



CITY
OF
BOULDER

Utilities Division
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December 28, 2018

Linda Bassi
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 80203

Re: Report on Boulder Creek Instream Flow Program for Water Year 2018

Dear Linda:

The City of Boulder is providing this annual report to the Colorado Water Conservation Board (CWCB), pursuant to paragraph 14 of the July 20, 1990 Agreement between the CWCB and Boulder regarding instream flows on Boulder Creek. This report addresses the period of November 1, 2017 to October 31, 2018.

Summary of Instream Flow Program Operations

Water Year 2018 began with slightly above-average flows at the Nederland gage (BOCMIDCO), conditions which continued into May. While statewide precipitation and snowpack were well below average in 2018, Boulder Creek basin snowpack was about average. Snowmelt occurred early in the runoff season, such that stream flows peaked about three weeks earlier than average and quickly fell to low levels. Separately from the snowmelt induced peak, the daily flow at the Nederland gage peaked on June 17, 2018 due to a rainfall event. Stream flows remained well below average from June through the end of the water year. Total annual discharge at the Nederland gage was 75 percent of average.

Stream flows were sufficient to meet the CWCB's instream flow rights on Boulder Creek and North Boulder Creek on various dates throughout the water year. As shown in Figures 1 through 3, instream flows attributable to the CWCB/Boulder donation agreements and the 90CW193 decree provided supplemental flows as follows:

- in North Boulder Creek below the Lakewood Pipeline Inlet (Segment B) in periods from November through April as detailed below.
- in Boulder Creek between Orodell and 75th Street (Segment C) in periods from November through April and July through October as detailed below.

Releases from Silver Lake Reservoir

Under the Boulder/CWCB donation agreements and pursuant to the 90CW193 decree, from October 1 through April 30, Boulder may release water assigned to the CWCB from Silver Lake Reservoir to maintain up to 0.5 cfs in Segment A and up to 1.5 cfs in Segment B. At its discretion, Boulder may also release water from Silver Lake Reservoir during this period to maintain up to 15 cfs in Segment C. In Water Year 2018, flows available to the CWCB's instream flow rights were sufficient to maintain 0.5 cfs in Segment A, and other donated or assigned rights were used for Segments B and C.

1904 Boulder City Pipeline Water Right Bypassed Water

Under the Boulder/CWCB donation agreements and pursuant to the 90CW193 decree, from November 1 through April 30, Boulder may bypass water assigned to the CWCB and available to the 1904 Boulder City Pipeline water right to maintain up to 1.5 cfs in Segment B. Such bypassed water may also be used during this period to maintain up to 15 cfs in Segment C.

Boulder bypassed 1.5 cfs available to the 1904 Boulder City Pipeline water right when it was in priority to supplement flows in Segment B from November 1-12, 2017, November 21-February 7, 2018, February 13-14, February 18-26, and again from March 19-April 30, 2018. From November 4-5, November 19, November 23-27 and December 5-7, 2017, and January 12, January 14-17, January 22-February 1, February 3-6, March 19-April 30, the 1.5 cfs bypass was also used to protect instream flows in Segment C. During the remainder of the November 1- April 30 period, other flows available to the CWCB's instream flow right were enough to maintain 1.5 cfs in Segment B.

Releases from Barker Reservoir

Under the Boulder/CWCB donation agreements and pursuant to the 90CW193 decree, Boulder may release water assigned to the CWCB from Barker Reservoir to maintain up to 15 cfs in Segment C. Senior priority diversions beginning in early February called out the Boulder City Pipeline right, described above, and lowered Segment C flows to the extent that Boulder decided to make releases from the 1956 Barker storage right pursuant to the 90CW193 decree and with Water Commissioner approval. Boulder made daily releases of 1.5 cfs from February 8-March 18, 2018.

Conveyed Rights

Under the Boulder/CWCB donation agreements and pursuant to the 90CW193 decree, from May 1 through September 30 (and through October 15 in the case of Smith & Goss), water available to the Anderson, Harden, McCarty and Smith & Goss Ditch conveyed rights may be bypassed to maintain up to 0.5 cfs in Segment A, up to 1.5 cfs in Segment B and up to 15 cfs in Segment C. Water available to the Farmers Ditch conveyed rights may be bypassed from May 1 through September 30 to maintain up to 15 cfs in Segment C.

The conveyed rights were used to supplement flows in Segment C but were not needed in Segments A or B because other flows available to the CWCB 1994 instream flow rights were generally sufficient to maintain at least 0.5 cfs and 1.5 cfs, respectively, in Segments A and B during the conveyed rights season. The conveyed rights were bypassed for instream flow use in Segment C from July 19 through October 15, 2018. During times when they were not needed for instream flow purposes, they were available and used for municipal purposes under the decree.

From the beginning of the water year through late January, stream flows in Segment C averaged above 15 cfs. Senior diversions began in early February and flows fluctuated in February, dropping to below 5 cfs for the entire month of March and into much of April, with some sporadic higher flows. Beginning May 1, stream flows rose above 15 cfs in Segment C and remained above 15 cfs through early July without the use of the conveyed rights. The conveyed rights were called in for instream flow purposes on July 19 and remained in through October 15. Farmers Ditch was prorated August 2 and was called out of priority August 14. During these last four months of the water year, periodic flows in Segment C above 15 cfs were the result of precipitation events and/or water being delivered to downstream users.

The total use of the water rights subject to the Agreements and the 90CW193 decree between the CWCB and Boulder for instream flow and municipal purposes is summarized in Table 1.

Status of Downstream Leasing Program

Reusable instream flow water was not leased in Water Year 2018.

Water Rights Accounting

City staff maintains daily water rights accounting and tracking of stream flow conditions. Daily accounting forms for Water Year 2018 are available upon request.

Water Rights Administration Issues

All Communication and cooperative efforts between the city, the District 6 Water Commissioner, and the Deputy Commissioner were excellent.

Status of Measuring Devices

1. *North Boulder Creek at the Silver Lake Diversion Structure.* During the summer, Segment A flows were measured using the eight-foot Parshall flume upstream of the Silver Lake diversion structure and the total flow diverted into the Silver Lake pipeline. The flume frequently freezes during winter, at which time flows in Segment A are determined through operational methods and corroborated by regular operator measurement checks. City staff has updated existing instrumentation related to the Constant Head Orifice structure in the creek and will operate this structure during winter 2018/2019.
2. *North Boulder Creek at the Lakewood Inlet.* Segment B flows are determined based on a combination of gage readings at the Lakewood Inlet, operator reports, historical virgin flows, and applicable accounting data. The gage reads accurately in warm weather.
3. *Boulder Creek at Orodell.* The State continues to operate this gage and is performing appropriate maintenance to ensure the instrument's accuracy.
4. *Boulder Creek below Anderson Ditch.* Flow at this site is measured with staff gage readings and manual streamflow measurements. City staff did not take any streamflow measurements at this site during Water Year 2018.
5. *Boulder Creek at Boulder (BOCOBOCO).* This gage was discontinued by the State in early 2015 and is no longer operational.
6. *Boulder Creek below Broadway Diversion Dam.* This site remains a critical measurement point for administering instream flows. City staff took six manual stream flow measurements during Water Year 2018. This rating curve remains stable at this site. This site has a pressure transducer with telemetry and the station was reading inaccurately towards the end of Water Year 2017. City staff worked with a contractor to replace the instrument in January 2018.
7. *Boulder Creek below Wellman Canal.* Flow at this site is measured with staff gage readings and manual streamflow measurements. The rating curve has not been stable due irregular pooling near the gage. City staff took 14 flow measurements over the course of Water Year 2018. Staff moved the gage to a more stable pool immediately downstream of the previous location in the beginning of Water Year 2019, as shown in the photo below.
8. *Boulder Creek below Butte Mill Ditch.* Flow at this site is measured with staff gage readings and manual streamflow measurements. City staff performed six flow measurements during Water Year 2018; the curve was relatively stable.
9. *Boulder Creek below Green Ditch.* Following completion of major channel realignment work in this reach in Water Year 2017, staff installed, and subsequently relocated, a new staff gage with associated pressure transducer and telemetry in Water Year 2018. Until that gage was operational in mid-

December 2017, streamflow data for this site were estimated using the 75th Street USGS gage minus Boulder Creek Supply Canal inflows minus estimated gains between the Green Ditch headgate and the 75th Street gage.

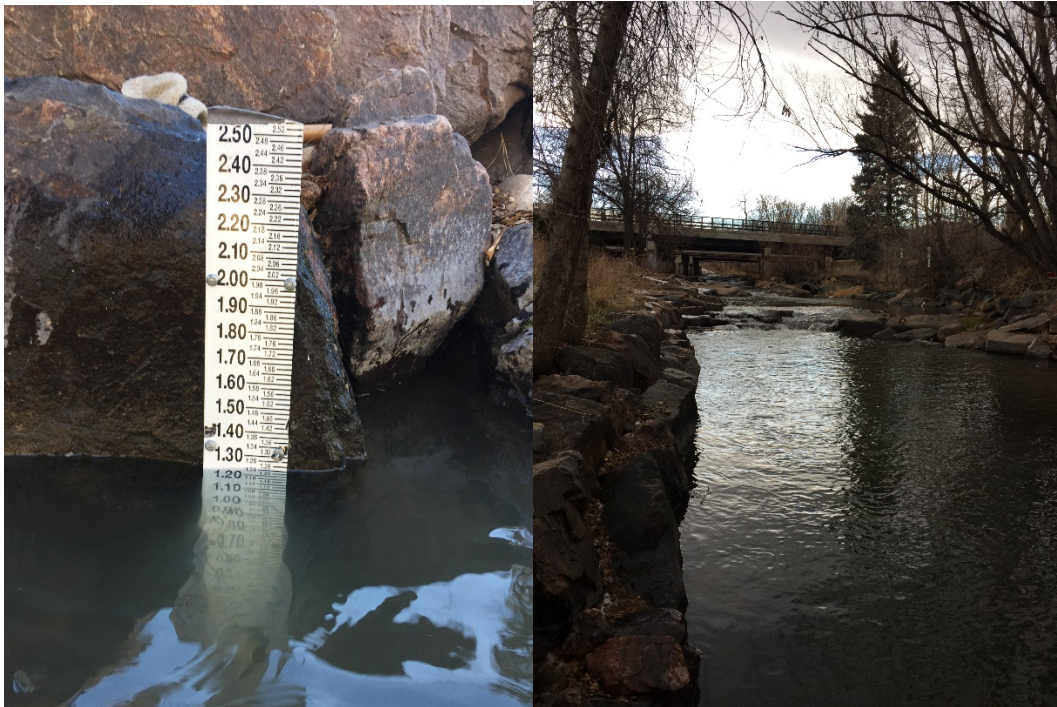


Figure 1. New staff gage at Wellman Canal diversion (L), looking upstream from new staff gage to old staff gage in next pool upstream, on river left (R).

Summary

The water available under the Agreement between the CWCB and the city was used to maintain instream flow in various reaches in November 2017 through April 2018 and July through October 2018.

Sincerely,

Laila B Parker
Source Water Administrator
City of Boulder

cc (w/enc.): Eric Johnson
Robert Carlson
Lee Rozaklis
Kim Hutton

Figure 1
Estimated Flow, North Boulder Creek Below Silver Lake Pipeline (Segment A)
Water Year 2018

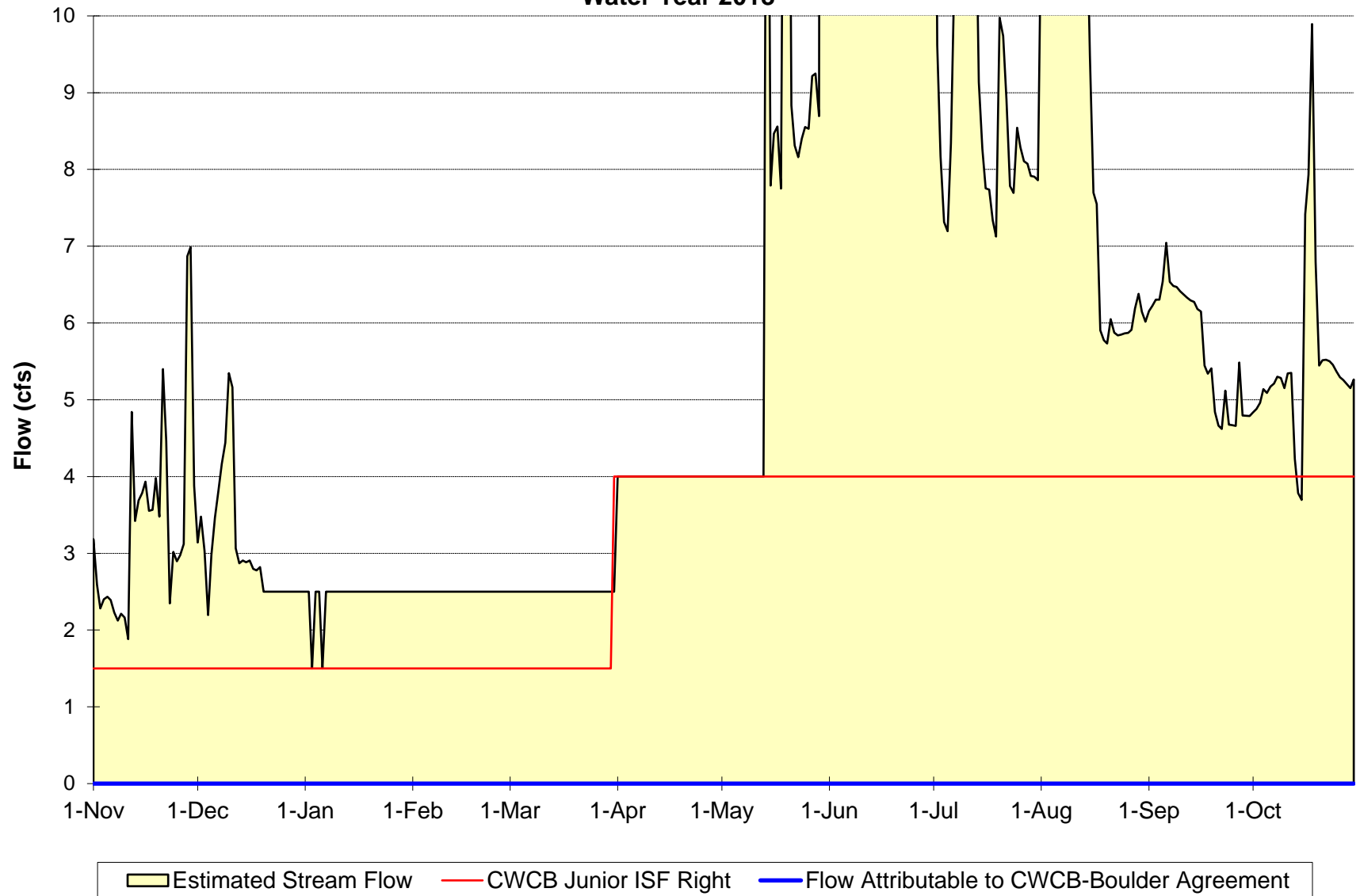


Figure 2
Estimated Flow, North Boulder Creek Below Lakewood Inlet (Segment B)
Water Year 2018

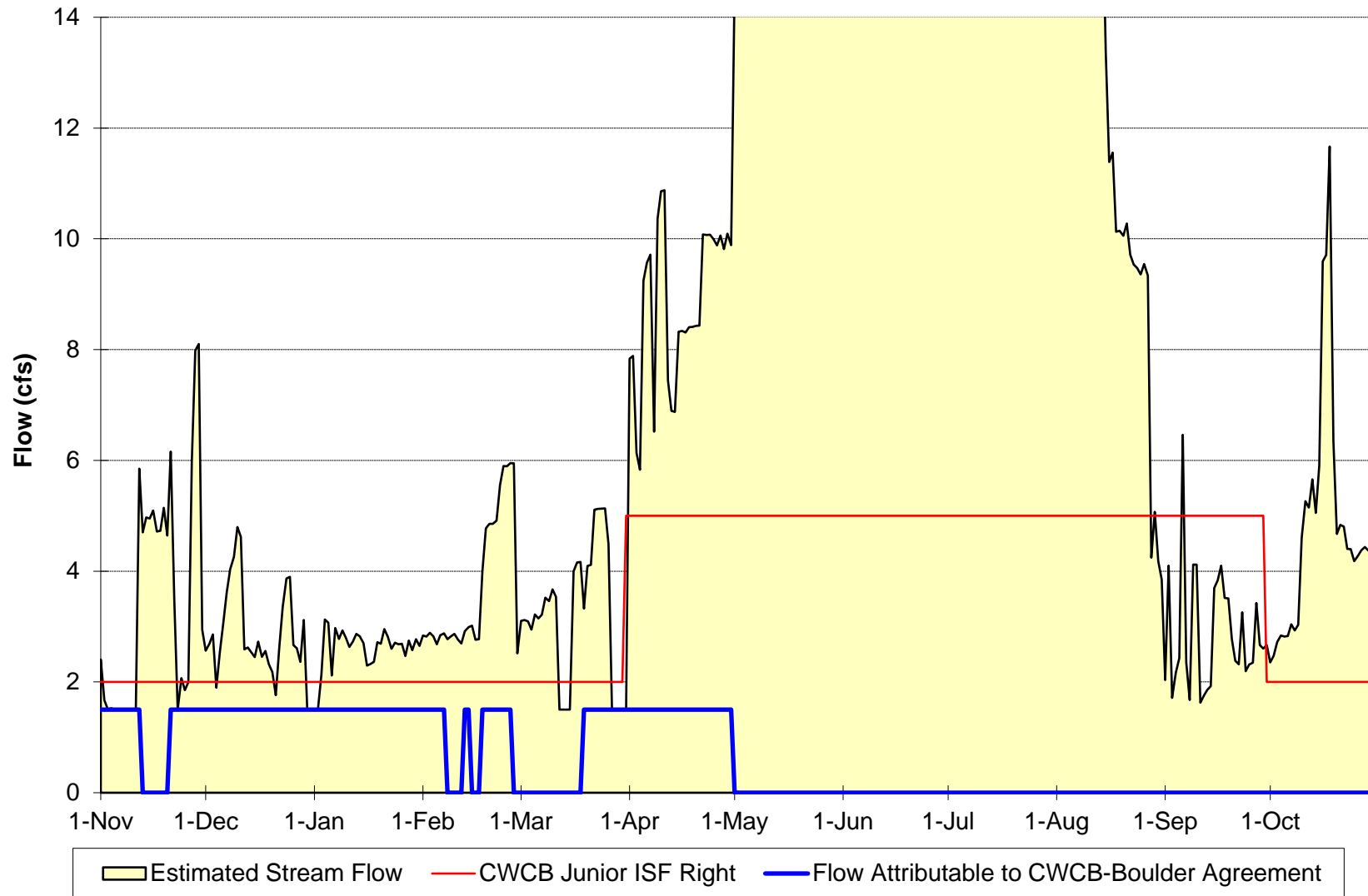


Figure 3
Estimated Flow, Boulder Creek Below Boulder Canyon Hydro Discharge (Segment C)
Water Year 2018

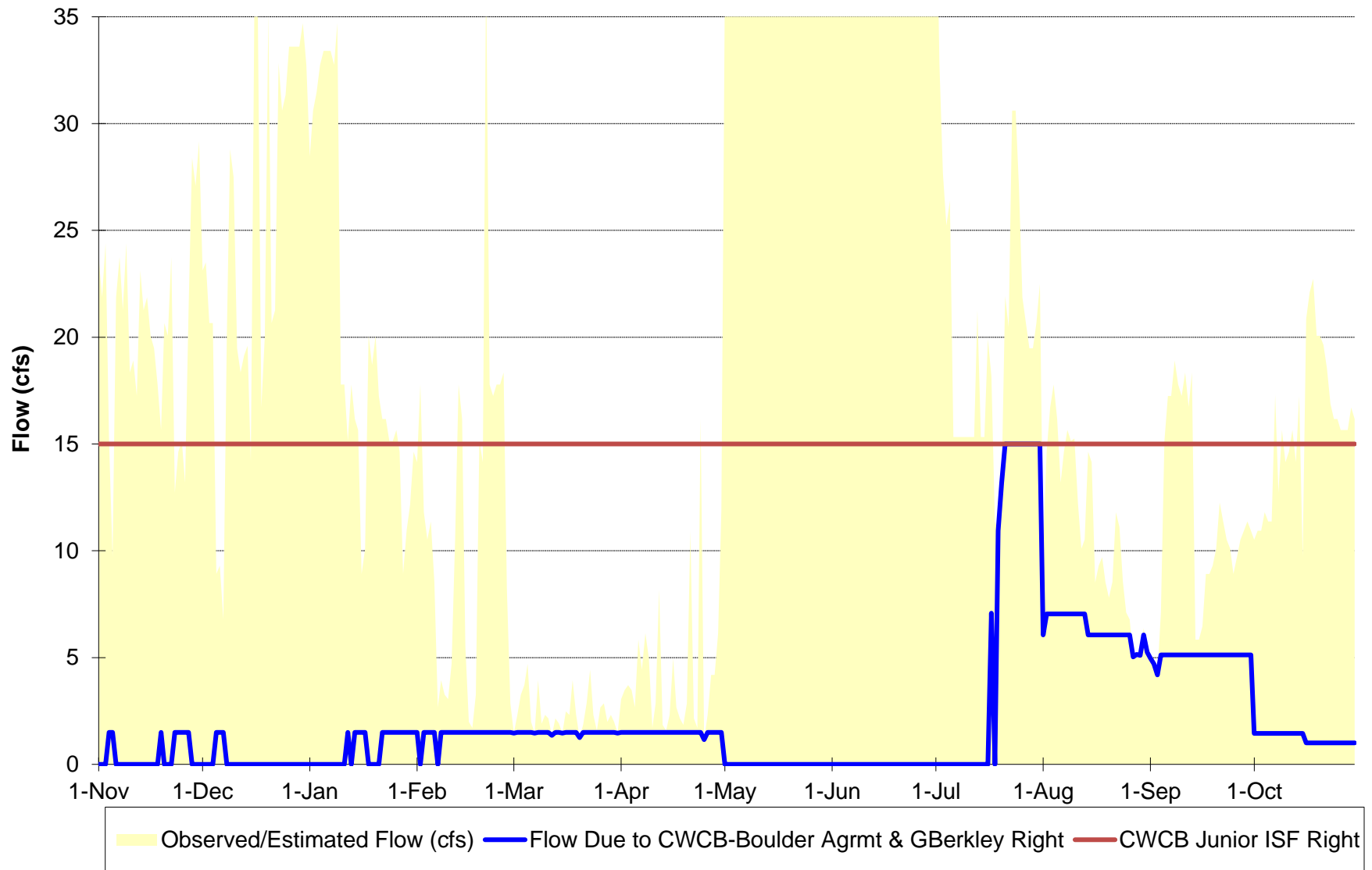


Table 1
Summary of Use of Water Rights Subject to Boulder/CWCB Instream Flow Agreement
Water Year 2018
(All values reported in acre-feet)

	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	TOTAL
Silver Lake ISF Releases	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barker ISF Releases	0.0	0.0	0.0	62.5	53.6	0.0	0.0	0.0	14.1	0.0	0.0	0.0	130.1
Conveyed Rights													
Anderson Ditch													
Municipal	-	-	-	-	-	-	14.9	18.1	52.8	-	-	-	85.8
ISF	-	-	-	-	-	-	-	-	55.7	132.8	73.2	-	261.7
Harden Ditch													
Municipal	-	-	-	-	-	-	25.0	25.6	17.1	-	-	-	67.7
ISF	-	-	-	-	-	-	-	-	46.4	110.7	107.1	-	264.2
McCarty Ditch													
Municipal	-	-	-	-	-	-	8.9	21.7	1.3	-	-	-	31.9
ISF	-	-	-	-	-	-	-	-	16.6	39.5	38.3	-	94.4
Smith Goss Ditch													
Municipal	-	-	-	-	-	-	6.3	12.8	0.9	-	-	-	20.0
ISF	-	-	-	-	-	-	-	-	11.6	27.7	26.8	13.4	79.6
Farmers Ditch													
Municipal	-	-	-	-	-	-	54.5	101.5	22.7	-	-	-	178.7
ISF	-	-	-	-	-	-	-	-	224.7	23.7	-	-	248.3
Boulder City Pipeline (NB/Como)													
Municipal	126.6	94.1	110.6	4.0	-	160.8	131.0	13.0	-	-	-	-	640.1
ISF	65.5	92.2	92.2	53.6	41.7	86.3	-	-	-	-	-	-	431.4
Totals													
Municipal	126.6	94.1	110.6	4.0	-	160.8	240.6	192.7	94.8	-	-	-	1024.2
ISF	65.5	92.2	92.2	116.0	95.2	86.3	-	-	369.0	334.4	245.4	13.4	1509.7
Leasable Flows													
Total Eligible ISF	-	-	-	62.5	53.6	-	-	-	369.0	334.4	245.4	13.4	1078.3
Percent Leasable	0%	0%	0%	0%	0%	21%	39%	48%	53%	48%	34%	17%	
Leasable Amount	-	-	-	-	-	-	-	-	195.6	160.5	83.4	2.3	441.8
Amount Leased	-	-	-	-	-	-	-	-	-	-	-	-	0.0

Notes: All values are in terms of acre feet

Total eligible ISF equals Total ISF minus Silver Lake ISF releases minus Boulder City Pipeline releases.

Leasable Amount is equal to the minimum of Total Eligible ISF times Percent Leasable and the actual flow below Broadway.