# RECLAMATION

*Managing Water in the West*

## Annual Operating Plan

## Fryingpan—Arkansas Project

# Water Year 2017
# Summary of Actual Operations

Pueblo Dam, Colorado

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

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## PROJECT HIGHLIGHTS

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|---|---|
| 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 (Chapman, South Fork, and Fryingpan) |
| June 7, 1972 | Initial diversion from Sawyer Creek |
| July 1972 | Construction began on Pueblo Dam - second contract |
| July 1972 | First sale of Project transmountain water |
| January 9, 1974 | Began storing water in Pueblo Reservoir |
| May 6, 1974 | Initial diversion from Lily Pad |
| 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 |

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| May 8, 1980 | Initial diversion from Hunter, Midway and No Name Creek Diversions |
| June 4, 1980 | Initial diversion from North Fork and South Cunningham |
| December 8, 1980 | Federal Register notification of availability of water from Ruedi Reservoir |
| April 28, 1981 | Initial diversion from Carter |
| 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 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 |
| 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 |

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| November 17, 1989 | Completed the removal of dikes and constructed the bypass channel around the old outlet works in the old Twin Lakes dam July 1990 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 | Began restricting imports due to high east slope storage |
| 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 | 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. The Bureau of Reclamation has maintained a heightened level of security at Fry-Ark facilities since that time. |

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| 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 | SDS began water deliveries |
| December 23, 2016 | The Master Contract with Southeastern Colorado Water Conservancy District (SECWCD) was executed |
| August 10, 2017 | Lease of Power Privilege signed with SECWCD for the construction, operation, maintenance and replacement associated with hydropower at Pueblo Dam |

# ANNUAL OPERATING PLAN (AOP) FRYINGPAN-ARKANSAS PROJECT
# WATER YEAR (WY) 2017 OPERATIONS

## GENERAL

This is the forty-ninth AOP for the Fryingpan-Arkansas Project (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, wildlife habitat, and 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 (Eighty-Seventh Congress, First Session), and are included in Appendix E.

This AOP is a summary of the actual Project operation in WY 2017 (October 1, 2016 through September 30, 2017).

## PROJECT FEATURES IN OPERATION DURING WY 2017

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 elevation 7,766.0 ft. The reservoir is operated on an annual cycle. Steady winter releases draft the reservoir such that it is 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, industrial uses on a contractual basis, and 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 (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 Boustead 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 elevation 9,869.4 ft. The lake is operated to provide regulation of both Project and non-Project water imported from the west slope, and provides recreation and wildlife habitat. 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 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 Powerplant as it is delivered to Twin Lakes.

The Mt. Elbert Powerplant is a pumped-storage facility located on the shore of Twin Lakes. The powerplant 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 powerplant is used to follow daily peak power loads. This load following is accomplished by pumping water to the Mt. Elbert Forebay, an 11,143 acre-foot 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 powerplant is transmitted and marketed by the Western Area Power Administration, 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 elevation of 9,200 ft. 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 ft msl (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 ft msl (63,324 AF). The inactive pool has remained at the same elevation of 9,168.7 ft msl (72,939 AF) so there has not been a change in operations.

Twin Lakes Reservoir is operated to regulate both Project and non-Project water imported from the west slope, and provides recreation and wildlife habitat. 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.

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 Project and has a total storage capacity of 338,374 AF at elevation 4,898.7 ft. 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.

The majority of water deliveries are made from Pueblo 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. SECWCD signed a Lease of Power Privilege contract with Reclamation to construct, operate, maintain and replace a hydroelectric generator below Pueblo Dam. The design will use the existing hydropower bifurcation at the North Outlet Works SDS connection. Initial construction began in May 2017.

## HYDROLOGIC CONDITIONS AND WEATHER EVENTS IN WY 2017

Precipitation over the Fryingpan watershed above Ruedi Reservoir was above average for most of WY 2017. Cumulative precipitation was below average for October and November but increased in December. Over the October to November period, total precipitation was 66 percent of average and by the end of December increased to 113 percent of average. Cumulative precipitation remained above average from December until the end of WY 2017. The most significant precipitation events occurred in December and January as shown in Figure 1. From February through the end of the summer, precipitation in the basin did not deviate by more than a few percentage points from average. The year finished in September at 103 percent of average.

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

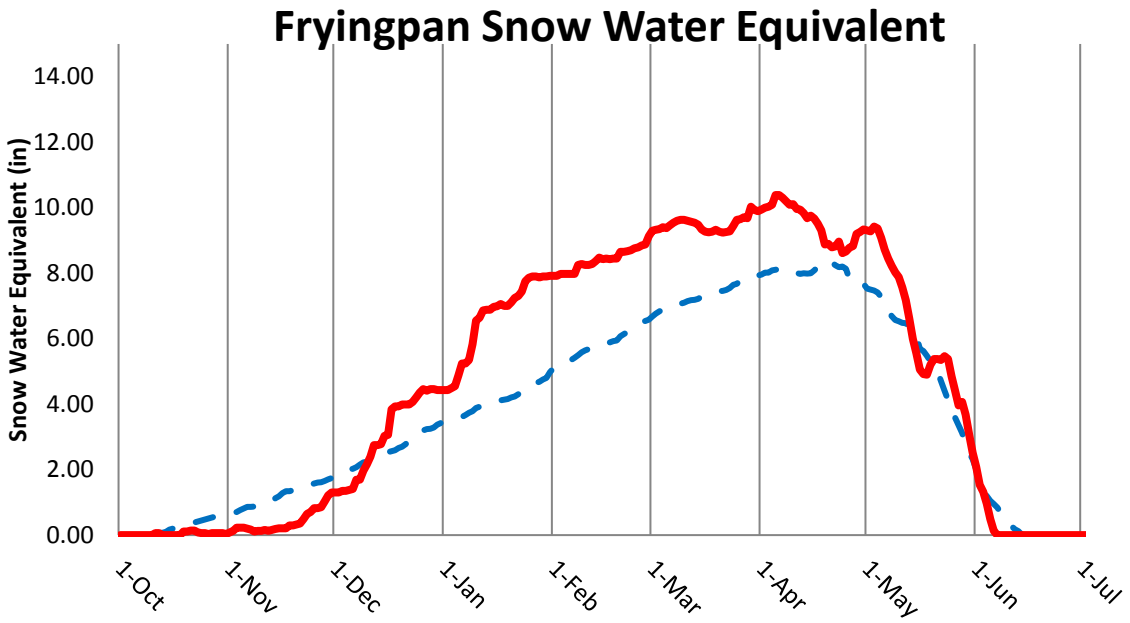



Figure 1: Combined SWE of Fremont Pass, Independence Pass, Ivanhoe Lake and Nast SNOTEL sites

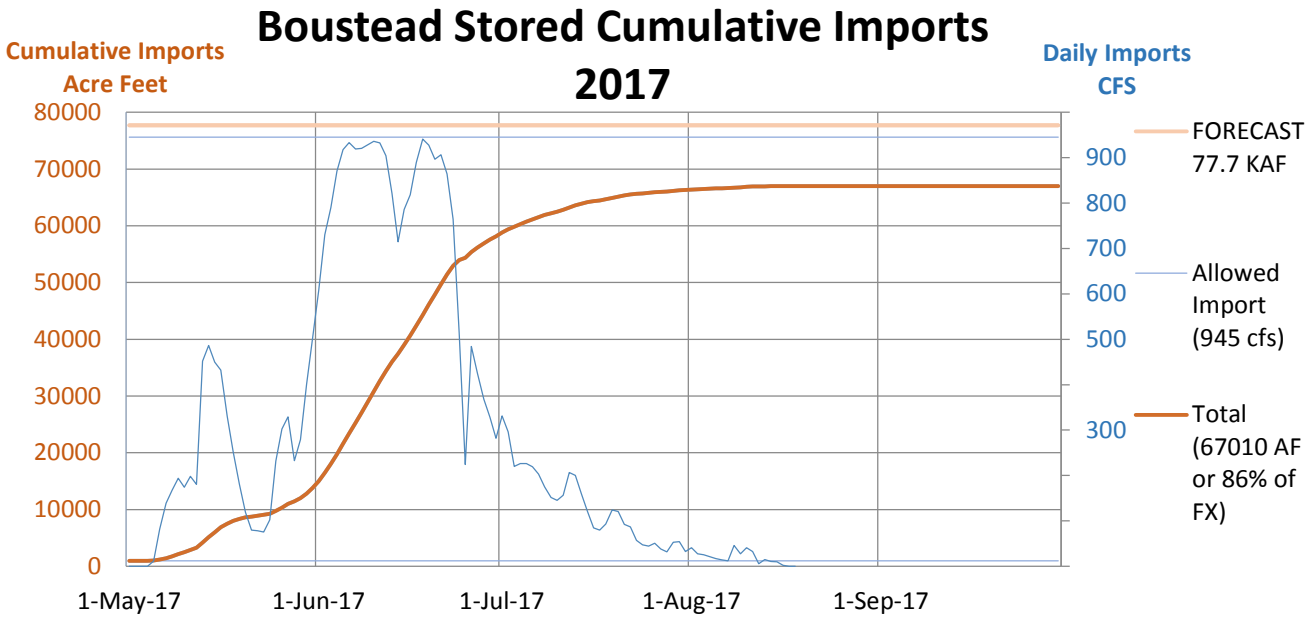



Figure 2: Boustead Tunnel Imports

Snow pack in the basin followed precipitation in that it remained above average for most of the year. Snow accumulation started out slow in October and November but increased rapidly in early December. The group of SNOTEL sites used to forecast undepleted inflow to Ruedi, which include the following: Fremont Pass, Ivanhoe, Nast Lake, and Kiln, were at 3 percent of average on November 1, 2016 and 126 percent of average by the end of December. January was also a high snow accumulation month with snowpack starting the month at 125 percent of average and ending the month at 154 percent of average. From February to the end of the snowpack accumulation season snow accumulation remained fairly close to average rates. On average, all the SNOTEL sites in the forecast group melted out about 6 days before the normal melt out date.

Import forecasts were made using the VIPER software package developed for the Project by the National Weather Service. The forecasts for 2017 were: February 76,900 AF; March 72,600 AF; April 78,000 AF; May 77,700 AF. The total imports in WY 2017 were 67,010 AF.

The collection system began diverting April 14, 2017. The inflow from the Boustead Tunnel peaked June 10, 2017 (see Figure 2).

## REPORT ON OPERATIONS DURING WY 2017

### Ruedi Reservoir

Ruedi Reservoir started out WY 2017 with a storage content of 77,583 AF, which was 88 percent of average. By mid-October the release from Ruedi was decreased to the winter target of 80 cfs and held at this rate until the end of March. The winter target releases were made through the city of Aspen's hydroelectric powerplant.

In January the forecast of undepleted inflow to Ruedi for April through July was 141 kaf, 100 percent of average. Reservoir storage was below average at the beginning of the month and releases continued at 80 cfs throughout the month. Modeling reservoir futures based on the January undepleted inflow forecast suggested that the current release rate would allow the reservoir to fill by July so no changes to releases were made in January.

In February the undepleted inflow forecast increased to194 kaf for the April through July period, 137 percent of average. The reservoir storage was at 94 percent of average and the release from the reservoir was held at 80 cfs. Modeling of reservoir futures based on the February undepleted inflow forecast indicated that the reservoir would fill by July if the 80 cfs release continues. Therefore no changes were made to the reservoir releases.

In March the undepleted inflow forecast decreased to 179 kaf for the April through July period, 127 percent of average. The reservoir storage was at 97 percent of average. Modeling of reservoir futures indicated that the reservoir would fill and that there wasn't a significant risk of exceeding the safe channel capacity below the reservoir once the reservoir filled. On March 16, 2017, the reservoir was drafted down to its lowest annual storage content of 65,116 AF. Snow was still accumulating at the SNOTEL sites and runoff was just starting to increase. As a precautionary measure given the uncertainty in the forecast, releases were increased from 80 cfs to 145 cfs over the last week of March.

In April the forecast of undepleted inflow for April through July called for 158 kaf, 112 percent of average. This forecast projected that Ruedi would fill under the most probable case and spill under the max reasonable case. Runoff increased rapidly in early April and stalled a few times at the end of the month in response to colder temperatures. Releases from the reservoir remained constant at 145 cfs for the entire month.

Runoff continued to increase in early May and releases from the reservoir were increased to keep on target. On May 12, 2017 the release was increased from 145 cfs to 240 cfs. The most probable forecast of undepleted inflow predicted 142 kaf, 106 percent of average over the May to July period. The forecast indicated that the reservoir would fill and not spill above the downstream safe channel capacity. It also indicated that there would be enough water to make Coordinated Reservoir Operations released to the 15-Mile reach of the Colorado River.

Depleted inflows to Ruedi Reservoir were above average for almost every month of WY 2017. From the start of the year until February and from June to September depleted inflow was above average. The total depleted inflow volume for the April through July period in was 82,235 AF

which was 91 percent of average and 55 percent exceedance of the period of record starting in 1974. Reservoir storage reached a maximum physical content of 102,084 AF on July 21, 2017. This storage content was 103 percent of the 30 year average on that day.

Ruedi Reservoir was in priority to store inflow from October 1, 2016 through August 30, 2017. Outside this period, Ruedi was required to make contract and replacement releases to the Colorado River. Ruedi Reservoir released 134 AF of water for out of priority diversions through the Boustead Tunnel and 1,064 AF for contracts during the period that the reservoir was out of priority.

On August 7, 2017 contracted water was released to support fish recovery efforts in the 15-Mile reach of the Colorado River which are designed to enhance habitat for endangered fish. A total of 21,412.5 AF was released between August 7, 2017 and October 16, 2017. This total includes 5,000 AF from the firm endangered fish pool, 5,412.5 AF from the mitigation water pool, 5,000 AF from the 4-out-of-5 fish pool and 6,000 AF of Ute rental water.

Ruedi Reservoir ended WY 2017 with an elevation of 7,737.88 ft., 76,743 AF of storage which was 92 percent of average.

**West Slope Collection System and Project Diversions**

The most probable forecasts were: February, 76,900 AF, March, 72,600 AF, April, 78,000 AF, and May, 77,700 AF. A total of 69,060 AF of water was diverted through the Boustead Tunnel and 67,010 AF of water was stored during WY 2017, which is 116 percent of average for the period from WY 1972 to WY 2017 and 86 percent of the May 2017 forecast.

The import of Project water through the Boustead Tunnel began on April 14, 2017. The maximum import through Boustead Tunnel was 941 cfs on June 18, 2017. A portion of the diversion system was shut down in late July and the rest during late August. Boustead Tunnel seepage was recorded whenever the Project water rights were in priority. There was no 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 46 years of accumulated imports total 2,420 thousand AF, for an unimpeded average of 55,812 AF per year, is shown on Table 5. A plot of the Boustead Tunnel imports during WY 2017 is shown on Figure 2 and Exhibit 5.

The Parshall Flume equations used to rate some of the west slope diversions are non-standard. These were checked to make sure they're the best rating and it was found that they are.

Ruedi Reservoir was forecast to fill this year. In accordance with stipulations to 02CW324 and 02CW354 and the November 30, 2004 agreement between the SECWCD, Colorado River Water Conservation District and the Twin Lakes Reservoir Canal Company, imports through the Boustead Tunnel were constrained to a maximum of 945 cfs.

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

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). On October 1, 2016, TLCC began bypassing water into the Roaring Fork River on the west slope in exchange for Project water stored in Twin Lakes on the east slope.

TLCC began the year with 37,746 AF in storage at Twin Lakes. They reached their maximum storage of 51,965 AF on June 14, 2017. Between June 13 and July 1, 2017 the TLCC exchange ceased because the volumetric storage limit was anticipated. Between July 17 and 18, July 27, and Aug 21, and Sep 1 and Sep 27, 2017 Colorado Canal was in priority below Pueblo Dam and the exchange stopped.

The total amount of the TLCC exchange was 2,006 AF with a net credit to TLCC of 1,988 AF. The operating criteria and the monthly summary of the exchange are shown in Appendix C.

**Turquoise Lake**

On September 30, 2016 there was 113,625 AF at elevation 9,860.41 ft., 100 percent of average, stored in Turquoise Lake. The highest storage was 118,944 AF at elevation 9863.48 ft., on Aug 8, 2017. Releases made down Lake Fork Creek and to Twin Lakes drafted Turquoise Lake to 41,907 AF, at elevation 9812.07 ft., on March 15, 2017 the lowest storage for WY 2017. At the end of WY 2017 there was 115,852 AF, at elevation 9,861.70 ft., which is 108 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 WY 2017.

There was 22,956 AF imported through Homestake Tunnel to the account in Turquoise Reservoir.

Busk-Ivanhoe imports through the Carlton Tunnel totaled 2,870 AF. Pueblo Water (formerly Board of Water Works Pueblo) received 2,717 AF of the imports and the City of Aurora received 153 AF.

Exhibits 5, 6, and 7 show the monthly imports through the Boustead, Homestake, and Busk-Ivanhoe Tunnels, respectively.

**Mt. Elbert Conduit/Halfmoon Creek Diversion**

During WY 2017, 107,768 AF of water was released from Turquoise Lake through the Sugarloaf Powerplant and 5,617 AF of water was bypassed around the powerplant. A total of 15,971 AF of water was diverted from Halfmoon Creek and was conveyed through the Mt. Elbert Conduit to the Mt. Elbert Forebay, and subsequently to Twin Lakes through the Mt. Elbert Powerplant. An additional 3,909 AF of water was 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 and then returned to the Arkansas River and stored in Pueblo Reservoir. The conduit operations are shown on Exhibit 11.

**Twin Lakes/Mt. Elbert Forebay and Mt. Elbert Pumped-Storage Powerplant**

On September 30, 2016, the storage for Twin Lakes was 103,803 AF at elevation 9184.80 ft. and Mt. Elbert Forebay was 10,489 AF at elevation 9643.34 ft. The Twin Lakes/Mt. Elbert Forebay combined water storage reached a low of 109,192 AF on May 24, 2017 and a high of 141,255 AF on June 17, 2017. On September 30, 2017 the storage for Twin Lakes was 121,850 AF at elevation 9192.71 ft. and Mt. Elbert Forebay was 8,528 AF at elevation 9635.85 ft., which was 105 percent of average.

The releases from Twin Lakes 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 5,840 AF was stored in the TLCC storage space from November 15, 2016 through March 15, 2017 as winter water storage. A total of 45,573 AF of Project water was released to Lake Creek.

Exhibits 12 and 13 show the precipitation and pan evaporation at Turquoise Lake. Table 7 and Exhibit 14 depict the monthly operation of Twin Lakes during WY 2017.

Colorado Division of Water Resources determines the amount of water trapped as bank storage in ice before March15, 2017, that will be credited to the TLCC as winter water. The amount of 78 AF was prorated between the first day of melting and the average last day of freezing at Twin Lakes. This amount was deducted from native inflows and credited daily to the TLCC account.

A total of 10,000 AF of Project water was made available to the Upper Arkansas Voluntary Flow Management Program (VFMP) to augment flows at the gage Arkansas River at Wellsville. While Reclamation is not a party to the agreement between SECWCD; 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. Reclamation was not asked to provide any water in support of the VFMP.

A total of 261,351 megawatt hours of energy was generated at the powerplant, with 769,719 AF of water; 129,061 AF came through the Mt. Elbert Conduit; and 642,951 AF were pumped to the Mt. Elbert Forebay from Twin Lakes during off-peak electric demand hours. Table 8 depicts the monthly power plant operation for WY 2017.

**Pueblo Reservoir**

The storage at Pueblo Reservoir was 186,027 AF at elevation 4,865.59 ft., 120 percent of average on September 30, 2016. The reservoir reached a high of 258,339 AF at elevation 4883.22 ft. on March 18, 2017 and a low of 182,229 AF at elevation 4864.54 ft. on November 14, 2017. There was 203,784 AF at elevation 4870.34 ft., which is 131 percent of average on September 30, 2017.

A total of 43,419 AF of native inflow was stored under the Pueblo Reservoir WWSP between November 15, 2016 and March 14, 2017. The program allows agricultural entities to store native flows during the winter to be used during irrigation season. On March 15, 2017 it was distributed to agricultural entities. Winter water account holders called for 13,216 AF of winter water and 18,028 AF of winter carryover. Winter water was reduced by 2,996 AF of evaporation.

Pueblo Reservoir storage was 254,890 AF on April 1, 2017. The Corps of Engineers (COE) requires the joint use pool be evacuated by April 15 and the reservoir drawn down to below 245,373 AF. In the past, COE issued waivers to allow accounts to encroach into the joint use pool until May 1, the day all winter water carryover must be out of the reservoir and any remaining Project carryover will revert to the Project. Changes in guidance from COE mean waivers will no longer be issued as in the past. This makes it much more likely that a spill, the forced evacuation of account water, will occur in mid-April in the future. In WY 2017, account holders cooperated to draw down their accounts, even when the timing of releases wasn't optimal for an individual account holder, releasing water before the April 15 deadline. Water was moved to other storage facilities, including John Martin and Great Plains Reservoir, or used early for irrigation.

Table 9 and Exhibit 19 depict Pueblo Reservoir monthly operations during WY 2017. The 2016-2017 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.

**Storage Contracts**

There were four long term storage contracts for a total of 57,416 AF of non-Project storage in Turquoise Lake, one long term storage contract for 54,452 AF in Twin Lakes and six long term storage contracts for 52,612.5 AF in Pueblo Reservoir.

Ten contracts totaling 9,829 AF were interim, 1-year contracts for "if-and-when" storage space in Pueblo Reservoir. Sixteen contracts totaling 6,515 AF were negotiated under the Master Contract for "if-and-when" storage. Under "if and when" contracts, non-Project water may be stored in Project storage space as long as that storage space is not required for Project water.

**Project Water Sales and Deliveries**

There was 46,371 AF of Project water made available to the SECWCD for allocation. Entities called for 31,180 AF of Project and 4,416 AF of Project carryover water during the year.

Evaporation reduced the Project carryover water in storage by 8,814 AF. By the end of WY 2017 the District had 19,637 AF of allocated water and 123,972 AF of carryover water remaining in storage. The monthly release of Project water from Pueblo Reservoir is shown on Exhibit 21.

**Reservoir Storage Allocation Data**

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

## Reservoir Evaporation and Precipitation

Tables 12 and 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. It is assumed that there is no evaporation from a reservoir water surface when ice completely covers the reservoir.

## Flood Control Benefits

The COE estimated that the operations at Ruedi Reservoir during WY 2017 prevented $131,000 of flood damages. Since impoundment, Ruedi Reservoir has prevented a total of $19,849,700 (unadjusted for inflation) in potential flood damages.

The COE estimated that the operations at Pueblo Reservoir prevented no flood damages during WY 2017. Since impoundment, Pueblo Reservoir has prevented a total of $36,785,000 (unadjusted for inflation) in potential flood damages.

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

## APPENDIX A: TABLES

### 1. Ruedi Reservoir Operations WY 2017

Fryingpan-Arkansas Project
Unit: 1,000 AF

| Month | Inflow | Evaporation | Outflow | End of Month Content | Water Surface Elevation (msl) |
|---|---|---|---|---|---|
| OCT-2016 | 4.1 | 0.1 | 8.9 | 73.0 | 7,733.34 |
| NOV-2016 | 3.3 | 0 | 5.0 | 71.3 | 7,731.20 |
| DEC-2016 | 3.3 | 0 | 5.0 | 69.6 | 7,729.03 |
| JAN-2017 | 3.1 | 0 | 4.9 | 67.8 | 7,726.70 |
| FEB-2017 | 2.8 | 0 | 4.6 | 66.1 | 7,724.34 |
| MAR-2017 | 6.1 | 0 | 5.9 | 66.2 | 7,724.55 |
| APR-2017 | 11.2 | 0 | 8.6 | 68.8 | 7,728.00 |
| MAY-2017 | 21.8 | 0.2 | 12.2 | 78.1 | 7,739.55 |
| JUN-2017 | 33.4 | 0.6 | 13.1 | 99.7 | 7,763.28 |
| JUL-2017 | 13.1 | 0.6 | 10.7 | 101.5 | 7,765.08 |
| AUG-2017 | 7.7 | 0.4 | 15.4 | 93.4 | 7,756.77 |
| SEP-2017 | 5.0 | 0.2 | 17.8 | 80.4 | 7,742.25 |
| | | | | | |
| **Total* (AF)** | 114,859 | 2,083 | 111,984 | | |

*Rounding may introduce discrepancies between monthly and yearly totals

**2. Ruedi Reservoir Releases for Contracts WY 2017**
Fryingpan-Arkansas Project
Unit: AF

| **Month** | **Round 1** | **Round 2 Nonfish** | **Round 2 Fish** |
|---|---|---|---|
| OCT 2016 | | | |
| NOV 2016 | | | |
| DEC 2016 | | | |
| JAN 2017 | | | |
| FEB 2017 | | | |
| MAR 2017 | | | |
| APR 2017 | | | |
| MAY 2017 | | | |
| JUN 2017 | | | |
| JUL 2017 | | | |
| AUG 2017 | 12 | 28 | 6544 |
| SEP 2017 | 221 | 803 | 11663 |
| OCT 2017 | | | 3206 |
| | | | |
| **Total** | **233** | **831** | **21413** |

# 3. Ruedi Reservoir Releases for Endangered Fish WY 2017

FRYINGPAN-ARKANSAS PROJECT
RUEDI RESERVOIR
RELEASES FOR ENDANGERED FISH
WATER YEAR 2017
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) | REQUIRED FISH RELEASE (CFS) | CUMULATIVE FISH RELEASE (AC-FT) | PALISADE GAGE (CFS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAT | 4/1/2017 | 7,724.49 | 66,168 | 121 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 2,268 |
| SUN | 4/2/2017 | 7,724.44 | 66,131 | 125 | 0 | 144 | 4 | 149 | N | 39 | 0 | 0 | 2,179 |
| MON | 4/3/2017 | 7,724.39 | 66,093 | 125 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,941 |
| TUE | 4/4/2017 | 7,724.33 | 66,048 | 121 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,782 |
| WED | 4/5/2017 | 7,724.23 | 65,973 | 106 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,637 |
| THU | 4/6/2017 | 7,724.13 | 65,898 | 107 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,448 |
| FRI | 4/7/2017 | 7,723.99 | 65,794 | 92 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,245 |
| SAT | 4/8/2017 | 7,724.03 | 65,824 | 159 | 0 | 145 | 4 | 148 | N | 39 | 0 | 0 | 1,120 |
| SUN | 4/9/2017 | 7,724.05 | 65,839 | 152 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,160 |
| MON | 4/10/2017 | 7,724.03 | 65,824 | 137 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,311 |
| TUE | 4/11/2017 | 7,724.01 | 65,809 | 137 | 0 | 144 | 4 | 148 | N | 39 | 0 | 0 | 1,204 |
| WED | 4/12/2017 | 7,724.00 | 65,801 | 141 | 0 | 145 | 4 | 149 | N | 39 | 0 | 0 | 1,110 |
| THU | 4/13/2017 | 7,724.11 | 65,884 | 186 | 0 | 145 | 4 | 149 | N | 39 | 0 | 0 | 982 |
| FRI | 4/14/2017 | 7,724.34 | 66,056 | 232 | 0 | 145 | 4 | 149 | N | 39 | 0 | 0 | 1,168 |
| SAT | 4/15/2017 | 7,724.62 | 66,266 | 251 | 0 | 145 | 4 | 150 | N | 39 | 0 | 0 | 1,567 |
| SUN | 4/16/2017 | 7,724.89 | 66,468 | 248 | 0 | 145 | 5 | 150 | N | 39 | 0 | 0 | 2,015 |
| MON | 4/17/2017 | 7,725.19 | 66,694 | 259 | 0 | 145 | 5 | 150 | N | 39 | 0 | 0 | 2,224 |
| TUE | 4/18/2017 | 7,725.51 | 66,935 | 267 | 0 | 146 | 6 | 152 | N | 39 | 0 | 0 | 2,370 |
| WED | 4/19/2017 | 7,725.94 | 67,261 | 311 | 0 | 147 | 7 | 153 | N | 39 | 0 | 0 | 2,575 |
| THU | 4/20/2017 | 7,726.32 | 67,549 | 291 | 0 | 146 | 7 | 153 | N | 39 | 0 | 0 | 3,164 |
| FRI | 4/21/2017 | 7,726.61 | 67,770 | 256 | 0 | 145 | 8 | 153 | N | 39 | 0 | 0 | 3,155 |
| SAT | 4/22/2017 | 7,726.81 | 67,922 | 221 | 0 | 145 | 9 | 153 | N | 39 | 0 | 0 | 2,859 |
| SUN | 4/23/2017 | 7,726.95 | 68,029 | 199 | 0 | 145 | 9 | 153 | N | 39 | 0 | 0 | 2,438 |
| MON | 4/24/2017 | 7,727.23 | 68,243 | 253 | 0 | 145 | 8 | 153 | N | 39 | 0 | 0 | 2,204 |
| TUE | 4/25/2017 | 7,727.47 | 68,428 | 238 | 0 | 145 | 8 | 153 | N | 39 | 0 | 0 | 2,285 |
| WED | 4/26/2017 | 7,727.64 | 68,558 | 211 | 0 | 145 | 8 | 153 | N | 39 | 0 | 0 | 2,291 |
| THU | 4/27/2017 | 7,727.81 | 68,689 | 211 | 0 | 145 | 8 | 153 | N | 39 | 0 | 0 | 2,203 |
| FRI | 4/28/2017 | 7,727.92 | 68,773 | 188 | 0 | 146 | 8 | 153 | N | 39 | 0 | 0 | 2,101 |
| SAT | 4/29/2017 | 7,727.97 | 68,812 | 165 | 0 | 146 | 7 | 153 | N | 39 | 0 | 0 | 1,947 |
| SUN | 4/30/2017 | 7,728.00 | 68,835 | 157 | 0 | 146 | 7 | 153 | N | 39 | 0 | 0 | 1,760 |
| Averages | | 7,725.51 | 66,946 | 189 | 0 | 145 | 6 | 150 | | 39 | 0 | | 1,924 |
| Totals (acft) | | | | 11,246 | 0 | 8,624 | 330 | 8,954 | | 2,321 | 0 | 0 | 114,470 |

NOTES: Releases of water to support 15-Mile Reach target started 8/7 and ceased 10/16. A total of 21,412.5 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT
RUEDI RESERVOIR
RELEASES FOR ENDANGERED FISH
WATER YEAR 2017
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) | PALISADE GAGE (CFS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MON | 5/1/2017 | 7,728.05 | 68,873 | 169 | 3 | 146 | 7 | 152 | N | 110 | 0 | 0 | 1,581 |
| TUE | 5/2/2017 | 7,728.11 | 68,920 | 172 | 3 | 145 | 6 | 152 | N | 110 | 0 | 0 | 1,454 |
| WED | 5/3/2017 | 7,728.14 | 68,943 | 161 | 3 | 146 | 6 | 152 | N | 110 | 0 | 0 | 1,251 |
| THU | 5/4/2017 | 7,728.19 | 68,981 | 169 | 3 | 146 | 6 | 152 | N | 110 | 0 | 0 | 1,246 |
| FRI | 5/5/2017 | 7,728.31 | 69,074 | 229 | 3 | 179 | 6 | 184 | N | 110 | 0 | 0 | 1,176 |
| SAT | 5/6/2017 | 7,728.54 | 69,252 | 289 | 3 | 196 | 6 | 202 | N | 110 | 0 | 0 | 1,410 |
| SUN | 5/7/2017 | 7,728.83 | 69,477 | 313 | 3 | 196 | 6 | 202 | N | 110 | 0 | 0 | 2,311 |
| MON | 5/8/2017 | 7,729.21 | 69,772 | 348 | 3 | 196 | 7 | 203 | N | 110 | 0 | 0 | 3,601 |
| TUE | 5/9/2017 | 7,729.80 | 70,232 | 432 | 3 | 197 | 9 | 206 | N | 110 | 0 | 0 | 4,254 |
| WED | 5/10/2017 | 7,730.38 | 70,686 | 429 | 3 | 197 | 12 | 208 | N | 110 | 0 | 0 | 4,682 |
| THU | 5/11/2017 | 7,730.92 | 71,111 | 415 | 3 | 198 | 13 | 211 | N | 110 | 0 | 0 | 5,067 |
| FRI | 5/12/2017 | 7,731.54 | 71,601 | 459 | 3 | 208 | 14 | 222 | N | 110 | 0 | 0 | 5,361 |
| SAT | 5/13/2017 | 7,732.23 | 72,149 | 518 | 3 | 238 | 16 | 254 | N | 110 | 0 | 0 | 6,664 |
| SUN | 5/14/2017 | 7,733.04 | 72,797 | 567 | 3 | 238 | 20 | 257 | N | 110 | 0 | 0 | 7,847 |
| MON | 5/15/2017 | 7,733.74 | 73,359 | 526 | 3 | 239 | 23 | 262 | N | 110 | 0 | 0 | 8,054 |
| TUE | 5/16/2017 | 7,734.38 | 73,876 | 503 | 3 | 239 | 23 | 262 | N | 110 | 0 | 0 | 8,086 |
| WED | 5/17/2017 | 7,734.87 | 74,273 | 442 | 4 | 239 | 22 | 261 | N | 110 | 0 | 0 | 7,852 |
| THU | 5/18/2017 | 7,735.25 | 74,582 | 395 | 4 | 236 | 21 | 257 | N | 110 | 0 | 0 | 7,423 |
| FRI | 5/19/2017 | 7,735.52 | 74,802 | 351 | 4 | 237 | 19 | 256 | N | 110 | 0 | 0 | 6,706 |
| SAT | 5/20/2017 | 7,735.71 | 74,957 | 319 | 4 | 237 | 17 | 254 | N | 110 | 0 | 0 | 5,962 |
| SUN | 5/21/2017 | 7,735.88 | 75,096 | 311 | 4 | 238 | 15 | 253 | N | 110 | 0 | 0 | 5,391 |
| MON | 5/22/2017 | 7,736.05 | 75,235 | 311 | 4 | 237 | 14 | 251 | N | 110 | 0 | 0 | 4,913 |
| TUE | 5/23/2017 | 7,736.22 | 75,375 | 287 | 4 | 213 | 13 | 226 | N | 110 | 0 | 0 | 4,639 |
| WED | 5/24/2017 | 7,736.48 | 75,588 | 291 | 4 | 180 | 13 | 192 | N | 110 | 0 | 0 | 4,346 |
| THU | 5/25/2017 | 7,736.83 | 75,876 | 329 | 4 | 180 | 13 | 193 | N | 110 | 0 | 0 | 4,278 |
| FRI | 5/26/2017 | 7,737.25 | 76,222 | 358 | 4 | 180 | 14 | 194 | N | 110 | 0 | 0 | 4,958 |
| SAT | 5/27/2017 | 7,737.79 | 76,669 | 409 | 4 | 180 | 16 | 197 | N | 110 | 0 | 0 | 5,912 |
| SUN | 5/28/2017 | 7,738.21 | 77,017 | 360 | 4 | 181 | 18 | 199 | N | 110 | 0 | 0 | 6,339 |
| MON | 5/29/2017 | 7,738.61 | 77,350 | 352 | 4 | 181 | 19 | 200 | N | 110 | 0 | 0 | 6,021 |
| TUE | 5/30/2017 | 7,739.03 | 77,700 | 361 | 4 | 181 | 20 | 201 | N | 110 | 0 | 0 | 6,147 |
| WED | 5/31/2017 | 7,739.55 | 78,135 | 404 | 4 | 181 | 22 | 203 | N | 110 | 0 | 0 | 6,421 |
| Averages | | 7,733.44 | 73,161 | 354 | 3 | 199 | 14 | 213 | | 110 | 0 | | 4,882 |
| Totals (acft) | | | | 21,775 | 213 | 12,261 | 863 | 13,125 | | 6,764 | 0 | 0 | 300,208 |

NOTES: Releases of water to support 15-Mile Reach target started 8/7 and ceased 10/16. A total of 21,412.5 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT
RUEDI RESERVOIR
RELEASES FOR ENDANGERED FISH
WATER YEAR 2017
June

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| THU | 6/1/2017 | 7,740.19 | 78,673 | 462 | 9 | 182 | 25 | 207 | N | 110 | 0 | 0 | 7,122 |
| FRI | 6/2/2017 | 7,740.98 | 79,341 | 538 | 9 | 192 | 28 | 220 | N | 110 | 0 | 0 | 8,114 |
| SAT | 6/3/2017 | 7,741.65 | 79,909 | 582 | 9 | 286 | 30 | 317 | N | 110 | 0 | 0 | 9,141 |
| SUN | 6/4/2017 | 7,742.32 | 80,481 | 679 | 9 | 382 | 33 | 415 | N | 110 | 0 | 0 | 9,887 |
| MON | 6/5/2017 | 7,743.10 | 81,150 | 820 | 9 | 474 | 37 | 511 | N | 110 | 0 | 0 | 11,107 |
| TUE | 6/6/2017 | 7,743.81 | 81,761 | 873 | 9 | 556 | 38 | 594 | N | 110 | 0 | 0 | 12,204 |
| WED | 6/7/2017 | 7,744.49 | 82,350 | 872 | 9 | 566 | 43 | 609 | N | 110 | 0 | 0 | 13,488 |
| THU | 6/8/2017 | 7,745.14 | 82,916 | 844 | 9 | 550 | 46 | 596 | N | 110 | 0 | 0 | 14,032 |
| FRI | 6/9/2017 | 7,746.21 | 83,851 | 937 | 9 | 456 | 48 | 505 | N | 110 | 0 | 0 | 14,741 |
| SAT | 6/10/2017 | 7,747.45 | 84,944 | 907 | 9 | 347 | 49 | 396 | N | 110 | 0 | 0 | 14,913 |
| SUN | 6/11/2017 | 7,748.97 | 86,294 | 942 | 9 | 252 | 49 | 301 | N | 110 | 0 | 0 | 14,729 |
| MON | 6/12/2017 | 7,750.25 | 87,441 | 776 | 10 | 189 | 47 | 236 | N | 110 | 0 | 0 | 14,036 |
| TUE | 6/13/2017 | 7,751.35 | 88,434 | 692 | 10 | 182 | 44 | 226 | N | 110 | 0 | 0 | 13,167 |
| WED | 6/14/2017 | 7,752.21 | 89,215 | 540 | 10 | 136 | 40 | 176 | N | 110 | 0 | 0 | 11,505 |
| THU | 6/15/2017 | 7,753.01 | 89,946 | 504 | 10 | 126 | 37 | 162 | N | 110 | 0 | 0 | 10,079 |
| FRI | 6/16/2017 | 7,753.89 | 90,755 | 523 | 10 | 105 | 35 | 140 | N | 110 | 0 | 0 | 10,099 |
| SAT | 6/17/2017 | 7,754.94 | 91,725 | 597 | 10 | 98 | 34 | 132 | N | 110 | 0 | 0 | 10,382 |
| SUN | 6/18/2017 | 7,756.34 | 93,030 | 766 | 10 | 98 | 34 | 132 | N | 110 | 0 | 0 | 11,254 |
| MON | 6/19/2017 | 7,757.59 | 94,206 | 702 | 10 | 99 | 32 | 131 | N | 110 | 0 | 0 | 11,961 |
| TUE | 6/20/2017 | 7,758.53 | 95,097 | 574 | 10 | 115 | 31 | 146 | N | 110 | 0 | 0 | 11,527 |
| WED | 6/21/2017 | 7,759.21 | 95,745 | 556 | 10 | 219 | 30 | 249 | N | 110 | 0 | 0 | 11,011 |
| THU | 6/22/2017 | 7,759.74 | 96,252 | 500 | 10 | 234 | 28 | 262 | N | 110 | 0 | 0 | 11,130 |
| FRI | 6/23/2017 | 7,760.14 | 96,636 | 418 | 10 | 214 | 26 | 240 | N | 110 | 0 | 0 | 10,979 |
| SAT | 6/24/2017 | 7,760.57 | 97,049 | 372 | 10 | 153 | 23 | 176 | N | 110 | 0 | 0 | 10,644 |
| SUN | 6/25/2017 | 7,761.02 | 97,483 | 382 | 10 | 153 | 21 | 174 | N | 110 | 0 | 0 | 9,659 |
| MON | 6/26/2017 | 7,761.50 | 97,948 | 397 | 10 | 153 | 20 | 172 | N | 110 | 0 | 0 | 8,645 |
| TUE | 6/27/2017 | 7,761.97 | 98,404 | 394 | 10 | 154 | 18 | 172 | N | 110 | 0 | 0 | 7,654 |
| WED | 6/28/2017 | 7,762.45 | 98,872 | 382 | 10 | 136 | 17 | 153 | N | 110 | 0 | 0 | 7,017 |
| THU | 6/29/2017 | 7,762.89 | 99,301 | 357 | 10 | 130 | 16 | 146 | N | 110 | 0 | 0 | 6,417 |
| FRI | 6/30/2017 | 7,763.28 | 99,683 | 332 | 10 | 129 | 15 | 144 | N | 110 | 0 | 0 | 5,743 |
| Averages | | 7,752.84 | 89,963 | 607 | 10 | 235 | 32 | 268 | | 110 | 0 | | 10,746 |
| Totals (acft) | | | | 36,139 | 578 | 14,013 | 1,931 | 15,944 | | 6,546 | 0 | 0 | 639,453 |

NOTES: Releases of water to support 15-Mile Reach target started 8/7 and ceased 10/16. A total of 21,412.5 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT
RUEDI RESERVOIR
RELEASES FOR ENDANGERED FISH
WATER YEAR 2017
July

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAT | 7/1/2017 | 7,763.51 | 99,909 | 252 | 9 | 129 | 14 | 143 | N | 110 | 0 | 0 | 5,573 |
| SUN | 7/2/2017 | 7,763.67 | 100,066 | 218 | 9 | 129 | 14 | 143 | N | 110 | 0 | 0 | 5,151 |
| MON | 7/3/2017 | 7,763.82 | 100,213 | 213 | 9 | 129 | 13 | 142 | N | 110 | 0 | 0 | 4,695 |
| TUE | 7/4/2017 | 7,764.00 | 100,391 | 228 | 9 | 129 | 13 | 142 | N | 110 | 0 | 0 | 4,360 |
| WED | 7/5/2017 | 7,764.19 | 100,578 | 234 | 9 | 130 | 12 | 142 | N | 110 | 0 | 0 | 4,185 |
| THU | 7/6/2017 | 7,764.33 | 100,716 | 208 | 9 | 129 | 11 | 141 | N | 110 | 0 | 0 | 4,035 |
| FRI | 7/7/2017 | 7,764.57 | 100,953 | 258 | 9 | 129 | 11 | 140 | N | 110 | 0 | 0 | 3,947 |
| SAT | 7/8/2017 | 7,764.73 | 101,111 | 219 | 9 | 130 | 10 | 140 | N | 110 | 0 | 0 | 3,856 |
| SUN | 7/9/2017 | 7,764.88 | 101,260 | 214 | 9 | 130 | 10 | 140 | N | 110 | 0 | 0 | 3,760 |
| MON | 7/10/2017 | 7,765.00 | 101,379 | 199 | 9 | 129 | 10 | 139 | N | 110 | 0 | 0 | 3,615 |
| TUE | 7/11/2017 | 7,765.15 | 101,527 | 213 | 9 | 129 | 9 | 138 | N | 110 | 0 | 0 | 3,402 |
| WED | 7/12/2017 | 7,765.37 | 101,746 | 249 | 9 | 129 | 9 | 138 | N | 110 | 0 | 0 | 3,985 |
| THU | 7/13/2017 | 7,765.53 | 101,904 | 241 | 9 | 152 | 9 | 161 | N | 110 | 0 | 0 | 5,391 |
| FRI | 7/14/2017 | 7,765.61 | 101,984 | 218 | 9 | 168 | 9 | 178 | N | 110 | 0 | 0 | 4,060 |
| SAT | 7/15/2017 | 7,765.64 | 102,014 | 205 | 9 | 180 | 10 | 190 | N | 110 | 0 | 0 | 3,794 |
| SUN | 7/16/2017 | 7,765.66 | 102,034 | 200 | 9 | 181 | 9 | 190 | N | 110 | 0 | 0 | 3,346 |
| MON | 7/17/2017 | 7,765.69 | 102,064 | 205 | 9 | 180 | 9 | 189 | N | 110 | 0 | 0 | 3,016 |
| TUE | 7/18/2017 | 7,765.70 | 102,074 | 194 | 9 | 180 | 8 | 188 | N | 110 | 0 | 0 | 2,723 |
| WED | 7/19/2017 | 7,765.70 | 102,074 | 200 | 9 | 190 | 8 | 198 | N | 110 | 0 | 0 | 2,508 |
| THU | 7/20/2017 | 7,765.71 | 102,084 | 209 | 9 | 195 | 8 | 203 | N | 110 | 0 | 0 | 2,434 |
| FRI | 7/21/2017 | 7,765.71 | 102,084 | 225 | 9 | 216 | 8 | 223 | N | 110 | 0 | 0 | 2,398 |
| SAT | 7/22/2017 | 7,765.70 | 102,074 | 226 | 9 | 222 | 8 | 230 | N | 110 | 0 | 0 | 2,541 |
| SUN | 7/23/2017 | 7,765.64 | 102,014 | 201 | 9 | 222 | 8 | 229 | N | 110 | 0 | 0 | 2,518 |
| MON | 7/24/2017 | 7,765.56 | 101,935 | 191 | 9 | 222 | 8 | 229 | N | 110 | 0 | 0 | 2,177 |
| TUE | 7/25/2017 | 7,765.50 | 101,875 | 201 | 9 | 222 | 7 | 229 | N | 110 | 0 | 0 | 2,203 |
| WED | 7/26/2017 | 7,765.43 | 101,805 | 196 | 9 | 221 | 7 | 229 | N | 110 | 0 | 0 | 2,423 |
| THU | 7/27/2017 | 7,765.35 | 101,726 | 191 | 9 | 221 | 7 | 229 | N | 110 | 0 | 0 | 2,320 |
| FRI | 7/28/2017 | 7,765.28 | 101,656 | 196 | 9 | 221 | 7 | 228 | N | 110 | 0 | 0 | 2,081 |
| SAT | 7/29/2017 | 7,765.25 | 101,626 | 216 | 9 | 221 | 7 | 228 | N | 110 | 0 | 0 | 2,129 |
| SUN | 7/30/2017 | 7,765.18 | 101,557 | 196 | 9 | 221 | 7 | 228 | N | 110 | 0 | 0 | 2,332 |
| MON | 7/31/2017 | 7,765.08 | 101,458 | 181 | 9 | 221 | 7 | 228 | N | 110 | 0 | 0 | 2,198 |
| Averages | | 7,765.10 | 101,480 | 213 | 9 | 174 | 9 | 184 | | 110 | 0 | | 3,328 |
| Totals (acft) | | | | 13,085 | 582 | 10,728 | 567 | 11,295 | | 6,764 | 0 | 0 | 204,603 |

NOTES: Releases of water to support 15-Mile Reach target started 8/7 and ceased 10/16. A total of 21,412.5 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT
RUEDI RESERVOIR
RELEASES FOR ENDANGERED FISH
WATER YEAR 2017
August

| 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TUE | 8/1/2017 | 7,764.92 | 101,299 | 148 | 7 | 222 | 7 | 228 | N | 110 | 0 | 0 | 1,815 |
| WED | 8/2/2017 | 7,764.76 | 101,141 | 148 | 7 | 221 | 6 | 228 | N | 110 | 0 | 0 | 1,484 |
| THU | 8/3/2017 | 7,764.60 | 100,983 | 151 | 7 | 224 | 6 | 230 | N | 110 | 0 | 0 | 1,371 |
| FRI | 8/4/2017 | 7,764.41 | 100,795 | 149 | 7 | 237 | 6 | 243 | N | 110 | 0 | 0 | 1,256 |
| SAT | 8/5/2017 | 7,764.19 | 100,578 | 142 | 7 | 245 | 6 | 251 | N | 110 | 0 | 0 | 1,202 |
| SUN | 8/6/2017 | 7,763.96 | 100,351 | 137 | 7 | 244 | 6 | 250 | N | 110 | 0 | 0 | 1,270 |
| MON | 8/7/2017 | 7,763.76 | 100,154 | 151 | 7 | 244 | 5 | 249 | N | 110 | 93 | 184 | 1,193 |
| TUE | 8/8/2017 | 7,763.58 | 99,978 | 161 | 7 | 244 | 5 | 249 | N | 110 | 82 | 347 | 1,308 |
| WED | 8/9/2017 | 7,763.40 | 99,801 | 161 | 7 | 243 | 5 | 248 | N | 110 | 82 | 510 | 1,366 |
| THU | 8/10/2017 | 7,763.23 | 99,634 | 166 | 7 | 243 | 6 | 248 | N | 110 | 77 | 664 | 1,437 |
| FRI | 8/11/2017 | 7,763.03 | 99,438 | 150 | 7 | 242 | 6 | 248 | N | 110 | 92 | 846 | 1,526 |
| SAT | 8/12/2017 | 7,762.80 | 99,213 | 135 | 7 | 241 | 6 | 247 | N | 110 | 107 | 1058 | 1,565 |
| SUN | 8/13/2017 | 7,762.60 | 99,018 | 149 | 7 | 241 | 5 | 246 | N | 110 | 92 | 1240 | 1,524 |
| MON | 8/14/2017 | 7,762.39 | 98,813 | 145 | 7 | 241 | 5 | 246 | N | 110 | 97 | 1431 | 1,498 |
| TUE | 8/15/2017 | 7,762.14 | 98,570 | 125 | 7 | 242 | 4 | 246 | N | 110 | 116 | 1662 | 1,447 |
| WED | 8/16/2017 | 7,761.89 | 98,327 | 127 | 7 | 243 | 4 | 247 | N | 110 | 116 | 1892 | 1,354 |
| THU | 8/17/2017 | 7,761.65 | 98,093 | 131 | 7 | 242 | 4 | 246 | N | 110 | 111 | 2112 | 1,281 |
| FRI | 8/18/2017 | 7,761.37 | 97,822 | 123 | 7 | 253 | 4 | 257 | N | 110 | 130 | 2370 | 1,217 |
| SAT | 8/19/2017 | 7,761.04 | 97,503 | 110 | 7 | 264 | 4 | 268 | N | 110 | 154 | 2676 | 1,106 |
| SUN | 8/20/2017 | 7,760.73 | 97,203 | 120 | 7 | 264 | 4 | 267 | N | 110 | 144 | 2962 | 1,058 |
| MON | 8/21/2017 | 7,760.39 | 96,876 | 105 | 7 | 264 | 3 | 267 | N | 109 | 158 | 3276 | 1,099 |
| TUE | 8/22/2017 | 7,760.05 | 96,549 | 105 | 7 | 264 | 3 | 267 | N | 109 | 158 | 3591 | 986 |
| WED | 8/23/2017 | 7,759.70 | 96,213 | 101 | 7 | 264 | 3 | 267 | N | 105 | 162 | 3913 | 875 |
| THU | 8/24/2017 | 7,759.35 | 95,878 | 101 | 7 | 264 | 3 | 267 | N | 105 | 162 | 4235 | 885 |
| FRI | 8/25/2017 | 7,759.01 | 95,554 | 107 | 7 | 264 | 3 | 267 | N | 110 | 157 | 4547 | 914 |
| SAT | 8/26/2017 | 7,758.66 | 95,220 | 102 | 7 | 264 | 3 | 267 | N | 105 | 161 | 4867 | 1,017 |
| SUN | 8/27/2017 | 7,758.29 | 94,869 | 93 | 7 | 264 | 3 | 267 | N | 96 | 171 | 5206 | 963 |
| MON | 8/28/2017 | 7,757.92 | 94,518 | 93 | 6 | 263 | 3 | 266 | N | 96 | 170 | 5544 | 934 |
| TUE | 8/29/2017 | 7,757.54 | 94,159 | 89 | 6 | 263 | 3 | 266 | N | 92 | 175 | 5890 | 1,028 |
| WED | 8/30/2017 | 7,757.15 | 93,791 | 84 | 6 | 263 | 3 | 266 | N | 87 | 179 | 6245 | 976 |
| THU | 8/31/2017 | 7,756.77 | 93,434 | 90 | 6 | 264 | 3 | 267 | Y | 93 | 151 | 6544 | 935 |
| Averages | | 7,761.46 | 97,928 | 126 | 7 | 250 | 4 | 254 | | 107 | 106 | | 1,222 |
| Totals (acft) | | | | 7,737 | 409 | 15,352 | 273 | 15,625 | | 6,557 | 6,544 | 6,544 | 75,155 |

NOTES: Releases of water to support 15-Mile Reach target started 8/7 and ceased 10/16. A total of 21,412.5 acre-feet was released to support Recovery Program target flows.

FRYINGPAN-ARKANSAS PROJECT
RUEDI RESERVOIR
RELEASES FOR ENDANGERED FISH
WATER YEAR 2017
September

| DAY | DATE | ELEV. (FT) | STORAGE (AC-FT) | INFLOW (CFS) | EVAP. (CFS) | TOTAL 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FRI | 9/1/2017 | 7,756.43 | 93,115 | 107 | 4 | 264 | 3 | 266 | Y | 110 | 136 | 6,813 | 924 |
| SAT | 9/2/2017 | 7,756.05 | 92,759 | 87 | 4 | 263 | 3 | 266 | Y | 90 | 154 | 7,119 | 923 |
| SUN | 9/3/2017 | 7,755.67 | 92,404 | 89 | 4 | 264 | 3 | 266 | Y | 92 | 154 | 7,424 | 943 |
| MON | 9/4/2017 | 7,755.28 | 92,041 | 84 | 4 | 263 | 3 | 266 | Y | 87 | 158 | 7,737 | 1,009 |
| TUE | 9/5/2017 | 7,754.80 | 91,595 | 68 | 4 | 289 | 3 | 292 | Y | 71 | 200 | 8,133 | 952 |
| WED | 9/6/2017 | 7,754.31 | 91,142 | 77 | 4 | 302 | 3 | 305 | Y | 80 | 204 | 8,538 | 897 |
| THU | 9/7/2017 | 7,753.82 | 90,690 | 77 | 4 | 301 | 3 | 304 | Y | 80 | 204 | 8,942 | 901 |
| FRI | 9/8/2017 | 7,753.30 | 90,212 | 82 | 4 | 319 | 3 | 322 | Y | 85 | 217 | 9,372 | 907 |
| SAT | 9/9/2017 | 7,752.76 | 89,717 | 83 | 4 | 329 | 3 | 332 | Y | 86 | 225 | 9,819 | 858 |
| SUN | 9/10/2017 | 7,752.25 | 89,252 | 98 | 4 | 329 | 3 | 332 | Y | 101 | 210 | 10,236 | 997 |
| MON | 9/11/2017 | 7,751.74 | 88,788 | 98 | 4 | 328 | 3 | 331 | Y | 101 | 209 | 10,651 | 1,069 |
| TUE | 9/12/2017 | 7,751.24 | 88,334 | 102 | 4 | 327 | 3 | 330 | Y | 105 | 204 | 11,056 | 1,119 |
| WED | 9/13/2017 | 7,750.70 | 87,846 | 83 | 4 | 325 | 3 | 328 | Y | 86 | 222 | 11,497 | 1,168 |
| THU | 9/14/2017 | 7,750.18 | 87,378 | 93 | 4 | 325 | 3 | 328 | Y | 96 | 212 | 11,917 | 1,165 |
| FRI | 9/15/2017 | 7,749.66 | 86,911 | 92 | 4 | 324 | 3 | 327 | Y | 96 | 211 | 12,336 | 1,366 |
| SAT | 9/16/2017 | 7,749.15 | 86,455 | 97 | 4 | 324 | 3 | 327 | Y | 101 | 206 | 12,745 | 1,404 |
| SUN | 9/17/2017 | 7,748.61 | 85,973 | 84 | 4 | 323 | 3 | 327 | Y | 87 | 219 | 13,178 | 1,317 |
| MON | 9/18/2017 | 7,748.08 | 85,502 | 89 | 4 | 323 | 3 | 326 | Y | 93 | 213 | 13,602 | 1,297 |
| TUE | 9/19/2017 | 7,747.51 | 84,997 | 72 | 4 | 323 | 3 | 326 | Y | 75 | 231 | 14,059 | 1,271 |
| WED | 9/20/2017 | 7,746.96 | 84,511 | 83 | 4 | 325 | 3 | 328 | Y | 87 | 218 | 14,491 | 1,211 |
| THU | 9/21/2017 | 7,746.44 | 84,053 | 77 | 4 | 304 | 3 | 307 | Y | 80 | 204 | 14,894 | 1,120 |
| FRI | 9/22/2017 | 7,745.95 | 83,624 | 69 | 4 | 282 | 3 | 285 | Y | 72 | 189 | 15,270 | 1,045 |
| SAT | 9/23/2017 | 7,745.51 | 83,238 | 91 | 4 | 282 | 3 | 285 | Y | 95 | 167 | 15,602 | 1,165 |
| SUN | 9/24/2017 | 7,745.05 | 82,837 | 83 | 4 | 282 | 3 | 285 | Y | 86 | 175 | 15,949 | 1,246 |
| MON | 9/25/2017 | 7,744.58 | 82,428 | 79 | 4 | 281 | 3 | 284 | Y | 82 | 179 | 16,304 | 1,253 |
| TUE | 9/26/2017 | 7,744.10 | 82,012 | 75 | 4 | 281 | 3 | 284 | Y | 78 | 183 | 16,666 | 1,254 |
| WED | 9/27/2017 | 7,743.63 | 81,606 | 80 | 4 | 281 | 3 | 285 | Y | 83 | 178 | 17,018 | 1,266 |
| THU | 9/28/2017 | 7,743.16 | 81,201 | 81 | 4 | 281 | 3 | 285 | N | 84 | 200 | 17,416 | 1,306 |
| FRI | 9/29/2017 | 7,742.67 | 80,780 | 72 | 4 | 281 | 3 | 284 | N | 75 | 217 | 17,846 | 1,439 |
| SAT | 9/30/2017 | 7,742.25 | 80,421 | 104 | 4 | 281 | 3 | 284 | N | 107 | 182 | 18,207 | 1,483 |
| Averages | | 7,749.39 | 86,727 | 85 | 4 | 300 | 3 | 303 | | | 196 | | 1,142 |
| Totals (acft) | | | | 5,074 | 222 | 17,865 | 183 | 18,048 | | | 11,663 | 18,207 | 67,978 |

NOTES: Releases of water to support 15-Mile Reach target started 8/7 and ceased 10/16. A total of 21,412.5 acre-feet was released to support Recovery Program target flows.

**4. Fryingpan-Arkansas Project Transmountain Diversions WY 2017**
Fryingpan-Arkansas Project
Unit: AF

| | APR | MAY | JUN | JUL | AUG | SEP | TOTAL |
|---|---|---|---|---|---|---|---|
| **South Fork[4]** | 67 | 1,675 | 6,748 | 1,743 | 169 | 0 | **10,403** |
| **No Name** | 0 | 569 | 1,984 | 25 | 0 | 0 | **2,578** |
| **Midway** | 0 | 930 | 3,457 | 589 | 0 | 0 | **4,977** |
| **Hunter** | 0 | 870 | 2,862 | 452 | 0 | 0 | **4,184** |
| **Sawyer[4]** | 16 | 166 | 720 | 100 | 4 | 0 | **986** |
| **Chapman[1]** | 1 | 745 | 3,626 | 880 | 146 | 0 | **5,401** |
| | | | | | | | |
| **Subtotal** | **84** | **4,955** | **19,397** | **3,789** | **319** | **0** | **28,529** |
| | | | | | | | |
| **Carter** | 101 | 769 | 2,004 | 760 | 6 | 0 | **3,641** |
| **North Fork** | 0 | 179 | 786 | 129 | 0 | 0 | **1,094** |
| **Mormon** | 92 | 917 | 2,663 | 427 | 2 | 0 | **4,010** |
| **North Cunningham** | 57 | 451 | 1,240 | 86 | 0 | 0 | **1,835** |
| **Middle Cunningham** | 0 | 351 | 1,735 | 144 | 0 | 0 | **2,231** |
| **Ivanhoe** | 292 | 1,587 | 5,257 | 113 | 0 | 0 | **7,249** |
| **Granite** | 0 | 239 | 1,341 | 49 | 0 | 0 | **1,628** |
| **Fryingpan[4]** | 0 | 2,430 | 9,453 | 2,243 | 203 | 0 | **14,476** |
| **Lily Pad** | 199 | 595 | 907 | 180 | 0 | 0 | **1,882** |
| | | | | | | | |
| **Subtotal** | **741** | **7,518** | **25,386** | **4,131** | **211** | **0** | **38,046** |
| | | | | | | | |
| **Total** | **825** | **12,473** | **44,783** | **7,920** | **530** | **0** | **66,575** |
| | | | | | | | |
| **Boustead Tunnel** | Oct-Apr | 12,835 | 44,316 | 8,184 | 694 | 4 | **67,011** |
| | 978 | | | | | | |

[1] Does not include No Name, Hunter, Sawyer and Midway.
[2] Includes South Cunningham.
[3] The difference between total diversion and Charles H. Boustead Tunnel results from the accuracy limitations of the measurement, rounding and seepage.
[4] These gages use non-standard Parshall Flume equations.

**5. Fryingpan-Arkansas Project Imports - Charles H. Boustead Tunnel Outlet**

Fryingpan-Arkansas Project

Unit: 1,000 AF

| Water Year | Imports | Accumulated Imports | Twin Lakes Exchange | Available to SECWCD |
|---|---|---|---|---|
| 1972 | 32.0 | 32.0 | 0 | 0.0 |
| 1973 | 36.8 | 68.8 | 0 | 16.0 |
| 1974 | 34.1 | 102.9 | 0 | 18.6 |
| 1975 | 37.2 | 140.1 | 0 | 25.0 |
| 1976 | 26.9 | 167.0 | 0 | 24.0 |
| 1977 | 11.4 | 178.4 | 0 | 25.0 |
| 1978 | 49.2 | 227.6 | 0 | 25.0 |
| 1979 | 53.7 | 281.3 | 0 | 25.6 |
| 1980 | 55.7 | 337.0 | 0 | 70.0 |
| 1981 | 34.6 | 371.6 | 0 | 25.0 |
| 1982 | 75.2 | 446.8 | 2.7 | 68.0 |
| 1983 | 90.8 | 537.6 | 0.3 | 125.0 |
| 1984 | 110.1 | 647.7 | 1.9 | 210.0 |
| 1985 | 70.2 | 717.9 | 1.7 | 289.9 |
| 1986 | 30.3 | 748.2 | 1.5 | 300.3 |
| 1987 | 2.2 | 750.4 | 1.1 | 288.0 |
| 1988 | 13.4 | 763.8 | 2.0 | 247.8 |
| 1989 | 36.2 | 800.0 | 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 | 55.0 |
| 1996 | 36.9 | 1226.7 | 1.8 | 110.0 |
| 1997 | 78.6 | 1305.3 | 1.8 | 116.0 |
| 1998 | 51.3 | 1356.6 | 2.6 | 102.0 |
| 1999 | 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 |
| 2004 | 27.4 | 1583.0 | 1.3 | 15.3 |
| 2005 | 54.6 | 1637.6 | 3.0 | 40.8 |

**5. Fryingpan-Arkansas Project Imports - Charles H. Boustead Tunnel Outlet**

Fryingpan-Arkansas Project

Unit: 1,000 AF

| Water Year | Imports | Accumulated Imports | Twin Lakes Exchange | Available to SECWCD |
|---|---|---|---|---|
| 2006 | 61.2 | 1698.8 | 3.0 | 49.2 |
| 2007 | 54.2 | 1753.0 | 3.0 | 40.4 |
| 2008 | 90.0 | 1843.0 | 3.0 | 83.0 |
| 2009 | 82.7 | 1925.7 | 3.0 | 78.0 |
| 2010 | 56.5 | 1982.2 | 3.0 | 44.0 |
| 2011 | 98.9 | 2081.1 | 2.3 | 75.0 |
| 2012 | 13.4 | 2094.5 | 1.5 | 9.9 |
| 2013 | 46.7 | 2141.2 | 2.8 | 37.6 |
| 2014 | 80.3 | 2221.5 | 3.0 | 56.0 |
| 2015 | 72.2 | 2293.7 | 1.9 | 67.9 |
| 2016 | 59.2 | 2353.0 | 2.5 | 39.1 |
| 2017 | 67.0 | 2420.0 | 2.0 | 46.3 |

Restriction: Not to exceed 120 KAF in 1 year.
Not to exceed 2,352.8 KAF AF in 34 consecutive years.
The imports between 1983 and 2017 are 1973.1 KAF.
1983 includes 3,120 AF imported through the Twin Lakes Tunnel.

**6. Turquoise Lake Operations WY 2017**

Fryingpan-Arkansas Project

Unit: 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 (FT msl) |
|---|---|---|---|---|---|---|---|---|---|---|
| OCT 2016 | 0 | - | 0 | 0.1 | 0.1 | 0.2 | 0.4 | 1.2 | 112.2 | 9859.60 |
| NOV 2016 | 0 | - | 0 | 0 | 0.6 | 0.7 | 0.2 | 8.9 | 103.9 | 9854.68 |
| DEC 2016 | 0 | - | 0 | 0 | 1.8 | 1.8 | 0 | 17.5 | 88.2 | 9845.15 |
| JAN 2017 | 0.1 | - | 0 | 0 | 2.3 | 2.4 | 0 | 21.5 | 69.1 | 9832.71 |
| FEB 2017 | 0 | - | 0 | 0 | 1.5 | 1.6 | 0 | 19.7 | 51.0 | 9819.43 |
| MAR 2017 | 0.1 | - | 10.7 | 0.1 | 1.0 | 11.8 | 0 | 18.5 | 44.3 | 9814.09 |
| APR 2017 | 0.1 | - | 9.2 | 0.8 | 1.8 | 12.0 | 0 | 6.1 | 50.1 | 9818.78 |
| MAY 2017 | 0.7 | - | 0.6 | 12.8 | 6.5 | 20.7 | 0.3 | 5.9 | 64.7 | 9829.59 |
| JUN 2017 | 1.5 | - | 2.4 | 44.3 | 14.8 | 63.0 | 0.8 | 10.4 | 116.5 | 9862.06 |
| JUL 2017 | 0.3 | - | 0 | 8.2 | 3.9 | 12.4 | 0.4 | 9.7 | 118.7 | 9863.35 |
| AUG 2017 | 0 | - | 0 | 0.7 | 1.1 | 1.8 | 0.4 | 3.0 | 117.1 | 9862.40 |
| SEP 2017 | 0 | - | 0 | 0 | 0.4 | 0.4 | 0.3 | 1.3 | 115.9 | 9861.70 |
| | | | | | | | | | | |
| **Total* (AF)** | **2,870** | - | **22,956** | **67,010** | **35,952** | **128,788** | **2,900** | **123,661** | | |

*Rounding may introduce discrepancies between monthly and yearly totals

## 7. Twin Lakes/Mt. Elbert Forebay WY 2017 Operations

Fryingpan-Arkansas Project
Unit: 1,000 AF

| | Twin Lakes Canal Company | | | Mt. Elbert Conduit | | | | Twin Lakes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date** | **Imports** | **Winter Water** | **Priority/ Native** | **Leadville Fish Hatchery[4]** | **Halfmoon** | **Sugarloaf Bypass** | **Sugarloaf Powerplant** | **Native Inflow** | **Total Inflow** | **Evap[2]** | **Total Outflow** | **End of Month Content[2]** | **Water Elevation[3] (FT msl)** |
| OCT 2016 | 0.4 | - | 0 | 0.3 | 0 | 0.5 | 0 | 1.5 | 2.5 | 0.6 | 1.3 | 114.9 | 9186.05 |
| NOV 2016 | 0.5 | 0.4 | 0 | 0.3 | 0 | 0.5 | 7.8 | 0.3 | 9.1 | 0.2 | 9.7 | 114.1 | 9185.47 |
| DEC 2016 | 0.4 | 1.7 | 0 | 0.3 | 0 | 0.5 | 16.4 | 0 | 17.1 | 0 | 15.8 | 115.4 | 9186.05 |
| JAN 2017 | 0.4 | 2.2 | 0 | 0.3 | 0 | 0.5 | 20.4 | 0.1 | 21.3 | 0 | 19.4 | 117.3 | 9187.19 |
| FEB 2017 | 0.2 | 0.9 | 0 | 0.3 | 0 | 0.4 | 18.8 | 0 | 19.1 | 0 | 20.7 | 115.7 | 9186.22 |
| MAR 2017 | 0.3 | 0.7 | 0 | 0.3 | 0 | 0.4 | 17.5 | 0.3 | 18.5 | 0 | 20.6 | 113.6 | 9185.39 |
| APR 2017 | 1.2 | - | 0 | 0.3 | 0 | 0.5 | 4.6 | 2.4 | 8.8 | 0.5 | 8.5 | 113.4 | 9185.22 |
| MAY 2017 | 7.5 | - | 3.5 | 0.3 | 1.7 | 0.6 | 4.0 | 11.8 | 25.6 | 0.8 | 25.0 | 113.2 | 9185.14 |
| JUN 2017 | 14.4 | - | 20.3 | 0.3 | 7.4 | 0.4 | 8.8 | 37.4 | 68.3 | 1.5 | 47.6 | 132.4 | 9193.86 |
| JUL 2017 | 5.9 | - | 0.1 | 0.3 | 4.5 | 0.5 | 8.1 | 15.1 | 34.0 | 0.7 | 27.7 | 137.9 | 9196.08 |
| AUG 2017 | 0.4 | - | 0 | 0.3 | 1.9 | 0.4 | 1.4 | 6.7 | 10.7 | 0.8 | 16.2 | 131.6 | 9193.55 |
| SEP 2017 | 0.1 | - | 0 | 0.3 | 0.5 | 0.4 | 0 | 2.2 | 3.2 | 0.7 | 3.8 | 130.4 | 9192.71 |
| | | | | | | | | | | | | | |
| **TOTAL[1] (AF)** | **31,634** | **5,840** | **24,021** | **3,909** | **15,971** | **5,615** | **107,766** | **77,319** | **238,307** | **5,855** | **216,366** | | |

[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

**8. Mt. Elbert Pumped-Storage Powerplant WY 2017 Operations**

Fryingpan-Arkansas Project

| | **Net Generation** mWh | **Gross Generation** mWh | **Inflow to Mt. Elbert** 1,000 AF | **Water Through Generator** 1,000 AF | **Water Pumped From Twin Lakes To Forebay** 1,000 AF |
|---|---|---|---|---|---|
| OCT 2016 | 2.5 | 2.7 | 0.5 | 6.9 | 6.4 |
| NOV 2016 | 14.0 | 14.2 | 8.3 | 42.4 | 35.0 |
| DEC 2016 | 19.1 | 19.5 | 16.8 | 59.2 | 42.6 |
| JAN 2017 | 26.0 | 26.4 | 20.8 | 76.9 | 55.8 |
| FEB 2017 | 20.5 | 20.9 | 19.2 | 61.8 | 43.0 |
| MAR 2017 | 21.5 | 21.9 | 18.0 | 65.3 | 46.9 |
| APR 2017 | 17.3 | 17.6 | 5.1 | 55.2 | 50.3 |
| MAY 2017 | 19.6 | 20.0 | 6.1 | 59.0 | 53.4 |
| JUN 2017 | 29.5 | 29.7 | 16.4 | 87.9 | 71.1 |
| JUL 2017 | 39.3 | 39.5 | 13.0 | 112.9 | 98.9 |
| AUG 2017 | 26.9 | 27.1 | 3.8 | 77.0 | 74.5 |
| SEP 2017 | 21.6 | 21.8 | 1.0 | 65.1 | 65.0 |
| **Total** | **257.9** | **261.4** | **129.1** | **769.7** | **643.0** |

## 9. Pueblo Reservoir WY 2017 Operations

Fryingpan-Arkansas Project
Unit: 1,000 AF

| Month | Inflow | | | | Evap | Total Outflow | End of Month Content | Water Surface Elevation (FT msl) |
|---|---|---|---|---|---|---|---|---|
| | **Project** | **Contract** | **Native[2]** | **Total** | | | | |
| OCT 2016 | 0.3 | 3.0 | 13.5 | 16.8 | 1.7 | 18.6 | 182.6 | 4864.65 |
| NOV 2016 | 3.4 | 8.8 | 7.4 | 19.6 | 0.8 | 12.9 | 188.5 | 4866.26 |
| DEC 2016 | 7.6 | 21.7 | 0 | 26.9 | 0.5 | 7.6 | 207.2 | 4871.23 |
| JAN 2017 | 10.9 | 23.7 | 0 | 30.5 | 0.5 | 8.1 | 229.2 | 4876.64 |
| FEB 2017 | 10.7 | 23.2 | 0 | 28.4 | 0.7 | 6.7 | 250.1 | 4881.44 |
| MAR 2017 | 9.1 | 60.1 | 0 | 31.4 | 1.6 | 24.5 | 255.4 | 4882.58 |
| APR 2017 | 0.3 | 4.5 | 26.4 | 31.2 | 1.8 | 51.3 | 233.5 | 4877.65 |
| MAY 2017 | 0.3 | 16.7 | 55.0 | 72.0 | 2.1 | 58.6 | 244.8 | 4880.25 |
| JUN 2017 | 1.8 | 10.6 | 180.4 | 192.8 | 3.2 | 191.1 | 243.3 | 4879.92 |
| JUL 2017 | 0.3 | 9.8 | 84.2 | 94.3 | 2.7 | 93.6 | 241.4 | 4879.47 |
| AUG 2017 | 0.3 | 10.3 | 72.4 | 83.0 | 2.4 | 88.6 | 233.3 | 4877.61 |
| SEP 2017 | 0.3 | 5.7 | 24.5 | 30.5 | 1.9 | 58.1 | 203.8 | 4870.34 |
| | | | | | | | | |
| **Total[1] (AF)** | **45,305** | **198,105** | **413,743** | **657,153** | **19,831** | **619,565** | | |

[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 and/or winter water storage, 0 is recorded.

**10. Reservoir Storage Allocation Data**
Fryingpan-Arkansas Project
Unit: AF

| 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 AF. A tilted morning glory spillway reduces the actual storage available to 140,357 AF.
[3] Area Capacity Table from 2012.
Note: Inactive includes dead storage.

## 11. Monthly Evaporation Factors

Fryingpan-Arkansas Project

| 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.
Factor is derived from ((the average monthly evaporation volume*12)/0.7)/(# days in month)
Evaporation in AF=monthly factor*surface area of the lake*(1- percent ice cover)

**12. Monthly Evaporation**
Fryingpan-Arkansas Project
Unit=AF

| Month | Ruedi | | Turquoise | | Twin Lakes and Mt. Elbert | | Pueblo | |
|---|---|---|---|---|---|---|---|---|
| | AVG | WY 2017 | AVG | WY 2017 | AVG | WY 2017 | AVG | WY 2017 |
| OCT 2016 | 53 | 78 | 360 | 383 | 521 | 490 | 1,090 | 1,663 |
| NOV 2016 | 0 | 0 | 161 | 169 | 230 | 208 | 565 | 826 |
| DEC 2016 | 0 | 0 | 15 | 22 | 25 | 30 | 440 | 491 |
| JAN 2017 | 0 | 0 | 0 | 0 | 1 | 5 | 401 | 483 |
| FEB 2017 | 0 | 0 | 0 | 0 | 2 | 7 | 593 | 750 |
| MAR 2017 | 0 | 0 | 0 | 0 | 24 | 39 | 1,254 | 1,627 |
| APR 2017 | 7 | 0 | 12 | 2 | 195 | 436 | 1,693 | 1,792 |
| MAY 2017 | 157 | 213 | 269 | 314 | 840 | 691 | 2,113 | 2,061 |
| JUN 2017 | 458 | 578 | 727 | 790 | 1,226 | 1,371 | 2,648 | 3,172 |
| JUL 2017 | 506 | 582 | 599 | 434 | 980 | 636 | 2,474 | 2,663 |
| AUG 2017 | 303 | 409 | 471 | 442 | 768 | 767 | 1,998 | 2,395 |
| SEP 2017 | 171 | 222 | 417 | 345 | 693 | 606 | 1,642 | 1,909 |

Average between 1996 and 2017.

## 13. Monthly Precipitation

Fryingpan-Arkansas Project
Unit=Inches

| MONTH | CHAPMAN [1] NEAR RUEDI | | TURQUOISE | | TWIN LAKES | | PUEBLO | |
|---|---|---|---|---|---|---|---|---|
| | AVG | WY 2017 | AVG | WY 2017 | AVG | WY 2017 | AVG | WY 2017 |
| OCT 2016 | 2.4 | 1.1 | 1.07 | 0.43 | 0.82 | 0.64 | 0.82 | 0.01 |
| NOV 2016 | 2.0 | 1.9 | 1.26 | 0.98 | 0.45 | 0.27 | 0.34 | 0.44 |
| DEC 2016 | 7.6 | 5.7 | 1.38 | 2.97 | 0.48 | 1.29 | 0.31 | 0.22 |
| JAN 2017 | 2.6 | 6.0 | 1.70 | 4.97 | 0.50 | 1.71 | 0.35 | 0.83 |
| FEB 2017 | 3.2 | 2.4 | 1.50 | 1.75 | 0.48 | 0.42 | 0.36 | 0.11 |
| MAR 2017 | 3.0 | 1.7 | 1.35 | 0.50 | 0.56 | 0.11 | 0.85 | 1.88 |
| APR 2017 | 3.7 | 2.2 | 1.68 | 1.85 | 0.82 | 0.82 | 1.89 | 3.81 |
| MAY 2017 | 3.5 | 3.3 | 1.55 | 2.35 | 0.93 | 1.87 | 1.47 | 2.83 |
| JUN 2017 | 1.0 | 0.2 | 0.84 | 0.13 | 0.75 | 0.11 | 0.91 | 0.98 |
| JUL 2017 | 3.3 | 2.0 | 2.11 | 2.92 | 1.86 | 2.64 | 1.79 | 2.47 |
| AUG 2017 | 2.3 | 1.3 | 2.15 | 2.05 | 1.58 | 1.12 | 2.25 | 1.13 |
| SEP 2017 | 2.2 | 2.4 | 1.54 | 2.28 | 1.18 | 1.72 | 0.73 | 2.05 |
| | | | | | | | | |
| **TOTAL** | 36.8 | 30.2 | 18.13 | 23.18 | 10.38 | 12.72 | 12.07 | 16.76 |
| | | | | | | | | |
| **Max. Annual** | 42.5 | (2008) | 25.95 | (1957) | 17.27 | (1952) | 20.32 | (2007) |

[1] The USGS weather station at Ruedi was out of service for WY2017. The precipitation totals from the Chapman Snotel have been substituted. The Snotel has been in operation since 2008.

## 14. Flood Control Benefits

Fryingpan-Arkansas Project

| WY | Ruedi Benefits WY 2017 | Ruedi Benefits Cumulative | Pueblo Benefits WY 2017 | 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 |
| 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 |

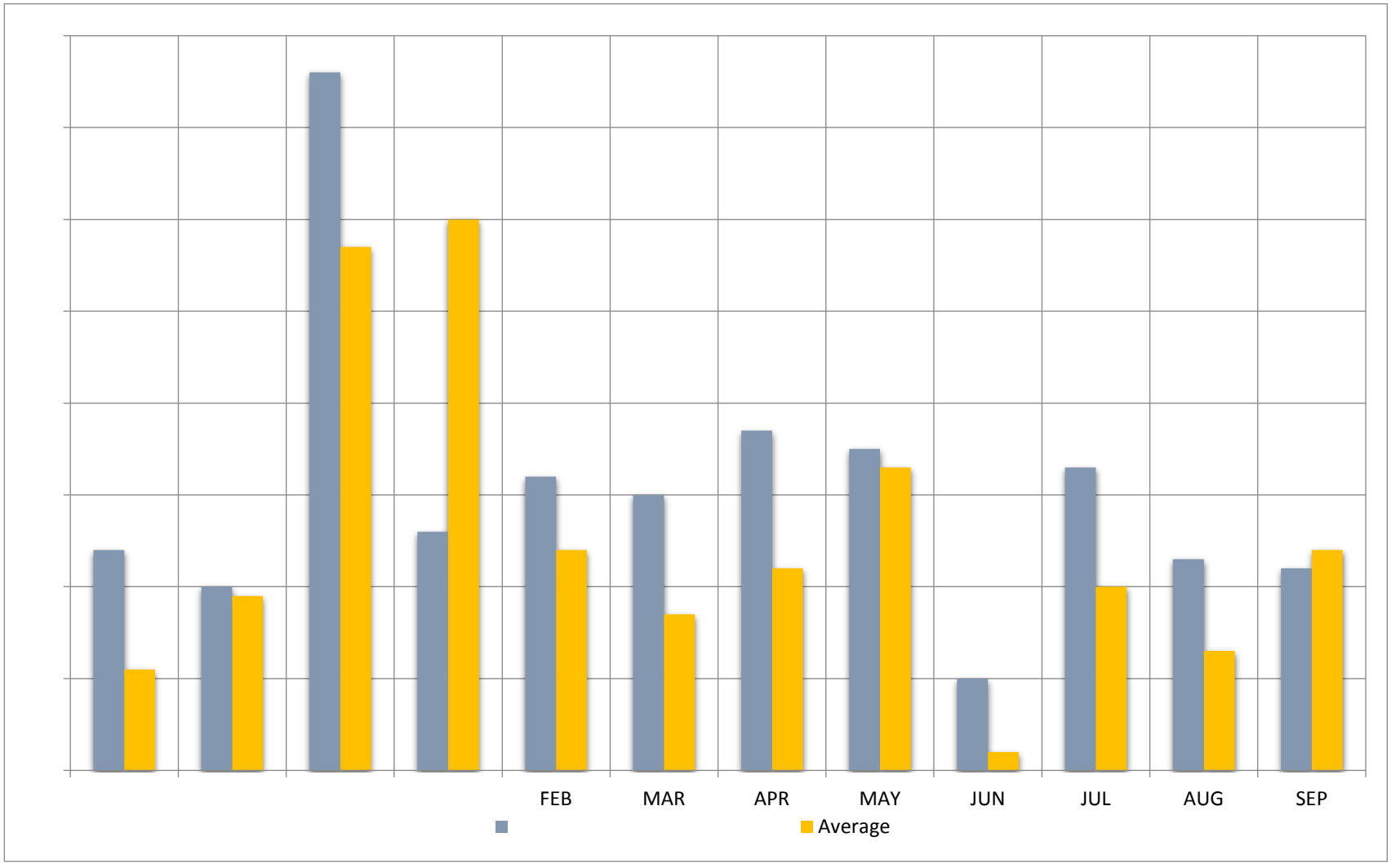
## 14. Flood Control Benefits

Fryingpan-Arkansas Project

| WY | Ruedi Benefits WY 2017 | Ruedi Benefits Cumulative | Pueblo Benefits WY 2017 | Pueblo Benefits Cumulative |
|---|---|---|---|---|
| 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 | $131,000 | 19,849,700 | $0 | $36,785,000 |

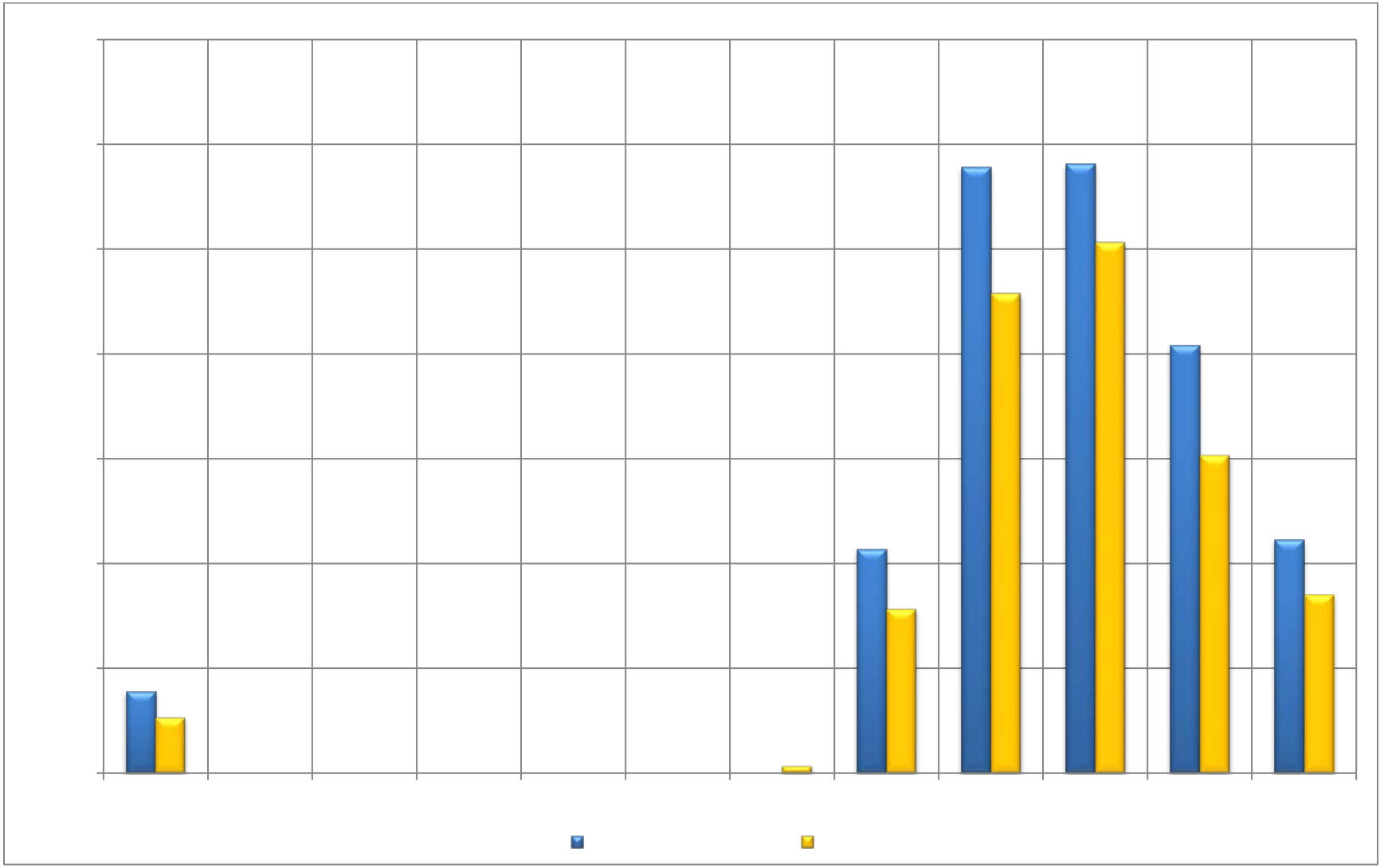
## APPENDIX B: EXHIBITS

### 1. Chapman CO Monthly Precipitation WY 2017

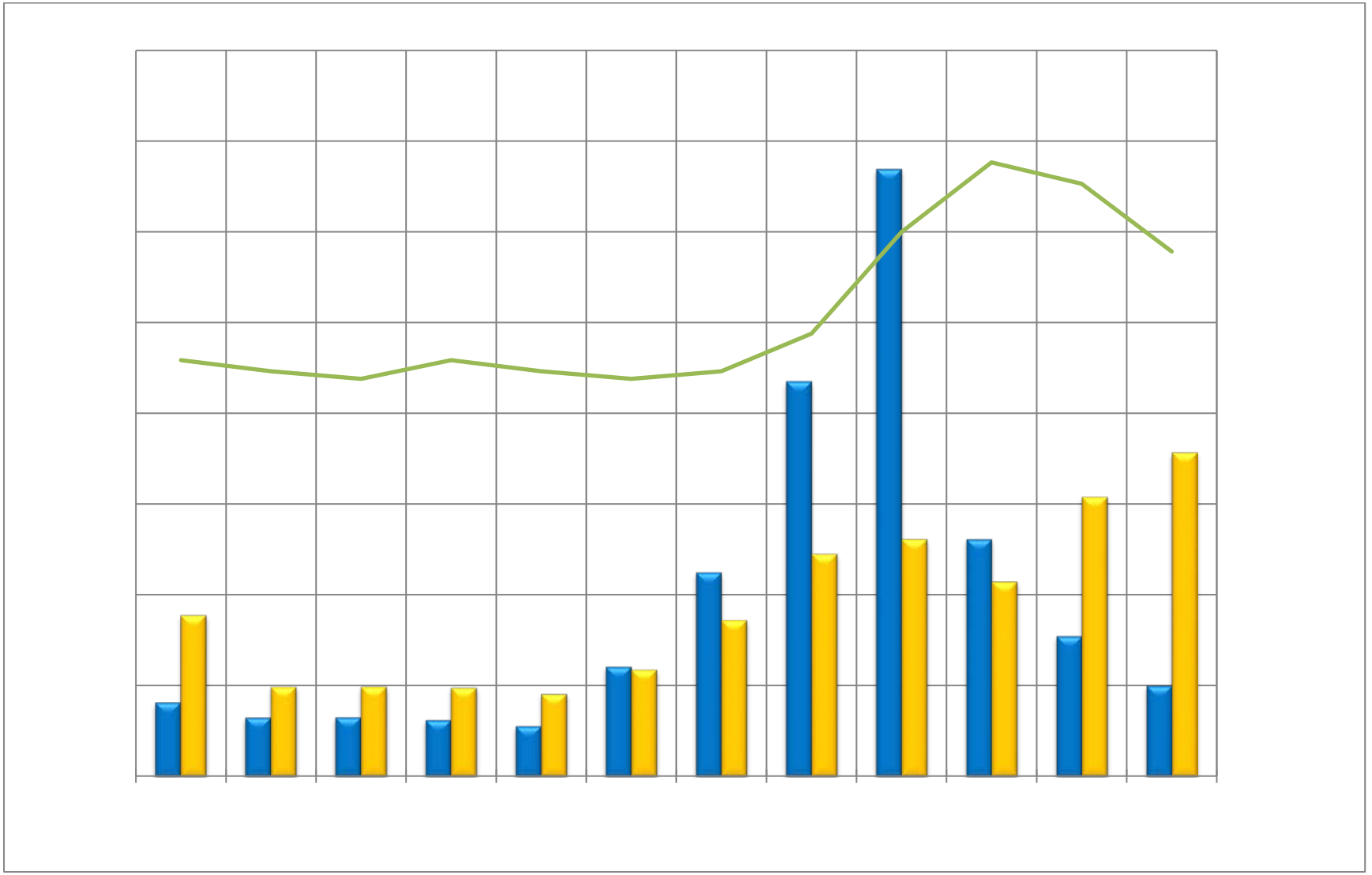



The weather station at Ruedi was out of service for the year. These precipitation values are from the nearby gage at the Chapman SNOTEL site.

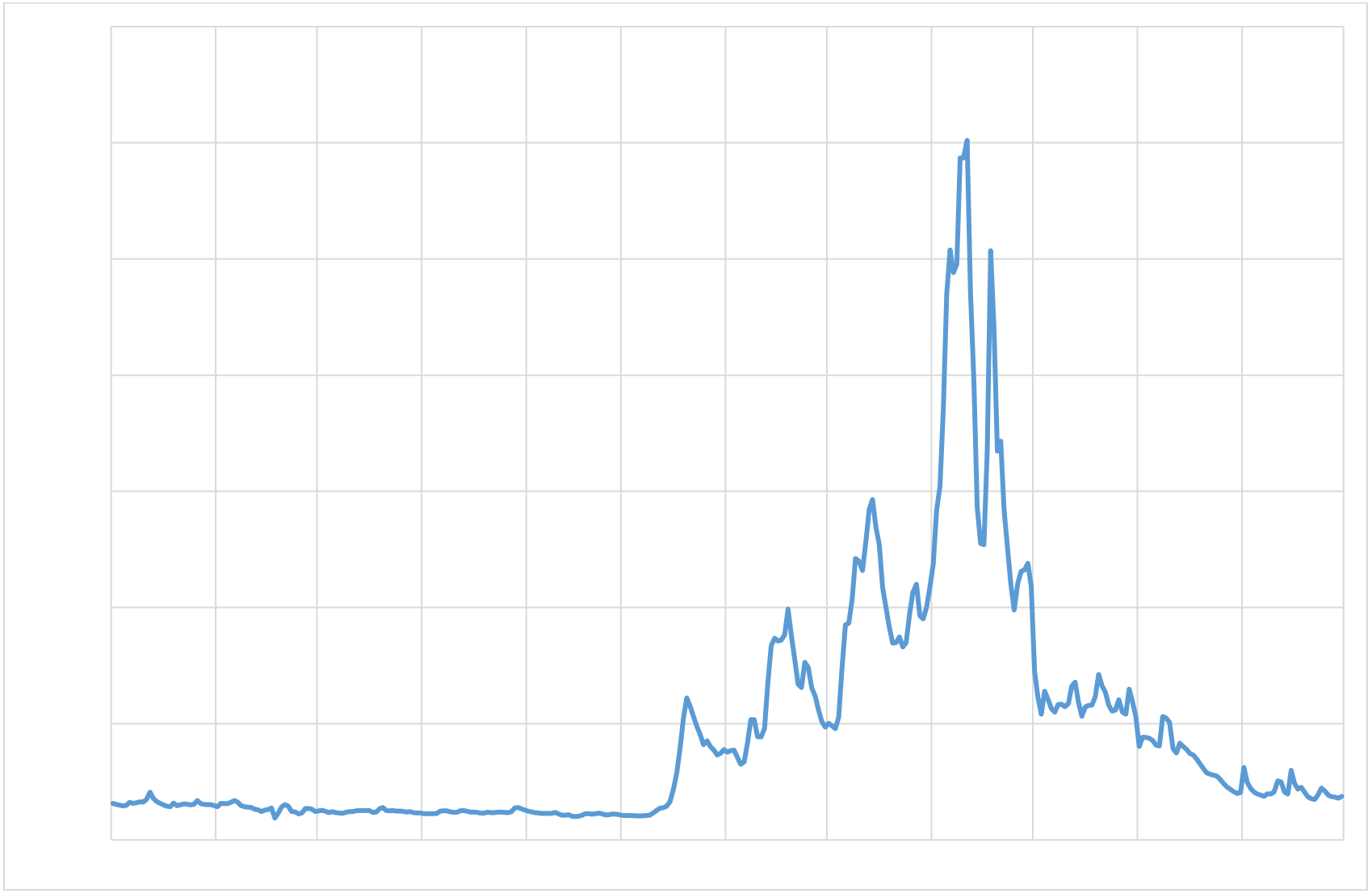
## 2. Ruedi Reservoir Monthly Evaporation WY 2017



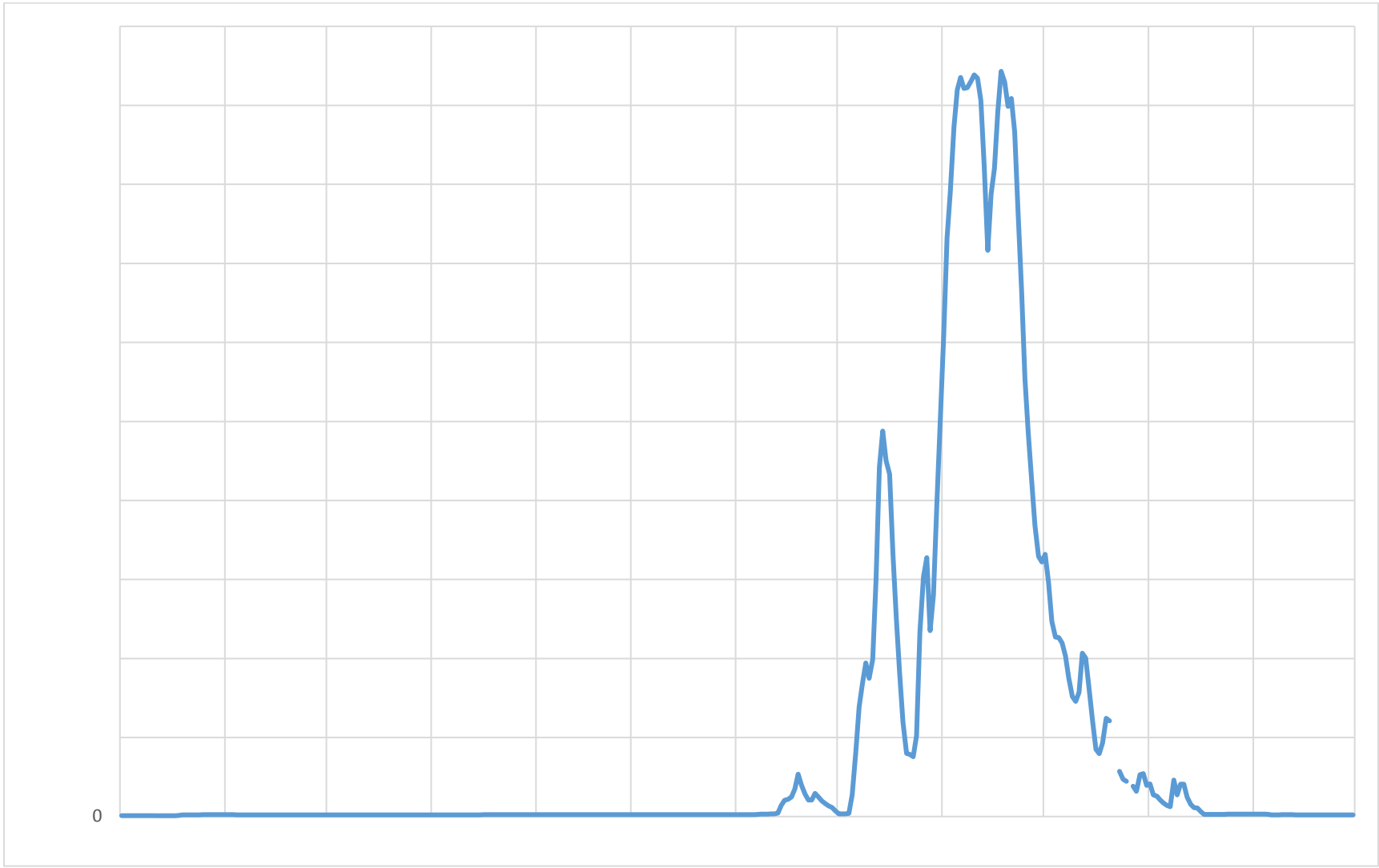
### 3. Ruedi Reservoir Actual Operations WY 2017



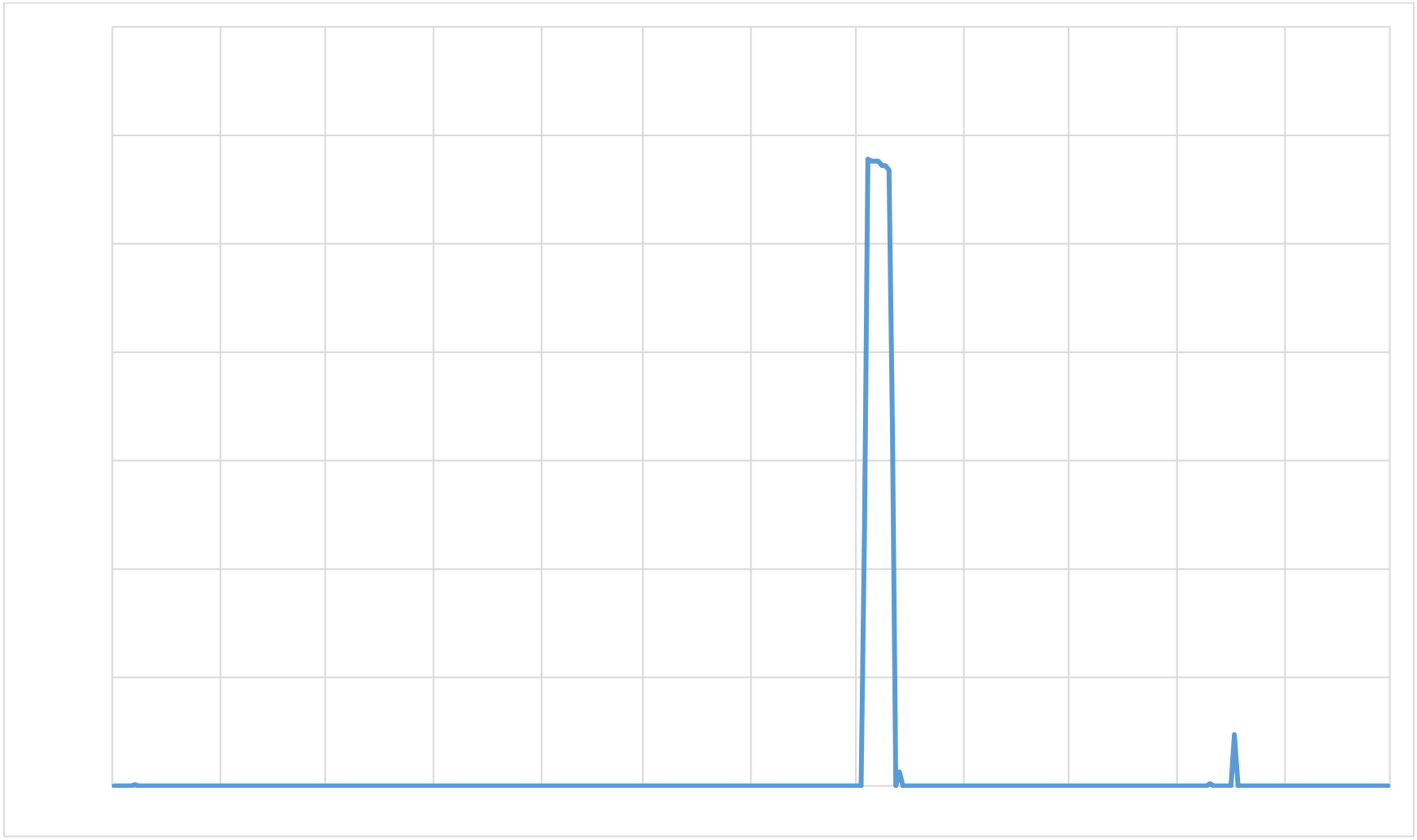
**4. Fryingpan River Near Thomasville Daily Discharge WY 2017**



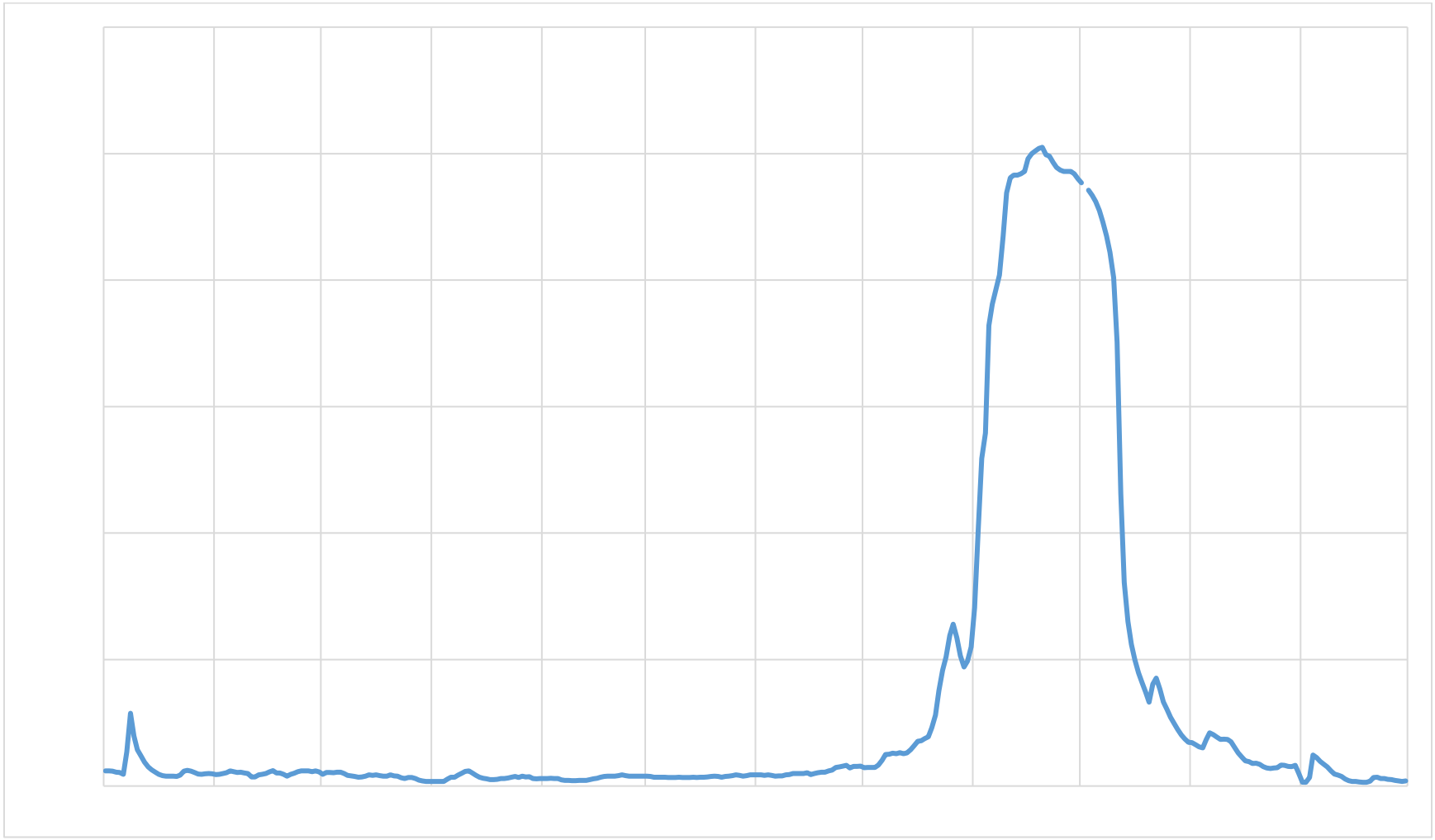
## 5. Boustead Tunnel Actual Operations WY 2017



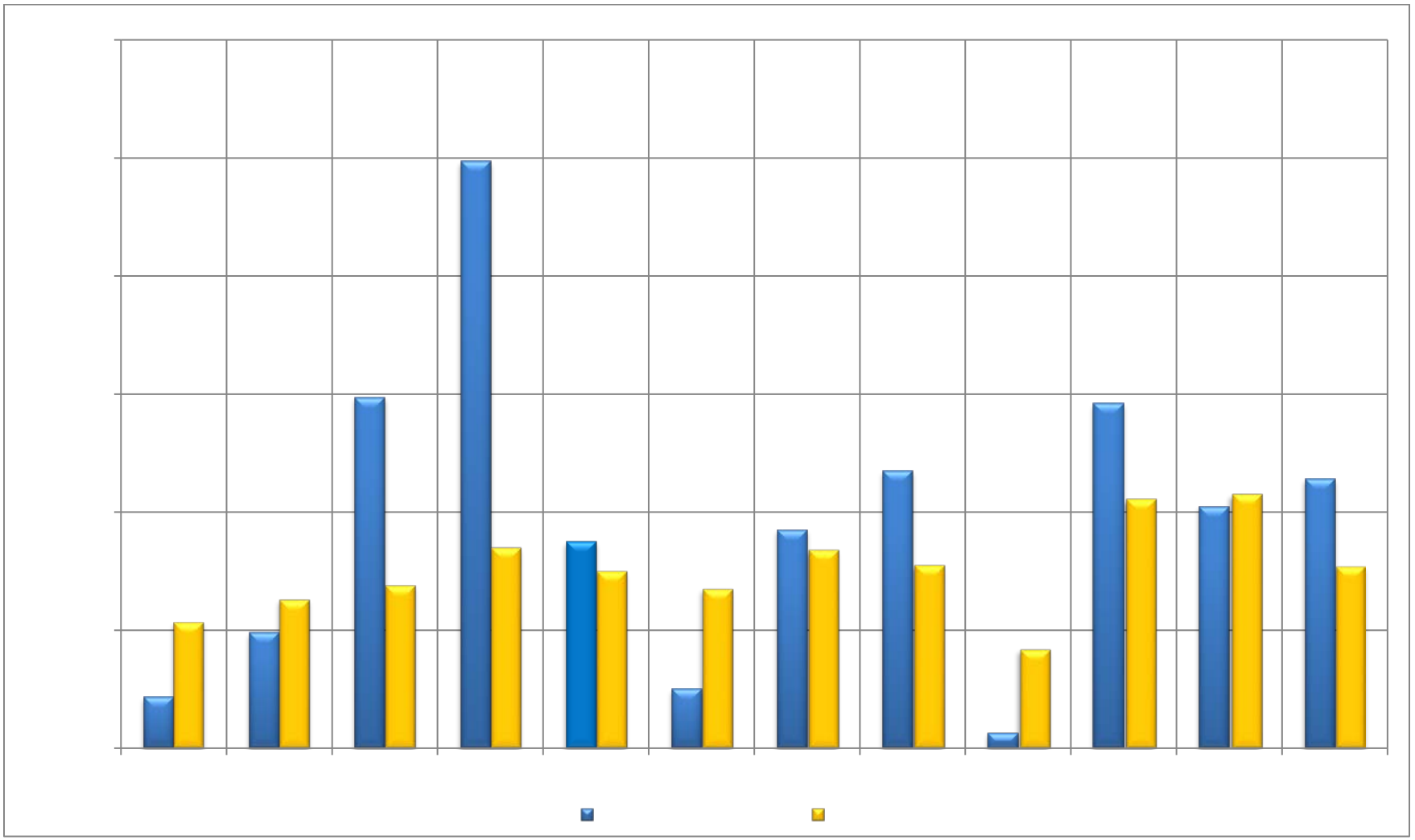
## 6. Homestake Tunnel Actual Operations WY 2017



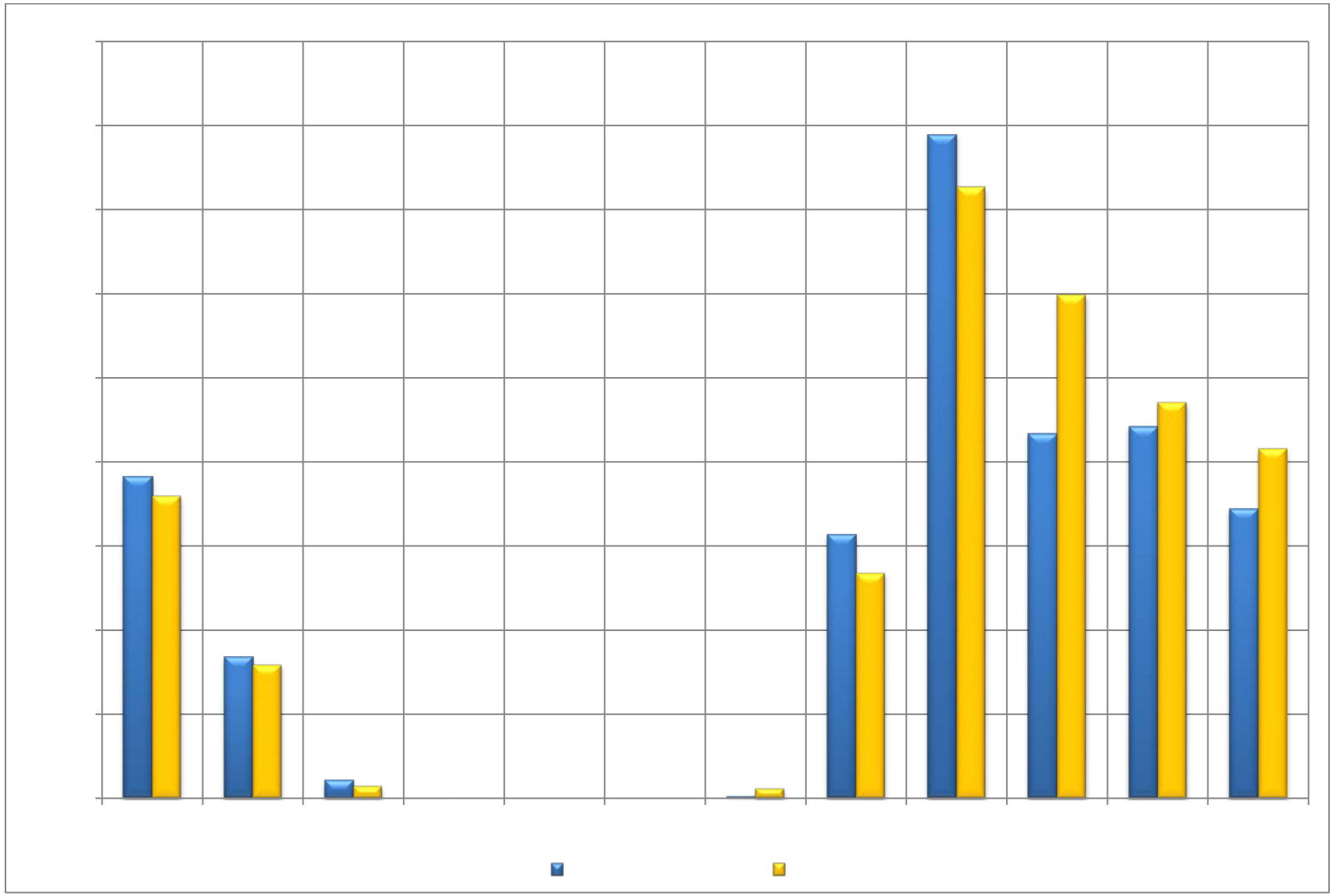
## 7. Busk-Ivanhoe Tunnel Actual Operations WY 2017



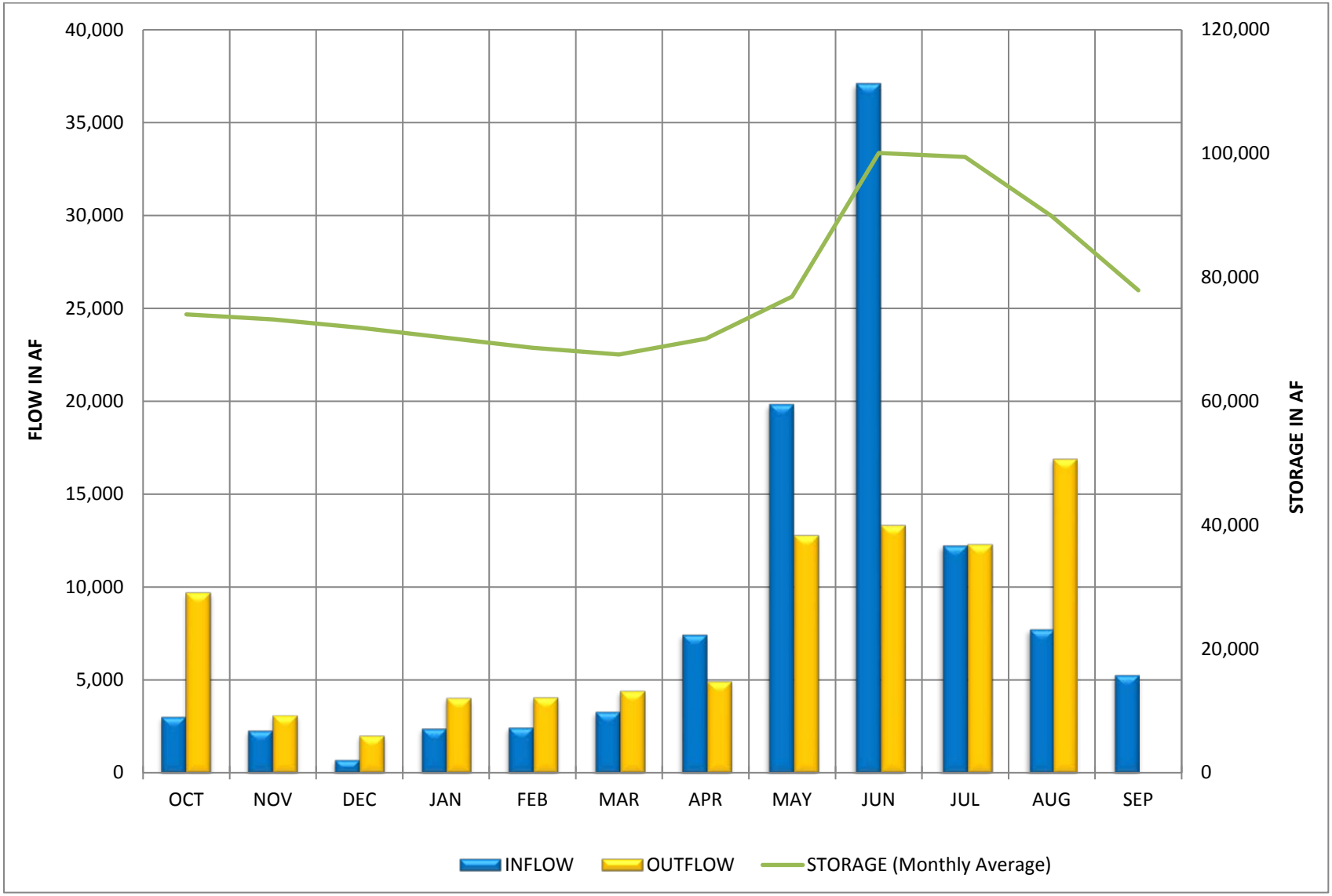
## 8. Turquoise Lake (Sugar Loaf Dam) Monthly Precipitation WY 2017



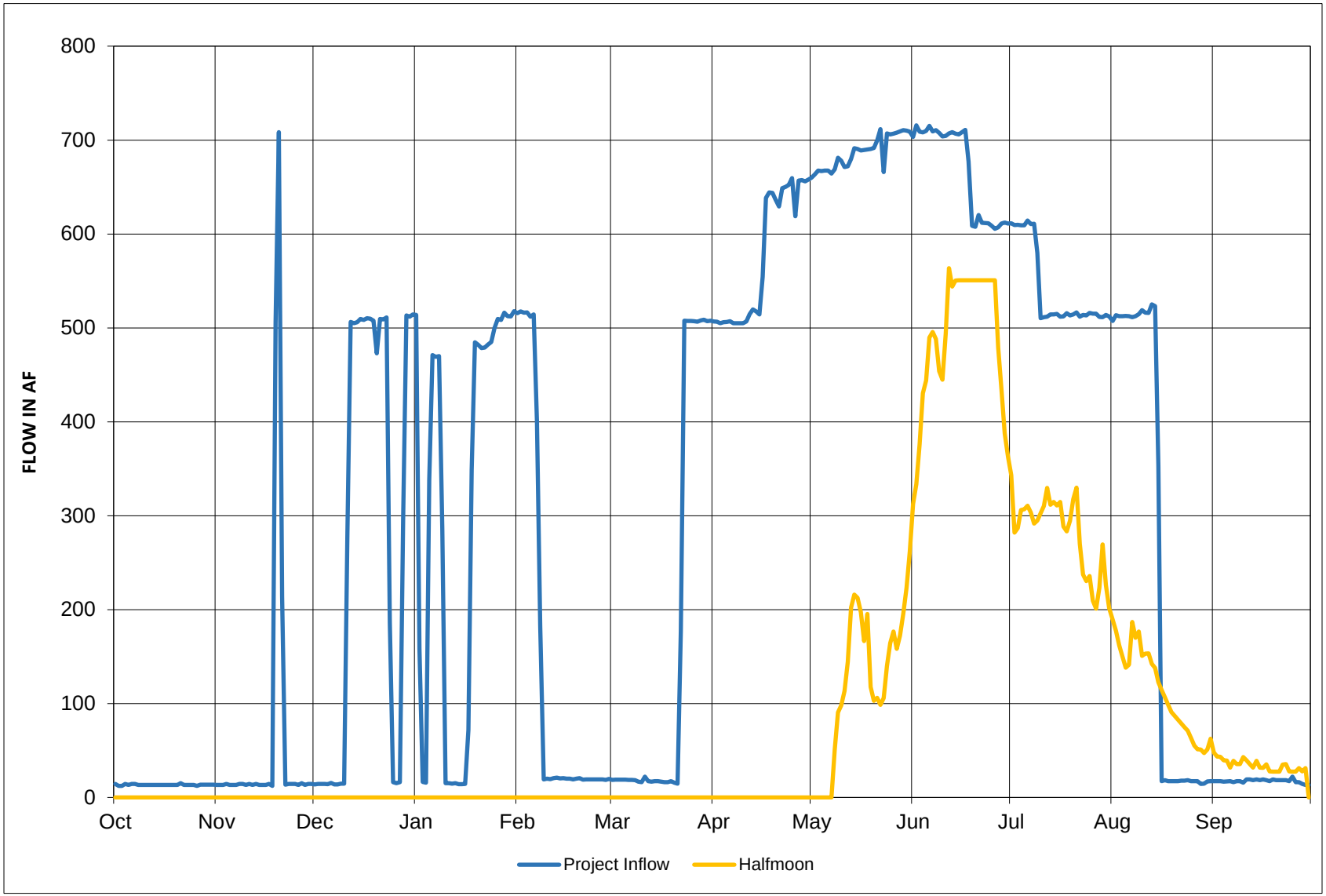
**9. Turquoise Lake (Sugar Loaf Dam) Monthly Evaporation WY 2017**



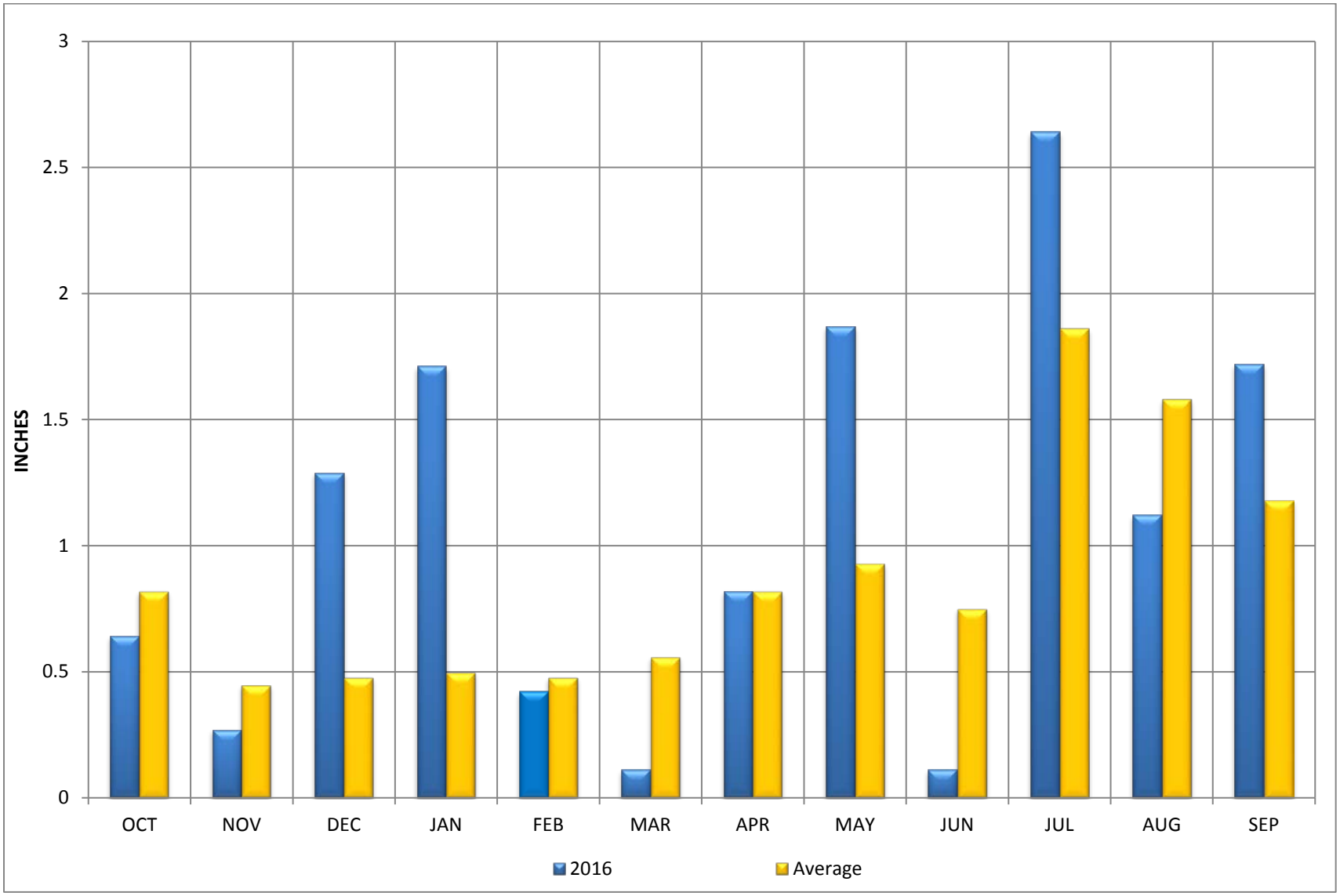
## 10. Turquoise Lake (Sugar Loaf Dam) Actual Operations WY 2017



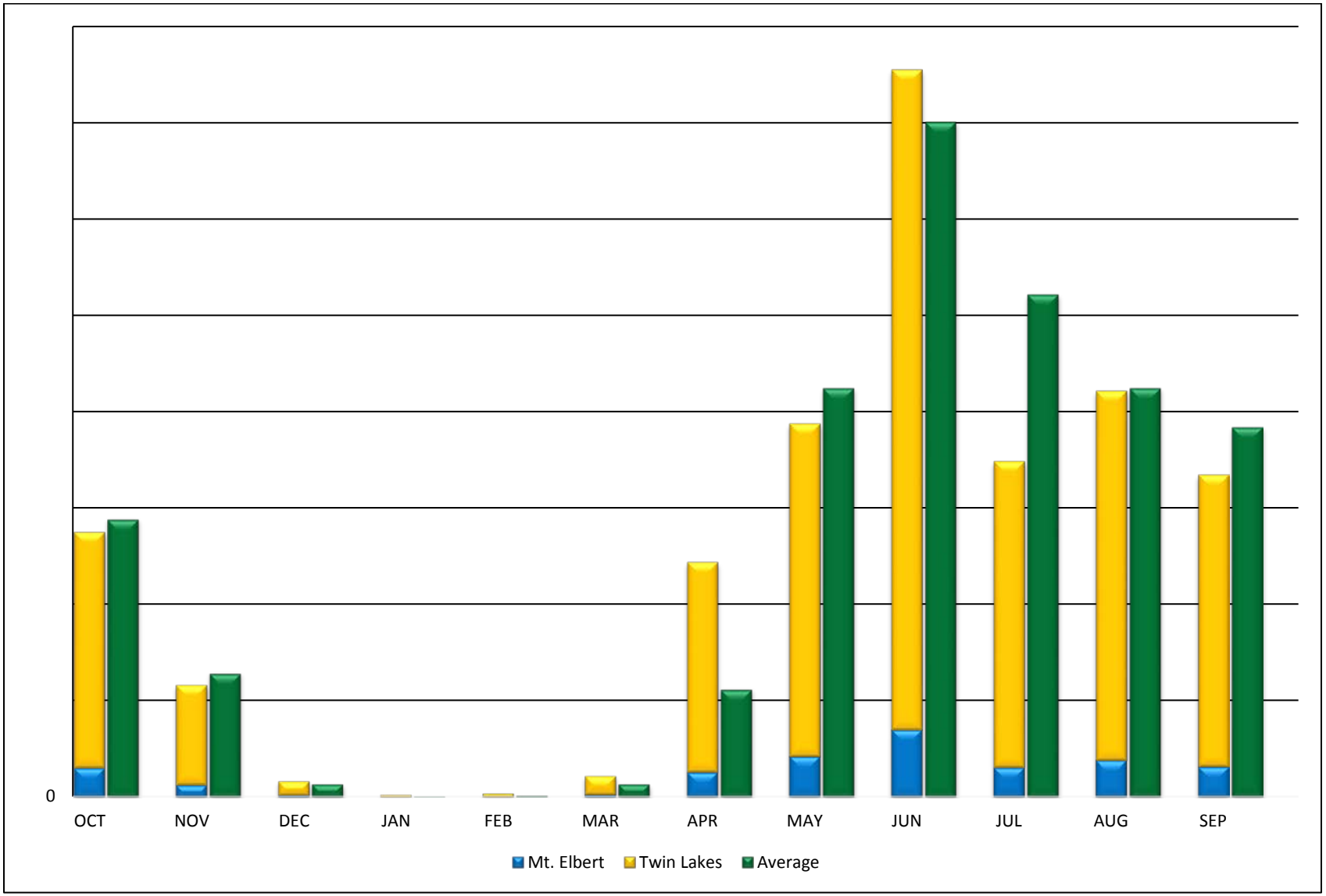
**11. Mt. Elbert Conduit Inflow Actual Operations WY 2017**



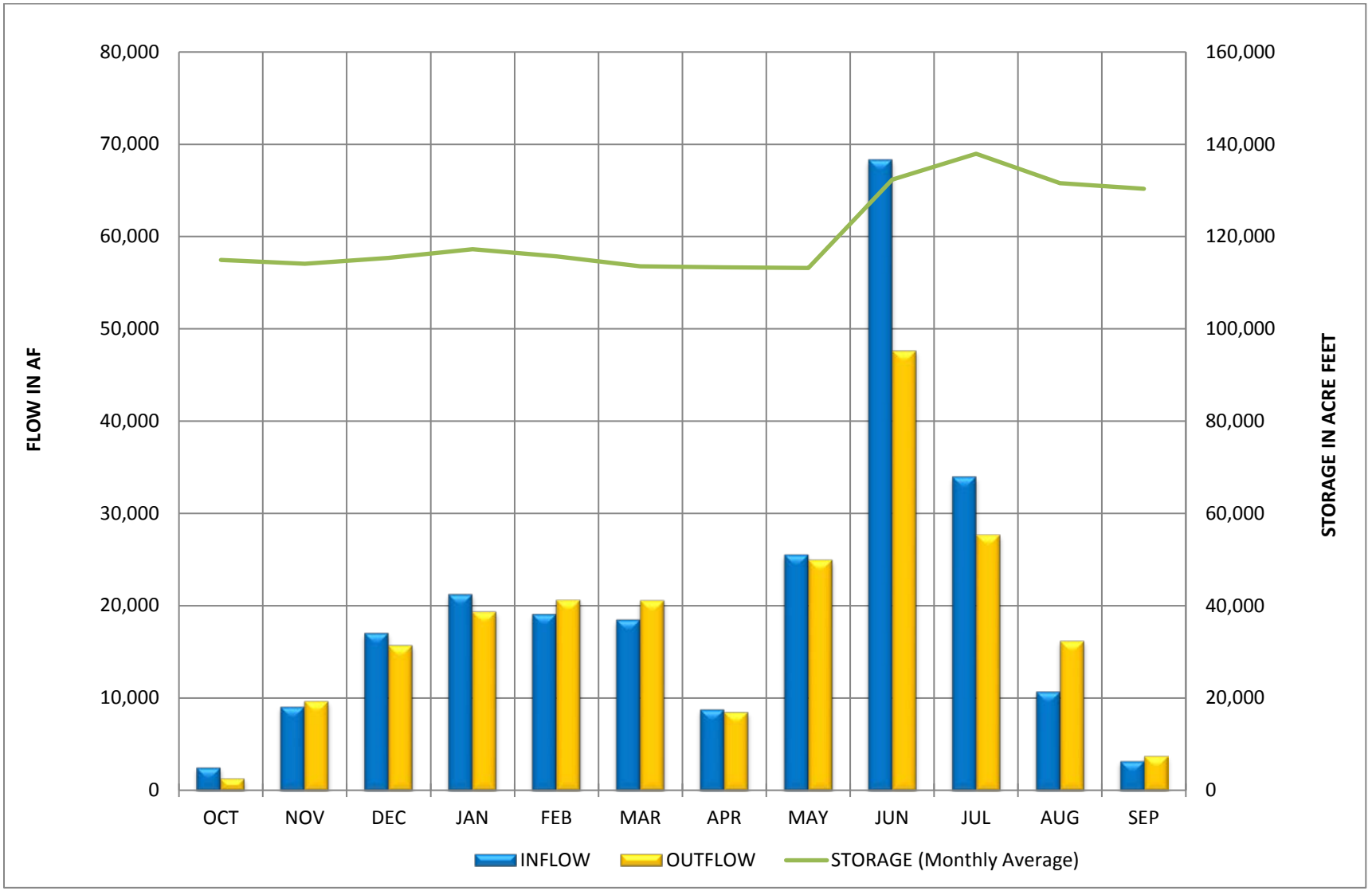
## 12. Twin Lakes Monthly Precipitation WY 2017



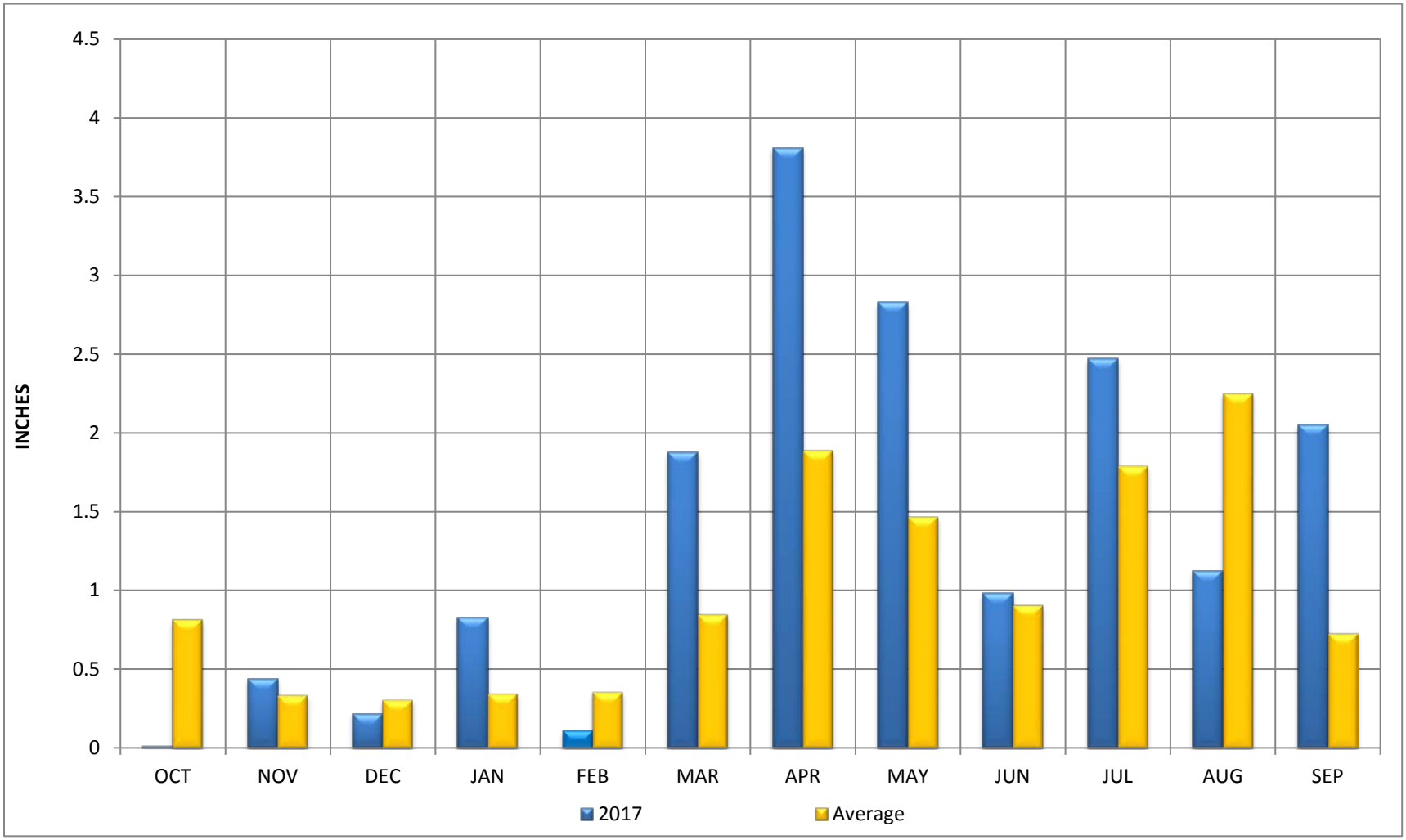
**13. Twin Lakes Dam and Mt. Elbert Forebay Monthly Evaporation WY 2017**



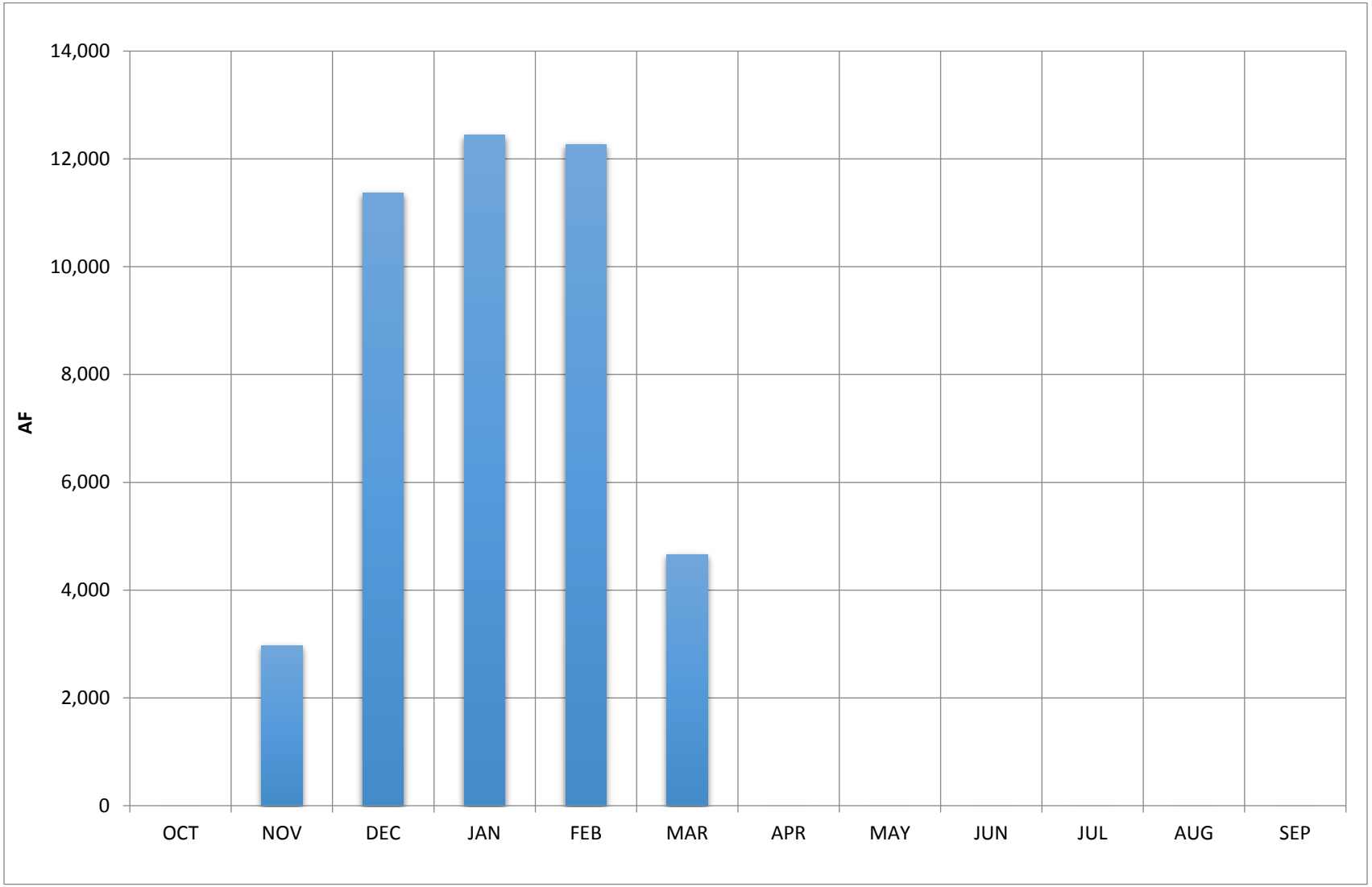
## 14. Twin Lakes/Mt. Elbert Forebay Actual Operations WY 2017



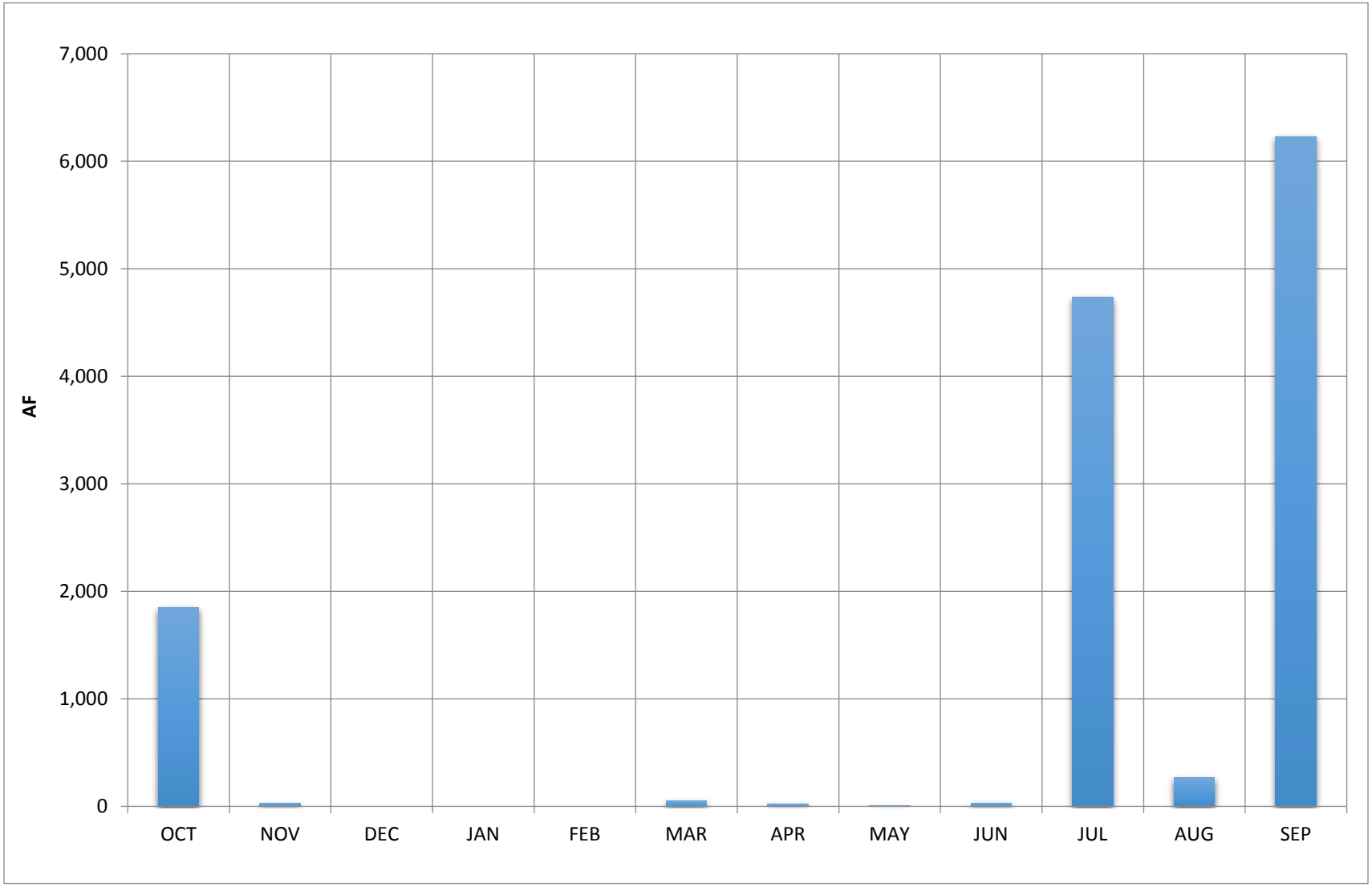
## 15. Pueblo Dam Monthly Precipitation WY 2017



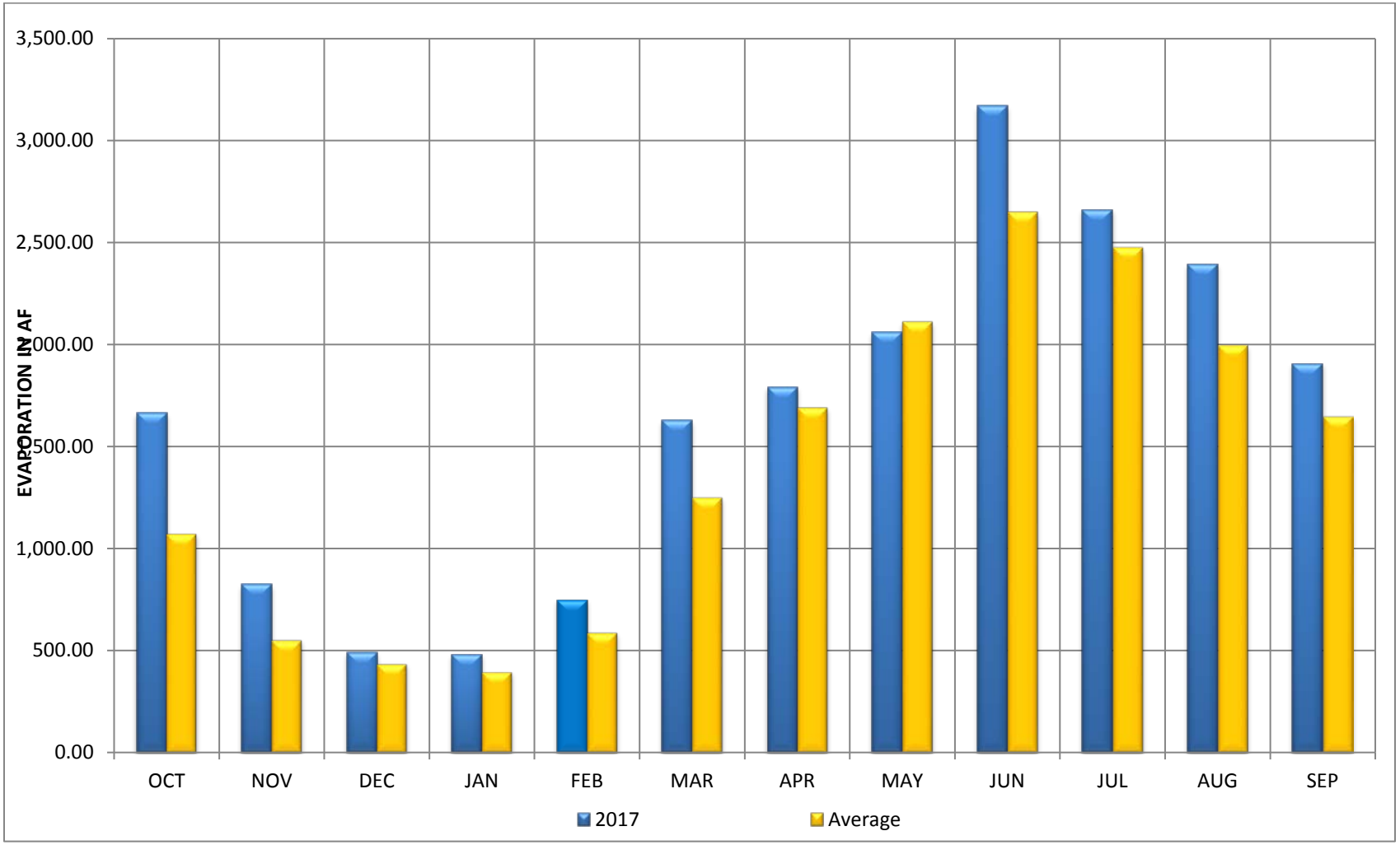
## 16. Pueblo Reservoir Winter Water Inflow WY 2017



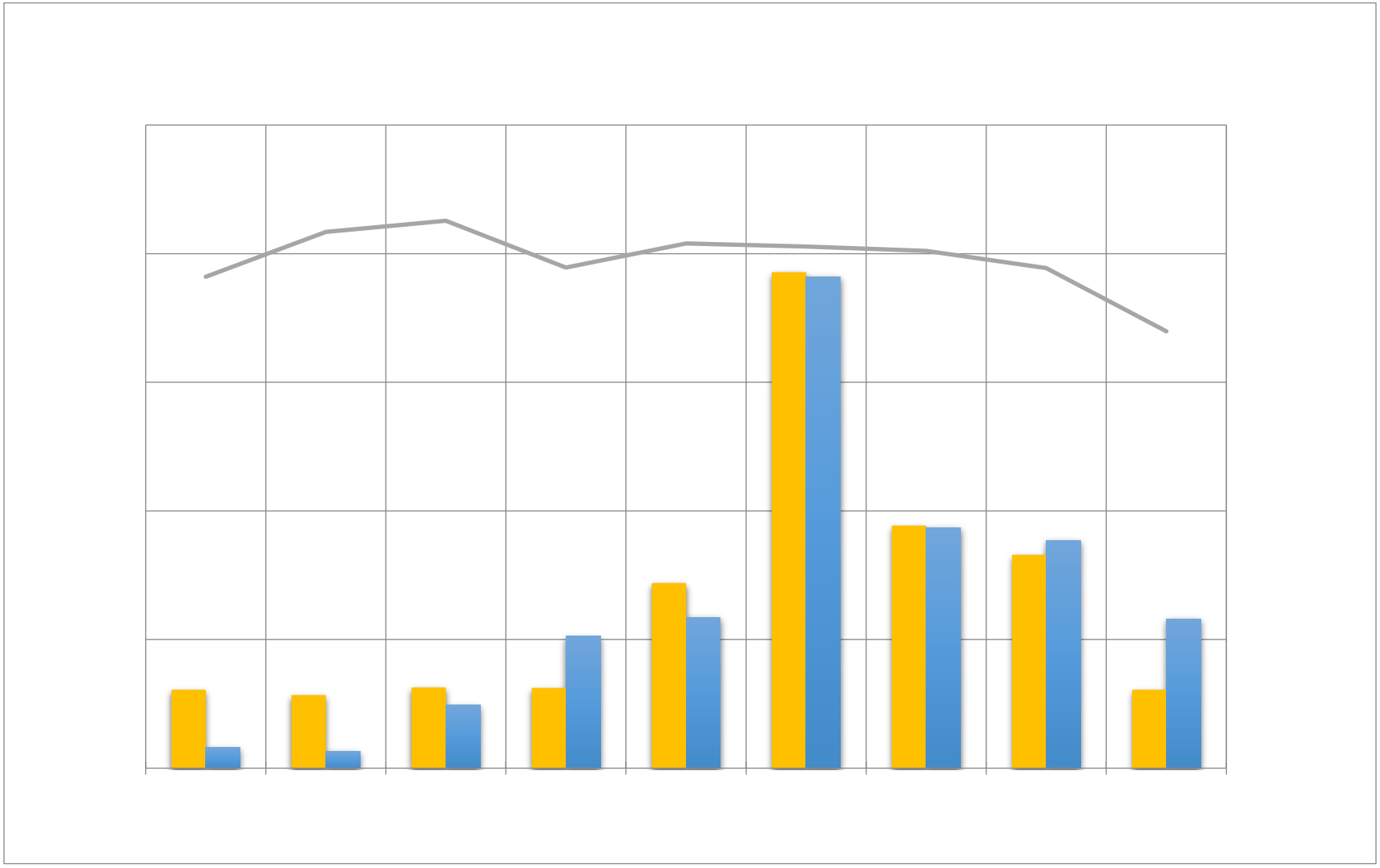
**17. Releases of Pueblo Reservoir Winter Water WY 2017**



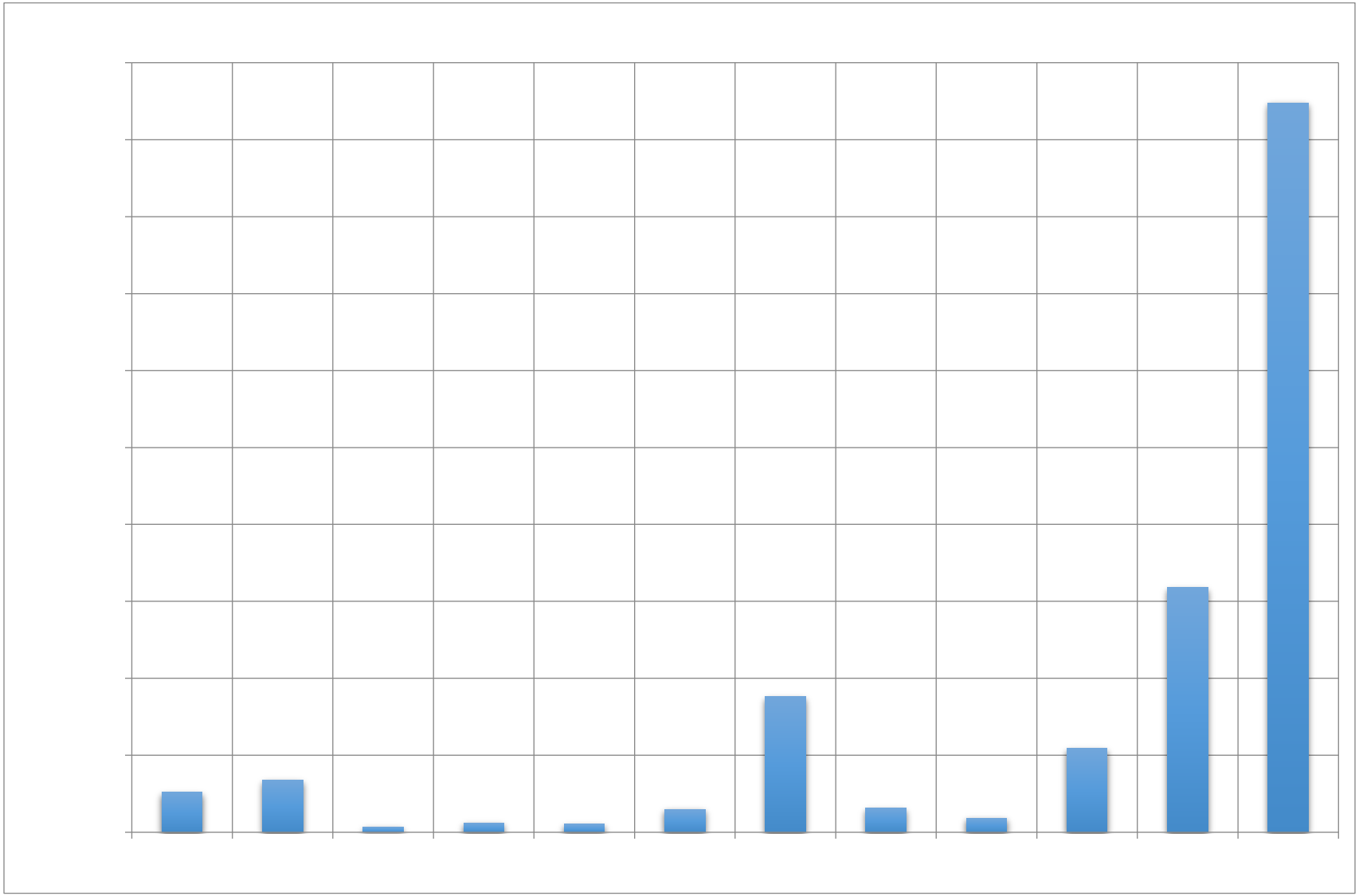
## 18. Pueblo Dam Monthly Evaporation WY 2017



**19. Pueblo Reservoir Actual Operations WY 2017**



**20. Releases of Fryingpan-Arkansas Project Water WY 2017**



## APPENDIX C:

## TWIN LAKES RESERVOIR AND CANAL COMPANY EXCHANGE WITH FRYINGPAN-ARKANSAS PROJECT WATER

### Twin Lakes Canal Company Exchange with Fryingpan-Arkansas Project Water WY 2017

Units = AF

| | Lincoln Creek below Grizzly Reservoir (1) | Roaring Fork River above Lost Man (2) | Total Exchanged (3) | Twin Lakes Storage (3) x 0.9913[1] |
|---|---|---|---|---|
| Oct 2016 | 99.76 | 0 | 99.76 | 98.89 |
| Nov 2016 | 163.86 | 0 | 163.86 | 162.43 |
| Dec 2016 | 172.24 | 0 | 172.24 | 170.74 |
| Jan 2017 | 172.60 | 0 | 172.60 | 171.10 |
| Feb 2017 | 164.23 | 0 | 164.23 | 162.80 |
| Mar 2017 | 175.12 | 0 | 175.12 | 173.60 |
| Apr 2017 | 167.83 | 0 | 167.83 | 166.37 |
| May 2017 | 173.15 | 0 | 173.15 | 171.64 |
| Jun 2017 | 97.00 | 100.89 | 197.89 | 196.17 |
| Jul 2017 | 184.19 | 119.23 | 303.42 | 300.78 |
| Aug 2017 | 157.06 | 26.13 | 183.19 | 181.60 |
| Sep 2017 | 32.34 | 0 | 32.34 | 32.06 |
| **Total** | **1,759.38** | **246.25** | **2,005.63** | **1,988.18** |

[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 WY17.

## 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[1]:

| Month | Grizzly Diversion (cfs) | Roaring Fork Diversion (cfs) |
|---|---|---|
| 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 | 4.0 | 4.0 |
| July | 4.0 | 4.0 |
| August | 4.0 | 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.

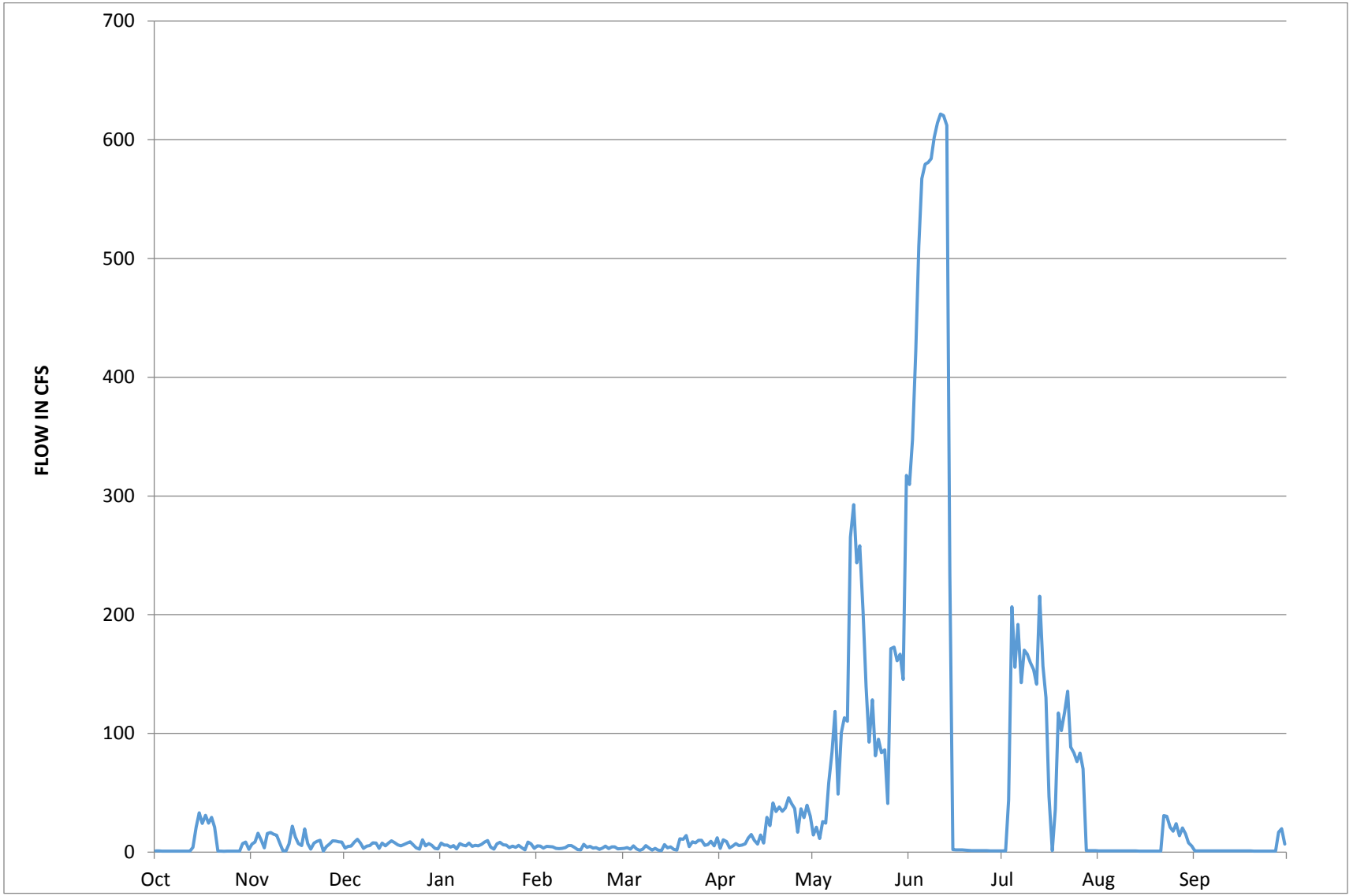
4. In the event less water than the above amounts is bypassed, only the amount actually bypassed will be credited.

5. The total volume of the release at both gages combined shall not exceed 3,000 AF in any one water year.

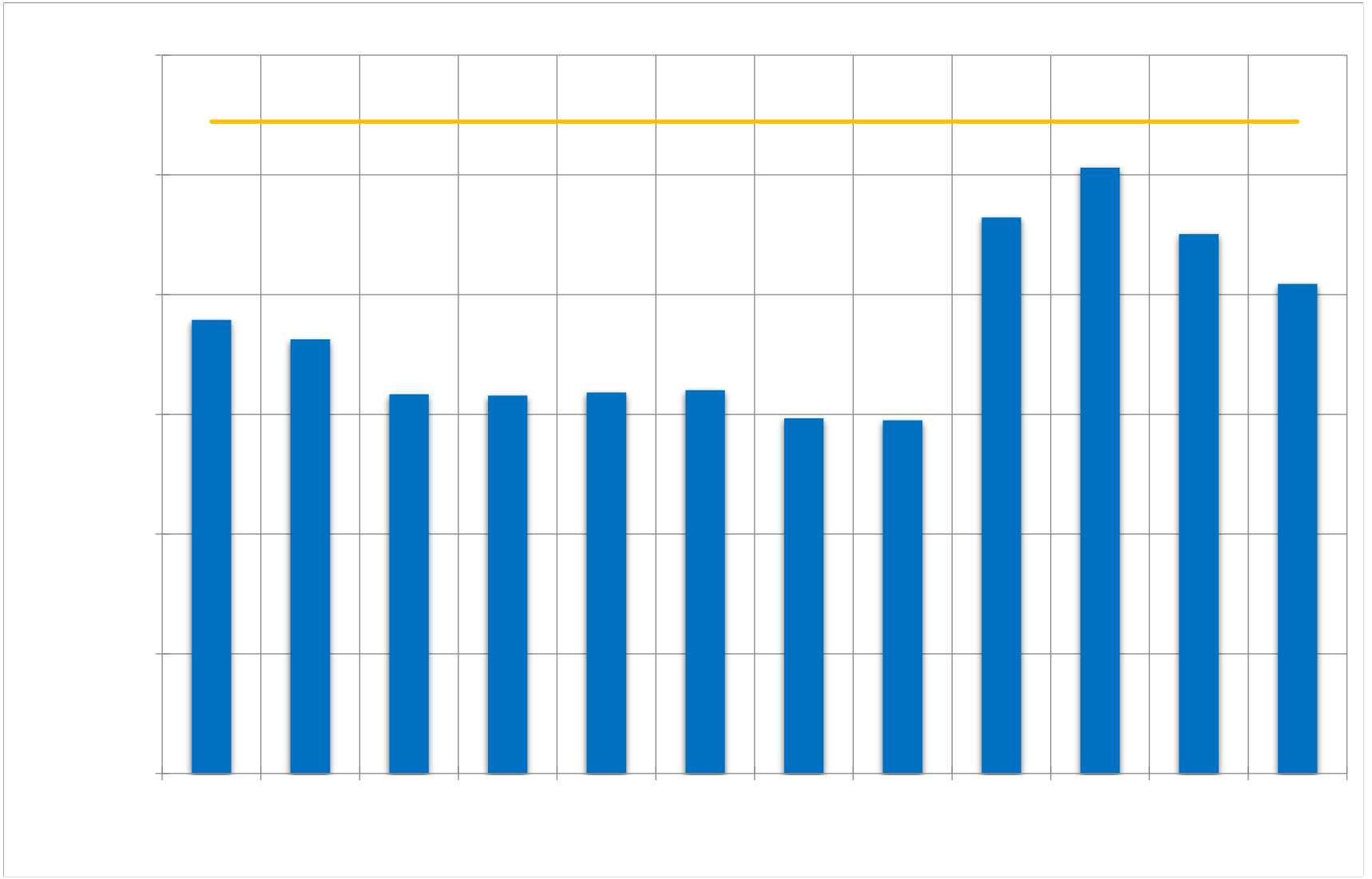
6. No credit for exchange will be made on days when there is no documentation of such bypasses.

7. No credit will be given for water bypassed when diversions are called out by the State Engineer.

**Twin Lakes Tunnel Imports WY 2017**



**Twin Lakes Canal Company Storage WY 2017**



## APPENDIX D:

## DAILY DISCHARGE RECORDS, FRYINGPAN-ARKANSAS PROJECT COLLECTION SYSTEM

### Carter Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0 | 30.3 | 17.3 | 3.2 | |
| 2 | | 0 | 37.2 | 16.7 | | |
| 3 | | 0 | 40.1 | 13.1 | | |
| 4 | | .6 | 42 | 15.2 | | |
| 5 | | 2.8 | 44.9 | 17.1 | | |
| 6 | | 6.2 | 46.7 | 16.5 | | |
| 7 | | 10.5 | 43.1 | 16 | | |
| 8 | | 13.3 | 38.4 | 16.3 | | |
| 9 | | 16 | 38.6 | 15.7 | | |
| 10 | | 13.5 | 37.6 | 15 | | |
| 11 | | 15.2 | 39.1 | 19 | | |
| 12 | | 25.3 | 38.9 | 21.1 | | |
| 13 | 1.1 | 30.6 | 33.7 | 20.1 | | |
| 14 | 4.6 | 29.7 | 22.6 | 16.1 | | |
| 15 | 4.6 | 24.9 | 29.4 | 12.5 | | |
| 16 | 4.6 | 22.2 | 36.7 | 11.5 | | |
| 17 | 4.4 | 15.1 | 39.9 | 11 | | |
| 18 | 5 | 10.2 | 36.8 | 9.4 | | |
| 19 | 7.7 | 7.2 | 37.4 | 9.1 | | |
| 20 | 3.9 | 5.4 | 35.7 | 11.2 | | |
| 21 | 2.5 | 4.2 | 35.4 | 9.3 | | |
| 22 | 1.5 | 4.8 | 32.5 | 7.8 | | |
| 23 | 1.9 | 5.2 | 31.6 | 6.6 | | |
| 24 | 3.7 | 7.5 | 27.4 | 5.6 | | |
| 25 | 2.5 | 16 | 25.2 | 5.5 | | |
| 26 | 1.5 | 17.9 | 24.2 | 9.7 | | |
| 27 | 1 | 18 | 23.3 | 7 | | |
| 28 | .4 | 11.2 | 22.6 | 5.8 | | |
| 29 | .1 | 12 | 19.7 | 10.9 | | |
| 30 | 0 | 17.4 | 19.6 | 8.9 | | |
| 31 | | 24.7 | | 6.4 | | |
| **TOTAL** | **51.1** | **387.8** | **1010.3** | **383.2** | **3.2** | |
| **AVERAGE** | **2.1** | **12.5** | **33.7** | **12.4** | **3.2** | |
| **MAX** | **7.7** | **30.6** | **46.7** | **21.1** | **3.2** | |

WY 2017 Total: 3,641 AF
Maximum Instantaneous Peak: 54.6 on 6 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## North Fork Fryingpan River Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | | 8.1 | 3.7 | .3 | |
| 2 | | | 11.6 | 3.3 | .1 | |
| 3 | | | 13.8 | 2.9 | .1 | |
| 4 | | | 16 | 2.7 | .1 | |
| 5 | | | 17.7 | 2.6 | .1 | |
| 6 | | | 18.4 | 2.6 | .1 | |
| 7 | | .6 | 18.4 | 2.5 | .1 | |
| 8 | | 2.1 | 17.7 | 2.5 | .1 | |
| 9 | | 2.9 | 19.5 | 2.5 | .1 | |
| 10 | | 2.7 | 19.9 | 2.4 | .1 | |
| 11 | | 2.8 | 19.2 | 2.5 | | |
| 12 | | 4.2 | 17.5 | 3.2 | | |
| 13 | | 6.4 | 15.1 | 3.6 | | |
| 14 | | 8 | 11.7 | 3.3 | | |
| 15 | | 7.3 | 11.9 | 2.8 | | |
| 16 | | 6.6 | 14.1 | 2.4 | | |
| 17 | | 5 | 17.4 | 2.1 | | |
| 18 | | 4.1 | 18.6 | 2 | | |
| 19 | | 3.2 | 16.5 | 1.8 | | |
| 20 | | 2.3 | 14.3 | 1.8 | | |
| 21 | | 1.5 | 13.2 | 1.7 | | |
| 22 | | 1.3 | 11.7 | 1.6 | | |
| 23 | | 1 | 10.4 | 1.3 | | |
| 24 | | 1.3 | 8.6 | 1.1 | | |
| 25 | | 2.5 | 7.4 | 1 | | |
| 26 | | 3.6 | 6.7 | 1.1 | | |
| 27 | | 4.3 | 6.1 | .8 | | |
| 28 | | 3.6 | 5.7 | .7 | | |
| 29 | | 3.4 | 4.9 | 1.1 | | |
| 30 | | 3.9 | 4.3 | .8 | | |
| 31 | | 5.3 | | .6 | | |
| TOTAL | | 90 | 396.3 | 65 | | |
| AVERAGE | | 2.9 | 13.2 | 2.1 | | |
| MAX | | 8 | 19.9 | 3.7 | | |

WY 2017 Total: 1,096 AF
Maximum Instantaneous Peak: 21.9 cfs on 17 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## South Fork Fryingpan River Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0.7 | 78.1 | 57.2 | 12.5 | |
| 2 | | 0.7 | 88.9 | 56.2 | 5.9 | |
| 3 | | 0.7 | 98.7 | 48.4 | 6.0 | |
| 4 | | 1.4 | 118.4 | 48.8 | 3.8 | |
| 5 | | 6.2 | 133.0 | 52.6 | 1.8 | |
| 6 | | 12.9 | 137.0 | 51.1 | 1.0 | |
| 7 | | 19.7 | 133.7 | 45.7 | 1.2 | |
| 8 | | 21.3 | 135.4 | 36.0 | 13.9 | |
| 9 | | 20.8 | 137.0 | 33.4 | 6.8 | |
| 10 | | 19.9 | 137.2 | 32.9 | 12.1 | |
| 11 | | 25.5 | 154.1 | 33.8 | 9.1 | |
| 12 | | 39.1 | 156.1 | 41.2 | 5.3 | |
| 13 | | 54.0 | 129.5 | 38.8 | 2.9 | |
| 14 | | 60.0 | 113.8 | 37.7 | 1.5 | |
| 15 | | 57.9 | 123.2 | 26.6 | 1.2 | |
| 16 | | 55.5 | 130.3 | 17.5 | | |
| 17 | | 41.7 | 138.7 | 20.8 | | |
| 18 | 2.2 | 32.9 | 149.6 | 25.0 | | |
| 19 | 6.3 | 25.2 | 152.6 | 29.1 | | |
| 20 | 5.0 | 11.3 | 147.7 | 26.3 | | |
| 21 | 3.3 | 0.7 | 153.4 | 21.3 | | |
| 22 | 3.1 | 10.8 | 143.0 | 17.4 | | |
| 23 | 2.3 | 14.2 | 125.6 | 11.7 | | |
| 24 | 3.5 | 16.8 | 105.0 | 9.3 | | |
| 25 | 2.8 | 27.7 | 68.3 | 8.3 | | |
| 26 | 1.7 | 36.2 | 59.5 | 9.6 | | |
| 27 | 1.0 | 39.8 | 49.8 | 6.2 | | |
| 28 | 0.7 | 30.4 | 39.5 | 5.2 | | |
| 29 | 1.3 | 37.6 | 31.2 | 11.8 | | |
| 30 | 0.7 | 54.7 | 34.2 | 10.2 | | |
| 31 | | 68.4 | | 8.9 | | |
| **TOTAL** | **33.9** | **844.7** | **3402.5** | **879** | **85** | |
| **AVERAGE** | **2.6** | **27.2** | **113.4** | **28.4** | **5.7** | |
| **MAX** | **6.3** | **68.4** | **156.1** | **57.2** | **13.9** | |

WY 2017 Total: 10,404 AF
Maximum Instantaneous Peak: 196.1 cfs on 11 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data
This is a non-standard Parshall Flume equation

## Mormon Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0 | 38.2 | 15.8 | 1.2 | |
| 2 | | 0 | 45.9 | 13.6 | | |
| 3 | | 0 | 49.6 | 12.1 | | |
| 4 | | 0 | 52 | 12.4 | | |
| 5 | | 3.7 | 58.4 | 11.6 | | |
| 6 | | 9.7 | 57.6 | 10.5 | | |
| 7 | | 12.1 | 57.8 | 9.7 | | |
| 8 | | 14.8 | 56.6 | 9.2 | | |
| 9 | | 15.8 | 57.1 | 8.3 | | |
| 10 | | 13.4 | 54.8 | 7.6 | | |
| 11 | | 13.9 | 55.3 | 7.8 | | |
| 12 | | 21.4 | 54 | 10.4 | | |
| 13 | .9 | 32 | 45.9 | 9.8 | | |
| 14 | 3.2 | 32.8 | 38.9 | 7.4 | | |
| 15 | 4.5 | 28.8 | 42.9 | 6.5 | | |
| 16 | 4.8 | 26.8 | 47.5 | 5.5 | | |
| 17 | 5 | 19.3 | 53.7 | 5.7 | | |
| 18 | 6.2 | 15 | 57.5 | 5.5 | | |
| 19 | 8.4 | 11.7 | 55.2 | 5.1 | | |
| 20 | 5.6 | 9.4 | 51.3 | 5.3 | | |
| 21 | 2.4 | 8.2 | 51.8 | 4.7 | | |
| 22 | .6 | 7.5 | 44.3 | 4.3 | | |
| 23 | .6 | 7.2 | 38.5 | 3.5 | | |
| 24 | .6 | 10.1 | 33.1 | 3.1 | | |
| 25 | .6 | 18.2 | 30.9 | 3.3 | | |
| 26 | .6 | 22.1 | 28.4 | 3.4 | | |
| 27 | .6 | 21.5 | 26.8 | 2.8 | | |
| 28 | .6 | 15.8 | 22.4 | 2.5 | | |
| 29 | .6 | 17.7 | 19.2 | 3.3 | | |
| 30 | .3 | 23.7 | 17 | 2.7 | | |
| 31 | | 29.8 | | 2.2 | | |
| **TOTAL** | 46.3 | 462.3 | 1342.7 | 215.3 | 1.2 | |
| **AVERAGE** | 1.9 | 14.9 | 44.8 | 6.9 | 1.2 | |
| **MAX** | 8.4 | 32.8 | 58.4 | 15.8 | 1.2 | |

WY 2017 total: 4,106 AF
Maximum Instantaneous Peak 68.4 cfs on 6 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## North Cunningham Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0 | 18.7 | 5.7 | | |
| 2 | | 0 | 22.8 | 4.7 | | |
| 3 | | 0 | 23.5 | 4 | | |
| 4 | | 0 | 24.3 | 3.8 | | |
| 5 | | 2.2 | 26.4 | 3.4 | | |
| 6 | | 5.7 | 26.7 | 3 | | |
| 7 | | 6.8 | 29.3 | 2.6 | | |
| 8 | | 8 | 32.3 | 2.3 | | |
| 9 | | 8.4 | 29.2 | 1.8 | | |
| 10 | | 6.9 | 23.6 | 1.4 | | |
| 11 | | 8 | 23.1 | 1.4 | | |
| 12 | | 12.6 | 22.6 | 2.8 | | |
| 13 | | 17 | 20.1 | 2.5 | | |
| 14 | .8 | 17.2 | 18 | 1.3 | | |
| 15 | 2.3 | 15.5 | 20.4 | .8 | | |
| 16 | 2.3 | 13.8 | 22.7 | .3 | | |
| 17 | 2.3 | 8.9 | 25.6 | .6 | | |
| 18 | 3.1 | 6 | 24.8 | .4 | | |
| 19 | 4.3 | 4.5 | 22.9 | .2 | | |
| 20 | 2.6 | 3.4 | 23.9 | .4 | | |
| 21 | 1.7 | 2.8 | 24.8 | .1 | | |
| 22 | 1.2 | 2.5 | 20.7 | .1 | | |
| 23 | 1.4 | 2.2 | 18 | | | |
| 24 | 2.2 | 3.5 | 15.7 | | | |
| 25 | 1.6 | 8 | 14.7 | | | |
| 26 | 1.2 | 10.3 | 13.4 | | | |
| 27 | .8 | 10.1 | 12.7 | | | |
| 28 | .5 | 6.8 | 10.2 | | | |
| 29 | .3 | 8.3 | 7.8 | | | |
| 30 | .1 | 12.6 | 6.5 | | | |
| 31 | | 15.6 | | | | |
| **TOTAL** | 28.8 | 227.5 | 625.2 | 43.6 | | |
| **AVERAGE** | 1.2 | 7.3 | 20.8 | 1.4 | | |
| **MAX** | 4.3 | 17.2 | 32.3 | 5.7 | | |

WY 2017 Total: 1,835 AF
Maximum Instantaneous Peak: 75.5 cfs on 9 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## Middle Cunningham Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | | 20.8 | 8.2 | | |
| 2 | | | 26.6 | 7 | | |
| 3 | | | 28.7 | 6.2 | | |
| 4 | | | 33.2 | 5.9 | | |
| 5 | | .2 | 36.3 | 5.3 | | |
| 6 | | .6 | 36.6 | 4.8 | | |
| 7 | | 1.6 | 36.8 | 4.4 | | |
| 8 | | 2.8 | 37.1 | 4 | | |
| 9 | | 4.3 | 33 | 3.4 | | |
| 10 | | 4.1 | 36.5 | 3 | | |
| 11 | | 4.7 | 34.7 | 2.7 | | |
| 12 | | 8 | 35.8 | 4.7 | | |
| 13 | | 12.6 | 32 | 4.2 | | |
| 14 | | 13.8 | 28.4 | 2.7 | | |
| 15 | | 12.9 | 30.6 | 1.9 | | |
| 16 | | 11.9 | 34 | 1.4 | | |
| 17 | | 8.2 | 40.8 | 1.3 | | |
| 18 | | 5.9 | 39 | 1 | | |
| 19 | | 4.5 | 37.1 | .6 | | |
| 20 | | 3.5 | 36.5 | .1 | | |
| 21 | | 2.8 | 35.9 | | | |
| 22 | | 2.4 | 30.5 | | | |
| 23 | | 2.1 | 25.9 | | | |
| 24 | | 3 | 21.6 | | | |
| 25 | | 6.4 | 19.2 | | | |
| 26 | | 9.1 | 17.2 | | | |
| 27 | | 9.7 | 15.7 | | | |
| 28 | | 6.6 | 13.5 | | | |
| 29 | | 7.4 | 11.3 | | | |
| 30 | | 11.8 | 9.5 | | | |
| 31 | | 16.2 | | | | |
| **TOTAL** | | **177** | **874.9** | **72.7** | | |
| **AVERAGE** | | **5.7** | **29.2** | **2.3** | | |
| **MAX** | | **16.2** | **40.8** | **8.2** | | |

WY 2017 Total: 2,233 AF
Maximum Instantaneous Peak: 51.7 cfs on 17 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## Ivanhoe Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 1.4 | 75.1 | 25.8 | | |
| 2 | | 1.4 | 89.7 | 6.8 | | |
| 3 | | 1.4 | 96.7 | 3.3 | | |
| 4 | | 1.4 | 105.7 | 2.6 | | |
| 5 | | 3.6 | 109.2 | 2.1 | | |
| 6 | | 14 | 93.2 | 1.8 | | |
| 7 | | 25.6 | 58 | 1.4 | | |
| 8 | | 29.7 | 59.6 | 1.4 | | |
| 9 | | 33.4 | 73.4 | 1.4 | | |
| 10 | | 28.8 | 108.2 | 1.4 | | |
| 11 | | 26.6 | 126.4 | 1.4 | | |
| 12 | | 43.1 | 124.8 | 2.8 | | |
| 13 | 1.8 | 60 | 115.2 | 3.3 | | |
| 14 | 5.7 | 60.7 | 89.5 | 1.4 | | |
| 15 | 7.6 | 52.7 | 46.4 | | | |
| 16 | 9.1 | 43.6 | 37.3 | | | |
| 17 | 10.2 | 30.7 | 71.8 | | | |
| 18 | 12 | 23.3 | 118.6 | | | |
| 19 | 15.2 | 16.8 | 125.6 | | | |
| 20 | 12.3 | 13.1 | 114.5 | | | |
| 21 | 10 | 11 | 110.5 | | | |
| 22 | 8.3 | 10.7 | 103 | | | |
| 23 | 8.5 | 10.1 | 95.4 | | | |
| 24 | 10.2 | 13.3 | 88.2 | | | |
| 25 | 8.9 | 24.8 | 82.3 | | | |
| 26 | 7.6 | 33.9 | 77 | | | |
| 27 | 6.4 | 35.6 | 72 | | | |
| 28 | 5.6 | 24.3 | 67.1 | | | |
| 29 | 4.8 | 30.2 | 61.6 | | | |
| 30 | 2.9 | 40.8 | 54.4 | | | |
| 31 | | 54.4 | | | | |
| **TOTAL** | **147.3** | **800.2** | **2650.4** | **56.9** | | |
| **AVERAGE** | **5.9** | **25.8** | **88.3** | **4.1** | | |
| **MAX** | **15.2** | **60.7** | **126.4** | **25.8** | | |

WY 2017 total: 7,249 AF
Maximum Instantaneous Peak 140.4 cfs on 19 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## Lily Pad Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 5.8 | 14.3 | 7.9 | | |
| 2 | | 5.7 | 15.9 | 7.6 | | |
| 3 | | 5.7 | 17.4 | 7.4 | | |
| 4 | | 6 | 19.9 | 7.2 | | |
| 5 | | 6.7 | 21 | 7 | | |
| 6 | | 7.4 | 19.5 | 6.8 | | |
| 7 | | 7.8 | 18 | 6.7 | | |
| 8 | | 8.4 | 19.5 | 6.6 | | |
| 9 | | 9 | 20.7 | 6.3 | | |
| 10 | | 9.1 | 21.3 | 6.4 | | |
| 11 | | 9.4 | 20.9 | 6.7 | | |
| 12 | | 10.5 | 19.2 | 5.6 | | |
| 13 | | 11.8 | 16.3 | 2.1 | | |
| 14 | | 12.3 | 15.3 | 1.6 | | |
| 15 | 5.9 | 12.4 | 15.7 | 1.5 | | |
| 16 | 5.8 | 12.3 | 15.7 | 1.3 | | |
| 17 | 6 | 11.9 | 16.3 | 1.2 | | |
| 18 | 6.3 | 11.5 | 16.4 | 1.2 | | |
| 19 | 6.7 | 10.8 | 14.9 | | | |
| 20 | 6.7 | 9.1 | 13.8 | | | |
| 21 | 6.4 | 8.6 | 13.3 | | | |
| 22 | 6.4 | 8.6 | 12.7 | | | |
| 23 | 6.6 | 8.3 | 12 | | | |
| 24 | 6.7 | 8.9 | 11.1 | | | |
| 25 | 6.4 | 10.4 | 10.4 | | | |
| 26 | 6.3 | 11.5 | 10 | | | |
| 27 | 6.2 | 12 | 9.6 | | | |
| 28 | 6.1 | 11 | 9.3 | | | |
| 29 | 6 | 11.5 | 8.8 | | | |
| 30 | 5.9 | 12.5 | 8.3 | | | |
| 31 | | 13.2 | | | | |
| TOTAL | 100.5 | 300.1 | 457.4 | 91 | | |
| AVERAGE | 6.3 | 9.7 | 15.2 | 5.1 | | |
| MAX | 6.7 | 13.2 | 21.3 | 7.9 | | |

WY 2017 Total: 1882 AF
Maximum Instantaneous Peak: 26.7 on 10 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## Granite Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | | 13.8 | 8 | | |
| 2 | | | 16.6 | 7.1 | | |
| 3 | | | 18.7 | 6.2 | | |
| 4 | | | 22.8 | 3.1 | | |
| 5 | | | 25.4 | | | |
| 6 | | .2 | 27 | | | |
| 7 | | .9 | 28 | | | |
| 8 | | 1.6 | 29.9 | | | |
| 9 | | 1.9 | 30.7 | | | |
| 10 | | 1.8 | 30.5 | | | |
| 11 | | 2.4 | 30.4 | | | |
| 12 | | 3.9 | 29.3 | | | |
| 13 | | 6.2 | 25.4 | | | |
| 14 | | 7.8 | 22.8 | | | |
| 15 | | 8.6 | 23.9 | | | |
| 16 | | 8.6 | 25.7 | | | |
| 17 | | 6.6 | 28.8 | | | |
| 18 | | 5.4 | 30.7 | | | |
| 19 | | 4.2 | 28.6 | | | |
| 20 | | 3.4 | 27 | | | |
| 21 | | 2.7 | 27.2 | | | |
| 22 | | 2.5 | 23.5 | | | |
| 23 | | 2.3 | 20.3 | | | |
| 24 | | 2.7 | 17.4 | | | |
| 25 | | 4.5 | 15.4 | | | |
| 26 | | 6 | 13.8 | | | |
| 27 | | 6.2 | 12.6 | | | |
| 28 | | 5 | 11.2 | | | |
| 29 | | 5.9 | 9.7 | | | |
| 30 | | 8.4 | 8.8 | | | |
| 31 | | 10.9 | | | | |
| **TOTAL** | | **120.4** | **675.9** | **24.5** | | |
| **AVERAGE** | | **3.9** | **22.5** | **.8** | | |
| **MAX** | | **10.9** | **30.7** | **8** | | |

WY 2017 Total: 1,628 AF
Maximum Instantaneous Peak: 35.3 cfs on 8 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## No Name Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | | 31.6 | 3.9 | | |
| 2 | | | 39.3 | 3 | | |
| 3 | | | 43.3 | 2.4 | | |
| 4 | | | 46 | 1.5 | | |
| 5 | | | 54.3 | .4 | | |
| 6 | | | 49 | | | |
| 7 | | 2.4 | 48.3 | | | |
| 8 | | 2.3 | 48.9 | | | |
| 9 | | 2.3 | 50.9 | | | |
| 10 | | 3 | 52 | | | |
| 11 | | 5.3 | 59.6 | | | |
| 12 | | 10.8 | 56 | | | |
| 13 | | 18.6 | 42.8 | | | |
| 14 | | 22.1 | 26.9 | | | |
| 15 | | 20.6 | 37.1 | | | |
| 16 | | 21 | 38.1 | | | |
| 17 | | 16.2 | 38.2 | | | |
| 18 | | 11 | 37.2 | | | |
| 19 | | 7.5 | 33.7 | | | |
| 20 | | 5.2 | 32.3 | | | |
| 21 | | 3.8 | 31.4 | | | |
| 22 | | 3.6 | 27.2 | | | |
| 23 | | 3.2 | 22.3 | | | |
| 24 | | 5.3 | 17.7 | | | |
| 25 | | 11 | 14.3 | | | |
| 26 | | 14.6 | 6.6 | | | |
| 27 | | 14.9 | 0 | | | |
| 28 | | 11.1 | 3.2 | | | |
| 29 | | 18 | 6.7 | | | |
| 30 | | 24.6 | 5.2 | | | |
| 31 | | 28.1 | | | | |
| **TOTAL** | | 286.8 | 1000.3 | 12.4 | | |
| **AVERAGE** | | 9.3 | 33.3 | .4 | | |
| **MAX** | | 28.1 | 59.6 | 3.9 | | |

WY 2017 Total: 2,578 AF.
Maximum Instantaneous Peak: 77.5 on 11 Jun 17
Blank: Recorder not operated.
M: Missing Data

## Midway Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | | 53.1 | 22.6 | | |
| 2 | | | 61.2 | 19.3 | | |
| 3 | | | 64.8 | 17.7 | | |
| 4 | | | 71.6 | 17.1 | | |
| 5 | | 2.2 | 70 | 16 | | |
| 6 | | 7.3 | 82.7 | 14.8 | | |
| 7 | | 8.6 | 79.5 | 14 | | |
| 8 | | 7.7 | 70.8 | 12.7 | | |
| 9 | | 7.7 | 69.6 | 11.8 | | |
| 10 | | 7.8 | 76.5 | 11.6 | | |
| 11 | | 11.4 | 29.9 | 12.3 | | |
| 12 | | 19.4 | 0 | 16.2 | | |
| 13 | | 29.3 | 0 | 15.2 | | |
| 14 | | 31.2 | 35.8 | 13.7 | | |
| 15 | | 30.6 | 74.6 | 10.6 | | |
| 16 | | 29.6 | 77.9 | 6.5 | | |
| 17 | | 23.4 | 82.1 | 4.1 | | |
| 18 | | 18.2 | 84.6 | 13.2 | | |
| 19 | | 12.7 | 82.7 | 13.7 | | |
| 20 | | 9.4 | 79.7 | 10.6 | | |
| 21 | | 7.5 | 81.3 | 8.9 | | |
| 22 | | 7.1 | 75.7 | 6.5 | | |
| 23 | | 6.9 | 65.8 | 4.1 | | |
| 24 | | 10.7 | 55 | 2.7 | | |
| 25 | | 17.9 | 48.1 | 1.3 | | |
| 26 | | 22.6 | 42.2 | | | |
| 27 | | 22.3 | 39.5 | | | |
| 28 | | 16.8 | 33.9 | | | |
| 29 | | 23 | 28.9 | | | |
| 30 | | 33.8 | 25.3 | | | |
| 31 | | 43.6 | | | | |
| **TOTAL** | | **468.8** | **1743.1** | **297.2** | | |
| **AVERAGE** | | **15.1** | **58.1** | **9.6** | | |
| **MAX** | | **43.6** | **84.6** | **22.6** | | |

WY 2017 Total: 4,977 AF.

Maximum Instantaneous Peak: 98.5 on 18 Jun 17
Blank: Recorder not operated.
M: Missing Data

## Hunter Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0 | 50.5 | 17 | | |
| 2 | | 0 | 62.7 | 16.1 | | |
| 3 | | 0 | 69.6 | 16 | | |
| 4 | | 0 | 69.2 | 16.3 | | |
| 5 | | 0 | 82.3 | 15.7 | | |
| 6 | | 5.7 | 81.5 | 14.2 | | |
| 7 | | 14.6 | 72.5 | 12.8 | | |
| 8 | | 10.6 | 66.7 | 8.3 | | |
| 9 | | 10.1 | 59.5 | 4.9 | | |
| 10 | | 10.2 | 54.1 | 5.1 | | |
| 11 | | 14.6 | 59.4 | 7.7 | | |
| 12 | | 25.6 | 59.1 | 13.5 | | |
| 13 | | 40 | 51 | 11.5 | | |
| 14 | | 41.4 | 38.1 | 9.5 | | |
| 15 | | 35.6 | 51.3 | 6.2 | | |
| 16 | | 32.8 | 49.1 | 3.5 | | |
| 17 | | 21.4 | 44.9 | 2.3 | | |
| 18 | | 12.5 | 43.6 | 5.5 | | |
| 19 | | 6.1 | 39.9 | 13 | | |
| 20 | | 1.8 | 39.5 | 11.3 | | |
| 21 | | 0 | 39.3 | 8.7 | | |
| 22 | | 0 | 37.8 | 5.8 | | |
| 23 | | 0 | 36.4 | .9 | | |
| 24 | | 2.9 | 34.8 | 1.7 | | |
| 25 | | 12.7 | 33.5 | .7 | | |
| 26 | | 19.5 | 32.5 | | | |
| 27 | | 19.7 | 28.5 | | | |
| 28 | | 9.6 | 21.1 | | | |
| 29 | | 16.4 | 18.1 | | | |
| 30 | | 33.1 | 16.4 | | | |
| 31 | | 41.9 | | | | |
| **TOTAL** | | **438.7** | **1442.7** | **228.1** | | |
| **AVERAGE** | | **14.2** | **48.1** | **7.4** | | |
| **MAX** | | **41.9** | **82.3** | **17** | | |

WY 2017 Total: 4,185 AF
Maximum Instantaneous Peak: 120.1 cfs on 5 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## Sawyer Creek Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0.5 | 7.0 | 4.4 | | |
| 2 | | 0.4 | 9.7 | 4.0 | | |
| 3 | | 0.4 | 11.0 | 3.4 | | |
| 4 | | 0.4 | 13.4 | 3.1 | | |
| 5 | | 0.5 | 15.5 | 2.9 | | |
| 6 | | 0.5 | 16.8 | 2.8 | | |
| 7 | | 1.2 | 16.7 | 2.6 | | |
| 8 | | 1.4 | 16.6 | 2.3 | | |
| 9 | | 1.8 | 17.0 | 2.1 | | |
| 10 | | 1.9 | 16.8 | 1.9 | | |
| 11 | | 2.2 | 16.7 | 1.9 | | |
| 12 | | 2.8 | 16.3 | 1.9 | | |
| 13 | | 3.8 | 15.9 | 2.2 | | |
| 14 | | 4.7 | 13.6 | 1.7 | | |
| 15 | | 4.9 | 14.5 | 1.4 | | |
| 16 | | 5.2 | 11.2 | 1.2 | | |
| 17 | | 4.4 | 12.3 | 1.0 | | |
| 18 | | 3.8 | 13.0 | 0.9 | | |
| 19 | | 3.3 | 12.6 | 1.0 | | |
| 20 | | 2.9 | 11.9 | 1.0 | | |
| 21 | | 2.5 | 12.4 | 1.0 | | |
| 22 | | 2.4 | 11.8 | 1.0 | | |
| 23 | | 2.2 | 10.2 | 0.7 | | |
| 24 | | 2.2 | 8.9 | 0.6 | | |
| 25 | | 2.9 | 8.7 | 0.5 | | |
| 26 | | 3.5 | 7.9 | 0.6 | | |
| 27 | | 4.0 | 7.2 | 0.4 | | |
| 28 | | 3.5 | 6.8 | 0.4 | | |
| 29 | | 3.7 | 5.9 | 0.5 | | |
| 30 | .5 | 4.4 | 5.2 | 0.4 | | |
| 31 | | 5.6 | | 0.3 | | |
| **TOTAL** | **.5** | **83.8** | **363.3** | **50.2** | | |
| **AVERAGE** | **.5** | **2.7** | **12.1** | **1.6** | | |
| **MAX** | **.5** | **5.6** | **17.0** | **4.4** | | |

WY 2017 Total: 988 AF
Maximum Instantaneous Peak: 16.1 cfs on 7 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data
This is a non-standard Parshall flume equation

## Chapman Gulch Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0 | 162 | 67.4 | 3.7 | |
| 2 | | 0 | 202 | 63.5 | 3.6 | |
| 3 | | 0 | 221.7 | 54.2 | 3.2 | |
| 4 | | 0 | 249.3 | 49.3 | 2.6 | |
| 5 | | 1.8 | 259.5 | 51.3 | 2.3 | |
| 6 | | 13.5 | 280.6 | 50.2 | 1.9 | |
| 7 | 0 | 27.5 | 278 | 46.3 | 2.1 | |
| 8 | 0 | 24.7 | 279.8 | 39.1 | 11.1 | |
| 9 | 0 | 24.3 | 270.2 | 33.9 | 4.5 | |
| 10 | 0 | 25.6 | 269.4 | 33.1 | 6.1 | |
| 11 | 0 | 37 | 239.3 | 36 | 3.7 | |
| 12 | 0 | 65.4 | 201.3 | 47.8 | 3.1 | |
| 13 | 0 | 102.8 | 167.7 | 43.3 | 2.7 | |
| 14 | 0 | 116.1 | 156.7 | 37.3 | 2.2 | |
| 15 | 0 | 104.6 | 227.7 | 30.2 | 1.7 | |
| 16 | 0 | 103.5 | 237.9 | 17.2 | .9 | |
| 17 | 0 | 76.9 | 250.5 | 11 | | |
| 18 | 0 | 52.7 | 258.7 | 19.2 | | |
| 19 | 0 | 35.3 | 242.1 | 35.1 | | |
| 20 | 0 | 23.3 | 231.5 | 28.5 | | |
| 21 | 0 | 16.5 | 237.1 | 23.1 | | |
| 22 | 0 | 14.8 | 214.8 | 17.6 | | |
| 23 | 0 | 13.6 | 177.4 | 7.8 | | |
| 24 | 0 | 20.5 | 151.4 | 5.7 | | |
| 25 | 0 | 47.7 | 123.7 | 5 | | |
| 26 | 0 | 65.5 | 104.4 | 2.7 | | |
| 27 | 0 | 72.8 | 77.4 | 1.4 | | |
| 28 | 0 | 46.5 | 58.3 | 1.1 | | |
| 29 | 0 | 64.4 | 60.2 | 4.3 | | |
| 30 | 0 | 105.8 | 62.8 | 1.4 | | |
| 31 | | 134.4 | | 1.7 | | |
| **TOTAL** | **.3** | **1437.3** | **5953.6** | **865.8** | **55.2** | |
| **AVERAGE** | **0** | **46.4** | **198.5** | **27.9** | **1.8** | |
| **MAX** | **0** | **134.4** | **280.6** | **67.4** | **11.1** | |

WY 2017 Total: 16,487 AF
Maximum Instantaneous Peak: 296.3 cfs on 5 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data

## Fryingpan River Feeder Conduit Near Norrie, CO

WY 2017
Unit: CFS
Source: Bureau of Reclamation

| | April | May | June | July | August | September |
|---|---|---|---|---|---|---|
| 1 | | 0.0 | 102.6 | 81.6 | 11.4 | |
| 2 | | 0.0 | 119.0 | 75.7 | 8.8 | |
| 3 | | 0.0 | 133.9 | 60.9 | 7.3 | |
| 4 | | 0.0 | 162.9 | 52.6 | 5.2 | |
| 5 | | 6.0 | 183.3 | 52.3 | 3.6 | |
| 6 | | 15.6 | 192.8 | 51.2 | 2.3 | |
| 7 | | 21.6 | 196.8 | 50.2 | 2.5 | |
| 8 | | 30.3 | 211.4 | 46.6 | 13.2 | |
| 9 | | 38.2 | 214.2 | 40.8 | 6.0 | |
| 10 | | 33.7 | 212.1 | 40.5 | 15.2 | |
| 11 | | 39.6 | 211.0 | 39.6 | 19.2 | |
| 12 | | 56.4 | 200.9 | 51.1 | 6.9 | |
| 13 | | 75.7 | 172.5 | 47.9 | 0.8 | |
| 14 | | 84.4 | 149.6 | 35.8 | 0.2 | |
| 15 | | 85.0 | 156.7 | 30.9 | 0.3 | |
| 16 | | 81.5 | 171.4 | 26.6 | | |
| 17 | 1.0 | 65.8 | 199.0 | 26.8 | | |
| 18 | 4.8 | 51.3 | 223.8 | 30.3 | | |
| 19 | 7.0 | 38.4 | 209.7 | 34.6 | | |
| 20 | 4.6 | 30.0 | 197.8 | 40.9 | | |
| 21 | 2.1 | 21.4 | 204.0 | 32.6 | | |
| 22 | 0.9 | 15.1 | 186.0 | 28.0 | | |
| 23 | 1.8 | 11.6 | 162.1 | 20.1 | | |
| 24 | 3.0 | 18.1 | 142.1 | 16.1 | | |
| 25 | 2.1 | 40.9 | 117.4 | 15.1 | | |
| 26 | 1.1 | 54.9 | 91.1 | 18.4 | | |
| 27 | 0.5 | 54.5 | 84.2 | 13.8 | | |
| 28 | 0.2 | 44.3 | 73.9 | 10.7 | | |
| 29 | 0.1 | 52.4 | 62.7 | 19.6 | | |
| 30 | 0.0 | 71.3 | 66.2 | 24.8 | | |
| 31 | | 87.1 | | 14.6 | | |
| **TOTAL** | **29.2** | **1,224.9** | **4,811.1** | **1,130.6** | **102.5** | |
| **AVERAGE** | **2.1** | **39.5** | **160.4** | **36.5** | **6.8** | |
| **MAX** | **7.0** | **87.1** | **223.8** | **81.6** | **19.2** | |

WY 2017 Total: 14,477 AF
Maximum Instantaneous Peak: 268.2 cfs on 18 Jun 17
Blank: Recorder not operated. No water diverted
M: Missing Data
This is a non-standard Parshall Flume equation

**APPENDIX E:**

**FRYINGPAN-ARKANSAS PROJECT OPERATING PRINCIPLES**

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

OPERATING PRINCIPLES

FRYINGPAN-ARKANSAS PROJECT

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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

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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 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) "SECWCD" 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 FT 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 AF. 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 AF: 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 AF of water in any year, but not to exceed a total aggregate of 2,352,800 AF 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 AF.

(c) For 3,000 AF 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-FT | AF (thousands) | Month | Average Second-FT | AF (thousands) |
|---|---|---|---|---|---|
| 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 | 2.6 |
| 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 AF 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 SECWCD 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 SECWCD.

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 SECWCD, 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