



— BUREAU OF —
RECLAMATION

Fryingpan-Arkansas Project

Summary of Actual Operations
Water Year 2020

Annual Operating Plans



Ruedi Reservoir, Colorado

Eastern Colorado Area Office
Missouri Basin Region

Mission Statements

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

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

Fryingpan-Arkansas Project

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Water Year 2020**

**Eastern Colorado Area Office
Missouri Basin Region**

Cover Photo: Morning view of Ruedi Reservoir in Colorado. Photo credit: Gary Barsness

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Contents

Page

Contents	iii
Project Highlights	1
Annual Operating Plan Fryingpan-Arkansas Project Water Year 2020	
Operation	4
General Overview	4
Project Features in Operation during Water Year 2020	4
Hydrologic Conditions and Weather Events in Water Year 2020	6
Report on Operations during Water Year 2020.....	7
A. Ruedi Reservoir	7
B. West Slope Collection System and Project Diversions.....	9
C. Twin Lakes Reservoir and Canal Company/Fryingpan-Arkansas Project Exchange.....	10
D. Turquoise Lake.....	10
E. Mt. Elbert Conduit/Halfmoon Creek Diversion	10
F. Twin Lakes/Mt. Elbert Forebay and Mt. Elbert Pumped-Storage Power Plant.....	11
G. Pueblo Reservoir.....	11
H. Storage Contracts	12
I. Project Water Sales and Deliveries.....	12
J. Reservoir Storage Allocation Data	12
K. Reservoir Evaporation and Precipitation	12
L. Flood Control Benefits	12
Appendix A: Tables.....	A-1
Appendix B: Exhibits.....	B-1
Appendix C: Twin Lakes Reservoir and Canal Company Exchange with Fryingpan-Arkansas Project Water	C-1
Twin Lakes Canal Company Exchange with Fryingpan-Arkansas Project Water WY2020.....	C-1
Twin Lake Tunnel Imports WY2020	C-3
Twin Lakes Canal Company Storage WY2020	C-4
Appendix D: Daily Discharge Records, Fryingpan-Arkansas Project Collection System	D-1
Carter Feeder Conduit near Norrie, CO.....	D-1
North Fryingpan River Feeder Conduit near Norrie, CO	D-2
South Fork Fryingpan River Feeder Conduit near Norrie, CO	D-3
Mormon Creek Feeder Conduit near Norrie, CO.....	D-4
North Cunningham Feeder Conduit near Norrie, CO.....	D-5
Middle Cunningham Feeder Conduit near Norrie, CO.....	D-6
Ivanhoe Creek Feeder Conduit near Norrie, CO	D-7

Lily Pad Creek Feeder Conduit near Norrie, CO	D-8
Granite Creek Feeder Conduit near Norrie, CO	D-9
No Name Creek Feeder Conduit near Norrie, CO	D-10
Midway Creek Feeder Conduit near Norrie, CO	D-11
Hunter Creek Feeder Conduit near Norrie, CO	D-12
Sawyer Creek Feeder Conduit near Norrie, CO	D-13
Chapman Gulch Feeder Conduit near Norrie, CO	D-14
Fryingpan River Feeder Conduit near Norrie, CO	D-15
Appendix E: Fryingpan-Arkansas Project Operating Principles	E-1

Project Highlights

Date	Event
August 16, 1962	Project authorized under Public Law 87-590.
August 1964	Construction began on Ruedi Dam.
November 2, 1965	Started excavating Charles H. Boustead Tunnel.
December 1965	Construction began on Sugar Loaf Dam.
April 15, 1968	Breached old Sugar Loaf Dam.
May 1968	Began storing water in Ruedi Reservoir.
June 15, 1969	Charles H. Boustead Tunnel "holed through".
July 1970	Construction began on Pueblo Dam - first contract.
May 16, 1972	Initial Project diversion from Chapman, South Fork, and Fryingpan diversion sites.
June 7, 1972	Initial diversion from Sawyer Creek.
July 1972	Construction began on Pueblo Dam - second contract.
July 1972	First sale of Project trans-mountain water.
January 9, 1974	Began storing water in Pueblo Reservoir.
May 6, 1974	Initial diversion from Lily Pad Creek.
May 4, 1976	Initial diversion from Ivanhoe Creek.
May 1977	First replacement water released from Ruedi Reservoir.
June 1977	First sale of water from Ruedi Reservoir.
November 22, 1977	Adopted the recommended bypass flow of 15 cfs or natural inflow, whichever is less on Lake Creek below Twin Lakes Dam.
June 1, 1979	Initial diversion from Middle Cunningham Creek.
June 4, 1979	Initial diversion from Mormon Creek.
June 14, 1979	Initial diversion from North Cunningham Creek.
May 8, 1980	Initial diversion from Hunter, Midway and No Name Creeks.
June 4, 1980	Initial diversion from North Fork and South Cunningham Creeks.

December 8, 1980	Federal Register notification of availability of water from Ruedi Reservoir.
April 28, 1981	Initial diversion from Carter Creek.
May 6, 1981	Initial diversion from Granite Creek.
June 1, 1981	Assume operation at Twin Lakes Dam.
June 23, 1981	Mt. Elbert Forebay filled.
September 29, 1981	Mt. Elbert Power Plant dedicated.
October 1, 1981	Mt. Elbert Unit #1 was made commercially available to Western Area Power Administration (WAPA) for their use.
May 5, 1982	Initial diversion from Halfmoon Creek.
July 29, 1982	Turquoise Lake filled for first time.
September 14, 1983	Initial diversion from south outlet works at Pueblo Dam for Pueblo West, CO.
August 9, 1984	Mt. Elbert Unit #2 was made commercially available to WAPA for their use.
May 24, 1985	Began storing water under Arkansas River Decree.
July 1, 1985	Initial diversion through Fountain Valley Conduit.
August 1985	Ruedi Hydroplant began operations.
November 27, 1985	Twin Lakes pipeline began operations.
May 7, 1986	Sugar Loaf Hydroplant began operations.
June 1986	Imports restricted due to high east slope storage.
November 10, 1987	Winter water storage decree approved and signed.
November 17, 1989	Initial release from Twin Lakes Reservoir for recreational benefits on the Arkansas River.
August 14, 1990	Initial release from Ruedi Reservoir for endangered fish (conservation flows pursuant to the biological opinion) in the Colorado River's "15-mile reach" for the U.S. Fish & Wildlife Service from water leased by the Colorado Water Conservation Board.
September 28, 1990	Dedication of Pueblo Fish Hatchery and the completion of construction on the Fryingpan-Arkansas Project ceremony.
November 1990	Final winter storage decree signed by court.
July 21, 1992	Dedication of Leadville Mine Drainage Tunnel Water Treatment Plant.

September 29, 1994	Transfer of Phase II of the Pueblo Fish Hatchery at Pueblo Reservoir to Colorado Division of Wildlife.
May 15, 1995	Final transfer of recreational facilities at Pueblo to the Department of Parks and Outdoor Recreation.
July 7, 1995	Began storing water under Arkansas River Decree.
July 18, 1995	All Project space filled with Project water. Imports curtailed.
July 1997	Reservoir level at Pueblo Reservoir restricted after a routine risk assessment of Pueblo Dam was completed and raised concern about the foundation below the spillway section of the dam.
May 1999	Pueblo Reservoir restriction lifted.
July 2000	Risk Analysis Study for Pueblo Dam completed.
July 11, 2000	Long-term contract between United States government and the Pueblo Board of Water Works executed.
September 11, 2001	As a result of the terrorist attacks on September 11, 2001, all Fryingpan-Arkansas Project facilities were closed to the public. The facilities remained closed until security measures to safeguard the federal investment were implemented. Reclamation has maintained a heightened level of security at Fry-Ark facilities since that time.
July 23, 2002	Initial release of water through Pueblo Board of Water Works South Outlet Works joint-use manifold.
September 12, 2007	Long-Term Contract between the United States Government and the city of Aurora executed.
May 2010	The upgrade to the control and monitoring system for the Fryingpan-Arkansas collection system was completed.
September 2012	Fiberoptic control of west slope systems from the east slope.
April 28, 2016	Southern Delivery System began water deliveries.
August 10, 2016	Lease of Power Privilege signed with SECWCD for the construction, operation, maintenance and replacement associated with hydropower at Pueblo Dam.
October 1, 2016	If and When Master Contract in effect.
May 14, 2019	Southeastern Colorado Conservancy District's James W. Broderick Hydropower Plant begins production of electricity at Pueblo Dam.

Annual Operating Plan Fryingpan-Arkansas Project Water Year 2020 Operation

General Overview

This is the 52nd annual operating plan (AOP) for the Fryingpan-Arkansas Project. The project, completed in 1990, imports spring snowmelt runoff from Colorado's west slope to the semi-arid Arkansas River Basin on Colorado's east slope. The project consists of federally owned dams, reservoirs, stream diversion structures, conduits, tunnels, pumping plants, a pumped-storage power plant, electric transmission lines, substations, and recreation facilities. These features are located in the Fryingpan River and Hunter Creek watersheds of the upper Colorado River Basin, and in the Arkansas River Basin in central and southeastern Colorado. The project provides water for irrigation, municipal and industrial use, hydroelectric power generation, recreation, and wildlife habitat. The project also provides for flood control.

The project was authorized under Public Law 87-590 on August 16, 1962. This law provides that the project will be operated under the operating principles adopted by the state of Colorado on April 30, 1959, as amended on December 30, 1959, and on December 9, 1960. These operating principles were published as House Document 130 (87th Congress, 1st Session), and are included in Appendix E.

This annual operating plan is a summary of the actual project operation in Water Year (WY) 2020 (October 1, 2019 through September 30, 2020). All tables can be found in Appendix A and all exhibits can be found in Appendix B.

Project Features in Operation during Water Year 2020

Ruedi Dam and Reservoir are located on the Fryingpan River, a tributary of the Roaring Fork River, on Colorado's west slope about 13 miles east of Basalt, Colorado. Ruedi Reservoir has a total capacity of 102,373 acre-feet (AF) at a water surface elevation of 7,766.0 feet. The reservoir is operated on an annual cycle. Steady winter releases draft the reservoir such that it can be filled with the spring runoff, while releases to the Fryingpan River are maintained below the safe channel capacity. The reservoir provides replacement water for out-of-priority depletions to the Colorado River by the project as well as water for west slope irrigation, municipal, and industrial uses on a contractual basis. The reservoir is also operated to provide for recreation and wildlife habitat.

The west slope collection system, located upstream of Ruedi Reservoir in the upper Fryingpan River and Hunter Creek watersheds, is a series of 16 stream diversion structures and eight tunnels. The system collects spring snowmelt runoff for diversion, by gravity, to the inlet of the Charles H. Boustead Tunnel. The Boustead Tunnel conveys water collected by the west slope collection system under the continental divide and into Turquoise Lake on the east slope. The tunnel is 5 miles long and has a water conveyance capacity of 945 cubic feet per second (cfs).

Sugarloaf Dam and Turquoise Lake are located on Lake Fork Creek, a tributary of the Arkansas River, about 5 miles west of Leadville, Colorado. The lake has a total capacity of 129,398 AF at a water surface elevation of 9,869.4 feet. The lake is operated to provide regulation of both project and non-project water imported from the west slope. Turquoise Lake is operated on an annual cycle. The lake is drafted through the Mt. Elbert Conduit during the winter to provide adequate space for the spring imports of west slope water. Most of the native inflow from Lake Fork Creek is impounded in the lake and returned to the Arkansas River via the Mt. Elbert Conduit, the Mt. Elbert Power Plant, and Twin Lakes. The lake is also operated to provide for recreation and wildlife habitat.

The Mt. Elbert Conduit conveys project, non-project, and native Lake Fork Creek water from Turquoise Lake to Twin Lakes. The conduit is 10.7 miles long and has a water conveyance capacity of 370 cfs. Native water from Halfmoon Creek is also added to the conduit and returned to the Arkansas River from Twin Lakes Dam. The Sugarloaf Powerplant, a privately-operated electrical generation station, runs when water is being conveyed from Sugarloaf Dam to the Mt. Elbert Conduit. All conduit flow which reaches the Mt. Elbert Forebay is used to generate electricity at the Mt. Elbert Power Plant as it is delivered to Twin Lakes.

The Mt. Elbert Powerplant is a pumped-storage facility located on the shore of Twin Lakes. It has two 100-megawatt turbine generators, which can be reversed and used as 340,000 horsepower pumps. In addition to being used to generate energy with the Mt. Elbert Conduit flow, the plant is used to follow daily peak power loads. This load following is accomplished by pumping water to the Mt. Elbert Forebay, an 11,143 AF regulating pool at the terminus of the Mt. Elbert Conduit, from Twin Lakes during off-peak load hours using surplus or low-cost energy. That water is then returned to Twin Lakes through the turbines during peak load hours, along with the Mt. Elbert Conduit flow. The energy generated at the plant is transmitted and marketed by the Western Area Power Administration (WAPA), with the revenues applied to the repayment of the project.

Twin Lakes Dam and Twin Lakes are located on Lake Creek, a tributary of the Arkansas River, about 13 miles south of Leadville, Colorado. Twin Lakes has a surveyed capacity of 140,855 AF at a maximum water surface elevation of 9,200 feet. Water surface elevations are measured with respect to mean sea level. The morning glory spillway is slightly tilted which reduces the active storage space by 498 AF. During construction, the dead pool (the elevation below which water cannot physically be released) was determined to be 9,157.5 feet (54,955 AF). In the 1980's, a 24 inch bypass line used during construction was grouted. At that time, the dead pool was increased to 9,162.8 feet (63,324 AF). The inactive pool has remained at the same elevation of 9,168.7 feet (72,939 AF) so there has not been a change in operations.

The reservoir is operated to regulate both project and non-project water imported from the west slope. The project water stored in the reservoir is released to Lake Creek for storage in Pueblo Reservoir during the winter months in anticipation of spring imports from the west slope. Native inflows into Turquoise Lake, native flows diverted from Halfmoon Creek, and native inflows into Twin Lakes, are all released to Lake Creek from the Twin Lakes Dam. The cities of Colorado Springs and Aurora take direct delivery of water from the reservoir through their Otero Pipeline. The operation of Twin Lakes also provides for recreation and wildlife habitat.

Pueblo Dam and Reservoir are located on the Arkansas River 6 miles west of the city of Pueblo, Colorado. The reservoir is the terminal storage facility for the Fryingpan-Arkansas Project and has a

total storage capacity of 338,374 AF at a water surface elevation of 4,898.7 feet. The upper 26,990 AF of storage space are reserved exclusively for flood control at all times, while an additional 66,011 AF of space are reserved for flood control seasonally from April 15 through November 1. Pueblo Reservoir is also operated to provide for recreation, wildlife habitat, and flood control.

Non-project water may be stored in the reservoir under contract with Reclamation. Native inflow can be stored when the project storage right is in priority or under the winter water storage program (WWSP). Under the WWSP, irrigators are permitted to store native Arkansas River water in Pueblo Reservoir during the winter months for an additional supply of irrigation water, on the condition that the water is used before May 1 of the next water year.

Most water deliveries are made from the reservoir. The Fountain Valley Authority, the Pueblo West Metropolitan District, and the Pueblo Board of Water Works can take direct delivery of municipal water through the south outlet works and joint-use manifold. The Southern Delivery System (SDS) in the north outlet works delivers water to the Fountain Valley Authority and Pueblo West. A direct irrigation delivery is made to the Bessemer Ditch. Releases from the fish hatchery outlet at Pueblo Dam support the Pueblo Fish Hatchery. Other project and contract deliveries are made as releases to the Arkansas River for diversion downstream.

Southeastern Colorado Water Conservancy District (SECWCD) signed a Lease of Power Privilege contract with the Bureau to construct, operate, maintain and replace the James W. Broderick Hydroelectric Power Plant below Pueblo Dam. The design uses an existing hydropower bifurcation at the North Outlet Works Southern Delivery System connection. Initial construction began in 2017 and power production began in 2019.

Hydrologic Conditions and Weather Events in Water Year 2020

Precipitation over the Fryingpan watershed above Ruedi Reservoir was below average for most of WY2020, with only four months of the year experiencing above average precipitation. Cumulative precipitation started out the year slightly above average in October but immediately dropped in November. December and January precipitation were slightly below average. In February, precipitation increased significantly ending the month at 138 percent of average. February was the only month of the year in which above average precipitation gains were logged in the basin. Monthly precipitation returned to below average with March, April and May all in the lower 70 percent of average range. June precipitation was slightly above average at 109 percent. July through September precipitation was reduced significantly to 37 percent of average. Total annual precipitation finished out at 81 percent of average at the end of September.

Snowpack accumulation in the watershed above Ruedi was different from precipitation in that it remained above median for almost the entire snow accumulation season. Snow accumulation started out high in October when the basin received over double the median for the month. In November snow accumulation slowed and ended the month slightly below median. December and January returned to above median snow accumulation with the basin group of SNOTEL sites (Fremont Pass, Ivanhoe, Nast Lake, and Kiln) at 120 percent of median by the end of January. February snow accumulation increased to 138 percent of median and was the largest monthly gain in snow for the year. By April, temperatures started warming and the snowpack started melting. In both April and May the snowpack decreased faster than median rates with April losing snowpack at

roughly double the normal rate. On average, all the SNOTEL sites in the basin group melted at the normal melt out date in June.

The monthly temperatures measured at the group of SNOTEL sites in the upper Fryingpan River basin were above average for every month except two in WY2020. The average temperature in October started out the year at 3.8 degrees below average. Temperatures climbed in November through January to nearly two degrees above average. February cooled down slightly to 0.1 degree below average but after February every month in the year was a least 1 degree above average. March, April and May warmed up significantly with May the warmest at 4.2 degrees above average. The summer months were also above average temperature and August was the warmest month of the year at 4.9 degrees above average. The seasons of the year averaged the following temperature deviations above average: autumn 0.5, winter 1.1, spring 2.7, and summer 2.5 degrees above average. Overall, the year averaged 1.7 degrees above average.

The combined Snow Water Equivalents (SWE) compared to average is shown in Exhibit 1.

Import forecasts were made using the VIPER software package developed for the Fryingpan-Arkansas Project by the National Weather Service. The forecasts for 2020 were: February 60,000 AF; March 64,000 AF; April 68,000 AF; May 62,000 AF. The total water through the Boustead Tunnel was 53,241 AF. Total imports in WY2020 were 51,034 AF.

The collection system began diverting in mid-April. Runoff began April 30. See Exhibit 6.

The flows through Boustead Tunnel can only be stored when the flow at the Fryingpan River near Thomasville gage is above a minimum flow. When flows are below the minimum, any imports from seepage are considered developed water and treated as native. Water is diverted from the collection system to the Fryingpan to keep the flow above minimum. See Exhibit 5 for flows at the Thomasville gage.

Report on Operations during Water Year 2020

A. Ruedi Reservoir

Ruedi Reservoir started out WY2020 with a storage content of 83,527 AF, which was 96 percent of average. During the winter months Ruedi Reservoir was drawn down, reaching its lowest storage content for the year of 64,671 AF on April 27. In mid-October the release from Ruedi was decreased to the winter flow target of 80 cfs and was held at this rate until the spring. All releases during the winter months were made through the city of Aspen's hydroelectric powerplant.

In January the first forecast of undepleted inflow to Ruedi was computed. This forecast indicated that the runoff resulting from snowpack melt in the basin would be 90 percent of average. This would result in an April through July runoff volume of 125,000 AF. Reservoir storage was below average at the beginning of the month and modeling of reservoir futures based on the January undepleted inflow forecast suggested that continuing at the current release of 80 cfs would fill the reservoir by July so no changes to releases were made in January.

In February the undepleted inflow forecast increased to 102 percent of average. This predicted that the undepleted inflow volume would be 142,000 AF for the April through July period. Reservoir

storage was slightly above average and the release from the reservoir was held constant at 80 cfs throughout the month. Modeling of reservoir futures based on the February undepleted inflow forecast indicated that the reservoir would fill by July at the current release rate. Therefore, no changes were made to the reservoir release in February.

In March the undepleted inflow forecast increased to 109 percent of average. The resulting April through July undepleted inflow volume forecast was 152,000 AF. The reservoir storage continued to be above average and on the first day of the month it was at 105 percent of average. Modeling of reservoir futures indicated that the reservoir would fill under the most probable assumptions and that there was not a significant risk of exceeding the safe channel capacity below the reservoir once the reservoir filled. Therefore, no changes were made to the reservoir release in March.

In April the forecast of undepleted inflow for the April through July period predicted 145,000 AF; 104 percent of average. This forecast projected that Ruedi would fill under all three cases: the maximum reasonable, the most probable, and the minimum reasonable cases. Runoff started increasing and releases were adjusted to compensate for the increase in inflow. Reservoir outflow was increased to 160 cfs the first week of the month. By the middle of the month releases were increased for two days to 205 cfs to help increase flows in the 15-Mile reach of the Colorado River for endangered fish recovery purposes. By the end of the month the reservoir reached the spring runoff target of 65,000 AF.

On April 23, the annual conference call took place as required under stipulation 1.7.b of Case Numbers 02CW324 & 02CW365 between the following parties: Reclamation, Southeastern, Division 5, and the Colorado River District. A decision was made to allow Reclamation to divert the additional 45 cfs through the Boustead Tunnel and but not to exceed 945 cfs in accordance with stipulation 5 of the above mentioned case numbers. It was further decided to revisit this decision when the May and June forecasts became available. The representatives for each of the parties were Bureau of Reclamation: Tim Miller, Terry Dawson, Michael Holmberg; Southeastern Colorado Water Conservancy District: Garrett Markus; Colorado Division of Water Resources: James Heath, Alan Martellaro; Colorado River District: Don Meyer, John Currier.

Runoff continued to increase in early May and releases from the reservoir were decreased slightly from 162 cfs to 137 cfs. The most probable forecast of undepleted inflow dropped from the April forecast down to 128,000 AF; 92 percent of average, for the April through July period. This forecast indicated that the reservoir would fill under all three modeling scenarios. However, because of the drop in forecasted volume, the models projected that there would not be enough water to make Coordinated Reservoir Operations (CROS) releases for the 15-Mile reach of the Colorado River.

In June the forecast of remaining inflow decreased significantly, with the April through July volume at 110,000 AF, 78 percent of average. This forecast projected that Ruedi Reservoir would not fill under both the most probable, and minimum reasonable model assumptions. As a result, on June 3 the Colorado River District placed a call on the Ruedi senior fill right with the State of Colorado Division of Water Resources. After this call was placed, the Boustead Tunnel was limited to 900 cfs of Fryingpan River diversions and Ruedi Reservoir release was reduced to the minimum flow of 115 cfs.

Depleted inflows to Ruedi Reservoir, during the runoff season, were below average for every month of WY2020. The total depleted inflow volume for the April through July runoff period was 59,605

AF which was 69 percent of average and was the tenth smallest runoff volume for the period of record starting in 1975. Reservoir storage reached a maximum physical content of 96,915 AF on July 17. This storage content represented 95 percent of the total capacity of the reservoir.

Ruedi Reservoir was in priority and allowed to store inflow from the first of the water year through July 29, and at the end of the year from October 26 through October 31. Outside this period, Ruedi was required to pass all inflow, make contract releases, and provide replacement releases to the Colorado River. Ruedi Reservoir released 367 AF of water for out of priority Boustead Tunnel diversions and 3,692 AF for regular contracts. An additional 1,205 AF of contract water was released for an exchange at Wolford Reservoir (18 AF) and a lease of water for power generation at the Grand Valley Powerplant (1,187 AF). Ruedi operations are summarized in Table 1 and Exhibit 1.

Ruedi Reservoir did not participate in the Coordinated Reservoir Operations (CROS) for WY2020 so inflow was not bypassed for that purpose. Beginning on April 15 contracted water was released to support fish recovery efforts in the 15-Mile reach of the Colorado River. These contract releases are designed to enhance habitat for endangered fish in the Colorado River. A total of 28,279.5 AF of water was released between April 15 and October 27 for fish recovery. This total includes 11,367 AF water leased from the Colorado River District, Ute Water, Town of Palisade and Garfield County. Of this total leased water, the Colorado Water Trust (CWT) leased 999 AF from the Colorado River District (released 8/1-8/18 and 9/5-9/8) and 188 AF from Town of Palisade (released 9/5-9/8). The primary purpose for this lease was power generation at the Grand Valley Powerplant located above the 15-Mile reach of the Colorado River. This non-consumptive water used by the powerplant also provided additional flow in the 15-Mile Reach of the Colorado River for endangered fish recovery purposes. The Colorado Water Conservation Board (CWCB) leased the remaining 9,830 AF from Ute Water (released 7/20-8/23 and 10/5-10/26) and 350 AF from Garfield County (released 7/17-7/19). In addition to the leased water for fish recovery, there was 6,500 AF of water donated to these efforts. There was 1,500 AF from the Colorado River District (released 9/30-10/4) and 5,000 AF from ExxonMobil (released 9/17-9/29). Lastly there was 10,412.5 AF of regular fish recovery water which included both 5,000 AF from the firm endangered fish pool (released 4/15-4/17 and 8/24-9/4) and 5,412.5 AF from the mitigation fish pool (released 9/5-9/16). The 5,000 AF from 4-out-of-5 fish pool was not available because Ruedi did not physically fill. Ruedi releases for contracts are shown in Table 2. Releases for endangered fish are shown in Table 3.

Ruedi ended the water year at a water surface elevation of 7,740.80 feet which equates to 70,686 AF of storage. That volume was 82 percent of average for September 30.

Monthly precipitation data and evaporation data for Ruedi can be found in Exhibit 2 and Exhibit 3 respectively.

B. West Slope Collection System and Project Diversions

The most probable forecasts for the first of February, March, April, and May were 60,000 AF, 64,000 AF, 68,000 AF, and 62,000 AF, respectively. There was a significant decrease in precipitation along with warm temperatures leading to early snowmelt in May. Runoff peaked in June with most of the flow coming from snow melt and very little from precipitation. A total of 53,241 AF of the water diverted through the Boustead Tunnel and 51,034 AF of water was stored during the

WY2020. The imports were 91 percent of average for the period from WY1972 to WY2020 and 82 percent of the May 2020 forecast.

The import of project water through the Boustead Tunnel began on April 30. The maximum mean daily import through Boustead Tunnel was 872 cfs on June 3. The diversion system was shut down in late August. Boustead Tunnel seepage was recorded whenever the Fry-Ark Project water rights were in priority. There was 379 AF of Busk-Ivanhoe water conveyed through the Boustead Tunnel. The daily discharge record for the diversion structures is included as Appendix D. An aggregated discharge record is shown on Table 4. The 48 years of accumulated imports total 2,605,000 AF, for an unimpeded average of 53,186 AF per year, shown on Table 5. A plot of the Boustead Tunnel imports during WY2020 is shown on Exhibit 6.

Ruedi Reservoir was not forecast to fill this year. In accordance with stipulations in Cases 02CW324 and 02CW354 and the November 30, 2004 agreement between the Southeastern Colorado Water Conservancy District, Colorado River Water Conservation District and the Twin Lakes Reservoir Canal Company, imports through the Boustead Tunnel were constrained to a maximum of 900 cfs plus half of the daily flow from Hunter system.

C. Twin Lakes Reservoir and Canal Company/Fryingpan-Arkansas Project Exchange

The Bureau of Reclamation is obligated to maintain minimum stream flows in the Roaring Fork River by the authorizing legislation of the project. This is accomplished through an exchange of water with the Twin Lakes Reservoir and Canal Company (TLCC). The total amount of the TLCC exchange was 2,736 AF. The operating criteria and the monthly summary of the exchange are shown in Appendix C.

D. Turquoise Lake

On September 30, 2019 there was 123,167 AF of water (elevation 9,865.89 feet) stored in Turquoise Lake, 115 percent of average. The high point for storage was 123,290 AF of water (elevation 9,865.84 feet) on October 1. Releases made down Lake Fork Creek and to Twin Lakes drafted Turquoise Lake to 55,355 AF (9,822.80 feet), the lowest storage of the water year, on March 30. On 30 September 2020 there was 94,026 AF, an elevation 9,848.73 feet, 88 percent of average. Exhibits 8 and 9 show the precipitation and pan evaporation at Turquoise Lake. Table 6 and Exhibit 10 depict the monthly operation of Turquoise Lake during WY2020.

There was 22,646 AF imported through Homestake Tunnel to the account in Turquoise Reservoir.

Busk-Ivanhoe imports through the Carlton Tunnel stored totaled 3,201 AF. Pueblo Water received 1,426 AF and the City of Aurora received 1,775 AF. Pueblo Water imported 379.22 AF from Ivanhoe Reservoir through the Boustead Tunnel.

Project water imports through the Boustead Tunnel totaled 51,034 AF.

Exhibit 6, Exhibit 7, and Exhibit 8 show the monthly imports through the Boustead, Homestake, and Busk- Ivanhoe Tunnels, respectively.

E. Mt. Elbert Conduit/Halfmoon Creek Diversion

Between October 1 and May 20 there was 97,669 AF of water released from Turquoise Lake through the sleeve valves. The Sugarloaf Powerplant was not in operation this year. There was

14,948 AF of water released through the bypass and into the conduit. There was 8,606 AF of water diverted from Halfmoon Creek and conveyed through the Mt. Elbert Conduit to the Mt. Elbert Forebay, and subsequently to Twin Lakes through the Mt. Elbert Power Plant. An additional 3,920 AF of water were released into the conduit from Turquoise Lake for use by the Leadville Federal Fish Hatchery. The water was diverted from the conduit and delivered to the hatchery. It was then returned to the Arkansas River and stored in Pueblo Reservoir. The conduit operations are shown on Exhibit 11.

F. Twin Lakes/Mt. Elbert Forebay and Mt. Elbert Pumped-Storage Power Plant

On September 30, 2019 Twin Lakes had 125,747 AF of water stored (elevation 9194.28 feet) and Mt. Elbert Forebay had 8,459 AF in storage (elevation 9635.58 feet). The Twin Lakes/Mt. Elbert Forebay combined water storage reached a low point of 95,472 AF on August 18 and was at its high point of 134,812 on November 2. The storage in Twin Lakes was 102,976 AF and in Mt. Elbert Forebay was 9,637 AF of water (Twin Lakes elevation 9,184.41 feet and Mt. Elbert Forebay elevation 9,637.04 feet) on September 30, 2020, 90 percent of average.

Twin Lakes releases to Lake Creek were made throughout the winter to pass the flow of the Mt. Elbert Conduit, and to transfer project water stored in Twin Lakes to Pueblo Reservoir.

The native inflow of 3,428 AF was stored in the Twin Lakes Canal Company (TLCC) storage space from November 15 through March 15 as winter water storage. A total of 56,852 AF of project water was released to Lake Creek during this time.

Exhibit 13 and Exhibit 14 show the precipitation and pan evaporation at Twin Lakes. Table 7 and Exhibit 15 depict the monthly operation of Twin Lakes during WY2020.

A total of 10,000 AF of Fry-Ark Project water was made available at the beginning of the season to the Upper Arkansas Voluntary Flow Management Program (VFMP) to augment flows at the gage Arkansas River at Wellsville. Colorado Parks and Wildlife called for 10,000 AF this year with an extra 56 AF supplied to help with the ramp-down. While the Bureau of Reclamation is not a party to the agreement between Southeastern Colorado Water Conservancy District; Colorado Parks and Wildlife; Chafee County; the Arkansas River Outfitters Association; and Trout Unlimited, project water is made available when possible to support this agreement. Water may be called for year-round to support fishery flows at 250 cfs. Recreational flows may be provided from July 1 to August 15 if the flow at Wellsville is below 700 cfs. The flows may be ramped down to prevent streambank erosion after August 15.

A total of 235,516 megawatt hours of energy was generated at the power plant, with 709,806 AF of water; 128,964 AF came through the Mt. Elbert Conduit; and 580,842 AF were first pumped to the Mt. Elbert Forebay from Twin Lakes during off-peak electric demand hours. Table 8 depicts the monthly power plant operation for WY2020.

G. Pueblo Reservoir

The water storage content of Pueblo Reservoir was 194,289 AF (elevation 4,867.83 feet) on September 30, 2019. The reservoir reached a high point in storage of 270,654 AF (elevation 4,880.12 feet) on March 13 and a low point on September 30, 2020 of 180,328 AF (elevation 4,864.01), 113 percent of average.

A total of 44,778 AF of native inflow was stored in the reservoir under the Pueblo Reservoir winter water storage program between November 15, 2019 and March 14, 2020. This program allows agricultural entities to store native flows during the winter to be used during irrigation season. On March 14, it was distributed to agricultural entities.

Table 9 and Exhibit 19 depict Pueblo Reservoir monthly operations during the 2020 Water Year. The 2019-2020 winter water storage is shown on Exhibit 16, and the winter water releases are shown on Exhibit 17. The precipitation and evaporation at the reservoir are shown on Exhibits 15 and 18. Project water releases are shown on Exhibit 20.

H. Storage Contracts

There were four long term storage contracts for a total of 57,416 AF of non-project storage in Turquoise Lake, one for 54,452 AF in Twin Lakes and eight for 55,062.5 AF in Pueblo Reservoir.

There were seven short-term if-and-when contracts totaling 4,430 AF for 1-year contracts in Pueblo Reservoir. Sixteen contracts totaling 6,575 AF under the Master Contract were used for “if-and-when” storage. Under "if and when" contracts, non-project water may be stored in project storage space if that storage space is not required for project water.

I. Project Water Sales and Deliveries

There was 42,588 AF of Fryingspan-Arkansas Project water made available to the Southeastern Colorado Water Conservancy District (SECWCD) during WY2020 for allocation based on an expected import of 84,000 AF. SECWCD allocates less than the forecast project yield in May. Municipal and industrial accounts received a total of 14,332 AF and agricultural accounts received 28,256 AF. After it was determined the import forecast would be met, SECWCD released an additional 20,412 for allocation to agricultural entities. Entities called for 34,531 AF of project and 3,281 project carryover water during the year.

Evaporation reduced the project carryover water in storage by 9,579 AF. By the end of the water year, the District had 14,759 AF of 2020 allocated water and 117,860 AF of carryover water remaining in storage. The monthly release of project water from Pueblo Reservoir is shown on Exhibit 19.

J. Reservoir Storage Allocation Data

Table 10 presents the reservoir storage allocations for the five project reservoirs.

K. Reservoir Evaporation and Precipitation

Table 12 and Table 13 present the monthly average evaporation and precipitation at the four weather stations near project facilities. When an evaporation pan is not in service and a reservoir is not completely ice-covered, the daily water surface evaporation is computed using seasonal evaporation factors. Those factors are listed in Table 11. The assumption is that there is no evaporation from a reservoir water surface when ice completely covers the reservoir.

L. Flood Control Benefits

The Army Corps of Engineers estimated that the operations at Ruedi Reservoir or Pueblo Reservoir during WY2020 did not prevent flood damages.

Table 14 shows the historic flood control benefits provided by Pueblo and Ruedi Dams.

Appendix A: Tables

Table 1: Ruedi Reservoir Operations WY2020Fryingpan-Arkansas Project (Units = 1,000 AF).

Month	Inflow	Evaporation	Outflow	End of Month Content	Water Surface Elevation (feet)
OCT 19	3.40	0.10	8.20	79.20	7,740.80
NOV 19	3.00	0.00	4.40	77.80	7,739.20
DEC 19	2.80	0.00	5.10	75.60	7,736.54
JAN 20	2.60	0.00	5.00	73.30	7,733.62
FEB 20	2.30	0.00	4.60	71.00	7,730.74
MAR 20	2.10	0.00	5.30	68.30	7,727.34
APR 20	2.50	0.00	8.50	65.00	7,722.95
MAY 20	22.00	0.20	8.40	78.40	7,739.91
JUN 20	23.00	0.60	5.70	95.10	7,758.58
JUL 20	9.10	0.60	8.30	95.40	7,758.83
AUG 20	3.70	0.40	14.70	84.00	7,746.34
SEP 20	3.10	0.20	16.20	70.70	7,730.38
Total* (acre-feet)	79,759	2,018	94,277		

*Rounding may introduce discrepancies between monthly and yearly totals

Table 2: Ruedi Reservoir Releases for Contracts WY 2020 (Units = AF).

Month	Round 1	Round 2: Non-fish	Round 2: Fish
OCT 19			
NOV 19			
DEC 19			
JAN 20			
FEB 20			
MAR 20			
APR 20			171
MAY 20			
JUN 20			
JUL 20	20	91	1,781
AUG 20	357	2,051	7,648
SEP 20	245	1,276	12,195
OCT 20	143	713	5,298
Total	765	4,132	27,093

Table 3: Ruedi Reservoir Releases for Endangered Fish WY2020.

FRYINGPAN-ARKANSAS PROJECT
 RUEDI RESERVOIR
 RELEASES FOR ENDANGERED FISH
 WATER YEAR 2020
 April

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN RIVER GAGE BELOW DAM (CFS)	RUEDI CALLED OUT? (Y= YES) (N= NO)	REQUIRED MIN FLOW BELOW RUEDI w/o FISH REL (CFS)	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
WED	4/1/2020	7,727.15	68,182	64	-	130	4	134	N	39	-	-	1,644
THU	4/2/2020	7,726.99	68,060	76	7	130	4	134	N	39	-	-	1,517
FRI	4/3/2020	7,726.77	67,892	62	7	140	4	144	N	39	-	-	1,610
SAT	4/4/2020	7,726.53	67,709	66	7	151	4	155	N	39	-	-	1,664
SUN	4/5/2020	7,726.29	67,526	66	7	151	4	155	N	39	-	-	1,604
MON	4/6/2020	7,726.06	67,352	70	7	151	5	155	N	39	-	-	1,362
TUE	4/7/2020	7,725.86	67,200	82	7	151	4	155	N	39	-	-	1,260
WED	4/8/2020	7,725.70	67,079	98	7	151	4	155	N	39	-	-	1,219
THU	4/9/2020	7,725.57	66,981	109	7	151	4	155	N	39	-	-	1,246
FRI	4/10/2020	7,725.47	66,905	120	7	151	4	155	N	39	-	-	1,166
SAT	4/11/2020	7,725.37	66,830	120	7	151	4	155	N	39	-	-	1,167
SUN	4/12/2020	7,725.28	66,762	124	7	151	5	155	N	39	-	-	1,149
MON	4/13/2020	7,725.13	66,649	101	7	151	5	155	N	39	-	-	1,180
TUE	4/14/2020	7,724.94	66,506	86	7	151	5	155	N	39	-	-	1,051
WED	4/15/2020	7,724.73	66,348	92	7	165	5	169	N	39	14	28	810
THU	4/16/2020	7,724.46	66,146	99	7	194	5	199	N	39	43	113	706
FRI	4/17/2020	7,724.15	65,913	70	7	179	5	184	N	39	29	171	742
SAT	4/18/2020	7,723.94	65,757	78	7	150	5	155	N	39	-	171	753
SUN	4/19/2020	7,723.75	65,615	86	7	150	5	155	N	39	-	171	672
MON	4/20/2020	7,723.56	65,473	86	7	150	5	155	N	39	-	171	699
TUE	4/21/2020	7,723.36	65,324	75	-	150	4	154	N	39	-	171	644
WED	4/22/2020	7,723.17	65,183	79	-	150	4	154	N	39	-	171	597
THU	4/23/2020	7,723.01	65,064	90	-	150	4	154	N	39	-	171	554
FRI	4/24/2020	7,722.85	64,945	91	-	150	4	155	N	39	-	171	560
SAT	4/25/2020	7,722.68	64,819	87	-	150	4	155	N	39	-	171	633
SUN	4/26/2020	7,722.55	64,723	100	-	149	5	154	N	39	-	171	687
MON	4/27/2020	7,722.48	64,671	122	-	149	5	153	N	39	-	171	769
TUE	4/28/2020	7,722.54	64,716	171	-	148	5	153	N	39	-	171	900
WED	4/29/2020	7,722.71	64,841	212	-	149	5	154	N	39	-	171	1,228
THU	4/30/2020	7,722.95	65,020	239	-	150	6	155	N	110	-	171	1,819
Averages		7,724.53	66,206	101	5	151	4	156		41	3	84	1,054
Totals (acft)				5,989	271	9,011	267	9,279		2,462	171	171	62,701

NOTES: Releases of water to support 15-Mile Reach target started 4/15 and ceased 10/27. A total of 28,279.5 acre-feet* was released to support Recovery Program target flows.
 *The Colorado Water Trust leased 1,187 acre-feet with primary purpose for power generation at the Grand Valley Powerplant this is not accounted for in the table but included in the total.

FRYINGPAN-ARKANSAS PROJECT
 RUEDI RESERVOIR
 RELEASES FOR ENDANGERED FISH
 WATER YEAR 2020
 May

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	ROCKY FORK CREEK (CFS)	FRYINGPAN RIVER GAGE BELOW DAM (CFS)	RUEDI CALLED OUT? (Y= YES) (N= NO)	REQUIRED MIN FLOW BELOW RUEDI w/o FISH REL (CFS)	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	FISH PALISADE GAGE (CFS)
FRI	5/1/2020	7,723.29	65,272	280	3	149	6	155	N	110	-	171	2,548
SAT	5/2/2020	7,723.78	65,637	335	3	148	7	155	N	110	-	171	3,408
SUN	5/3/2020	7,724.25	65,988	328	3	147	9	157	N	110	-	171	4,303
MON	5/4/2020	7,724.75	66,363	339	3	147	14	161	N	110	-	171	4,662
TUE	5/5/2020	7,725.27	66,754	347	3	147	15	162	N	110	-	171	4,884
WED	5/6/2020	7,725.68	67,064	307	3	148	15	163	N	110	-	171	4,287
THU	5/7/2020	7,726.06	67,352	296	3	148	15	162	N	110	-	171	4,047
FRI	5/8/2020	7,726.38	67,595	274	3	148	14	162	N	110	-	171	4,052
SAT	5/9/2020	7,726.68	67,823	267	3	148	14	162	N	110	-	171	3,913
SUN	5/10/2020	7,726.97	68,045	263	3	148	14	162	N	110	-	171	3,817
MON	5/11/2020	7,727.48	68,435	336	3	135	15	150	N	110	-	171	3,994
TUE	5/12/2020	7,728.15	68,950	394	3	130	17	147	N	110	-	171	4,658
WED	5/13/2020	7,728.75	69,415	367	3	130	18	148	N	110	-	171	5,051
THU	5/14/2020	7,729.27	69,819	337	3	130	19	148	N	110	-	171	5,043
FRI	5/15/2020	7,729.73	70,177	315	3	131	18	149	N	110	-	171	5,122
SAT	5/16/2020	7,730.17	70,522	308	3	131	18	149	N	110	-	171	5,115
SUN	5/17/2020	7,730.65	70,899	325	3	132	19	150	N	110	-	171	5,150
MON	5/18/2020	7,731.30	71,411	393	3	131	22	153	N	110	-	171	5,620
TUE	5/19/2020	7,732.10	72,046	454	3	130	26	156	N	110	-	171	6,677
WED	5/20/2020	7,733.00	72,765	496	3	130	28	158	N	110	-	171	7,518
THU	5/21/2020	7,733.79	73,399	453	3	130	28	158	N	110	-	171	7,654
FRI	5/22/2020	7,734.42	73,908	390	3	130	27	157	N	110	-	171	7,115
SAT	5/23/2020	7,735.02	74,395	380	4	131	26	157	N	110	-	171	6,500
SUN	5/24/2020	7,735.53	74,810	344	4	131	25	156	N	110	-	171	6,200
MON	5/25/2020	7,735.96	75,162	312	4	132	23	155	N	110	-	171	5,756
TUE	5/26/2020	7,736.33	75,465	288	4	132	22	154	N	110	-	171	5,234
WED	5/27/2020	7,736.73	75,793	301	4	131	23	154	N	110	-	171	5,008
THU	5/28/2020	7,737.24	76,214	347	4	131	25	156	N	110	-	171	5,262
FRI	5/29/2020	7,737.99	76,835	448	4	131	28	159	N	110	-	171	6,168
SAT	5/30/2020	7,738.95	77,634	538	4	131	32	163	N	110	-	171	7,393
SUN	5/31/2020	7,739.91	78,438	540	4	131	35	166	N	110	-	171	9,079
Averages		7,730.82	71,109	358	3	136	20	156		110	-	171	5,330
Totals (acft)				22,015	209	8,388	1,223	9,611		6,764	-	171	327,750

NOTES: Releases of water to support 15-Mile Reach target started 4/15 and ceased 10/27. A total of 28,279.5 acre-feet* was released to support Recovery Program target flows.
 *The Colorado Water Trust leased 1,187 acre-feet with primary purpose for power generation at the Grand Valley Powerplant this is not accounted for in the table but included in the total.

FRYINGPAN-ARKANSAS PROJECT
 RUEDI RESERVOIR
 RELEASES FOR ENDANGERED FISH
 WATER YEAR 2020
 June

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL	ROCKY	FRYINGPAN	RUEDI	REQUIRED	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE FISH RELEASE (AC-FT)	PALISADE GAGE (CFS)
						RESERVOIR RELEASE (CFS)	FORK CREEK (CFS)	RIVER GAGE BELOW DAM (CFS)	CALLED OUT? (Y= YES) (N= NO)	MIN FLOW BELOW RUEDI w/o FISH REL (CFS)			
MON	6/1/2020	7,740.92	79,290	569	9	131	37	168	N	110	-	171	10,776
TUE	6/2/2020	7,742.00	80,208	600	9	128	41	169	N	110	-	171	11,488
WED	6/3/2020	7,742.89	80,969	493	9	100	44	143	N	110	-	171	11,280
THU	6/4/2020	7,743.72	81,684	462	9	92	43	135	N	110	-	171	10,672
FRI	6/5/2020	7,744.48	82,341	423	9	82	41	124	N	110	-	171	10,041
SAT	6/6/2020	7,745.52	83,247	545	9	79	42	121	N	110	-	171	9,445
SUN	6/7/2020	7,746.64	84,229	584	9	79	40	120	N	110	-	171	10,107
MON	6/8/2020	7,747.28	84,793	373	9	80	37	117	N	110	-	171	8,409
TUE	6/9/2020	7,747.96	85,395	392	9	80	36	115	N	110	-	171	7,032
WED	6/10/2020	7,748.59	85,955	372	9	80	33	113	N	110	-	171	6,273
THU	6/11/2020	7,749.12	86,428	329	9	81	29	110	N	110	-	171	5,398
FRI	6/12/2020	7,749.68	86,929	346	10	84	25	108	N	110	-	171	4,721
SAT	6/13/2020	7,750.36	87,540	403	10	86	23	109	N	110	-	171	4,440
SUN	6/14/2020	7,751.00	88,117	390	10	89	23	112	N	110	-	171	4,666
MON	6/15/2020	7,751.61	88,669	377	10	89	22	111	N	110	-	171	4,850
TUE	6/16/2020	7,752.16	89,170	354	10	92	21	113	N	110	-	171	4,530
WED	6/17/2020	7,752.71	89,672	360	10	97	20	117	N	110	-	171	4,004
THU	6/18/2020	7,753.25	90,166	356	10	97	19	116	N	110	-	171	3,680
FRI	6/19/2020	7,753.77	90,644	347	10	97	19	115	N	110	-	171	3,438
SAT	6/20/2020	7,754.26	91,096	335	10	97	18	115	N	110	-	171	3,188
SUN	6/21/2020	7,754.76	91,558	340	10	97	17	114	N	110	-	171	2,864
MON	6/22/2020	7,755.23	91,995	328	10	99	15	114	N	110	-	171	2,662
TUE	6/23/2020	7,755.69	92,423	327	10	101	11	113	N	110	-	171	2,411
WED	6/24/2020	7,756.16	92,862	334	10	102	11	114	N	110	-	171	2,366
THU	6/25/2020	7,756.60	93,274	325	10	107	12	119	N	110	-	171	2,295
FRI	6/26/2020	7,757.05	93,697	329	10	106	12	119	N	110	-	171	2,452
SAT	6/27/2020	7,757.46	94,083	311	10	106	12	118	N	110	-	171	2,739
SUN	6/28/2020	7,757.86	94,461	305	10	105	13	117	N	110	-	171	2,912
MON	6/29/2020	7,758.26	94,840	305	10	104	13	117	N	110	-	171	2,746
TUE	6/30/2020	7,758.58	95,144	268	10	105	12	117	N	110	-	171	2,584
Averages		7,751.19	88,363	386	10	96	25	120		110	-	171	5,482
Totals (acft)				22,976	572	5,698	1,468	7,166		6,546	-	171	326,220

NOTES: Releases of water to support 15-Mile Reach target started 4/15 and ceased 10/27. A total of 28,279.5 acre-feet* was released to support Recovery Program target flows.
 *The Colorado Water Trust leased 1,187 acre-feet with primary purpose for power generation at the Grand Valley Powerplant this is not accounted for in the table but included in the total.

FRYINGPAN-ARKANSAS PROJECT
 RUEDI RESERVOIR
 RELEASES FOR ENDANGERED FISH
 WATER YEAR 2020
 July

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL	ROCKY	FRYINGPAN	RUEDI	REQUIRED	ENDANGERED	CUMULATIVE	PALISADE
						RESERVOIR RELEASE (CFS)	FORK CREEK (CFS)	RIVER GAGE BELOW DAM (CFS)	CALLED OUT? (Y= YES) (N= NO)	MIN FLOW BELOW RUEDI w/o FISH REL (CFS)			
WED	7/1/2020	7,758.71	95,268	176	9	104	12	117	N	110	-	171	2,378
THU	7/2/2020	7,758.85	95,401	185	9	109	7	116	N	110	-	171	2,042
FRI	7/3/2020	7,758.98	95,525	180	9	109	7	116	N	110	-	171	1,816
SAT	7/4/2020	7,759.15	95,687	200	9	109	7	116	N	110	-	171	1,612
SUN	7/5/2020	7,759.32	95,850	200	9	109	8	117	N	110	-	171	1,439
MON	7/6/2020	7,759.47	95,993	190	9	108	7	115	N	110	-	171	1,472
TUE	7/7/2020	7,759.59	96,108	176	9	109	7	116	N	110	-	171	1,395
WED	7/8/2020	7,759.71	96,223	177	9	110	7	117	N	110	-	171	1,352
THU	7/9/2020	7,759.80	96,309	161	9	109	8	116	N	110	-	171	1,140
FRI	7/10/2020	7,759.89	96,396	160	9	108	8	115	N	110	-	171	984
SAT	7/11/2020	7,759.97	96,472	153	9	105	10	115	N	110	-	171	862
SUN	7/12/2020	7,760.05	96,549	152	9	104	11	115	N	110	-	171	753
MON	7/13/2020	7,760.14	96,636	155	9	102	13	115	N	110	-	171	703
TUE	7/14/2020	7,760.24	96,732	163	9	105	10	115	N	110	-	171	631
WED	7/15/2020	7,760.33	96,818	162	9	109	6	115	N	110	-	171	587
THU	7/16/2020	7,760.40	96,885	151	9	107	7	115	N	110	-	171	644
FRI	7/17/2020	7,760.43	96,915	165	9	141	6	147	N	110	36	243	621
SAT	7/18/2020	7,760.39	96,876	142	9	152	6	158	N	110	47	336	754
SUN	7/19/2020	7,760.33	96,818	129	9	149	9	158	N	110	47	429	636
MON	7/20/2020	7,760.26	96,751	119	9	144	14	158	N	110	47	523	549
TUE	7/21/2020	7,760.16	96,655	104	9	144	15	158	N	110	47	616	492
WED	7/22/2020	7,760.05	96,549	104	9	148	11	159	N	110	47	709	471
THU	7/23/2020	7,759.96	96,463	121	9	155	5	159	N	110	47	802	491
FRI	7/24/2020	7,759.87	96,376	127	9	161	4	166	N	110	53	908	470
SAT	7/25/2020	7,759.75	96,261	134	9	183	4	187	N	110	74	1,055	525
SUN	7/26/2020	7,759.68	96,194	158	9	183	5	187	N	110	74	1,202	568
MON	7/27/2020	7,759.57	96,089	138	9	183	5	187	N	110	74	1,348	674
TUE	7/28/2020	7,759.43	95,955	125	9	183	4	187	N	110	74	1,495	799
WED	7/29/2020	7,759.26	95,792	110	9	183	5	188	N	110	74	1,642	672
THU	7/30/2020	7,759.07	95,611	121	9	203	4	208	Y	125	80	1,801	503
FRI	7/31/2020	7,758.83	95,382	102	9	208	4	213	Y	107	76	1,952	609
Averages		7,759.73	96,243	150	9	137	8	144		110	29	587	924
Totals (acft)				9,202	562	8,402	469	8,870		6,788	1,781	1,952	56,813

NOTES: Releases of water to support 15-Mile Reach target started 4/15 and ceased 10/27. A total of 28,279.5 acre-feet* was released to support Recovery Program target flows.
 *The Colorado Water Trust leased 1,187 acre-feet with primary purpose for power generation at the Grand Valley Powerplant this is not accounted for in the table but included in the total.

FRYINGPAN-ARKANSAS PROJECT
 RUEDI RESERVOIR
 RELEASES FOR ENDANGERED FISH
 WATER YEAR 2020
 August

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RESERVOIR RELEASE (CFS)	FRYINGPAN		RUEDI	REQUIRED	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE	
							ROCKY FORK CREEK (CFS)	RIVER GAGE BELOW DAM (CFS)	CALLED OUT? (Y= YES) (N= NO)	MIN FLOW BELOW RUEDI w/o FISH REL (CFS)		FISH RELEASE (AC-FT)	FISH PALISADE GAGE (CFS)
SAT	8/1/2020	7,758.58	95,144	95	7	209	4	213	Y	100	51	2,052	552
SUN	8/2/2020	7,758.31	94,888	87	7	209	4	213	Y	91	55	2,161	454
MON	8/3/2020	7,758.04	94,632	86	6	208	4	212	Y	89	55	2,270	454
TUE	8/4/2020	7,757.78	94,385	90	6	208	4	212	Y	94	55	2,379	495
WED	8/5/2020	7,757.48	94,102	71	6	208	4	211	Y	75	55	2,488	480
THU	8/6/2020	7,757.18	93,819	72	6	208	4	212	Y	76	55	2,597	463
FRI	8/7/2020	7,756.87	93,528	68	6	209	4	212	Y	72	55	2,707	416
SAT	8/8/2020	7,756.56	93,237	69	6	209	3	213	Y	72	55	2,816	396
SUN	8/9/2020	7,756.23	92,927	63	6	212	3	215	Y	66	62	2,939	443
MON	8/10/2020	7,755.89	92,610	66	6	220	3	223	Y	70	80	3,098	536
TUE	8/11/2020	7,755.52	92,264	67	6	235	3	238	Y	70	80	3,257	490
WED	8/12/2020	7,755.17	91,939	61	6	219	3	222	Y	65	80	3,415	468
THU	8/13/2020	7,754.80	91,595	51	6	218	3	221	Y	54	80	3,574	487
FRI	8/14/2020	7,754.43	91,253	49	6	216	5	221	Y	55	80	3,733	473
SAT	8/15/2020	7,754.06	90,911	48	6	214	6	220	Y	54	80	3,891	464
SUN	8/16/2020	7,753.70	90,580	54	6	215	4	219	Y	58	80	4,050	394
MON	8/17/2020	7,753.33	90,240	50	6	215	4	220	Y	54	80	4,209	350
TUE	8/18/2020	7,752.96	89,900	52	6	217	4	221	Y	56	88	4,383	346
WED	8/19/2020	7,752.57	89,544	44	6	217	4	221	Y	48	130	4,641	333
THU	8/20/2020	7,752.10	89,115	55	6	265	4	269	Y	59	200	5,038	317
FRI	8/21/2020	7,751.56	88,624	43	6	284	3	287	Y	46	200	5,434	352
SAT	8/22/2020	7,751.03	88,144	50	6	286	3	289	Y	53	200	5,831	342
SUN	8/23/2020	7,750.49	87,657	47	6	286	3	289	Y	50	200	6,228	302
MON	8/24/2020	7,749.96	87,180	52	6	286	3	289	Y	55	200	6,625	307
TUE	8/25/2020	7,749.43	86,705	45	6	279	3	281	Y	48	200	7,021	294
WED	8/26/2020	7,748.92	86,249	54	7	277	3	279	Y	56	200	7,418	297
THU	8/27/2020	7,748.38	85,768	55	6	292	3	294	Y	58	220	7,854	269
FRI	8/28/2020	7,747.83	85,280	55	6	295	3	297	Y	57	220	8,291	245
SAT	8/29/2020	7,747.33	84,838	78	6	295	3	297	Y	80	220	8,727	254
SUN	8/30/2020	7,746.86	84,423	90	6	293	3	296	Y	93	220	9,163	330
MON	8/31/2020	7,746.34	83,965	80	6	292	4	296	Y	84	220	9,600	472
Averages		7,753.22	90,176	63	6	242	3	245		66	124	4,861	396
Totals (acft)				3,862	388	14,865	214	15,080		4,077	7,648	9,600	24,348

NOTES: Releases of water to support 15-Mile Reach target started 4/15 and ceased 10/27. A total of 28,279.5 acre-feet* was released to support Recovery Program target flows.
 *The Colorado Water Trust leased 1,187 acre-feet with primary purpose for power generation at the Grand Valley Powerplant this is not accounted for in the table but included in the total.

FRYINGPAN-ARKANSAS PROJECT
 RUEDI RESERVOIR
 RELEASES FOR ENDANGERED FISH
 WATER YEAR 2020
 September

DAY	DATE	ELEV. (FT)	STORAGE (AC-FT)	INFLOW (CFS)	EVAP. (CFS)	TOTAL RELEASE (CFS)	FRYINGPAN		RUEDI	REQUIRED	ENDANGERED FISH RELEASE (CFS)	CUMULATIVE	
							ROCKY FORK CREEK (CFS)	RIVER GAGE BELOW DAM (CFS)	CALLED OUT? (Y= YES) (N= NO)	MIN FLOW BELOW RUEDI w/o FISH REL (CFS)		FISH RELEASE (AC-FT)	FISH PALISADE GAGE (CFS)
TUE	9/1/2020	7,745.85	83,536	79	4	292	4	296	Y	83	220	10,036	508
WED	9/2/2020	7,745.33	83,081	67	4	292	3	296	Y	70	220	10,473	447
THU	9/3/2020	7,744.79	82,611	57	4	291	3	294	Y	60	220	10,909	381
FRI	9/4/2020	7,744.25	82,142	57	4	290	3	293	Y	60	220	11,345	327
SAT	9/5/2020	7,743.69	81,658	50	4	291	3	294	Y	53	170	11,682	318
SUN	9/6/2020	7,743.12	81,167	45	4	289	4	293	Y	49	170	12,020	314
MON	9/7/2020	7,742.53	80,660	31	4	283	4	287	Y	35	170	12,357	322
TUE	9/8/2020	7,741.96	80,173	40	4	282	4	286	Y	45	214	12,781	422
WED	9/9/2020	7,741.38	79,680	44	4	290	4	294	Y	49	220	13,217	770
THU	9/10/2020	7,740.84	79,222	64	4	291	4	295	Y	68	220	13,653	833
FRI	9/11/2020	7,740.32	78,783	72	4	290	4	294	Y	76	220	14,090	872
SAT	9/12/2020	7,739.85	78,387	94	4	290	4	294	Y	98	220	14,526	774
SUN	9/13/2020	7,739.37	77,985	90	3	290	4	294	Y	95	220	14,963	643
MON	9/14/2020	7,738.81	77,517	73	3	306	4	310	Y	77	240	15,439	593
TUE	9/15/2020	7,738.20	77,009	60	3	313	4	317	Y	64	245	15,925	515
WED	9/16/2020	7,737.57	76,486	53	3	313	4	317	Y	57	245	16,411	485
THU	9/17/2020	7,736.93	75,958	51	3	314	4	318	Y	55	245	16,897	552
FRI	9/18/2020	7,736.29	75,432	50	3	312	5	317	Y	55	245	17,382	557
SAT	9/19/2020	7,735.65	74,908	51	3	312	5	317	Y	56	245	17,868	522
SUN	9/20/2020	7,735.00	74,379	48	3	311	5	316	Y	53	245	18,354	507
MON	9/21/2020	7,734.35	73,851	49	3	311	5	316	Y	54	245	18,840	496
TUE	9/22/2020	7,733.78	73,391	38	3	267	5	272	Y	43	210	19,256	462
WED	9/23/2020	7,733.34	73,037	45	3	220	2	222	Y	47	167	19,587	424
THU	9/24/2020	7,732.92	72,700	41	3	207	3	210	Y	44	155	19,894	437
FRI	9/25/2020	7,732.91	72,693	41	3	207	2	210	Y	43	155	20,202	386
SAT	9/26/2020	7,732.12	72,062	41	3	207	2	209	Y	43	155	20,509	339
SUN	9/27/2020	7,731.70	71,728	43	3	208	2	210	Y	45	155	20,816	399
MON	9/28/2020	7,731.29	71,404	47	3	207	2	210	Y	49	155	21,124	443
TUE	9/29/2020	7,730.84	71,048	45	3	221	2	223	Y	47	166	21,454	451
WED	9/30/2020	7,730.38	70,686	45	3	224	2	227	Y	47	172	21,795	498
Averages		7,737.84	76,779	54	3	274	4	278		57	205	16,127	500
Totals (acft)				3,199	206	16,307	216	16,523		3,415	12,195	21,795	29,748

NOTES: Releases of water to support 15-Mile Reach target started 4/15 and ceased 10/27. A total of 28,279.5 acre-feet* was released to support Recovery Program target flows.
 *The Colorado Water Trust leased 1,187 acre-feet with primary purpose for power generation at the Grand Valley Powerplant this is not accounted for in the table but included in the total.

Table 4: Fryingpan- Arkansas Project Transmountain Diversions WY2020 (Units = AF).

	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
South Fork	27.0	3,115.3	3,786.7	95.6	0.0	0.0	7,024.6
No Name	0.0	993.5	1,003.3	0.0	0.0	0.0	1,996.8
Midway	3.7	1,521.2	2,594.7	136.7	0.0	0.0	4,256.3
Hunter	0.0	1,592.8	2,498.6	26.8	0.0	0.0	4,118.1
Sawyer	7.5	398.1	746.4	58.3	0.0	0.0	1,210.3
Chapman ¹	40.2	1912.9	1866.2	0.0	0.0	0.0	3,761.0
Subtotal	85.9	9,931.9	13,242.3	317.4			22,367.1
Carter	33.5	1,271.2	1,776.8	304.7	0.0	0.0	3,386.2
North Fork	1.6	354.3	526.4	65.9	0.0	0.0	948.1
Mormon	31.3	1,489.8	1,936.9	133.8	0.0	0.0	3,591.8
North Cunningham	8.5	728.7	866.4	19.8	0.0	0.0	1,623.5
Middle Cunningham ²	0.8	662.7	1,020.9	25.4	0.0	0.0	1,709.8
Ivanhoe	22.4	2,386.7	3,118.3	17.7	0.0	0.0	5,545.1
Granite	3.2	531.8	995.5	0.0	0.0	0.0	1,530.5
Fryingpan	41.7	4,591.2	5,117.8	375.7	0.0	0.0	10,126.4
Lily Pad	74.0	1,401.9	0.0	0.0			1,475.9
Subtotal	217.0	13,418.3	15,359.0	942.9	0.0	0.0	28,726.9
Total	302.9	23,350.2	28,601.3	1,260.2			52,304.3
Boustead Tunnel³	Oct-Apr 190.3	22,074.6	28,513.5	1,358.0	0.0	3.9	52,140.2

¹ Does not include No Name, Hunter, Sawyer and Midway

² Includes South Cunningham

³ The difference between the west slope diversion and Charles H. Boustead Tunnel diversion results from the accuracy limitations of the measurement, rounding and seepage

Table 5: Fryingpan-Arkansas Project Imports - Charles H. Boustead Tunnel Outlet (Units = 1,000 AF).

Water Year	Imports	Accumulated Imports	Twin Lakes Exchange	Available to SECWCD
1972	32	32	0	0
1973	36.8	68.8	0	16
1974	34.1	102.9	0	18.6
1975	37.2	140.1	0	25
1976	26.9	167	0	24
1977	11.4	178.4	0	25
1978	49.2	227.6	0	25
1979	53.7	281.3	0	25.6
1980	55.7	337	0	70
1981	34.6	371.6	0	25
1982	75.2	446.8	2.7	68
1983	90.8	537.6	0.3	125
1984	110.1	647.7	1.9	210
1985 ¹	70.2	717.9	1.7	289.9
1986 ¹	30.3	748.2	1.5	300.3
1987 ¹	2.2	750.4	1.1	288
1988 ¹	13.4	763.8	2	247.8
1989	36.2	800	1.7	197.6
1990	46.6	846.6	1.7	142.1
1991	59.1	905.7	1.5	58.7
1992	54.8	960.5	1.2	32.9
1993	86.6	1047.1	2.3	70.1
1994	52.2	1099.3	1.3	51.7
1995	90.5	1189.8	2.3	55
1996 ¹	36.9	1226.7	1.8	110
1997	78.6	1305.3	1.8	116
1998	51.3	1356.6	2.6	102
1999 ¹	40.8	1397.4	2.1	127.5
2000	44.8	1442.2	1.7	171.6
2001	45.3	1487.5	2.1	67.5
2002	13.2	1500.7	1.5	8.5
2003	54.9	1555.6	2.4	37.5

Water Year	Imports	Accumulated Imports	Twin Lakes Exchange	Available to SECWCD
2004	27.4	1583	1.3	15.3
2005	54.6	1637.6	3	40.8
2006	61.2	1698.8	3	49.2
2007	54.2	1753	3	40.4
2008	90	1843	3	83
2009	82.7	1925.7	3	78
2010	56.5	1982.2	3	44
2011	98.9	2081.1	2.3	75
2012	13.4	2094.5	1.5	9.9
2013	46.7	2141.2	2.8	37.6
2014	80.3	2221.5	3	56
2015	72.2	2293.7	1.9	67.9
2016	59.2	2353	2.5	39.1
2017	67	2420	2	46.3
2018	39.2	2459.2	3	41.3
2019	95.8	2555	0.1	42.6
2020	51	2606	2.7	62.9

¹Imports impeded

Restriction: Not to exceed 120 KAF in 1 year

Not to exceed 2,352.8 KAF acre-feet in 34 consecutive years.

The imports between 1985 and 2020 are 1837.1 KAF

1983 includes 3,120 acre-feet imported through the Twin Lakes Tunnel

Table 6: Turquoise Lake Operations WY2020 (Units = 1,000 AF).

Month	Busk-Ivanhoe Imports through Carlton Tunnel	Busk-Ivanhoe Imports through Boustead Tunnel	Imports through Homestake Tunnel	Project Imports	Native Inflow	Total Inflow	Evap	Total Outflow	End of Month Content	Water Surface Elevation (feet)
OCT 2019	0	0	0	0		0.3	0.4	1.3	121.8	9,865.10
NOV 2019	0	0	0	0		0.2	0.2	1.1	120.8	9,864.50
DEC 2019	0	0	0	0		2.6	0	23.3	100	9,852.40
JAN 2020	0	0	0	0		2	0	24.1	78	9,838.60
FEB 2020	0	0	0	0		2	0	22.5	57.5	9,824.40
MAR 2020	0	0.2	0.3	0		1	0	2.8	55.6	9,823.00
APR 2020	0	0	16.9	0.1		19.7	0	6.7	68.6	9,832.30
MAY 2020	1	0	5.1	22.1		36.6	0.3	21.9	83	9,841.80
JUN 2020	1.8	0	0.2	28.5		39.4	0.6	7.1	114.6	9,861.00
JUL 2020	0.3	0	0	1.4		4.2	0.6	1.7	116.5	9,862.10
AUG 2020	0	0	0.1	0		0.8	0.6	10.8	105.9	9,855.90
SEP 2020	0	0	0	0		0.9	0.5	12.2	94	9,848.70
Total* (acre-feet)	3,201	0.2	22,646	52,140		109,828	3,258	135,710		

*Rounding may introduce discrepancies between monthly and yearly totals

Table 7: Twin Lakes/Mt. Elbert Forebay Water Year 2020 Operations (Units = 1,000 Acre-feet).

Date	Twin Lakes Canal Company			Mt. Elbert Conduit				Twin Lakes					
	Imports	Winter Water	Priority/ Native	Leadville Fish Hatchery ⁴	Halfmoon	Sugarloaf Bypass	Sugarloaf Powerplant/ Sleeve Valve	Native Inflow	Total Inflow	Evap ²	Total Outflow	End of Month Content ²	Water Elevation ³ (feet)
OCT 19	0.3	0	0	0.3	0	0.6	0	1.3	2.2	0.6	1.1	134.6	9,194.34
NOV 19	0.3	0.4	0	0.3	0	0.6	0	1.2	2.1	0.3	17.2	119.3	9,187.85
DEC 19	0.3	0.9	0	0.3	0	0.6	22.2	0	22	0	23.3	117.9	9,187.51
JAN 20	0.1	1.5	0	0.3	0	0.6	23	0	22.9	0	20.8	120	9,188.24
FEB 20	0.1	0.3	0	0.3	0	0.6	21.5	0	21.4	0	18.9	122.5	9,189.22
MAR 20	0.2	0.2	0	0.3	0	0.6	1.7	0.3	2.8	0	10.7	114.6	9,185.85
APR 20	0.2	0.1	0	0.3	0	0.6	4.1	0.2	6.6	0.1	12.5	108.6	9,182.95
MAY 20	12.6	0.1	0	0.3	1.3	0.6	20	14.9	49.5	0.9	40.4	116.8	9,186.91
JUN 20	20	0	1.3	0.3	4.8	0.4	5.3	26.2	56.7	1.1	45.7	126.7	9,191.73
JUL 20	1.9	0	0.6	0.3	2.2	0.6	0	8.3	13	0.9	26.4	112.3	9,185.40
AUG 20	0.1	0	0	0.3	0.3	9.9	0	4.3	14.4	0.9	24.6	101.2	9,179.36
SEP 20	0	0	0.1	0.3	0	11.8	0	2.3	14	0.7	2.7	111.8	9,184.41
TOTAL¹ (acre-feet)	36,115	3,531	1,966	3,920	8,606	27,240	97,669	56,580	227,575	5,549	244,307		

¹ Rounding may introduce discrepancies between monthly and yearly totals

² Both Twin Lakes and Mt. Elbert Forebay

³ Elevation of Twin Lakes

⁴ Leadville Fish Hatchery diverts from Mt Elbert Conduit

Table 8: Mt. Elbert Pumped-Storage Power Plant WY2020 Operations.

Month	Year	Station Service (MWH)	Net Generation (MWH)	Gross Generation (MWH)	Inflow to Mt. Elbert (KAF)	Water Through Generator (KAF)	Water Pumped From Twin Lakes To Forebay (KAF)
OCT	2019	233.1	20,602.9	20,836	492	57,901	58,361
NOV	2019	272.7	16,714.3	16,987	476	46,924	47,526
DEC	2019	294.2	15,103.9	15,398	2,2670	43,920	22,815
JAN	2020	312.4	8,818.6	9,131	23,441	27,252	6,764
FEB	2020	303.0	6,474.0	6,777	22,030	20,028	1,322
MAR	2020	268.4	12,807.6	13,076	2,723	39,952	36,606
APR	2020	266.3	15,398.7	15,665	476	49,001	42,971
MAY	2020	291.6	25,448.4	25,740	21,383	71,336	50,516
JUN	2020	277.6	28,997.4	29,275	10,480	79,282	67,541
JUL	2020	251.3	40,938.7	41,190	2,805	109,304	102,670
AUG	2020	229.3	33,402.7	33,632	9,897	106,127	96,920
SEP	2020	207.7	21,807.3	22,015	12,091	56,295	46,830
	Totals	3,207.6	246,514.4	249,722	128,964	707,322	580,842

Table 9: Pueblo Reservoir WY2020 Operations (Units = 1,000 AF).

Month	Inflow				Evap	Total Outflow	End of Month Content	Water Surface Elevation (feet)
	Project	Contract	Native ²	Total				
OCT 19	1.1	3.4	20.9	25.4	1.2	30.1	188.4	4,866.24
NOV 19	6.9	2	28.9	37.8	0.6	23.1	202.6	4,870.02
DEC 19	11.5	1.7	21.6	34.8	0.5	11.4	225.3	4,875.72
JAN 20	11.5	1.8	19.4	32.7	0.5	11.3	246.2	4,880.56
FEB 20	10.1	1.5	18.7	30.3	0.8	11.1	264.5	4,884.53
MAR 20	2.7	1.5	34.3	38.5	1.8	40.2	261	4,883.79
APR 20	2.8	1.7	41.6	46.1	2.0	74.2	231	4,877.06
MAY 20	10.7	12.5	78.5	101.7	3.0	92.7	237	4,878.46
JUN 20	2.7	8.4	127.7	138.8	3.5	149.6	222.7	4,875.08
JUL 20	2	13.2	65.3	80.5	3.0	101.9	198.3	4,868.89
AUG 20	8.3	11.6	26.1	46	2.7	55.2	186.3	4,865.67
SEP 20	.3	4.3	10.6	15.2	2.1	19.1	180.3	4,864.01
Total¹ (acre-feet)	70,630	134,090	422,933	627,653	21,698	619,915		

¹ Rounding may introduce discrepancies

² Native inflows are the total inflows less the account and project inflow. If the result is negative because of exchanges, 0 is recorded.

Table 10: Reservoir Storage Allocation Data (Unit = Acre-feet).

Reservoir	Dead	Inactive	Active Conservation	Joint Use	Exclusive Flood Control	Total Capacity Storage
Ruedi ¹	63	1,095	101,278	0	0	102,373
Turquoise ¹	2,810	8,920	120,478	0	0	129,398
Twin Lakes ¹	63,324	72,938	67,917	0	0	140,855 ²
Mt. Elbert ¹ Forebay	561	3,825	3,493	0	0	11,143
Pueblo ³	1,895	25,601	219,772	66,011	26,990	469,878

¹ Area Capacity Table from 1984

² The top of the active conservation pool at Twin Lakes corresponds to 140,855 acre-feet. A tilted morning glory spillway reduces the actual storage available to 140,357 acre-feet

³ Area Capacity Table from 2012

Note: Inactive includes dead storage

Table 11: Monthly Evaporation Factors.

Month	Ruedi	Turquoise	Twin Lakes	Pueblo
OCT	0.0530	0.1217	0.1217	0.1366
NOV	0	0.0566	0.0566	0.0886
DEC	0	0.0171	0.0171	0.0735
JAN	0	0.0274	0.0274	0.07078
FEB	0	0.0497	0.0497	0.10592
MAR	0	0.0771	0.0771	0.1548
APR	0	0.1337	0.1337	0.1760
MAY	0.1470	0.2006	0.2006	---
JUN	0.3605	0.2554	0.2554	---
JUL	0.3244	0.2246	0.2246	---
AUG	0.2332	0.1766	0.1766	---
SEP	0.1419	0.1663	0.1663	---

Note: These factors are used only when the pan is frozen or unavailable. Ruedi doesn't have a pan. Factor is derived from $((\text{the average monthly evaporation volume} \times 12) / 0.7) / (\# \text{ days in month})$
Evaporation in acre-feet = monthly factor * surface area of the lake * (1 - % ice cover)

Table 12: Monthly Evaporation for Fryingpan-Arkansas Project (Unit = Acre-feet).

Month	Ruedi		Turquoise		Twin Lakes and Mt. Elbert		Pueblo	
	AVG	WY 2020	AVG	WY 2020	AVG	WY 2020	AVG	WY 2020
OCT 2019	56	82	364	434	523	583	1,106	1,185
NOV 2019	0	0	162	174	229	239	567	576
DEC 2019	0	0	15	18	25	32	452	528
JAN 2020	0	0	0	0	1	0	416	536
FEB 2020	0	0	0	0	3	0	633	793
MAR 2020	0	0	0	0	23	6	1,288	1,776
APR 2020	6	0	11	0	194	65	1,751	1,995
MAY 2020	163	209	264	282	832	794	2,181	2,965
JUN 2020	471	572	717	648	1,205	1,005	2,732	3,506
JUL 2020	513	562	601	593	968	818	2,542	2,988
AUG 2020	315	387	485	605	773	786	2,089	2,746
SEP 2020	176	206	431	505	696	659	1,718	2,103

Average between 1996 and 2019

Table 13: Monthly Precipitation Data for Fryingpan-Arkansas Project (Unit = Inches).

MONTH	CHAPMAN ¹ NEAR RUEDI		TURQUOISE		TWIN LAKES		PUEBLO	
	AVG	WY 2020	AVG	WY 2020	AVG	WY 2020	AVG	WY 2020
OCT 19	2.34	2.8	1.15	1.66	1.06	1.28	0.88	1.41
NOV 19	1.98	2.3	1.30	0.90	0.59	0.38	0.34	0.25
DEC 19	3.25	2.6	1.44	2.04	0.37	0.70	0.29	0.32
JAN 20	3.05	2.4	1.66	1.12	0.40	0.25	0.34	0.04
FEB 20	2.80	3.6	1.54	3.05	0.56	0.44	0.38	0.82
MAR 20	2.80	2.7	1.50	1.01	1.23	0.85	0.82	0.32
APR 20	3.72	3.3	1.74	1.48	1.33	0.91	1.72	0.65
MAY 20	3.08	1.5	1.52	1.30	0.79	0.70	1.44	0.94
JUN 20	1.02	1.2	0.84	1.15	0.77	1.12	0.92	0.89
JUL 20	3.01	1.7	2.01	1.91	1.12	1.58	1.85	1.40
AUG 20	2.57	1.2	2.03	1.18	0.86	0.66	2.08	0.89
SEP 20	1.95	1.3	1.44	1.20	0.95	1.12	0.73	0.83
TOTAL	31.57	26.6	18.25	17.97	10.44	9.99	11.81	8.76
Max. Annual	40.9	(2011)	25.95	(1957)	17.27	(1952)	20.32	(2007)

¹The USGS weather station at Ruedi was out of service for WY2020. The precipitation averages and totals from the Chapman SNOTEL have been substituted. The SNOTEL has been in operation since 2008

Table 14: Flood Control Benefits of the Fryingpan-Arkansas Project.

WY	Ruedi Benefits	Ruedi Benefits Cumulative	Pueblo Benefits	Pueblo Benefits Cumulative
1976			\$320,000	\$320,000
1979			\$90,000	\$410,000
1980			\$86,000	\$496,000
1981			\$111,000	\$607,000
1982			\$836,000	\$1,443,000
1983	\$80,000	\$80,000	\$47,000	\$1,490,000
1984	\$330,000	\$410,000	\$1,039,000	\$2,529,000
1985	\$91,000	\$501,000	\$234,000	\$2,763,000
1986	\$70,000	\$571,000	\$0	\$2,763,000
1987	\$0	\$571,000	\$90,000	\$2,853,000
1988	\$0	\$571,000	\$0	\$2,853,000
1989	\$0	\$571,000	\$0	\$2,853,000
1990	\$0	\$571,000	\$0	\$2,853,000
1991	\$0	\$571,000	\$482,000	\$3,335,000
1992	\$0	\$571,000	\$266,000	\$3,601,000
1993	\$4,000	\$575,000	\$496,000	\$4,097,000
1994	\$280,000	\$855,000	\$290,000	\$4,387,000
1995	\$1,770,000	\$2,625,000	\$832,000	\$5,219,000
1996	\$1,550,000	\$4,175,000	\$0	\$5,219,000
1997	\$1,207,000	\$5,382,000	\$320,200	\$6,539,200
1998	\$0	\$5,382,000	\$0	\$6,539,200
1999	\$116,000	\$5,498,000	\$4,778,000	\$11,317,200
2000	\$1,061,000	\$6,559,000	\$0	\$11,317,200

WY	Ruedi Benefits	Ruedi Benefits Cumulative	Pueblo Benefits	Pueblo Benefits Cumulative
2001	\$0	\$6,559,000	\$0	\$11,317,200
2002	\$0	\$6,559,000	\$0	\$11,317,200
2003	\$1,515,100	\$8,074,100	\$0	\$11,317,200
2004	\$0	\$8,074,100	\$0	\$11,317,200
2005	\$970,200	\$9,044,300	\$0	\$11,317,200
2006	\$799,000	\$9,843,300	\$20,159,000	\$31,476,200
2007	\$103,000	\$9,946,300	\$0	\$31,476,200
2008	\$1,635,000	\$11,581,300	\$0	\$31,476,200
2009	\$740,100	\$12,321,400	\$0	\$31,476,200
2010	\$2,993,000	\$15,314,400	\$0	\$31,476,200
2011	\$3,002,000	\$18,316,400	\$0	\$31,476,200
2012	\$0	\$18,316,400	\$0	\$31,476,200
2013	\$0	\$18,316,400	\$383,900	\$31,860,100
2014	\$0	\$18,316,400	\$431,900	\$32,292,000
2015	\$1,402,300	\$19,718,700	\$4,493,000	\$36,785,000
2016	\$0	\$19,718,700	\$0	\$36,785,000
2017	\$0	\$19,718,700	\$0	\$36,785,000
2018	\$0	\$19,718,700	\$0	\$36,785,000
2019	\$0	\$19,718,700	\$189,100	\$36,974,100
2020	\$0	\$19,718,700	\$0	\$36,974,100

Appendix B: Exhibits

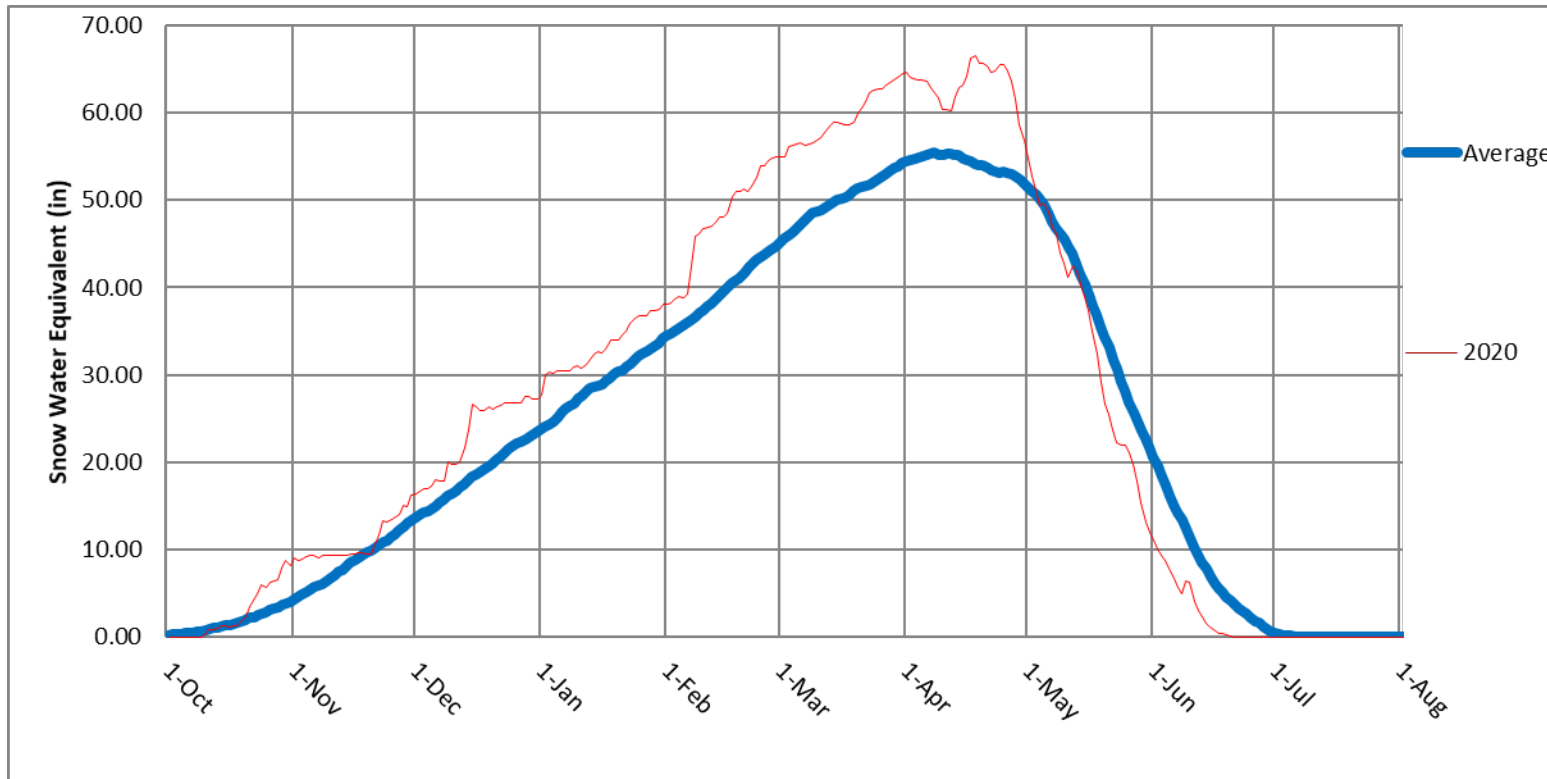


Exhibit 1: Combined Snow Water Equivalent of Fremont Pass, Independence Pass, Ivanhoe Lake and Nast SNOTEL sites.

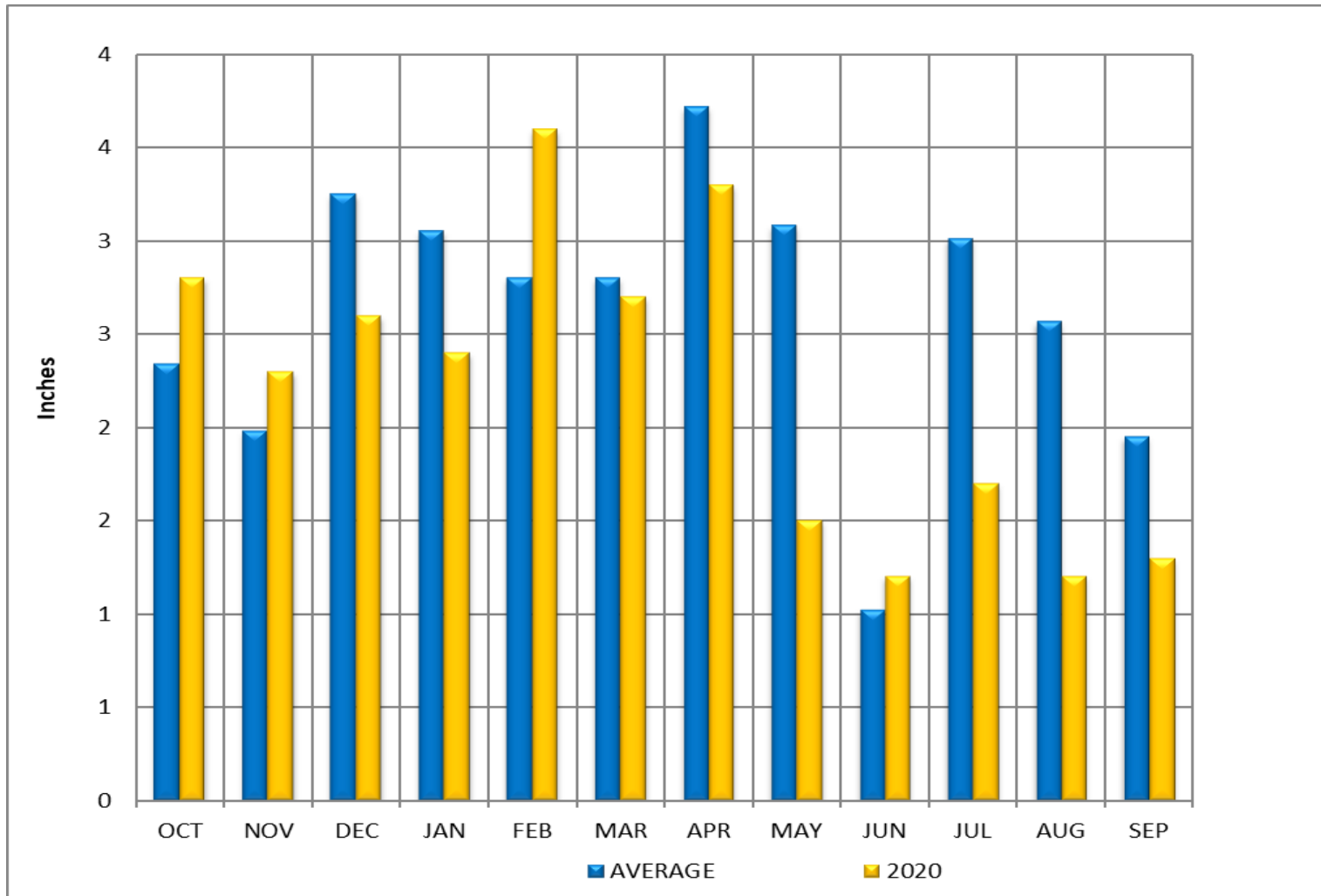


Exhibit 2: Chapman SNOTEL Monthly Precipitation WY2020.

The weather station at Ruedi was out of service for the year. These precipitation values are from the Chapman SNOTEL gage.

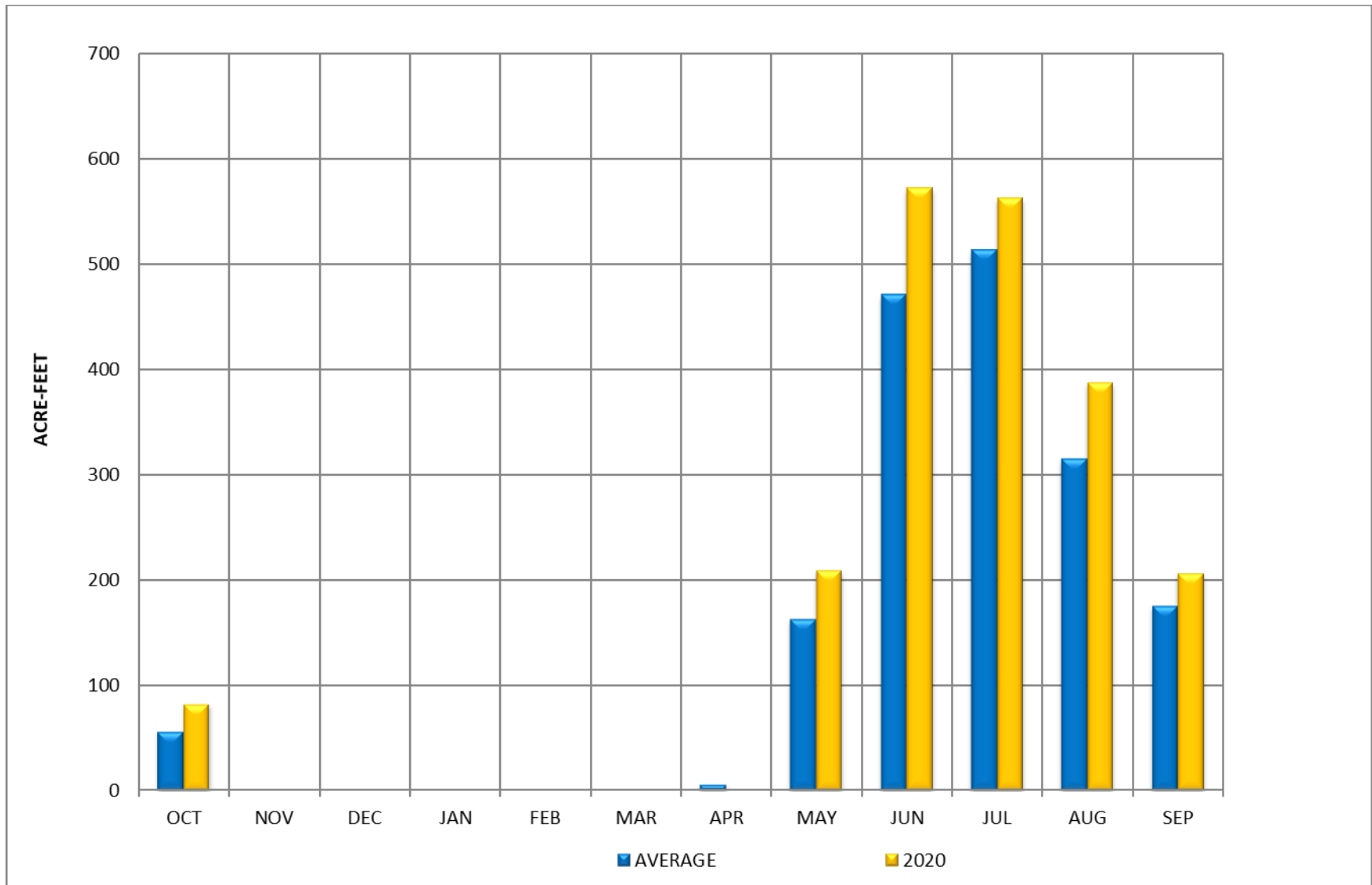


Exhibit 3: Ruedi Reservoir Monthly Evaporation WY2020.

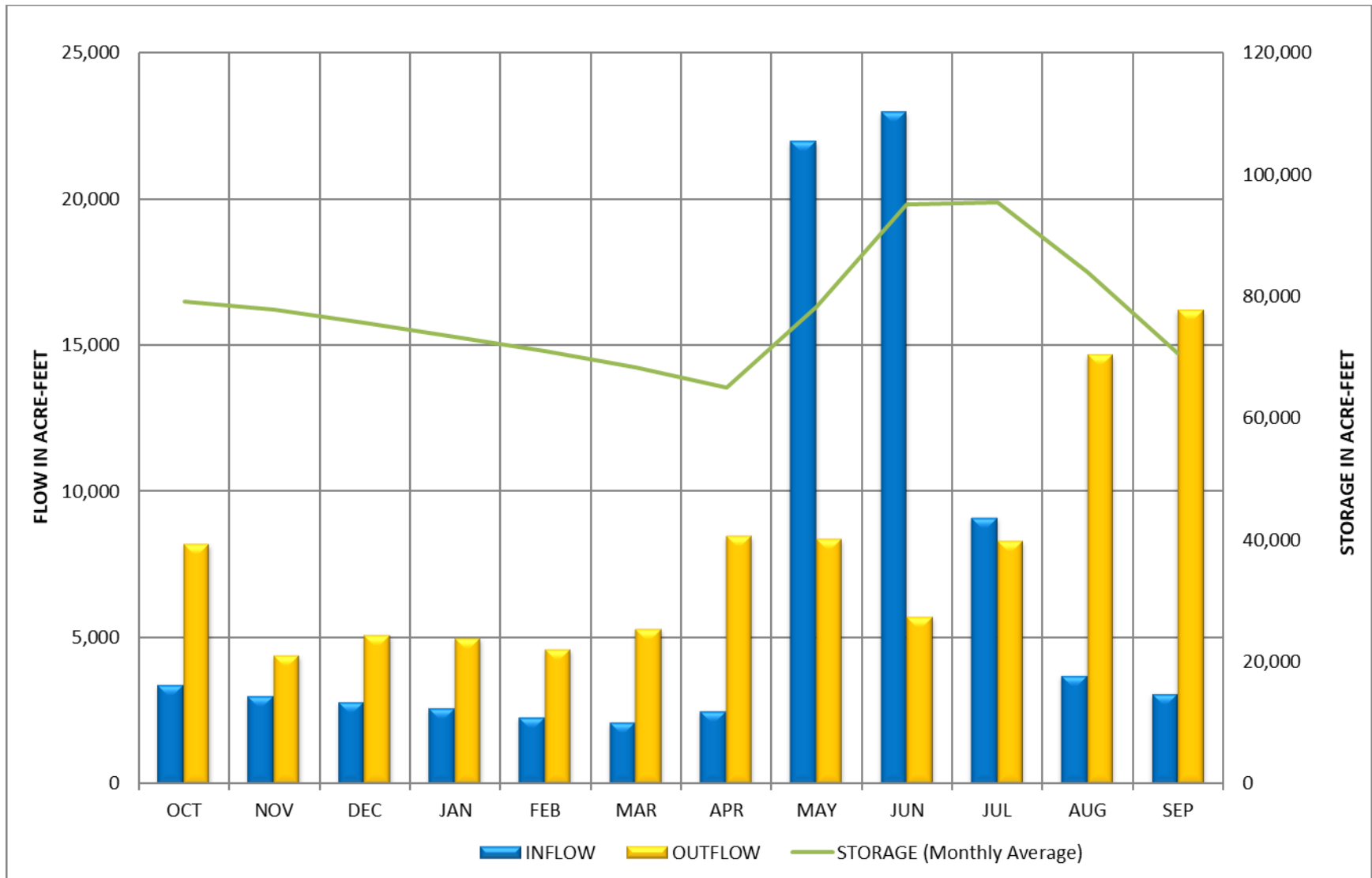


Exhibit 4: Ruedi Reservoir Actual Operations WY2020.

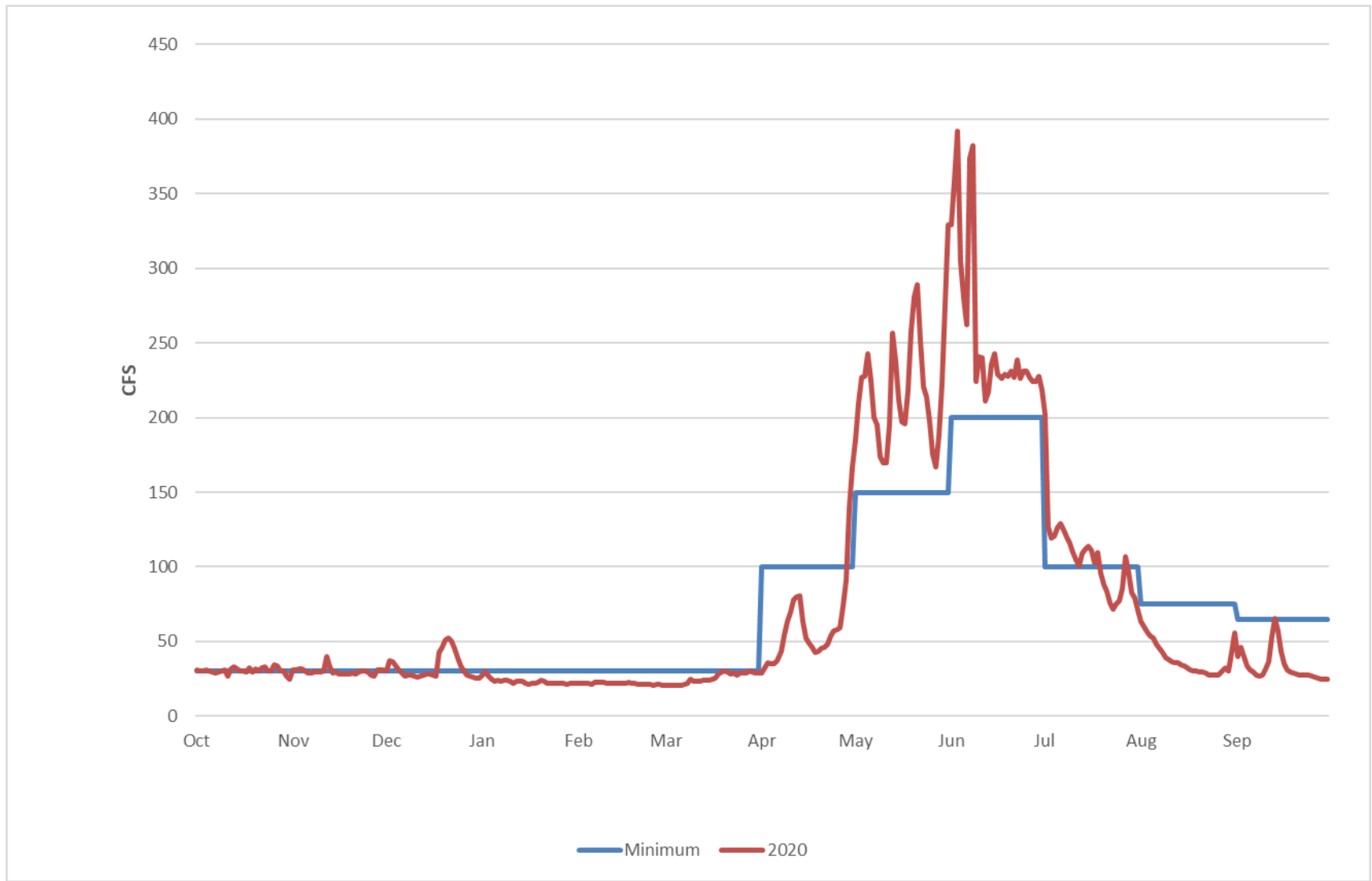


Exhibit 5: Fryingspan River near Thomasville Daily Discharge WY2020.

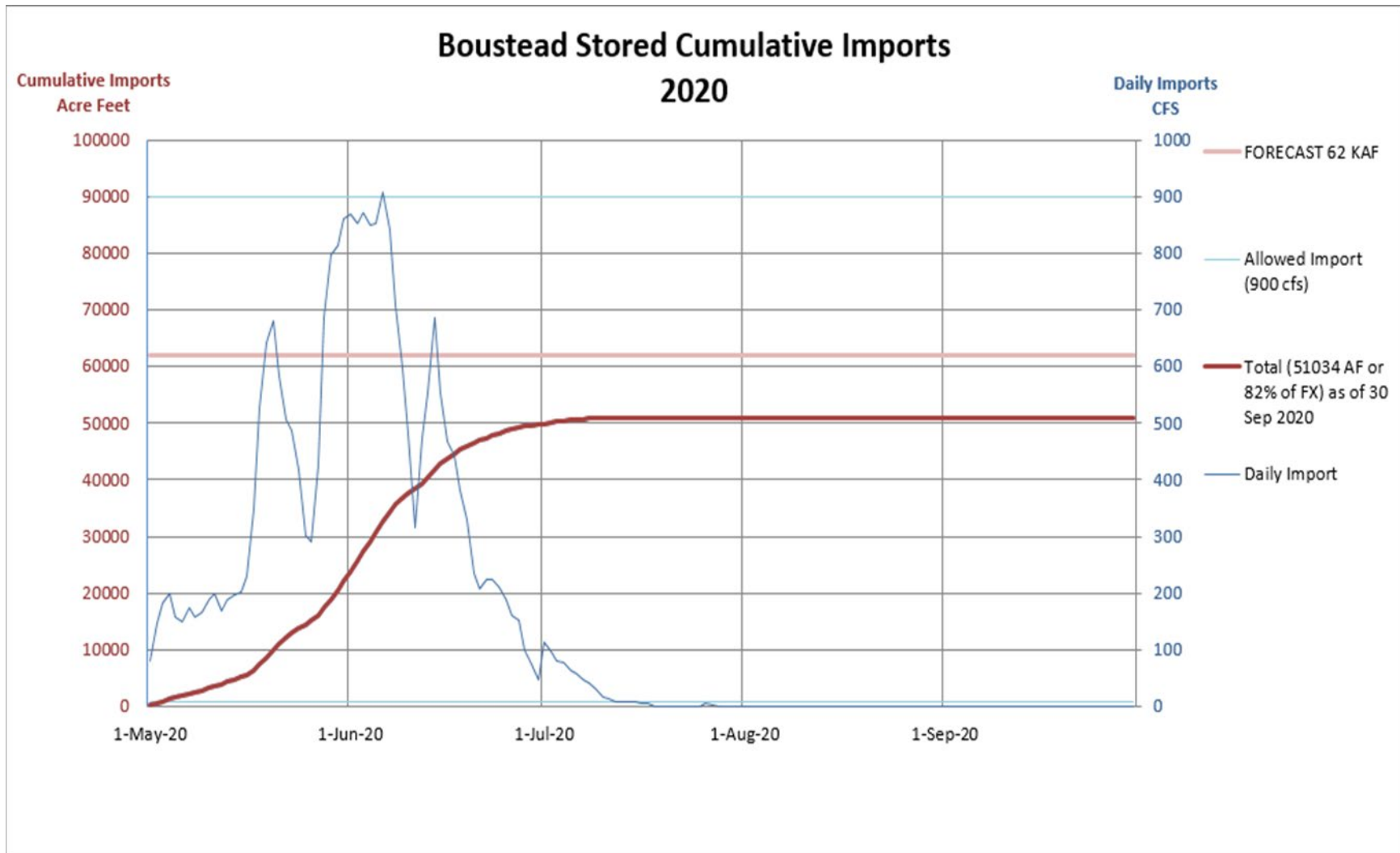


Exhibit 6: Boustead Tunnel Actual Operations WY2020.

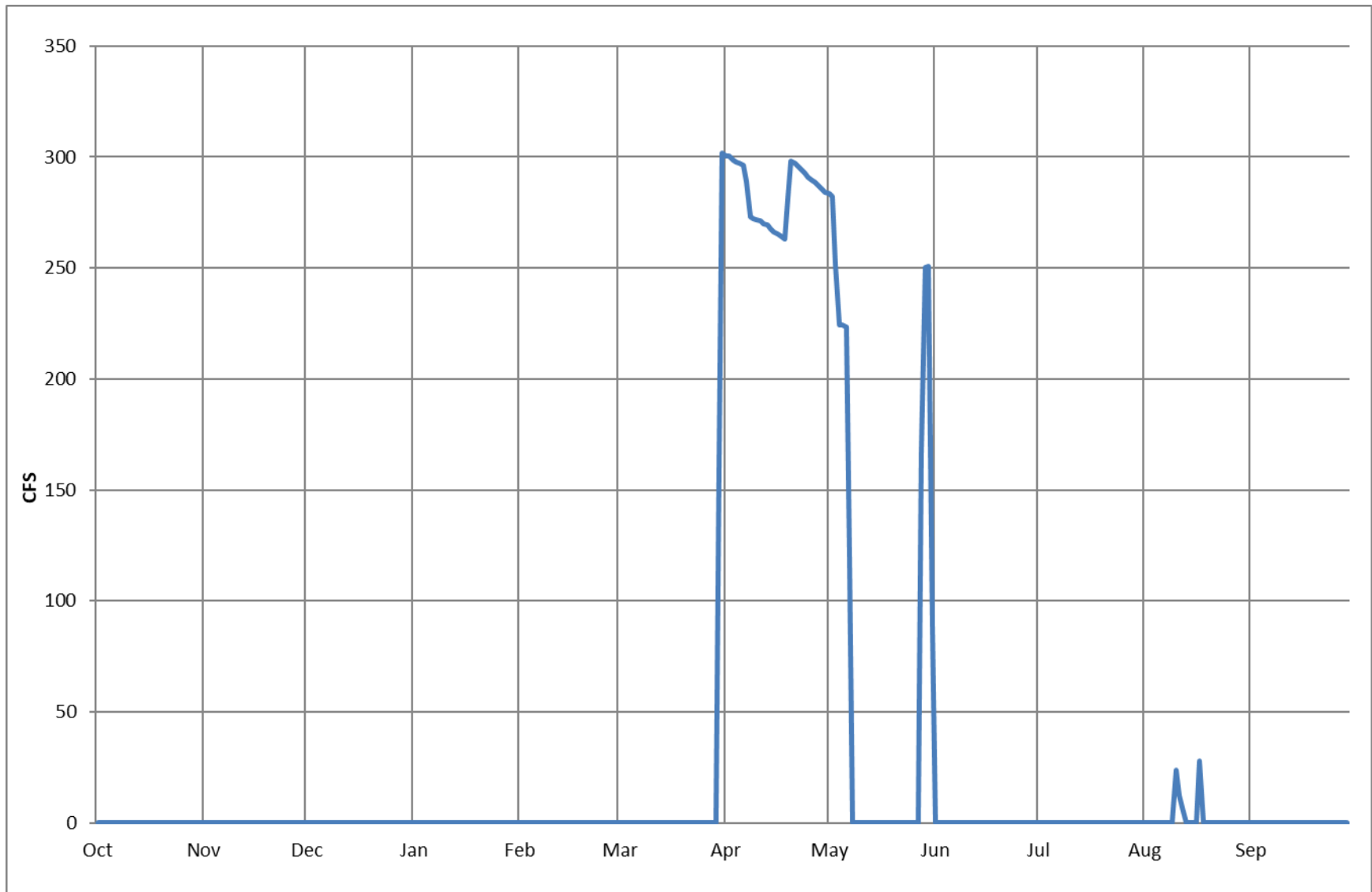


Exhibit 7: Homestake Tunnel Actual Operations WY2020.

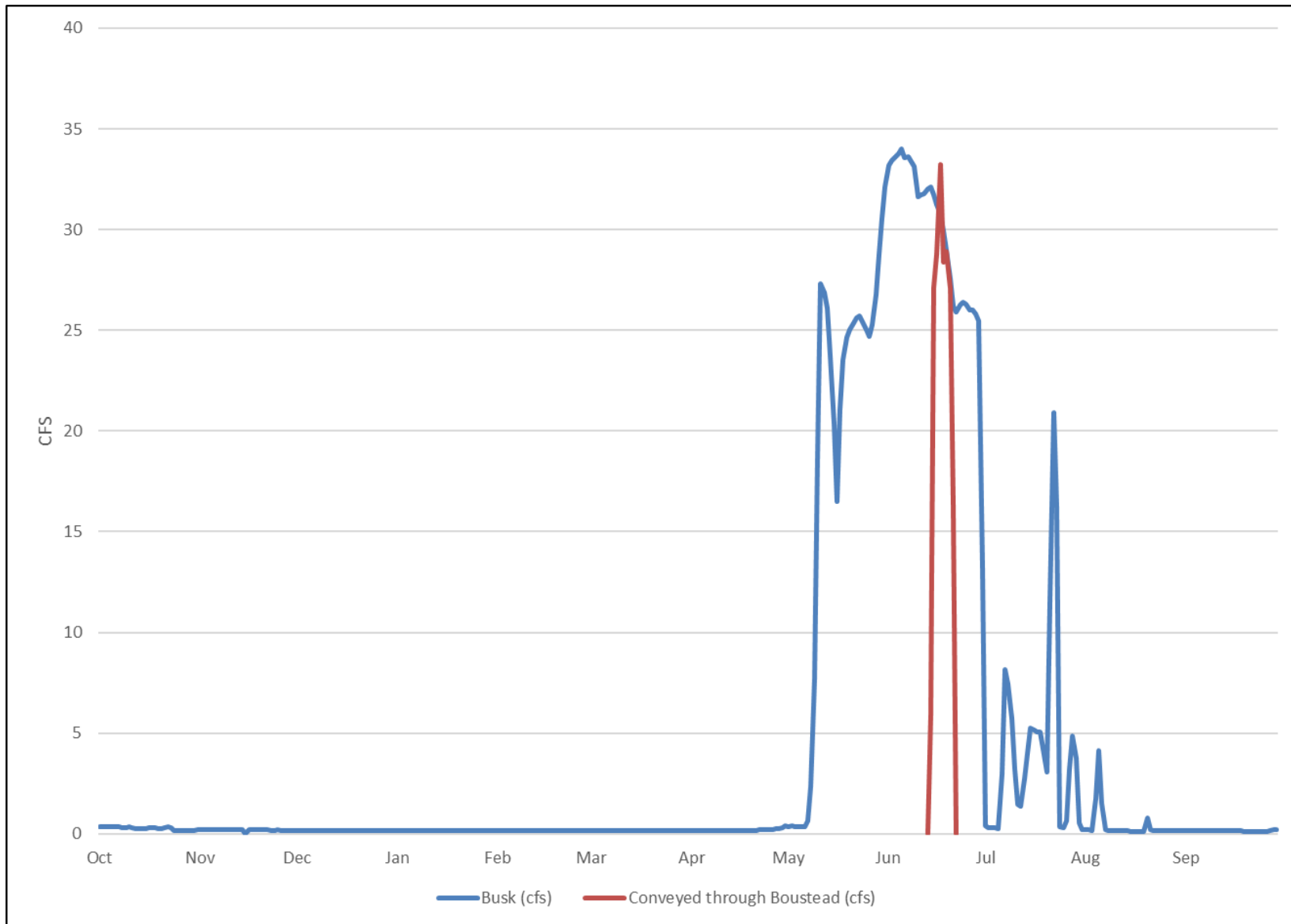


Exhibit 8: Busk-Ivanhoe Tunnel Actual Operations WY2020.

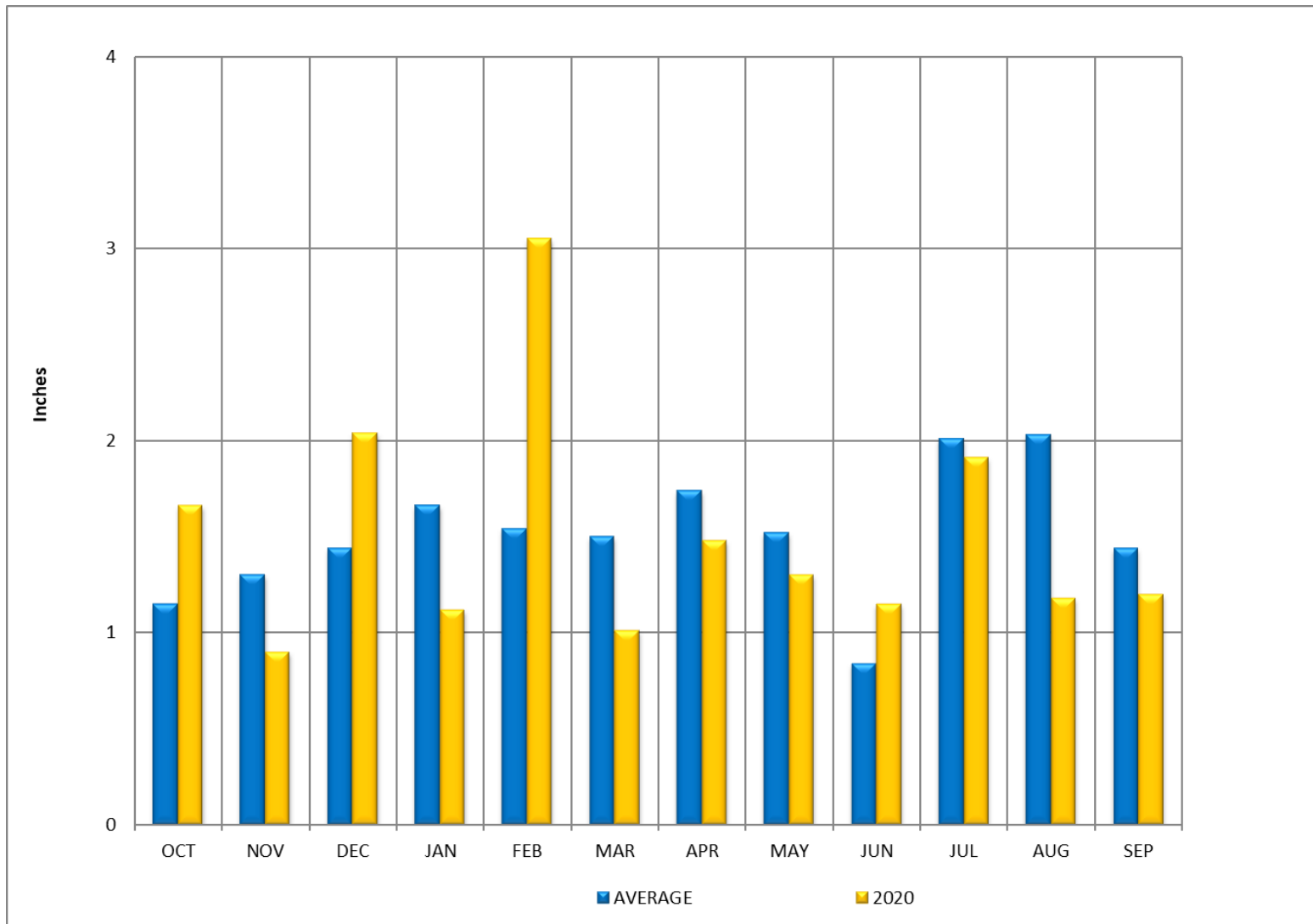


Exhibit 9: Turquoise Lake (Sugar Loaf Dam) Monthly Precipitation WY2020.

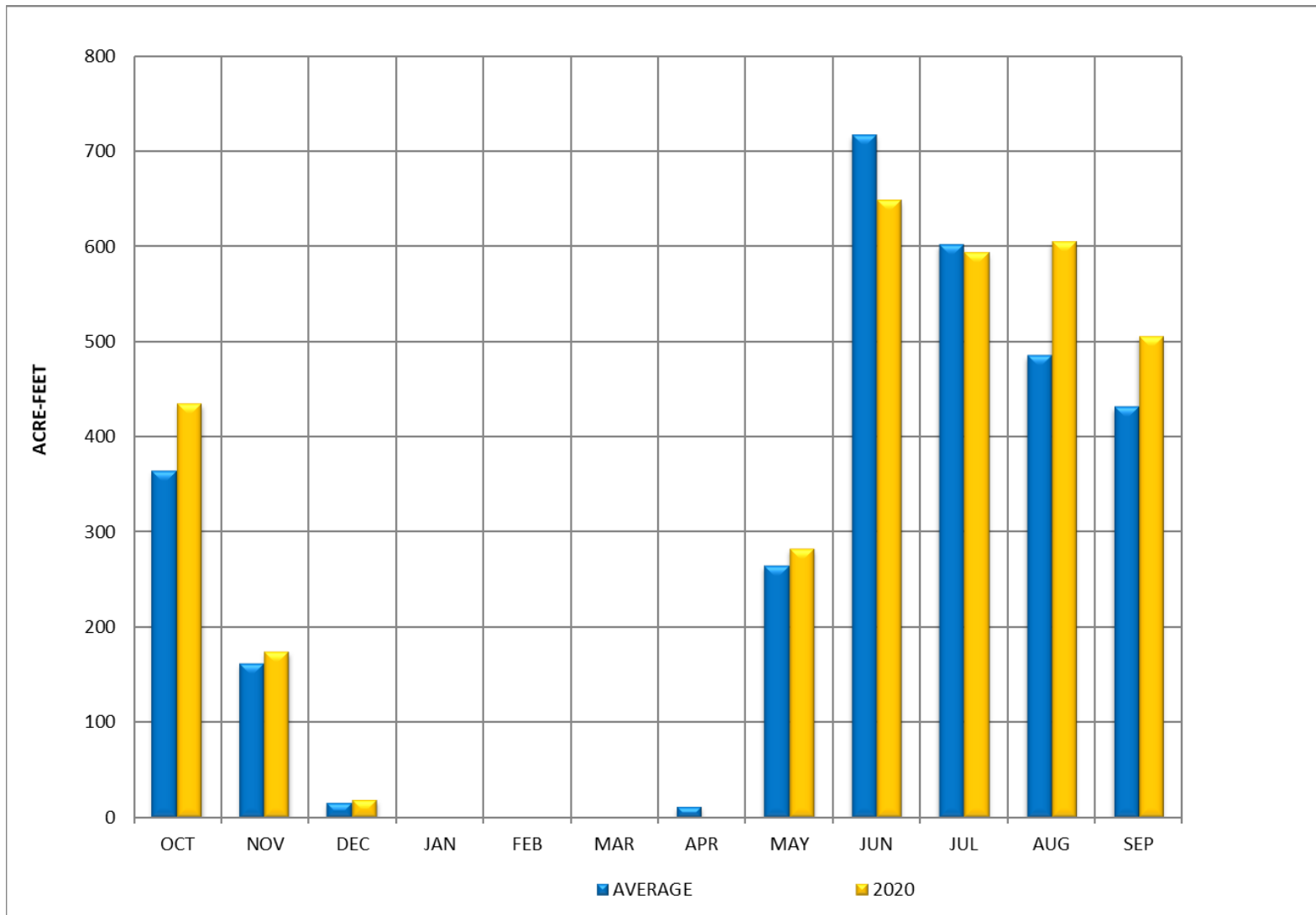


Exhibit 10: Turquoise Lake (Sugar Loaf Dam) Monthly Evaporation WY2020.

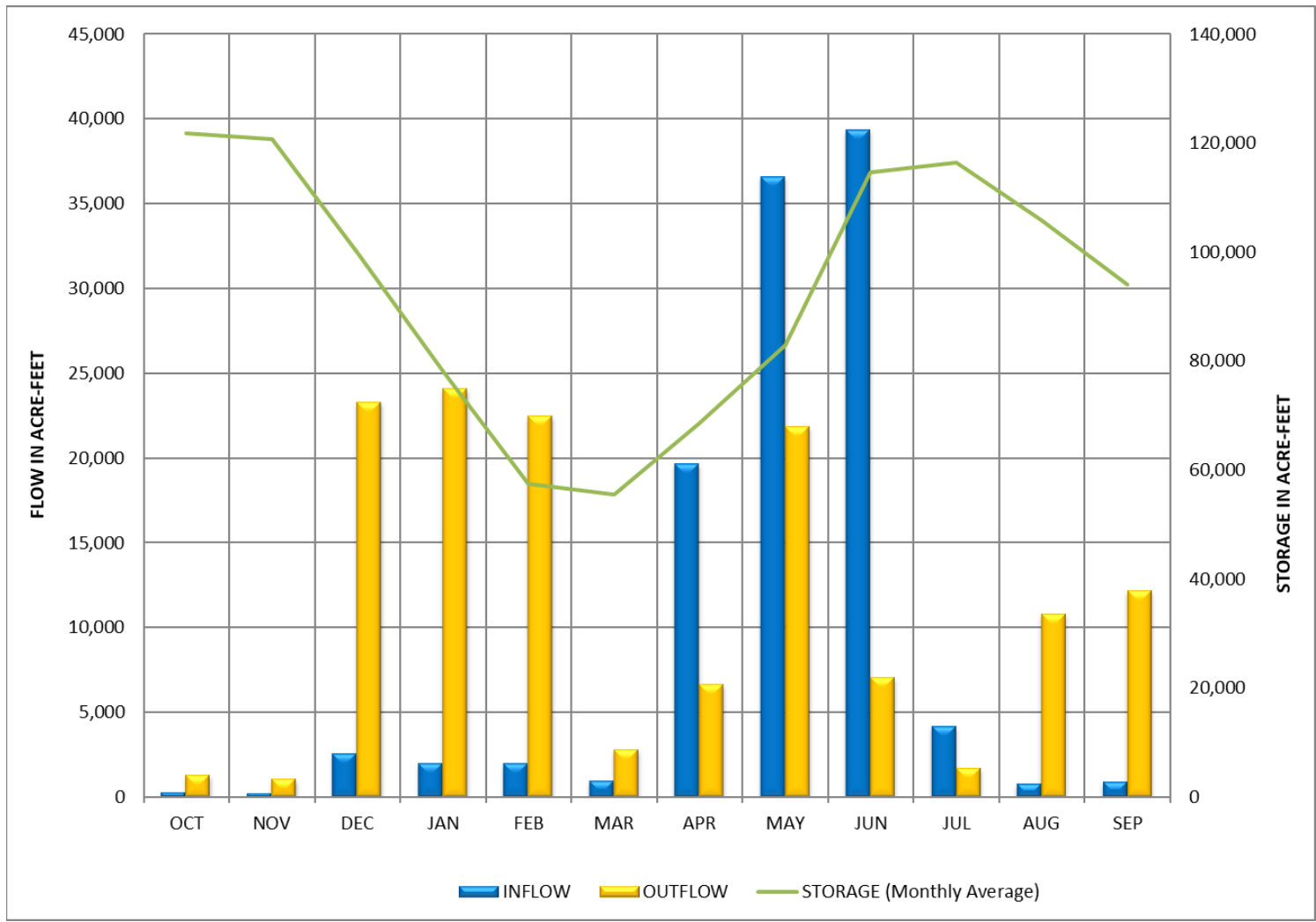


Exhibit 11: Turquoise Lake (Sugarloaf Dam) Actual Operations WY2020.

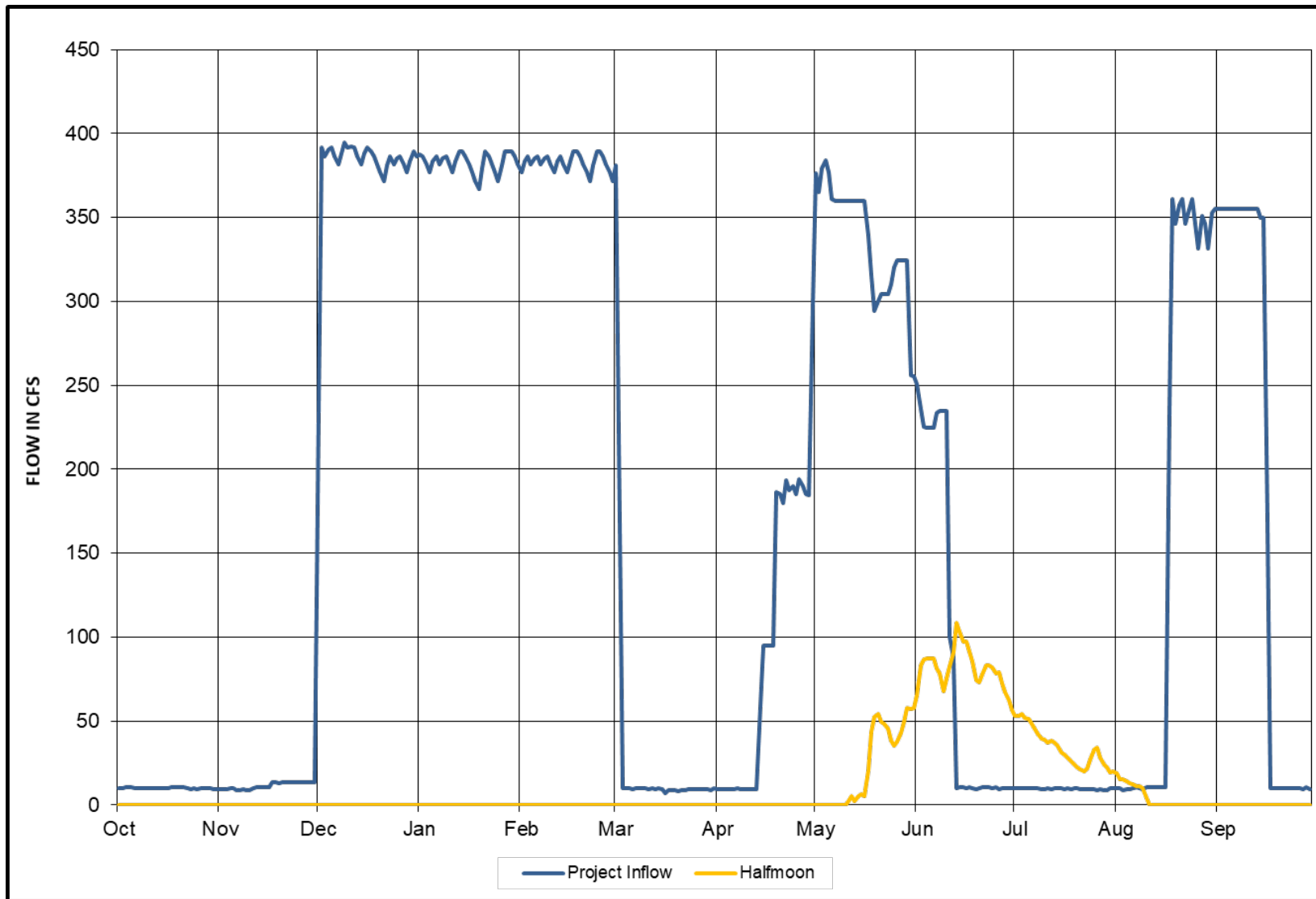


Exhibit 12: Mt. Elbert Conduit Inflow Actual Operations WY2020.

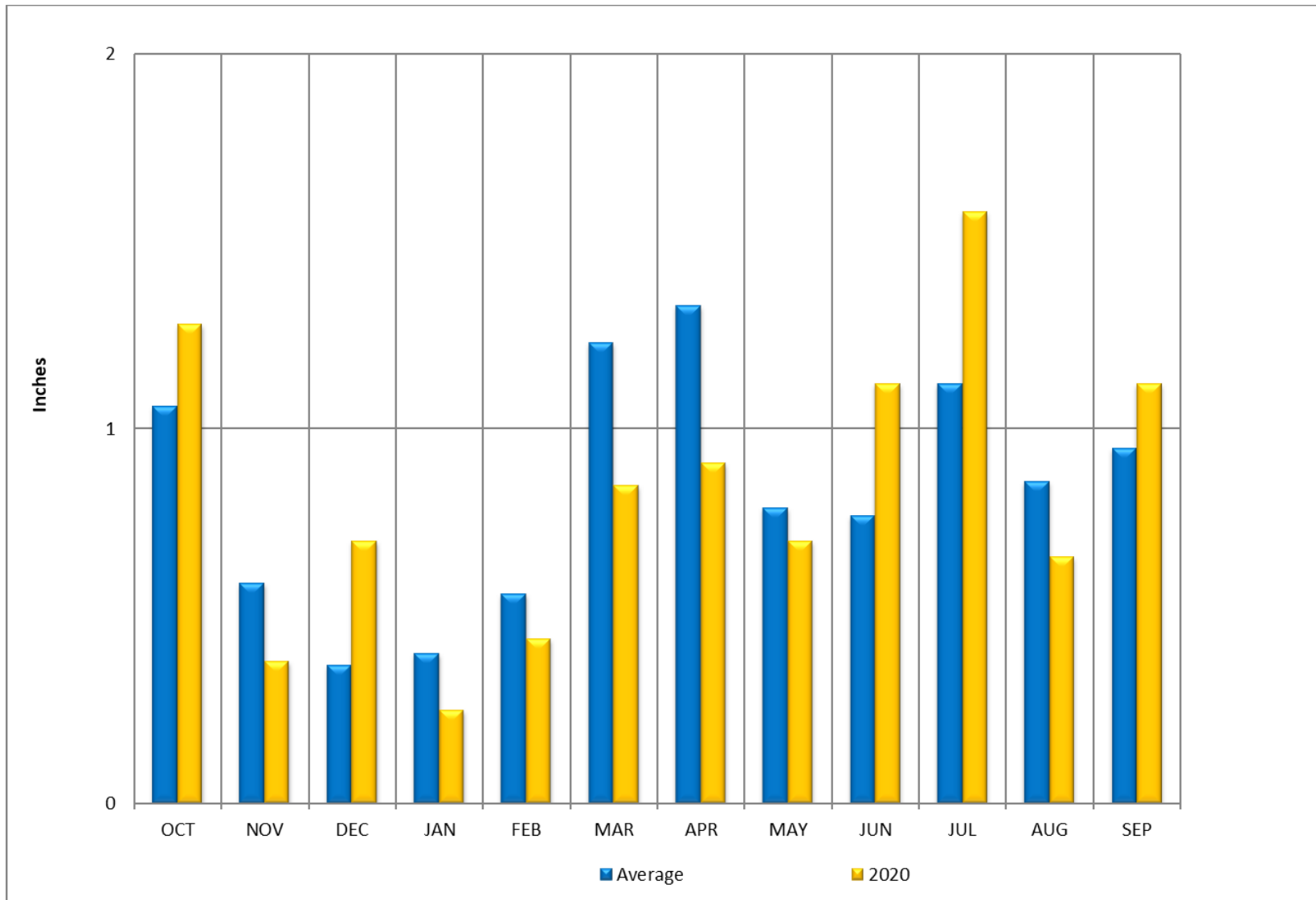


Exhibit 13: Twin Lakes Monthly Precipitation WY2020.

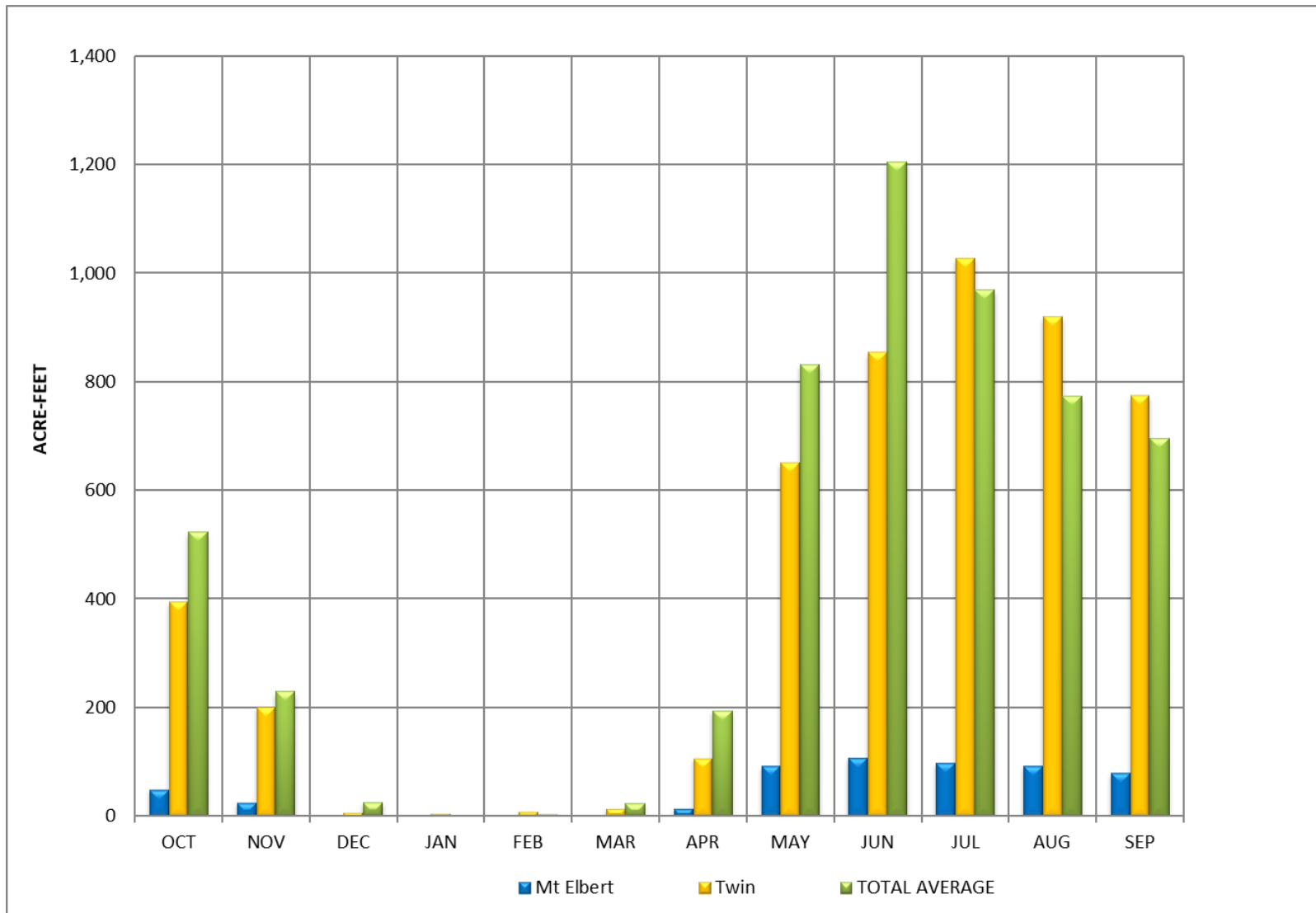


Exhibit 14: Twin Lakes Dam and Mt. Elbert Forebay Monthly Evaporation WY2020.

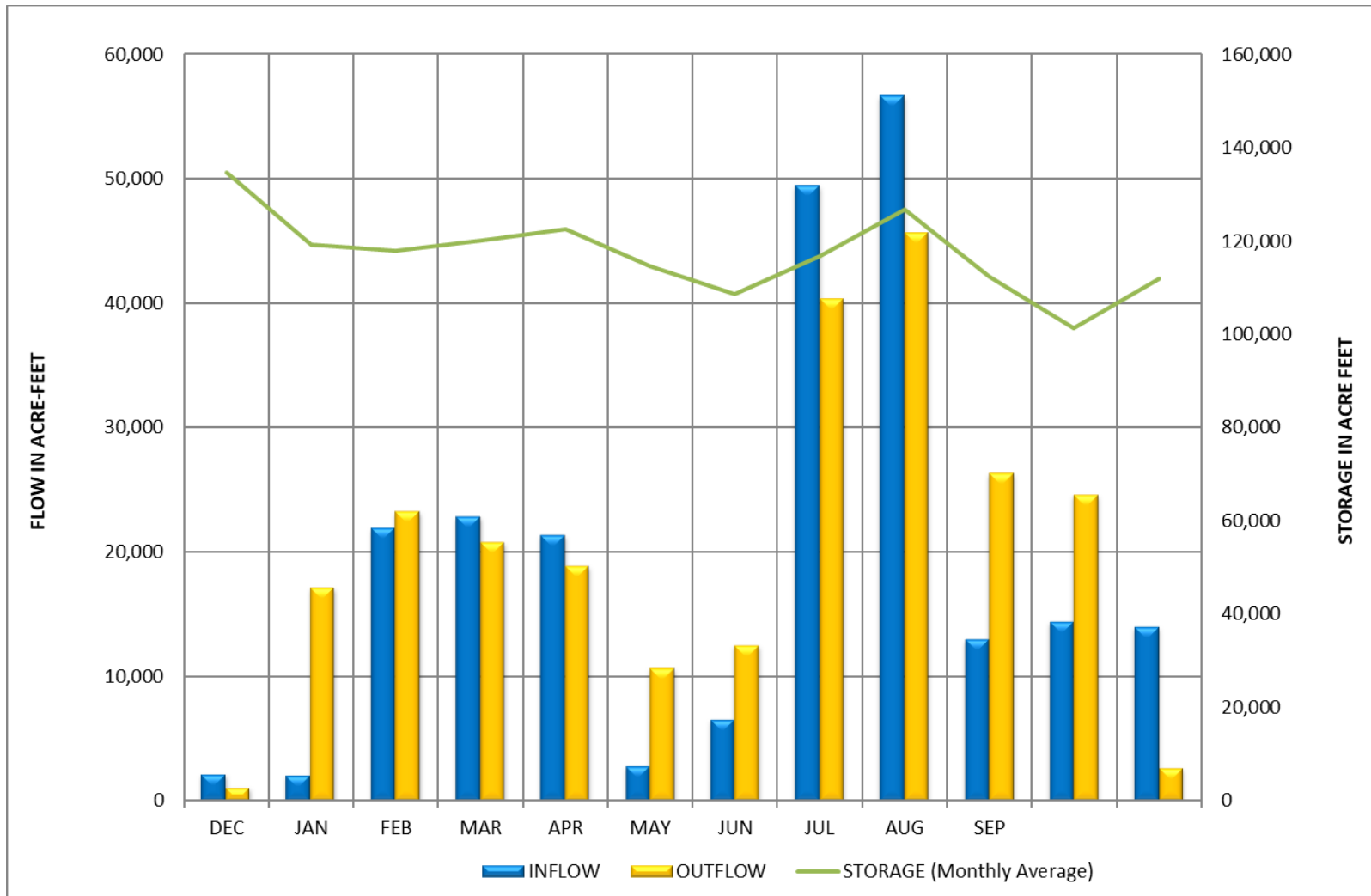


Exhibit 15: Twin Lakes/Mt. Elbert Forebay Actual Operations WY2020.

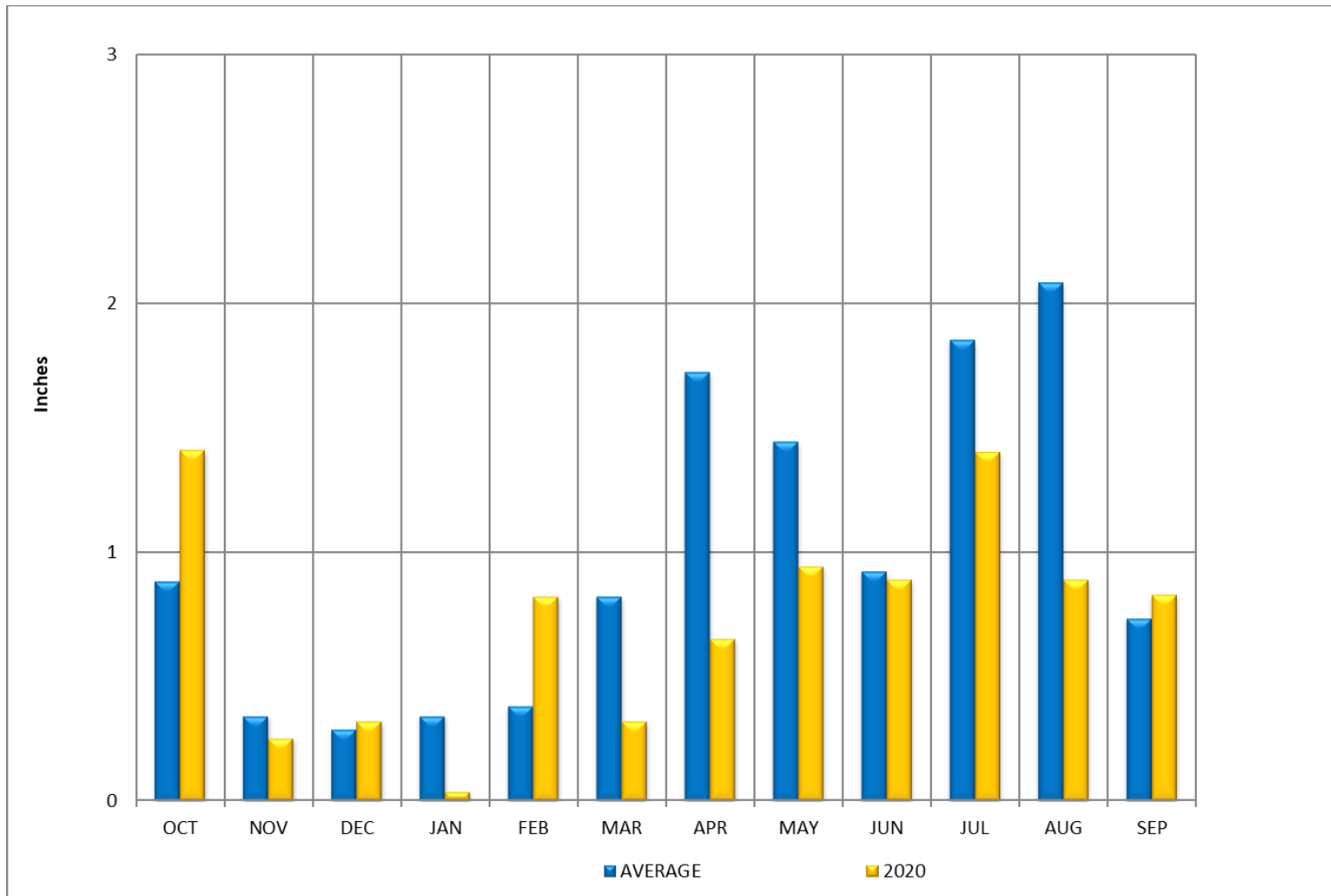


Exhibit 16: Pueblo Dam Monthly Precipitation WY2020.

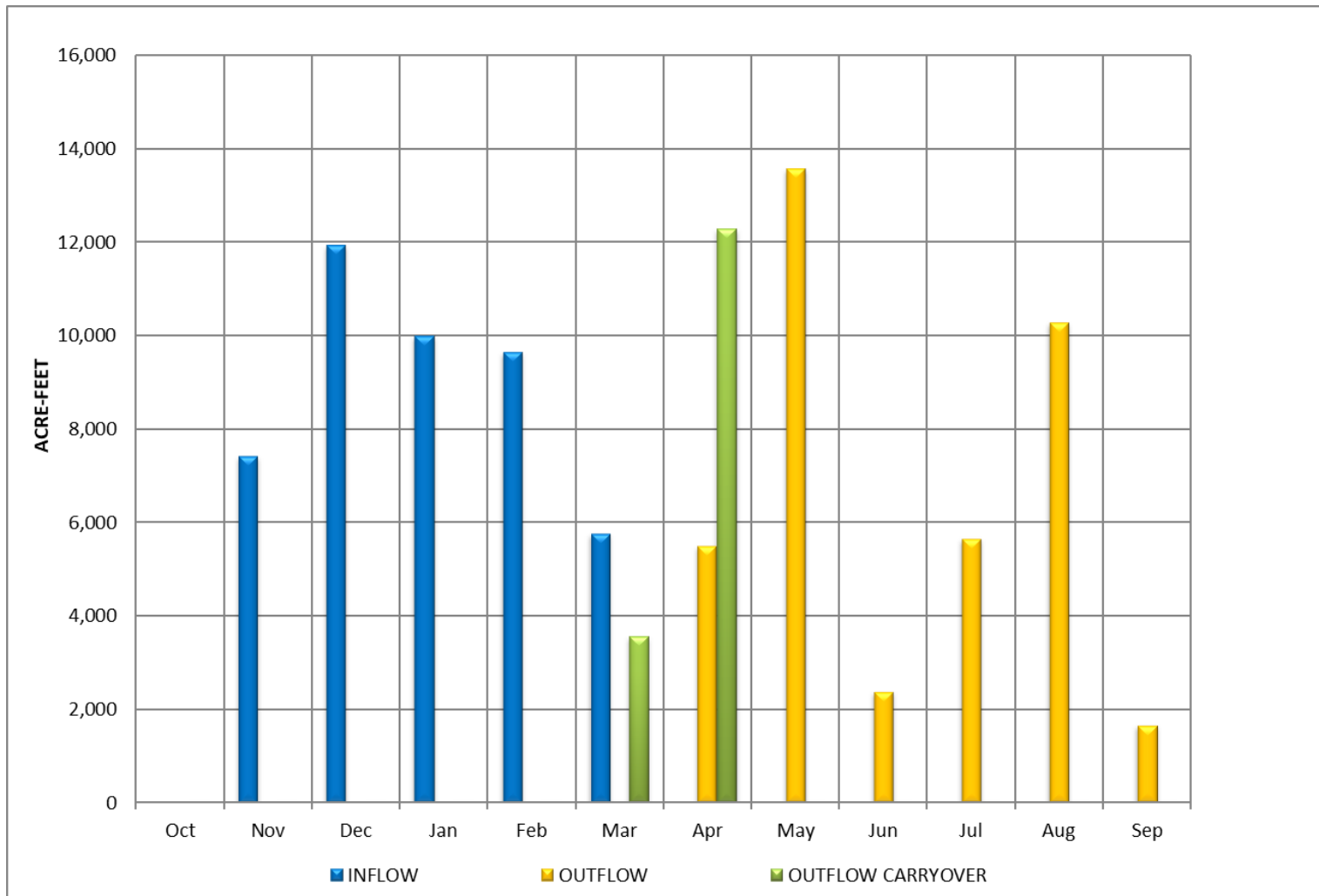


Exhibit 17: Pueblo Reservoir Winter Water WY2020.

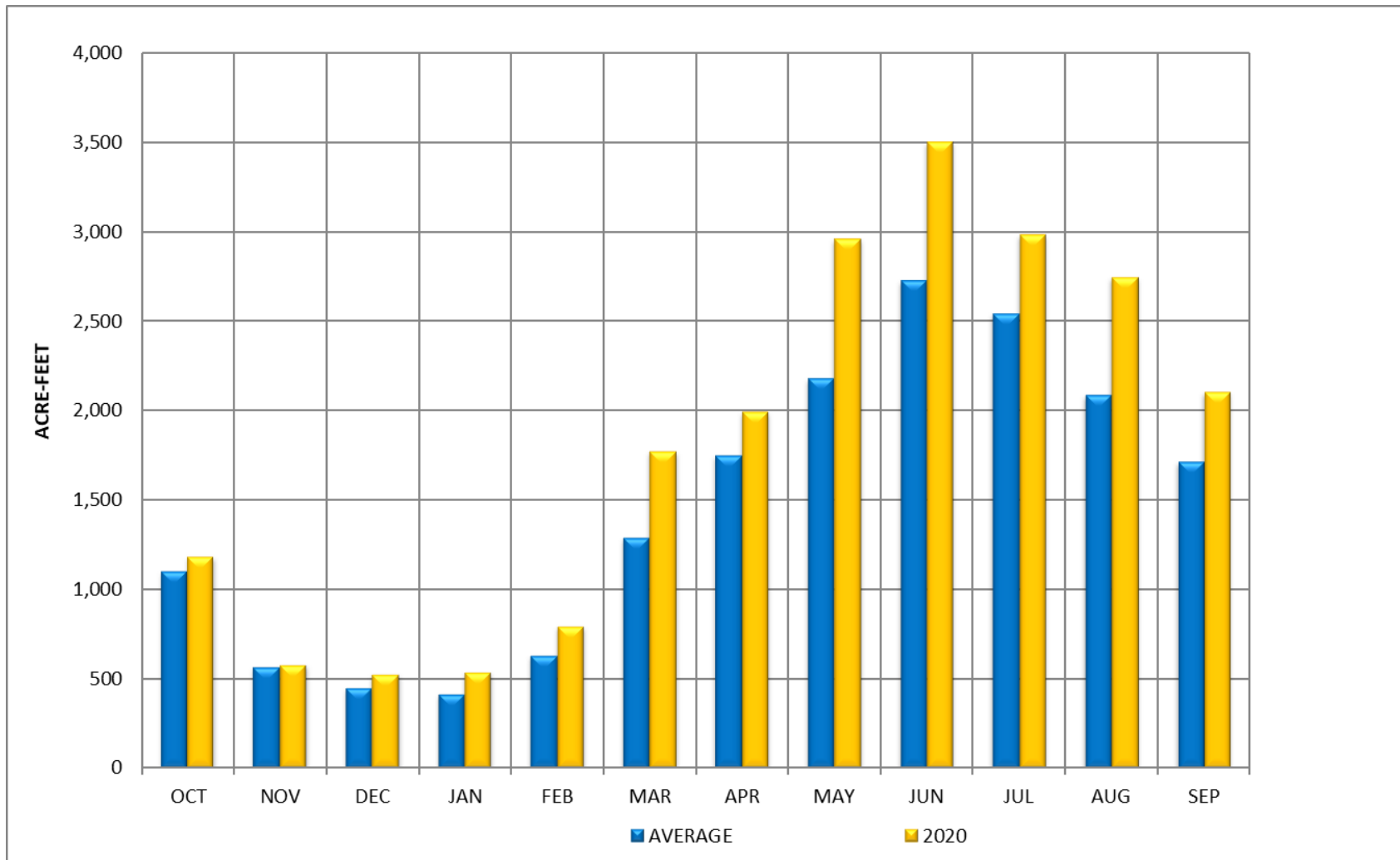


Exhibit 18: Pueblo Dam Monthly Evaporation WY2020.

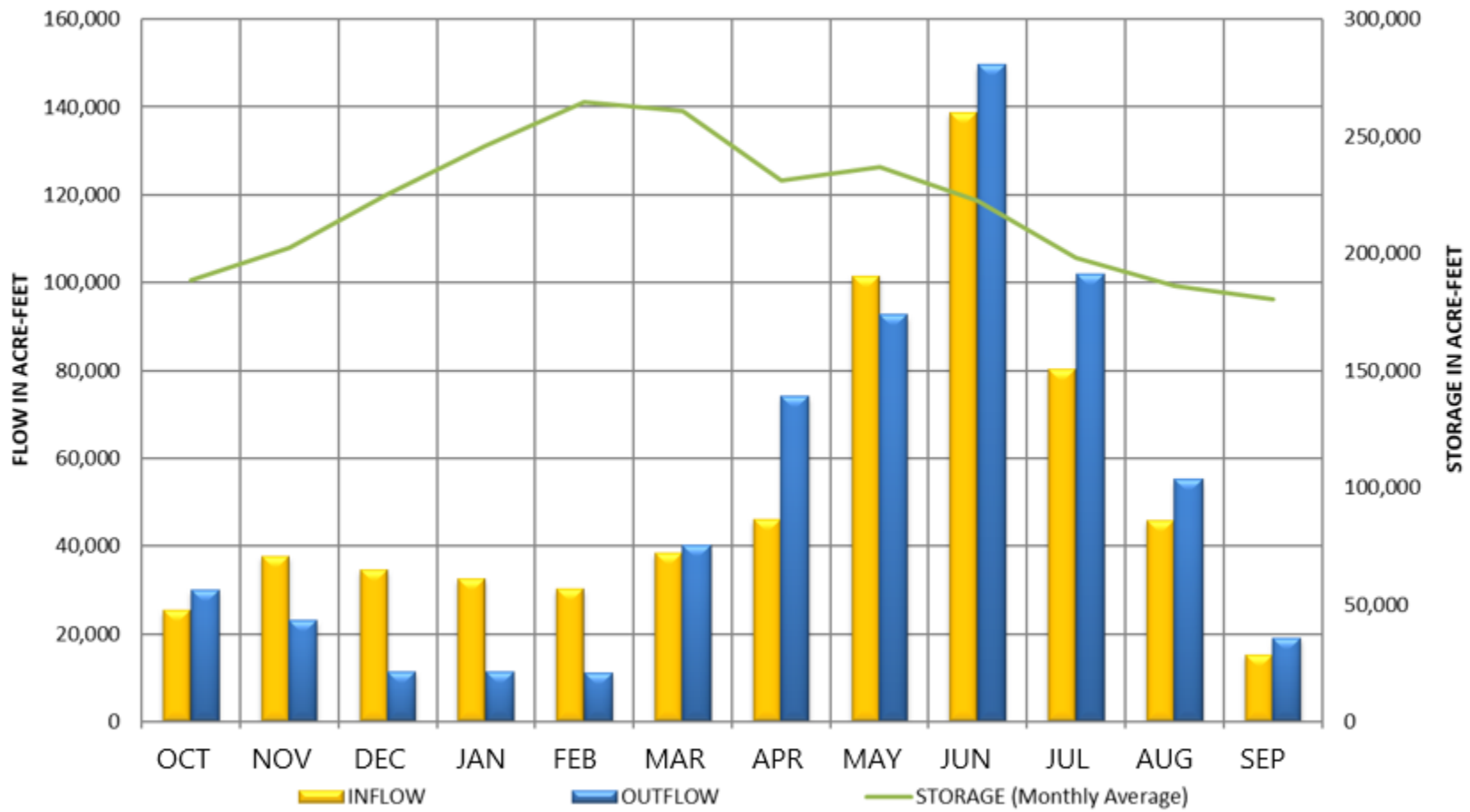


Exhibit 19: Pueblo Reservoir Actual Operations WY2020.

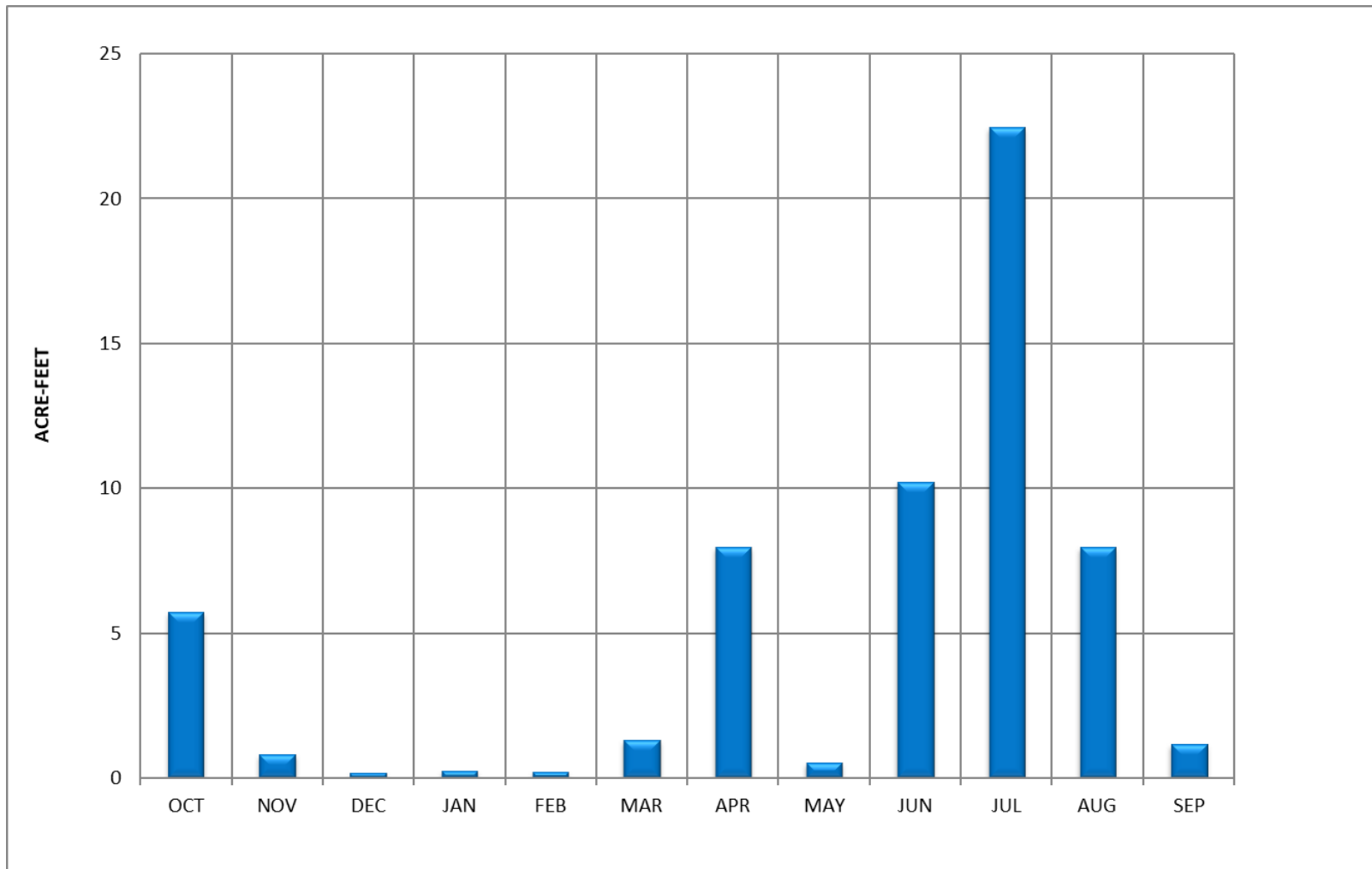


Exhibit 20: Releases of Fryngpan-Arkansas Project Water WY2020.

Appendix C: Twin Lakes Reservoir and Canal Company Exchange with Fryingpan-Arkansas Project Water

Twin Lakes Canal Company Exchange with Fryingpan-Arkansas Project Water WY2020

Table C-1: Twin Lakes Canal Company Exchanges with Fryingpan-Arkansas Project Water (Units = Acre-ft)

	Lincoln Creek below Grizzly Reservoir (1)	Roaring Fork above Lost Man (2)	Total Exchanged (3)	Twin Lakes Storage (3) x 0.9913 ¹
Oct 2019	0	0	0	0
Nov 2019	0	0	0	0
Dec 2019	0	0	0	0
Jan 2020	0	0	0	0
Feb 2020	0	0	0	0
Mar 2020	0	0	0	0
Apr 2020	0	0	0	0
May 2020	0	0	0	0
Jun 2020	810	122	932	924
Jul 2020	1702	230	1932	2143
Aug 2020	0	0	0	0
Sep 2020	0	0	0	0
Total	2512	352	2864	2839

¹ Transit loss from the outlet of Twin Lakes Tunnel to Twin Lakes normally taken on all Twin Lakes Reservoir and Canal Company imported water.

Operating Criteria may prevent the total 3000 x 0.9913 from being stored

Please see the discussion in Chapter IV, Paragraph C for a full discussion of the Twin Lakes Canal Company Exchange in WY2020

Operating Criteria

1. The water exchange will be implemented October 1 through September 30.
2. The releases to the Roaring Fork River at the Roaring Fork Diversion Dam and Lincoln Creek at the Grizzly Diversion Dam shall be accounted as follows:

<u>Month</u>	<u>Grizzly Diversion (cfs)</u>	<u>Roaring Fork Diversion (cfs)</u>
October	3.0	0.0
November	3.0	0.0
December	3.0	0.0
January	3.0	0.0
February	3.0	0.0
March	3.0	0.0
April	3.0	0.0
May	3.0	0.0
June	45.0	4.0
July	45.0	4.0
August	45.0	3.0
September	4.0	3.0

3. At any time the Twin Lakes Reservoir and Canal Company (TLCC) is bypassing water, in addition to that designated above, it will be assumed that the Company could not have diverted that water and will not receive any credit for exchange in excess of the above amounts.
4. In the event less water than the above amounts is bypassed, only the amount actually bypassed will be credited.
5. The total volume of the release at both gages combined shall not exceed 3,000 acre-feet in any one water year.
6. No credit for exchange will be made on days when there is no documentation of such bypasses.
7. No credit will be given for water bypassed when diversions are called out by the State Engineer.

Twin Lake Tunnel Imports WY2020

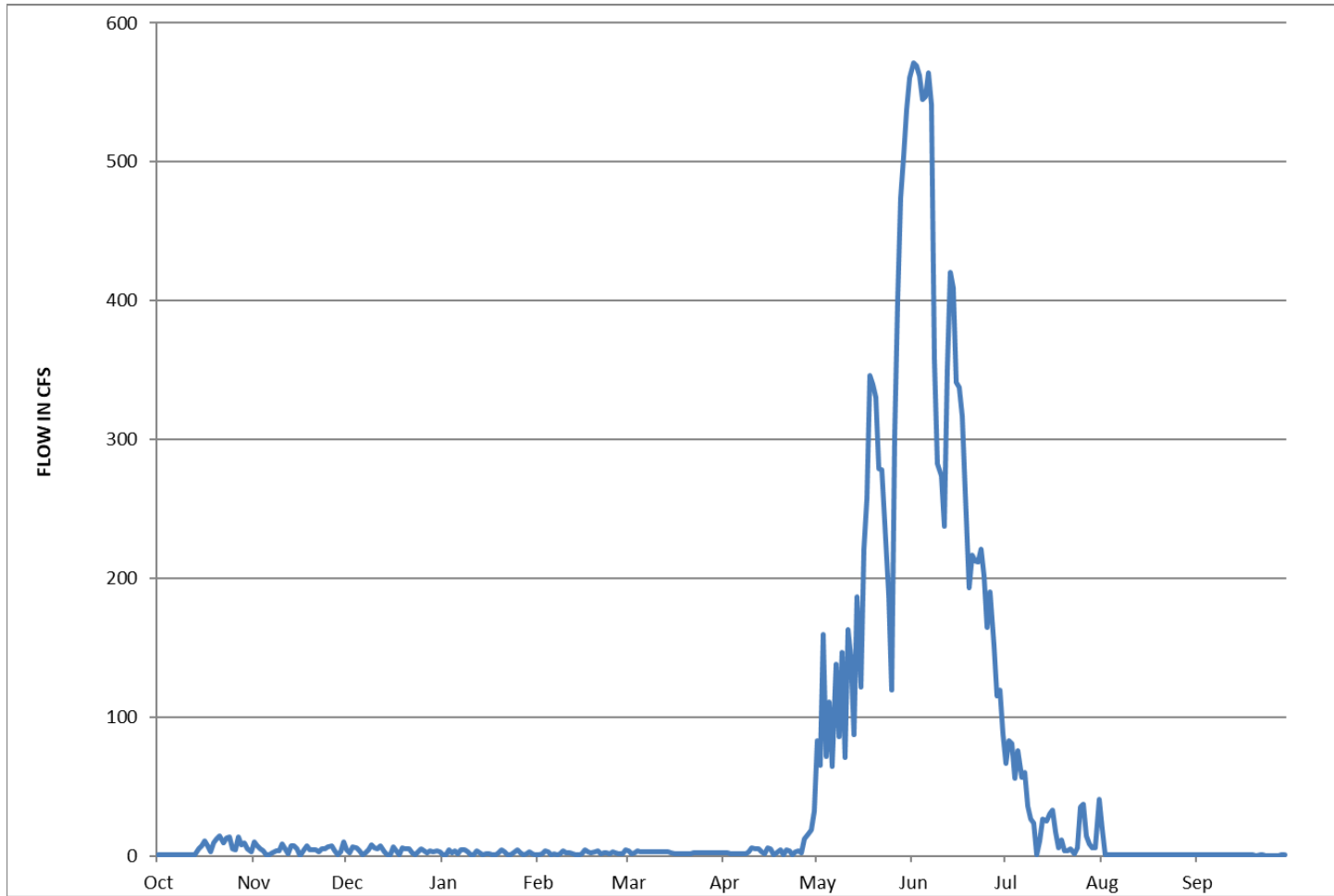


Figure C-1: Graph of Twin Lakes Tunnel Imports for water year 2020.

Twin Lakes Canal Company Storage WY2020

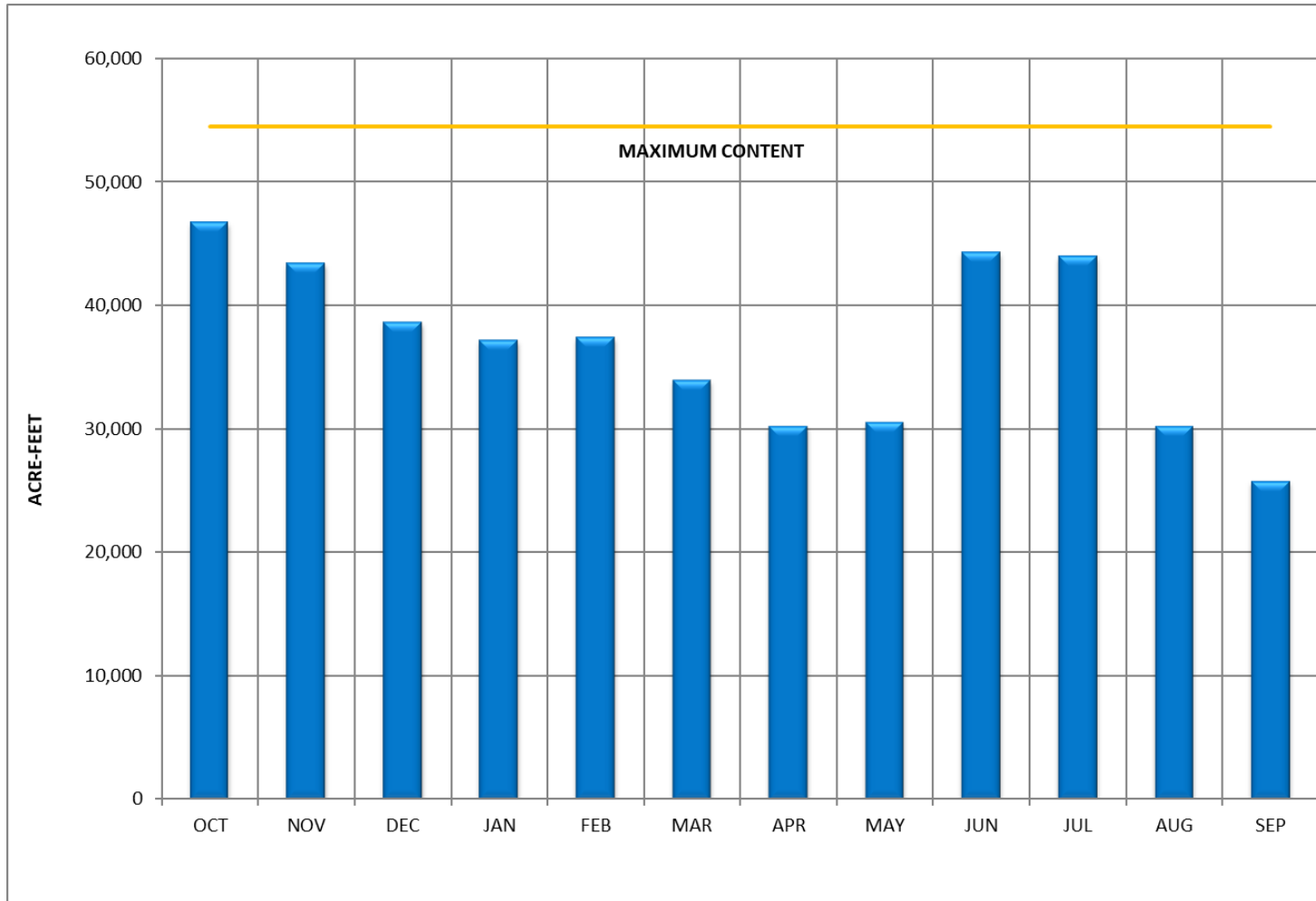


Figure C-2: Graph of Twin Lakes Canal Company Storage for water year 2020.

Appendix D: Daily Discharge Records, Fryingpan-Arkansas Project Collection System

Carter Feeder Conduit near Norrie, CO

Table D-1: Water Year 2020 daily data for Carter Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		15.2	47.4	16.8		
2		19.2	48.3	13.6		
3		17.5	43.6	13.6		
4		17.6	39.5	14		
5		12	39.8	16.4		
6		11.1	42.4	14		
7		12.6	39.8	13.7		
8		10	36.3	12.4		
9		9.7	29.6	12.2		
10		12.1	22	11.3		
11		13.1	19.2	10.5		
12		10.7	20.8	5.1		
13		13.5	27.2			
14		12.2	34.3			
15		10.8	41			
16		11	30.4			
17		18.5	27.8			
18		30.2	31			
19		38.2	28.4			
20		40.6	25			
21		33.6	19.9			
22		25.4	19.6			
23		24	20.8			
24		21	23.6			
25		14.9	24.6			
26		12.6	24.2			
27		16.2	23.3			
28	0.6	30.9	24.7			
29	5.9	40.8	21.8			
30	10.4	41.2	19.5			
31		44.5				
TOTAL	16.9	640.9	895.8	153.6		
AVERAGE	5.6	20.7	29.9	12.8		
MAX	10.4	44.5	48.3	16.8		

WY2020 Total: 3386.2 acre-feet

Maximum Instantaneous Peak: 57.46 cfs on 2 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

North Fryingpan River Feeder Conduit near Norrie, CO

Table D-2: Water Year 2020 daily data for North Fryingpan River Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		2.6	18.5	4.1		
2		3.3	17.9	3.6		
3		3.4	16.9	3.4		
4		2.9	16.2	3.3		
5		2.5	16.3	3.3		
6		2.6	18.2	3.2		
7		2.6	17.2	3		
8		2.2	14.3	2.9		
9		2.2	12.4	2.6		
10		2.4	9.2	2.4		
11		2.4	8.7	1.4		
12		2.4	9.4			
13		2.6	10.9			
14		2.6	14			
15		2.5	13.5			
16		2.9	11.8			
17		4.7	11.7			
18		7.9	11			
19		10.9	10.2			
20		11.9	5.4			
21		10	0.1			
22		8				
23		6.9				
24		5.8				
25		4.5				
26		4.2				
27		5.9				
28		10.1				
29		12.9				
30	0.8	15.8	1.6			
31		17				
TOTAL	0.8	178.6	265.4	33.2		
AVERAGE	0.4	5.8	8.8	3		
MAX	0.8	17	18.5	4.1		

WY2020 Total: 948.1 acre-feet

Maximum Instantaneous Peak: 20.6 cfs on 6 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

South Fork Fryingpan River Feeder Conduit near Norrie, CO

Table D-3: Water Year 2020 daily data for South Fork Fryingpan River Feeder Conduit near Norrie, CO
(Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		3.9	144.6	19.5		
2		14.6	145.1	14.7		
3		22.4	133.3	9.1		
4		24.7	126	4.9		
5		19.5	123.6			
6		18.1	132.2			
7		22.2	127.3			
8		23.1	115.7			
9		23.8	91.6			
10		26.6	73.6			
11		27.7	58.4			
12		20.8	46.5			
13		20.7	59.8			
14		23.9	85.1			
15		27.6	58.6			
16		30.2	48.5			
17		46.5	42.3			
18		70.2	33.5			
19		88.1	25.9			
20		92.4	11.4			
21		83.1	16.5			
22	0.9	72.9	29.9			
23	1.5	70.6	32.5			
24	1.5	62.6	31.6			
25	1.6	45.9	29			
26	1.6	44.7	24.2			
27	1.7	60.8	24.1			
28	1.6	91.3	15.8			
29	1.6	103.4	10.2			
30	1.6	131.4	12.3			
31		156.9				
TOTAL	13.6	1570.6	1909.1	48.2		
AVERAGE	1.5	50.7	63.6	12.1		
MAX	1.7	156.9	145.1	19.5		

WY2020 Total: 7024.6 acre-feet

Maximum Instantaneous Peak: 170.4 cfs on 2 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Mormon Creek Feeder Conduit near Norrie, CO

Table D-4: Water Year 2020 daily data for Mormon Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		7.4	55.6	10.1		
2		13.6	55.3	9.4		
3		18.1	52.2	8.5		
4		19.7	49.8	9		
5		15.2	50.7	8.3		
6		14.8	54.6	7.4		
7		14.8	48.3	6.4		
8		12.1	40.2	5.8		
9		12.5	31.7	2.6		
10		14	25.2			
11		13.6	25.5			
12		13.4	29.1			
13		16.1	36.1			
14		15.5	44.3			
15		14.5	36.1			
16		18	33.7			
17		26.9	33.7			
18		37.7	29.7			
19		43	27.1			
20		43.3	23.1			
21		34.8	24			
22		28.7	26.1			
23		25.7	25.6			
24		21.7	25.2			
25		16.6	22.4			
26		14.8	20.2			
27	0.7	22.1	15.5			
28	0.1	40.2	11.1			
29	2.4	50.1	12.3			
30	4.7	55.3	12.1			
31		56.9				
TOTAL	15.8	751.1	976.5	67.5		
AVERAGE	2	24.2	32.5	6.7		
MAX	4.7	7.4	55.6	10.1		

WY2020 total: 3591.9 acre-feet

Maximum Instantaneous Peak 67.0 cfs on 29 May 20

Blank: Recorder not operated. No water diverted

M: Missing Data

North Cunningham Feeder Conduit near Norrie, CO

Table D-5: Water Year 2020 daily data for North Cunningham Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		4.9	26.5	2.5		
2		8.7	26.2	1.8		
3		10.1	24.6	1.5		
4		10.5	23.2	1.6		
5		7.9	24.1	1.2		
6		6.6	25.9	0.8		
7		6.7	22.3	0.4		
8		5.7	18.3	0.2		
9		5.9	14.2			
10		6.7	11.1			
11		6.4	11.5			
12		5.7	13.9			
13		7.3	17.2			
14		7.1	21.6			
15		6.5	16.8			
16		8.6	15.9			
17		13.9	16.2			
18		19.5	13.9			
19		21.8	12.3			
20		20.3	10.6			
21		16.6	11.1			
22		14.2	12.5			
23		12.6	12.7			
24		10	11.7			
25		6.6	9.6			
26		5.8	8			
27		10.7	3.6			
28	0.2	20.7	0.1			
29	1.3	24.8				
30	2.8	27	1.2			
31		27.8				
TOTAL	4.3	367.4	436.8	10		
AVERAGE	0.8	11.9	15	0.9		
MAX	1.3	27.8	26.5	2.5		

WY2020 Total: 1623.5 acre-feet

Maximum Instantaneous Peak: 37.3 cfs on 29 May 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Middle Cunningham Feeder Conduit near Norrie, CO

Table D-6: Water Year 2020 daily data for Middle Cunningham Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		1.1	36.9	3.3		
2		2	36.5	2.7		
3		3.1	34.4	2.1		
4		3.3	32.6	1.9		
5		2.3	35.3	1.6		
6		2.4	39.2	1.2		
7		2.7	34.2			
8		2.7	28.7			
9		3.4	22.7			
10		3.8	18.6			
11		3.9	17.8			
12		3.9	19.8			
13		4.9	23.8			
14		5.1	27.2			
15		4.9	22.5			
16		6.2	20.5			
17		10.1	20.2			
18		16	17.4			
19		20	15.8			
20		22.3	7.9			
21		18.1	0.2			
22		15.3	0.2			
23		14	0.2			
24		11.6	0.1			
25		8.2	0.1			
26		8.7	0.1			
27		14.6	0.1			
28		25.7	0.1			
29		32.8	0.1			
30	0.4	29.9	1.5			
31		31.1				
TOTAL	0.4	334.1	514.7	12.8		
AVERAGE	0.4	10.8	17.2	2.1		
MAX	0.4	32.8	39.2	3.3		

WY2020 Total: 1709.8 acre-feet

Maximum Instantaneous Peak: 50.0 cfs on 6 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Ivanhoe Creek Feeder Conduit near Norrie, CO

Table D-7: Water Year 2020 daily data for Ivanhoe Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		12.2	71.7	1.9		
2		22.7	100.7	1.4		
3		29.9	96.9	1.4		
4		32.7	95.4	1.4		
5		28.1	95.6	1.4		
6		26.6	99.3	1.4		
7		28.6	97.1			
8		25.2	83.5			
9		27	46			
10		28.7	28			
11		27.6	45.3			
12		25.5	41.6			
13		27.5	47.2			
14		27.2	58.4			
15		24.7	62.5			
16		29.9	75.8			
17		45.2	77.4			
18		62.2	75.1			
19		72.1	73.7			
20		72.2	71.8			
21		57.7	67.9			
22		49.1	45.1			
23		44.9	6.1			
24		36.9	1.4			
25		26.6	1.4			
26		27	1.4			
27		40.3	1.4			
28	1.1	55.1	1.4			
29	3.6	60.3	1.4			
30	6.6	65.9	1.6			
31		63.7				
TOTAL	11.3	1203.3	1572.1	8.9		
AVERAGE	3.8	38.8	52.4	1.5		
MAX	6.6	72.2	100.7	1.9		

WY2020 total: 5545.1 acre-feet

Maximum Instantaneous Peak 108.6 on 2 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Lily Pad Creek Feeder Conduit near Norrie, CO

Table D-8: Water Year 2020 daily data for Lily Pad Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		16.9				
2		18.1				
3		19.3				
4		20.6				
5		20.5				
6		24.9				
7		29.1				
8		29.2				
9		29.9				
10		30.8				
11		31.4				
12		30.9				
13		28.7				
14		26.8				
15		27				
16		28				
17		30.5				
18		32.5				
19		34.1				
20		35.1				
21		36.2				
22		36.1				
23		35.8				
24		32.3				
25		21.3				
26		0.8				
27						
28	7					
29	14.8					
30	15.5					
31						
TOTAL	37.3	706.8				
AVERAGE	12.4	27.2				
MAX	15.5	36.2				

WY2020 Total: 1475.9 acre-feet

Maximum Instantaneous Peak: 37.2 on 23 May 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Granite Creek Feeder Conduit near Norrie, CO

Table D-9: Water Year 2020 daily data for Granite Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		1.2	30.8			
2		1.7	29.5			
3		1.9	27			
4		2.3	26.1			
5		2.1	27.3			
6		2.1	31.7			
7		2.4	26.8			
8		2.2	22.5			
9		2.4	18.7			
10		2.9	15.9			
11		3	15.9			
12		3	17.4			
13		3.3	18.9			
14		3.5	20.6			
15		3.6	16.9			
16		4.1	16.2			
17		6.6	15.4			
18		10.9	13.8			
19		13.8	12.9			
20		15.8	11			
21		14.3	10.4			
22		13.1	10.6			
23		12.8	10.3			
24		11.5	9.8			
25		9.1	9.1			
26		8.7	8.3			
27		11.9	8.7			
28	0.3	18	7.2			
29	0.5	22.8	6.5			
30	0.8	26.9	5.7			
31		30.2				
TOTAL	1.6	268.1	501.9			
AVERAGE	0.5	8.6	16.7			
MAX	0.8	30.2	31.7			

WY2020 Total: 1530.5 acre-feet

Maximum Instantaneous Peak: 38.4 cfs on 6 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

No Name Creek Feeder Conduit near Norrie, CO

Table D-10: Water Year 2020 daily data for No Name Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		0.08	48.3			
2		2.13	23.4			
3		2.14	34.2			
4		2.89	37.1			
5		1.87	37.6			
6		1.94	37.6			
7		2.5	26			
8		2.45	29.8			
9		3.37	25.5			
10		4.72	28.2			
11		4.94	22.6			
12		3.31	21.2			
13		5.71	23.7			
14		7.72	25.3			
15		8.68	20			
16		9.12	18.2			
17		14	15.9			
18		24.1	13.3			
19		33.7	12.3			
20		38.9	5.58			
21		32.5				
22		29.1				
23		28.7				
24		21.4				
25		15.4				
26		19.8				
27		28				
28		38.8				
29		40.4				
30		31.5				
31		41				
TOTAL		500.9	505.8			
AVERAGE		16.2	25.3			
MAX		41	48.3			

WY2020 Total: 1996.7acre-feet.

Maximum Instantaneous Peak: 68.9 cfs on 31 May 20

Blank: Recorder not operated.

M: Missing Data

Midway Creek Feeder Conduit near Norrie, CO

Table D-11: Water Year 2020 daily data for Midway Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		6.22	50	11.69		
2		10.47	50	10.37		
3		10.66	51.32	9.9		
4		9.99	50.46	9.08		
5		7.08	52.3	8.27		
6		7.67	45	7.46		
7		8.59	39.72	6.64		
8		7.64	63.2	5.47		
9		8.48	55			
10		9.94	50.59			
11		10	49.3			
12		10	55.44			
13		10.48	64.94			
14		12.87	73.63			
15		15.06	61.66			
16		17	60.09			
17		21.68	54.09			
18		37.57	48.11			
19		47.91	42.19			
20		47.91	35.1			
21		47.6	32.34			
22		43.17	32.84			
23		41.92	32.41			
24		35.66	30.87			
25		24.92	28.59			
26		28.43	25.64			
27		42.54	22			
28		63.02	19.81			
29		44.47	17.18			
30	1.76	34	14.35			
31		44				
TOTAL	1.8	766.9	1308.2	68.9		
AVERAGE	1.8	24.7	43.6	8.6		
MAX	1.8	63	73.6	11.7		

WY2020 Total: 4256.2 acre-feet.

Maximum Instantaneous Peak: 89.5 cfs on 14 Jun 20

Blank: Recorder not operated.

M: Missing Data

Hunter Creek Feeder Conduit near Norrie, CO

Table D-12: Water Year 2020 daily data for Hunter Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		3.9	65.1	9.1		
2		10.7	30.2	4.4		
3		17.8	49.4			
4		18.9	48.7			
5		12	49.7			
6		8.9	46.9			
7		12.5	36.8			
8		9.8	54.7			
9		10.7	49.2			
10		12.5	39.9			
11		12.9	42.3			
12		8.3	52			
13		9.4	62			
14		10.6	70			
15		10.3	56.9			
16		12	56			
17		26.5	53.3			
18		48.2	46.4			
19		57.7	39.5			
20		60.7	32.2			
21		49	31.6			
22		42.8	35.8			
23		39.6	37.3			
24		30.2	36.6			
25		17.3	31.4			
26		18.2	27.7			
27		37.9	27.2			
28		67.8	20.4			
29		70.3	17.5			
30		55.6	13			
31		3.9				
TOTAL		803	1259.7	13.5		
AVERAGE		26.8	42	6.8		
MAX		70.3	70	9.1		

WY2020 Total: 4118.1 acre-feet

Maximum Instantaneous Peak: 100.0 CFS ON 3 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Sawyer Creek Feeder Conduit near Norrie, CO

Table D-13: Water Year 2020 daily data for Sawyer Creek Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		1.6	20.1	3.5		
2		2.2	20.3	2.9		
3		2.4	20.8	2.5		
4		2.8	20	2.3		
5		3	20	2.3		
6		3	20.1	2		
7		3.2	20.6	1.8		
8		3.5	19.9	1.6		
9		3.6	18.4	1.3		
10		3.9	14.3	1.1		
11		4.4	11.1	0.9		
12		4.6	10.1	0.8		
13		4.2	10.8	0.7		
14		4	13.4	0.6		
15		4	15.6	0.8		
16		4	13.7	0.6		
17		4.6	12.3	0.6		
18		6.4	11.6	0.5		
19		9.5	10.6	0.4		
20		12.9	9.7	0.3		
21		11.9	8	0.2		
22		9	7.2	0.1		
23		8.3	7.1	0.1		
24	0.1	7.9	7.1	0.1		
25	0.2	6.9	6.7	0.1		
26	0.2	5.5	6.4	0.4		
27	0.4	5.1	5.9	0.4		
28	0.6	7.3	5.5	0.2		
29	1	13.1	4.8	0.2		
30	1.3	18	4.2	0.1		
31		19.9				
TOTAL	3.8	200.7	376.3	29.4		
AVERAGE	0.5	6.5	12.5	1		
MAX	1.3	19.9	20.8	3.5		

WY2020 Total: 1210.3 acre-feet

Maximum Instantaneous Peak: 22.5 cfs on 7 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Chapman Gulch Feeder Conduit near Norrie, CO

Table D-14: Water Year 2020 daily data for Chapman Gulch Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		18.7	217.5	21.5		
2		38.7	179.1	15.5		
3		47.3	235.8	8.8		
4		53.1	238.4	11.5		
5		40.3	239.5	8		
6		34.9	249.7	5.3		
7		43.6	205.7	2.9		
8		38.6	235.3	2.1		
9		42.6	205.2	1.3		
10		49	169.6			
11		55.4	166.1			
12		41.7	182.2			
13		48.5	208.3			
14		56.7	244.3			
15		62.9	198.2			
16		65.3	187.7			
17		98.3	177.4			
18		161.3	147.8			
19		201.5	125.4			
20		219.6	93.2			
21		191.4	75.6			
22	0.9	166.5	71.2			
23	1.9	161.1	68.4			
24	1.9	137.2	64.4			
25	2	94.7	55.5			
26	2.1	98.2	45.2			
27	2.2	148.6	40.1			
28	2.1	238.1	20.5			
29	3	259.3	12.9			
30	7.8	194.1	14.3			
31		197.6				
TOTAL	23.9	18.7	217.5	21.5		
AVERAGE	0.8	38.7	179.1	15.5		
MAX	7.8	47.3	235.8	8.8		

WY2020 Total: 15431.8 acre-feet

Maximum Instantaneous Peak: 305.7 cfs on 28 May 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Fryingpan River Feeder Conduit near Norrie, CO

Table D-15: Water Year 2020 daily data for Fryingpan River Feeder Conduit near Norrie, CO (Units: Cubic Feet per Second, Source: Bureau of Reclamation)

	April	May	June	July	August	September
1		20.4	220.3	30.8		
2		23.5	196.3	29		
3		28.7	184.1	27.4		
4		26.5	172.2	22.7		
5		25.6	188.8	22		
6		32.1	217.9	18.1		
7		34.9	171.3	15.4		
8		33.5	115.4	11.9		
9		35.8	108	5.8		
10		40.4	74.8	3.3		
11		34.6	69.7	1.6		
12		39.5	69.5	1.4		
13		40.3	95.6			
14		40.7	102			
15		42	71.2			
16		55.3	62.7			
17		82.9	56.8			
18		107.4	46.7			
19		121.7	29.9			
20		117.6	25			
21		98.7	33.4			
22		97.9	40.5			
23		92.7	37.9			
24		71.2	38.2			
25		60.7	31.5			
26		60.3	32.7			
27		102.8	25.6			
28	1.4	148.5	18			
29	7	181.4	11			
30	12.6	204.6	33.2			
31		212.5				
TOTAL	21	2314.7	2580.2	189.4		
AVERAGE	7	74.7	86	15.8		
MAX	12.6	212.5	220.3	30.8		

WY2020 Total: 10126.4 acre-feet

Maximum Instantaneous Peak: 261.8 on 1 Jun 20

Blank: Recorder not operated. No water diverted

M: Missing Data

Appendix E: Fryingpan-Arkansas Project Operating Principles

87th Congress, 1st Session-----House Document No. 130

OPERATING PRINCIPLES

FRYINGPAN-ARKANSAS PROJECT

ADOPTED BY THE STATE OF COLORADO

APRIL 30, 1959

(As amended December 30, 1959,
and December 9, 1960)

MARCH 15, 1961----Ordered to be printed

U. S. GOVERNMENT PRINTING OFFICE

WASHINGTON: 1961

H. RES. 91

In the House of Representatives, U. S.,

March 15, 1961.

Resolved, That there be printed as a House document the publication entitled “Operating Principles, Fryingpan-Arkansas Project, Adopted by the State of Colorado, April 30, 1959 (as amended December 30, 1959, and December 9, 1960)”, and that there be printed for the use of the Committee on Interior and Insular Affairs one thousand additional copies.

Attest:

Ralph R. Roberts, Clerk.

OPERATING PRINCIPLES, FRYINGPAN-ARKANSAS PROJECT

ADOPTED BY THE STATE OF COLORADO, APRIL 30, 1959

(As Amended December 30, 1959, and December 9, 1960)

The construction and operation of the project involve the diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork River to the Arkansas River Basin. The project contemplates—

- (a) The maximum conservation and use of water;
- (b) The protection of western Colorado water uses, both existing and potential, in accordance with the declared policy of the State of Colorado; and
- (c) The preservation of recreational values.

In order to accomplish such purposes, the project shall be operated by the United States in compliance with the Federal reclamation laws, the laws of the State of Colorado relating to the appropriation, use, or distribution of water, and the following operating principles:

- 1. As used herein:
 - (a) “Project” means that certain enterprise planned and designed by the Bureau of Reclamation, Department of the Interior, for the transmountain diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork

River to the basin of the Arkansas River, together with all of its appurtenant works and facilities in both eastern and western Colorado.

- (b) “Eastern Colorado” means that portion of the State of Colorado lying within the natural drainage basin of the Arkansas River.
- (c) “Western Colorado” means that portion of the State of Colorado lying within the natural drainage basin of the Colorado River and served by diversions made from the Colorado River, or its tributaries, above its confluence with the Gunnison River.
- (d) “Southeastern Colorado Water Conservancy District” means that entity created to contract for payment to the United States of an appropriate portion of project cost allocated to certain water uses in eastern Colorado.
- (e) “Colorado River Water Conservation District” means that entity created by Colorado Revised Statutes 1953, 149-8, as amended.
- (f) “Southwestern Water Conservation District” means that entity created by Colorado Revised Statutes 1953, 149-9, as amended.
- (g) “Ruedi Reservoir” means the reservoir presently planned for construction on the Fryingpan River above the town of Basalt as part of the project.
- (h) “Ashcroft Reservoir” means not only the reservoir contemplated for construction on Castle Creek, a tributary of the Roaring Fork River, but also, unless the context requires otherwise, any other reservoir that may be constructed in the Roaring Fork basin above the town of Aspen in lieu of that reservoir.
- (i) “cfs” means cubic feet of water per second of time.

2. The Ruedi Reservoir shall be constructed and maintained on the Fryingpan River above the town of Basalt with an active capacity of not less than 100,000 acre-feet. In addition thereto and in order to offset adverse streamflow conditions on the Roaring Fork River above the town of Aspen which might occur as a result of the project enlargement of the Twin Lakes Reservoir, the Ashcroft Reservoir on Castle Creek, or some reservoir in lieu thereof, shall be constructed on the Roaring Fork drainage above Aspen to a capacity of approximately 5,000 acre-feet: Providing, However, That the Ashcroft Reservoir shall be constructed only if the Secretary of the Interior after appropriate study shall determine that its benefits exceed the costs: And providing further, That no part of the construction, operation, or maintenance of said Ashcroft Reservoir shall be chargeable to the Fryingpan-Arkansas project. All of such stored water shall be released under the conditions and limitations hereinafter set forth.
3. The receipts from the sale of water from Ruedi Reservoir, as permitted in paragraph 6(b) hereof, shall be applied solely to the operation and maintenance costs and to those reimbursable construction costs of said reservoir which exceed \$7,600,000. The cost of perpetual operation and maintenance of the Ruedi Reservoir shall be borne by users of project water and users of water stored in Ruedi Reservoir in such proportion as may be determined by the Secretary of the Interior.
4. The inclusion of the Ruedi Reservoir in the project shall not preclude the construction of any other replacement or regulatory reservoirs on the Colorado River or its tributaries above Cameo gaging station.

5. The Ruedi Reservoir shall be completed and in operation before any water is diverted to eastern Colorado by means of the project.
6.
 - (a) The replacement capacity of Ruedi Reservoir, and any reservoir constructed in addition thereto, is that portion of the total reservoir capacity required to permit project diversions at times when such diversions could not otherwise be made because of simultaneous demands of senior diversions in western Colorado existing at the time of the adoption of these operating principles, and shall be so operated to accomplish this purpose. Water stored in such capacity shall be released by the United States, upon the request of the Colorado State engineer, to the extent that water would have been available to said decreed rights except for stream depletion resulting from diversions by this project to the Arkansas Valley.
 - (b) The regulatory capacity of Ruedi Reservoir, and any reservoir constructed in addition thereto, is that portion of the total reservoir capacity not needed for replacement purposes. Water stored in such category may be sold or leased by the United States to water users in Colorado for any purpose recognized by the laws of the United States: Provided, That the sale of water for use outside the natural basin of the Colorado River can only be made with the consent of the Colorado River Water Conservation District. Charges for the use of such water shall be established by the Secretary of the Interior by appropriate contract in accordance with the payment ability of such water users.
7. The primary purpose of Ruedi Reservoir, and any reservoir constructed in addition thereto, is to furnish, to the extent of its capacity, in like manner as if the project were constructed by a water conservancy district organized pursuant to the laws of the State of Colorado, the water required for the protection of western Colorado water users by the provisions of Colorado Revised Statutes 1953, 149-6-13, reading as follows:

However, any works or facilities planned and designed for the exportation of water from the natural basin of the Colorado River and its tributaries in Colorado, by any district created under this article, shall be subject to the provisions of the Colorado River Compact and the Boulder Canyon Project Act. Any such works or facilities shall be designed, constructed and operated in such a manner that the present appropriations of water, and in addition thereto prospective uses of water for irrigation and other beneficial consumptive use purposes, including consumptive uses for domestic, mining, and industrial purposes, within the natural basin of the Colorado River in the State of Colorado, from which water is exported, will not be impaired nor increased in cost at the expense of the water users within the natural basin. The facilities and other means for the accomplishment of said purpose shall be incorporated in, and made a part of any project plans for the exportation of water from said natural basin in Colorado.

8. Project diversions from Lime Creek shall be made only in the months of May and June of each year, unless the Colorado River Water Conservation District shall, by written communication, advise the Colorado State engineer that additional diversions can be made.

9 The respective decrees which may be or have been awarded to the parties hereto as a part of the Fryingpan-Arkansas project and Basalt project shall be administered by the proper officials of the State of Colorado, in accordance with the applicable laws of the State of Colorado, and with the following principles and procedures, to wit:

(1) That the demand on the waters available under such decrees shall be allocated in the following sequence:

(a) For diversion to the Arkansas Valley through the collection system and the facilities of the Fryingpan-Arkansas project in an amount not exceeding an aggregate of 120,000 acre-feet of water in any year, but not to exceed a total aggregate of 2,352,800 acre-feet in any period of 34 consecutive years reckoned in continuing progressive series starting with the first full year of diversions, both limitations herein being exclusive of Roaring Fork exchanges as provided in (c) below, and exclusive of diversions for the Busk-Ivanhoe decree; and with the further and absolute limitation that in order to protect existing and future beneficial uses of water in Western Colorado, including recreational and fishing values, the State engineer shall so regulate the transmountain diversions above referred to, to the end that no diversions shall be made which will reduce the remaining aggregate streamflows to less than either of the following minimum standards:

(i) The Fryingpan collection system at the points of diversion collectively, exclusive of Lime Creek: 15 cfs October 1 through March 31; 30 cfs April 1 through September 30.

(ii) Near Norrie (immediately below the junction of North Fork and Fryingpan River): 30 cfs October 1 through March 31; 100 cfs April 1 through April 30; 150 cfs May 1 through May 31; 200 cfs June 1 through June 30; 100 cfs July 1 through July 31; 75 cfs August 1 through August 31; 65 cfs September 1 through September 30.

In maintaining the above minimum standards, the project diversions shall be regulated, so far as is practicable, in such a manner that the North Fork of the Fryingpan River, the Fryingpan River, and each of the tributaries of those streams, shall contribute to the residual streamflows required by those minimum standards quantities of water in proportion to their natural contributions.

(b) For storage in Ruedi Reservoir to the extent of its actual capacity, which is to be not less than 100,000 acre-feet.

(c) For 3,000 acre-feet annually, to the extent that it is available in excess of (a) and (b) above, or such part thereof as may be required, to be delivered to the Twin Lakes Reservoir and Canal Company in exchange for equivalent releases from the headwaters of the Roaring Fork River which would otherwise be diverted through such Twin Lakes Reservoir and Canal Company collection and diversion system.

- (d) For any other beneficial use in western Colorado in accordance with court decree, but not herein contemplated.
- (2) The effectuation of the above principles requires concurrent Fryingpan-Arkansas project diversion and Ruedi Reservoir storage to be accomplished in the manner following: The State engineer annually shall collect pertinent data, including information pertaining to snowpack and all other available evidence, and shall thereafter so divide and apportion the surface runoff as to achieve, as nearly as possible, the foregoing division of water and the maximum of concurrent diversions and storage. The diversions herein contemplated shall be on the basis of a water year hereby defined as that interim of October 1 through the following September 30.
10. For the protection of recreational values, including fishing, on the Fryingpan River below Ruedi Reservoir, releases of water from said reservoir, not to exceed the stream inflow, shall be made so that the streamflow immediately below the junction of the Fryingpan River and Rocky Fork shall not be reduced below 39 cfs from November 1 to April 30, and 110 cfs from May 1 to October 30, or as actual experience or court decree hereafter dictate.
11. An appropriate written contract may be made whereby Twin Lakes Reservoir and Canal Company shall refrain from diverting water whenever the natural flow of the Roaring Fork River and its tributaries shall be only sufficient to maintain a flow equal to or less than that required to maintain the recommended average flows in the Roaring Fork River immediately above its confluence with Difficult Creek in a quantity proportionate to the respective natural flow of the Roaring Fork River. The recommended average flows above mentioned are flows in quantities equal to those recommended as a minimum immediately above its confluence with Difficult Creek according to the following schedule submitted by the United States Fish and Wildlife Service and the Colorado Game and Fish Commission:

Month	Average Second-feet (thousands)	Acre-feet	Month	Average Second-feet (thousands)	Acre-feet
October	44	2.7	May	100	6.2
November	35	2.1	June	120	7.1
December	29	1.8	July	100	6.2
January	26	1.6	August	63	3.9
February	25	1.4	September	44	<u>2.6</u>
March	24	1.5			
April	64	3.8	Total	----	40.9

In maintaining the above averages, at no time shall the flow be reduced below 15 cfs during the months of August to April, inclusive, or below 60 cfs during the months of May to July, inclusive, providing the natural flow during said period is not less than these amounts. The obligation to supply the minimum streamflow as set forth in the above table on the Roaring Fork River shall, to the extent of 3,000 acre-feet annually, be a project obligation to be supplied from any waters diverted from the south tributaries of Hunter Creek, Lime Creek, Last Chance Creek, or any of them.

The Twin Lakes Reservoir and Canal Company shall not be required to refrain from diverting water under its existing decrees from the Roaring Fork River except to the extent that a like quantity of replacement water is furnished to said company without charge therefore through and by means of project diversions and storage.

If by reason of storage capacity in the Ruedi Reservoir, or any reservoir constructed in addition thereto, the Twin Lakes Reservoir and Canal Company derives additional water or other benefits or advantages it would not have realized had this project not been constructed, then nothing herein contained shall prevent the project from making appropriate charges for such water or other benefits or advantages. All revenues derived from the use of water stored in Ashcroft Reservoir shall be used to assist in the repayment of the construction, operation, and maintenance costs of that reservoir, or any reservoir constructed in lieu thereof, as may be determined by the Secretary of the Interior.

12. All lands acquired and held for project construction and operation and water surfaces of project reservoirs will be open to the public for recreational purposes, excepting those areas reserved by the operating agency.
13. The project will be operated in such a manner that those in eastern Colorado using project water imported from the Colorado River Basin for domestic purposes shall have preference over those claiming or using water for any other purpose.
14. The project is to be operated in such a manner as to secure the greatest benefit from the use and reuse of imported project waters within project boundaries in the State of Colorado
15. Any and all benefits and rights of western Colorado water users in and to water stored in Green Mountain Reservoir, as described and defined in Senate Document 80, 75th Congress, 1st session, shall not be impaired or diminished by this project.
16. The project, its operation, maintenance, and use shall be subject to the provisions of the Upper Colorado River Basin Compact of October 11, 1948 (Public Law 37, 81st Congress, 1st session), and the Colorado River Compact of November 24, 1922 (House Document 605, 67th Congress, 4th session).
17. The Colorado River Water Conservation District of the State of Colorado shall acquire title to storage of water in Ruedi Reservoir and any reservoir constructed in addition thereto, by appropriate proceedings in the courts of the State of Colorado. The Southeastern Colorado Water Conservancy District of the State of Colorado shall likewise acquire title to the water required by the project for diversion to the Arkansas Valley. The Secretary of the Interior

shall at any time after the authorization of the project have the option to obtain or require the transfer to the United States of any and all rights initiated or acquired by appropriation as herein set forth: Provided, however, That the rights so taken shall be subject to a beneficial use of such water as may be provided in the repayment contract or contracts, and subject to all the operating principles herein set forth.

18. No transmountain diversion of water shall ever be made through the collection and diversion system of the Fryingpan-Arkansas Project in excess of the quantitative limitations and conditions established by this document: Provided, however, That when under the laws of the State of Colorado, there may be additional water available for such collection and diversion which is not at the time of diversion required for beneficial use in western Colorado or for filling interstate water compact agreements, then such water may be collected and diverted for beneficial use in the Arkansas Valley: Provided further, That such additional diversion shall only be made with the mutual consent of each of the following agencies of the State of Colorado, to wit: the Colorado Water Conservation Board, the Southwestern Water Conservation District, the Colorado River Water Conservation District, and the Southeastern Colorado Water Conservancy District.
19. To assure project operation in conformity with the operating principle heretofore stated, to provide a means for the collection and interchange of information, and to provide a method for the continued study of project operations to the end that, if the stated operating principles may be improved upon, recommendations for changes may be made to the contracting parties, a commission shall be created in an appropriate manner to be composed of one representative of the Southeastern Colorado Water Conservancy District, one representative of the Colorado River Water Conservation District, two representatives of the United States, and one representative of the State of Colorado appointed by the Colorado Water Conservation Board after consultation with the Colorado Game and Fish Commission. The powers of such commission shall be limited to the collection of data, the making of findings of fact, and the suggestion of changes in operating principles.

These operating principles shall be deemed to have amended and take the place of those operating principles signed and executed on April 30, 1959. These operating principles shall be and do constitute a contract between the signatory parties, and shall inure to the benefit of and shall be and remain binding upon said parties, their respective successors and assigns.

Executed as amended at Denver, Colorado, this 9th day of December 1960.

COLORADO WATER CONSERVATION BOARD

Steve McNichols, Chairman;

Governor, State of Colorado

Attest:

Felix L. Sparks,

Director and Secretary

SOUTHEASTERN COLORADO WATER CONSERVANCY

DISTRICT

By J. Selby Young, President

Attest:

J. G. Shoun,

Secretary

COLORADO RIVER WATER CONSERVATION DISTRICT

By A. Allen Brown, President

Attest:

Philip P. Smith,

Secretary

SOUTHWESTERN WATER CONSERVATION DISTRICT

By Ira E. Kelly, President

Attest:

Archie B. Toner,

Secretary