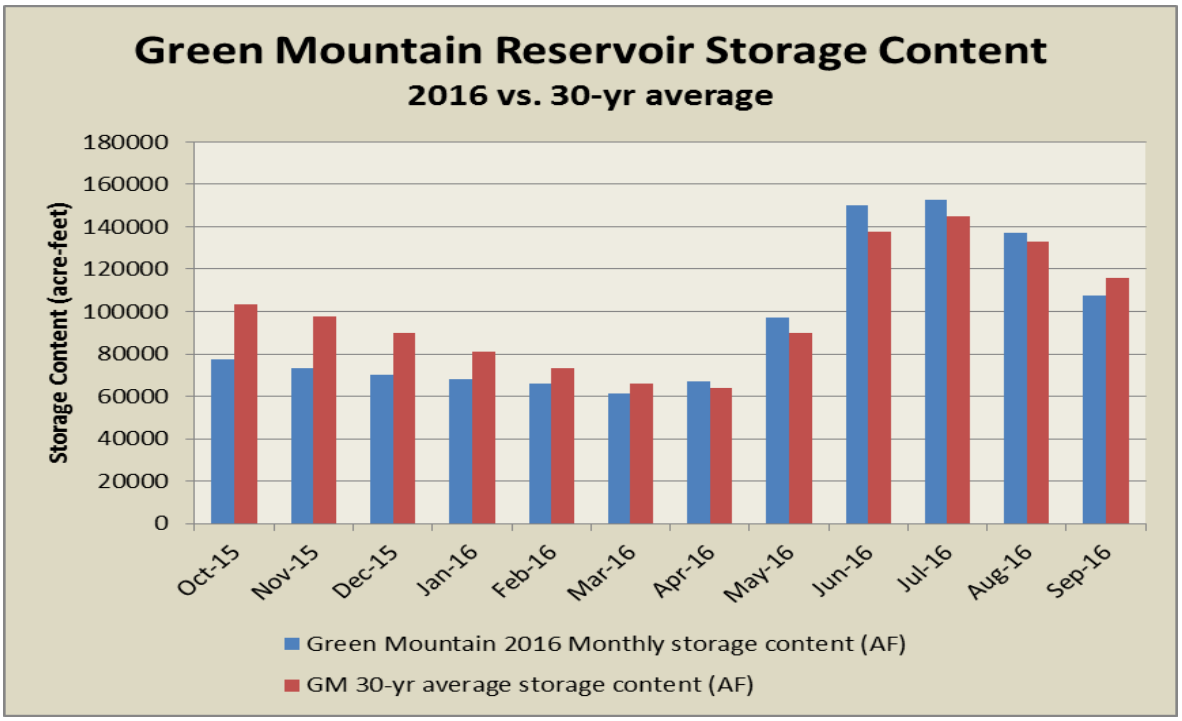


Figure 2: Comparison between the Green Mountain Reservoir monthly content during WY 2016 and its 30-year average content.

March 9: The HUP managing entities held the 2015 HUP Operations Wrap Up meeting where Victor Lee reported on total HUP deliveries and Green Mountain Reservoir Operations. Victor 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. Victor discussed the status of the Heeney Slide operation restriction, and stated that the restriction was not expected to become in effect for the WY 2016 irrigation season.

April through July Fill Operations: Green Mountain Reservoir exercised refill storage rights from April 11, 216 until May 9, 2016. During this period Green Mountain Reservoir stored 13,388 AF. Reservoir storage was 73,821 AF May 9, 2016 about 105 percent of the 30-year average.

Reclamation forecasted that Green Mountain Reservoir would fill in WY 2016. The good carryover storage conditions and average May 1, 2016 streamflow projections indicated a physical fill in all but the 5 percent exceedance case. The Denver Water Board and Colorado Springs Utilities were permitted to divert out of priority since all forecasts projected a substantial amount of runoff available for power generation.

Denver Water Board, Colorado River Conservation District, and Reclamation agreed to participate in the CROS program. 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 and Wolford Reservoirs. Green Mountain Reservoir increased releases up to powerplant capacity during the period from June 3, 2016 through June 11, 2016 while releasing 8,400 AF of water in excess of the fill plan.

The Colorado State Engineer office administered Green Mountain Reservoir operations under the Green Mountain Administrative Protocol (Protocol) for WY 2016. Green Mountain Reservoir maintained the Direct Flow Power Water Right call with a priority of June 23, 1946 during the entire year with the exception of May 1 through May 5, 2016 when releases were reduced to below powerplant capacity for maintenance.

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.

April 11: 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 7,072 AF toward the junior right.

May 9: The start of fill for Green Mountain Senior Refill Right was declared for WY 2016. Re-allocation of the carry over storage of 73,821 AF replenished the 52,000 AF collection system replacement pool, 12,000 AF for the Silt Project allocation, and 9,821 AF was allocated for the HUP.

June 3: 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 24: 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 Colorado Springs Utilities (Cities) had depleted a total of 7,968 AF against the Green Mountain Reservoir First Fill Storage

Right. Green Mountain Reservoir had a physical fill of 138,339 AF by June 24, 2016. 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 5, 2016 to fully eliminate the amount owed by the Cities.

June 22: The HUP Managing Entities held their initial meeting in Grand Junction to consider conditions and plan for WY 2016 operations. A total of 13 meetings and or conference calls were held between June 22 and October 19, 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 U.S. Fish and Wildlife Service proposed an average year target flow of 1,200 cfs.

July 5: Green Mountain Reservoir achieved a physical fill with a fill level of 7949.50 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.

July 5: While the interim policy requires that upstream depletions by Green Mountain Reservoir beneficiaries junior to Green Mountain Reservoir be charged against the paper fill of Green Mountain Reservoir, those depletions 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 24, 2016.

July-August: The C-BT project remained in priority for all of July through August 2016. Green Mountain Reservoir obtained a peak pool elevation level of 7949.83 on July 22, 2016. Green Mountain Reservoir commenced deliveries on August 1, 2016 with the Colorado River coming under administration with the Junior Shoshone Direct Flow Right. The HUP managing entities declared HUP surplus on August 3, 2016. Green Mountain Reservoir increased releases on August 5, 2016 to commence delivery of surplus water to the 15-Mile Reach. Division 5 placed a 1935 C-BT swing call with partial Project curtailment on August 21, 2016.

September 2: The C-BT Project went out of priority with the Colorado River placed under administration from the Senior Shoshone Direct Flow Right. Green Mountain Reservoir commenced releasing full Collection System out-of-priority diversions. Green Mountain remained out of priority for the remainder of WY 2016.

WY 2016: Green Mountain Reservoir operations did not require any operating restrictions during delivery and filling. All releases were passed through the outlet works. Power was generated from all releases except the 5 days of minimum bypass flows during a powerplant outage in May 2016.

Green Mountain Reservoir delivered a total of 44,111 AF between the start of fill and the end of WY 2016. These deliveries included 5,616 AF for HUP beneficiaries, 4,001 AF for C-BT collection system replacement, 862 AF for contract obligations and 477 AF for Silt Project replacement. Green Mountain Reservoir released 33,155 AF of HUP Surplus releases for the

benefit of the Colorado Endangered Fish Recovery Program. The Shoshone Outage Protocol was not implemented during WY 2016.

Willow Creek Reservoir – Chronological Summary of Operations

October through March: Willow Creek had an above average fall and early winter snow accumulation. The snowpack remained high throughout the entire winter and during most of the spring.

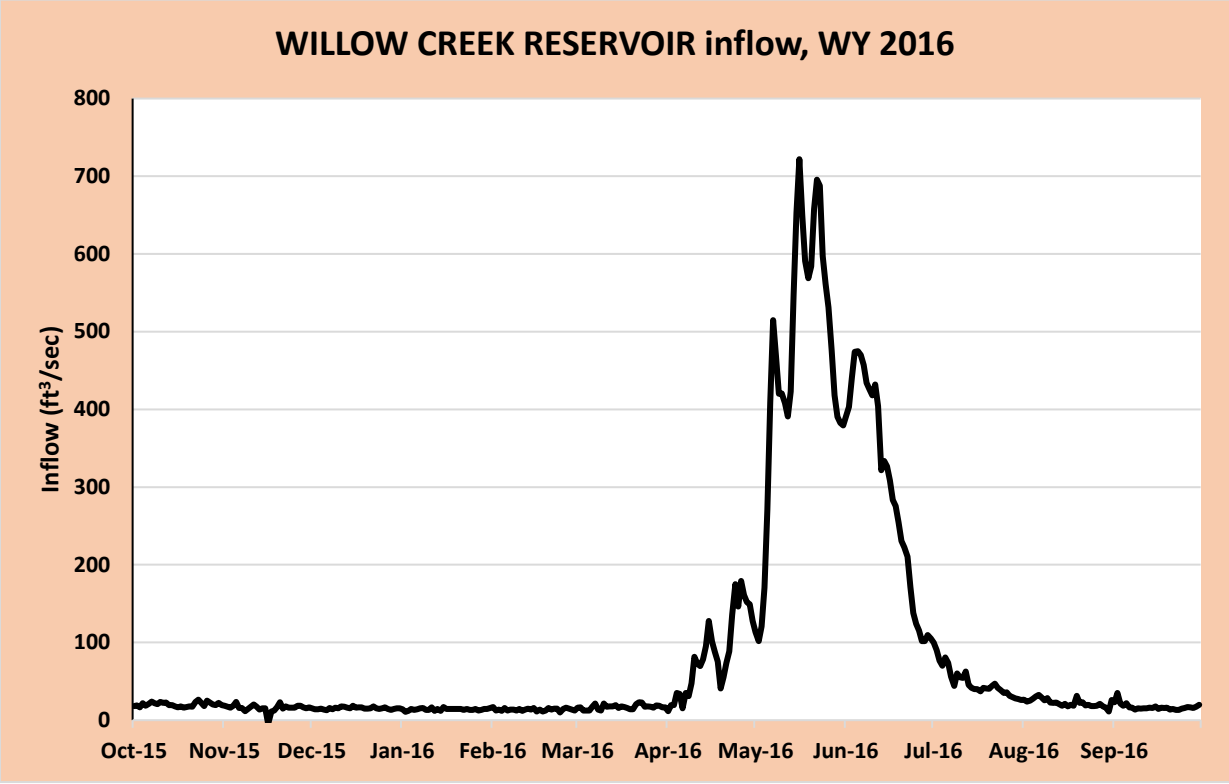
April, May: Runoff at the Willow Creek watershed began in April 2016 close to its normal time. Pumping to Granby began in early April 2016, with one pump. Later in May 2016, two pumps were used for most of the month and into June 2016.

May: The peak inflow for WY 2016 was reached on May16, 2106 at 722 cfs. The flow was twice as high as the peak inflow for WY 2015.

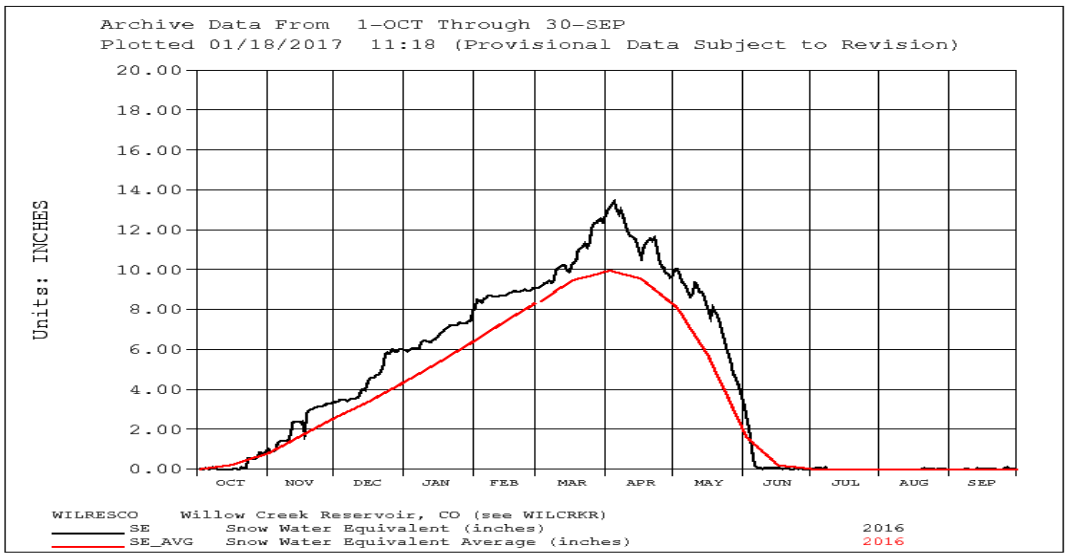
June: The highest release from Willow Creek Reservoir into Willow Creek occurred on June 15, 2106 with a discharge of 386 cfs.

July: The Willow Creek Reservoir level was lowered early in early July 2016 in order to allow maintenance to take place at the outlet works facility at the dam.

May through September: Operations at Willow Creek Reservoir were relatively normal the entire water season, with no incidents reported.



Releases from Willow Creek Reservoir to Willow Creek during WY 2016.

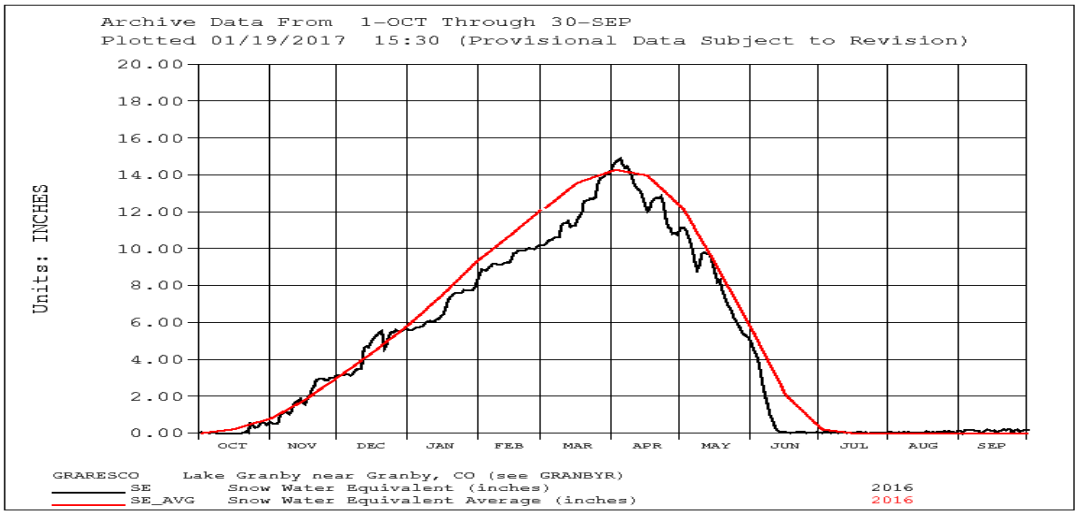


WY 2016 and 30-year average snow-water equivalent for the Willow Creek Reservoir drainage area.

Granby Reservoir – Chronological Summary of Operations

October through December: The carryover content from WY 2015 for Granby Reservoir was 500,098 AF which represents 120 percent of the 30 year average. At full capacity the Granby Reservoir is 539,758 AF. The reservoir content remained steady until the middle of December 2015. Once the diversions through the Adams Tunnel and the pumping at the Farr Pumping Plant resumed in December 2015 the Granby Reservoir level began to fall rapidly.

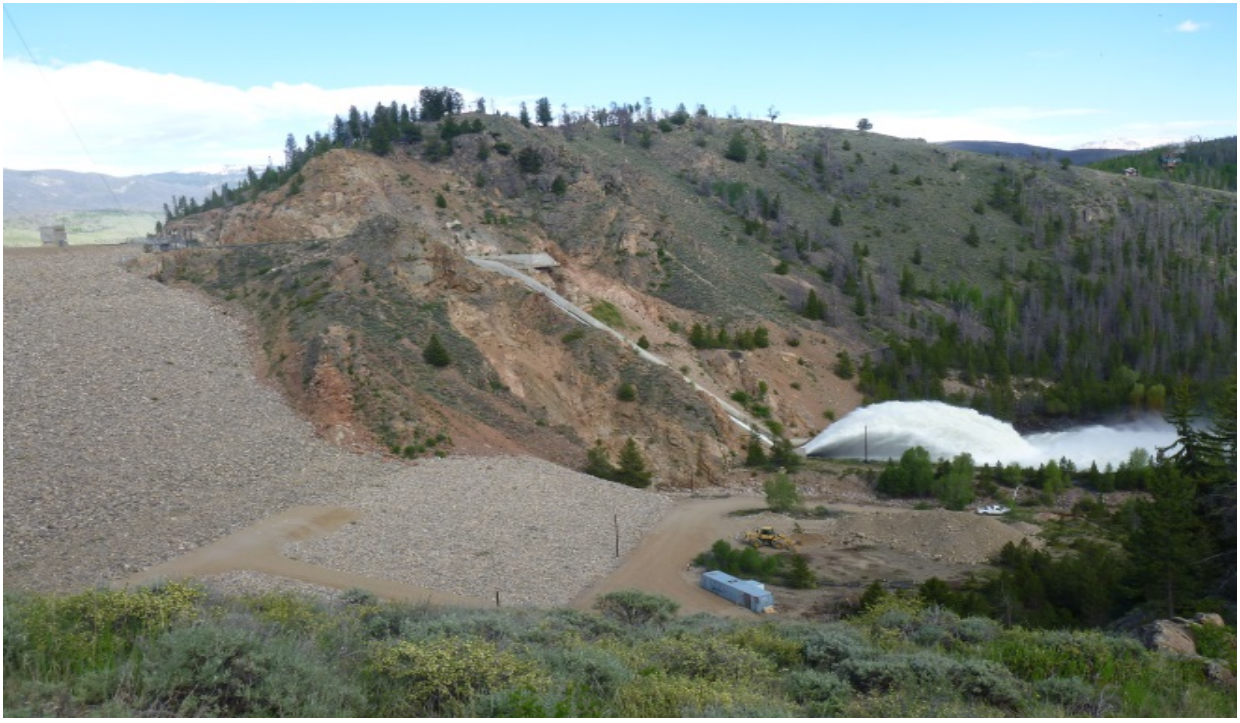
December through April: As diversions through the Adams Tunnel resumed Granby Reservoir content began to fall steadily. The reservoir content dropped to 375,566 AF by April 6, 2016 before it began a steady rise. By early April 2016 the Adams Tunnel diversions were only one half of its full capacity due to the high levels of Carter and Horsetooth Reservoirs and a rising runoff.



WY 2016 versus 30-year average snow-water equivalent for the Granby Reservoir drainage area.

June through July: Granby Reservoir was going to face a possible spill during June and July 2016 due to Carter and Horsetooth Reservoir contents being near full capacity. A decision was reached not to pump from the Windy Gap pool into Granby Reservoir during WY 2016. By June 11, 2016 the pumping operation from Willow Creek Reservoir into Granby Reservoir had also been suspended.

With the high content levels at the two terminal reservoirs over the east slope diversions through the Adams Tunnel were curtailed in early June 2016. By June 20, 2016 Granby Reservoir began to release more water than the minimum flow required. By June 24, 2016 Granby Reservoir was releasing 1,132 cfs. That was the highest release flow from the reservoir during WY 2016. Despite the high releases in late June 2016 the water surface level at Granby Reservoir continued to rise at a significant pace until late June 2016. The high releases did not cause any flood damages downstream. As the peak inflow passed the releases over the spillway were lowered accordingly in order to keep a full reservoir. By July 6, 2016 the Granby Reservoir releases had been reduced back to 75 cfs, which is the minimum required flow for the month of July.

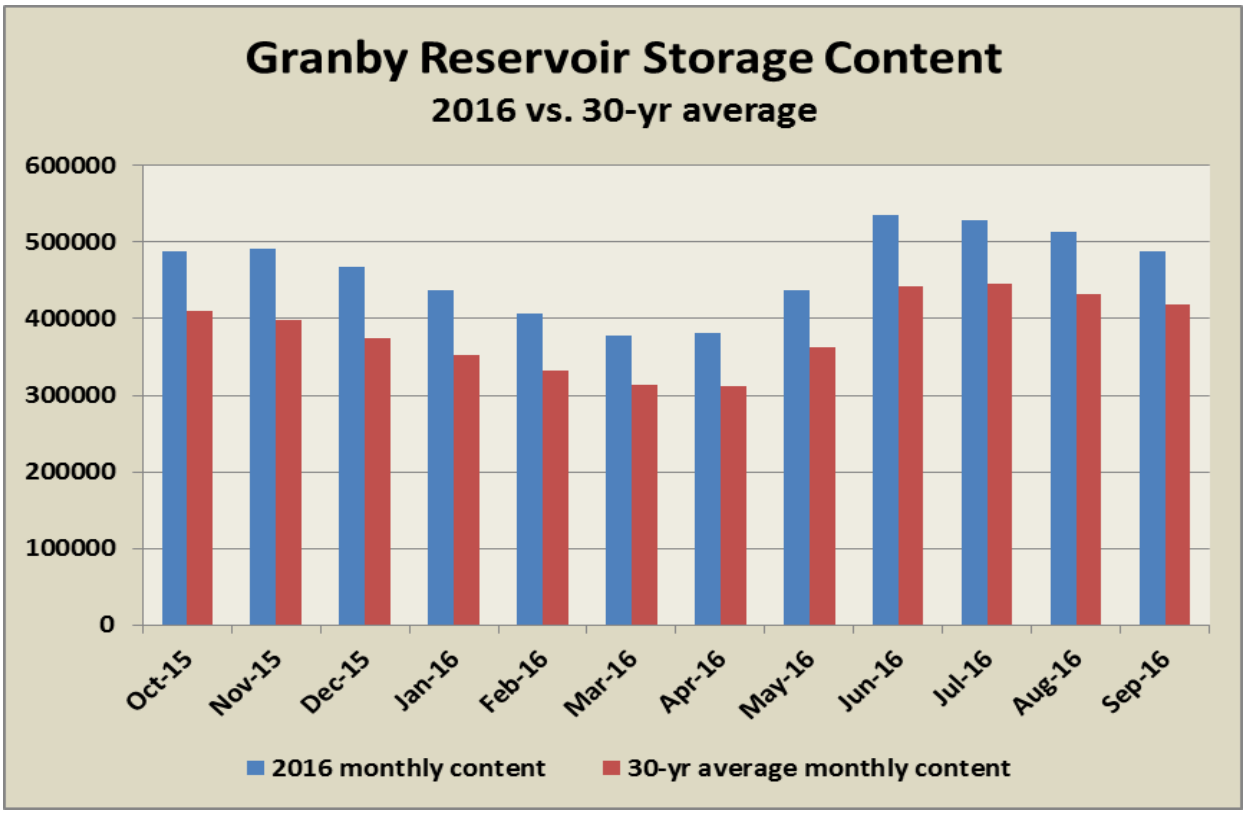


Granby Reservoir spill; approximately 2,400 cfs, June 13 through June 21, 2015.

July: By early July 2016 the threat of high releases and potential flooding had passed. The reservoir level had stabilized at an elevation of 8279.50 feet where it stayed several days before it began to drop. The releases from Granby Reservoir were managed in order to maintain its level.

July through September: Farr Plant pumping operations varied during the period from July 16 through September 11, 2016 as part of Grand Lake Clarity operations. Operational changes included the magnitude of Shadow Mountain Reservoir pool elevation fluctuation and the number of units operating during a singular pumping session. Indirect results of these changes were the duration of the pumping sessions and the frequency of those sessions.

Beginning July 16, 2016 the Adams Tunnel diversions were reduced to a constant 250 cfs, as prescribed in the Grand Lake Clarity operational plan. From July 16 until August 20, 2016 daily pumping using one pump unit augmented native Grand Lake and Shadow Mountain Reservoir native inflow while maintaining the constant 250 cfs diversion. During this period the Shadow Mountain Reservoir pool elevation would fluctuate approximately 0.1 foot daily. After initially improving, the Grand Lake Clarity started degrading in early August 2016.



Granby Reservoir storage content during WY 2016 versus the 30-year average.

The pumping operation was modified on August 20, 2016, in response to the clarity degradation. From August 20 until September 11, 2016 the Shadow Mountain Reservoir pool elevation was allowed to fluctuate 0.6 feet between pumping sessions. During this operation, up to two units would operate while maintaining the constant diversion rate. This operation required pumping every two to three days.

The change in pump operation was an effort to promote water mixing and to destabilize developing thermal stratification in Shadow Mountain Reservoir. Promoting mixing of Shadow Mountain Reservoir was hypothesized to improve clarity or slow down the rate of clarity degradation by reducing algae productivity. Depth profiles of temperature indicate that the pump regime change did promote Shadow Mountain Reservoir mixing. The rate of water clarity degradation did slow and clarity began to improve following the pumping operation change. It is uncertain if the observed change in clarity was a result of the change in pumping operations, or of other environmental factors.

September: After the Adaptive Management operation ended in September diversions through the Adams Tunnel were increased. That increase in diversions required additional pumping from the Farr Pumping Plant which accelerated the drawdown of Granby Reservoir. Granby Reservoir finished WY 2016 with 487,231 AF of water in storage.

Adams Tunnel, Marys Lake and Lake Estes – Chronological Summary of Operations

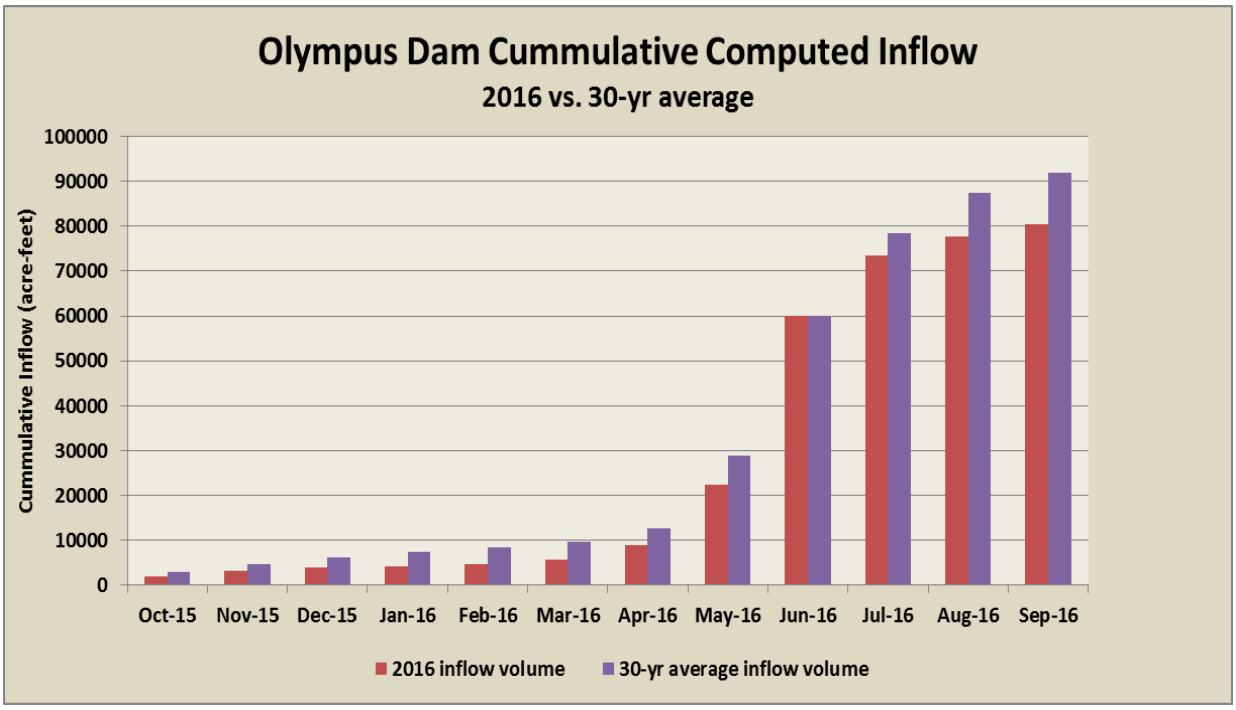
November: Similar to previous years the month of November 2015 brought multiple inspections and maintenance projects for the C-BT. Marys Lake was drained to do inspections and testing balanced and unbalanced) of the Prospect Mountain bulkhead gate. The Marys Powerplant headgate was also inspected along with other features. The Lake Estes water surface was lowered down to the spillway crest level in early November 2015 to inspect the Olympus Tunnel intake facility, and to test and recalibrate all the radial gates at Olympus Dam.

November 25: Water began to flow through the Adams Tunnel once again after the drawdown of Lake Estes. The level of the Marys Lake water surface began to rise soon after.

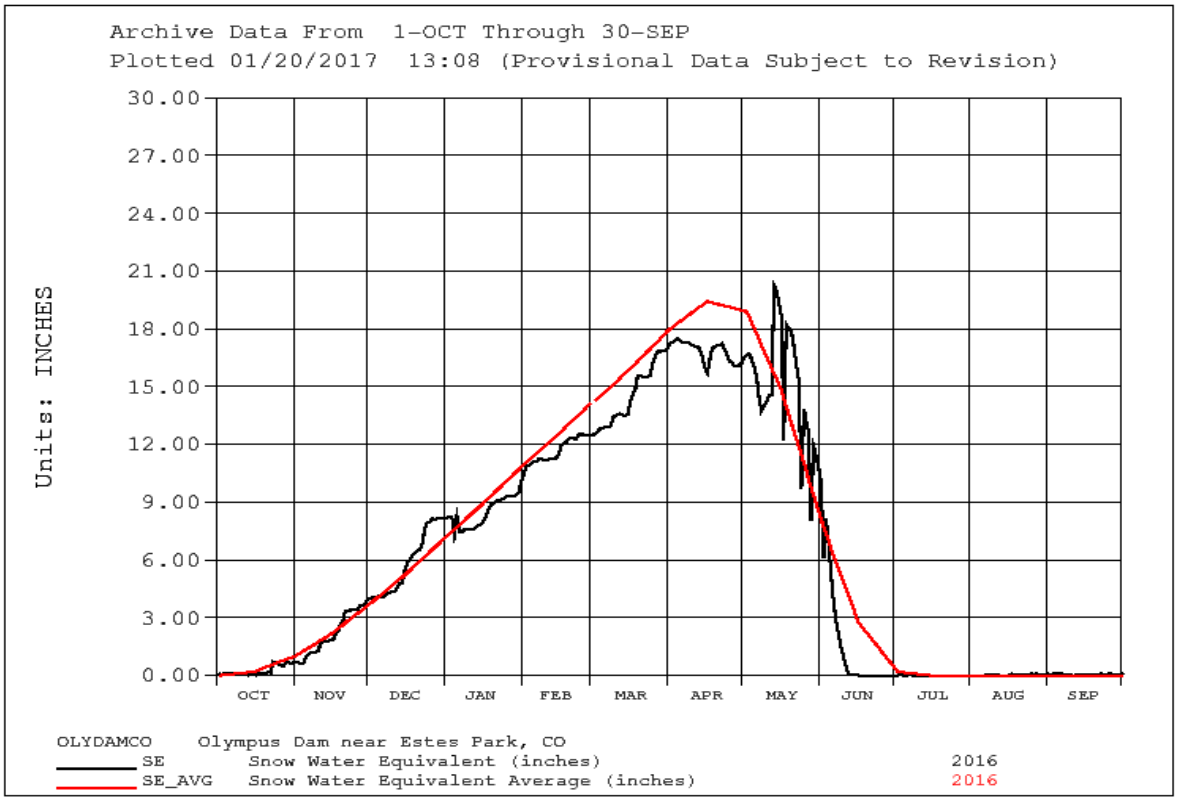
December 1: The level at Lake Estes reached its normal operational pool.

December 15: As the C-BT maintenance season came to an end 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 March 28, 2016.

February and March: Snowpack remained below the 30 year average during the late winter and early spring. The mild winter and below-average snowpack produced below-average inflow for Lake Estes during WY 2016.



Computed 24-hour average native inflow for Lake Estes during WY 2016 versus its 30-year average.



WY 2016 and 30-year average snow-water for the Olympus Dam drainage area.

April: A relatively warm period during March and early April 2016 began to melt some of the snow at the lower elevations. The inflow to Lake Estes began to rise soon after. By the middle of April 2016 runoff was already beginning. The C-BT skim operation began soon after adding to the power generation at Pole Hill and Flatiron Powerplants. The runoff in April 2016 was not sufficient to operate the Big Thompson Powerplant, therefore the Wasteway was used to return flows to the Big Thompson River at the mouth of the Big Thompson Canyon during April and early May 2016.

April 15: Carter Reservoir reached its maximum storage capacity on April 15, 2016, and pumping to Carter Reservoir was suspended temporarily. This pushed Carter Reservoir level to its maximum capacity while preventing the water from being spilled from Granby Reservoir on the west slope.

April 30: By the end of April 2016 the daily average inflow to Lake Estes was approaching 100 cfs. A portion of this water was being diverted as part of the skim operation.

May: The month of May 2016 was relatively mild and wet over the east slope. Snow and rain continued to fall over the Front Range keeping the runoff relatively high. The inflow to Lake Estes reached a daily average flow of 416 cfs on May 23, 2016.

May 18: Pumping to Carter Reservoir resumed on May 18, 2016. The reservoir had reached its maximum capacity. Its storage content had dropped over 4,000 AF since April 15, 2106. The strategy was to keep Carter Reservoir as full as possible throughout the summer. Horsetooth Reservoir had also reached near-full capacity by the middle of May 2016.

May 30: The Adams Tunnel diversions were reduced significantly due to the lack of storage space over the east slope. Pumping to Carter Reservoir was also suspended. The Olympus Tunnel continued to divert skim water generating power at Pole Hill and Flatiron Powerplants.

June: Temperatures over the Front Range began to rise during June 2016. In addition, a series of wet systems continued to impact the region during the first two weeks of June 2016. The warm and wet conditions contributed to higher runoff during the middle of June 2016. With Horsetooth and Carter Reservoirs at near full capacity the capture of priority water was limited. Must of the skimmed water was used to generate power through the southern power arm of the project.

June 2: The Big Thompson Powerplant began generating power, using skim water.

June 12: The peak runoff for the Big Thompson River occurred on June 12, 2016. The daily average inflow for Lake Estes that day was estimated at 931 cfs.

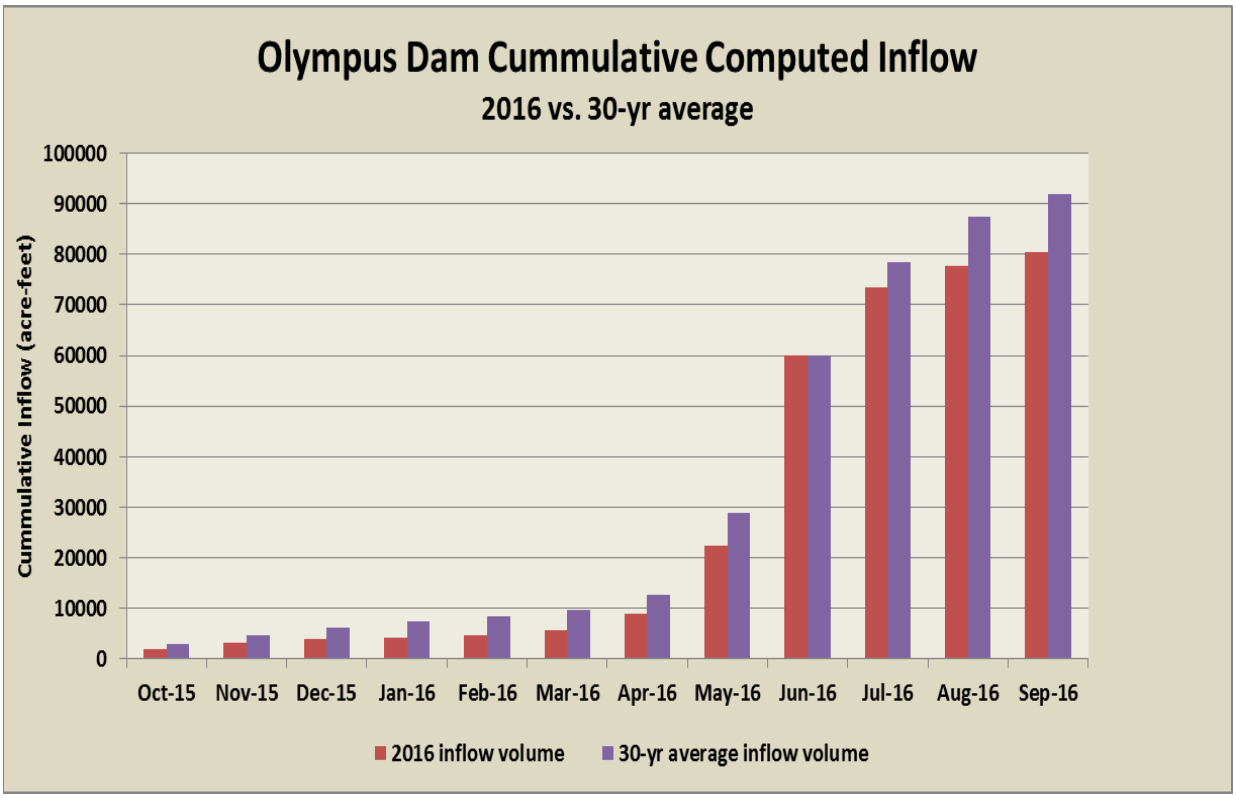
June 16: Pumping operation to Carter Reservoir resumed on June 6, 2016. Initially, the pumping consisted mainly of east slope priority water. But soon after, as the volume of priority water diminished, project water was added.

June 18: Diversions through the Adams Tunnel resumed this day as pumping to Carter Reservoir demanded C-BT water.

June 23: The highest 24-hour average release from Olympus Dam to the Big Thompson River was 631 cfs on June 23, 2016. The high releases from Olympus Dam in late May and June 2106 were not considered flooding operations, and did not cause any known issues along the Big Thompson River.

July 16: The Grand Lake Water Clarity Initiative for WY 2016 began on July 16, 2016. The WY 2016 plan was to divert 250 cfs through the Adams Tunnel uninterrupted. The operation lasted until early September 2016. The 250 cfs flow of water was sufficient to satisfy all the demands for C-BT water and to keep daily power generation at the system powerplants.

September 11: The Water Clarity operation for WY 2016 ended this day. Diversions from the west slope via the Adams Tunnel were increased soon after, trying to position the Horsetooth Reservoir level with adequate storage before spring.



Cumulative inflow to Lake Estes for WY 2016, compared to its 30-year average. The inflow at Lake Estes was consistently below average during WY 2016.

Foothill's Power Arm Plus Carter and Horsetooth–Chronological Summary of Operations

October: Flows through the Olympus Tunnel were low in October 2015. In the first week the flows were set at 25 cfs, in order to keep the Pole Hill Powerplant headgate open. Annual maintenance work of the CHFC 550 section and the Flatiron Unit 3 prevented more water being moved. Once the CHFC 550 section maintenance work ended on October 7, 2015 higher flows resumed. With Flatiron Unit 3 under maintenance and Horsetooth Reservoir levels well above the normal for the fall season diversions through the Adams Tunnel were kept at 250 cfs until the end of the month. During the last week of October 2016 demands for C-BT water increased. The Olympus Tunnel finished the month moving over 400 cfs.

November: Pinewood Reservoir began the month of November 2015 relatively full when compared to other years. The Pole Hill Powerplant annual maintenance began on November 1, 2015 and continued until the middle of December 2015. Flatiron Reservoir maintained normal operations during November 2015. The CHFC was down for maintenance and inspections between November 2 and November 10, 2015. There was sufficient water stored at Pinewood and Flatiron Reservoir to supply the CHFC, therefore no water from Carter Reservoir was needed to continue deliveries in November and December 2015.

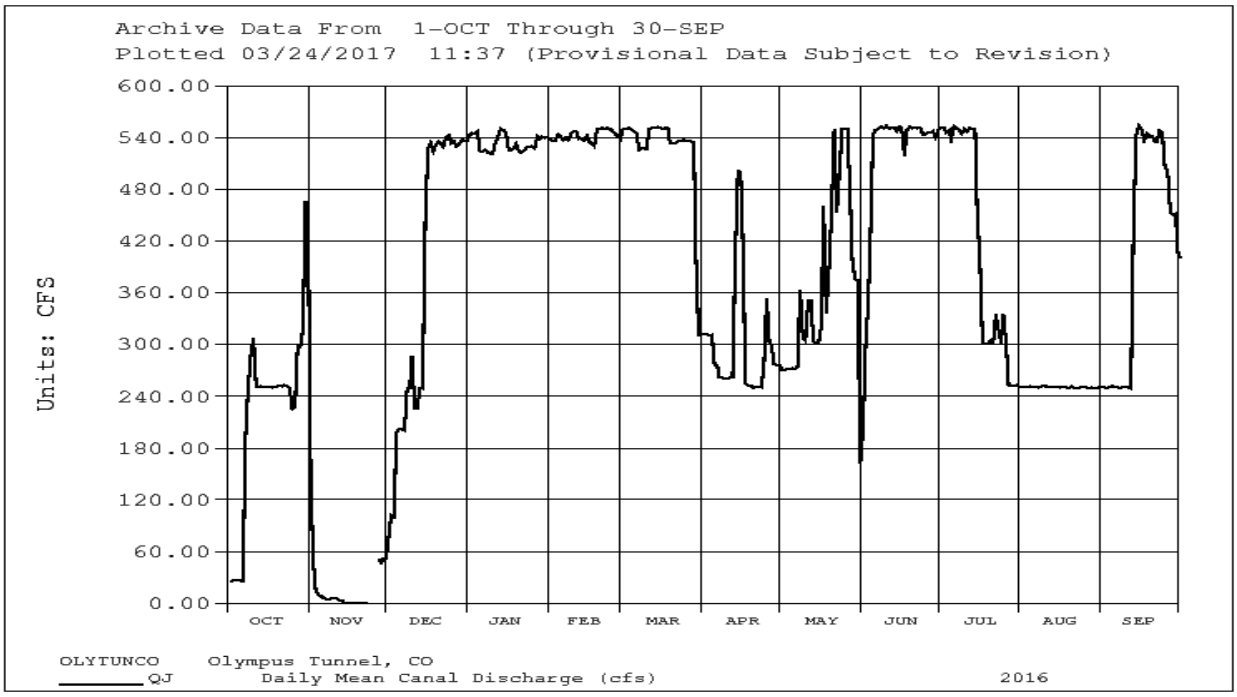
November 25: Limited diversions through the Adams Tunnel resumed, sufficient enough to fill Marys Lake and Lake Estes, and to supply the CHFC.

December 15: Normal operations resumed on December 15, 2015 as the Adams Tunnel diversions were increased to 550 cfs, and pumping to Carter Reservoir began for WY 2106. The remaining water left behind by the Flatiron Unit 3 pump began flowing towards Horsetooth Reservoir via the CHFC.

January through March: Diversions from the west slope continued at full capacity, uninterrupted, until the end of March 2016.

April 1: The annual maintenance for the CHFC began on April 1, 2016 and continued until April 12, 2016. During this period pumping to Carter Reservoir continued.

April 15: Pumping to Carter Reservoir ended on April 15, 2016 as the reservoir reached its full capacity. The Adams Tunnel diversions were reset to 250 cfs with the water flowing north towards Horsetooth Reservoir. This operation kept the powerplants in the system generating power for several weeks until Horsetooth Reservoir reached its maximum capacity as the system slowly transitioned into the skim operation for WY 2016.



Olympus Tunnel 24-hour average flow during WY 2016.

May 18: Horsetooth reached its maximum capacity on May 18, 2016. From this point on the CHFC flows were adjusted daily in order to maintain that reservoir level.

June 2: The Big Thompson Powerplant began generating power June 2, 2016. The operation used skimmed water from the plentiful inflow to Lake Estes, and allowed flows into the Big Thompson River Canyon to be kept below 630 cfs during the peak of the runoff season in June 2016. Water also began to flow through the Dille Tunnel for the first time since the September 2013 flood. Initially the Dille Tunnel water was considered strictly skim water which was used to

augment power generation at the Big Thompson Powerplant. Later in the month of June 2016 east slope priority water also began to flow through the Dille Tunnel on its way to Horsetooth Reservoir.

June 16: Pumping to Carter Reservoir resumed on June 16, 2016 in order to reduce the spill at Granby Reservoir, and to maximize the storage of C-BT water. As demands for C-BT water increased in late June and early July 2016 Carter Reservoir never reached its maximum capacity again.

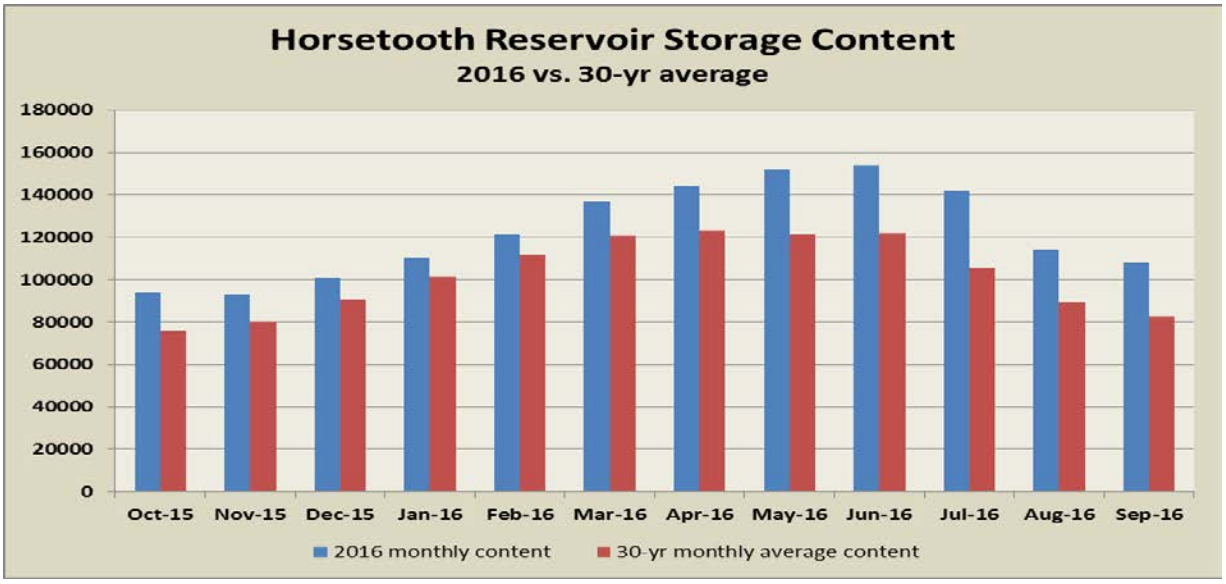
July 16: As the Grand Lake Water Clarity operation began on July 16, 2016 pumping to Carter Lake was suspended. By then, runoff was almost over, and so was the availability of east slope priority water. The Adams Tunnel diversions were not sufficient to continue pumping to Carter Reservoir as the pump demanded 285 cfs.

August: The power generation at the Big Thompson Powerplant continued during the month of August 2016 fed mainly by demands for C-BT water along with limited skim water from the Dille Tunnel. The deeper the operation went into August the more dependent its power generation became on C-BT water deliveries due to low runoff.

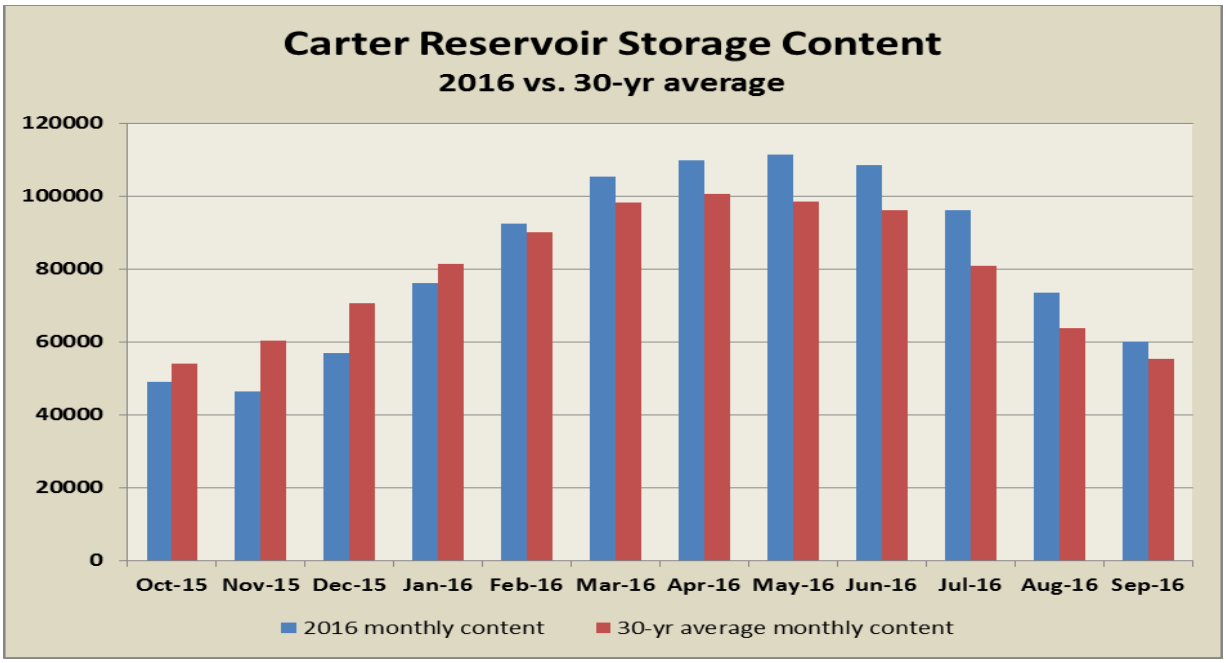
September: The annual maintenance for the CHFC 550 Section was postponed for the first two weeks of November 2015. The CHFC continued to move water towards Horsetooth Reservoir the month of September 2016.

Throughout WY 2016: With Carter and Horsetooth Reservoirs levels above average for the majority spring and summer seasons of WY 2016, recreation at Larimer County parks was very successful. The boat ramps were in the water the entire recreational season.

Carter Reservoir delivered 87,023 AF of C-BT water during WY 2016 with another 6348.5 AF of Windy Gap water. Horsetooth Reservoir delivered 95,419 AF of C-BT water and 4,763 AF of Windy Gap water.



Horsetooth Reservoir storage content during WY 2016 versus its 30-year average.



Carter Reservoir storage content during WY 2016 versus its 30-year average.

C-BT 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 Division of Water Resources of the state of Colorado, Northern Water, Upper Colorado and Great Plains regions of Reclamation, WAPA, 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 new 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 changing conditions occur. Computer programs and models are used by ECAO to develop the AOP and water supply forecasts. Tables 5A, 5B and 5C include the October 2016 three versions of the AOP. Exhibits 3 through 9 also provide a view of the planned WY 2017 C-BT operations.

IRRIGATION REQUIREMENTS

The amount of water that is made available to the C-BT for irrigation will be determined by Northern Water. This determination will be 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 inflow conditions were estimated by analyzing actual use under a variety of actual runoff conditions.

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

Charles Hansen Feeder Canal 550 Section flowing at full capacity.

MINIMUM REQUIRED RESERVOIR RELEASES

January 19, 1961 the Secretary of the Interior established specific guidelines for water releases out of Lake Granby to satisfy fish habitat requirements. 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.

A minimum flow requirement of 75 cfs, 40 cfs during August, and 20 cfs during September is maintained at the YMCA gauge downstream of Lake Granby. The flow during the May through September period can be progressively reduced if the inflow during the WY to Shadow Mountain Lake, Grand Lake, and Lake Granby (less the decreed 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 during that year is forecasted to be 230,000 AF or less.

According to the *"Principles to Govern the Release of Water at Granby Dam to Provide Fishery Flows immediately Downstream in the Colorado River"* signed by the Secretary of the Interior and Commissioner of Reclamation in 1961, 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	Percentage Reduction
in AF	in Minimum Release
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. In the Secretarial determination minimum instream flow requirements for Willow Creek were not provided. However, a release of 7 cfs or inflow (whichever is the lesser) 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 the lesser) 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. 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 much less than the recommended minimum flows. Releases in excess of inflows are not required.

GREEN MOUNTAIN RESERVOIR OPERATIONS

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 CROS effort 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 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

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.

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 HISTORIC USERS POOL (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 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 Green Mountain Reservoir HUP Operating Criteria (Operating Criteria). The Operating Criteria further defines operation of the Green Mountain Reservoir HUP consistent with Senate Document 80 and

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.

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 Grand Valley Water Users Association, the Orchard Mesa Irrigation District, the Grand Valley Irrigation Company, the Division 5 Engineer, the Colorado Water Conservation Board, and Fish and Wildlife Service (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.

OPERATION 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. This operation is known as "Operation Skim". The amount diverted depends on the flow at the Big Thompson River and the tributaries above Lake Estes, C-BT water imported through the Adams Tunnel, and the capacity of the Foothills System.

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 the 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 along the Big Thompson Canyon by attenuating high flows, and by maintaining a steady stream during the runoff season.

Operation 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.

A volume of 19,022 AF of Big Thompson River water was skimmed through the Olympus Tunnel during WY 2016 one fifth of the water skimmed during WY 2015. The skimmed water produced an estimated 29,257 megawatts of power while passing through Pole Hill, Flatiron and the Big Thompson Powerplants. An additional 18,138 AF of east slope priority water was also diverted through the Olympus Tunnel, which also helped produce an estimated 9,670 megawatts of power at Pole Hill and Flatiron Powerplants. The Dille Tunnel also diverted water during WY 2016, first time since the September 2013 flood. The Dille skim diversion totaled 17,468 AF in WY2016

APPENDIX A – DAILY RECORDS

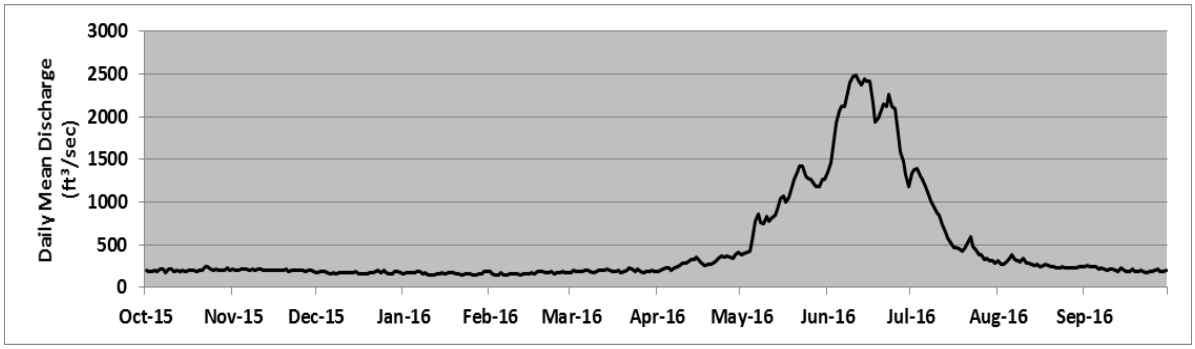
Appendix A (1 of 38)

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-2015 to 30-Sep-2016. 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	198	213	176	155	178	164	187	387	1357	1341	304	234
2	182	205	179	166	156	199	196	390	1466	1373	267	248
3	183	199	181	168	145	185	207	405	1647	1392	272	245
4	201	207	181	171	144	189	223	429	1924	1306	301	247
5	188	213	172	174	164	187	229	543	2072	1263	344	240
6	217	214	158	189	138	198	204	771	2124	1187	384	212
7	209	198	168	188	149	200	231	858	2125	1088	325	224
8	172	211	161	162	156	179	246	755	2292	1008	313	207
9	211	195	167	165	155	175	262	752	2404	940	298	202
10	212	213	175	147	154	189	282	831	2475	870	333	209
11	187	208	170	146	163	192	276	774	2489	842	290	216
12	200	198	172	143	149	193	291	813	2435	734	283	202
13	182	201	166	158	156	203	320	846	2378	643	263	188
14	194	204	172	160	160	210	319	916	2443	581	262	223
15	189	198	178	165	160	193	358	1035	2423	520	269	201
16	196	204	152	157	164	191	312	1075	2411	471	238	189
17	201	203	161	166	162	189	283	999	2171	463	254	189
18	195	198	163	165	178	196	259	1062	1939	455	265	216
19	186	203	153	165	182	177	271	1145	1983	426	260	178
20	193	213	167	163	178	182	268	1267	2073	455	238	186
21	193	185	177	155	175	198	277	1351	2156	516	242	197
22	243	193	191	149	173	224	314	1421	2117	598	233	191
23	237	195	192	156	183	209	345	1424	2262	481	231	173
24	211	194	172	152	158	184	367	1301	2127	443	242	180
25	203	193	196	154	175	214	354	1273	2089	382	227	188
26	206	197	174	145	172	179	366	1271	1899	377	225	194
27	205	179	161	145	180	170	351	1215	1591	332	230	210
28	194	199	161	159	173	181	342	1182	1473	345	229	184
29	203	193	183	154		189	376	1177	1328	316	227	188
30	224	191	189	180		193	416	1263	1181	317	244	196
31	193		172	178		187		1271		289	238	
Min	172	179	152	143	138	164	187	387	1181	289	225	173
Max	243	214	196	189	183	224	416	1424	2489	1392	384	248
Mean	200	201	172	161	164	191	291	974	2028	702	269	205
AF	12294	11914	10578	9901	9071	11723	17288	59793	120489	43066	16496	12193

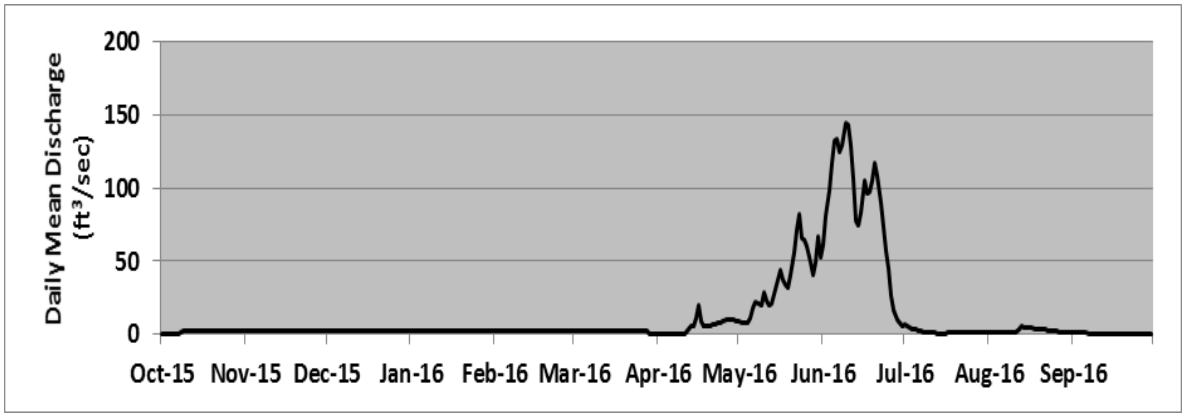


Appendix A (2 of 38)
Elliot Creek Canal near Green Mountain Reservoir, CO

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. Recorder was operated in the early fall, and from12-Apr-2016 through 30-Sep-2016. 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	3	3	3	3	3	0	9	61	7	1	1
2	0	3	3	3	3	3	0	8	81	6	1	1
3	0	3	3	3	3	3	0	8	99	5	1	1
4	0	3	3	3	3	3	0	8	117	4	1	1
5	0	3	3	3	3	3	0	11	132	3	1	1
6	0	3	3	3	3	3	0	18	133	3	2	1
7	0	3	3	3	3	3	0	22	125	2	2	1
8	1	3	3	3	3	3	0	21	128	2	1	1
9	3	3	3	3	3	3	0	21	145	1	2	0
10	3	3	3	3	3	3	0	29	143	1	2	0
11	3	3	3	3	3	3	0	24	128	1	1	0
12	3	3	3	3	3	3	3	20	106	1	4	0
13	3	3	3	3	3	3	5	21	77	1	6	0
14	3	3	3	3	3	3	6	28	75	1	5	0
15	3	3	3	3	3	3	12	37	83	1	5	0
16	3	3	3	3	3	3	20	45	105	1	5	0
17	3	3	3	3	3	3	9	38	97	1	4	0
18	3	3	3	3	3	3	6	34	98	1	4	0
19	3	3	3	3	3	3	6	32	104	1	4	0
20	3	3	3	3	3	3	6	41	117	1	4	0
21	3	3	3	3	3	3	7	56	109	2	4	0
22	3	3	3	3	3	3	7	71	90	1	3	0
23	3	3	3	3	3	3	8	82	73	1	3	0
24	3	3	3	3	3	3	8	66	57	1	3	0
25	3	3	3	3	3	3	9	65	45	1	3	0
26	3	3	3	3	3	3	10	60	27	1	2	0
27	3	3	3	3	3	3	10	49	17	1	2	0
28	3	3	3	3	3	3	10	41	10	1	1	0
29	3	3	3	3		0	10	50	8	1	1	0
30	3	3	3	3		0	9	66	6	1	1	0
31	3		3	3		0		52		1	1	
Min	0	3	3	3	3	0	0	8	6	1	1	0
Max	3	3	3	3	3	3	20	82	145	7	6	1
Mean	2	3	3	3	3	2	5	37	86	2	3	1
AF	127	149	154	153	139	140	324	2244	5137	116	161	30

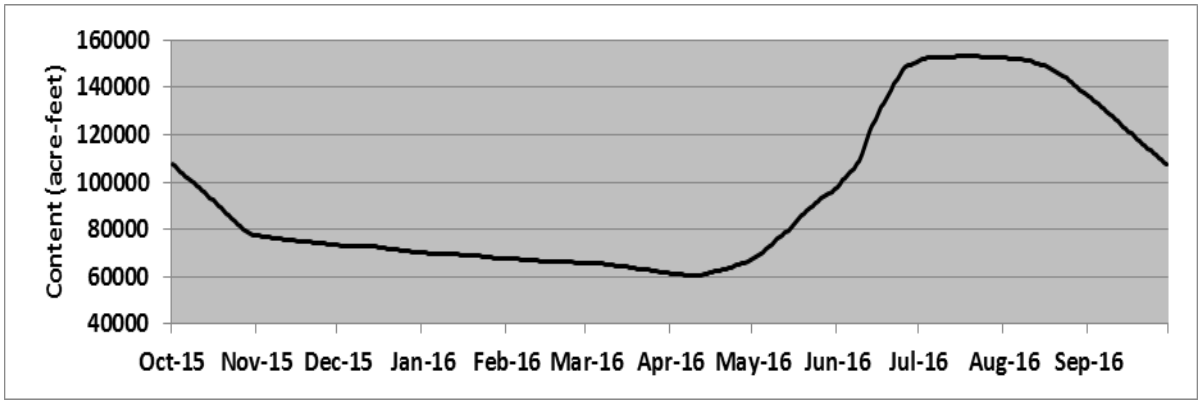


Appendix A (3 of 38)
Green Mountain Reservoir, CO

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-2015 to 30-Sep-2016. 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	107673	77433	73368	70187	67830	65708	61386	67653	98047	151314	152518	136367
2	106577	77276	73217	70054	67724	65674	61234	68267	99335	151926	152391	135502
3	105540	77106	73093	69933	67594	65616	61104	68911	100873	152264	152264	134624
4	104542	76964	73018	69848	67464	65570	61007	69605	101983	152476	152222	133768
5	103522	76835	72956	69824	67381	65513	60920	70418	103166	152560	152222	132877
6	102574	76680	72869	69824	67239	65478	60779	71506	104429	152582	152201	131875
7	101600	76422	72819	69824	67123	65433	60649	72769	105688	152603	152032	130839
8	100558	76189	72806	69775	67018	65295	60552	73821	107307	152624	151820	129788
9	99584	75970	72831	69727	66913	65111	60487	74871	109149	152730	151587	128706
10	98603	75892	72869	69642	66820	64950	60465	76034	111668	152772	151377	127627
11	97570	75854	72844	69557	66785	64803	60454	76822	114880	152835	151042	126577
12	96559	75764	72831	69461	66727	64655	60627	77694	118001	152814	150686	125510
13	95527	75611	72806	69402	66681	64531	60963	78624	121016	152835	150266	124415
14	94489	75470	72757	69354	66646	64418	61310	79694	123987	152899	149847	123416
15	93443	75304	72644	69306	66611	64260	61735	81004	126670	153005	149449	122386
16	92391	75164	72433	69246	66588	64113	62076	82382	129312	153089	149054	121344
17	91292	75062	72234	69210	66553	63954	62339	83613	131489	153068	148680	120287
18	90201	74947	72047	69162	66518	63807	62559	84925	133205	153047	148119	119276
19	89076	74845	71838	69127	66471	63617	62803	85776	134994	152983	147579	118233
20	87946	74768	71666	69067	66413	63439	63037	86686	136976	153068	146981	117251
21	86800	74628	71531	68935	66355	63294	63294	87762	139114	153237	146343	116309
22	85706	74501	71457	68768	66285	63204	63617	88976	141195	153195	145582	115339
23	84593	74388	71371	68588	66239	63093	64000	90201	143561	152962	144825	114304
24	83435	74274	71212	68409	66146	62915	64429	91175	145623	152835	144009	113309
25	82260	74148	71101	68231	66076	62770	64836	92083	147351	152856	143053	112306
26	81098	74035	70941	68054	66007	62548	65272	92984	148556	152899	142083	111341
27	80001	73884	70758	67924	65949	62317	65685	93769	149075	152856	141095	110404
28	79205	73771	70588	67889	65880	62108	66064	94489	149491	152793	140114	109419
29	78531	73645	70491	67842		61900	66518	95209	149847	152708	139154	108443
30	77994	73519	70418	67854		61713	67064	96088	150371	152666	138222	107473
31	77602		70321	67854		61548		96986		152582	137271	
Min	77602	73519	70321	67842	65880	61548	60454	67653	98047	151314	137271	107473
Max	107673	77433	73368	70187	67830	65708	67064	96986	150371	153237	152518	136367
Mean	92145	75345	72069	69093	66716	63979	62575	82284	125879	152745	147551	121977
AF	77602	73519	70321	67854	65880	61548	67064	96986	150371	152582	137271	107473

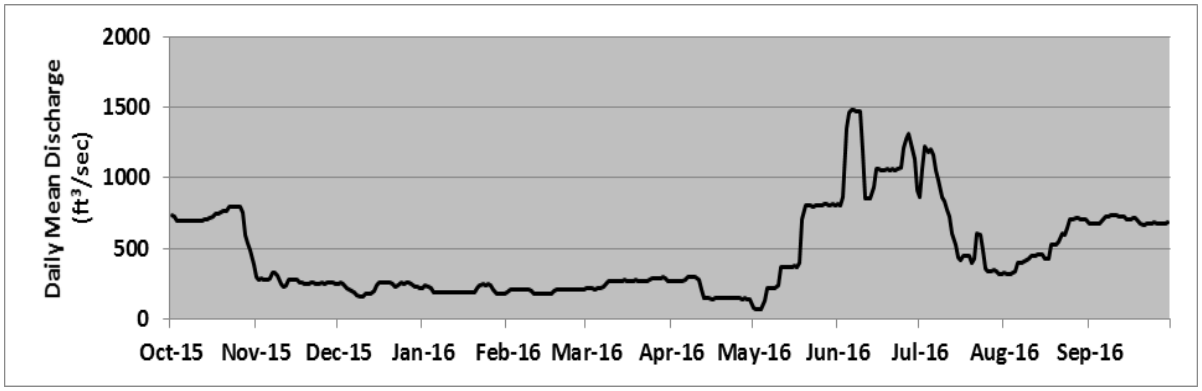


Appendix A (4 of 38)
Blue River below Green Mountain Reservoir, CO

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 mi^2 including 15.3 mi^2 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-2015 to 30-Sep-2016. Records 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	737	297	252	222	190	216	269	83	810	863	323	676
2	728	281	254	233	210	216	272	73	805	1064	321	674
3	697	283	243	229	210	214	272	73	859	1220	321	676
4	696	277	218	214	210	213	272	72	1352	1187	322	677
5	698	276	203	187	206	216	272	126	1464	1204	339	675
6	695	290	201	189	209	216	275	215	1475	1162	394	701
7	693	326	192	188	207	223	296	214	1478	1050	397	726
8	694	326	167	187	209	248	295	217	1470	981	410	726
9	696	304	154	189	208	268	294	215	1466	863	415	733
10	697	250	155	189	201	270	293	237	1188	833	425	735
11	699	225	182	189	180	267	282	369	856	774	451	732
12	699	241	178	191	178	267	204	365	849	727	449	729
13	703	276	178	188	179	266	151	369	858	608	452	729
14	709	273	196	185	178	267	145	368	932	522	458	721
15	712	279	234	189	177	273	143	367	1061	441	455	705
16	720	273	258	187	176	266	141	373	1059	413	431	710
17	742	253	261	184	179	268	151	371	1054	448	428	711
18	741	254	257	190	196	271	148	392	1057	449	528	710
19	751	252	258	183	205	273	148	708	1059	447	529	694
20	763	250	254	193	208	272	150	800	1054	399	527	679
21	767	254	245	221	204	271	148	800	1058	430	545	663
22	794	255	228	234	208	269	151	800	1056	607	602	675
23	794	250	236	246	207	266	152	797	1060	596	600	678
24	795	249	253	242	205	274	151	801	1074	491	643	675
25	794	254	252	244	210	287	148	807	1210	355	707	689
26	792	252	255	234	207	290	147	807	1273	338	708	674
27	753	253	253	211	209	287	143	810	1309	340	714	671
28	593	254	247	177	208	286	146	811	1242	345	717	673
29	538	254	232	178		294	143	805	1130	337	708	673
30	490	252	226	174		287	136	811	909	321	709	684
31	386		221	178		270		809		322	701	
Min	386	225	154	174	176	213	136	72	805	321	321	663
Max	795	326	261	246	210	294	296	811	1478	1220	717	735
Mean	702	267	224	201	199	260	198	480	1118	650	507	696
AF	43100	15863	13749	12364	11041	15979	11754	29433	66385	39868	31147	41334

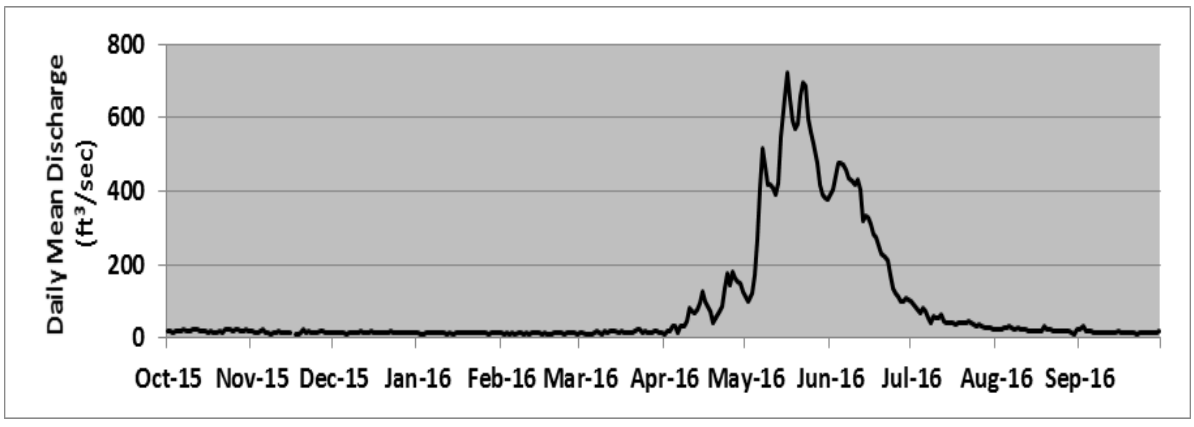


Appendix A (5 of 38)
Willow Creek Reservoir, CO

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-2015 to 30-Sep-2016. 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	18	19	15	14	17	16	12	113	391	100	26	23
2	19	17	14	11	12	16	19	102	403	90	24	35
3	17	16	14	12	14	12	19	121	440	77	25	21
4	22	19	15	14	12	12	35	171	474	70	28	19
5	19	23	14	13	16	12	34	271	475	81	31	22
6	21	16	13	14	12	17	15	409	470	74	32	17
7	24	16	16	15	14	21	35	515	457	56	29	16
8	22	12	14	16	14	14	31	468	434	44	26	13
9	21	14	16	13	12	13	47	420	426	60	29	15
10	23	17	15	13	14	21	81	420	418	55	23	15
11	22	20	18	17	12	17	73	408	432	54	22	15
12	23	17	17	12	13	18	70	391	404	63	23	15
13	20	14	16	14	15	18	78	423	322	45	21	16
14	20	15	15	12	14	19	95	547	334	42	19	16
15	18	15	19	17	16	16	128	653	327	40	21	18
16	17	0	16	14	11	18	101	722	309	40	18	14
17	18	11	16	14	14	17	88	651	284	37	20	16
18	16	12	16	14	11	16	75	591	275	42	19	16
19	17	17	15	15	12	14	41	569	255	41	31	16
20	18	23	15	15	16	14	55	584	231	40	22	14
21	17	15	15	14	14	20	74	658	222	44	23	14
22	24	18	18	13	15	23	89	696	211	47	19	13
23	26	16	15	15	15	23	135	688	171	41	20	13
24	22	16	14	13	10	17	175	597	138	39	18	15
25	18	16	15	13	15	18	146	561	124	35	18	16
26	25	19	17	15	16	17	179	531	115	36	19	17
27	23	19	14	12	15	16	161	476	102	31	21	16
28	20	16	13	13	14	19	152	418	102	30	18	16
29	19	15	14	15		19	149	390	109	28	16	17
30	22	16	15	15		17	128	383	105	27	11	20
31	19		15	16		16		379		26	26	
Min	16	0	13	11	10	12	12	102	102	26	11	13
Max	26	23	19	17	17	23	179	722	475	100	32	35
Mean	20	16	15	14	14	17	84	462	299	50	22	17
AF	1245	949	944	862	759	1045	4992	28364	17740	3041	1380	1007

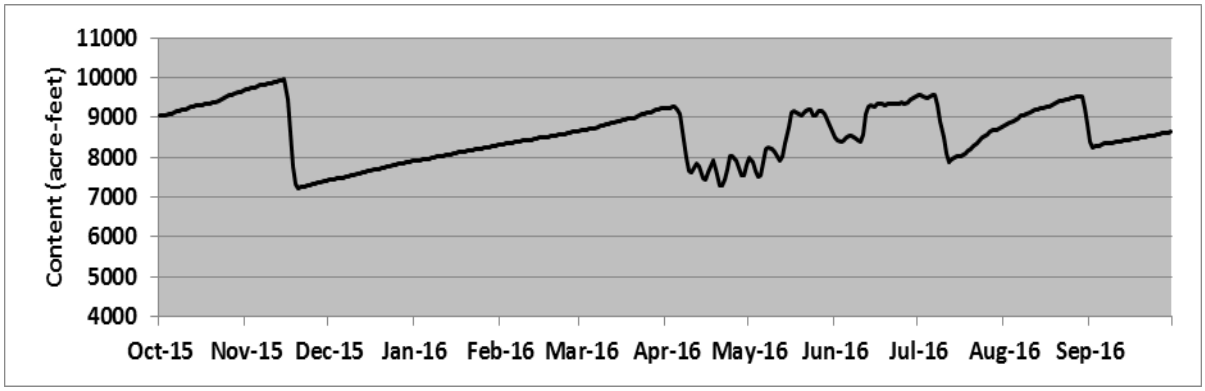


Appendix A (6 of 38)
Willow Creek Reservoir, CO

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 2015 to 30-Sep-2016. 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	9035	9696	7424	7911	8319	8669	9218	7998	8504	9553	8800	8395
2	9051	9715	7435	7918	8328	8687	9242	7893	8415	9551	8830	8254
3	9062	9732	7448	7928	8341	8698	9267	7652	8395	9517	8861	8275
4	9083	9754	7463	7942	8351	8707	9267	7510	8439	9504	8898	8297
5	9099	9786	7477	7953	8365	8718	9189	7565	8484	9534	8942	8321
6	9120	9803	7488	7965	8375	8736	9088	7893	8519	9545	8991	8336
7	9147	9820	7503	7981	8387	8764	8637	8195	8529	9542	9030	8348
8	9168	9828	7516	7998	8400	8776	7988	8252	8494	9291	9065	8358
9	9187	9842	7534	8010	8410	8787	7655	8197	8444	8905	9101	8368
10	9210	9862	7549	8022	8422	8814	7612	8128	8375	8512	9131	8378
11	9232	9888	7570	8038	8432	8833	7741	8036	8569	8105	9157	8387
12	9253	9908	7588	8047	8444	8853	7851	7911	9073	7886	9184	8400
13	9272	9919	7605	8062	8459	8874	7778	8024	9278	7933	9202	8413
14	9288	9934	7621	8071	8472	8898	7490	8363	9296	7970	9221	8427
15	9302	9948	7644	8090	8486	8913	7433	8761	9269	8005	9242	8442
16	9313	9432	7661	8102	8494	8931	7616	9115	9332	8041	9261	8454
17	9323	8609	7677	8116	8507	8950	7773	9149	9345	8071	9280	8467
18	9334	7773	7696	8130	8514	8965	7906	9115	9345	8109	9302	8479
19	9348	7326	7712	8145	8524	8978	7680	9070	9318	8159	9348	8492
20	9367	7235	7727	8159	8539	8991	7303	9062	9323	8219	9377	8504
21	9385	7247	7743	8171	8552	9015	7288	9162	9334	8290	9402	8514
22	9419	7266	7764	8183	8567	9046	7450	9202	9329	8365	9421	8524
23	9457	7284	7780	8197	8581	9078	7705	9197	9326	8427	9441	8532
24	9487	7301	7794	8209	8586	9099	8038	9056	9358	8482	9460	8547
25	9509	7318	7810	8222	8599	9120	8041	9056	9364	8532	9476	8562
26	9545	7339	7828	8234	8617	9139	7911	9141	9356	8584	9498	8577
27	9575	7359	7842	8244	8632	9157	7745	9152	9388	8629	9520	8592
28	9600	7376	7854	8256	8644	9181	7563	9067	9441	8664	9540	8607
29	9623	7391	7867	8270		9205	7552	8934	9476	8700	9517	8624
30	9651	7408	7883	8285		9218	7789	8789	9537	8733	9242	8649
31	9673		7900	8299		9221		8637		8766	8825	
Min	9035	7235	7424	7911	8319	8669	7288	7510	8375	7886	8800	8254
Max	9673	9948	7900	8299	8644	9221	9267	9202	9537	9553	9540	8649
Mean	9326	8703	7658	8102	8477	8936	8027	8557	9022	8649	9212	8451
AF	9673	7408	7900	8299	8644	9221	7789	8637	9537	8766	8825	8649

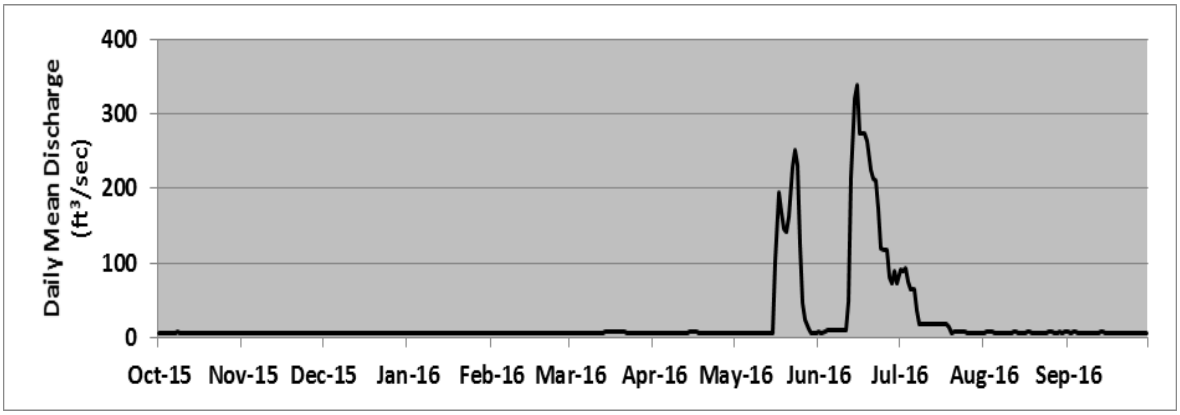


Appendix A (7 of 38)
Willow Creek below Willow Creek Reservoir, CO

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-2015 to 30-Sep-2016. 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	7	8	92	7	8
2	7	7	7	7	7	7	7	7	7	90	7	7
3	7	7	7	7	7	7	7	7	9	93	8	8
4	7	7	7	7	7	7	7	7	11	74	8	8
5	7	7	7	7	7	7	7	7	11	65	7	7
6	7	7	7	7	7	7	7	7	11	65	7	7
7	7	7	7	7	7	7	7	7	11	36	7	6
8	8	7	7	7	7	7	7	7	11	19	7	7
9	7	7	7	7	7	7	7	7	11	19	7	7
10	7	7	7	7	7	7	7	7	11	19	7	7
11	7	7	7	7	7	7	7	7	11	19	7	7
12	7	7	7	7	7	7	7	7	49	19	7	7
13	7	7	7	7	7	7	7	7	216	19	8	7
14	7	7	7	7	7	8	8	7	321	19	7	8
15	7	7	7	7	7	8	8	7	338	19	7	7
16	7	7	7	7	7	8	8	101	274	19	7	7
17	7	7	7	7	7	8	8	195	273	19	7	7
18	7	7	7	7	7	8	7	168	273	19	7	7
19	7	7	7	7	7	8	7	146	264	14	7	7
20	7	7	7	7	7	8	7	143	225	7	7	7
21	7	7	7	7	7	8	7	162	213	8	7	7
22	7	7	7	7	7	7	7	230	210	8	7	7
23	7	7	7	7	7	7	7	251	172	8	7	7
24	7	7	7	7	7	7	7	231	120	8	7	7
25	7	7	7	7	7	7	7	125	118	8	8	7
26	7	7	7	7	7	7	7	48	117	6	8	7
27	7	7	7	7	7	7	7	25	82	7	7	7
28	7	7	7	7	7	7	6	13	73	7	7	7
29	7	7	7	7		7	7	7	89	7	8	7
30	7	7	7	7		7	7	7	73	7	7	7
31	7		7	7		7		7		7	8	
Min	7	7	7	7	7	7	6	7	7	6	7	6
Max	8	7	7	7	7	8	8	251	338	93	8	8
Mean	7	7	7	7	7	7	7	63	120	27	7	7
AF	430	417	445	449	405	445	418	3886	7156	1643	457	433

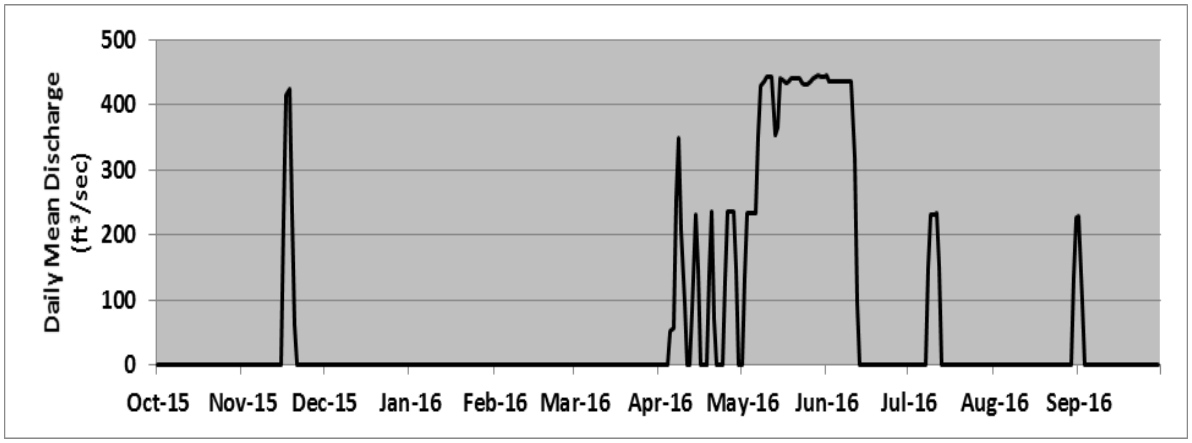


Appendix A (8 of 38)
Willow Creek Pump Canal, CO

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-2015 to 30-Sep-2016. 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	0	444	0	0	230
2	0	0	0	0	0	0	0	135	435	0	0	97
3	0	0	0	0	0	0	0	233	435	0	0	0
4	0	0	0	0	0	0	0	233	435	0	0	0
5	0	0	0	0	0	0	52	233	435	0	0	0
6	0	0	0	0	0	0	58	233	435	0	0	0
7	0	0	0	0	0	0	254	351	435	0	0	0
8	0	0	0	0	0	0	349	427	435	148	0	0
9	0	0	0	0	0	0	206	435	435	232	0	0
10	0	0	0	0	0	0	95	443	435	231	0	0
11	0	0	0	0	0	0	0	442	317	234	0	0
12	0	0	0	0	0	0	0	442	97	151	0	0
13	0	0	0	0	0	0	85	354	0	0	0	0
14	0	0	0	0	0	0	231	365	0	0	0	0
15	0	0	0	0	0	0	147	440	0	0	0	0
16	0	225	0	0	0	0	0	437	0	0	0	0
17	0	414	0	0	0	0	0	433	0	0	0	0
18	0	424	0	0	0	0	0	435	0	0	0	0
19	0	233	0	0	0	0	140	440	0	0	0	0
20	0	61	0	0	0	0	236	440	0	0	0	0
21	0	0	0	0	0	0	72	440	0	0	0	0
22	0	0	0	0	0	0	0	440	0	0	0	0
23	0	0	0	0	0	0	0	434	0	0	0	0
24	0	0	0	0	0	0	0	431	0	0	0	0
25	0	0	0	0	0	0	129	431	0	0	0	0
26	0	0	0	0	0	0	235	435	0	0	0	0
27	0	0	0	0	0	0	236	440	0	0	0	0
28	0	0	0	0	0	0	236	442	0	0	0	0
29	0	0	0	0		0	146	445	0	0	0	0
30	0	0	0	0		0	0	443	0	0	135	0
31	0		0	0		0		444		0	225	
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	424	0	0	0	0	349	445	444	234	225	230
Mean	0	45	0	0	0	0	97	380	159	32	12	11
AF	0	2687	0	0	0	0	5756	23311	9451	1972	713	647

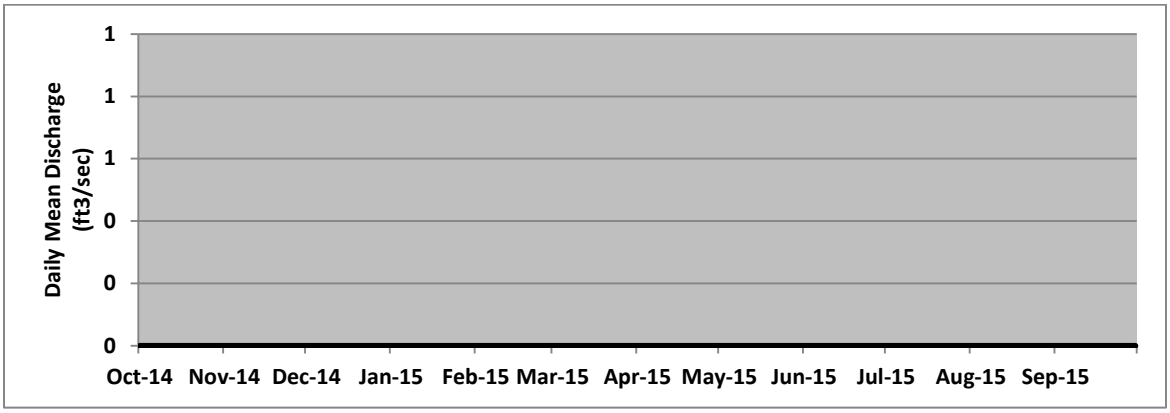


Appendix A (9 of 38)
Windy Gap Pumping Plant, CO

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-2015 to 30-Sep-2016. 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

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
AF	0	0	0	0	0	0	0	0	0	0	0	0

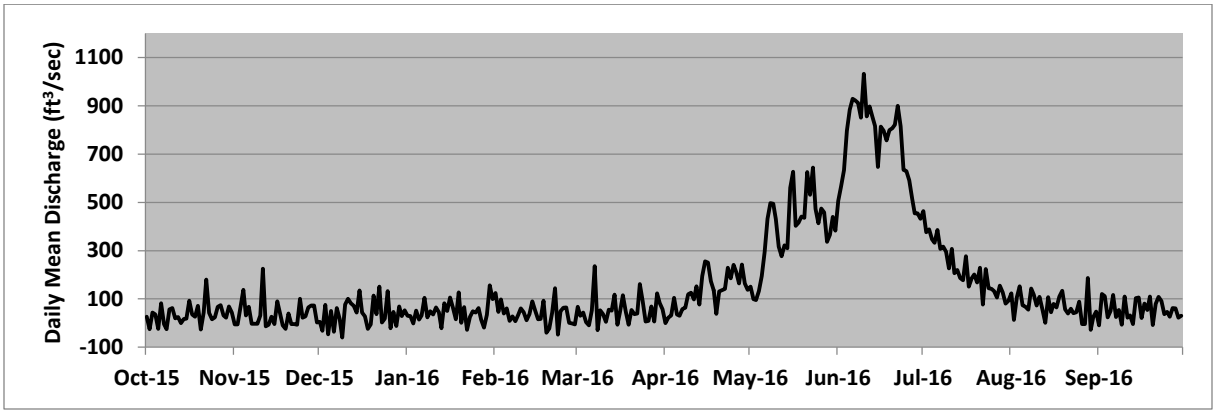


Appendix A (10 of 38)
Granby Reservoir, CO

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-2015 to 30-Sep-2016. 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	27	-5	5	30	124	67	0	151	507	464	124	-10
2	-25	-5	-32	29	45	30	22	99	567	377	13	121
3	44	67	75	-2	98	43	32	95	634	388	106	111
4	36	137	-47	51	39	4	104	132	797	348	152	24
5	-24	32	50	14	61	-10	35	195	884	333	74	51
6	82	67	-36	32	9	53	30	294	930	386	68	117
7	-5	-2	62	105	27	236	58	431	923	308	56	25
8	-25	-2	17	23	8	-29	63	497	913	317	143	55
9	57	-2	-60	49	34	53	119	495	851	296	118	-7
10	63	32	76	36	60	37	125	431	1033	227	73	110
11	20	225	101	65	45	5	97	317	856	307	109	22
12	25	-13	82	44	11	55	152	277	897	207	56	32
13	0	-6	71	-22	37	52	77	321	854	220	1	-4
14	17	27	43	82	90	118	194	310	817	186	107	103
15	18	-4	135	50	52	-7	255	561	646	177	45	106
16	93	89	44	105	15	47	250	628	814	277	79	21
17	35	39	28	63	17	114	174	403	796	151	65	81
18	26	-9	-24	15	92	48	134	417	757	186	110	55
19	71	-25	-6	127	-40	-7	38	441	799	201	134	109
20	-27	40	114	1	-23	54	131	436	807	168	57	-8
21	43	-4	37	66	43	36	136	625	823	229	39	80
22	180	-4	151	-28	145	39	141	532	901	76	60	108
23	42	-7	2	25	-48	162	229	644	815	225	41	91
24	15	101	19	48	49	90	185	474	635	145	45	37
25	23	22	133	44	64	7	241	413	630	141	89	46
26	68	27	-21	62	65	9	212	474	592	133	-4	27
27	74	65	47	14	1	69	165	458	516	105	-5	62
28	32	73	-12	-18	-2	6	243	336	454	155	187	61
29	22	73	69	34		123	164	365	454	127	-28	22
30	69	2	30	157		83	138	440	432	80	25	30
31	43		52	100		56		383		92	48	
Min	-27	-25	-60	-28	-48	-29	0	95	432	76	-28	-10
Max	180	225	151	157	145	236	255	644	1033	464	187	121
Mean	36	34	39	45	40	53	132	390	745	227	71	56
AF	2214	2033	2385	2771	2219	3250	7814	23913	44227	13922	4329	3319

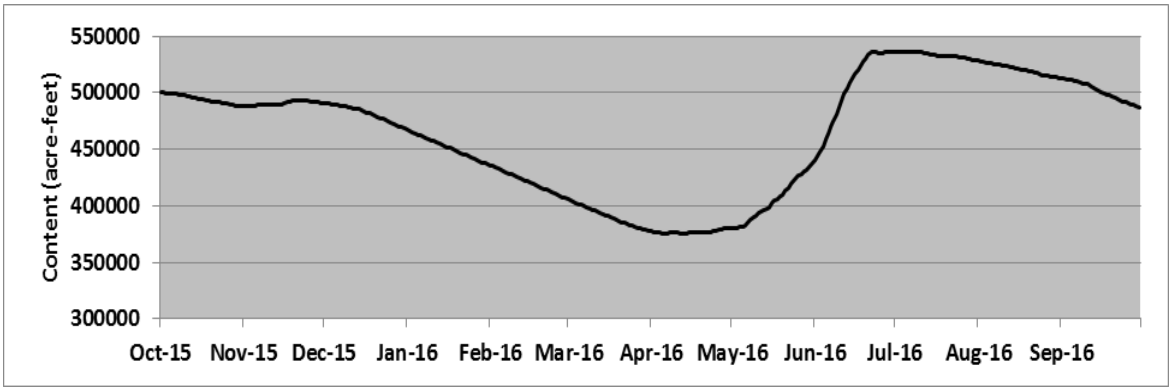


Appendix A (11 of 38)
Granby Reservoir, CO

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.--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-2015 to 30-Sep-2016. 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	500092	488342	490921	467235	436006	405791	377746	380435	440742	536133	528277	512855
2	499952	488342	490501	466142	434960	404717	377199	380495	444048	536133	527627	512925
3	499882	488481	490293	465057	433977	403710	376650	380801	448100	536205	527196	511860
4	499671	488760	489876	464036	432994	402641	376224	381232	452906	536133	526767	511789
5	499388	488830	489599	463016	431954	401572	375921	381904	458825	536133	526406	511365
6	499459	488971	488971	461936	430844	400568	375557	383316	464239	536133	526045	510023
7	499177	488971	488760	460985	429736	400006	375739	385404	469758	535917	525617	509809
8	498617	488971	488273	459970	428700	398877	376102	387566	475198	535989	525331	509526
9	498126	488971	487716	458960	427659	397874	376345	389726	480700	535917	524903	508041
10	497633	489041	487225	457947	426684	396816	376466	391646	487156	535773	524401	508041
11	497075	489668	486809	457005	425653	395691	376284	393199	493367	535628	523969	507549
12	496586	489807	486393	455927	424487	394692	375739	394568	499247	535267	523398	505926
13	496096	489807	485908	454719	423452	393700	375315	395753	504516	534541	522681	504516
14	495533	489876	485490	453847	422489	392827	375315	396940	509315	533748	522180	503464
15	494906	489876	484863	452839	421457	391769	376102	399251	512855	533240	521611	502337
16	494413	490501	483818	451905	420428	390719	376345	402138	516903	533168	521112	501070
17	493924	491412	482712	450966	419403	389850	376345	404274	520682	532809	520467	499882
18	493367	492248	481600	449897	418440	388921	376284	406045	524041	532593	520110	498617
19	492949	492669	480491	449032	417223	387812	376284	408319	527196	532521	519754	497563
20	492388	492880	479593	447966	416077	386822	376650	410283	530433	532306	519325	496377
21	492038	492880	478487	446969	415055	385773	376650	412827	533676	532377	519038	495324
22	491968	492880	477659	445904	414227	384730	376650	416267	535989	532162	517476	494413
23	491620	492880	476622	444777	413080	384114	376894	419595	535989	532090	517333	493367
24	491131	493088	475524	443784	412062	383132	377260	422039	535556	531875	516975	492388
25	490640	492669	474626	442788	411045	382148	377931	424230	535267	531586	515765	491412
26	490293	492248	473526	441801	410093	381109	378603	426555	535267	531223	515622	490501
27	489876	491829	472567	440742	409016	380130	379393	428700	535628	530720	515124	489599
28	489460	491690	471401	439619	407876	379700	380068	430519	536133	530289	513992	488900
29	488551	491551	470375	438505		379333	380678	432344	535989	529782	513778	487926
30	488273	491272	469281	437713		378907	380617	434828	536133	529207	513778	487225
31	488342		468326	436859		378360		437451		528706	512642	
Min	488273	488342	468326	436859	407876	378360	375315	380435	440742	528706	512642	487225
Max	500092	493088	490921	467235	436006	405791	380678	437451	536133	536205	528277	512925
Mean	494562	490647	481878	451898	421967	391058	376979	404472	503862	533429	520926	501153
EOM	488342	491272	468326	436859	407876	378360	380617	437451	536133	528706	512642	487225

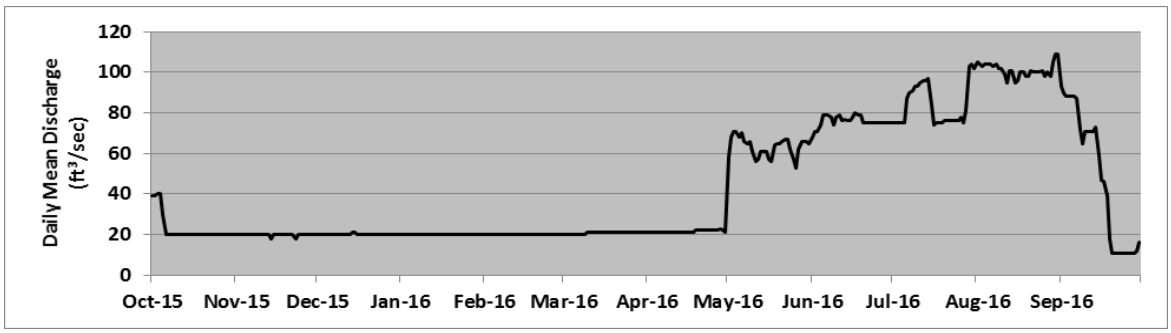


Appendix A (12 of 38)
Granby Reservoir, CO

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 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-2015 to 30-Sep-2016. 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	44	20	24	20	20	20	21	58	68	268	105	93
2	39	20	26	20	20	20	21	68	71	267	104	90
3	40	22	24	20	20	20	21	71	71	238	103	88
4	40	22	20	20	20	20	21	71	74	174	104	88
5	33	22	20	20	20	20	21	68	79	114	104	88
6	23	22	20	20	20	20	21	70	79	87	104	88
7	21	23	20	20	20	20	21	66	79	90	103	87
8	23	23	20	20	20	20	21	65	78	91	104	72
9	23	23	20	20	20	20	21	66	74	93	102	65
10	23	22	20	20	20	21	21	61	78	93	102	71
11	23	23	20	20	20	21	21	56	79	95	99	71
12	23	20	20	20	20	21	21	57	76	96	95	71
13	23	20	20	20	20	21	21	61	77	96	101	71
14	23	18	21	20	20	21	21	61	76	97	101	73
15	22	22	21	20	20	21	21	61	76	84	95	59
16	24	24	20	20	20	21	21	57	78	74	96	47
17	24	20	20	20	20	21	21	56	80	75	100	46
18	23	20	20	20	20	21	21	64	79	75	100	39
19	21	21	20	20	20	21	22	65	79	75	98	18
20	21	21	20	20	20	21	22	65	106	76	98	11
21	21	21	20	20	20	21	22	66	288	76	101	11
22	22	21	20	20	20	21	22	67	666	76	100	11
23	22	18	20	20	20	21	22	67	1140	76	100	11
24	22	20	20	20	20	21	22	62	1130	76	100	11
25	22	20	20	20	20	21	22	57	1040	76	101	11
26	21	20	20	20	20	21	22	53	644	78	98	11
27	21	20	20	20	20	21	22	62	275	126	100	11
28	21	20	20	20	20	21	23	66	166	81	98	11
29	21	20	20	20		21	22	66	282	103	105	12
30	20	20	20	20		21	21	66	266	104	109	16
31	20		20	20		21		65		102	109	
Min	20	18	20	20	20	20	21	53	68	74	95	11
Max	44	24	26	20	20	21	23	71	1140	268	109	93
Mean	25	21	21	20	20	21	21	63	248	107	101	48
AF	1523	1243	1259	1228	1109	1271	1271	3889	14759	6597	6215	2875

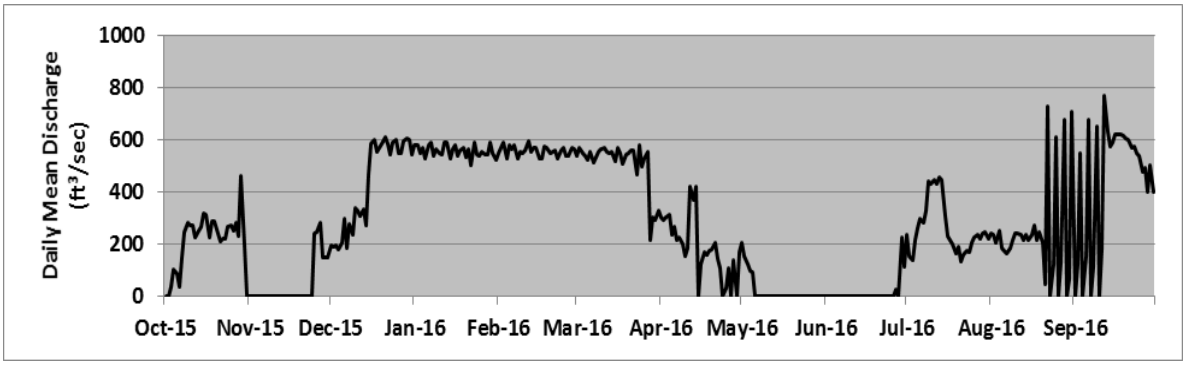


Appendix A (13 of 38)
Farr Pumping Plant, Granby Reservoir, CO

Location. --Lat 40°11'30", long 105°52'52", Grand County, Hydrologic Unit 14010001, at Farr Pumping Plant on the north end of Granby Reservoir, 8 miles northeast of Granby, Colorado, on the Colorado River.
Gage.-- Reading taken directly from the pumps, based on conduit pressure and Granby Reservoir's elevation. Elevation of the pumping plant is 8320 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-2015 to 30-Sep-2016. 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	0	0	193	580	547	539	301	204	0	235	240	0
2	0	0	188	580	566	565	291	154	0	151	234	120
3	33	0	193	545	586	545	302	122	0	138	201	548
4	100	0	178	565	529	537	312	95	0	214	248	0
5	83	0	205	528	579	523	233	92	0	260	183	152
6	34	0	295	578	563	553	264	0	0	294	171	674
7	148	0	183	586	580	513	213	0	0	280	161	0
8	245	0	277	537	524	534	222	0	0	326	185	110
9	280	0	236	560	553	553	196	0	0	437	216	651
10	271	0	338	548	546	563	153	0	0	429	237	0
11	268	0	325	542	559	565	183	0	0	444	239	177
12	225	0	306	590	593	552	421	0	0	429	233	766
13	250	0	330	589	553	545	370	0	0	456	216	630
14	267	0	268	524	570	551	420	0	0	442	236	571
15	317	0	465	560	566	518	0	0	0	305	215	589
16	313	0	585	578	528	568	122	0	0	230	236	621
17	222	0	600	538	528	545	168	0	0	216	270	621
18	288	0	551	556	572	508	159	0	0	197	215	621
19	287	0	568	565	568	544	171	0	0	160	245	613
20	254	0	581	534	549	545	176	0	0	188	205	604
21	208	0	609	562	553	558	202	0	0	132	47	596
22	219	0	583	502	556	558	140	0	0	156	726	566
23	221	0	540	586	524	464	107	0	0	172	0	572
24	266	0	587	542	556	577	0	0	0	166	121	548
25	268	239	600	539	570	495	31	0	0	202	610	535
26	248	246	548	553	539	525	107	0	0	223	0	476
27	279	282	548	541	538	554	0	0	25	234	127	490
28	231	149	594	541	567	215	135	0	0	217	676	397
29	461	149	603	589		300	0	0	224	240	0	500
30	195	149	598	549		290	168	0	112	242	63	396
31	0		540	523		324		0		217	705	
Min	0	0	178	502	524	215	0	0	0	132	0	0
Max	461	282	609	590	593	577	421	204	224	456	726	766
Mean	209	40	426	555	556	507	186	22	12	259	241	438
AF	12832	2404	26166	34076	30813	31137	11023	1321	715	15903	14773	26025

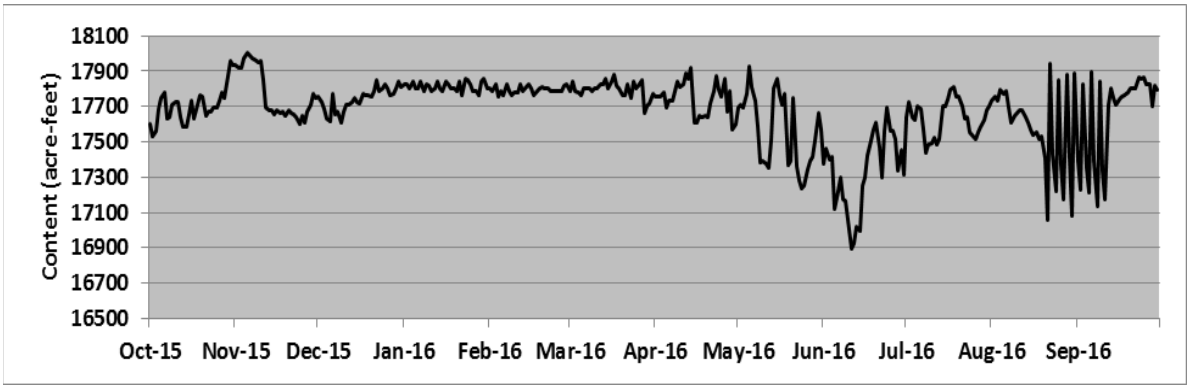


Appendix A (14 of 38)
Shadow Mountain/Grand Lake, CO

Location. --Lat 40°12'26", long 105°50'28", Grand County, Hydrologic Unit 14010001, on the Colorado River at the Shadow Mountain outlet works structure, 10 miles northeast of Granby, Colorado.
Gage.--Water-stage recorder with satellite telemetry. Elevation of gage is 8375 feet 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-2015 to 30-Sep-2016. 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	17598	17934	17753	17822	17804	17791	17756	17698	17376	17637	17735	17390
2	17534	17920	17721	17822	17791	17841	17756	17711	17462	17721	17753	17228
3	17561	17915	17684	17804	17822	17786	17756	17698	17400	17643	17735	17826
4	17690	17976	17629	17841	17754	17780	17779	17771	17412	17624	17795	17353
5	17750	18002	17616	17804	17786	17767	17698	17929	17121	17701	17771	17209
6	17782	17989	17771	17804	17767	17804	17735	17813	17218	17682	17790	17892
7	17629	17971	17653	17841	17822	17804	17735	17731	17299	17567	17698	17390
8	17637	17965	17674	17786	17786	17804	17790	17584	17176	17438	17611	17136
9	17711	17952	17611	17822	17767	17791	17845	17382	17163	17488	17648	17845
10	17724	17957	17669	17817	17780	17804	17813	17395	17004	17493	17666	17335
11	17721	17847	17706	17786	17780	17804	17826	17377	16897	17525	17679	17178
12	17637	17695	17706	17804	17822	17822	17888	17353	16926	17488	17679	17707
13	17582	17681	17724	17841	17786	17822	17856	17506	17015	17517	17643	17799
14	17587	17676	17748	17804	17804	17854	17918	17800	16993	17701	17606	17749
15	17656	17658	17722	17791	17827	17804	17611	17860	17255	17703	17569	17707
16	17729	17681	17714	17841	17804	17841	17611	17763	17295	17740	17540	17739
17	17634	17663	17772	17827	17767	17878	17648	17708	17422	17795	17551	17757
18	17711	17668	17767	17804	17791	17817	17643	17768	17510	17813	17514	17767
19	17761	17650	17767	17804	17804	17804	17648	17372	17570	17758	17532	17780
20	17753	17681	17754	17791	17809	17767	17643	17395	17606	17758	17409	17799
21	17648	17663	17791	17841	17804	17767	17716	17745	17472	17703	17057	17804
22	17671	17658	17846	17767	17804	17822	17790	17361	17295	17635	17942	17799
23	17674	17640	17791	17859	17786	17749	17873	17285	17561	17636	17427	17864
24	17693	17603	17804	17846	17786	17841	17795	17235	17695	17551	17223	17856
25	17698	17648	17827	17822	17786	17804	17758	17248	17561	17532	17850	17864
26	17735	17611	17804	17791	17786	17817	17855	17345	17561	17514	17372	17830
27	17776	17671	17767	17786	17791	17851	17671	17395	17519	17551	17173	17830
28	17748	17708	17772	17767	17817	17664	17790	17414	17335	17587	17882	17704
29	17871	17768	17804	17841		17701	17569	17506	17454	17624	17404	17816
30	17957	17745	17841	17859		17719	17601	17663	17312	17679	17081	17798
31	17934		17809	17804		17774		17573		17703	17887	
Min	17534	17603	17611	17767	17754	17664	17569	17235	16897	17438	17057	17136
Max	17957	18002	17846	17859	17827	17878	17918	17929	17695	17813	17942	17892
Mean	17703	17773	17743	17814	17794	17797	17746	17561	17329	17629	17588	17658
EOM	17934	17745	17809	17804	17817	17774	17601	17573	17312	17703	17887	17798

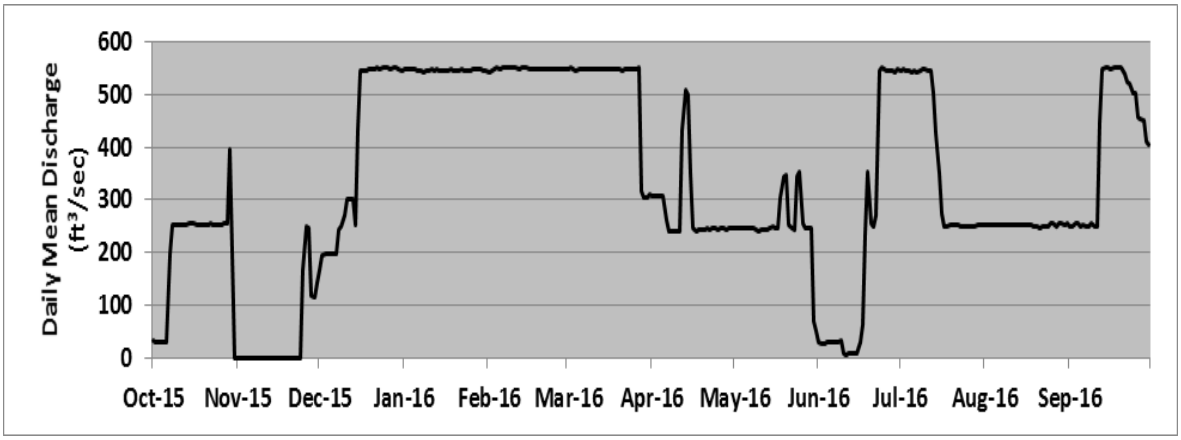


Appendix A (15 of 38)
Alva B. Adams Tunnel at East Portal, near Estes Park, CO

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-2015 to 30-Sep-2016. 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	34	0	169	547	542	549	309	245	32	544	253	249
2	31	0	195	548	544	549	308	247	29	548	253	251
3	31	0	198	549	547	548	308	247	26	544	253	255
4	31	0	198	546	549	545	307	247	30	543	253	256
5	31	0	198	548	548	546	308	248	30	542	254	250
6	31	0	199	546	552	547	261	248	31	545	254	253
7	198	0	199	544	550	549	239	247	31	543	254	249
8	252	0	243	542	551	547	241	246	31	544	253	250
9	253	0	250	543	549	547	241	244	33	548	252	255
10	253	0	270	546	549	547	241	242	11	549	253	251
11	254	0	300	548	550	547	241	242	7	545	253	249
12	253	0	300	545	549	547	433	243	8	543	253	447
13	253	0	301	547	549	547	507	245	9	502	253	547
14	255	0	254	543	549	547	500	247	9	427	252	550
15	255	0	432	544	549	548	351	250	9	351	252	549
16	256	0	545	544	548	546	246	248	30	274	251	549
17	251	0	545	545	548	548	241	247	64	249	251	551
18	251	0	546	546	547	547	243	305	234	251	251	551
19	252	0	548	544	548	546	244	343	352	252	251	551
20	252	0	549	545	547	546	245	346	255	251	251	550
21	253	0	548	545	547	546	245	251	250	252	246	538
22	254	0	550	547	547	547	245	247	270	252	249	524
23	254	0	549	546	546	548	247	243	545	251	251	519
24	254	0	549	546	547	547	247	343	551	250	250	500
25	254	167	549	543	547	548	245	353	547	250	255	500
26	254	249	549	546	547	547	247	255	545	250	256	456
27	254	248	549	546	547	549	246	246	545	250	250	453
28	254	118	550	547	548	316	245	247	543	251	255	450
29	397	117	550	548		305	246	248	541	251	256	411
30	200	143	546	545		305	245	72	548	252	251	405
31	0		546	545		310		53		252	255	
Min	0	0	169	542	542	305	239	53	7	249	246	249
Max	397	249	550	549	552	549	507	353	551	549	256	551
Mean	203	35	402	546	548	516	282	249	205	382	252	412
AF	12480	2071	24692	33487	30378	31702	16768	15312	12177	23474	15494	24487

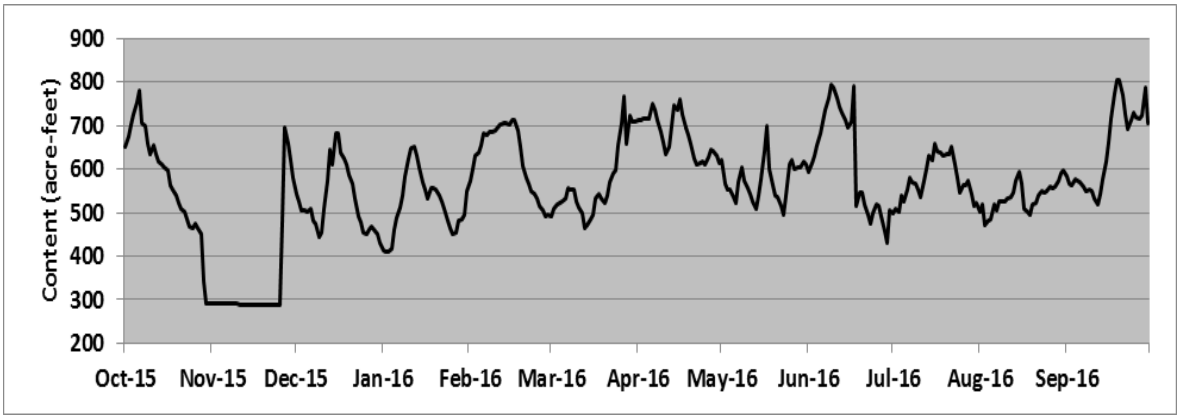


Appendix A (16 of 38)
Marys Lake, CO

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-2015 to 30-Sep-2016. 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	650	292	544	414	574	492	711	621	592	499	501	582
2	676	291	527	411	600	508	713	566	615	510	520	567
3	701	291	506	411	632	519	715	553	632	503	473	562
4	727	291	506	416	637	523	716	554	656	538	480	577
5	752	291	503	461	653	527	715	535	680	524	486	574
6	779	291	508	490	682	532	748	523	707	554	518	569
7	704	290	480	512	677	556	736	569	735	581	506	559
8	700	290	473	540	685	552	713	604	763	570	525	549
9	659	290	445	584	686	554	686	573	794	565	525	553
10	635	290	455	623	690	525	662	556	788	553	525	551
11	653	290	510	646	696	511	635	541	762	536	532	532
12	633	289	575	650	700	499	652	527	742	574	536	518
13	618	289	645	629	706	466	699	508	729	602	547	543
14	610	289	610	603	706	472	748	538	713	632	572	575
15	605	289	681	568	702	484	735	577	694	621	595	618
16	595	289	680	551	713	494	761	643	709	658	567	660
17	564	288	637	532	712	531	726	699	791	640	510	715
18	553	288	623	555	688	542	696	599	516	639	501	774
19	538	288	611	556	653	531	677	563	546	629	495	804
20	524	288	586	553	607	521	657	540	546	634	518	804
21	508	288	567	538	578	539	624	534	518	634	523	770
22	501	288	531	525	565	570	610	517	495	650	539	727
23	484	288	491	509	549	592	613	497	474	611	549	692
24	468	288	478	481	542	598	616	539	499	579	545	712
25	464	288	454	466	532	653	612	609	519	546	548	730
26	474	477	450	449	516	705	626	621	516	563	559	720
27	465	696	462	454	504	765	643	602	491	564	556	715
28	450	660	466	481	493	658	641	603	458	575	560	723
29	344	621	458	484		724	630	603	431	542	574	785
30	293	580	452	496		709	615	617	504	516	588	706
31	292		431	548		708		610		523	597	
Min	292	288	431	411	493	466	610	497	431	499	473	518
Max	779	696	681	650	713	765	761	699	794	658	597	804
Mean	568	342	527	520	631	566	678	572	621	576	535	649
EOM	292	580	431	548	493	708	615	610	504	523	597	706



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 mi^2. Station consists of data collection platform as primary record with graphic chart recorder as backup. Recorder was operated from 01-Oct-2015 until 04-Nov-15, before it was winterized. The station was put back into service from 13-Apr-2016 to 30-Sep-2016. 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

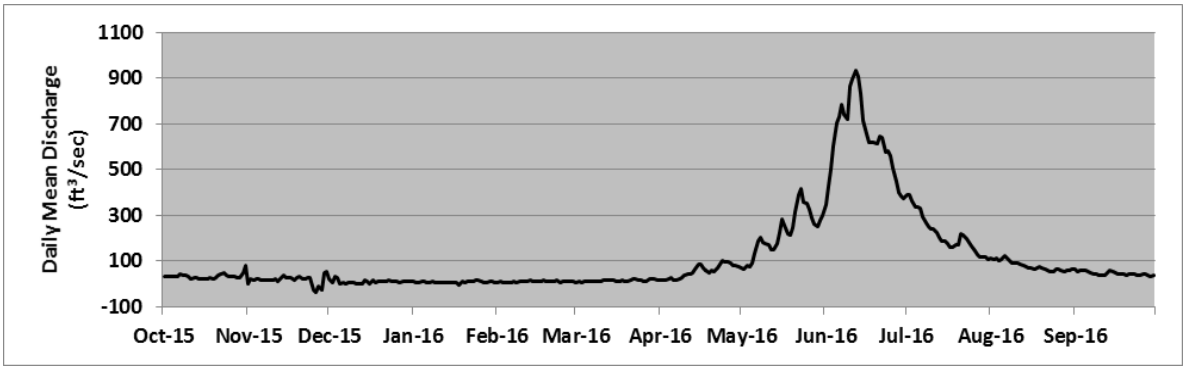
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	63	59	0	0	0	0	0	59	393	406	99	57
2	63	58	0	0	0	0	0	60	478	397	102	57
3	65	58	0	0	0	0	0	69	567	362	101	59
4	65	0	0	0	0	0	0	73	680	344	96	60
5	64	0	0	0	0	0	0	97	755	347	102	57
6	66	0	0	0	0	0	0	141	760	319	114	52
7	70	0	0	0	0	0	0	203	815	289	100	49
8	66	0	0	0	0	0	0	171	730	260	92	46
9	64	0	0	0	0	0	0	156	800	240	88	43
10	62	0	0	0	0	0	0	164	916	232	90	41
11	60	0	0	0	0	0	0	145	916	224	88	39
12	59	0	0	0	0	0	0	131	974	203	83	38
13	57	0	0	0	0	0	69	139	875	181	76	46
14	56	0	0	0	0	0	68	177	817	168	70	43
15	56	0	0	0	0	0	80	242	692	161	67	41
16	57	0	0	0	0	0	69	294	675	153	65	39
17	56	0	0	0	0	0	63	227	643	145	63	38
18	56	0	0	0	0	0	56	186	658	147	68	35
19	56	0	0	0	0	0	52	206	645	159	69	32
20	58	0	0	0	0	0	52	273	656	163	66	32
21	67	0	0	0	0	0	58	349	686	231	60	31
22	73	0	0	0	0	0	71	425	651	188	56	31
23	73	0	0	0	0	0	89	404	594	171	55	31
24	68	0	0	0	0	0	95	341	612	161	56	32
25	64	0	0	0	0	0	83	353	566	143	60	33
26	64	0	0	0	0	0	84	306	506	131	60	33
27	65	0	0	0	0	0	76	261	444	118	56	32
28	61	0	0	0	0	0	71	236	409	111	53	31
29	62	0	0	0		0	69	250	391	110	59	30
30	62	0	0	0		0	64	293	393	106	60	31
31	60		0	0		0		319		103	65	
Min	56	0	0	0	0	0	0	59	391	103	53	30
Max	73	59	0	0	0	0	95	425	974	406	114	60
Mean	63	6	0	0	0	0	42	218	657	209	75	41
AF	3839	348	0	0	0	0	2512	13370	39003	12815	4634	2413

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 November and December 2015, when the reservoir was drain. This record contains 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	33	0	22	8	7	4	15	68	346	391	109	62
2	33	23	3	5	8	10	17	62	427	389	106	56
3	32	17	30	6	7	5	18	80	503	365	113	60
4	33	19	29	9	6	11	22	75	604	338	103	60
5	32	21	0	8	8	10	26	91	702	335	105	60
6	33	17	3	7	6	11	15	131	733	329	120	52
7	41	15	2	7	8	13	14	185	782	295	111	49
8	35	16	3	9	7	9	22	205	740	266	98	44
9	36	18	7	7	9	9	27	181	722	252	90	40
10	33	16	5	6	9	11	39	178	863	238	92	39
11	23	19	0	6	11	13	42	172	895	238	93	36
12	25	9	0	4	10	15	42	151	935	224	87	39
13	25	22	-2	6	13	14	49	149	907	201	81	49
14	22	35	14	7	9	16	64	174	832	187	72	59
15	21	29	9	7	11	13	82	224	713	186	67	52
16	23	28	1	5	9	10	83	281	657	175	67	46
17	21	28	16	4	9	12	70	258	619	161	63	44
18	24	18	4	-3	13	13	61	219	618	159	67	42
19	22	25	10	8	12	12	49	213	618	170	75	41
20	25	32	11	5	11	11	56	246	614	171	70	37
21	34	22	11	9	10	18	54	314	642	217	62	41
22	44	21	11	8	9	19	71	387	639	215	56	43
23	49	28	14	10	14	23	87	415	574	194	54	41
24	39	25	11	13	3	18	101	356	579	178	52	37
25	32	-25	10	13	8	17	96	354	561	166	61	35
26	30	-39	12	11	9	9	94	322	509	146	61	41
27	29	-10	7	7	9	10	89	285	447	129	57	40
28	25	-28	10	3	12	23	79	261	402	117	51	38
29	28	46	9	9		19	79	253	386	118	56	34
30	48	55	12	8		20	76	275	375	115	59	35
31	81		11	7		14		298		109	65	
Min	21	-39	-2	-3	3	4	14	62	346	109	51	34
Max	81	55	30	13	14	23	101	415	935	391	120	62
Mean	33	17	9	7	9	13	55	221	631	218	78	45
AF	2003	986	566	436	510	823	3244	13587	37508	13408	4798	2672

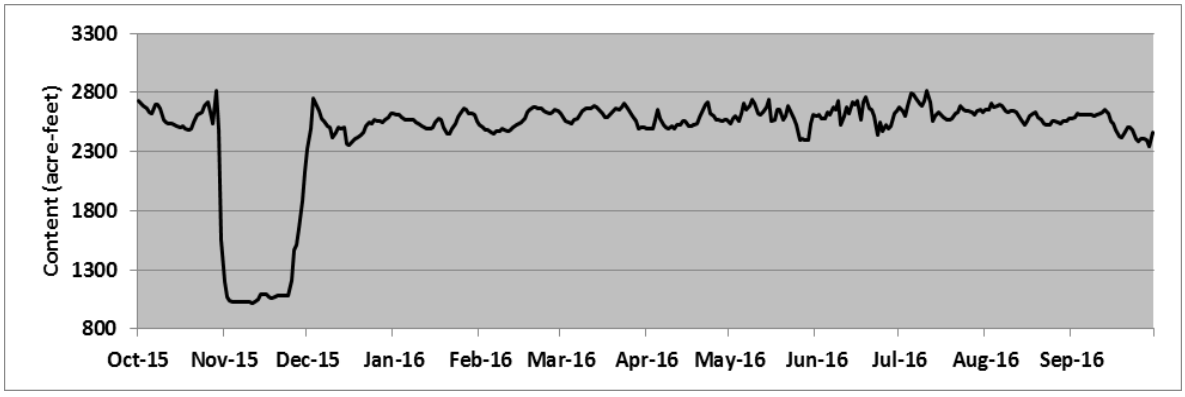


Appendix A (19 of 38)
Olympus Dam, CO

Location. --Lat 40°22'31", long 105°29'19", Larimer County, Hydrologic Unit 10190006, 1.5 miles east of Estes Park, Colorado, on the Big Thompson River.
Gage.-- Water-level recorder with satellite telemetry. Elevation of gage is 7490 feet 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-2015 to 30-Sep-2016. 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	2733	1198	2319	2626	2527	2618	2492	2539	2606	2674	2659	2582
2	2708	1070	2496	2616	2501	2594	2489	2579	2614	2647	2650	2591
3	2684	1042	2756	2608	2484	2556	2491	2599	2584	2606	2711	2621
4	2660	1034	2710	2587	2480	2549	2571	2559	2575	2682	2681	2613
5	2635	1031	2642	2572	2460	2537	2657	2618	2637	2796	2691	2611
6	2620	1027	2584	2571	2452	2569	2584	2711	2609	2778	2701	2608
7	2696	1025	2561	2571	2473	2580	2527	2650	2677	2756	2688	2609
8	2699	1027	2516	2566	2475	2614	2503	2686	2655	2710	2643	2611
9	2664	1025	2509	2547	2489	2647	2497	2740	2728	2689	2631	2606
10	2574	1025	2421	2537	2480	2660	2511	2706	2530	2727	2645	2609
11	2544	1021	2464	2519	2476	2662	2492	2623	2599	2820	2643	2623
12	2542	1025	2508	2501	2484	2667	2522	2608	2681	2716	2630	2638
13	2532	1056	2496	2496	2504	2688	2530	2628	2618	2556	2601	2655
14	2522	1088	2504	2494	2522	2679	2556	2672	2721	2599	2566	2626
15	2511	1090	2368	2509	2539	2654	2554	2737	2703	2628	2527	2561
16	2506	1089	2359	2547	2547	2623	2517	2563	2732	2614	2561	2532
17	2514	1075	2391	2582	2580	2585	2516	2574	2569	2591	2604	2484
18	2496	1059	2408	2566	2638	2589	2525	2654	2721	2564	2621	2434
19	2486	1077	2423	2503	2659	2620	2542	2655	2764	2569	2633	2418
20	2497	1081	2443	2450	2672	2648	2587	2566	2664	2575	2594	2447
21	2544	1078	2465	2455	2679	2662	2633	2603	2652	2625	2567	2501
22	2608	1085	2519	2492	2665	2659	2701	2684	2603	2631	2539	2501
23	2623	1083	2549	2536	2660	2679	2720	2620	2437	2691	2524	2483
24	2630	1082	2542	2589	2640	2706	2620	2577	2553	2657	2530	2407
25	2682	1209	2567	2618	2630	2667	2599	2522	2473	2647	2554	2386
26	2720	1471	2563	2660	2618	2628	2574	2403	2530	2647	2554	2411
27	2633	1506	2554	2652	2638	2601	2564	2413	2489	2638	2546	2413
28	2542	1652	2551	2626	2659	2558	2561	2397	2517	2611	2541	2395
29	2815	1880	2574	2626		2491	2567	2399	2620	2643	2563	2349
30	2488	2135	2592	2614		2503	2572	2539	2640	2652	2561	2460
31	1554		2620	2558		2501		2613		2633	2580	
Min	1554	1021	2319	2450	2452	2491	2489	2397	2437	2556	2524	2349
Max	2815	2135	2756	2660	2679	2706	2720	2740	2764	2820	2711	2655
Mean	2570	1178	2515	2561	2558	2613	2559	2595	2617	2657	2604	2526
EOM	1554	2135	2620	2558	2659	2501	2572	2613	2640	2633	2580	2460

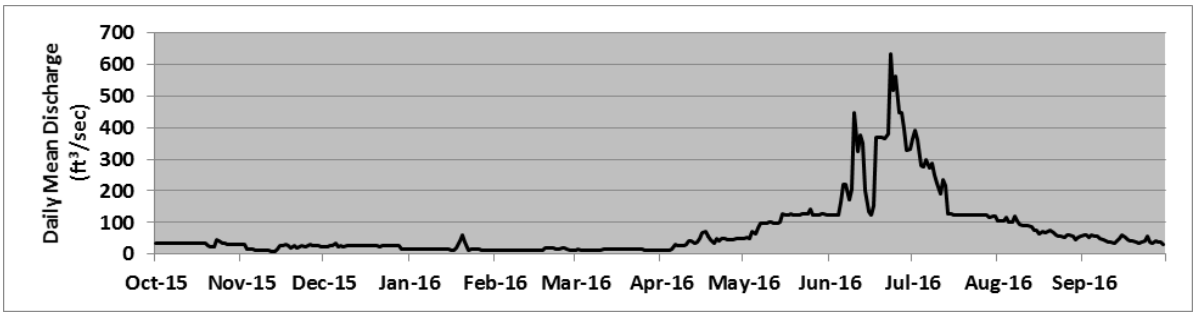


Appendix A (20 of 38)
Big Thompson River below Olympus Dam, CO

Location. --Lat 40°22'35", long 105°29'06", Larimer County, Hydrologic Unit 10190006, 620 feet downstream from Olympus Dam and 100 feet upstream of Dry Gulch, 2.0 miles east in Estes Park.
Gage.-- Water-stage recorder with satellite telemetry. 15 foot Parshall flume with overflow weirs in a concrete shelter with a supplemental outside gage. Datum of gage at 7422.50 feet.
Remarks.— Drainage area is 155 mi^2. Area at site used between 29-Jan-1934 and 21-Mar-1951 was 162 mi^2. Station consists of data collection platform and digital recorder as primary record. Recorder was operated from 01-Oct-2015 to 30-Sep-2016. 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	35	30	25	16	13	14	14	51	124	366	106	62
2	36	32	26	16	13	15	14	52	124	389	107	61
3	36	16	27	16	13	14	14	49	125	362	105	53
4	36	15	27	16	13	14	14	73	124	281	115	61
5	36	15	34	16	13	14	16	64	166	275	103	57
6	36	13	25	16	12	14	30	84	222	297	104	59
7	36	12	26	16	13	14	29	99	220	271	121	49
8	36	11	26	16	12	14	29	98	174	287	107	47
9	37	11	26	16	12	14	29	99	206	251	96	43
10	36	11	27	16	12	14	30	100	448	226	90	38
11	34	13	26	16	12	15	41	101	324	191	91	37
12	36	10	27	16	12	15	42	99	377	236	92	36
13	36	8	26	16	12	15	33	99	349	216	87	41
14	34	17	27	16	12	15	39	101	202	126	77	50
15	35	27	27	15	11	15	51	126	137	126	75	59
16	35	28	27	14	11	15	70	125	124	126	65	52
17	35	32	28	14	11	15	72	124	152	125	71	44
18	36	28	27	19	12	15	58	127	370	125	69	44
19	36	21	27	41	21	15	47	126	370	124	71	41
20	27	26	28	62	20	15	34	125	368	123	74	40
21	26	19	25	38	20	15	48	125	365	126	67	33
22	25	24	26	13	20	15	41	126	381	125	60	40
23	44	27	26	16	15	15	51	127	633	125	55	43
24	44	25	26	17	15	15	48	128	517	126	56	58
25	35	26	27	17	19	15	47	142	561	125	53	39
26	34	32	27	16	21	14	47	124	447	126	61	36
27	31	27	27	14	15	14	47	124	445	125	60	43
28	31	27	27	13	14	14	50	123	394	123	57	39
29	31	28	15	13		14	51	127	328	116	48	37
30	30	24	16	13		14	51	126	332	122	54	32
31	29		16	13		14		125		119	58	
Min	25	8	15	13	11	14	14	49	124	116	48	32
Max	44	32	34	62	21	15	72	142	633	389	121	62
Mean	34	21	26	18	14	15	40	107	304	190	79	46
AF	2102	1254	1574	1121	791	897	2357	6572	18033	11639	4855	2721

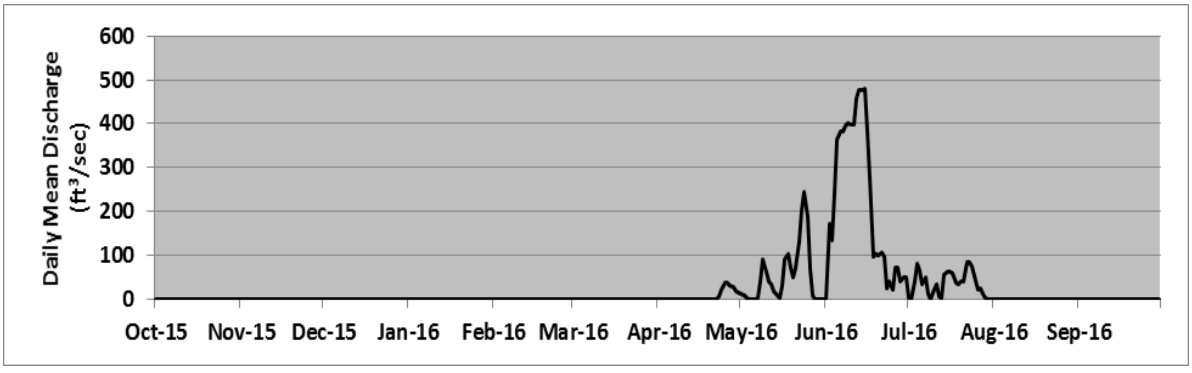


Appendix A (21 of 38)
Olympus Tunnel near Estes Park, CO

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-2015 through 30-Sep-2016. Records are complete and reliable. This record contains operational data which could be subject to future revisions and changes.

Hydropower Diversion (Skim), cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	13	0	2	0	0
2	0	0	0	0	0	0	0	8	172	0	0	0
3	0	0	0	0	0	0	0	2	136	40	0	0
4	0	0	0	0	0	0	0	0	240	83	0	0
5	0	0	0	0	0	0	0	0	363	66	0	0
6	0	0	0	0	0	0	0	0	384	33	0	0
7	0	0	0	0	0	0	0	4	384	49	0	0
8	0	0	0	0	0	0	0	42	395	11	0	0
9	0	0	0	0	0	0	0	91	401	0	0	0
10	0	0	0	0	0	0	0	62	400	17	0	0
11	0	0	0	0	0	0	0	40	399	34	0	0
12	0	0	0	0	0	0	0	35	459	6	0	0
13	0	0	0	0	0	0	0	20	478	3	0	0
14	0	0	0	0	0	0	0	9	478	58	0	0
15	0	0	0	0	0	0	0	2	480	61	0	0
16	0	0	0	0	0	0	0	31	384	64	0	0
17	0	0	0	0	0	0	0	90	276	60	0	0
18	0	0	0	0	0	0	0	103	98	38	0	0
19	0	0	0	0	0	0	0	73	103	34	0	0
20	0	0	0	0	0	0	0	50	101	41	0	0
21	0	0	0	0	0	0	0	73	107	41	0	0
22	0	0	0	0	0	0	0	132	96	85	0	0
23	0	0	0	0	0	0	7	203	25	86	0	0
24	0	0	0	0	0	0	23	246	40	74	0	0
25	0	0	0	0	0	0	36	189	21	54	0	0
26	0	0	0	0	0	0	36	70	71	23	0	0
27	0	0	0	0	0	0	32	9	71	25	0	0
28	0	0	0	0	0	0	29	0	40	13	0	0
29	0	0	0	0		0	19	0	51	4	0	0
30	0	0	0	0		0	15	0	50	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	36	246	480	86	0	0
Mean	0	0	0	0	0	0	7	51	223	36	0	0
AF	0	0	0	0	0	0	390	3151	13264	2183	0	0

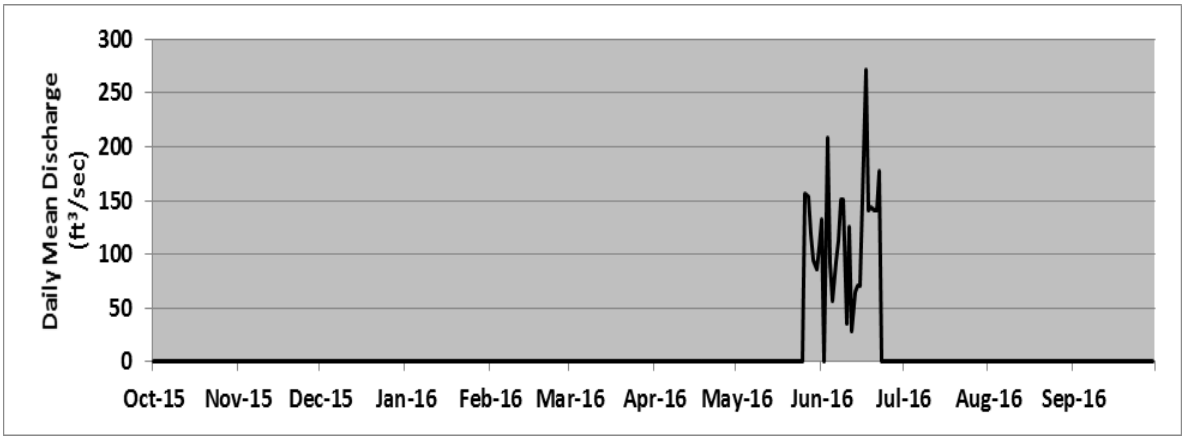


Appendix A (22 of 38)
Olympus Tunnel, CO

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-2015 through 30-Sep-2016. 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	132	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	209	0	0	0
4	0	0	0	0	0	0	0	0	92	0	0	0
5	0	0	0	0	0	0	0	0	57	0	0	0
6	0	0	0	0	0	0	0	0	93	0	0	0
7	0	0	0	0	0	0	0	0	112	0	0	0
8	0	0	0	0	0	0	0	0	151	0	0	0
9	0	0	0	0	0	0	0	0	151	0	0	0
10	0	0	0	0	0	0	0	0	36	0	0	0
11	0	0	0	0	0	0	0	0	126	0	0	0
12	0	0	0	0	0	0	0	0	29	0	0	0
13	0	0	0	0	0	0	0	0	66	0	0	0
14	0	0	0	0	0	0	0	0	71	0	0	0
15	0	0	0	0	0	0	0	0	71	0	0	0
16	0	0	0	0	0	0	0	0	151	0	0	0
17	0	0	0	0	0	0	0	0	272	0	0	0
18	0	0	0	0	0	0	0	0	140	0	0	0
19	0	0	0	0	0	0	0	0	144	0	0	0
20	0	0	0	0	0	0	0	0	141	0	0	0
21	0	0	0	0	0	0	0	0	141	0	0	0
22	0	0	0	0	0	0	0	0	177	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	156	0	0	0	0
27	0	0	0	0	0	0	0	154	0	0	0	0
28	0	0	0	0	0	0	0	118	0	0	0	0
29	0	0	0	0		0	0	94	0	0	0	0
30	0	0	0	0		0	0	86	0	0	0	0
31	0		0	0		0		108		0	0	
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	0	0	0	0	0	0	156	272	0	0	0
Mean	0	0	0	0	0	0	0	23	85	0	0	0
AF	0	0	0	0	0	0	0	1417	5066	0	0	0

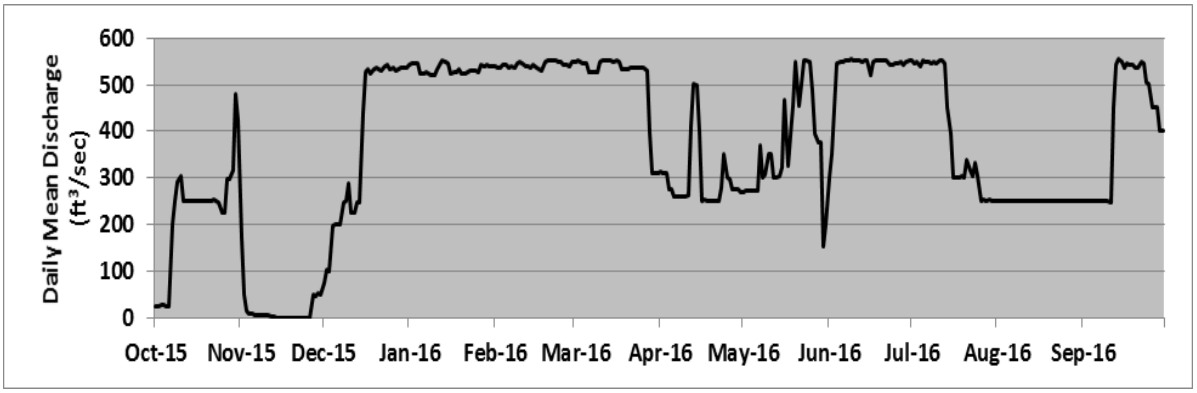


Appendix A (23 of 38)
Olympus Tunnel, CO

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-2015 to 30-Sep-2016. 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	26	171	76	543	538	550	312	271	302	552	251	250
2	26	51	102	545	536	552	311	271	350	546	252	249
3	27	15	100	544	536	549	310	271	449	549	251	251
4	27	10	197	547	544	547	276	272	546	539	251	252
5	26	8	202	525	541	546	276	272	549	553	251	250
6	26	6	201	524	537	526	261	274	550	550	251	250
7	201	5	200	526	540	528	261	370	553	550	250	250
8	251	5	249	522	538	527	260	301	551	545	252	251
9	291	6	250	521	545	527	260	307	554	550	252	251
10	305	5	287	521	547	550	261	351	550	547	250	250
11	251	6	226	534	547	551	262	350	552	551	250	249
12	251	3	226	541	538	551	412	302	552	551	250	452
13	251	3	249	550	539	552	501	301	548	546	251	543
14	251	0	249	549	537	551	498	303	553	450	251	554
15	251	0	439	546	542	550	400	324	551	394	250	549
16	251	0	528	525	535	551	252	467	520	301	251	537
17	250	0	534	526	533	550	253	325	549	301	250	545
18	252	0	524	527	530	534	252	392	553	301	250	542
19	252	0	532	533	550	534	250	455	551	304	252	542
20	252	0	535	523	550	534	251	548	551	301	250	535
21	251	0	533	523	551	536	251	453	551	338	249	536
22	253	0	530	526	551	537	252	503	551	316	250	549
23	251	0	540	530	551	537	279	551	543	303	250	546
24	249	0	543	530	550	537	351	551	544	334	251	503
25	224	0	534	530	547	536	302	550	546	303	250	501
26	227	0	536	528	544	536	299	485	546	251	250	453
27	299	51	530	541	542	531	277	397	548	253	251	450
28	298	47	532	539	538	397	277	376	541	252	250	452
29	318	52	537	541		311	276	375	549	253	250	401
30	478	51	536	540		312	270	153	551	251	251	400
31	423		536	540		312		201		250	250	
Min	26	0	76	521	530	311	250	153	302	250	249	249
Max	478	171	543	550	551	552	501	551	554	553	252	554
Mean	225	17	380	533	542	514	298	365	530	406	251	411
AF	13831	981	23352	32745	30051	31563	17728	22418	31486	24915	15381	24442

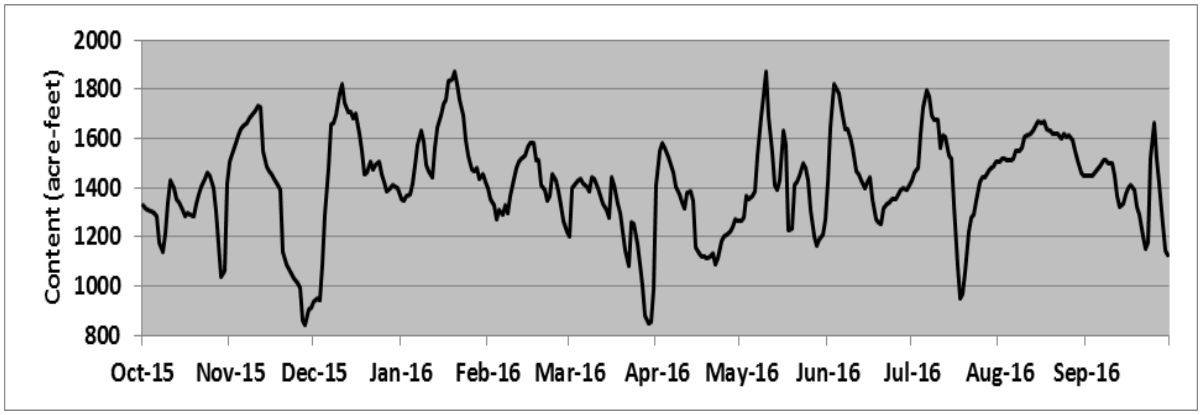


Appendix A (24 of 38)
Pinewood Reservoir near Loveland, Colorado, CO

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-2015 to 30-Sep-2016. 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	1328	1502	935	1351	1399	1204	1411	1266	1425	1428	1504	1451
2	1318	1538	951	1349	1355	1397	1547	1277	1647	1460	1517	1450
3	1311	1583	945	1366	1330	1416	1579	1369	1824	1477	1518	1449
4	1304	1611	1085	1370	1269	1428	1560	1351	1805	1621	1509	1462
5	1295	1636	1288	1418	1307	1438	1523	1366	1783	1723	1511	1476
6	1283	1652	1477	1493	1292	1417	1494	1388	1717	1799	1517	1488
7	1175	1666	1656	1574	1326	1403	1462	1528	1639	1774	1551	1510
8	1139	1681	1664	1634	1298	1385	1404	1686	1640	1697	1551	1512
9	1213	1696	1692	1588	1365	1444	1371	1780	1605	1678	1560	1498
10	1343	1713	1785	1495	1437	1433	1342	1870	1564	1676	1605	1497
11	1432	1732	1823	1465	1480	1400	1313	1687	1469	1561	1611	1447
12	1401	1723	1748	1441	1505	1369	1376	1544	1457	1613	1620	1367
13	1351	1548	1709	1561	1521	1337	1384	1412	1429	1606	1634	1323
14	1339	1488	1705	1644	1530	1309	1347	1392	1400	1533	1652	1333
15	1311	1469	1682	1696	1560	1278	1158	1430	1425	1515	1672	1372
16	1287	1452	1698	1741	1584	1445	1130	1630	1440	1330	1666	1395
17	1296	1433	1619	1759	1580	1411	1121	1572	1357	1084	1669	1408
18	1290	1413	1548	1833	1512	1336	1117	1227	1270	949	1640	1394
19	1286	1394	1456	1842	1513	1295	1112	1231	1259	966	1630	1320
20	1333	1137	1463	1872	1412	1219	1117	1409	1252	1060	1622	1290
21	1371	1086	1508	1820	1391	1145	1133	1425	1317	1223	1617	1200
22	1407	1066	1476	1761	1350	1084	1088	1450	1334	1277	1619	1154
23	1435	1048	1494	1693	1367	1259	1115	1500	1340	1292	1601	1175
24	1460	1030	1506	1593	1452	1252	1185	1477	1353	1349	1622	1517
25	1447	1011	1454	1533	1432	1171	1200	1428	1352	1421	1605	1662
26	1397	994	1423	1475	1384	1087	1211	1308	1373	1442	1612	1518
27	1303	862	1388	1466	1326	998	1222	1203	1392	1443	1591	1414
28	1170	841	1401	1482	1266	881	1242	1167	1397	1469	1552	1306
29	1036	905	1413	1437		846	1269	1192	1389	1482	1514	1145
30	1063	913	1403	1453		854	1265	1210	1410	1488	1462	1129
31	1416		1401	1424		989		1272		1507	1450	
Min	1036	841	935	1349	1266	846	1088	1167	1252	949	1450	1129
Max	1460	1732	1823	1872	1584	1445	1579	1870	1824	1799	1672	1662
Mean	1308	1361	1477	1569	1412	1256	1293	1421	1469	1450	1581	1389
EOM	1416	913	1401	1424	1266	989	1265	1272	1410	1507	1450	1129

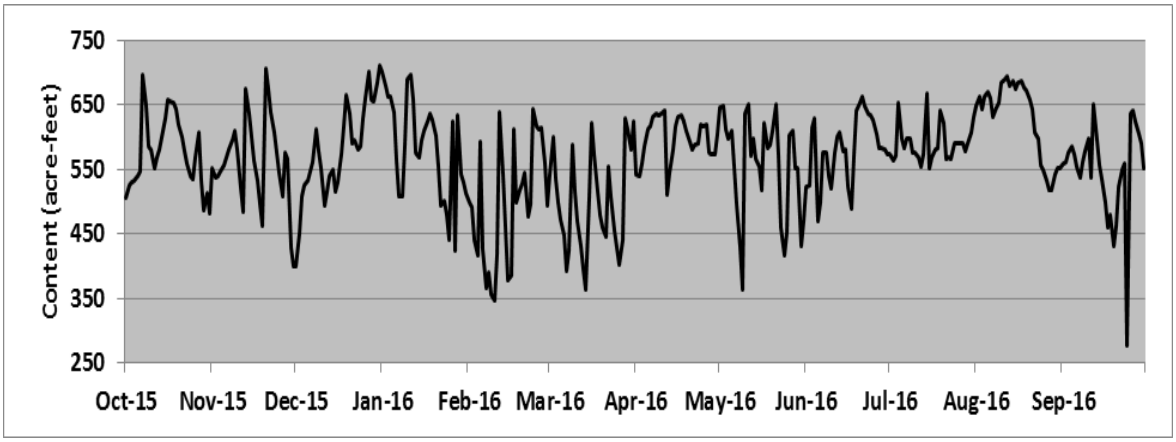


Appendix A (25 of 38)
Flatiron Reservoir, CO

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-2015 to 30-Sep-2016. 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	506	550	400	701	498	542	542	645	523	574	648	558
2	525	537	450	680	490	601	540	647	524	564	663	561
3	531	540	508	663	440	534	558	611	614	570	644	575
4	533	547	526	663	417	500	584	598	628	652	663	584
5	539	557	533	639	593	472	613	609	471	596	670	574
6	546	569	547	565	427	449	617	555	499	582	660	553
7	697	582	561	508	367	392	632	496	575	597	631	538
8	649	595	613	508	389	423	636	429	575	597	644	561
9	586	609	579	587	357	587	632	365	540	577	653	579
10	580	580	551	690	347	516	636	635	519	575	683	597
11	552	520	494	697	420	470	640	651	575	568	689	538
12	569	483	514	658	638	430	510	571	599	553	693	651
13	581	674	538	577	542	396	543	598	606	574	680	595
14	609	635	549	569	460	363	580	566	577	667	687	555
15	629	599	515	596	377	507	618	555	581	551	674	535
16	657	565	530	610	385	622	632	519	522	568	683	499
17	656	532	574	625	612	574	633	621	490	581	687	461
18	652	496	617	637	499	514	625	583	571	584	677	480
19	644	462	665	627	517	479	609	588	640	641	672	431
20	619	707	635	602	527	460	593	609	652	621	658	463
21	601	674	590	553	545	446	580	651	662	567	642	522
22	579	639	595	495	477	554	587	571	648	569	606	549
23	559	608	580	500	496	507	591	461	636	567	598	558
24	540	577	585	480	642	456	619	416	634	590	557	276
25	536	545	630	440	617	429	618	454	627	590	550	636
26	568	508	659	623	612	401	620	603	604	591	532	642
27	608	577	701	425	613	441	575	610	583	590	517	625
28	533	566	658	634	559	629	573	551	584	578	518	605
29	488	429	656	541		612	573	551	580	589	541	590
30	514	401	684	531		581	606	430	573	608	551	553
31	481		710	513		625		469		631	550	
Min	481	401	400	425	347	363	510	365	471	551	517	276
Max	697	707	710	701	642	629	640	651	662	667	693	651
Mean	576	562	579	585	495	500	597	555	580	589	630	548
EOM	481	401	710	513	559	625	606	469	573	631	550	553

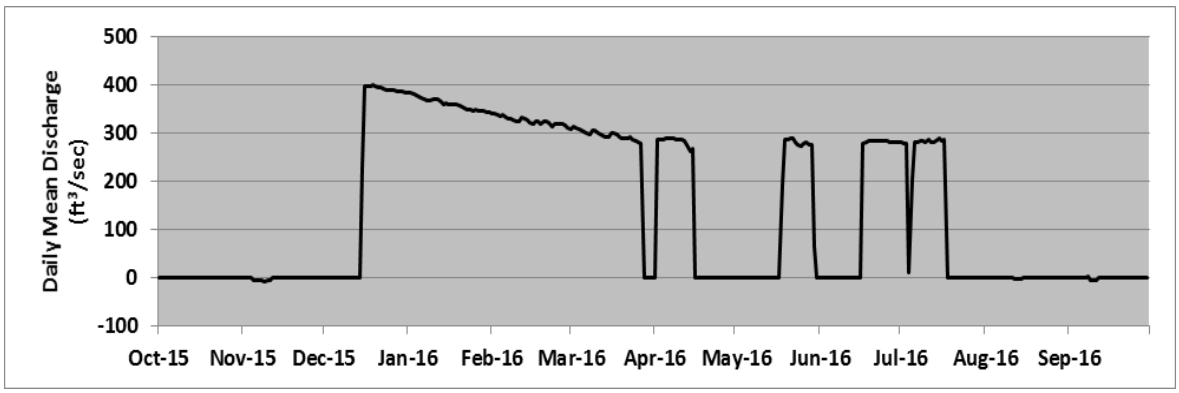


Appendix A (26 of 38)
Flatiron Powerplant Unit #3 Pump, CO

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-2015 to 30-Sep-2016. 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	0	383	340	309	0	0	0	281	0	0
2	0	0	0	382	340	312	287	0	0	277	0	0
3	0	0	0	380	337	310	287	0	0	277	0	0
4	0	0	0	378	335	308	287	0	0	10	0	0
5	0	-5	0	375	337	305	288	0	0	203	0	0
6	0	-5	0	373	332	303	288	0	0	282	0	0
7	0	-6	0	369	330	300	287	0	0	281	0	0
8	0	-6	0	366	329	297	288	0	0	284	0	2
9	0	-8	0	366	327	304	287	0	0	283	0	-6
10	0	-6	0	370	324	304	286	0	0	281	0	-6
11	0	-6	0	370	323	300	285	0	0	287	0	-6
12	0	0	0	369	331	297	284	0	0	281	-3	0
13	0	0	0	364	331	294	275	0	0	282	-3	0
14	0	0	0	360	327	291	263	0	0	284	-3	0
15	0	0	229	361	322	291	267	0	0	288	0	0
16	0	0	396	360	318	299	0	0	0	283	0	0
17	0	0	398	360	324	300	0	0	277	286	0	0
18	0	0	397	358	325	297	0	191	280	0	0	0
19	0	0	398	358	319	292	0	287	282	0	0	0
20	0	0	397	355	323	290	0	287	284	0	0	0
21	0	0	395	354	323	288	0	288	283	0	0	0
22	0	0	393	350	320	288	0	287	284	0	0	0
23	0	0	392	347	313	291	0	282	285	0	0	0
24	0	0	389	349	320	287	0	275	283	0	0	0
25	0	0	390	345	320	283	0	273	283	0	0	0
26	0	0	389	348	318	279	0	279	282	0	0	0
27	0	0	388	345	317	279	0	280	281	0	0	0
28	0	0	386	344	316	0	0	276	281	0	0	0
29	0	0	386	346		0	0	274	281	0	0	0
30	0	0	385	343		0	0	66	281	0	0	0
31	0		384	342		0		0		0	0	
Min	0	-8	0	342	313	0	0	0	0	0	-3	-6
Max	0	0	398	383	340	312	288	288	285	288	0	2
Mean	0	-1	209	360	326	258	132	108	132	144	0	0
AF	0	-85	12854	22120	18048	15836	7842	6624	7815	8811	-19	-29

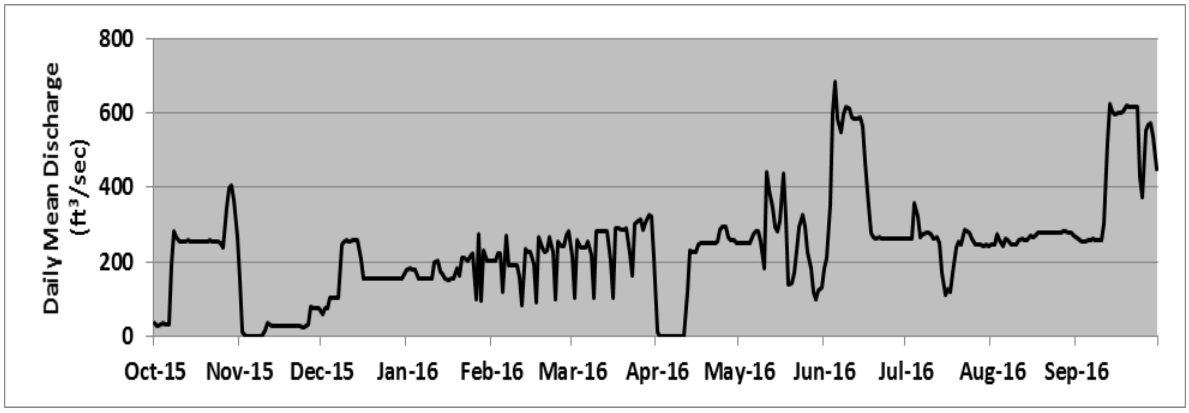


Appendix A (27 of 38)
CHFC 930 Section, CO

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-2015 to 30-Sep-2016. 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	36	151	61	179	203	213	11	249	181	263	244	265
2	26	12	77	181	203	103	0	249	210	263	245	257
3	33	0	77	179	224	256	0	251	355	263	273	254
4	35	0	101	179	224	240	0	251	599	357	258	256
5	33	0	102	155	118	240	0	250	684	321	244	260
6	33	0	102	153	269	240	0	274	582	266	261	260
7	190	0	102	153	192	255	0	282	548	274	260	261
8	282	0	246	154	189	220	0	282	597	277	247	260
9	266	0	256	155	189	104	0	254	616	279	245	259
10	255	16	257	155	189	281	0	181	612	275	244	259
11	254	35	256	199	157	280	0	441	588	264	257	302
12	255	30	257	204	82	281	119	393	584	265	260	521
13	257	27	258	174	234	281	232	347	583	252	259	623
14	254	28	256	168	226	280	226	294	586	172	260	604
15	256	27	205	153	226	203	227	282	565	110	271	597
16	255	27	154	153	193	102	245	308	468	126	264	598
17	256	26	155	154	91	290	251	437	350	118	269	601
18	255	27	155	153	264	292	251	318	277	170	278	604
19	255	27	155	181	239	288	251	141	264	240	278	620
20	253	27	156	164	228	288	251	143	264	254	278	617
21	256	26	154	209	230	290	250	172	266	248	278	617
22	256	26	154	212	268	222	251	232	262	286	277	617
23	254	26	154	203	228	165	255	296	262	281	279	617
24	254	25	155	215	97	301	284	328	262	277	278	430
25	252	26	154	224	253	311	295	294	262	263	277	373
26	237	30	155	100	244	314	295	225	263	247	278	552
27	345	77	155	276	244	286	268	183	261	246	280	567
28	397	77	155	94	271	305	260	119	262	245	280	570
29	404	76	155	231		325	259	100	263	244	280	536
30	364	76	156	203		323	251	122	262	246	278	447
31	266		168	204		209		130		243	268	
Min	26	0	61	94	82	102	0	100	181	110	244	254
Max	404	151	258	276	271	325	295	441	684	357	280	623
Mean	227	31	165	178	206	251	158	252	405	246	266	453
AF	13906	1830	10106	10922	11435	15420	9374	15498	24035	15114	16336	26934

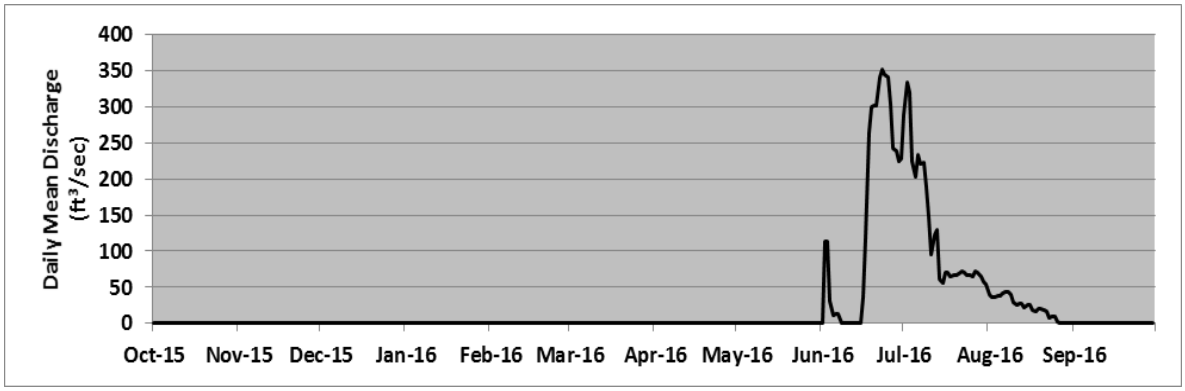


Appendix A (28 of 38)
Dille Tunnel near Drake, CO

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	0	0	289	40	0
2	0	0	0	0	0	0	0	0	113	334	37	0
3	0	0	0	0	0	0	0	0	113	319	37	0
4	0	0	0	0	0	0	0	0	31	225	38	0
5	0	0	0	0	0	0	0	0	12	203	38	0
6	0	0	0	0	0	0	0	0	13	232	42	0
7	0	0	0	0	0	0	0	0	13	220	43	0
8	0	0	0	0	0	0	0	0	1	223	43	0
9	0	0	0	0	0	0	0	0	0	188	40	0
10	0	0	0	0	0	0	0	0	0	147	30	0
11	0	0	0	0	0	0	0	0	0	96	26	0
12	0	0	0	0	0	0	0	0	0	123	27	0
13	0	0	0	0	0	0	0	0	0	130	27	0
14	0	0	0	0	0	0	0	0	0	61	23	0
15	0	0	0	0	0	0	0	0	0	56	26	0
16	0	0	0	0	0	0	0	0	36	70	26	0
17	0	0	0	0	0	0	0	0	116	70	19	0
18	0	0	0	0	0	0	0	0	263	66	17	0
19	0	0	0	0	0	0	0	0	299	67	20	0
20	0	0	0	0	0	0	0	0	301	67	20	0
21	0	0	0	0	0	0	0	0	302	68	18	0
22	0	0	0	0	0	0	0	0	341	72	17	0
23	0	0	0	0	0	0	0	0	351	70	9	0
24	0	0	0	0	0	0	0	0	343	67	9	0
25	0	0	0	0	0	0	0	0	340	67	10	0
26	0	0	0	0	0	0	0	0	302	66	3	0
27	0	0	0	0	0	0	0	0	242	73	0	0
28	0	0	0	0	0	0	0	0	238	71	0	0
29	0	0	0	0		0	0	0	225	66	0	0
30	0	0	0	0		0	0	0	228	58	0	0
31	0		0	0		0		0		55	0	
Min	0	0	0	0	0	0	0	0	0	55	0	0
Max	0	0	0	0	0	0	0	0	351	334	43	0
Mean	0	0	0	0	0	0	0	0	141	126	22	0
AF	0	0	0	0	0	0	0	0	8362	7758	1348	0

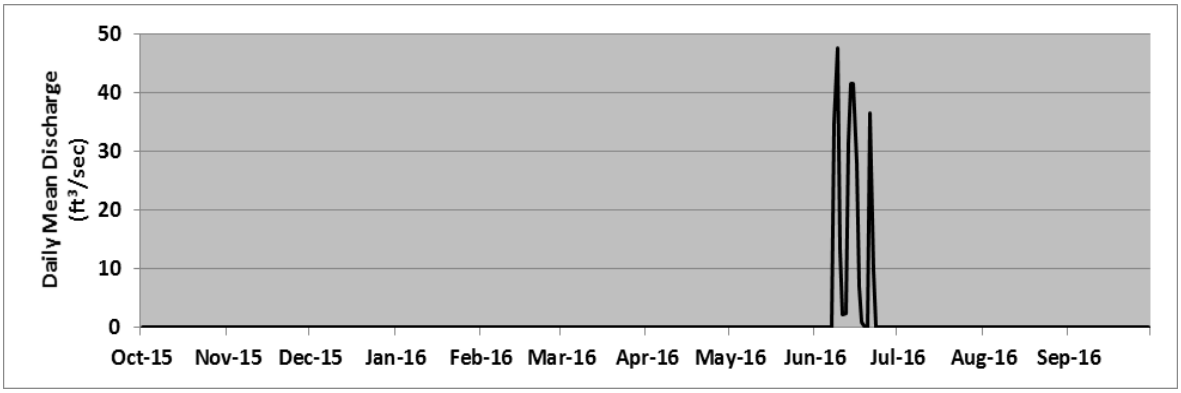


Appendix A (29 of 38)
Dille Tunnel near Drake, CO

Location. --Lat 40°25'02", long 105°14'35", Larimer County, Hydrologic Unit 10190006, 11 miles west of Loveland, Colorado, on the Big Thompson River.
Gage.-- None.
Remarks.-- Constructed in 1950. Maximum capacity is 600 cfs. Dille Tunnel diverts water from the Big Thompson River for power generation and water supply. The right to divert native run-off is determined by the State of Colorado. The numbers presented in this table are based on mass balance computations. 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	35	0	0	0
9	0	0	0	0	0	0	0	0	48	0	0	0
10	0	0	0	0	0	0	0	0	13	0	0	0
11	0	0	0	0	0	0	0	0	2	0	0	0
12	0	0	0	0	0	0	0	0	2	0	0	0
13	0	0	0	0	0	0	0	0	32	0	0	0
14	0	0	0	0	0	0	0	0	41	0	0	0
15	0	0	0	0	0	0	0	0	41	0	0	0
16	0	0	0	0	0	0	0	0	28	0	0	0
17	0	0	0	0	0	0	0	0	7	0	0	0
18	0	0	0	0	0	0	0	0	1	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	37	0	0	0
22	0	0	0	0	0	0	0	0	9	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	48	0	0	0
Mean	0	0	0	0	0	0	0	0	10	0	0	0
AF	0	0	0	0	0	0	0	0	585	0	0	0

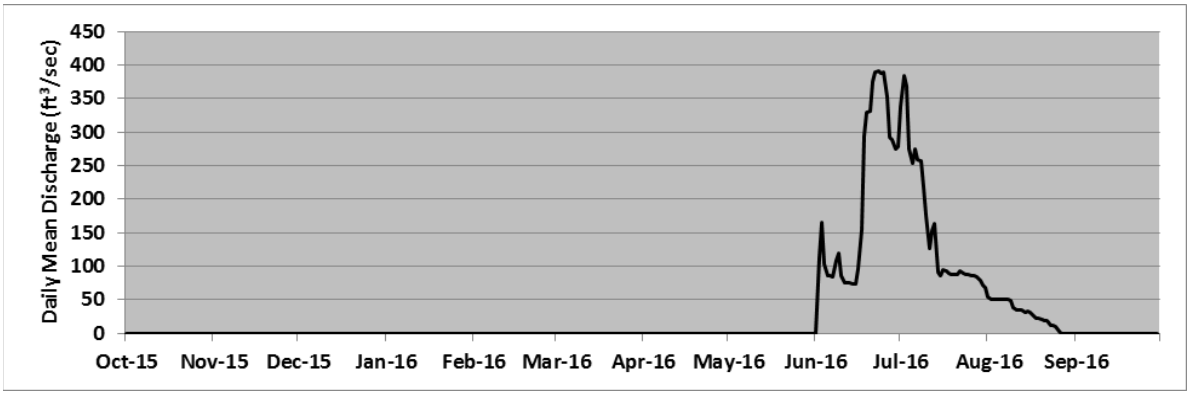


Appendix A (30 of 38)
Dille Tunnel near Drake, CO

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	0	0	339	54	0
2	0	0	0	0	0	0	0	0	113	384	51	0
3	0	0	0	0	0	0	0	0	166	369	51	0
4	0	0	0	0	0	0	0	0	104	275	51	0
5	0	0	0	0	0	0	0	0	85	253	51	0
6	0	0	0	0	0	0	0	0	85	275	51	0
7	0	0	0	0	0	0	0	0	85	260	51	0
8	0	0	0	0	0	0	0	0	108	256	51	0
9	0	0	0	0	0	0	0	0	120	218	49	0
10	0	0	0	0	0	0	0	0	86	177	39	0
11	0	0	0	0	0	0	0	0	75	126	35	0
12	0	0	0	0	0	0	0	0	75	153	35	0
13	0	0	0	0	0	0	0	0	75	163	35	0
14	0	0	0	0	0	0	0	0	74	91	31	0
15	0	0	0	0	0	0	0	0	74	86	34	0
16	0	0	0	0	0	0	0	0	97	95	32	0
17	0	0	0	0	0	0	0	0	154	93	25	0
18	0	0	0	0	0	0	0	0	294	89	23	0
19	0	0	0	0	0	0	0	0	329	88	22	0
20	0	0	0	0	0	0	0	0	331	87	21	0
21	0	0	0	0	0	0	0	0	376	88	19	0
22	0	0	0	0	0	0	0	0	390	92	19	0
23	0	0	0	0	0	0	0	0	391	90	11	0
24	0	0	0	0	0	0	0	0	387	87	12	0
25	0	0	0	0	0	0	0	0	389	87	11	0
26	0	0	0	0	0	0	0	0	352	86	2	0
27	0	0	0	0	0	0	0	0	292	86	0	0
28	0	0	0	0	0	0	0	0	288	85	0	0
29	0	0	0	0		0	0	0	275	80	0	0
30	0	0	0	0		0	0	0	278	71	0	0
31	0		0	0		0		0		68	0	
Min	0	0	0	0	0	0	0	0	0	68	0	0
Max	0	0	0	0	0	0	0	0	391	384	54	0
Mean	0	0	0	0	0	0	0	0	198	155	28	0
AF	0	0	0	0	0	0	0	0	11781	9496	1710	0

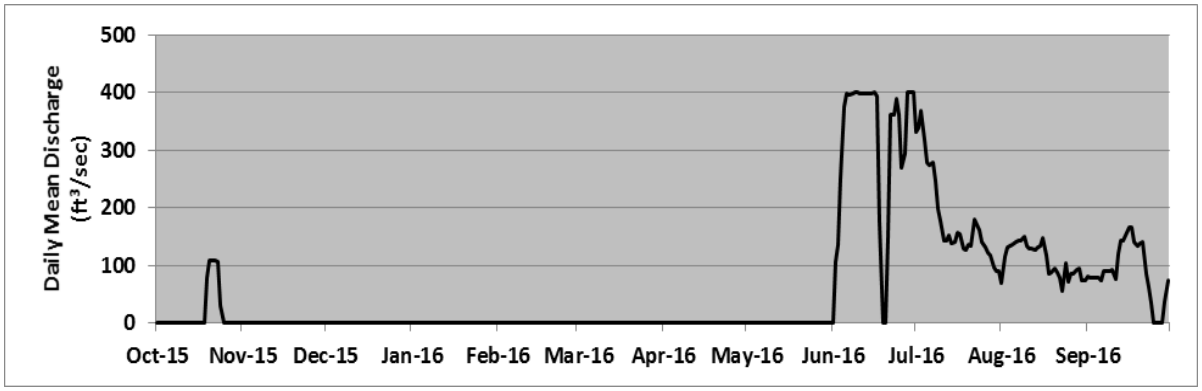


Appendix A (31 of 38)
Big Thompson Power Plant, CO

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-2015 and 30-Sep-2016. Record is complete and fair. This record contains operational data which could be subject to future revisions and changes.

Discharge, cfs, Daily Mean Values

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0	0	0	0	0	0	0	0	0	332	70	81
2	0	0	0	0	0	0	0	0	107	339	115	79
3	0	0	0	0	0	0	0	0	136	368	132	79
4	0	0	0	0	0	0	0	0	251	317	134	78
5	0	0	0	0	0	0	0	0	375	278	135	78
6	0	0	0	0	0	0	0	0	397	275	141	74
7	0	0	0	0	0	0	0	0	397	278	143	89
8	0	0	0	0	0	0	0	0	399	245	142	90
9	0	0	0	0	0	0	0	0	401	198	150	90
10	0	0	0	0	0	0	0	0	400	177	133	91
11	0	0	0	0	0	0	0	0	399	143	130	76
12	0	0	0	0	0	0	0	0	399	143	130	121
13	0	0	0	0	0	0	0	0	398	152	126	142
14	0	0	0	0	0	0	0	0	398	139	132	142
15	0	0	0	0	0	0	0	0	399	140	134	158
16	0	0	0	0	0	0	0	0	399	158	149	166
17	0	0	0	0	0	0	0	0	393	154	119	166
18	0	0	0	0	0	0	0	0	174	130	86	141
19	78	0	0	0	0	0	0	0	0	128	88	134
20	107	0	0	0	0	0	0	0	0	137	94	139
21	108	0	0	0	0	0	0	0	146	134	89	141
22	108	0	0	0	0	0	0	0	361	179	78	85
23	107	0	0	0	0	0	0	0	362	171	57	63
24	30	0	0	0	0	0	0	0	390	160	105	35
25	0	0	0	0	0	0	0	0	361	141	72	0
26	0	0	0	0	0	0	0	0	270	131	85	0
27	0	0	0	0	0	0	0	0	294	122	85	0
28	0	0	0	0	0	0	0	0	400	117	93	0
29	0	0	0	0		0	0	0	399	98	95	38
30	0	0	0	0		0	0	0	400	90	75	74
31	0		0	0		0		0		90	74	
Min	0	0	0	0	0	0	0	0	0	90	57	0
Max	108	0	0	0	0	0	0	0	401	368	150	166
Mean	17	0	0	0	0	0	0	0	307	183	109	88
AF	1064	0	7	27	16	0	0	0	18223	11214	6712	5249



Appendix A (32 of 38)
CHFC Wasteway, CO

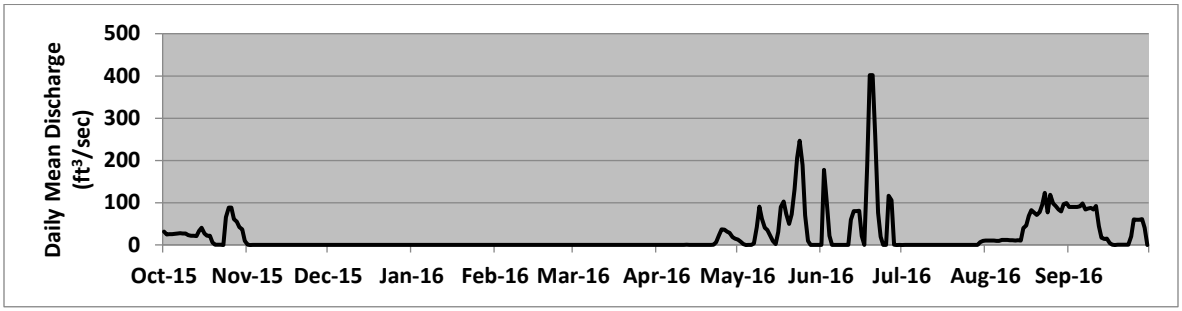
Location. --Lat 40°25'13", long 105°13'28", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado, on the Big Thompson River.

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 2015 and also between April 2016 and September 2016. 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	31	0	0	0	0	0	0	13	0	0	10	90
2	25	0	0	0	0	0	0	8	178	0	10	90
3	25	0	0	0	0	0	0	2	98	0	10	90
4	25	0	0	0	0	0	0	0	21	0	10	89
5	26	0	0	0	0	0	0	0	0	0	9	91
6	27	0	0	0	0	0	0	0	0	0	9	98
7	27	0	0	0	0	0	0	4	0	0	12	84
8	27	0	0	0	0	0	0	42	0	0	12	86
9	27	0	0	0	0	0	0	91	0	0	12	87
10	23	0	0	0	0	0	0	62	0	0	11	83
11	22	0	0	0	0	0	0	40	0	0	11	92
12	22	0	0	0	0	0	0	35	60	0	11	44
13	21	0	0	0	0	0	0	22	80	0	11	17
14	33	0	0	0	0	0	0	10	80	0	10	14
15	41	0	0	0	0	0	0	2	81	0	40	15
16	27	0	0	0	0	0	0	31	21	0	46	4
17	22	0	0	0	0	0	0	90	0	0	69	0
18	22	0	0	0	0	0	0	103	188	0	82	0
19	6	0	0	0	0	0	0	73	402	0	76	0
20	0	0	0	0	0	0	0	50	402	0	71	0
21	0	0	0	0	0	0	0	73	259	0	78	0
22	0	0	0	0	0	0	0	132	76	0	95	0
23	0	0	0	0	0	0	7	206	19	0	123	0
24	65	0	0	0	0	0	23	246	0	0	77	20
25	88	0	0	0	0	0	36	189	0	0	119	60
26	88	0	0	0	0	0	36	70	116	0	98	60
27	61	0	0	0	0	0	32	9	106	0	92	60
28	55	0	0	0	0	0	29	0	0	0	84	61
29	42	0	0	0		0	19	0	0	0	80	40
30	37	0	0	0		0	15	0	0	7	97	0
31	10		0	0		0		0		9	99	
Min	0	0	0	0	0	0	0	0	0	0	9	0
Max	88	0	0	0	0	0	36	246	402	9	123	98
Mean	30	0	0	0	0	0	7	52	73	1	51	46
AF	1829	0	0	0	0	0	390	3170	4331	32	3113	2727

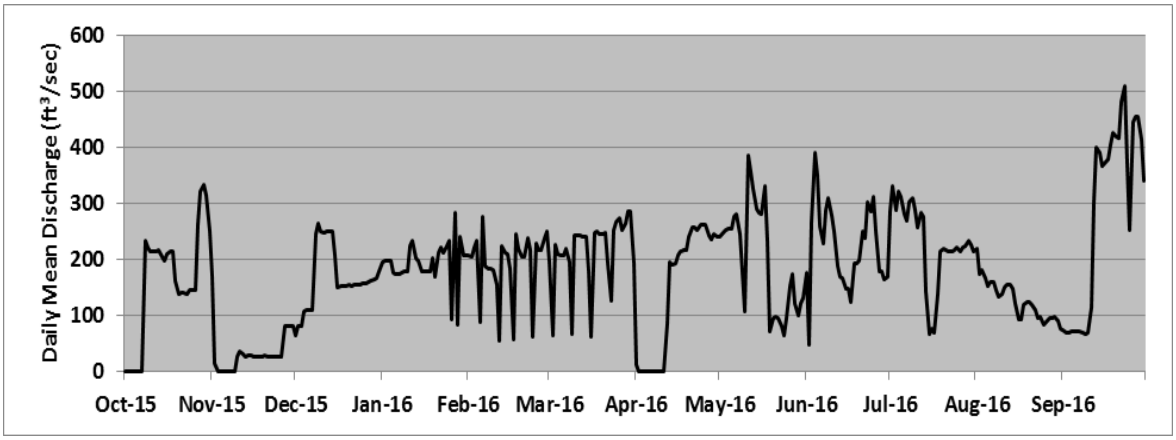


Appendix A (33 of 38)
CHFC 550 Section, CO

Location. --Lat 40°25'25", long 105°13'34", Larimer County, Hydrologic Unit 10190006, 9 miles west of Loveland, Colorado.
Gage.-- Water-stage recorder with satellite telemetry. Elevation of gage is 5460 feet 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-2015 to 30-Sep-2016. 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	170	64	195	206	196	12	240	177	286	220	75
2	0	15	81	198	205	65	0	246	47	330	173	70
3	0	0	82	197	221	227	0	252	267	288	181	69
4	0	0	106	198	234	208	0	255	390	321	167	71
5	0	0	109	177	88	208	0	254	351	312	153	73
6	0	0	110	174	275	207	0	276	258	280	161	72
7	0	0	110	175	189	220	0	282	229	270	159	73
8	234	0	244	177	184	196	0	246	289	301	145	69
9	221	0	263	179	183	67	0	176	310	310	134	67
10	214	27	249	180	181	243	0	106	278	288	138	69
11	214	37	248	223	155	243	0	385	249	256	150	115
12	215	32	251	234	55	242	85	356	188	283	154	299
13	217	28	251	201	223	241	196	327	168	276	155	399
14	204	29	250	199	213	241	191	291	167	142	147	389
15	197	28	207	178	210	180	192	283	148	66	123	367
16	209	27	151	178	184	62	208	280	147	75	92	370
17	214	26	152	179	57	248	215	331	124	69	93	378
18	215	28	153	178	246	249	216	234	193	138	120	405
19	163	28	153	202	219	245	216	72	194	213	124	426
20	139	28	154	169	205	245	239	95	197	218	123	418
21	141	27	153	212	206	247	258	97	251	216	120	416
22	140	27	154	222	237	192	258	96	237	214	110	481
23	139	26	154	212	216	126	252	82	301	215	95	508
24	147	26	156	223	63	253	263	64	285	216	97	371
25	146	26	157	233	228	266	261	96	312	221	83	252
26	145	26	158	94	216	274	261	154	250	215	87	444
27	263	81	160	284	216	251	243	174	180	221	95	455
28	321	81	162	84	238	264	236	121	179	223	95	454
29	333	80	164	240		286	245	100	165	234	97	414
30	314	81	166	207		284	241	123	169	226	90	339
31	250		178	207		193		130		215	78	
Min	0	0	64	84	55	62	0	64	47	66	78	67
Max	333	170	263	284	275	286	263	385	390	330	220	508
Mean	161	33	166	194	191	215	143	201	223	230	128	280
AF	9890	1944	10201	11893	10600	13207	8490	12326	13268	14134	7840	16646

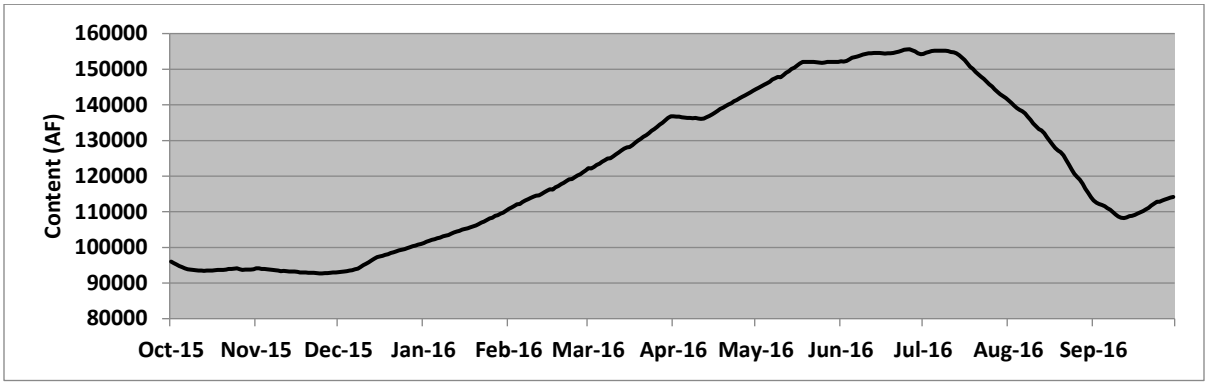


Appendix A (34 of 38)
Horsetooth Reservoir near Fort Collins, CO

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-2015 to 30-Sep-2016. 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	95983	94130	93070	101245	110795	122206	136765	144406	152182	154277	141230	113165
2	95557	94099	93180	101553	111219	122117	136689	144797	152102	154641	140595	112498
3	95211	93959	93242	101861	111662	122617	136651	145227	152322	154844	139809	112157
4	94772	93959	93304	102106	112071	123117	136557	145637	152785	155067	139141	111917
5	94458	93865	93475	102333	112208	123494	136387	146069	153228	155189	138568	111508
6	94130	93756	93553	102561	112737	124031	136349	146481	153429	155229	138207	111049
7	93881	93662	93834	102790	113148	124445	136349	147072	153611	155169	137598	110558
8	93803	93553	94083	103084	113492	124931	136273	147505	153833	155169	136689	109916
9	93709	93475	94521	103263	113904	125004	136292	147802	154136	155169	135783	109241
10	93584	93351	95008	103476	114248	125581	136160	147703	154317	155088	134843	108720
11	93460	93413	95384	103805	114489	126106	136084	148374	154500	154844	133981	108300
12	93475	93289	95872	104215	114628	126613	136122	148950	154480	154763	133216	108216
13	93444	93226	96346	104462	115025	127159	136557	149485	154540	154500	132806	108434
14	93491	93226	96821	104677	115458	127724	136859	150063	154561	153955	131988	108753
15	93491	93211	97249	104957	115908	128053	137314	150441	154520	153328	130934	108871
16	93491	93117	97424	105205	116290	128180	137769	151041	154459	152543	129866	109106
17	93569	92993	97662	105337	116255	128728	138340	151621	154399	151601	128801	109460
18	93678	92946	97902	105635	116829	129332	138816	152022	154439	150681	127870	109831
19	93709	92961	98061	105900	117232	129921	139236	152042	154480	150063	127177	110219
20	93709	92899	98428	106165	117703	130417	139656	152042	154581	149287	126704	110676
21	93818	92884	98636	106563	118106	131063	140078	152062	154783	148553	125834	111083
22	93912	92838	98860	106947	118614	131525	140480	152022	154885	147880	124535	111730
23	93974	92761	99116	107280	119107	132043	140999	151941	155189	147249	123188	112310
24	94037	92714	99357	107731	119195	132750	141365	151881	155432	146500	121814	112840
25	94115	92699	99549	108149	119687	133197	141789	151821	155555	145755	120625	112823
26	93849	92745	99807	108333	120129	133832	142234	151841	155595	145090	119705	113148
27	93662	92807	100016	108888	120571	134431	142639	152002	155270	144309	118966	113423
28	93740	92884	100322	109039	121050	135031	143027	152062	154986	143609	117843	113681
29	93771	92946	100500	109477		135726	143531	152042	154500	143008	116535	113990
30	93771	92993	100742	109747		136311	143998	152042	154237	142465	115319	114196
31	93865		100985	110286		136802		152082		141924	114024	
Min	93444	92699	93070	101245	110795	122117	136084	144406	152102	141924	114024	108216
Max	95983	94130	100985	110286	121050	136802	143998	152082	155595	155229	141230	114196
Mean	93972	93245	96978	105389	115777	128790	138712	149696	154245	150702	129168	111061
EOM	93865	92993	100985	110286	121050	136802	143998	152082	154237	141924	114024	114196

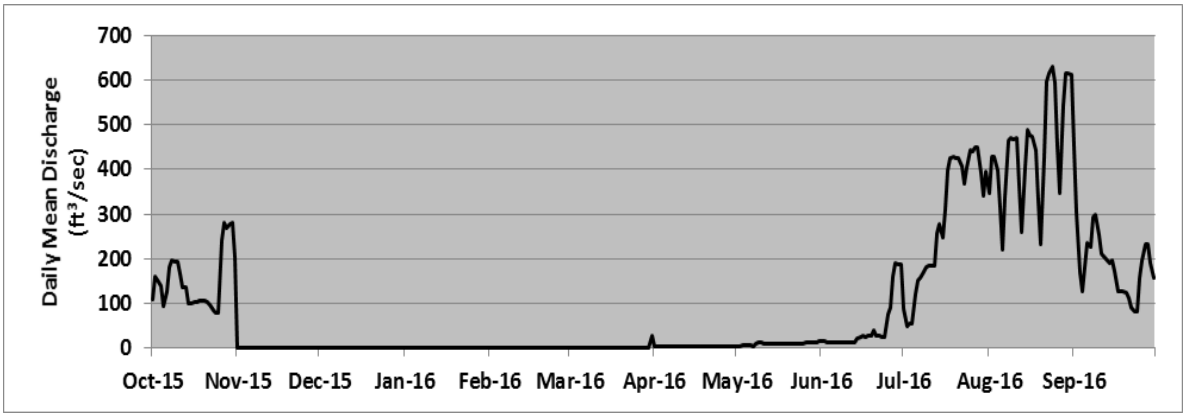


Appendix A (35 of 38)
Charles Hansen Supply Canal below Horsetooth Reservoir, CO

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-2015 to 30-Sep-2016 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	109	0	0	0	0	0	3	3	16	89	347	452
2	161	1	0	0	0	0	3	3	14	50	427	305
3	148	0	0	0	0	0	3	5	13	54	429	170
4	140	0	0	0	0	0	3	6	13	56	399	128
5	95	0	0	0	0	0	3	5	13	120	313	180
6	126	0	0	0	0	0	3	5	13	150	221	235
7	182	0	0	0	0	0	2	5	13	156	337	228
8	196	0	0	0	0	0	3	9	13	168	463	294
9	194	0	0	0	0	0	3	11	13	182	470	299
10	192	0	0	0	0	0	3	11	14	184	468	253
11	165	0	0	0	0	0	3	11	14	184	470	211
12	137	0	0	0	0	0	3	10	13	186	360	206
13	137	0	0	0	0	0	3	10	13	256	260	198
14	101	0	0	0	0	0	3	10	22	276	404	191
15	99	0	0	0	0	0	3	10	25	246	487	196
16	104	0	0	0	0	0	3	10	28	311	475	173
17	104	0	0	0	0	0	3	10	25	397	474	126
18	106	0	0	0	0	0	3	10	29	426	444	126
19	107	0	0	0	0	0	3	10	28	428	329	126
20	107	0	0	0	0	0	3	11	38	426	232	125
21	104	0	0	0	0	0	3	10	27	425	425	112
22	97	0	0	0	0	0	3	10	26	406	597	91
23	85	0	0	0	0	0	3	10	25	369	614	81
24	77	0	0	0	0	0	3	10	25	404	631	81
25	77	0	0	0	0	0	3	11	75	444	594	158
26	241	0	0	0	0	0	3	12	91	439	451	198
27	279	0	0	0	0	0	3	12	160	448	346	233
28	267	0	0	0	0	0	3	12	189	449	541	233
29	276	0	0	0		0	3	12	187	392	613	191
30	280	0	0	0		0	3	12	186	342	614	156
31	201		0	0		27		15		394	612	
Min	77	0	0	0	0	0	2	3	13	50	221	81
Max	280	1	0	0	0	27	3	15	189	449	631	452
Mean	151	0	0	0	0	1	3	9	45	286	447	192
AF	9294	12	6	6	10	67	173	580	2700	17534	27413	11404

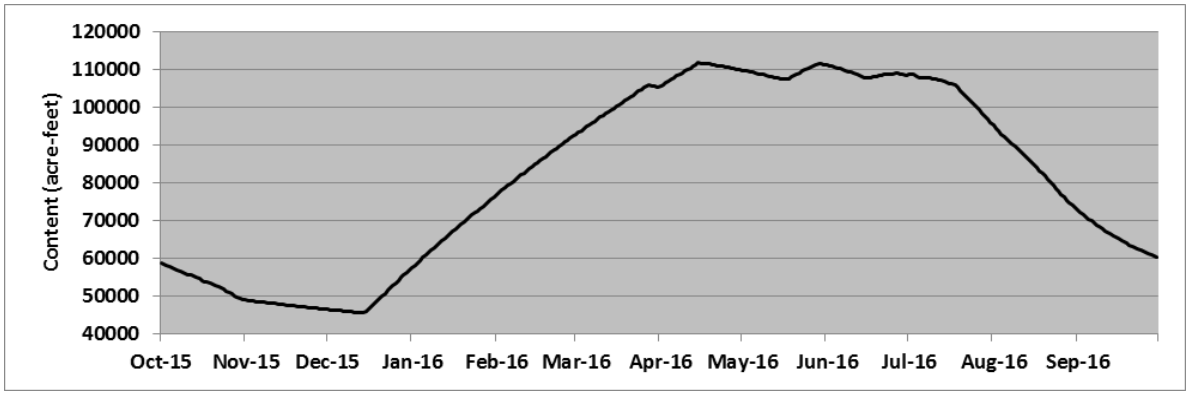


Appendix A (36 of 38)
Carter Lake near Berthoud, Colorado, CO

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-2015 to 30-Sep-2016. 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	58793	48899	46426	57491	76904	92796	105463	109733	111098	108578	95196	72780
2	58382	48796	46359	58173	77479	93364	105922	109620	110939	108544	94332	72168
3	58100	48685	46267	58821	78106	93816	106371	109472	110722	108567	93537	71558
4	57800	48583	46200	59472	78624	94311	106864	109325	110517	108025	92850	70970
5	57464	48506	46125	60125	79194	94818	107315	109144	110301	107776	92186	70412
6	57075	48438	46066	60876	79775	95326	107720	108952	110063	107822	91535	69896
7	56804	48345	45975	61517	80308	95792	108217	108770	109846	107709	90938	69331
8	56560	48277	45899	62180	80861	96269	108634	108679	109643	107731	90312	68817
9	56264	48182	45857	62807	81426	96780	109053	108555	109393	107675	89602	68247
10	56021	48106	45782	63446	81972	97335	109472	108353	109132	107472	88956	67764
11	55698	47979	45690	64070	82518	97815	109915	108183	108839	107371	88250	67235
12	55430	47936	45623	64694	83086	98219	110358	108014	108544	107146	87556	66803
13	55126	47869	45557	65302	83655	98777	110813	107856	108296	106955	86895	66372
14	54850	47809	45440	65932	84225	99182	111224	107664	108014	106808	86183	65999
15	54503	47741	45857	66534	84787	99665	111634	107540	107743	106539	85484	65588
16	54166	47580	46569	67129	85296	100116	111600	107439	107664	106303	84568	65160
17	53864	47513	47260	67773	85902	100633	111543	107326	107810	106147	83862	64741
18	53573	47496	47903	68362	86445	101184	111418	107540	107957	105776	83096	64277
19	53281	47327	48659	68992	86873	101670	111326	107957	108161	105071	82404	63918
20	52982	47277	49344	69575	87514	102146	111201	108375	108308	104335	81673	63532
21	52728	47183	49979	70188	88008	102589	111087	108759	108466	103600	80984	63108
22	52526	47116	50687	70784	88545	103110	110962	109099	108555	102845	80164	62694
23	52176	47049	51486	71381	89062	103700	110836	109461	108646	102069	79306	62376
24	51765	46930	52114	71980	89676	104190	110711	109779	108713	101349	78503	62011
25	51364	46863	52824	72572	90206	104748	110517	110086	108748	100655	77681	61787
26	50947	46799	53485	73166	90737	105273	110380	110437	108816	99863	76914	61433
27	50549	46734	54148	73761	91311	105676	110187	110791	108929	99138	76179	61182
28	50117	46670	54850	74417	91791	105743	110097	111201	108793	98350	75406	60876
29	49670	46611	55493	75015		105676	110006	111554	108544	97542	74656	60505
30	49198	46494	56156	75636		105463	109881	111452	108375	96790	73968	60135
31	48984		56849	76209		105340		111269		95998	73344	
Min	48984	46494	45440	57491	76904	92796	105463	107326	107664	95998	73344	60135
Max	58793	48899	56849	76209	91791	105743	111634	111554	111098	108578	95196	72780
Mean	54089	47660	48933	67044	84439	100049	109691	109109	108986	104534	84404	65722
EOM	48984	46494	56849	76209	91791	105340	109881	111269	108375	95998	73344	60135

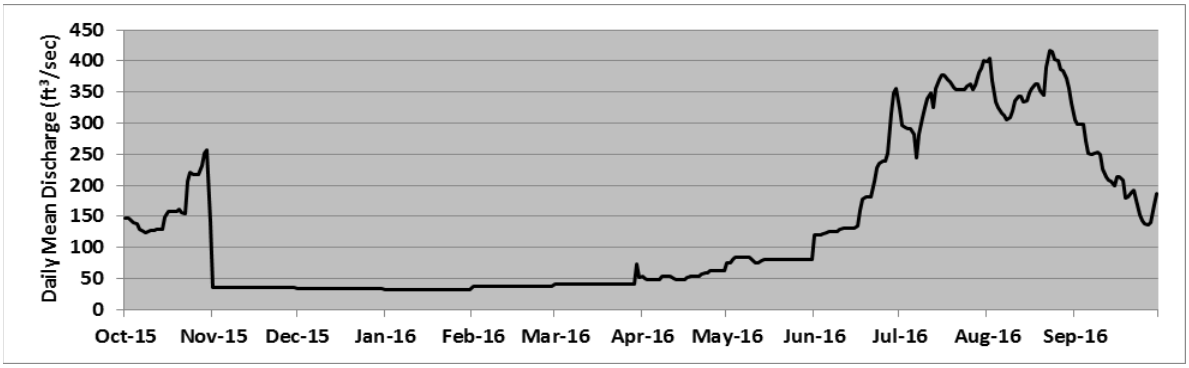


Appendix A (37 of 38)
Saint Vrain Canal below Carter Reservoir, CO

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-2015 to 30-Sep-2016. 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	147	36	33	33	37	41	53	76	121	323	399	305
2	147	36	33	33	37	41	50	76	121	296	404	299
3	143	36	33	33	37	41	48	81	121	292	368	299
4	140	36	33	33	37	41	48	84	122	291	334	299
5	138	36	33	33	37	41	48	84	124	291	324	272
6	130	36	33	33	37	41	48	84	125	281	316	252
7	126	36	33	33	37	41	48	84	125	245	313	249
8	124	36	33	33	37	41	53	84	125	283	306	251
9	126	36	33	33	37	41	53	84	125	309	309	253
10	127	36	33	33	37	41	53	78	129	326	319	250
11	127	36	33	33	37	41	53	76	131	340	336	225
12	129	36	33	33	37	41	50	76	131	348	343	214
13	129	36	33	33	37	41	48	79	131	325	343	209
14	129	36	33	33	37	41	48	81	131	356	334	207
15	149	36	33	33	37	41	48	81	131	371	336	199
16	157	36	33	33	37	41	48	81	135	377	348	214
17	157	36	33	33	37	41	52	81	159	377	356	214
18	157	36	33	33	37	41	53	81	177	371	363	209
19	157	36	33	33	37	41	53	81	181	367	362	179
20	161	36	33	33	37	41	53	81	181	358	352	182
21	156	36	33	33	37	41	53	81	181	353	344	189
22	153	36	33	33	37	41	57	81	207	353	389	192
23	206	36	33	33	37	41	58	81	227	353	416	176
24	220	36	33	33	37	41	58	81	236	353	414	152
25	217	36	33	33	37	41	62	81	239	360	403	144
26	217	36	33	33	37	41	63	81	239	363	401	138
27	217	36	33	33	37	41	63	81	252	353	386	136
28	231	36	33	33	37	41	63	81	317	362	384	140
29	251	36	33	33		41	63	81	349	382	371	169
30	257	36	33	33		74	63	81	357	388	356	187
31	141		33	33		52		81		401	332	
Min	124	36	33	33	37	41	48	76	121	245	306	136
Max	257	36	33	33	37	74	63	84	357	401	416	305
Mean	164	36	33	33	37	42	54	80	177	340	357	213
AF	10044	2149	2023	2001	2024	2590	3198	4937	10538	20889	21912	12676

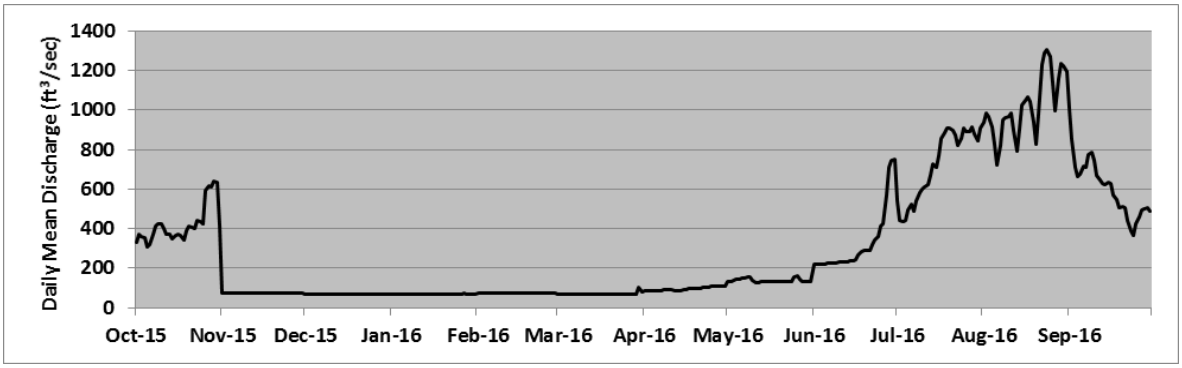


Appendix A (38 of 38)
Colorado-Big Thompson Project, CO

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 CHFC 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-2015 and 30-Sep-2016. 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	331	75	67	69	72	69	88	131	219	543	936	1009
2	370	75	67	69	72	69	85	131	219	439	982	850
3	362	75	67	69	72	70	84	138	219	435	966	709
4	352	75	67	69	72	70	84	142	220	440	913	662
5	309	75	67	69	72	70	84	142	222	497	825	674
6	322	75	67	69	72	70	84	149	223	524	722	716
7	373	75	67	69	72	70	84	152	223	488	819	712
8	411	75	68	69	72	70	89	155	224	538	949	773
9	426	75	68	69	72	70	89	157	224	579	963	787
10	423	75	68	69	72	70	89	139	229	596	967	743
11	398	75	68	69	72	70	89	129	230	610	983	669
12	369	75	68	69	72	70	86	129	230	620	895	648
13	369	75	68	69	72	70	84	133	230	667	789	630
14	348	75	68	69	72	70	84	134	235	724	905	620
15	366	75	68	69	72	70	92	134	240	712	1023	636
16	369	75	68	69	72	70	94	134	244	765	1050	629
17	366	75	68	69	72	70	97	134	268	857	1063	572
18	341	75	68	69	72	70	99	134	286	888	1045	547
19	388	75	68	69	72	70	99	134	290	907	936	508
20	415	75	68	69	72	70	99	134	290	906	825	512
21	409	75	68	69	72	69	99	134	290	897	977	508
22	400	75	68	69	72	69	102	134	316	875	1232	440
23	440	75	69	69	72	69	104	134	341	821	1287	391
24	433	75	68	69	72	69	104	134	361	858	1306	366
25	425	75	67	69	73	69	107	154	410	909	1271	423
26	590	75	67	69	73	69	109	164	422	893	1136	458
27	618	75	67	71	72	69	109	144	569	891	995	496
28	613	75	67	70	72	69	109	134	711	915	1162	501
29	639	77	67	69		69	109	134	744	877	1235	507
30	634	76	67	69		103	109	134	750	844	1221	486
31	411		67	69		81		134		909	1191	
Min	309	75	67	69	72	69	84	129	219	435	722	366
Max	639	77	69	71	73	103	109	164	750	915	1306	1009
Mean	420	75	68	69	72	71	95	139	323	723	1018	606
AF	25781	4446	4154	4249	4006	4371	5626	8508	19164	44404	62507	36002



APPENDIX B – OPERATIONS DATA

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

(Data in AF)

Reservoir	Dead Storage 1/	Active Storage 2/	Total Storage	Normal Minimum Storage	Limitation on normal minimum storage
Green Mountain	6,860	146,779	153,639	47,684	Minimum elevation for rated power output
Willow Creek	1,486	9,779	10,553	6,675	Elevation of pump canal head-works
Lake Granby	74,190	465,568	539,758	74,190	Lowest outlet elevation
Shadow Mountain	506	16,848	17,354	16,026	Minimum permissible Grand Lake elevation; 8,366 ft.
Grand Lake	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

C-BT
MONTHLY SUMMARY
WATER YEAR 2016 **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		14,600	12,000	10,400	10,200	9,100	11,100	20,900	57,900	148400	52,100	24,900	15,600	332,600
UNDEPLETED RUNOFF ABOVE DILLON RES.		8,900	6,600	5,700	6,000	5,200	5,600	10,200	31,400	89,100	28,600	15,100	9,800	198,500
PERCENT OF TOTAL UN-DEPLETED RUNOFF ABV DILLON		0.61	0.55	0.548	0.588	0.571	0.504	0.488	0.542	0.6	0.549	0.606	0.628	0.597
DEPLETIONS BY 1929 COLORADO SPRINGS RIGHT		0	0	0	0	0	0	16	119	593	211	112	3	1186
DEPLETIONS BY 1948 COLORADO SPRINGS RIGHT		77	-374	0	0	0	0	42	802	4235	1688	218	0	9088
INFLOW TO DILLON		8,800	7,000	5,700	5,900	5,200	5,600	10,100	30,400	84,200	26,700	14,800	9,800	188,000
DILLON STORAGE (1000 AF)	247	238.9	236.8	236.5	236.9	236.6	235.9	239.3	235.8	257.8	253.3	246.9	246.5	
ROBERTS TUNNEL DIVERSIONS		9,200	1,700	0	0	0	0	0	20	200	10,500	13,400	2,600	85,500
DILLON OUTFLOW TO THE RIVER		6,600	6,500	5,900	5,600	5,500	6,300	6,700	33,350	61,200	19,500	6,700	6,400	49,800
TOTAL DEPLETIONS BY DENVER		2,200	400	-200	300	-300	-700	3,400	-2,900	22,900	7,100	8,000	3,400	137,200
RUNOFF BETWEEN DILLON & GREEN MTN RESERVOIR		5,800	5,500	4,700	4,400	4,000	5,600	10,900	27,000	60,500	24,000	10,000	5,900	137,000
ACTUAL INFLOW TO GREEN MTN RESERVOIR		12,300	11,900	10,600	9,900	9,400	11,800	17,400	59,900	120,700	43,200	16,500	12,200	185,300
GREEN MOUNTAIN EOM STORAGE (1000 AF)	108.8	77.6	73.5	70.3	67.9	65.8	61.6	67	97	150.4	152.6	137.3	107.5	
TOTAL GREEN MOUNTAIN OUTFLOW		43,200	15,900	13,800	12,400	11,500	16,000	11,800	29,500	66,500	40,000	31,200	41,400	150,800

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
GREEN MOUNTAIN RESERVOIR													
Depleted Watershed Inflow	335.8	12.3	11.9	10.6	9.9	9.4	11.8	17.4	59.9	120.7	43.2	16.5	12.2
Turbine Release	332.5	43.2	15.9	13.8	12.4	11.5	16.0	11.8	28.8	66.5	40.0	31.2	41.4
Bypass	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Spill	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
End of Month Content	108.8	77.6	73.5	70.3	67.9	65.8	61.6	67.0	97.0	150.4	152.6	137.3	107.5
Kwh/AF		189.8	150.9	137.7	129.0	121.7	150.0	127.1	177.1	212.0	215.0	205.1	188.4
Generation	61.4	8.2	2.4	1.9	1.6	1.4	2.4	1.5	5.1	14.1	8.6	6.4	7.8
WILLOW CREEK RESERVOIR													
Inflow	62.1	1.2	0.9	0.9	0.8	0.8	1.0	5.0	28.4	17.7	3.0	1.4	1.0
Release to River	16.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.9	7.2	1.7	0.4	0.4
Pumped to Granby	44.7	0.0	2.7	0.0	0.0	0.0	0.0	5.8	23.4	9.5	2.0	0.7	0.6
End of Month Content	9.0	9.7	7.4	7.9	8.3	8.7	9.2	7.8	8.7	9.5	8.8	8.8	8.7
Pump Energy	9.5	0.0	0.6	0.0	0.0	0.0	0.0	1.2	5.0	2.0	0.4	0.1	0.1
GRANBY - SHADOW MOUNTAIN - GRAND LAKE													
Natural Watershed Inflow	255.9	4.8	4.2	3.7	3.8	3.0	5.3	16.2	55.7	120.4	26.1	8.2	4.5
Total Inflow into Granby	261.3	4.5	7.4	5.1	4.4	3.5	4.8	16.0	64.4	118.1	19.4	7.5	6.2
Granby Fish Release	31.4	1.4	1.2	1.2	1.2	1.2	1.3	1.3	3.9	4.5	5.1	6.2	2.9
Granby Seepage	6.0	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.5	0.7	0.6	0.5
Granby Spill	11.9	0.1	0.01	0.03	0.0	0.0	0.0	0.0	0.0	10.3	1.5	0.0	0.0
Adams Tunnel	243.4	12.5	2.1	24.7	33.5	31.5	31.7	16.8	15.2	11.9	23.5	15.5	24.5
Granby End of Month content	500.1	488.3	493.1	468.3	436.9	406.8	378.4	380.6	437.3	536.1	528.8	512.6	487.2
SM-GL End of Month Content	17.7	17.9	17.7	17.8	17.8	17.8	17.7	17.6	17.6	17.3	17.7	17.9	17.8
Pumped from Granby	208.5	12.9	2.4	26.2	34.1	32.0	31.1	11.0	1.3	0.7	15.9	14.8	26.1
Granby Pump Kwh/AF		139.5	125.0	145.0	149.6	153.1	157.6	154.5	153.8	142.9	138.4	141.9	141.8
Granby Pump Energy	30.6	1.8	0.3	3.8	5.1	4.9	4.9	1.7	0.2	0.1	2.2	2.1	3.7

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
MARYS LAKE – ESTES – FLATIRON													
Adams Tunnel Water	243.4	12.5	2.1	24.7	33.5	31.5	31.7	16.8	15.2	11.9	23.5	15.5	24.5
Marys Lake Generation	40.3	1.9	0.0	3.6	6.0	5.4	5.6	2.7	2.5	2.0	4.0	2.4	4.2
Estes Generation	114.2	5.6	0.5	11.2	15.6	15.5	15.2	8.0	7.2	5.5	11.1	7.1	11.7
Divertible Big-Thompson	43.5	0.0	0.0	0.4	0.0	0.0	0.0	1.0	6.8	29.9	5.4	0.0	0.0
Diverted Big-Thompson Water	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.6	6.7	1.1	0.0	0.0
Olympus Tunnel	270.5	13.8	1.0	23.4	32.8	31.2	31.6	17.8	22.5	31.5	25.0	15.4	24.5
Pole Hill Generation	187.4	8.6	0.1	14.2	24.3	21.4	23.3	12.2	15.5	22.9	17.4	10.0	17.4
Flatiron 1 & 2 Generation	240.9	11.3	1.1	19.4	29.3	28.9	29.8	15.2	20.3	28.3	21.8	13.6	21.8
Flatiron 3 Turbine Release	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 Kwh/AF Gen.		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flatiron 3 Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flatiron 3 Pumping	100.4	0.0	0.0	12.9	22.0	18.5	15.8	7.9	6.5	7.8	9.0	0.0	0.0
Flatiron 3 Kwh/AF Pump		0.0	0.0	286.8	309.1	329.7	348.1	354.4	369.2	359.0	366.7	0.0	0.0
Flatiron 3 Pump Energy	33.4	0.0	0.0	3.7	6.8	6.1	5.5	2.8	2.4	2.8	3.3	0.0	0.0
CARTER LAKE													
Pumped from Flatiron	100.4	0.0	0.00	12.9	22.0	18.5	15.8	7.9	6.5	7.8	9.0	0.0	0.00
Release to Flatiron	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 Delivery	89.6	10.0	1.7	1.5	1.4	1.8	2.1	3.1	4.9	9.5	20.1	21.6	11.9
Evaporation & Seepage	2.2	0.1	0.04	0.0	0.0	0.0	0.0	0.3	0.2	0.4	0.5	0.4	0.3
End of Month Content	59.2	49.0	46.5	56.9	76.2	92.3	105.4	109.9	111.3	108.4	96.0	73.4	60.1
BIG THOMPSON POWERPLANT													
Diverted Dille Tunnel Water	23.0	0.0	0.0	0.0	0.0	0.0	0.0 .	0.0	0.0	11.8	9.5	1.7	0.0
Irrigation Delivery	36.6	3.9	0.02	0.03	0.04	0.03	0.03	0.8	2.4	4.1	7.2	9.8	8.2
Turbine Release	42.6	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.3	11.2	6.7	5.3
Generation	5.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	1.5	0.7	0.5
HORSETOOTH RESERVOIR													
Hansen Feeder Canal Inflow	119.7	9.2	2.0	10.2	11.9	11.1	13.2	7.7	10.0	10.3	11.8	5.9	16.4
Irrigation Delivery	99.2	11.7	2.0	1.9	2.0	1.8	1.6	1.8	3.1	7.1	21.2	30.2	14.8
Evaporation	4.0	0.2	0.04	0.0	0.0	0.0	0.0	0.4	0.5	0.9	0.8	0.7	0.5
End of Month Content	96.3	93.9	93.0	101.0	110.3	121.6	136.8	144.0	152.1	154.2	141.9	114.1	114.2
TOTAL CBT DELIVERY *	225.5	25.6	3.7	3.4	3.4	3.6	3.7	5.7	10.4	20.7	48.5	61.6	34.9

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

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	61.4	8.2	2.4	1.9	1.6	1.4	2.4	1.5	5.1	14.1	8.6	6.4	7.8
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
Big Thompson	5.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	1.5	0.7	0.5
TOTAL	66.8	8.3	2.4	1.9	1.6	1.4	2.4	1.5	5.1	16.8	10.1	7.1	8.3
LOAD FOLLOWING GENERATION													
Marys Lake	40.3	1.9	0.0	3.6	6.0	5.4	5.6	2.7	2.5	2.0	4.0	2.4	4.2
Estes	114.2	5.6	0.5	11.2	15.6	15.5	15.2	8.0	7.2	5.5	11.1	7.1	11.7
Pole Hill	187.4	8.6	0.1	14.2	24.3	21.4	23.3	12.2	15.5	22.9	17.4	10.0	17.4
Flatiron 1 & 2	240.9	11.3	1.1	19.4	29.3	28.9	29.8	15.2	20.3	28.3	21.8	13.6	21.8
TOTAL	582.8	27.4	1.7	48.4	75.2	71.2	73.9	38.1	45.5	58.7	54.3	33.1	55.1
PUMP ENERGY													
Willow Creek	9.5	0.0	0.6	0.0	0.0	0.0	0.0	1.2	5.0	2.0	0.4	0.1	0.1
Granby	30.6	1.8	0.3	3.8	5.1	4.9	4.9	1.7	0.2	0.1	2.2	2.1	3.7
Flatiron 3	33.4	0.0	0.0	3.7	6.8	6.1	5.5	2.8	2.4	2.8	3.3	0.0	0.0
TOTAL	73.5	1.8	0.9	7.5	11.9	11.0	10.4	5.7	7.6	4.9	5.9	2.2	3.8
TOTAL GENERATION	649.6	35.7	4.1	50.3	76.8	72.6	76.3	38.2	47.6	75.5	64.4	40.2	63.4
TOTAL GENERATION MINUS PUMP	576.1	33.9	3.2	42.8	64.9	61.6	65.9	32.5	40.0	70.6	58.5	38.0	59.6

C-BT
FLOOD DAMAGE PREVENTED IN WATER YEAR 2016

	Cumulative Total Prior to WY 2016	WY 2016	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

RECLAMATION
Managing Water in the West

CBT October 2016 Most Probable: 01-OCT-2016

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

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Dillon Inflow	kaf	6.9	6.3	5.3	4.6	3.8	4.1	7.8	34.9	58.7	29.0	14.8	8.9	185.1
DL to GM Gain	kaf	4.6	4.2	3.9	3.4	2.9	4.1	8.1	23.3	40.7	19.1	12.5	6.7	133.5

Green Mountain Reservoir

Init Cont: 107.00 kaf **Maximum Cont:** 154.60 kaf **Minimum Cont:** 8.00 kaf
Elev: 7925.7 ft **Elev:** 7950.4 ft **Elev:** 7804.7 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Undepleted Inflow	kaf	11.5	10.3	9.2	8.1	6.7	8.2	15.9	59.3	102.3	48.8	27.4	15.7	323.4
Depletion	kaf	0.7	0.6	0.3	-0.1	-0.6	-1.0	2.1	28.5	26.5	17.1	7.7	2.6	84.4
Depleted Inflow	kaf	10.9	9.7	8.9	8.1	7.3	9.2	13.9	30.8	75.8	31.8	19.7	13.1	239.2
Turbine Release	kaf	34.5	13.1	12.6	11.8	10.6	12.8	10.6	3.7	22.7	26.7	34.1	24.5	217.7
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	561	220	204	192	191	209	178	60	382	435	555	412	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	34.5	13.1	12.6	11.8	10.6	12.8	10.6	3.7	22.7	26.7	34.1	24.5	217.7
Evaporation	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.7	0.5	0.4	3.1
End-Month Targets	kaf	80.2	80.2	76.5	72.8	69.4	65.7	68.8	99.7	148.2	152.5	137.6	125.7	
End-Month Contents	kaf	83.6	80.2	76.5	72.8	69.4	65.7	68.8	95.6	148.2	152.5	137.6	125.7	
End-Month Elevation	ft	7909.89	7907.32	7904.50	7901.58	7898.84	7895.70	7898.37	7918.21	7947.39	7949.46	7942.16	7935.98	

Willow Creek Reservoir

Init Cont: 9.00 kaf **Maximum Cont:** 10.20 kaf **Minimum Cont:** 7.20 kaf
Elev: 8123.1 ft **Elev:** 8128.8 ft **Elev:** 8116.9 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	1.1	1.1	1.0	0.9	0.7	1.0	3.5	18.0	12.4	3.8	1.7	1.2	46.4
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	0.8	1.5	0.0	0.0	0.0	0.0	4.4	17.3	10.8	3.2	1.2	0.7	39.9
Evaporation	kaf	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7
End-Month Targets	kaf	8.5	7.6	7.6	8.2	8.0	8.0	8.0	8.0	9.2	9.2	9.2	9.2	
End-Month Contents	kaf	8.5	7.6	8.1	8.6	8.9	9.5	8.0	8.2	9.2	9.2	9.2	9.2	
End-Month Elevation	ft	8122.54	8118.73	8121.05	8122.80	8124.07	8126.20	8120.48	8121.17	8125.26	8125.26	8125.26	8125.26	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Most Probable: 01-OCT-2016

Granby Reservoir

Init Cont: 487.00 kaf **Maximum Cont:** 539.80 kaf **Minimum Cont:** 76.50 kaf
Elev: 8272.6 ft **Elev:** 8280.0 ft **Elev:** 8186.9 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	2.2	2.1	1.9	1.6	1.4	1.8	4.4	20.1	35.9	14.1	5.4	3.1	94.0
Release from Shadow Mtn	kaf	2.5	2.6	2.5	2.5	2.2	2.5	2.4	11.3	20.6	5.6	2.5	2.1	59.3
Pump from Windy Gap	kaf	0.0	0.0	0.0	0.0	0.0	0.0	2.6	23.8	13.7	0.0	0.0	0.0	40.1
Pump from Willow Creek	kaf	0.8	1.5	0.0	0.0	0.0	0.0	4.4	17.3	10.8	3.2	1.2	0.7	39.9
Total Inflow	kaf	5.5	6.2	4.4	4.1	3.6	4.3	13.9	72.5	81.0	22.9	9.1	6.0	233.5
Minimum River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	4.6	4.5	4.6	4.6	4.5	39.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	3.2	5.4
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	4.6	4.5	4.6	6.8	7.7	45.2
Pumped to Shadow Mtn	kaf	16.4	0.0	16.6	27.0	24.8	29.4	21.3	10.7	0.0	2.8	12.4	19.3	180.7
Evaporation	kaf	1.6	0.7	0.0	0.0	0.0	0.8	1.4	2.2	3.0	2.9	2.3	2.0	16.9
Seepage loss	kaf	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	3.6
End-Month Contents	kaf	472.0	474.8	459.9	434.2	410.5	381.7	370.2	424.9	498.2	510.5	497.9	474.6	
End-Month Elevation	ft	8270.39	8270.81	8268.61	8264.75	8261.07	8256.46	8254.57	8263.32	8274.17	8275.92	8274.12	8270.77	

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-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	2.9	2.8	2.5	2.2	1.8	2.4	5.9	26.1	44.8	18.7	5.9	3.9	119.9
Pumped from Granby	kaf	16.4	0.0	16.6	27.0	24.8	29.4	21.3	10.7	0.0	2.8	12.4	19.3	180.7
Total Inflow	kaf	19.3	2.8	19.0	29.2	26.6	31.8	27.2	36.8	44.8	21.5	18.3	23.2	300.5
Minimum River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	2.5	2.4	2.5	2.5	2.1	29.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.5	2.6	2.5	2.5	2.2	2.5	2.4	11.3	20.6	5.6	2.5	2.1	59.3
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	24.9	23.4	15.2	15.2	20.5	236.9
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-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Maximum Tunnel Capacity	kaf	16.6	0.0	18.5	33.8	30.5	33.8	32.7	33.8	32.7	15.2	15.2	26.1	288.9
Actual Diversion	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	24.9	23.4	15.2	15.2	20.5	236.9
% Maximum Delivery	%	100	0	89	79	80	86	74	74	71	100	100	79	

RECLAMATION
Managing Water in the West

CBT October 2016 Most Probable: 01-OCT-2016

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

Lake Estes

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Big Thompson Inflow	kaf	1.1	0.6	0.3	0.2	0.1	1.0	3.2	8.4	17.2	12.6	5.9	2.8	53.4
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	3.7	45.3
Actual River Release	kaf	1.1	0.6	0.3	0.2	0.1	0.9	2.4	6.7	11.9	7.7	21.0	23.2	76.1
Max Diversion Available	kaf	0.0	0.0	0.0	0.0	0.0	0.1	1.0	1.8	9.8	4.9	0.1	0.0	17.7
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	4.3	0.0	0.0	0.0	4.6
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.1	0.8	1.4	3.3	4.9	0.0	0.0	10.5
% Maximum Diversion	%	0	0	0	0	0	99	81	97	77	100	0	0	
Irrigation Demand	kaf	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.6
Irrigation Delivery	kaf	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.4
Total River Release	kaf	1.1	0.6	0.3	0.2	0.1	0.9	2.4	6.7	11.9	7.7	21.0	23.2	76.1

Olympus Tunnel

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	16.6	0.0	16.5	26.6	24.3	29.2	25.0	26.4	28.5	19.9	0.0	0.0	213.0
% Maximum Delivery	%	49	0	49	79	80	86	76	78	87	59	0	0	
Inflow to Flatiron	kaf	17.0	2.2	18.7	26.6	24.3	29.2	25.0	26.4	28.5	8.7	0.0	0.0	206.6

Carter Lake

Init Cont: 60.00 kaf **Maximum Cont:** 112.20 kaf **Minimum Cont:** 6.00 kaf
Elev: 5708.8 ft **Elev:** 5759.0 ft **Elev:** 5626.8 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Pumped from Flatiron	kaf	0.0	0.0	13.1	21.7	17.6	17.7	15.7	7.6	9.3	0.0	0.0	0.0	102.7
Carter to Flatiron	kaf	0.5	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	6.4
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	60.0	60.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	20.0	20.0	
End-Month Contents	kaf	51.4	46.3	54.1	72.9	87.4	101.5	111.9	112.0	112.0	104.1	80.5	63.4	
End-Month Elevation	ft	5699.08	5693.13	5702.11	5722.13	5735.76	5748.95	5758.27	5758.59	5758.53	5751.76	5729.73	5712.35	
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	7.4	2.2	2.4	2.3	2.6	2.7	4.4	6.1	7.3	17.2	21.4	15.5	91.5
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	0.6	0.5	0.6	0.5	0.4	0.5	0.4	0.8	1.4	1.3	1.6	1.2	9.8
Total Demand	kaf	7.9	2.7	2.9	2.8	3.0	3.2	4.8	6.9	8.6	18.5	23.0	16.7	101.0
Total Delivery	kaf	7.9	2.7	2.9	2.8	3.0	3.2	4.8	6.9	8.6	18.5	23.0	16.7	101.0
% 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

RECLAMATION
Managing Water in the West

CBT October 2016 Most Probable: 01-OCT-2016

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

Hansen Canal 930

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	27.7	57.2	57.2	51.6	57.2	55.3	57.2	55.3	57.2	57.2	55.3	645.6
Actual Flow	kaf	17.0	2.2	5.7	4.9	6.7	11.5	9.3	18.8	19.2	8.7	0.0	0.0	104.0

Dille Tunnel

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Big Thompson River Below Lake Estes	kaf	1.1	0.6	0.3	0.2	0.1	0.9	2.4	6.7	11.9	7.7	21.0	23.2	76.1
North Fork Big Thompson River at Drake	kaf	1.5	1.0	0.8	0.6	0.5	0.4	0.6	2.1	3.0	1.8	1.2	0.7	14.2
Dille Skim Water Diverted	kaf	0.3	0.0	0.0	0.0	0.0	0.0	0.0	6.4	10.3	7.0	4.6	0.7	29.3
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	2.7	1.6	1.1	0.8	0.6	1.3	3.0	8.9	14.9	9.5	22.1	23.9	90.4
water diverted	kaf	0.3	0.0	0.0	0.0	0.0	0.0	0.0	6.4	12.5	7.0	19.7	21.1	67.0
% Diverted	%	5	0	0	0	0	0	0	118	231	130	364	391	
Big T @ Canyon Mouth	kaf	2.4	1.6	1.1	0.8	0.6	1.3	3.0	2.5	2.4	2.5	2.5	2.8	23.5

Trifurcation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Release from Flatiron	kaf	17.0	2.2	5.7	4.9	6.7	11.5	9.3	18.8	19.2	8.7	0.0	0.0	104.0
Release to 550 Canal	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7
Dille Tunnel	kaf	0.3	0.0	0.0	0.0	0.0	0.0	0.0	6.4	12.5	7.0	19.7	21.1	67.0
Total release to river	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
Irrigation demand	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.1	7.2	17.4
Windy Gap demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Total requirement	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
Total delivery	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
% Required Delivery	%	100	0	100	0	0	0	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECLAMATION
Managing Water in the West

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

CBT October 2016 Most Probable: 01-OCT-2016

Hansen Canal 550

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow from Flatiron	**kaf**	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7
Maximum flow	**kaf**	31.8	15.4	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**	0.8	0.2	0.3	0.3	0.3	0.3	0.4	0.6	0.5	1.0	1.0	1.0	6.7
Minimum flow	**kaf**	1.5	3.0	4.6	4.6	4.2	4.6	1.5	1.5	1.5	1.5	1.5	1.5	31.5
Rels to Horsetooth	**kaf**	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7

Horsetooth Reservoir

Init Cont: 114.00 kaf **Maximum Cont:** 157.00 kaf **Minimum Cont:** 13.00 kaf
Elev: 5407.3 ft **Elev:** 5430.0 ft **Elev:** 5316.8 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow	**kaf**	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7
Total irrigation delivery	**kaf**	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
Evaporation loss	**kaf**	0.4	0.2	0.0	0.0	0.0	0.2	0.4	0.7	0.9	0.8	0.6	0.5	4.7
Seepage loss	**kaf**	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.3
End-Month Targets	**kaf**	156.7	85.0	115.0	115.0	121.0	130.0	135.0	145.0	155.0	156.7	156.7	156.7	
End-Month Content	**kaf**	113.2	112.9	116.1	118.3	122.5	130.9	135.0	145.0	155.0	127.7	105.2	101.6	
End-Month Elevation	**ft**	5406.75	5406.60	5408.41	5409.68	5412.07	5416.71	5418.93	5424.15	5429.17	5414.98	5401.98	5399.82	
Priority water diverted to Horsetooth	**kaf**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.9	0.0	0.0	0.0	4.1
Irrigation demand	**kaf**	8.7	0.0	0.0	0.0	0.0	0.0	0.4	0.8	1.1	19.6	23.9	9.6	64.1
Metered Demand	**kaf**	2.4	1.5	1.6	1.8	1.7	1.8	2.4	4.4	4.7	7.6	6.3	4.1	40.3
Windy Gap demand	**kaf**	0.6	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.9	0.7	1.5	1.4	8.5
Total demand	**kaf**	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
Total irrigation	**kaf**	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
% Required Delivery	**%**	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	**kaf**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CBT Project Summary

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total CBT Delivery	**kaf**	24.3	3.9	4.4	4.4	4.6	4.9	7.7	11.9	13.6	46.7	56.7	37.3	220.4

RECLAMATION
Managing Water in the West

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

CBT October 2016 Most Probable: 01-OCT-2016

Windy Gap

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Pumping	**kaf**	0.0	0.0	0.0	0.0	0.0	0.0	2.6	23.8	13.7	0.0	0.0	0.0	40.1
Losses	**kaf**	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.4	1.4	0.0	0.0	0.0	4.1
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**	1.2	0.9	1.0	0.9	0.8	1.0	1.0	1.5	2.2	2.0	3.2	2.7	18.4
Account Balance	**kaf**	-1.2	-2.1	-3.0	-3.9	-4.7	-5.6	-4.2	15.7	25.8	23.8	20.6	17.9	

RECLAMATION
Managing Water in the West

CBT October 2016 Most Probable: 01-OCT-2016

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

PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	6.300	2.300	2.200	2.000	1.800	2.100	1.700	0.600	4.500	5.700	7.100	5.000	41.300
% Maximum Generation	%	34	13	12	11	10	11	10	3	25	30	38	28	
Average	kwh/af	183	174	172	169	166	164	163	172	198	212	208	203	

Willow Creek Pumping

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	0.8	1.5	0.0	0.0	0.0	0.0	4.4	17.3	10.8	3.2	1.2	0.7	39.9
Pump Energy	gwh	0.200	0.300	0.000	0.000	0.000	0.000	0.900	3.700	2.300	0.700	0.300	0.200	8.600
% Maximum Pumping	%	3	6	0	0	0	0	19	70	46	13	5	3	165
Average	kwh/af	213	213	0	0	0	0	213	213	213	213	213	213	

Lake Granby Pumping

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	16.4	0.0	16.6	27.0	24.8	29.4	21.3	10.7	0.0	2.8	12.4	19.3	180.7
Pump Energy	gwh	2.300	0.000	2.400	3.900	3.600	4.300	3.200	1.600	0.000	0.400	1.800	2.700	26.200
% Maximum Pumping	%	44	0	45	73	74	80	60	29	0	8	34	54	
Average	kwh/af	143	0	143	144	146	148	149	149	0	141	142	142	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Most Probable: 01-OCT-2016

Marys Lake Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	24.9	23.4	15.2	15.2	20.5	236.9
Maximum Generation	gwh	6.200	0.000	4.500	6.400	5.800	6.400	6.200	6.400	6.200	6.400	6.400	6.200	67.100
Generation	gwh	2.900	0.000	3.100	4.900	4.500	5.400	4.500	4.600	4.000	2.600	2.600	3.700	42.800
% Maximum Generation	%	17	0	19	18	18	19	18	18	17	17	17	18	
Average	kwh/af	172	0	186	183	184	186	183	183	170	169	169	178	

Lake Estes Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	24.9	23.4	15.2	15.2	20.5	236.9
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	7.200	0.000	7.800	12.300	11.200	13.500	11.100	11.700	10.800	7.100	7.200	9.400	109.300
% Maximum Generation	%	45	0	49	77	77	84	72	73	70	45	45	61	
Average	kwh/af	433	0	472	461	458	464	455	469	463	469	472	458	

Pole Hill Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	0.000	18.300	25.800	23.300	25.800	25.000	25.800	25.000	25.800	25.800	25.000	270.600
Generation	gwh	11.500	0.000	12.600	20.300	18.400	22.000	18.500	19.600	21.600	14.300	0.000	0.000	158.800
% Maximum Generation	%	46	0	69	79	79	85	74	76	86	55	0	0	
Average	kwh/af	341	0	374	599	602	649	567	578	659	421	0	0	

RECLAMATION
Managing Water in the West

CBT October 2016 Most Probable: 01-OCT-2016

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

Flatiron Units 1 and 2 Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow to Flatiron	kaf	17.0	2.2	18.7	26.6	24.3	29.2	25.0	26.4	28.5	8.7	0.0	0.0	206.6
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	13.400	0.000	14.800	22.600	21.300	26.600	22.000	23.700	25.800	4.800	0.000	0.000	175.000
% Maximum Generation	%	42	0	46	70	73	82	71	74	83	15	0	0	
Average	kwh/af	787	0	789	847	876	911	880	900	906	547	0	0	

Flatiron Unit 3 Pump/Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Maximum Pumping	kaf	0.0	0.0	24.0	21.7	17.6	17.7	15.7	15.6	15.1	0.0	0.0	0.0	127.4
Pump from Flatiron	kaf	0.0	0.0	13.1	21.7	17.6	17.7	15.7	7.6	9.3	0.0	0.0	0.0	102.7
Pump Energy	gwh	0.000	0.000	3.700	6.600	5.700	6.100	5.600	2.800	3.400	0.000	0.000	0.000	33.900
% Maximum Pumping	%	0	0	54	100	100	100	100	49	62	0	0	0	
Average	kwh/af	0	0	285	304	325	343	359	366	366	0	0	0	
Maximum Turbine release	kaf	8.1	21.7	22.2	23.6	22.4	25.7	25.7	27.1	26.2	26.7	25.6	23.5	278.5
Carter to Flatiron	kaf	0.5	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	6.4
Maximum Generation	gwh	1.500	4.000	4.000	4.700	4.700	5.600	5.700	6.000	5.800	5.900	5.500	4.800	58.200
Actual Generation	gwh	0.100	0.400	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.300	0.000	0.000	1.200
% Maximum Generation	%	6	10	10	0	0	0	0	0	0	6	0	0	
Average	kwh/af	186	183	179	0	0	0	0	0	0	222	0	0	

Big Thompson Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total release	kaf	5.2	0.0	0.0	0.0	0.0	0.1	0.8	7.9	13.5	13.2	8.8	8.0	57.5
Turbine release	kaf	5.2	0.0	0.0	0.0	0.0	0.0	0.0	7.9	13.5	13.2	8.8	8.0	56.6
Wasteway release	kaf	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.9
Maximum Generation	gwh	3.800	0.000	0.000	0.000	0.000	0.000	0.000	3.800	3.700	3.800	3.800	3.700	22.600
Generation	gwh	0.600	0.000	0.000	0.000	0.000	0.000	0.000	1.000	2.100	2.000	1.200	1.000	7.900
% Maximum Generation	%	15	0	0	0	0	0	0	25	56	52	30	27	
Average	kwh/af	107	0	0	0	0	0	0	123	152	150	130	126	

RECLAMATION
Managing Water in the West

CBT October 2016 Most Probable: 01-OCT-2016

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

Project Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total Generation	**gwh**	41.900	2.700	40.800	62.000	57.100	69.600	57.800	61.100	68.700	36.700	18.000	19.000	535.400
Total Max Generation	**gwh**	103.400	68.700	93.700	103.700	94.200	104.600	101.500	108.900	105.400	108.800	108.400	104.400	1205.700

Project Pump Energy

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Granby	**gwh**	2.300	0.000	2.400	3.900	3.600	4.300	3.200	1.600	0.000	0.400	1.800	2.700	26.200
Willow Creek	**gwh**	0.200	0.300	0.000	0.000	0.000	0.000	0.900	3.700	2.300	0.700	0.300	0.200	8.600
Flatiron Unit 3	**gwh**	0.000	0.000	3.700	6.600	5.700	6.100	5.600	2.800	3.400	0.000	0.000	0.000	33.900
Total Pump Energy	**gwh**	2.500	0.300	6.100	10.500	9.300	10.400	9.700	8.100	5.700	1.100	2.000	2.900	68.600

RECLAMATION
Managing Water in the West

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

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CBT October 2016 Min Reasonable: 01-OCT-2016

HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Dillon Inflow	kaf	7.4	6.6	5.3	4.6	3.7	3.8	4.5	15.7	29.7	15.5	8.1	5.6	110.5
DL to GM Gain	kaf	4.5	3.9	3.6	3.3	2.8	3.2	5.1	13.8	22.8	13.3	10.1	5.5	91.9

Green Mountain Reservoir

Init Cont: 107.00 kaf **Maximum Cont:** 154.60 kaf **Minimum Cont:** 8.00 kaf
Elev: 7925.7 ft **Elev:** 7950.4 ft **Elev:** 7804.7 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Undepleted Inflow	kaf	11.4	9.5	8.8	7.9	6.5	7.0	9.7	29.8	52.5	28.8	18.0	11.1	201.0
Depletion	kaf	4.7	3.2	2.1	2.3	1.0	0.9	2.0	12.9	26.8	12.4	4.8	2.6	75.7
Depleted Inflow	kaf	6.7	6.4	6.7	5.6	5.6	6.1	7.7	16.9	25.8	16.4	13.2	8.5	125.6
Turbine Release	kaf	30.4	9.7	10.4	9.3	8.9	9.7	4.4	3.7	3.6	3.7	3.7	7.0	104.5
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	495	164	169	151	160	158	73	60	60	60	60	118	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	30.4	9.7	10.4	9.3	8.9	9.7	4.4	3.7	3.6	3.7	3.7	7.0	104.5
Evaporation	kaf	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.5	0.5	0.4	2.8
End-Month Targets	kaf	80.2	80.2	76.5	72.8	69.4	65.7	68.8	99.7	148.2	152.5	137.6	125.7	
End-Month Contents	kaf	83.6	80.2	76.5	72.8	69.4	65.7	68.8	81.7	103.5	115.6	124.6	125.7	
End-Month Elevation	ft	7909.84	7907.32	7904.50	7901.58	7898.84	7895.70	7898.37	7908.49	7923.21	7930.41	7935.40	7935.98	

Willow Creek Reservoir

Init Cont: 9.00 kaf **Maximum Cont:** 10.20 kaf **Minimum Cont:** 7.20 kaf
Elev: 8123.1 ft **Elev:** 8128.8 ft **Elev:** 8116.9 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	1.1	1.0	0.9	0.8	0.7	0.8	1.5	5.2	3.3	1.5	1.0	0.8	18.6
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	0.8	1.4	0.0	0.0	0.0	0.0	2.2	4.7	1.6	0.9	0.5	0.3	12.4
Evaporation	kaf	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7
End-Month Targets	kaf	8.5	7.6	7.6	8.2	8.0	8.0	8.0	8.0	9.2	9.2	9.2	9.2	
End-Month Contents	kaf	8.5	7.6	8.1	8.5	8.8	9.1	8.0	8.0	9.2	9.2	9.2	9.2	
End-Month Elevation	ft	8122.54	8118.73	8120.90	8122.61	8123.84	8124.98	8120.48	8120.48	8125.26	8125.26	8125.26	8125.26	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Min Reasonable: 01-OCT-2016

Granby Reservoir

Init Cont: 487.00 kaf **Maximum Cont:** 539.80 kaf **Minimum Cont:** 76.50 kaf
Elev: 8272.6 ft **Elev:** 8280.0 ft **Elev:** 8186.9 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	2.1	1.9	1.8	1.6	1.3	1.4	2.2	9.5	19.3	6.9	3.2	2.4	53.6
Release from Shadow Mtn	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	3.8	2.5	2.5	2.5	2.1	30.4
Pump from Windy Gap	kaf	0.0	0.0	0.0	0.0	0.0	0.0	2.6	23.8	13.7	0.0	0.0	0.0	40.1
Pump from Willow Creek	kaf	0.8	1.4	0.0	0.0	0.0	0.0	2.2	4.7	1.6	0.9	0.5	0.3	12.4
Total Inflow	kaf	5.3	5.7	4.2	4.1	3.5	3.9	9.3	41.8	37.1	10.3	6.1	4.8	136.1
Minimum River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	4.6	4.5	4.6	4.6	4.5	39.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	3.2	5.4
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	4.6	4.5	4.6	6.8	7.7	45.2
Pumped to Shadow Mtn	kaf	16.5	0.1	16.7	27.1	24.8	29.9	24.3	17.1	5.2	9.2	14.0	20.0	204.9
Evaporation	kaf	1.6	0.7	0.0	0.0	0.0	0.8	1.4	2.1	2.8	2.6	2.0	1.8	15.8
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	471.8	474.0	458.8	433.1	409.3	379.7	360.7	378.3	402.8	396.4	379.5	354.5	
End-Month Elevation	ft	8270.36	8270.69	8268.46	8264.58	8260.88	8256.13	8252.97	8255.90	8259.85	8258.83	8256.09	8251.94	

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-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	2.8	2.5	2.3	2.1	1.8	1.9	2.9	12.6	25.8	9.2	4.2	3.2	71.3
Pumped from Granby	kaf	16.5	0.1	16.7	27.1	24.8	29.9	24.3	17.1	5.2	9.2	14.0	20.0	204.9
Total Inflow	kaf	19.3	2.6	19.0	29.2	26.6	31.8	27.2	29.6	31.0	18.4	18.3	23.2	276.2
Minimum River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	2.5	2.4	2.5	2.5	2.1	29.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	3.8	2.5	2.5	2.5	2.1	30.4
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	25.1	27.7	15.2	15.2	20.5	241.4
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	16.8	16.8	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-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Maximum Tunnel Capacity	kaf	16.6	0.0	18.5	33.8	30.5	33.8	32.7	33.8	32.7	15.2	15.2	26.1	288.9
Actual Diversion	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	25.1	27.7	15.2	15.2	20.5	241.4
% Maximum Delivery	%	100	0	89	79	80	86	74	74	85	100	100	79	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Min Reasonable: 01-OCT-2016

Lake Estes

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Big Thompson Inflow	kaf	1.1	0.5	0.3	0.2	0.1	0.2	1.6	5.0	7.9	5.5	2.6	1.3	26.3
Minimum River Release	kaf	3.1	1.5	1.5	1.5	1.4	1.5	2.2	6.9	7.4	7.7	6.9	3.7	45.3
Actual River Release	kaf	1.1	0.5	0.3	0.2	0.1	0.2	1.6	5.0	7.8	5.5	17.6	21.7	61.6
Max Diversion Available	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
% Maximum Diversion	%	0	0	0	0	0	0	0	99	14	80	0	0	
Irrigation Demand	kaf	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.6
Irrigation Delivery	kaf	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.4
Total River Release	kaf	1.1	0.5	0.3	0.2	0.1	0.2	1.6	5.0	7.8	5.5	17.6	21.7	61.6

Olympus Tunnel

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	16.6	0.0	16.5	26.6	24.3	29.1	24.2	24.9	27.6	15.0	0.0	0.0	204.8
% Maximum Delivery	%	49	0	49	79	80	86	74	74	84	44	0	0	
Inflow to Flatiron	kaf	17.0	2.2	18.7	26.6	24.3	29.1	24.2	24.9	27.6	3.8	0.0	0.0	198.4

Carter Lake

Init Cont: 60.00 kaf Maximum Cont: 112.20 kaf Minimum Cont: 6.00 kaf
Elev: 5708.8 ft Elev: 5759.0 ft Elev: 5626.8 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Pumped from Flatiron	kaf	0.0	0.0	13.1	21.7	17.6	17.7	15.7	7.6	9.3	0.0	0.0	0.0	102.7
Carter to Flatiron	kaf	0.5	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	6.4
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	60.0	60.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	20.0	20.0	
End-Month Contents	kaf	51.4	46.3	54.1	72.9	87.4	101.5	111.9	112.0	112.0	104.1	80.5	63.4	
End-Month Elevation	ft	5699.08	5693.13	5702.11	5722.13	5735.76	5748.95	5758.27	5758.59	5758.53	5751.76	5729.73	5712.35	
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	7.4	2.2	2.4	2.3	2.6	2.7	4.4	6.1	7.3	17.2	21.4	15.5	91.5
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	0.6	0.5	0.6	0.5	0.4	0.5	0.4	0.8	1.4	1.3	1.6	1.2	9.8
Total Demand	kaf	7.9	2.7	2.9	2.8	3.0	3.2	4.8	6.9	8.6	18.5	23.0	16.7	101.0
Total Delivery	kaf	7.9	2.7	2.9	2.8	3.0	3.2	4.8	6.9	8.6	18.5	23.0	16.7	101.0
% 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

RECLAMATION
Managing Water in the West

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

CBT October 2016 Min Reasonable: 01-OCT-2016

Hansen Canal 930

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	27.7	57.2	57.2	51.6	57.2	55.3	57.2	55.3	57.2	57.2	55.3	645.6
Actual Flow	kaf	17.0	2.2	5.7	4.9	6.7	11.4	8.6	17.4	18.3	3.8	0.0	0.0	96.0

Dille Tunnel

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Big Thompson River Below Lake Estes	kaf	1.1	0.5	0.3	0.2	0.1	0.2	1.6	5.0	7.8	5.5	17.6	21.7	61.6
North Fork Big Thompson River at Drake	kaf	1.5	1.0	0.8	0.6	0.5	0.4	0.4	1.0	1.2	0.8	0.6	0.4	9.2
Dille Skim Water Diverted	kaf	0.3	0.0	0.0	0.0	0.0	0.0	0.0	3.5	6.6	3.8	0.7	0.0	14.9
Dille Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
water available	kaf	2.6	1.5	1.1	0.8	0.5	0.6	1.9	6.0	8.9	6.3	18.2	22.1	70.5
water diverted	kaf	0.3	0.0	0.0	0.0	0.0	0.0	0.0	3.5	6.6	3.8	15.8	20.4	50.4
% Diverted	%	5	0	0	0	0	0	0	64	121	70	292	379	
Big T @ Canyon Mouth	kaf	2.3	1.5	1.1	0.8	0.5	0.6	1.9	2.5	2.4	2.5	2.4	1.7	20.2

Trifurcation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Release from Flatiron	kaf	17.0	2.2	5.7	4.9	6.7	11.4	8.6	17.4	18.3	3.8	0.0	0.0	96.0
Release to 550 Canal	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7
Dille Tunnel	kaf	0.3	0.0	0.0	0.0	0.0	0.0	0.0	3.5	6.6	3.8	15.8	20.4	50.4
Total release to river	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
Irrigation demand	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.1	7.2	17.4
Windy Gap demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Total requirement	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
Total delivery	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
% Required Delivery	%	100	0	100	0	0	0	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECLAMATION
Managing Water in the West

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

CBT October 2016 Min Reasonable: 01-OCT-2016

Hansen Canal 550

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow from Flatiron	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7
Maximum flow	kaf	31.8	15.4	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	0.8	0.2	0.3	0.3	0.3	0.3	0.4	0.6	0.5	1.0	1.0	1.0	6.7
Minimum flow	kaf	1.5	3.0	4.6	4.6	4.2	4.6	1.5	1.5	1.5	1.5	1.5	1.5	31.5
Rels to Horsetooth	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7

Horsetooth Reservoir

Init Cont: 114.00 kaf **Maximum Cont:** 157.00 kaf **Minimum Cont:** 13.00 kaf
Elev: 5407.3 ft **Elev:** 5430.0 ft **Elev:** 5316.8 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	16.7	17.7	1.5	9.9	12.1	106.7
Total irrigation delivery	kaf	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
Evaporation loss	kaf	0.4	0.2	0.0	0.0	0.0	0.2	0.4	0.7	0.9	0.8	0.6	0.5	4.7
Seepage loss	kaf	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.3
End-Month Targets	kaf	156.7	85.0	115.0	115.0	121.0	130.0	135.0	145.0	155.0	156.7	156.7	156.7	
End-Month Content	kaf	113.2	112.9	116.1	118.3	122.5	130.9	135.0	145.0	155.0	127.7	105.2	101.6	
End-Month Elevation	ft	5406.75	5406.60	5408.41	5409.68	5412.07	5416.71	5418.93	5424.15	5429.17	5414.98	5401.98	5399.82	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Irrigation demand	kaf	8.7	0.0	0.0	0.0	0.0	0.0	0.4	0.8	1.1	19.6	23.9	9.6	64.1
Metered Demand	kaf	2.4	1.5	1.6	1.8	1.7	1.8	2.4	4.4	4.7	7.6	6.3	4.1	40.3
Windy Gap demand	kaf	0.6	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.9	0.7	1.5	1.4	8.5
Total demand	kaf	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
Total irrigation	kaf	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CBT Project Summary

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total CBT Delivery	kaf	24.3	3.9	4.4	4.4	4.6	4.9	7.7	11.9	13.6	46.7	56.7	37.3	220.4

RECLAMATION
Managing Water in the West

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

CBT October 2016 Min Reasonable: 01-OCT-2016

Windy Gap

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Pumping	**kaf**	0.0	0.0	0.0	0.0	0.0	0.0	2.6	23.8	13.7	0.0	0.0	0.0	40.1
Losses	**kaf**	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.4	1.4	0.0	0.0	0.0	4.1
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**	1.2	0.9	1.0	0.9	0.8	1.0	1.0	1.5	2.2	2.0	3.2	2.7	18.4
Account Balance	**kaf**	-1.2	-2.1	-3.0	-3.9	-4.7	-5.6	-4.2	15.7	25.8	23.8	20.6	17.9	

RECLAMATION
Managing Water in the West

CBT October 2016 Min Reasonable: 01-OCT-2016

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

PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	5.600	1.700	1.800	1.600	1.500	1.600	0.700	0.600	0.700	0.700	0.700	1.400	18.600
% Maximum Generation	%	30	9	10	8	9	9	4	3	4	4	4	8	
Average	kwh/af	183	174	171	169	166	164	163	169	182	192	197	200	

Willow Creek Pumping

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	0.8	1.4	0.0	0.0	0.0	0.0	2.2	4.7	1.6	0.9	0.5	0.3	12.4
Pump Energy	gwh	0.200	0.300	0.000	0.000	0.000	0.000	0.500	1.000	0.300	0.200	0.100	0.100	2.700
% Maximum Pumping	%	3	6	0	0	0	0	9	19	7	4	2	1	51
Average	kwh/af	213	213	0	0	0	0	213	213	213	213	213	213	

Lake Granby Pumping

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	16.5	0.1	16.7	27.1	24.8	29.9	24.3	17.1	5.2	9.2	14.0	20.0	204.9
Pump Energy	gwh	2.400	0.000	2.400	3.900	3.600	4.400	3.600	2.600	0.800	1.400	2.100	3.000	30.200
% Maximum Pumping	%	45	0	45	73	75	81	68	46	15	25	38	56	
Average	kwh/af	143	143	143	144	146	148	149	150	148	147	148	150	

RECLAMATION
Managing Water in the West

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

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CBT October 2016 Min Reasonable: 01-OCT-2016

Marys Lake Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	25.1	27.7	15.2	15.2	20.5	241.4
Maximum Generation	gwh	6.200	0.000	4.500	6.400	5.800	6.400	6.200	6.400	6.200	6.400	6.400	6.200	67.100
Generation	gwh	2.900	0.000	3.100	4.900	4.500	5.400	4.500	4.600	5.100	2.600	2.600	3.700	43.900
% Maximum Generation	%	17	0	19	18	18	19	18	18	19	17	17	18	
Average	kwh/af	172	0	186	183	184	186	183	184	186	169	169	178	

Lake Estes Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	25.1	27.7	15.2	15.2	20.5	241.4
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	7.200	0.000	7.800	12.300	11.200	13.500	11.100	11.800	12.800	7.100	7.200	9.400	111.400
% Maximum Generation	%	45	0	49	77	77	84	72	74	83	45	45	61	
Average	kwh/af	433	0	472	461	458	464	455	470	463	469	472	458	

Pole Hill Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	0.000	18.300	25.800	23.300	25.800	25.000	25.800	25.000	25.800	25.800	25.000	270.600
Generation	gwh	11.500	0.000	12.600	20.300	18.400	21.900	17.900	18.500	20.700	10.200	0.000	0.000	152.000
% Maximum Generation	%	46	0	69	79	79	85	72	72	83	40	0	0	
Average	kwh/af	341	0	374	599	602	646	546	546	631	302	0	0	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Min Reasonable: 01-OCT-2016

Flatiron Units 1 and 2 Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow to Flatiron	kaf	17.0	2.2	18.7	26.6	24.3	29.1	24.2	24.9	27.6	3.8	0.0	0.0	198.4
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	13.400	0.000	14.800	22.600	21.300	26.500	21.200	22.300	25.300	0.800	0.000	0.000	168.200
% Maximum Generation	%	42	0	46	70	73	82	68	69	81	3	0	0	
Average	kwh/af	787	0	789	847	876	911	876	896	919	216	0	0	

Flatiron Unit 3 Pump/Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Maximum Pumping	kaf	0.0	0.0	24.0	21.7	17.6	17.7	15.7	15.6	15.1	0.0	0.0	0.0	127.4
Pump from Flatiron	kaf	0.0	0.0	13.1	21.7	17.6	17.7	15.7	7.6	9.3	0.0	0.0	0.0	102.7
Pump Energy	gwh	0.000	0.000	3.700	6.600	5.700	6.100	5.600	2.800	3.400	0.000	0.000	0.000	33.900
% Maximum Pumping	%	0	0	54	100	100	100	100	49	62	0	0	0	
Average	kwh/af	0	0	285	304	325	343	359	366	366	0	0	0	
Maximum Turbine release	kaf	8.1	21.7	22.2	23.6	22.4	25.7	25.7	27.1	26.2	26.7	25.6	23.5	278.5
Carter to Flatiron	kaf	0.5	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	6.4
Maximum Generation	gwh	1.500	4.000	4.000	4.700	4.700	5.600	5.700	6.000	5.800	5.900	5.500	4.800	58.200
Actual Generation	gwh	0.100	0.400	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.300	0.000	0.000	1.200
% Maximum Generation	%	6	10	10	0	0	0	0	0	0	6	0	0	
Average	kwh/af	186	183	179	0	0	0	0	0	0	222	0	0	

Big Thompson Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total release	kaf	5.2	0.0	0.0	0.0	0.0	0.0	0.0	3.5	6.7	5.0	4.9	7.4	32.7
Turbine release	kaf	5.2	0.0	0.0	0.0	0.0	0.0	0.0	3.5	6.7	5.0	4.9	7.4	32.7
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	0.100	3.700	3.800	3.700	3.800	3.800	3.700	26.400
Generation	gwh	0.600	0.000	0.000	0.000	0.000	0.000	0.000	0.300	0.800	0.400	0.400	0.900	3.400
% Maximum Generation	%	15	0	0	0	0	0	0	7	21	11	11	24	
Average	kwh/af	107	0	0	0	0	0	0	78	115	85	86	121	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Min Reasonable: 01-OCT-2016

Project Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total Generation	**gwh**	41.200	2.100	40.500	61.600	56.800	68.900	55.400	58.200	65.400	22.200	10.900	15.400	498.600
Total Max Generation	**gwh**	103.400	68.700	93.700	103.700	94.200	104.800	105.200	108.900	105.400	108.800	108.400	104.400	1209.600

Project Pump Energy

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Granby	**gwh**	2.400	0.000	2.400	3.900	3.600	4.400	3.600	2.600	0.800	1.400	2.100	3.000	30.200
Willow Creek	**gwh**	0.200	0.300	0.000	0.000	0.000	0.000	0.500	1.000	0.300	0.200	0.100	0.100	2.700
Flatiron Unit 3	**gwh**	0.000	0.000	3.700	6.600	5.700	6.100	5.600	2.800	3.400	0.000	0.000	0.000	33.900
Total Pump Energy	**gwh**	2.500	0.300	6.100	10.500	9.300	10.500	9.700	6.300	4.500	1.600	2.200	3.100	66.600

RECLAMATION
Managing Water in the West

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

CBT October 2016 Max Reasonable: 01-OCT-2016

HYDROLOGY OPERATIONS

Dillon Reservoir

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Dillon Inflow	kaf	7.6	7.1	5.7	4.8	3.9	5.8	14.2	61.3	110.8	61.1	28.0	15.4	325.7
DL to GM Gain	kaf	5.1	4.9	4.2	3.6	3.3	6.1	12.8	42.9	74.1	44.6	20.6	10.2	232.4

Green Mountain Reservoir

Init Cont: 107.00 kaf **Maximum Cont:** 154.60 kaf **Minimum Cont:** 8.00 kaf
Elev: 7925.7 ft **Elev:** 7950.4 ft **Elev:** 7804.7 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Undepleted Inflow	kaf	12.9	12.0	9.9	8.4	7.2	11.8	27.4	108.0	190.7	107.9	49.9	25.8	571.9
Depletion	kaf	-3.2	-0.7	-1.1	-1.6	-2.0	-1.2	2.1	20.5	30.0	13.7	4.1	2.0	62.6
Depleted Inflow	kaf	16.1	12.7	11.0	10.1	9.2	13.0	25.3	87.5	160.6	94.2	45.9	23.8	509.4
Turbine Release	kaf	39.7	16.2	14.7	13.8	12.5	16.7	22.0	56.3	89.3	89.2	60.2	35.2	465.8
Spill/Waste	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.3	0.0	0.0	0.0	22.3
Total River Release	cfs	645	272	239	224	226	271	369	916	1874	1450	980	591	
Min Release	cfs	60	60	60	60	60	60	60	60	60	60	60	60	
Total River Release	kaf	39.7	16.2	14.7	13.8	12.5	16.7	22.0	56.3	111.5	89.2	60.2	35.2	488.0
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	80.2	80.2	76.5	72.8	69.4	65.7	68.8	99.7	148.2	152.5	137.6	125.7	
End-Month Contents	kaf	83.7	80.2	76.5	72.8	69.4	65.7	68.8	99.7	148.2	152.5	137.6	125.7	
End-Month Elevation	ft	7909.91	7907.32	7904.50	7901.58	7898.84	7895.70	7898.37	7920.84	7947.39	7949.46	7942.16	7935.98	

Willow Creek Reservoir

Init Cont: 9.00 kaf **Maximum Cont:** 10.20 kaf **Minimum Cont:** 7.20 kaf
Elev: 8123.1 ft **Elev:** 8128.8 ft **Elev:** 8116.9 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	1.4	1.3	1.1	0.9	0.8	2.1	8.4	38.7	35.5	8.0	3.3	2.0	103.5
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	0.2	0.0	11.8	13.5	0.0	0.0	0.0	25.5
Total River Release	kaf	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.8
Pumped to Granby	kaf	1.0	1.7	0.0	0.0	0.0	0.0	10.5	23.6	23.0	7.4	2.7	1.5	71.4
Evaporation	kaf	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7
End-Month Targets	kaf	8.5	7.6	7.6	8.2	8.0	8.0	8.0	8.0	9.2	9.2	9.2	9.2	
End-Month Contents	kaf	8.5	7.6	8.2	8.7	9.1	10.6	8.0	10.7	9.2	9.2	9.2	9.2	
End-Month Elevation	ft	8122.54	8118.73	8121.46	8123.36	8125.06	8130.13	8120.48	8130.56	8125.26	8125.26	8125.26	8125.26	

RECLAMATION
Managing Water in the West

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

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CBT October 2016 Max Reasonable: 01-OCT-2016

Granby Reservoir

		Init Cont:		487.00 kaf	Maximum Cont:		539.80 kaf	Minimum Cont:		76.50 kaf			
		Elev:		8272.6 ft	Elev:		8280.0 ft	Elev:		8186.9 ft			
		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	2.5	2.6	2.0	1.7	1.4	3.1	10.6	34.2	65.5	27.9	9.0	5.1	165.6
Release from Shadow Mtn	kaf	2.6	3.2	2.6	2.5	2.2	2.5	2.7	21.5	68.9	16.2	2.5	2.1	129.5
Pump from Windy Gap	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump from Willow Creek	kaf	1.0	1.7	0.0	0.0	0.0	0.0	10.5	23.6	23.0	7.4	2.7	1.5	71.4
Total Inflow	kaf	6.2	7.5	4.6	4.1	3.7	5.5	23.7	79.3	157.4	51.5	14.2	8.7	366.4
Minimum River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	4.6	4.5	4.6	4.6	4.5	39.8
5412.5 Release	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	3.2	5.4
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.2	45.1	0.6	0.0	120.9
Total River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	4.6	4.5	4.6	6.8	7.7	45.2
Pumped to Shadow Mtn	kaf	15.6	0.0	16.5	27.0	24.7	27.8	13.5	2.5	0.0	0.2	8.2	16.6	152.6
Evaporation	kaf	1.6	0.7	0.0	0.0	0.0	0.8	1.4	2.3	3.2	3.0	2.3	2.1	17.4
Seepage loss	kaf	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	3.6
End-Month Contents	kaf	473.5	477.7	462.9	437.3	413.8	388.0	394.2	463.8	538.0	536.4	532.3	514.4	
End-Month Elevation	ft	8270.61	8271.22	8269.06	8265.23	8261.60	8257.47	8258.47	8269.19	8279.76	8279.53	8278.97	8276.46	

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-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Native Inflow	kaf	3.8	3.4	2.6	2.2	1.9	4.0	14.0	42.4	77.9	32.0	10.0	6.5	200.7
Pumped from Granby	kaf	15.6	0.0	16.5	27.0	24.7	27.8	13.5	2.5	0.0	0.2	8.2	16.6	152.6
Total Inflow	kaf	19.4	3.4	19.1	29.2	26.6	31.8	27.5	44.8	77.9	32.2	18.3	23.2	353.4
Minimum River Release	kaf	2.5	2.4	2.5	2.5	2.2	2.5	2.4	2.5	2.4	2.5	2.5	2.1	29.0
Spill/Bypass	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total River Release	kaf	2.6	3.2	2.6	2.5	2.2	2.5	2.7	21.5	68.9	16.2	2.5	2.1	129.5
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	22.6	8.2	15.2	15.2	20.5	219.4
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-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Maximum Tunnel Capacity	kaf	16.6	0.0	18.5	33.8	30.5	33.8	32.7	33.8	32.7	15.2	15.2	26.1	288.9
Actual Diversion	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	22.6	8.2	15.2	15.2	20.5	219.4
% Maximum Delivery	%	100	0	89	79	80	86	74	67	25	100	100	79	

RECLAMATION
Managing Water in the West

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

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CBT October 2016 Max Reasonable: 01-OCT-2016

Lake Estes

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Big Thompson Inflow	kaf	1.6	1.1	0.9	0.7	0.7	3.6	7.6	15.6	36.7	30.8	12.6	5.4	117.3
Minimum River Release	kaf	3.1	1.5	1.5	1.5	1.4	1.5	2.2	6.9	7.4	7.7	6.9	3.7	45.3
Actual River Release	kaf	1.6	1.1	0.9	0.7	0.7	2.3	3.6	9.3	13.0	12.3	27.7	25.8	99.0
Max Diversion Available	kaf	0.0	0.0	0.0	0.0	0.0	2.1	5.3	8.7	29.2	23.1	5.7	1.7	75.8
Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	18.0	0.0	0.0	0.0	22.0
Skim Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	1.2	4.0	2.3	7.5	18.5	0.0	0.0	33.5
% Maximum Diversion	%	0	0	90	0	99	61	74	73	87	80	0	0	
Irrigation Demand	kaf	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.6
Irrigation Delivery	kaf	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	1.4
Total River Release	kaf	1.6	1.1	0.9	0.7	0.7	2.3	3.6	9.3	13.0	12.3	27.7	25.8	99.0

Olympus Tunnel

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	16.6	0.0	16.5	26.6	24.3	30.3	28.2	28.7	31.7	33.5	0.0	0.0	236.4
% Maximum Delivery	%	49	0	49	79	80	90	86	85	97	99	0	0	
Inflow to Flatiron	kaf	17.0	2.2	18.7	26.6	24.3	30.3	28.2	28.7	31.7	22.3	0.0	0.0	230.0

Carter Lake

Init Cont: 60.00 kaf **Maximum Cont:** 112.20 kaf **Minimum Cont:** 6.00 kaf
Elev: 5708.8 ft **Elev:** 5759.0 ft **Elev:** 5626.8 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Pumped from Flatiron	kaf	0.0	0.0	13.1	21.7	17.6	17.7	15.7	7.6	9.3	0.0	0.0	0.0	102.7
Carter to Flatiron	kaf	0.5	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	6.4
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	60.0	60.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	112.0	20.0	20.0	
End-Month Contents	kaf	51.4	46.3	54.1	72.9	87.4	101.5	111.9	112.0	112.0	104.1	80.5	63.4	
End-Month Elevation	ft	5699.08	5693.13	5702.11	5722.13	5735.76	5748.95	5758.27	5758.59	5758.53	5751.76	5729.73	5712.35	
Priority Water Diverted to Carter	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	4.5
Irrigation Demand	kaf	7.4	2.2	2.4	2.3	2.6	2.7	4.4	6.1	7.3	17.2	21.4	15.5	91.5
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	0.6	0.5	0.6	0.5	0.4	0.5	0.4	0.8	1.4	1.3	1.6	1.2	9.8
Total Demand	kaf	7.9	2.7	2.9	2.8	3.0	3.2	4.8	6.9	8.6	18.5	23.0	16.7	101.0
Total Delivery	kaf	7.9	2.7	2.9	2.8	3.0	3.2	4.8	6.9	8.6	18.5	23.0	16.7	101.0
% 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

RECLAMATION
Managing Water in the West

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

CBT October 2016 Max Reasonable: 01-OCT-2016

Hansen Canal 930

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	27.7	57.2	57.2	51.6	57.2	55.3	57.2	55.3	57.2	57.2	55.3	645.6
Actual Flow	kaf	17.0	2.2	5.7	4.9	6.8	12.6	12.5	21.1	22.4	22.3	0.0	0.0	127.5

Dille Tunnel

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Big Thompson River Below Lake Estes	kaf	1.6	1.1	0.9	0.7	0.7	2.3	3.6	9.3	13.0	12.3	27.7	25.8	99.0
North Fork Big Thompson River at Drake	kaf	1.6	1.0	0.8	0.6	0.5	0.7	1.5	4.9	8.0	5.9	3.4	1.8	30.7
Dille Skim Water Diverted	kaf	0.7	0.0	0.0	0.0	0.0	0.0	0.0	11.7	12.7	4.9	9.1	2.0	41.1
Dille Priority Water Diverted	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
water available	kaf	3.2	2.1	1.7	1.3	1.1	3.0	5.1	14.2	21.0	18.2	31.0	27.6	129.5
water diverted	kaf	0.7	0.0	0.0	0.0	0.0	0.0	0.0	11.7	14.5	4.9	24.2	22.5	78.5
% Diverted	%	14	0	0	0	0	0	0	216	266	90	448	416	
Big T @ Canyon Mouth	kaf	2.5	2.1	1.7	1.3	1.1	3.0	5.1	2.5	6.5	13.3	6.9	5.1	51.1

Trifurcation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Release from Flatiron	kaf	17.0	2.2	5.7	4.9	6.8	12.6	12.5	21.1	22.4	22.3	0.0	0.0	127.5
Release to 550 Canal	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	18.2	16.2	1.5	9.9	12.1	106.7
Dille Tunnel	kaf	0.7	0.0	0.0	0.0	0.0	0.0	0.0	11.7	14.5	4.9	24.2	22.5	78.5
Total release to river	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
Irrigation demand	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.1	7.2	17.4
Windy Gap demand	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Total requirement	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
Total delivery	kaf	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	4.2	7.4	17.7
% Required Delivery	%	100	0	100	0	0	0	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECLAMATION
Managing Water in the West

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

CBT October 2016 Max Reasonable: 01-OCT-2016

Hansen Canal 550

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow from Flatiron	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	18.2	16.2	1.5	9.9	12.1	106.7
Maximum flow	kaf	31.8	15.4	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	0.8	0.2	0.3	0.3	0.3	0.3	0.4	0.6	0.5	1.0	1.0	1.0	6.7
Minimum flow	kaf	1.5	3.0	4.6	4.6	4.2	4.6	1.5	1.5	1.5	1.5	1.5	1.5	31.5
Rels to Horsetooth	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	18.2	16.2	1.5	9.9	12.1	106.7

Horsetooth Reservoir

Init Cont: 114.00 kaf **Maximum Cont:** 157.00 kaf **Minimum Cont:** 13.00 kaf
Elev: 5407.3 ft **Elev:** 5430.0 ft **Elev:** 5316.8 ft

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow	kaf	11.3	1.9	5.3	4.6	6.4	11.1	8.2	18.2	16.2	1.5	9.9	12.1	106.7
Total irrigation delivery	kaf	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
Evaporation loss	kaf	0.4	0.2	0.0	0.0	0.0	0.2	0.4	0.7	0.9	0.8	0.6	0.5	4.7
Seepage loss	kaf	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.3
End-Month Targets	kaf	156.7	85.0	115.0	115.0	121.0	130.0	135.0	145.0	155.0	156.7	156.7	156.7	
End-Month Content	kaf	113.2	112.9	116.1	118.3	122.5	130.9	135.0	146.5	155.0	127.7	105.2	101.6	
End-Month Elevation	ft	5406.75	5406.60	5408.41	5409.68	5412.07	5416.71	5418.93	5424.91	5429.17	5414.98	5401.98	5399.82	
Priority water diverted to Horsetooth	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	13.1	0.0	0.0	0.0	16.8
Irrigation demand	kaf	8.7	0.0	0.0	0.0	0.0	0.0	0.4	0.8	1.1	19.6	23.9	9.6	64.1
Metered Demand	kaf	2.4	1.5	1.6	1.8	1.7	1.8	2.4	4.4	4.7	7.6	6.3	4.1	40.3
Windy Gap demand	kaf	0.6	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.9	0.7	1.5	1.4	8.5
Total demand	kaf	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
Total irrigation	kaf	11.7	1.9	2.0	2.2	2.0	2.2	3.4	5.8	6.6	27.9	31.7	15.0	112.4
% Required Delivery	%	100	100	100	100	100	100	100	100	100	100	100	100	
Shortage	kaf	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CBT Project Summary

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total CBT Delivery	kaf	24.3	3.9	4.4	4.4	4.6	4.9	7.7	11.9	13.6	46.7	56.7	37.3	220.4

RECLAMATION
Managing Water in the West

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

CBT October 2016 Max Reasonable: 01-OCT-2016

Windy Gap

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	-10.2	-2.0	-0.4	0.0	-12.6
Total Delivery	**kaf**	1.2	0.9	1.0	0.9	0.8	1.0	1.0	1.5	2.2	2.0	3.2	2.7	18.4
Account Balance	**kaf**	-1.2	-2.1	-3.0	-3.9	-4.7	-5.6	-6.6	-8.0	-0.1	-0.1	-2.9	-5.6	

RECLAMATION
Managing Water in the West

CBT October 2016 Max Reasonable: 01-OCT-2016

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

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PUMPING AND GENERATION OPERATIONS

Green Mountain Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	7.300	2.800	2.500	2.300	2.100	2.700	3.600	9.600	17.700	18.900	12.600	7.100	89.200
% Maximum Generation	%	39	16	14	13	12	15	20	51	99	102	68	40	
Average	kwh/af	183	174	172	169	166	163	162	170	199	212	209	203	

Willow Creek Pumping

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	1.0	1.7	0.0	0.0	0.0	0.0	10.5	23.6	23.0	7.4	2.7	1.5	71.4
Pump Energy	gwh	0.200	0.400	0.000	0.000	0.000	0.000	2.200	5.000	4.900	1.600	0.600	0.300	15.200
% Maximum Pumping	%	4	7	0	0	0	0	44	96	97	30	11	6	295
Average	kwh/af	213	213	0	0	0	0	213	213	213	213	213	213	

Lake Granby Pumping

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	15.6	0.0	16.5	27.0	24.7	27.8	13.5	2.5	0.0	0.2	8.2	16.6	152.6
Pump Energy	gwh	2.200	0.000	2.400	3.900	3.600	4.100	2.000	0.400	0.000	0.000	1.200	2.300	22.100
% Maximum Pumping	%	42	0	45	73	74	75	38	7	0	0	22	47	
Average	kwh/af	143	0	143	144	146	147	148	147	0	140	140	141	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Max Reasonable: 01-OCT-2016

Marys Lake Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	22.6	8.2	15.2	15.2	20.5	219.4
Maximum Generation	gwh	6.200	0.000	4.500	6.400	5.800	6.400	6.200	6.400	6.200	6.400	6.400	6.200	67.100
Generation	gwh	2.900	0.000	3.100	4.900	4.500	5.400	4.500	3.600	1.000	2.600	2.600	3.700	38.800
% Maximum Generation	%	17	0	19	18	18	19	18	16	12	17	17	18	
Average	kwh/af	172	0	186	183	184	186	183	157	119	169	169	178	

Lake Estes Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Adams Tunnel Flow	kaf	16.6	0.0	16.5	26.7	24.4	29.1	24.4	22.6	8.2	15.2	15.2	20.5	219.4
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	7.200	0.000	7.800	12.300	11.200	13.500	11.100	10.500	3.500	7.100	7.200	9.400	100.800
% Maximum Generation	%	45	0	49	77	77	84	72	65	23	45	45	61	
Average	kwh/af	433	0	472	461	458	464	455	462	428	469	472	458	

Pole Hill Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	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	0.000	18.300	25.800	23.300	25.800	25.000	25.800	25.000	25.800	25.800	25.000	270.600
Generation	gwh	11.500	0.000	12.600	20.300	18.400	23.100	21.500	21.600	24.200	25.500	0.000	0.000	178.700
% Maximum Generation	%	46	0	69	79	79	89	86	84	97	99	0	0	
Average	kwh/af	341	0	374	599	603	682	657	638	740	755	0	0	

RECLAMATION
Managing Water in the West

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

CBT October 2016 Max Reasonable: 01-OCT-2016

Flatiron Units 1 and 2 Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Inflow to Flatiron	kaf	17.0	2.2	18.7	26.6	24.3	30.3	28.2	28.7	31.7	22.3	0.0	0.0	230.0
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	13.400	0.000	14.800	22.600	21.300	27.700	25.100	26.100	29.700	16.900	0.000	0.000	197.600
% Maximum Generation	%	42	0	46	70	73	86	81	81	95	53	0	0	
Average	kwh/af	787	0	789	847	876	914	891	909	935	761	0	0	

Flatiron Unit 3 Pump/Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Maximum Pumping	kaf	0.0	0.0	24.0	21.7	17.6	17.7	15.7	15.6	15.1	0.0	0.0	0.0	127.4
Pump from Flatiron	kaf	0.0	0.0	13.1	21.7	17.6	17.7	15.7	7.6	9.3	0.0	0.0	0.0	102.7
Pump Energy	gwh	0.000	0.000	3.700	6.600	5.700	6.100	5.600	2.800	3.400	0.000	0.000	0.000	33.900
% Maximum Pumping	%	0	0	54	100	100	100	100	49	61	0	0	0	
Average	kwh/af	0	0	285	304	325	343	359	366	366	0	0	0	
Maximum Turbine release	kaf	8.1	21.7	22.2	23.6	22.4	25.7	25.7	27.1	26.1	26.7	25.6	23.5	278.4
Carter to Flatiron	kaf	0.5	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	6.4
Maximum Generation	gwh	1.500	4.000	4.000	4.700	4.700	5.600	5.700	6.000	5.800	5.900	5.500	4.800	58.200
Actual Generation	gwh	0.100	0.400	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.300	0.000	0.000	1.200
% Maximum Generation	%	6	10	10	0	0	0	0	0	0	6	0	0	
Average	kwh/af	186	183	179	0	0	0	0	0	0	222	0	0	

Big Thompson Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total release	kaf	5.7	0.0	0.0	0.0	0.0	1.2	4.0	14.0	20.2	24.6	13.3	9.4	92.4
Turbine release	kaf	5.7	0.0	0.0	0.0	0.0	0.0	0.0	14.0	20.1	24.6	13.3	9.4	87.1
Wasteway release	kaf	0.0	0.0	0.0	0.0	0.0	1.2	4.0	0.0	0.1	0.0	0.0	0.0	5.3
Maximum Generation	gwh	3.800	0.000	0.000	0.000	0.000	0.000	0.000	3.800	3.700	3.800	3.800	3.700	22.600
Generation	gwh	0.600	0.000	0.000	0.000	0.000	0.000	0.000	2.100	3.200	3.800	2.000	1.300	13.000
% Maximum Generation	%	16	0	0	0	0	0	0	56	86	100	52	34	
Average	kwh/af	110	0	0	0	0	0	0	152	158	156	150	136	

RECLAMATION
Managing Water in the West

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

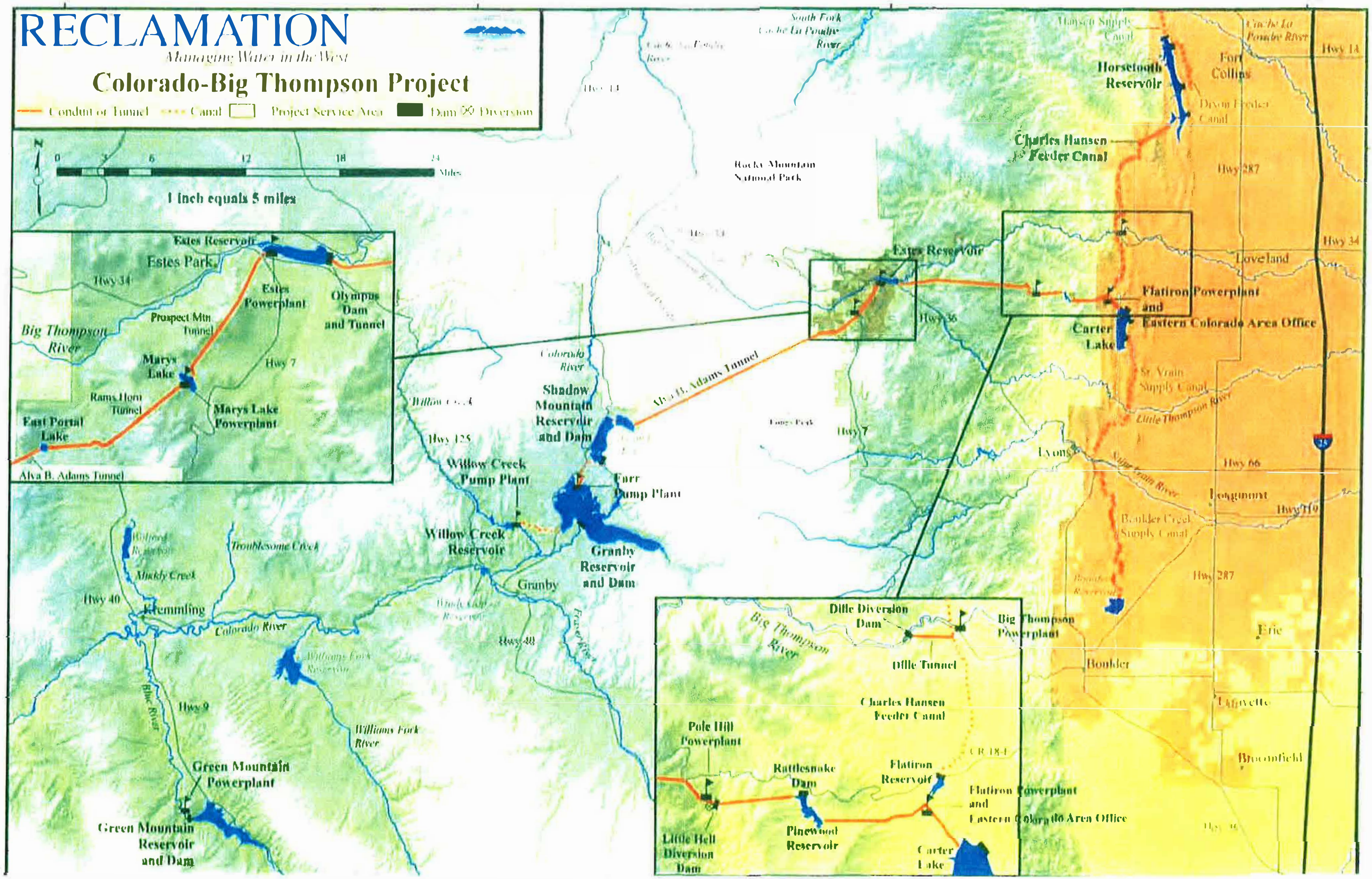
CBT October 2016 Max Reasonable: 01-OCT-2016

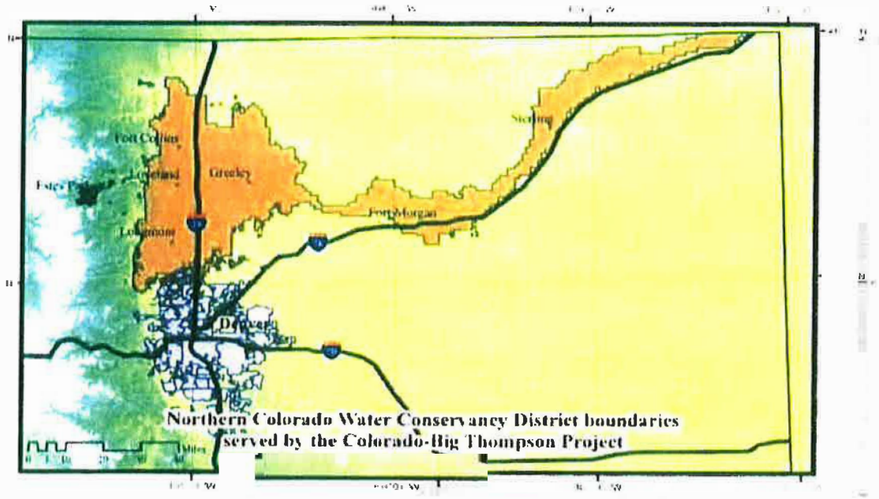
Project Generation

		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Total Generation	gwh	43.000	3.200	41.200	62.400	57.500	72.400	65.700	73.400	79.300	75.300	24.400	21.500	619.300
Total Max Generation	gwh	103.400	68.700	93.700	103.700	94.200	104.600	101.500	108.900	105.400	108.800	108.400	104.400	1205.700

Project Pump Energy

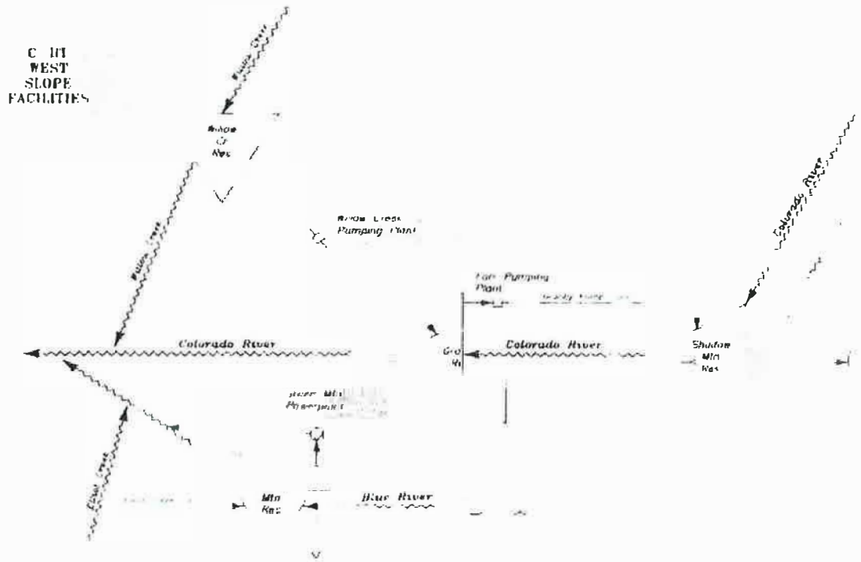
		Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Total
Granby	gwh	2.200	0.000	2.400	3.900	3.600	4.100	2.000	0.400	0.000	0.000	1.200	2.300	22.100
Willow Creek	gwh	0.200	0.400	0.000	0.000	0.000	0.000	2.200	5.000	4.900	1.600	0.600	0.300	15.200
Flatiron Unit 3	gwh	0.000	0.000	3.700	6.600	5.700	6.100	5.600	2.800	3.400	0.000	0.000	0.000	33.900
Total Pump Energy	gwh	2.400	0.400	6.100	10.500	9.300	10.100	9.900	8.200	8.300	1.600	1.700	2.700	71.200

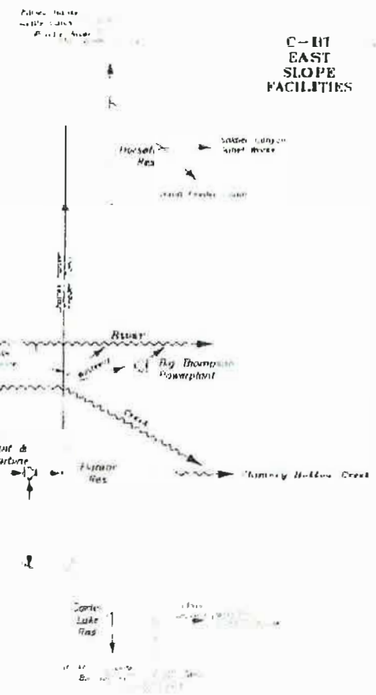

RECLAMATION
Colorado-Big Thompson Project
1 inch equals 5 miles
Horsetooth Reservoir
Fort Collins
Charles Hansen Feeder Canal
Estes Reservoir
Flatiron Powerplant and Eastern Colorado Area Office
Carter Lake
Loveland
Longmont
Boulder
Erie
Lafayette
Broomfield
Lyons
Alva B. Adams Tunnel
Shadow Mountain Reservoir and Dam
Willow Creek Pump Plant
Farr Pump Plant
Willow Creek Reservoir
Granby Reservoir and Dam
Granby
Kremmling
Green Mountain Powerplant
Green Mountain Reservoir and Dam
Estes Park
Estes Powerplant
Olympus Dam and Tunnel
Prospect Mtn Tunnel
Big Thompson River
Marys Lake
Rams Horn Tunnel
Marys Lake Powerplant
East Portal Lake
Dille Diversion Dam
Big Thompson Powerplant
Dille Tunnel
Pole Hill Powerplant
Rattlesnake Dam
Flatiron Reservoir
Little Hell Diversion Dam
Pinewood Reservoir

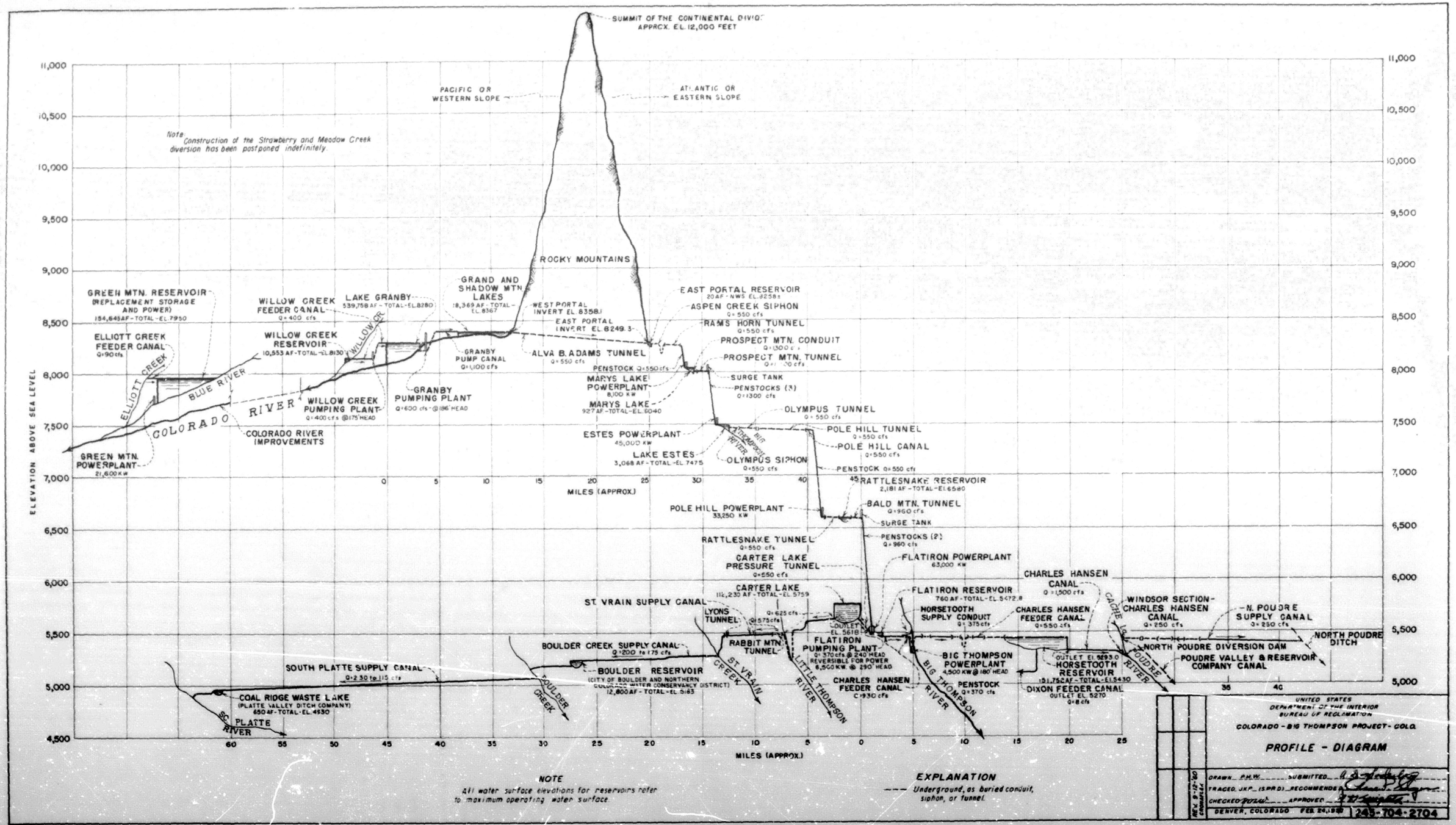


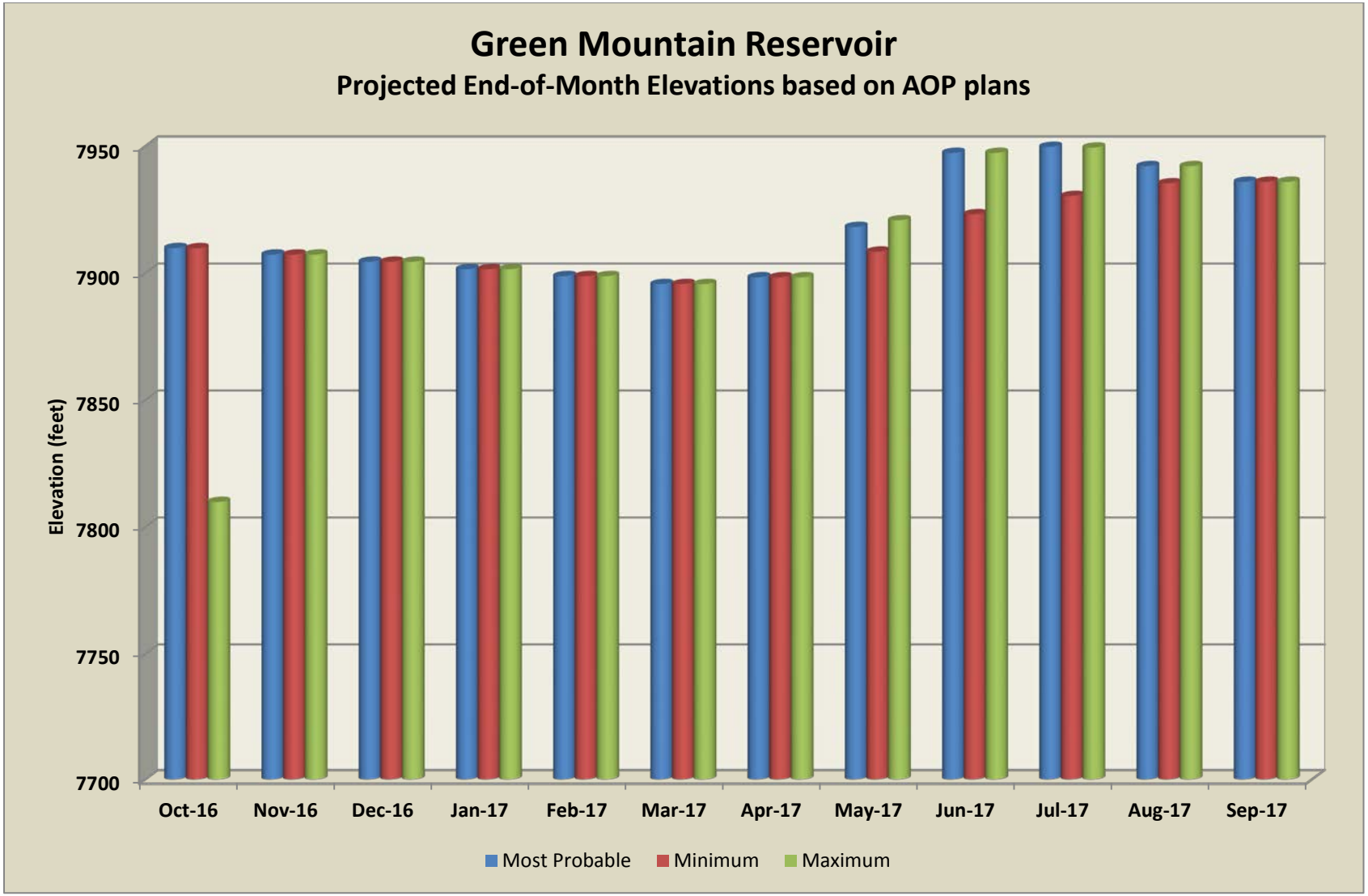
Colorado-Big Thompson Facts

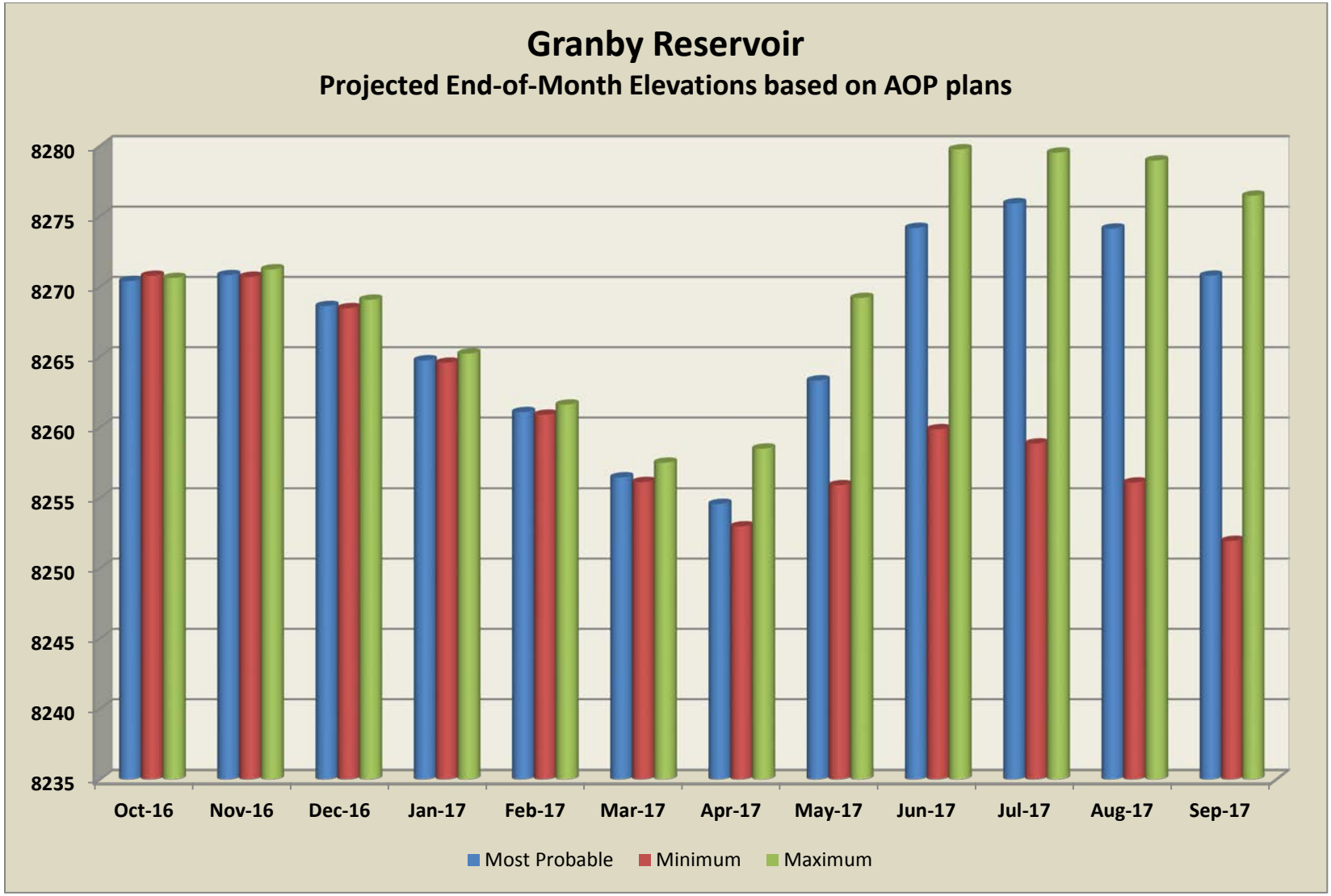
- A trans-mountain, trans-basin water diversion, storage, and delivery project
- Signed into law by President Roosevelt in 1937
- Construction period 1938-1952
- Ten major reservoirs (Green Mountain, Willow Creek, Granby, Shadow Mountain, Marys Lake, Estes, Pinewood, Carter, Flatiron and Horsetooth)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

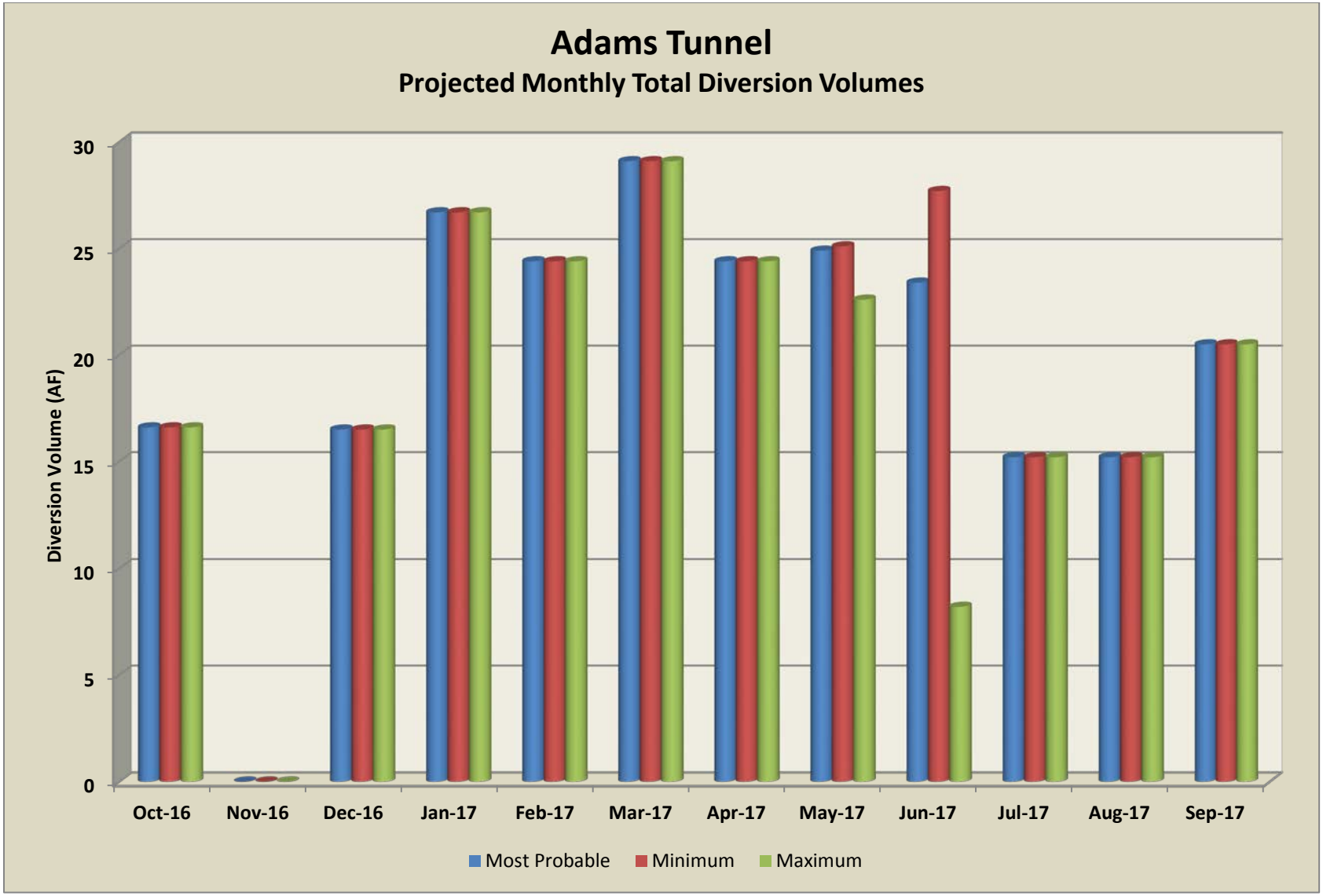


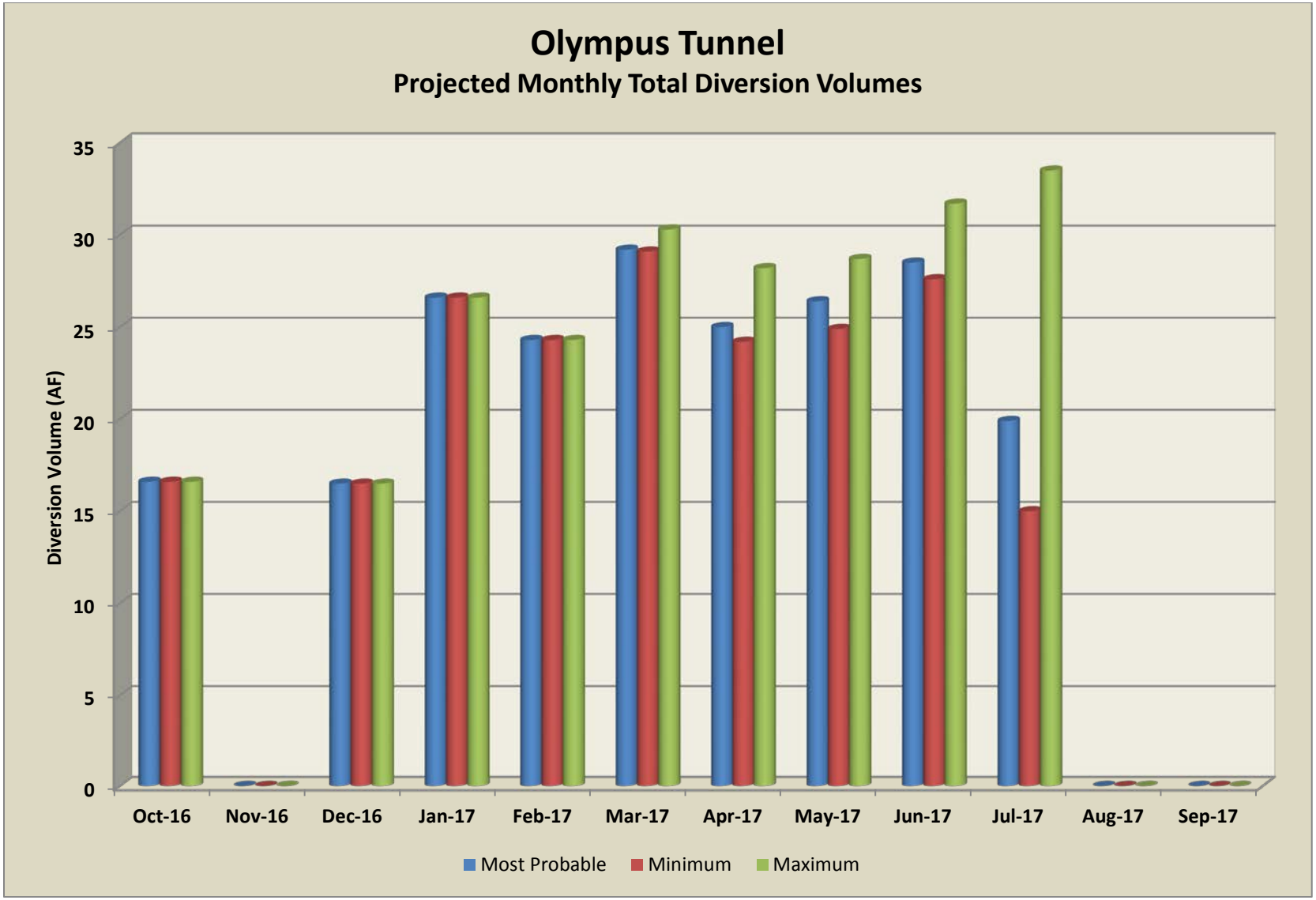


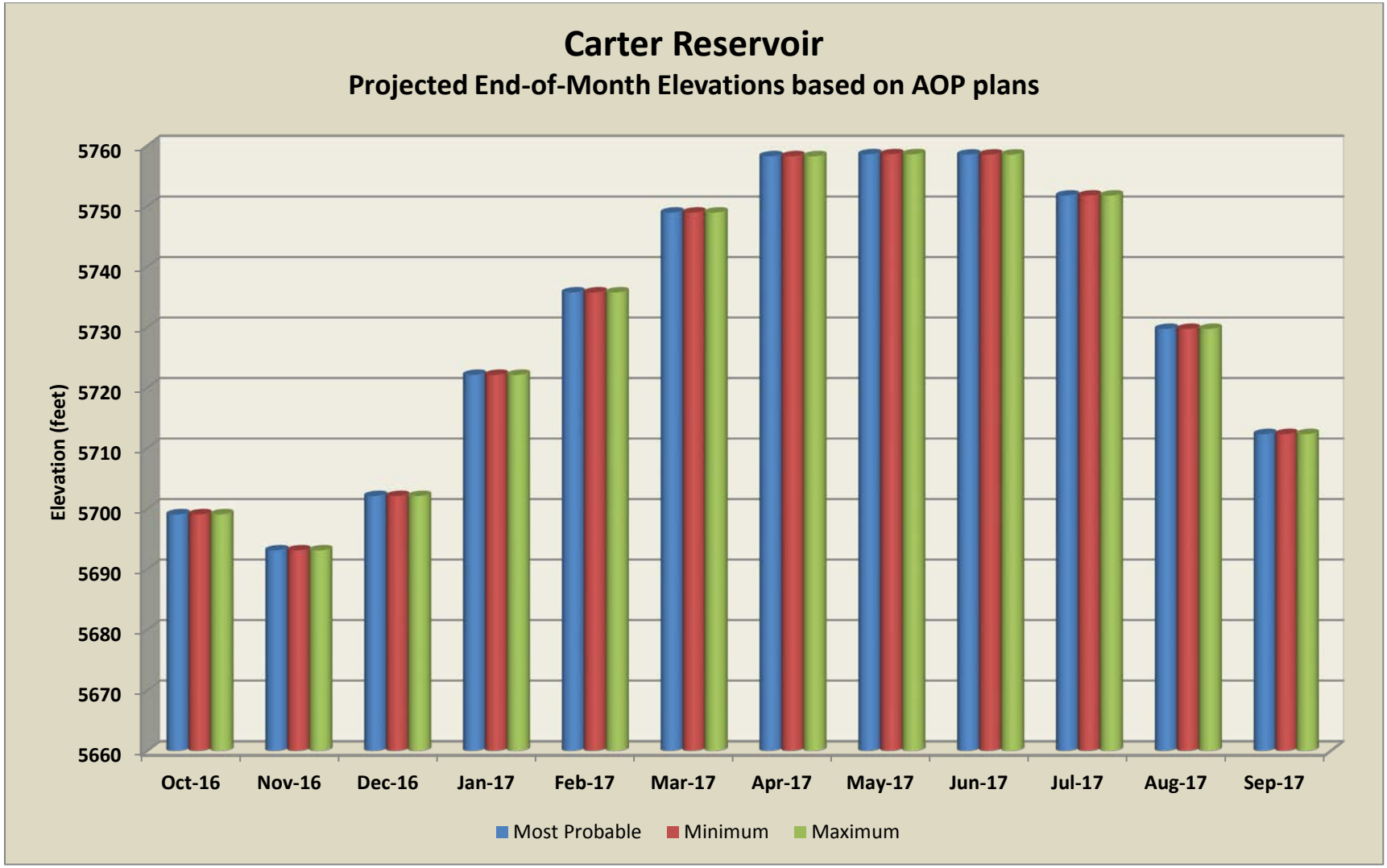

SUMMIT OF THE CONTINENTAL DIVIDE
APPROX. EL. 12,000 FEET
PACIFIC OR WESTERN SLOPE
ATLANTIC OR EASTERN SLOPE
Note: Construction of the Strawberry and Meadow Creek diversion has been postponed indefinitely.
ROCKY MOUNTAINS
ELEVATION ABOVE SEA LEVEL
MILES (APPROX.)
GREEN MTN. RESERVOIR (REPLACEMENT STORAGE AND POWER) 154,645AF-TOTAL-EL.7950
ELLIOTT CREEK FEEDER CANAL Q=90cfs
ELLIOTT CREEK
BLUE RIVER
COLORADO RIVER
GREEN MTN. POWERPLANT 21,600KW
COLORADO RIVER IMPROVEMENTS
WILLOW CREEK RESERVOIR 10,553 AF-TOTAL-EL.8130
WILLOW CREEK FEEDER CANAL Q=400 cfs
WILLOW CR.
WILLOW CREEK PUMPING PLANT Q=400 cfs @175 HEAD
LAKE GRANBY 539,758 AF-TOTAL-EL.8280
GRANBY PUMPING PLANT Q=600 cfs-@186' HEAD
GRANBY PUMP CANAL Q=1,100 cfs
GRAND AND SHADOW MTN. LAKES 8,369 AF-TOTAL-EL.8367
WEST PORTAL INVERT EL. 8358.1
EAST PORTAL INVERT EL. 8249.3
ALVA B. ADAMS TUNNEL Q=550 cfs
EAST PORTAL RESERVOIR 20AF-NWS EL.8258
ASPEN CREEK SIPHON Q=550 cfs
RAMS HORN TUNNEL Q=550 cfs
PROSPECT MTN. CONDUIT Q=1300 cfs
PROSPECT MTN. TUNNEL Q=1300 cfs
PENSTOCK Q=550 cfs
MARYS LAKE POWERPLANT 8,100 KW
SURGE TANK
PENSTOCKS (3) Q=1300 cfs
MARYS LAKE 927AF-TOTAL-EL.6040
OLYMPUS TUNNEL Q=550 cfs
POLE HILL TUNNEL Q=550 cfs
POLE HILL CANAL Q=550 cfs
ESTES POWERPLANT 45,000 KW
LAKE ESTES 3,068 AF-TOTAL-EL.7475
BIG THOMPSON RIVER
OLYMPUS SIPHON Q=550 cfs
PENSTOCK Q=550 cfs
RATTLESNAKE RESERVOIR 2,181 AF-TOTAL-EL.6580
POLE HILL POWERPLANT 33,250 KW
BALD MTN. TUNNEL Q=960 cfs
SURGE TANK
PENSTOCKS (2) Q=960 cfs
RATTLESNAKE TUNNEL Q=550 cfs
CARTER LAKE PRESSURE TUNNEL Q=550 cfs
FLATIRON POWERPLANT 63,000 KW
CHARLES HANSEN CANAL Q=1,500 cfs
CARTER LAKE 112,230 AF-TOTAL-EL.5759
FLATIRON RESERVOIR 760 AF-TOTAL-EL.5472.8
ST VRAIN SUPPLY CANAL
LYONS TUNNEL Q=575cfs
Q=625 cfs
OUTLET EL. 5618
HORSETOOTH SUPPLY CONDUIT Q=375cfs
CHARLES HANSEN FEEDER CANAL Q=550 cfs
CACHE LA POUDRE RIVER
WINDSOR SECTION-CHARLES HANSEN CANAL Q=250 cfs
N. POUDRE SUPPLY CANAL Q=250 cfs
NORTH POUDRE DITCH
NORTH POUDRE DIVERSION DAM
POUDRE VALLEY & RESERVOIR COMPANY CANAL
BOULDER CREEK SUPPLY CANAL Q=200 to 175 cfs
RABBIT MTN. TUNNEL
FLATIRON PUMPING PLANT Q=370 cfs @ 240 HEAD REVERSIBLE FOR POWER 6,500 KW. @ 290' HEAD
BIG THOMPSON POWERPLANT 4,500 KW @ 180' HEAD
PENSTOCK Q=370 cfs
OUTLET EL. 5293.0
HORSETOOTH RESERVOIR 151,752 AF-TOTAL-EL.5430
DIXON FEEDER CANAL OUTLET EL. 5270 Q=8 cfs
SOUTH PLATTE SUPPLY CANAL Q=230 to 115 cfs
BOULDER RESERVOIR (CITY OF BOULDER AND NORTHERN COLORADO WATER CONSERVANCY DISTRICT) 12,600 AF-TOTAL-EL.5183
BOULDER CREEK
ST VRAIN CREEK
LITTLE THOMPSON RIVER
BIG THOMPSON RIVER
CHARLES HANSEN FEEDER CANAL Q=930 cfs
COAL RIDGE WASTE LAKE (PLATTE VALLEY DITCH COMPANY) 650 AF-TOTAL-EL.4930
SO. PLATTE RIVER
NOTE
All water surface elevations for reservoirs refer to maximum operating water surface
EXPLANATION
Underground, as buried conduit, siphon, or tunnel
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION
COLORADO - BIG THOMPSON PROJECT - COLO.
PROFILE - DIAGRAM
DRAWN P.H.W. SUBMITTED
TRACED J.K.P. (S.P.R.D.) RECOMMENDED
CHECKED APPROVED
DENVER, COLORADO FEB. 24, 1950
245-704-2704

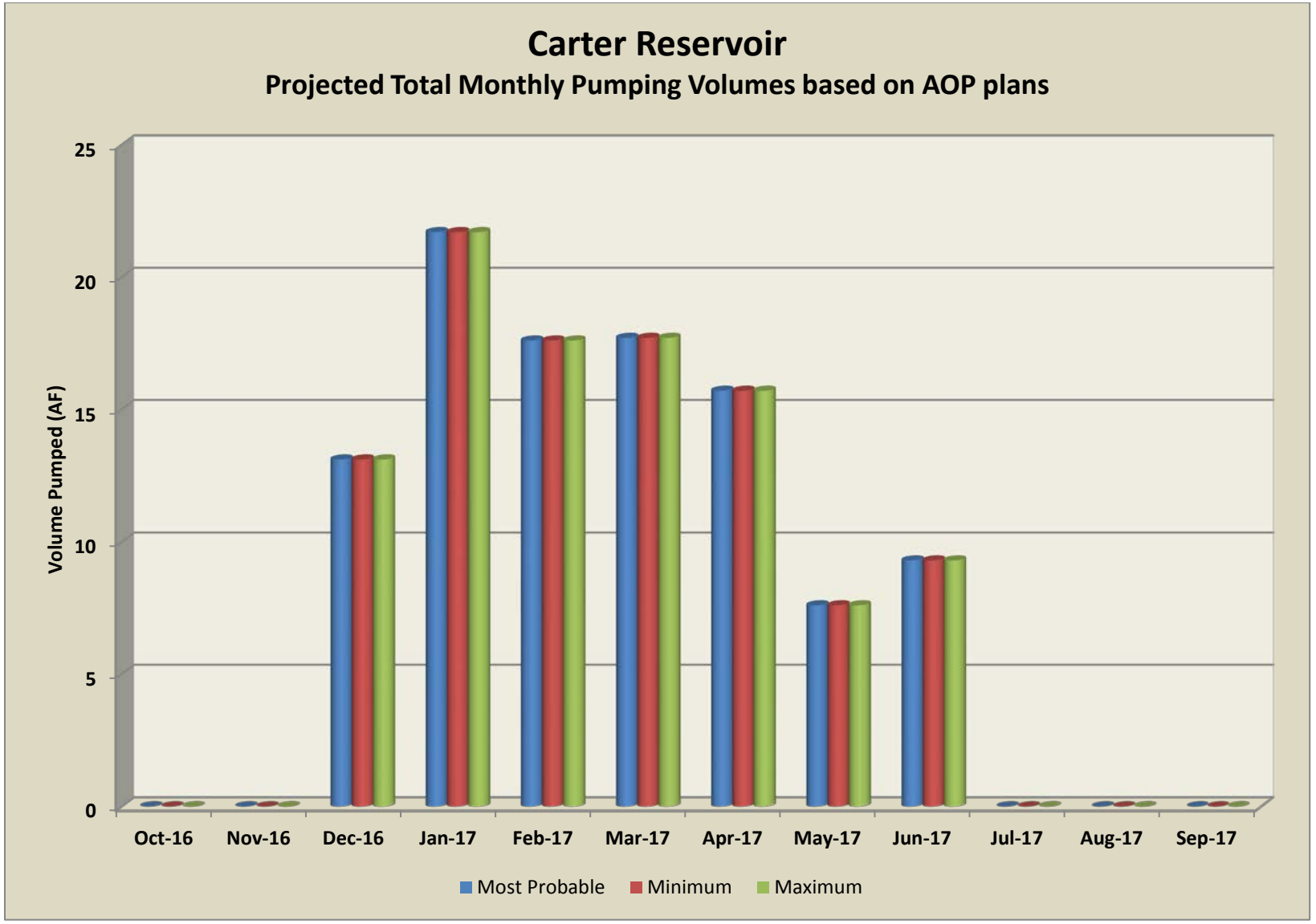

Green Mountain Reservoir
Projected End-of-Month Elevations based on AOP plans
Elevation (feet)
7950
7900
7850
7800
7750
7700
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum

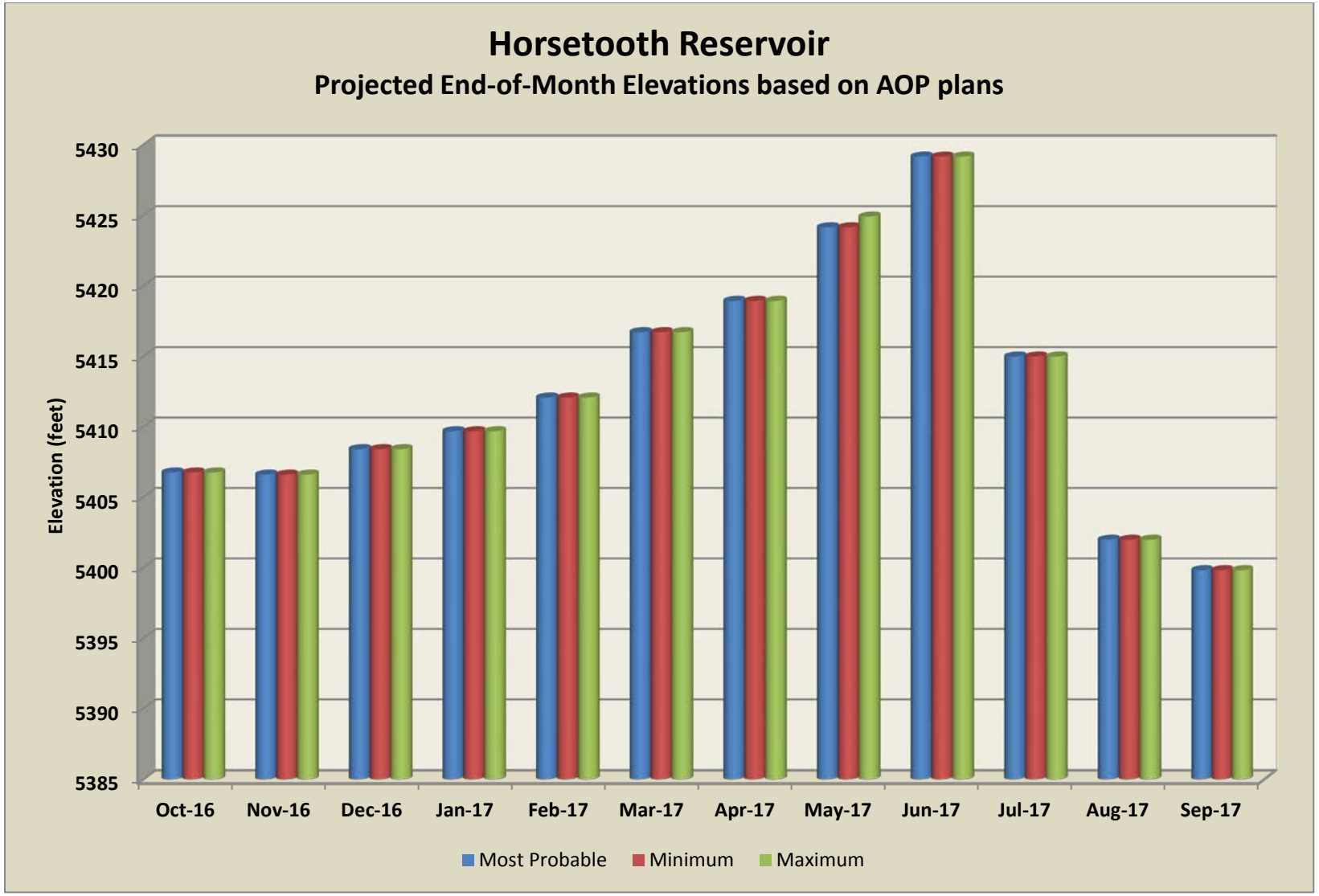

Granby Reservoir
Projected End-of-Month Elevations based on AOP plans
8280
8275
8270
8265
8260
8255
8250
8245
8240
8235
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum

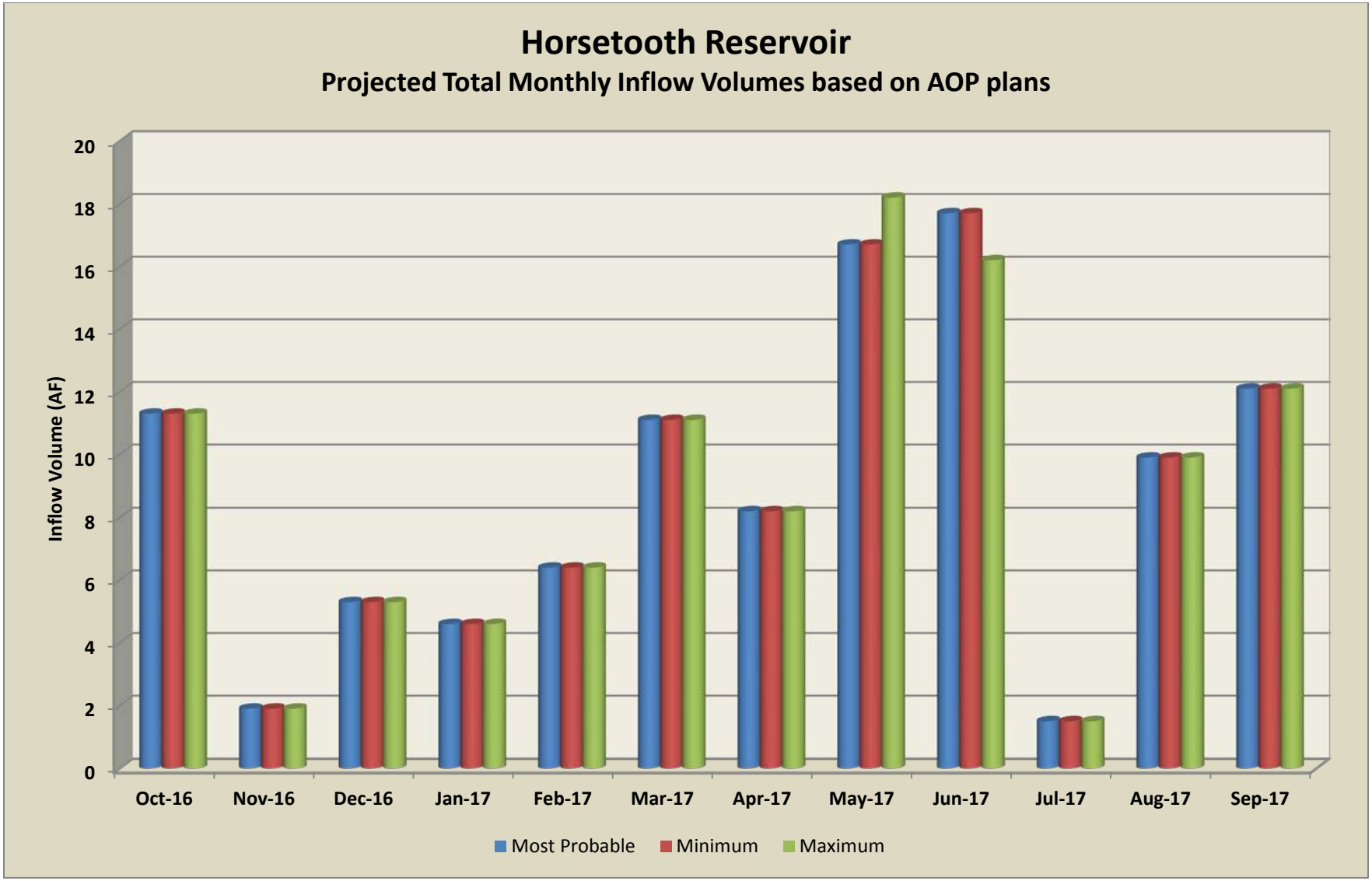

Adams Tunnel
Projected Monthly Total Diversion Volumes
Diversion Volume (AF)
30
25
20
15
10
5
0
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum

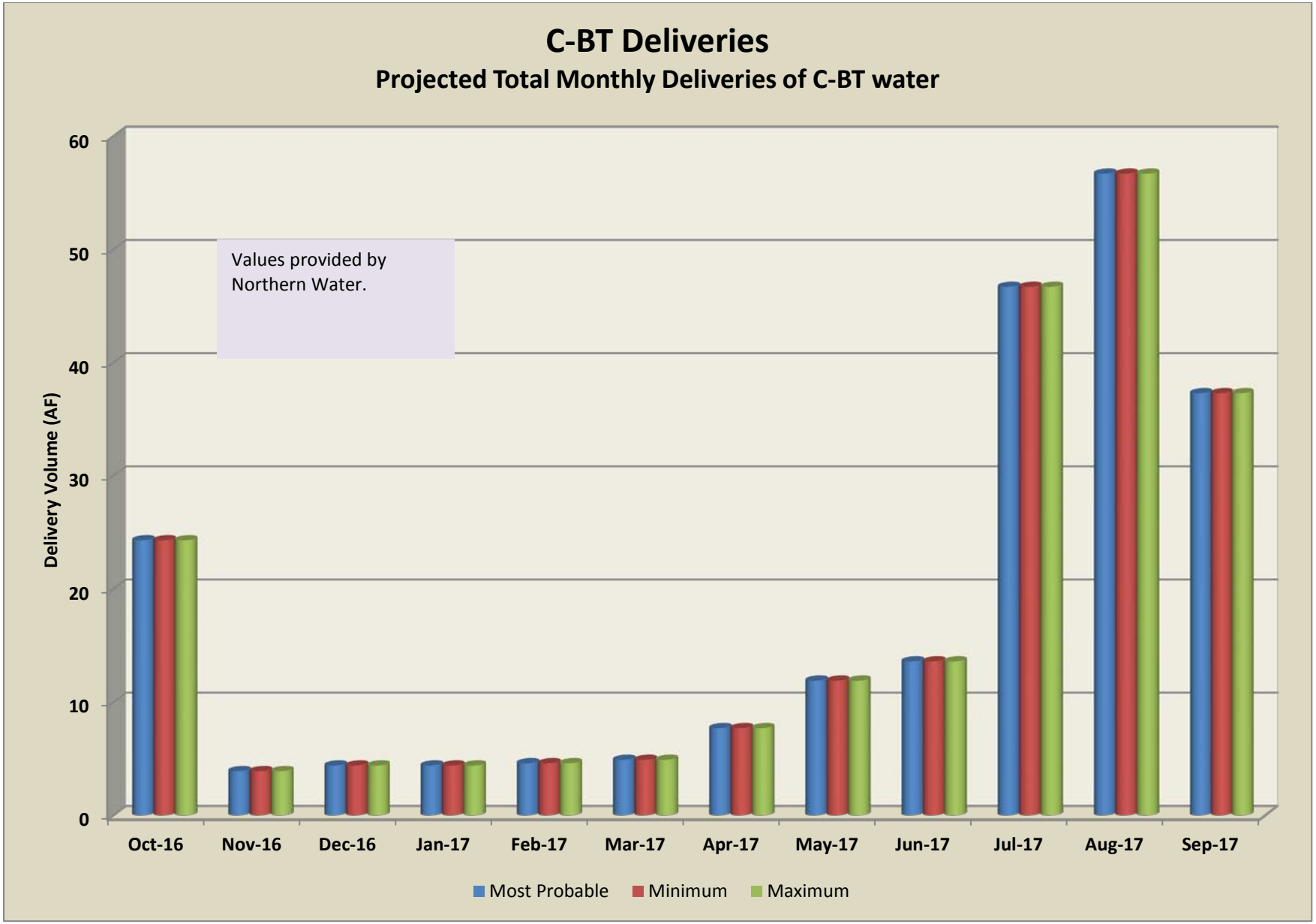

Olympus Tunnel
Projected Monthly Total Diversion Volumes
Diversion Volume (AF)
35
30
25
20
15
10
5
0
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum


Carter Reservoir
Projected End-of-Month Elevations based on AOP plans
Elevation (feet)
5760
5750
5740
5730
5720
5710
5700
5690
5680
5670
5660
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum


Carter Reservoir
Projected Total Monthly Pumping Volumes based on AOP plans
Volume Pumped (AF)
25
20
15
10
5
0
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum


Horsetooth Reservoir
Projected End-of-Month Elevations based on AOP plans
Elevation (feet)
5430
5425
5420
5415
5410
5405
5400
5395
5390
5385
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum


Horsetooth Reservoir
Projected Total Monthly Inflow Volumes based on AOP plans
Inflow Volume (AF)
20
18
16
14
12
10
8
6
4
2
0
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum


C-BT Deliveries
Projected Total Monthly Deliveries of C-BT water
Values provided by Northern Water.
Delivery Volume (AF)
60
50
40
30
20
10
0
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Most Probable
Minimum
Maximum

SIXTY-FIFTH ANNUAL REPORT
WESTERN DIVISION SYSTEM POWER OPERATIONS
* * * * * * * * *

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 2016 and the other part presents the plan of generation and pumping operations for WY 2017.

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

WESTERN DIVISION POWER SYSTEM
WATER YEAR 2016 – GENERATION AND PUMP ENERGY SUMMARY

Power generation for the C-BT and the Fry Ark projects, as well as most of the Western Division System during WY 2016 was lower than average, but higher during WY 2015. Most plants in the C-BT and Fry Ark projects produced above average power, while many plants in Wyoming and Montana had below average production. In the case of the C-BT, demands for water were average for WY 2016, and that translated into average diversions of project water, with slightly above average power generation thanks to the skim operation.

The C-BT powerplants produced an accumulated gross generation total of 649.4 gigawatt-hours (GWh) of electricity representing only 108 percent of its 30 year average. Meanwhile, the gross generation produced by the entire System was 2,523.6 GWh or 95 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 2016 was 2,095 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 Exhibit 1. Table 1 in this section includes the total generation for every powerplant in the system. Table 3 shows monthly generation and pumping energy, by plant, as well as monthly System loads for WY 2016. The total energy that was required to operate the pumps in the System is included in Table 2. Some of the numbers included in this section were provided by WAPA.

Contrary to WY 2015, the Willow Creek Pumping Station pumped a significant volume of water to Granby during WY 2016. The Willow Creek Pumping Station used 9.4 GWh of power during its WY 2016 operation. Meanwhile, the Farr Pumping Plant and the Flatiron Powerplant Unit 3 required 30.8 and 33.4 GWh, respectively. The Farr Pumping Plant and Flatiron Powerplant Unit 3 operations were above average in WY 2016. Their power requirement was 112 percent of the 30 year average.

According to the numbers provided by WAPA's office in Loveland, sales of electric power totaled 2,784,903 mega-watt hours (MWh) during WY 2016, with a revenue of $94,346,015. 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 547,639 MWh during WY 2016 for which WAPA paid a total of $14,474,396, a substantial reduction from the previous water year.

WESTERN DIVISION POWER SYSTEM
WATER YEAR 2017 – GENERATION AND PUMP ENERGY FORECAST

Under the most-probable runoff condition plan developed on October 2016, the total generation for the C-BT powerplants is projected to be 535.4 GWh during WY 2017, while pump energy requirements from the C-BT Power System are expected to reach 68.6 GWh. The total generation for the entire System is expected to be 2,175.8 GWh, with a total load of 2,162.5 GWh, leaving a surplus of 13.3 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 conditions plan from October 2016, the total generation for the C-BT powerplants is projected to be 498.6 GWh in WY 2017 while the total System generation is projected to be 1,660.9 GWh during WY 2017. Under this plan, pump energy requirements for the C-BT would total 66.6 GWh. The total System load is expected to be 2,162.5 GWh over WY 2017 leaving a total generation shortfall of 501.6 GWh. Under the reasonable-minimum runoff conditions, total generation shortfalls are expected for almost every month except for May and June.

If reasonable maximum runoff conditions occur during WY 2017 the C-BT powerplants should produce 619.3 GWh of power generation while the System total generation should reach 2,450.5 GWh. Under the reasonable maximum conditions the total C-BT pump energy requirements would be 71.2 GWh. The total System load is expected to be 2,162.5 GWh WY 2017, leaving a total generation surplus of 288.0 GWh.

Tables 4A through 4C summarize the projected monthly System generation, pump energy, and loads for the three forecasted runoff conditions for WY 2017. Exhibits 3A through 3C 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 5 lists the scheduled maintenance for the various facilities in the C-BT. Tables 6 and 7 summarize the capacity data for the powerplants and pumping plants within the System, including the Yellowtail and Mount Elbert Units.

APPENDIX A - TABLES

TABLE 1

WESTERN DIVISION SYSTEM
GENERATION FOR WY 2016

Powerplant	Accum. Gross Generation 1/		
	WY 2016 (GWH)	Avg 2/ (GWH)	percent of Avg
Green Mtn.	61.4	51.9	118
Marys Lake	40.3	37.3	108
Estes	114.1	100.3	114
Pole Hill	187.3	172.3	109
Flatiron 1&2	240.8	226.7	106
Big Thompson	5.5	10.9	50
Seminoe	145.7	132.5	110
Kortes	143.8	140.3	102
Fremont C.	231.3	239.6	97
Alcova	109.2	118.1	92
Glendo	100.2	80.3	125
Guernsey	18.4	19.4	95
Boysen	67.8	69.3	98
Heart Mtn.	18.3	15.7 3/	117
Buffalo Bill	56.8	68.3 3/	83
Shoshone	17.0	20.3 3/	84
Spirit Mtn.	17.3	14.7 3/	118
Mt. Elbert	265.8	169.0 4/	157
Yellowtail	682.6	959.0 5/	71
Total	2523.6	2645.9	95

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 Western Division System through marketing arrangement. The other 1/2 is marketed in Eastern Division System.

TABLE 2

PUMP ENERGY USED DURING WY2016

Pumping Plant	Oct-September Pump Energy		
	WY2016 (GWH)	Avg 1/ (GWH)	percent of Avg
Willow Crk	9.4	5.7	165
Farr	30.8	30.6	101
Flatiron 3	33.4	26.8	125
Mt. Elbert	354.7	182.1 2/	195
Total	428.3	245.2	175

1/ 1976-2005 average
2/ 1990-1999 average

TABLE 3

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM
WATER YEAR 2016 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	4.5	5.3	5.1	4.7	0.3	0.1	0.5	7.9	5.5	0.5	0.0	34.6
Green Mtn.	8.2	2.4	1.9	1.6	1.4	2.4	1.5	5.1	14.1	8.6	6.4	7.8	61.4
Willow Cr. pump	0.0	0.6	0.0	0.0	0.0	0.0	1.2	5.0	2.0	0.4	0.1	0.1	9.5
Farr pump	1.8	0.3	3.8	5.1	4.9	4.9	1.7	0.2	0.1	2.2	2.1	3.7	30.6
Marys Lake	1.9	0.0	3.6	6.0	5.4	5.6	2.7	2.5	2.0	4.0	2.4	4.2	40.3
Estes	5.6	0.5	11.2	15.6	15.5	15.2	8.0	7.2	5.5	11.1	7.1	11.7	114.2
Pole Hill	8.6	0.1	14.2	24.3	21.4	23.3	12.2	15.5	22.9	17.4	10.0	17.4	187.4
Flatiron 1&2	11.3	1.1	19.4	29.3	28.9	29.8	15.2	20.3	28.3	21.8	13.6	21.8	240.9
Flatiron 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flatiron 3 pump	0.0	0.0	3.7	6.8	6.1	5.5	2.8	2.4	2.8	3.3	0.0	0.0	33.4
Big Thompson	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	1.5	0.7	0.5	5.4
Seminoe	4.5	7.8	8.6	8.7	7.1	5.8	16.1	29.7	29.6	15.4	8.2	4.2	145.7
Kortes	5.4	8.8	9.8	9.5	3.7	2.5	17.3	28.3	27.8	16.6	9.2	4.9	143.9
Fremont Canyon	0.3	8.0	7.9	6.8	6.8	13.6	13.9	32.6	45.7	47.5	35.0	13.2	231.2
Alcova	2.5	2.8	3.0	3.0	2.9	5.6	2.9	18.1	27.0	22.8	14.2	4.4	109.2
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	26.2	23.5	22.9	9.8	100.2
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	0.7	4.3	4.1	3.7	2.1	3.5	18.4
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	4.0	4.4	4.5	4.5	4.1	3.0	3.0	10.1	10.8	8.6	6.4	4.4	67.8
Shoshone	1.5	1.2	1.2	1.2	0.3	1.2	1.4	1.7	1.9	2.0	1.8	1.6	17.0
Buffalo Bill	1.5	0.9	1.1	1.0	1.3	0.6	5.9	10.4	12.6	10.0	8.2	3.3	56.8
Spirit Mtn.	1.6	0.0	0.0	0.0	0.0	0.0	0.6	2.8	3.0	3.3	3.1	2.9	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.	1.3	0.0	0.0	0.0	0.0	0.0	1.1	3.3	3.1	3.2	3.2	3.1	18.3
Yellowtail/2	30.4	26.0	25.1	24.7	22.8	20.8	23.8	46.0	47.2	27.2	25.5	22.1	341.3
	------	------	------	------	------	------	------	------	------	------	------	------	------
Fry-Ark	0.2	4.5	5.3	5.1	4.7	0.3	0.1	0.5	7.9	5.5	0.5	0.0	34.6
CBT	33.9	3.2	42.9	64.9	61.7	65.9	33.9	43.0	70.6	58.6	38.0	59.6	576.0
North Platte	12.7	27.4	29.3	28.0	20.5	27.5	50.9	130.8	160.4	129.5	91.7	40.0	748.5
Bighorn	40.3	32.5	32.0	31.4	28.5	25.6	35.8	74.3	78.6	54.3	48.1	37.4	518.6
	------	------	------	------	------	------	------	------	------	------	------	------	------
TOTAL GEN	87.0	67.6	109.4	129.4	115.3	119.4	120.7	248.5	317.4	247.8	178.4	136.9	1877.8
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	-75.4	-94.6	-67.7	-43.2	-21.7	-29.9	-55.7	63.8	106.4	-14.2	-32.8	-19.7	-284.7
	------	------	------	------	------	------	------	------	------	------	------	------	------
*	projected values are historic average flow through energy												
**	projected values are marketed energy												

TABLE 4A

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM
WATER YEAR 2017 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.	6.3	2.3	2.2	2.0	1.8	2.1	1.7	0.6	4.5	5.7	7.1	5.0	41.3
Willow Cr. pump	0.2	0.3	0.0	0.0	0.0	0.0	0.9	3.7	2.3	0.7	0.3	0.2	8.6
Farr pump	2.3	0.0	2.4	3.9	3.6	4.3	3.2	1.6	0.0	0.4	1.8	2.7	26.2
Marys Lake	2.9	0.0	3.1	4.9	4.5	5.4	4.5	4.6	4.0	2.6	2.6	3.7	42.8
Estes	7.2	0.0	7.8	12.3	11.2	13.5	11.1	11.7	10.8	7.1	7.2	9.4	109.3
Pole Hill	11.5	0.0	12.6	20.3	18.4	22.0	18.5	19.6	21.6	14.3	0.0	0.0	158.8
Flatiron 1&2	13.4	0.0	14.8	22.6	21.3	26.6	22.0	23.7	25.8	4.8	0.0	0.0	175.0
Flatiron 3	0.1	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.2
Flatiron 3 pump	0.0	0.0	3.7	6.6	5.7	6.1	5.6	2.8	3.4	0.0	0.0	0.0	33.9
Big Thompson	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.1	2.0	1.2	1.0	7.9
Seminoe	33.5	32.4	33.4	33.4	30.2	33.5	32.4	33.5	31.8	32.6	32.8	31.9	391.4
Kortes	5.6	5.4	5.6	5.6	5.1	10.6	18.4	26.4	26.7	20.1	10.6	6.1	146.2
Fremont Canyon	0.4	7.2	7.3	7.4	6.7	12.6	19.0	29.3	45.8	47.3	37.0	22.3	242.3
Alcova	4.1	4.1	4.2	4.2	3.8	6.7	6.6	13.8	23.2	25.8	19.0	11.7	127.2
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	3.7	17.1	18.6	25.2	20.2	8.0	92.8
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.8	3.7	3.8	3.8	3.4	19.1
Pilot Butte**	0.4	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	4.4	4.3	4.4	4.4	3.9	4.9	6.7	11.6	11.5	11.9	8.9	7.0	83.9
Shoshone	1.1	1.1	1.1	1.1	0.4	1.1	1.1	1.1	2.2	2.2	2.2	1.1	15.8
Buffalo Bill	5.6	1.6	1.7	1.7	1.5	1.7	6.1	13.1	13.0	13.4	13.4	12.8	85.6
Spirit Mtn.	1.6	0.0	0.0	0.0	0.0	0.0	1.6	2.7	2.9	3.3	3.2	3.1	18.4
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	2.9	4.3	4.5	4.5	1.8	22.4
Yellowtail/2	28.3	27.4	28.2	27.8	24.4	27.4	30.7	48.0	60.8	44.3	41.8	37.0	426.1
	------	------	------	------	------	------	------	------	------	------	------	------	------
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	39.5	2.4	34.8	51.6	47.9	59.2	48.1	53.1	63.1	35.7	16.0	16.2	467.6
North Platte	43.6	49.1	50.5	50.6	45.8	63.4	80.7	123.9	149.8	154.8	123.4	83.4	1019.0
Bighorn	43.6	34.4	35.4	35.0	30.2	35.1	49.0	80.6	95.9	80.8	75.2	64.0	659.2
	------	------	------	------	------	------	------	------	------	------	------	------	------
TOTAL GEN	128.0	88.3	123.1	139.7	127.0	160.2	181.3	261.5	313.5	275.7	216.6	164.6	2179.5
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	-34.4	-73.9	-54.0	-32.9	-10.0	10.9	4.8	76.8	102.5	13.7	5.4	8.0	17.0
	------	------	------	------	------	------	------	------	------	------	------	------	------
*	PROJECTED VALUES ARE HISTORIC AVERAGE FLOW THROUGH ENERGY												
**	PROJECTED VALUES ARE MARKETED ENERGY												

TABLE 4B

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM
WATER YEAR 2017 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.	5.6	1.7	1.8	1.6	1.5	1.6	0.7	0.6	0.7	0.7	0.7	1.4	18.6
Willow Cr. pump	0.2	0.3	0.0	0.0	0.0	0.0	0.5	1.0	0.3	0.2	0.1	0.1	2.7
Farr pump	2.4	0.0	2.4	3.9	3.6	4.4	3.6	2.6	0.8	1.4	2.1	3.0	30.2
Marys Lake	2.9	0.0	3.1	4.9	4.5	5.4	4.5	4.6	5.1	2.6	2.6	3.7	43.9
Estes	7.2	0.0	7.8	12.3	11.2	13.5	11.1	11.8	12.8	7.1	7.2	9.4	111.4
Pole Hill	11.5	0.0	12.6	20.3	18.4	21.9	17.9	18.5	20.7	10.2	0.0	0.0	152.0
Flatiron 1&2	13.4	0.0	14.8	22.6	21.3	26.5	21.2	22.3	25.3	0.8	0.0	0.0	168.2
Flatiron 3	0.1	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.2
Flatiron 3 pump	0.0	0.0	3.7	6.6	5.7	6.1	5.6	2.8	3.4	0.0	0.0	0.0	33.9
Big Thompson	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.4	0.4	0.9	3.4
Seminoe	5.7	5.4	5.6	5.6	5.0	5.6	8.2	14.8	16.6	16.9	14.5	7.9	111.8
Kortes	5.6	5.4	5.6	5.6	5.1	5.6	8.2	14.8	16.4	16.9	14.8	8.2	112.2
Fremont Canyon	0.4	7.2	7.3	7.3	6.7	12.6	22.1	41.2	44.2	45.7	37.0	11.7	243.4
Alcova	4.1	4.1	4.2	4.2	3.8	6.7	8.2	19.8	20.8	21.5	19.8	6.7	123.9
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	4.1	15.7	11.2	24.3	19.7	6.4	81.4
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.8	3.7	3.8	3.8	3.4	19.1
Pilot Butte **	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	4.4	4.2	4.4	4.3	3.9	4.8	4.1	5.9	5.8	6.0	5.5	4.3	57.6
Shoshone	1.1	1.1	1.1	1.1	0.4	1.1	1.1	1.1	1.1	1.2	1.1	1.5	13.0
Buffalo Bill	4.1	1.6	1.7	1.7	1.5	1.7	5.4	13.2	12.7	13.1	11.1	8.4	76.2
Spirit Mtn.	0.8	0.0	0.0	0.0	0.0	0.0	1.6	2.8	2.8	3.0	2.8	2.6	16.4
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.	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.8	3.0	2.9	3.9	4.3	19.1
Yellowtail/2	28.0	25.4	26.1	25.8	22.7	25.5	20.2	26.0	25.5	27.4	27.0	24.2	303.6
	------	------	------	------	------	------	------	------	------	------	------	------	------
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	38.7	1.8	34.4	51.2	47.6	58.4	45.7	51.7	60.9	20.5	8.7	12.3	431.9
North Platte	15.8	22.1	22.7	22.7	20.6	30.5	51.4	110.1	112.9	129.1	109.6	44.3	691.8
Bighorn	39.6	32.8	33.3	32.9	28.5	33.1	35.4	53.7	54.9	57.4	55.1	47.0	503.5
	------	------	------	------	------	------	------	------	------	------	------	------	------
TOTAL GEN	95.4	59.1	92.8	109.3	99.7	124.5	136.0	219.4	233.4	211.4	175.4	104.6	1660.9
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	-67.0	-103.1	-84.3	-63.3	-37.3	-24.8	-40.4	34.7	22.4	-50.7	-35.9	-52.1	-501.6
	------	------	------	------	------	------	------	------	------	------	------	------	------
*	PROJECTED VALUES ARE HISTORIC AVERAGE FLOW THROUGH ENERGY												
**	PROJECTED VALUES ARE MARKETED ENERGY												

TABLE 4C

PICK-SLOAN MISSOURI BASIN PROGRAM WESTERN DIVISION POWER SYSTEM
WATER YEAR 2017 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.	7.3	2.8	2.5	2.3	2.1	2.7	3.6	9.6	17.7	18.9	12.6	7.1	89.2
Willow Cr. pump	0.2	0.4	0.0	0.0	0.0	0.0	2.2	5.0	4.9	1.6	0.6	0.3	15.2
Farr pump	2.2	0.0	2.4	3.9	3.6	4.1	2.0	0.4	0.0	0.0	1.2	2.3	22.1
Marys Lake	2.9	0.0	3.1	4.9	4.5	5.4	4.5	3.6	1.0	2.6	2.6	3.7	38.8
Estes	7.2	0.0	7.8	12.3	11.2	13.5	11.1	10.5	3.5	7.1	7.2	9.4	100.8
Pole Hill	11.5	0.0	12.6	20.3	18.4	23.1	21.5	21.6	24.2	25.5	0.0	0.0	178.7
Flatiron 1&2	13.4	0.0	14.8	22.6	21.3	27.7	25.1	26.1	29.7	16.9	0.0	0.0	197.6
Flatiron 3	0.1	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.2
Flatiron 3 pump	0.0	0.0	3.7	6.6	5.7	6.1	5.6	2.8	3.4	0.0	0.0	0.0	33.9
Big Thompson	0.6	0.0	0.0	0.0	0.0	0.0	0.0	2.1	3.2	3.8	2.0	1.3	13.0
Seminoe	5.7	5.5	5.7	5.7	5.1	15.9	32.4	33.5	31.9	32.3	25.2	8.4	207.3
Kortes	5.6	5.4	5.6	5.6	5.1	15.9	26.7	27.6	26.7	27.6	24.3	8.2	184.3
Fremont Canyon	0.4	7.5	7.4	7.4	6.7	16.0	45.8	47.3	45.8	47.3	47.3	16.5	295.4
Alcova	4.1	4.1	4.2	4.2	3.8	8.4	26.3	27.6	26.7	27.6	27.6	8.8	173.3
Glendo	0.0	0.0	0.0	0.0	0.0	0.0	25.5	27.0	26.4	25.3	21.9	16.3	142.4
Guernsey	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.8	3.7	3.8	3.8	3.4	21.9
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	4.4	4.3	4.5	4.4	4.0	8.9	10.6	10.8	11.4	11.9	11.7	7.0	93.9
Shoshone	1.1	1.1	1.1	1.1	0.4	1.1	2.2	2.2	2.2	2.2	2.2	1.1	18.0
Buffalo Bill	6.3	1.6	1.6	1.7	1.5	5.1	13.0	13.4	13.0	13.4	13.4	12.7	96.7
Spirit Mtn.	1.6	0.0	0.0	0.0	0.0	0.0	1.4	2.4	2.8	3.3	3.2	3.0	17.7
Diamond Cr. pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heart Mtn.	2.2	0.0	0.0	0.0	0.0	0.0	2.2	4.5	4.3	4.5	4.5	3.9	25.9
Yellowtail/2	29.1	31.6	32.4	31.8	27.8	36.4	63.2	75.3	72.9	75.3	58.3	41.8	575.9
	------	------	------	------	------	------	------	------	------	------	------	------	------
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	40.6	2.8	35.1	51.9	48.2	62.2	56.0	65.3	71.0	73.5	22.6	18.9	548.1
North Platte	15.8	22.5	22.9	22.9	20.7	56.2	160.1	166.8	161.2	163.9	150.1	61.6	1024.6
Bighorn	46.3	38.6	39.6	39.0	33.7	51.5	93.3	110.1	110.1	114.7	96.3	71.2	844.3
	------	------	------	------	------	------	------	------	------	------	------	------	------
TOTAL GEN	104.0	66.3	100.0	116.3	105.6	172.4	312.9	346.1	347.0	356.5	271.0	152.7	2450.5
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	-58.4	-96.0	-77.1	-56.3	-31.4	23.1	136.5	161.4	136.0	94.5	59.8	-3.9	288.0
	------	------	------	------	------	------	------	------	------	------	------	------	------
*	PROJECTED VALUES ARE HISTORIC AVERAGE FLOW THROUGH ENERGY												
**	PROJECTED VALUES ARE MARKETED ENERGY												

TABLE 5

COLORADO-BIG THOMPSON AND FRYINGPAN-ARKANSAS PROJECTS
ESTIMATED MAINTENANCE SCHEDULE FOR WATER YEAR 2017

	Task Name	Start	Finish
Big T Unit 1	2017 Annual Maintenance	Tue 1/3/17	Fri 2/10/17
Big T XFMR KW1A	2017 Annual Maintenance	Mon 1/9/17	Fri 1/20/17
Adams Tunnel	2017 Annual Inspection	Wed 11/1/17	Wed 11/15/17
Marys Powerplant	2017 Annual Maintenance	Wed 11/1/17	Fri 12/15/17
Estes Unit 1	2017 Annual Maintenance	Tue 1/3/17	Fri 2/10/17
Estes Unit 2	2017 Annual Maintenance	Mon 2/13/17	Fri 3/17/17
Estes Unit 3	2017 Annual Maintenance	Mon 3/27/17	Fri 4/28/17
Flatiron Unit 1	WAPA SWYD Maintenance	Mon 2/6/17	Fri 2/10/17
Flatiron SWYD KW1A	WAPA SWYD Maintenance	Mon 2/6/17	Fri 2/10/17
Flatiron Unit 2	WAPA SWYD Maintenance	Mon 2/13/17	Fri 2/17/17
Flatiron SWYD KW2A	WAPA SWYD Maintenance	Mon 2/13/17	Fri 2/17/17
Flatiron Unit 1	2017 Annual Maintenance	Tue 2/21/17	Fri 3/31/17
Flatiron SWYD KW1A	2017 Annual Maintenance	Mon 3/6/17	Fri 3/17/17
Flatiron Unit 2	2017 Annual Maintenance	Mon 4/17/17	Fri 5/26/17
Flatiron SWYD KW2A	2017 Annual Maintenance	Mon 5/1/17	Fri 5/12/17
Flatiron Unit 3	2017 Annual Maintenance	Tue 10/10/17	Fri 11/17/17
Green Mtn. Unit 1	2017 Annual Maintenance	Tue 1/17/17	Fri 2/24/17
Green Mtn. SWYD KZ1A	2017 Annual Maintenance	Mon 1/23/17	Fri 1/27/17
Green Mtn. Unit 2	2017 Annual Maintenance	Mon 2/27/17	Fri 4/7/17
Green Mtn. SWYD KZ2A	2017 Annual Maintenance	Mon 3/20/17	Fri 3/24/17
Pole Hill Unit G1	2017 Unit Annual Maintenance	Mon 7/31/17	Fri 9/8/17
Pole Hill XFMR K1A	2017 XFMR Annual Maintenance	Mon 8/14/17	Fri 8/25/17
Mt Elbert Unit 1	2017 Annual Maintenance		
Mt Elbert Units 1 & 2	DUAL OUTAGE - Troubleshooting & Testing Static Start Controllers	Mon 1/9/17	Wed 1/11/17
Mt Elbert Unit 2	2017 Annual Maintenance	Mon 2/6/17	Fri 4/14/17
Farr Pumping Plant Units 1, 2 and 3	WAPA SWYD Maintenance	Thu 6/1/17	Fri 6/30/17
CHFC 930 Section	Maitland Siphon Rehab	Tue 8/1/17	Thu 11/16/17

TABLE 6

WESTERN DIVISION - PICK-SLOAN MISSOURI BASIN PROGRAM

POWERPLANT DATA

Facility	No. Units	Capacity Each Unit (kWh)	Total Installed Capacity (kWh)	Normal Operating Head (ft)	Output at Rated Head (ft^3/s)
Green Mountain	2	13,000	26,000	192-262	1,660
Marys Lake	1	8,100	8,100	202-217	550
Estes	3	16,500	49,500	551-571	1,300
Pole Hill	1	33,250	33,250	830-838	550
Flatiron units #1 & #2	2	43,000	86,000	1,096 - 1,118	1,070
(Flatiron 1/)	1	8,500	8,500	158-287	440
Big Thompson	1	5,300	5,300	183- 184	350
Seminoe	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 Butte2/	2	800	1,600	-- --	---
Boysen	2	7,500	15,000	72-112	2,415
Shoshone3/	1	3,000	3,000	-- --	---
Buffalo Bill3/	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	----------	-------

TABLE 7

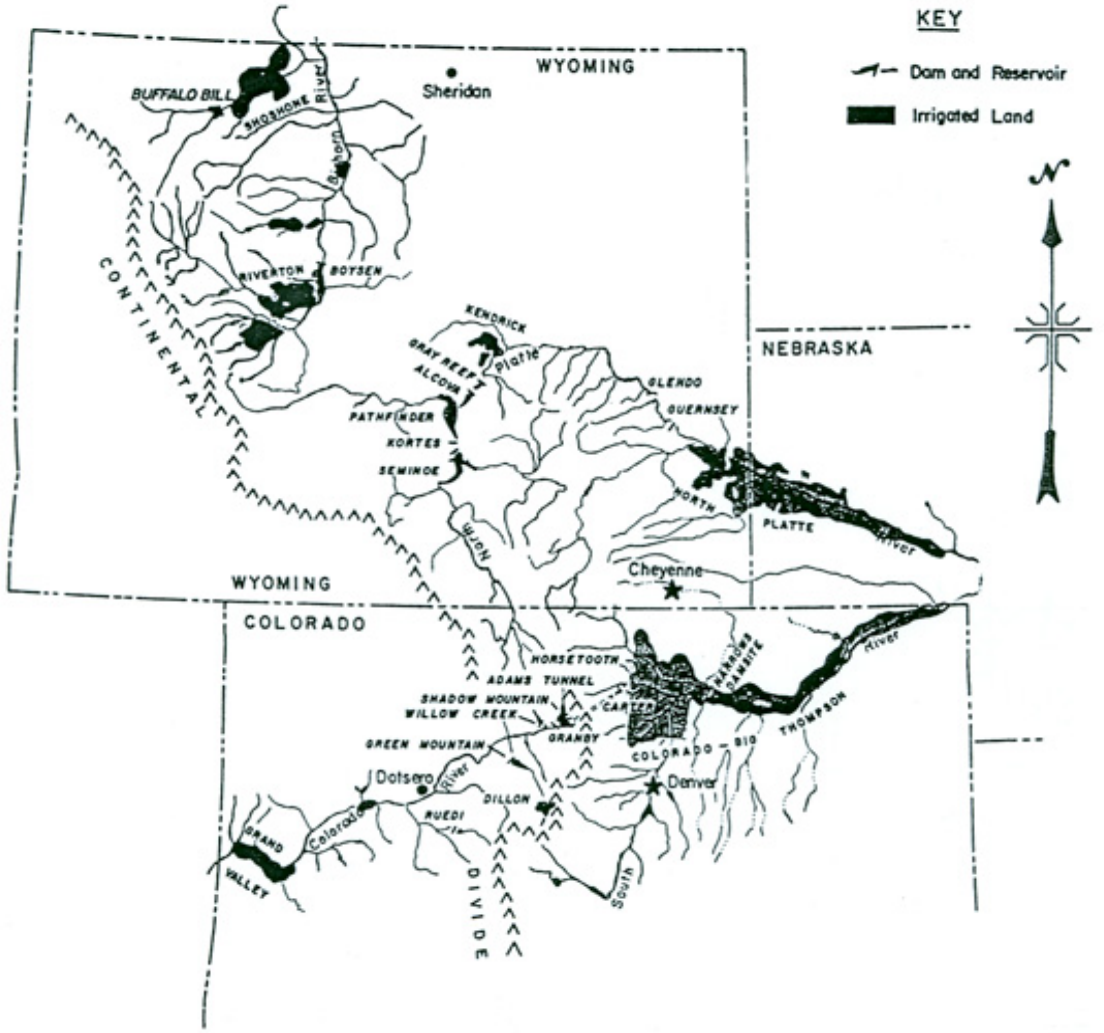
WESTERN DIVISION - PICK-SLOAN MISSOURI BASIN PROGRAM

PUMPING PLANT DATA

	Pumping Units			Plant Rating	
Facilities	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

APPENDIX B - EXHIBITS

EXHIBIT 1



PICK-SLOAN MISSOURI BASIN PROJECT

WESTERN DIVISION

WATER RESOURCE MAP

50 0 50 100

SCALE OF MILES

MAP NO. X-700-121

JUNE 1, 1976

EXHIBIT 2

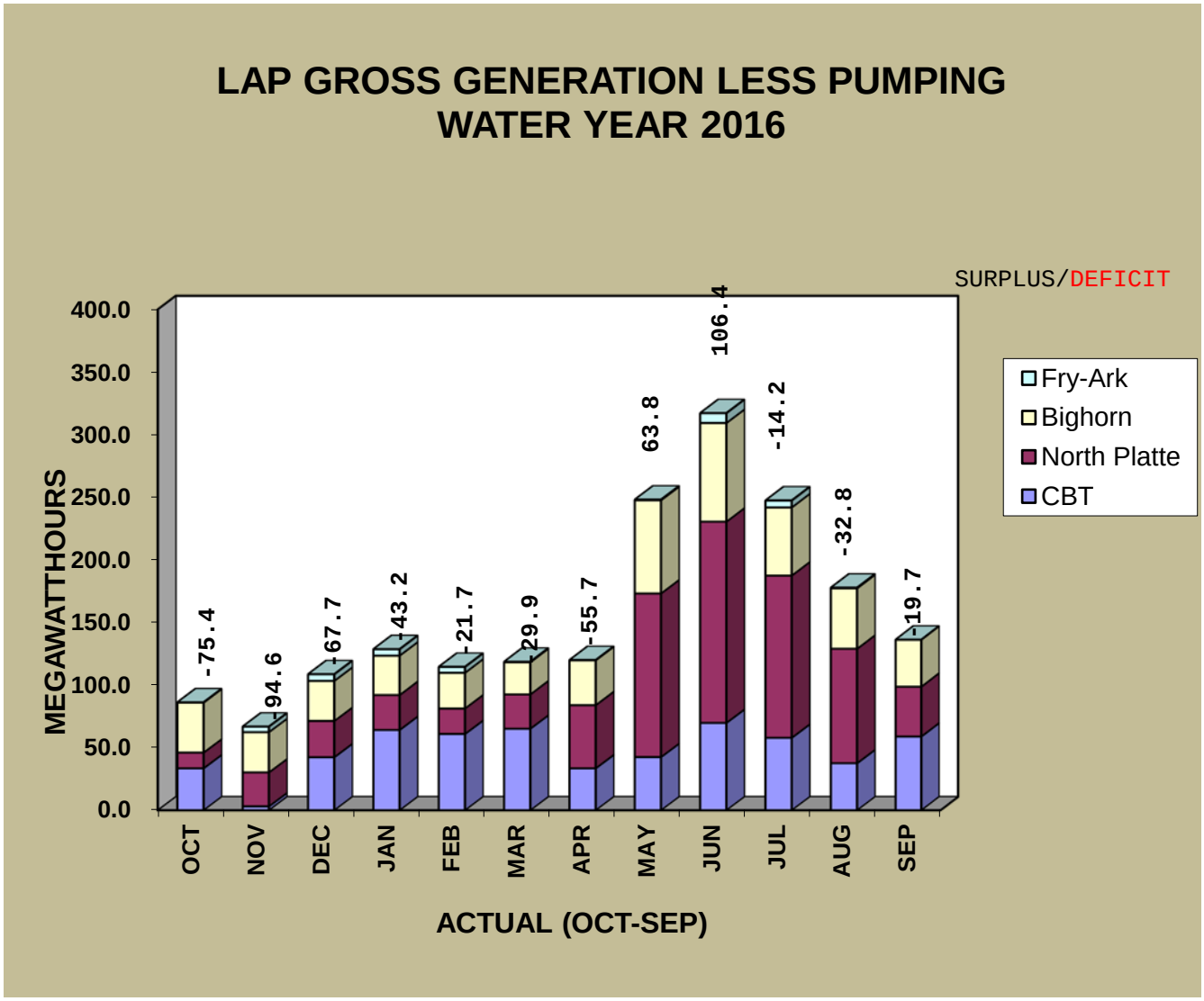

LAP GROSS GENERATION LESS PUMPING
WATER YEAR 2016
SURPLUS/DEFICIT
MEGAWATTHOURS
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-75.4
94.6
-67.7
-43.2
-21.7
-29.9
-55.7
63.8
106.4
-14.2
-32.8
-19.7
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ACTUAL (OCT-SEP)
Fry-Ark
Bighorn
North Platte
CBT

EXHIBIT 3A

PROJECTED LAP GROSS GENERATION LESS PUMPING
WATER YEAR 2017
FOR MOST PROBABLE INFLOW

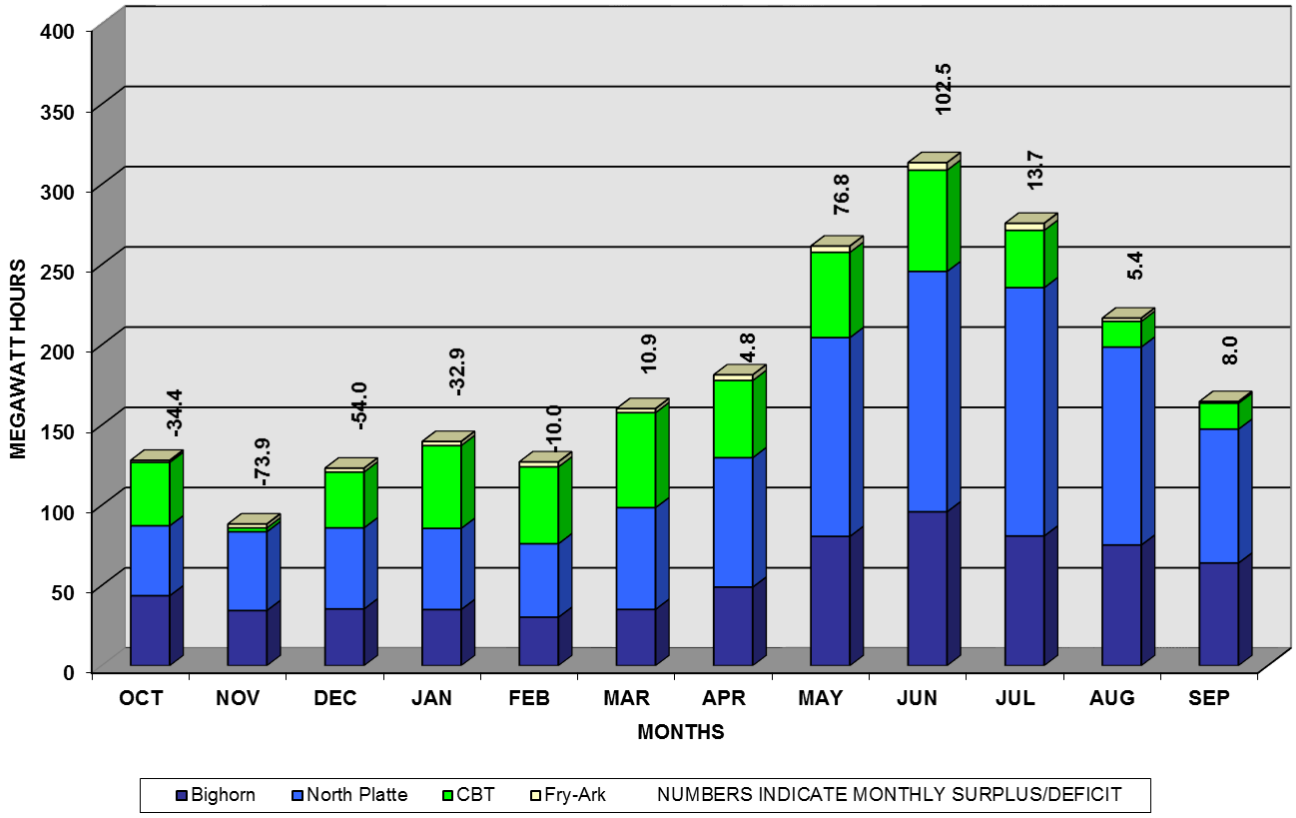


EXHIBIT 3B

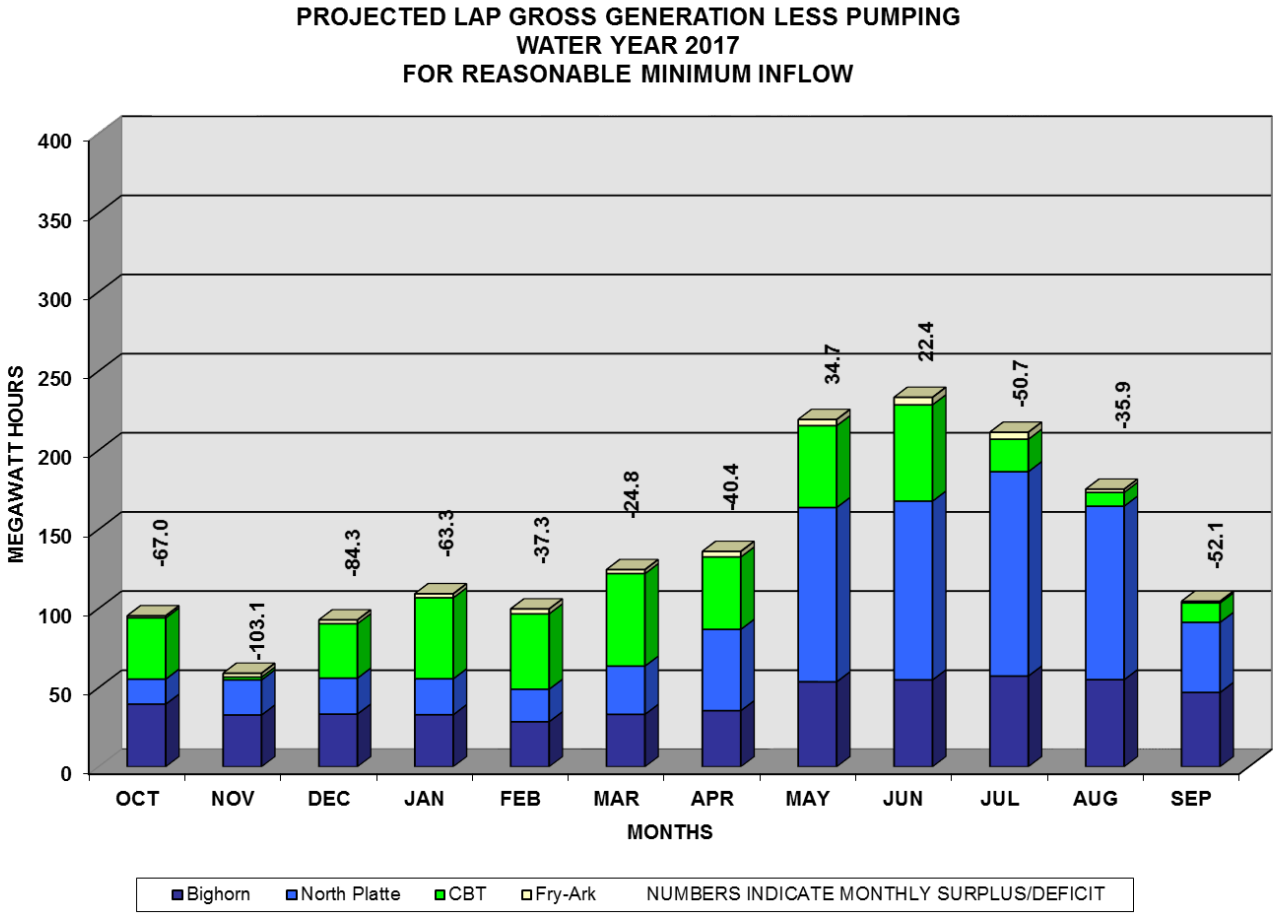
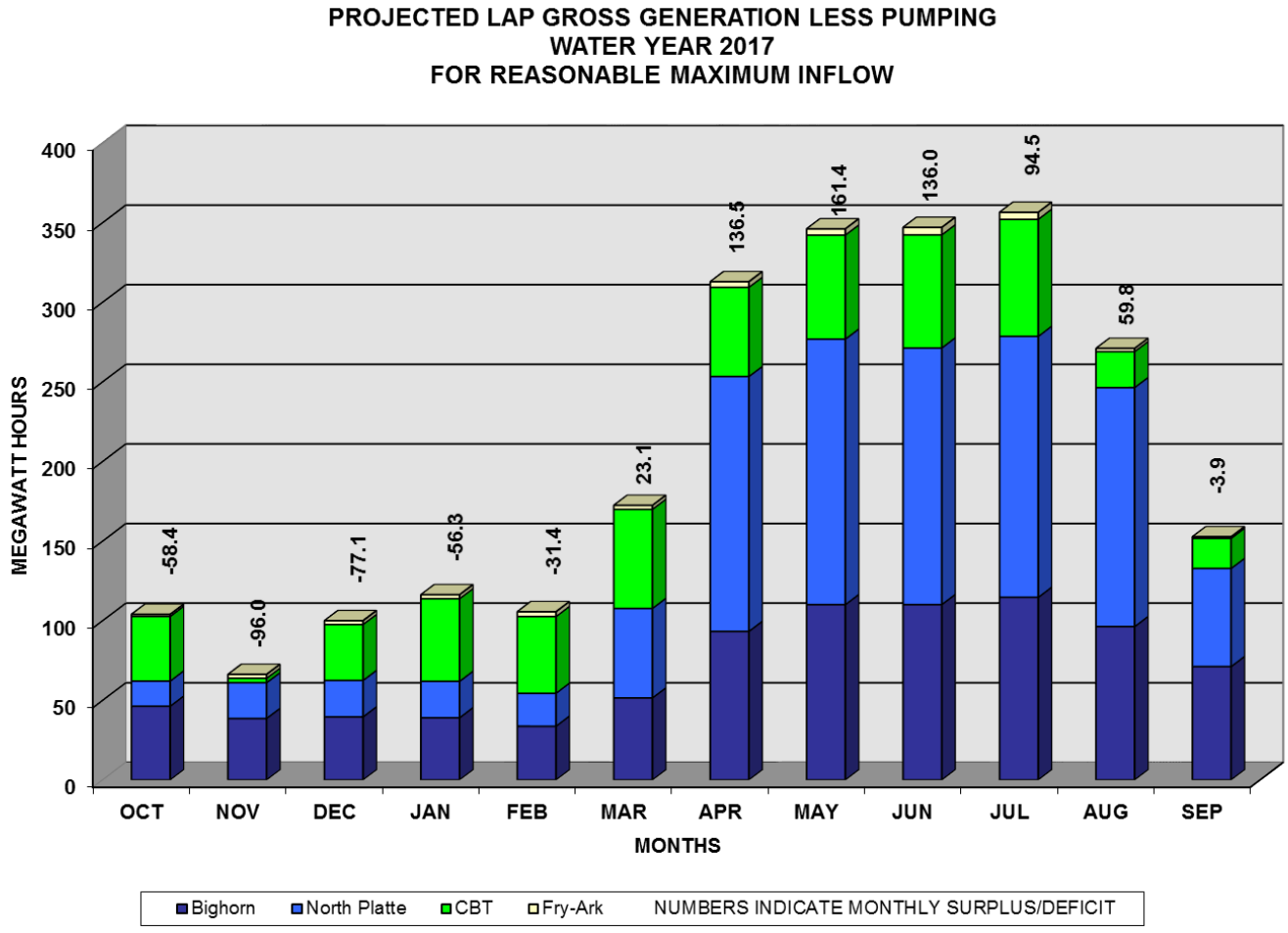

PROJECTED LAP GROSS GENERATION LESS PUMPING
WATER YEAR 2017
FOR REASONABLE MINIMUM INFLOW
MEGAWATT HOURS
400
350
300
250
200
150
100
50
0
-67.0
-103.1
-84.3
-63.3
-37.3
-24.8
-40.4
34.7
22.4
-50.7
-35.9
-52.1
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTHS
Bighorn
North Platte
CBT
Fry-Ark
NUMBERS INDICATE MONTHLY SURPLUS/DEFICIT

EXHIBIT 3C


PROJECTED LAP GROSS GENERATION LESS PUMPING
WATER YEAR 2017
FOR REASONABLE MAXIMUM INFLOW
MEGAWATT HOURS
400
350
300
250
200
150
100
50
0
-58.4
-96.0
-77.1
-56.3
-31.4
23.1
136.5
161.4
136.0
94.5
59.8
-3.9
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTHS
Bighorn
North Platte
CBT
Fry-Ark
NUMBERS INDICATE MONTHLY SURPLUS/DEFICIT