

Data Transmittal Report



To: Upper Clear Creek Watershed Association (UCCWA)

CC:

From: Mike Crouse

Date: 11-March-2024

Re: Stream Gaging Report Water Year 2023 – Clear Creek at Kermitts (Station CC-40)

Clear Creek Consultants (CCC) has been retained by UCCWA to operate and maintain the stream flow gaging station on Clear Creek above Johnson Gulch near Kermitts (Station CC-40). The UCCWA and others utilize streamflow data from this gage to assess water quality conditions in Clear Creek. From October 1994 to October 2005, the gage was operated by the U.S. Geological Survey and records were published in annual reports. CCC has operated the CC-40 gage and published the flow data annually since 2006. This report presents data collected at the gage from October 2022 to October 2023.

Data Collection and Evaluation

A continuous recording Campbell Scientific data logger was used to measure a submersible pressure transducer to develop the water stage height record for CC-40. The 15-minute average stream stage height was recorded during ice-free periods extending from approximately March to November. The transducer was calibrated using an electronic tape gage referenced to the base of the gage enclosure box. An outside staff gage mounted in the stream is also utilized as a stream stage height reference.

Continuous recording water quality probes operated at the CC-40 gage for water quality monitoring were discontinued in 2022.

Operation of the CC-40 streamgage requires the development and maintenance of a discharge rating to define the relationship between stream stage height and discharge (flow). Data collection methods and procedures used at the CC-40 streamgage follow standard USGS guidelines and protocols (USGS, 1982 – Measurement and Computation of Streamflow, Volumes 1 and 2).

Direct measurements of stream flow using a current meter are required each year to evaluate this relationship at various seasonal flow rates. Direct current meter discharge measurements are taken each season to maintain the discharge rating. Measurement results are available upon request. The discharge rating is evaluated annually to assess the accuracy of the rating in comparison to the direct measurements. The measurements are plotted on log-normal distribution using a computer program for comparison to the existing rating. If necessary, either shift adjustments are applied to the data before calculating discharge, or the rating is revised to maintain accuracy.

Three separate rating curves were developed and utilized for the CC-40 gage representing low flow (20-70 cfs), medium flow (70-300 cfs), and high flow (300-2,000 cfs). The streamflow rating table for CC-40 is attached.

The stage height record was compiled for review, plotted, and any necessary corrections were made based on field calibration measurements. The final stage height record was then imported into an Access database program for the computation of discharge and to archive data.

The discharge rating equations were applied to the corrected stage height data for the computation of discharge. A stream flow computation program was used within the Access database framework to compute the 15-minute discharge. Statistical output summaries from the database program include mean daily flow; mean hourly flow; and maximum and minimum instantaneous flow by month.

Results

The gage was audited approximately monthly during ice-free periods to check calibration against the gage reference points and make any necessary adjustments to maintain accuracy. Routine maintenance of the gage included removal of silt accumulated in the stilling well and instrument maintenance.

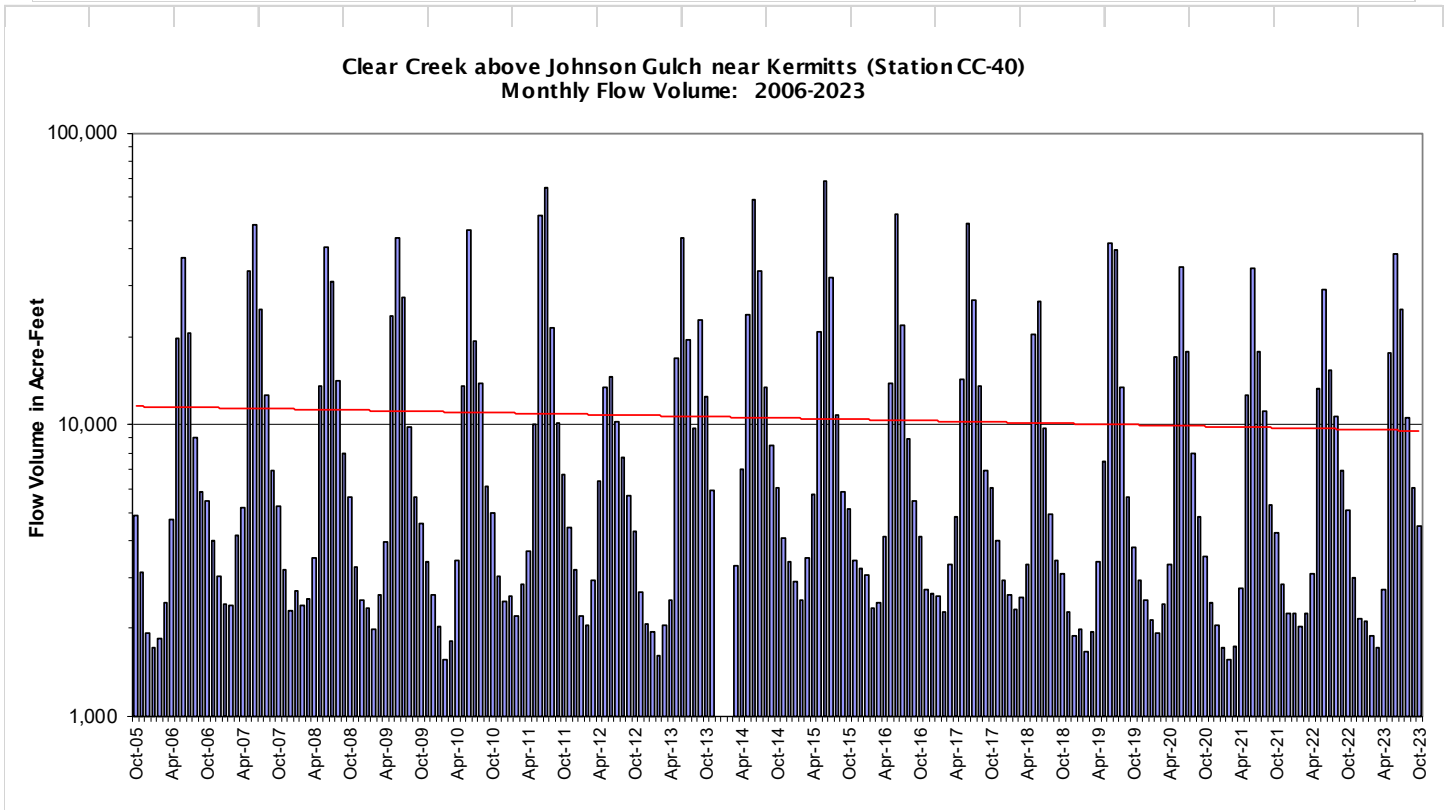
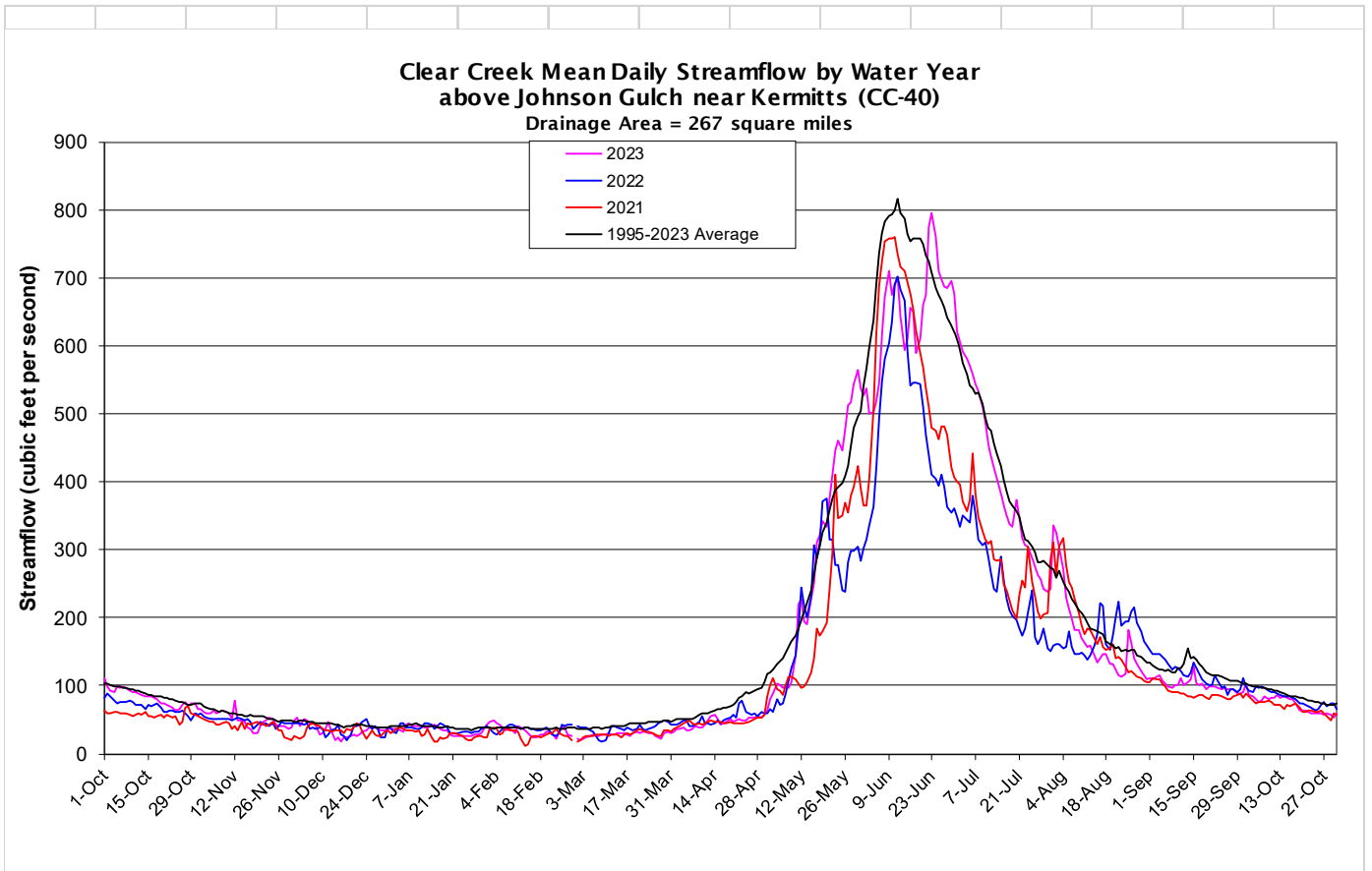
Stream flow results during the operation season are available in real-time on Clear Creek Consultants web site for fishermen, rafters and other water users to obtain current stream flow conditions at clearcr.com/flow-pages.html.

The CC-40 mean daily discharge results for this reporting period are presented in the attached table, along with the flow hydrograph. The gage is not operated over the winter months (November-March) because the gage rating is not accurate during heavy ice-cover conditions which occur each year at CC-40. Significant channel ice accumulation renders the flow rating useless during the winter. When possible, wintertime flows are estimated based on Clear Creek flows at the Golden USGS gage (CC-60) adjusted using the average flow ratio for the winter low-flow period.

Minimum Clear Creek flows occur in winter, with maximum flows typically in June. Minimum flows typically range from 20 to 40 cfs at CC-40. Mean daily flows in June and July 2022 were below average, and near average the remainder of 2022. Peak snowmelt flow in 2022 was 779 cfs on 11-June, similar to 2021.


CLEAR CREEK ABOVE JOHNSON GULCH NEAR KERMITTS													
WY 2023													
Provisional Data - Subject to Revision													
LOCATION -- 0.5 mi upstream Johnson Gulch				LATITUDE 39 44'47" LONGITUDE 105 26'08"									
GAGE DRAINAGE AREA -- 267 sq-mi				GAGE ELEVATION -- 7210 ft-msl									
PERIOD OF RECORD -- October 1994 to Current Year													
DISCHARGE IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2022 TO OCTOBER 2023													
MEAN DAILY VALUES													
DAY	2022 OCT	2022 NOV	2022 DEC	2023 JAN	2023 FEB	2023 MAR	2023 APR	2023 MAY	2023 JUN	2023 JUL	2023 AUG	2023 SEP	2023 OCT
1	111	65.1	48 e	37 e	43 e	22 e	33 e	62.5	526	621	335	112	89.6
2	99.4	60.8	53 e	36 e	47 e	21 e	36 e	80.2	538	605	326	109	103
3	93.3	59.7	41 e	35 e	48 e	21 e	37 e	88.8	500	591	305	113	86.5
4	90.8	59.4	50 e	34 e	46 e	24 e	38 e	104	502	581	272	116	83.3
5	98.0	64.0	50 e	32 e	43 e	26 e	34 e	100	519	572	229	107	79.1
6	97.5	58.7	45 e	43 e	39 e	28 e	34 e	96.4	545	558	213	103	76.7
7	99.4	61.0	44 e	44 e	35 e	27 e	35 e	98.5	617	544	198	99.3	78.3
8	96.8	63.7	43 e	40 e	36 e	27 e	40 e	96.4	673	533	182	97.1	84.7
9	93.1	61.9	27 e	41 e	35 e	28 e	38 e	106	710	510	181	100	80.2
10	91.1	58.6	30 e	41 e	30 e	29 e	39 e	145	674	487	170	101	81.7
11	89.7	50.7	36 e	40 e	40 e	31 e	42 e	219	692	457	163	111	83.0
12	87.4	79 e	46 e	38 e	38 e	29 e	49 e	228	702	437	156	102	86.4
13	85.3	50 e	34 e	39 e	34 e	29 e	56 e	194	644	421	159	106	82.2
14	84.7	49 e	20 e	41 e	30 e	30 e	57 e	191	592	403	145	109	83.7
15	83.1	47 e	23 e	42 e	26 e	31 e	50 e	227	610	384	135	129	82.3
16	84.0	38 e	17 e	41 e	24 e	29 e	43 e	251	655	364	140	103	80.3
17	82.2	36 e	23 e	37 e	24 e	27 e	44.6	311	649	351	146	100	79.9
18	80.5	31 e	23 e	35 e	28 e	26 e	47.0	321	589	338	146	104	73.7
19	73.2	29 e	27 e	34 e	29 e	29 e	50.6	343	610	333	133	94.7	64.0
20	73.4	40 e	28 e	29 e	31 e	32 e	46.8	334	661	374	131	98.7	64.0
21	72.4	46 e	26 e	26 e	32 e	31 e	48.7	375	674	346	124	98.1	64.4
22	69.8	50 e	27 e	25 e	29 e	32 e	50.8	410	774	317	116	98.4	61.0
23	67.6	53 e	31 e	26 e	21 e	32 e	48.1	445	795	307	114	95.7	59.2
24	64.4	50 e	34 e	26 e	31 e	31 e	48.1	461	760	304	117	94.1	59.2
25	65.7	42 e	38 e	26 e	39 e	30 e	53.4	445	709	288	181	95.6	60.1
26	70.8	40 e	39 e	26 e	39 e	25 e	53.5	478	698	276	164	95.4	59.0
27	75.7	40 e	38 e	27 e	28 e	23 e	52.8	512	686	262	141	94.4	58.1
28	69.3	40 e	36 e	28 e	26 e	23 e	55.4	516	685	256	133	94.5	58.8
29	74.4	36 e	35 e	28 e		31 e	53.2	544	696	242	121	87.9	57.2
30	73.9	38 e	35 e	30 e		32 e	57.3	564	677	238	115	89.1	52.9
31	64.8		36 e	37 e		30 e		537		243	110		60.0
TOTAL	2562	1498 e	1086 e	1063 e	951 e	864 e	1373 e	8881	19364	12543	5301	3057	2272
MEAN	82.7	50 e	35 e	34 e	34 e	28 e	45.8 e	286	645	405	171	102	73.3
MAX	111	79 e	53 e	44 e	48 e	32 e	57.3 e	564	795	621	335	129	103
MIN	64.4	29 e	17 e	25 e	21 e	21 e	33.2 e	62.5	500	238	110	87.9	52.9
AC-FT	5,082	2,971 e	2,154 e	2,109 e	1,887 e	1,713 e	2,723 e	17,615	38,409	24,879	10,515	6,064	4,507
INSTANTANEOUS MEASUREMENTS													
MAX FLOW	119						63.8	612	853	650	382	146	113
DATE	1-Oct						25-Apr	30-May	23-Jun	1-Jul	1-Aug	15-Sep	2-Oct
MIN FLOW	58.6						42.0	59.6	479	228	106	77.5	49.0
DATE	28-Oct						17-Apr	1-May	3-Jun	31-Jul	31-Aug	29-Sep	30-Oct
e = estimated during ice affected period using average seasonal flow ratio of Clear Creek at Golden (CC-60)													
p = partial data NA = not available													





CLEAR CREEK NEAR KERMITTS (Station CC-40)	
PROVISIONAL STREAMFLOW RATING TABLE	
GAGE HEIGHT	STREAMFLOW
(feet)	(cubic feet per second)
3.3	33
3.4	41
3.5	50
3.6	61
3.7	78
3.8	93
3.9	109
4.0	128
4.1	150
4.2	175
4.3	203
4.4	235
4.5	271
4.6	312
4.7	304
4.8	327
4.9	352
5.0	379
5.1	406
5.2	435
5.3	466
5.4	498
5.5	532
5.6	567
5.7	604
5.8	643
5.9	683
6.0	726
6.1	770
6.2	816
6.3	864
6.4	914
6.5	966
6.6	1020
6.7	1076
6.8	1135
6.9	1195
7.0	1258
7.1	1324
7.2	1391
7.3	1462
7.4	1534
7.5	1610

Streamgauge sponsored by the Upper Clear Creek Watershed Association

Operated by:  *Clear Creek Consultants*

Based on Rating No. 11

