



United States Department of the Interior
BUREAU OF LAND MANAGEMENT



Colorado State Office
Denver Federal Center, Building 40
Lakewood, Colorado 80225
www.blm.gov/colorado

In Reply Refer To:
CO-932 (7250)

Mr. Rob Viehl
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Mr. Viehl:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its recommendation for an instream flow water right on Clear Creek near Thornburg, located in Water Division 6.

Location and Land Status. Clear Creek originates on Horse Ridge approximately 20 miles northeast of the community of Meeker. This recommendation addresses the entire length of Clear Creek from the headwaters to the confluence with Milk Creek, a distance of approximately 7.4 miles. The BLM manages approximately 0.7 miles of this reach, the U.S. Forest Service manages 4.4 miles, and 2.3 miles are in private ownership.

Biological Summary. Clear Creek is a cold water, moderate gradient stream. It begins in a rolling, forested valley on the north side of Horse Ridge, descends through alternating open meadows and forested reaches, then merges with Milk Creek on a broad valley floor. Substrate ranges from silt to 2-foot boulders, and it appears that the creek carries a substantial sediment load. Bank stability appears to be good, but there are locations where livestock use is evident.

The creek appears to have adequate pools and riffles for natural reproduction of native species, but population sizes appear to be limited by low flows and high stream temperatures in late summer. Other than the limiting factor of water temperatures, water quality appears to be sufficient for supporting native species.

Fish surveys have documented an entirely native fishery, with self-supporting populations of speckled dace and mountain suckers. Colorado Parks and Wildlife reports that Colorado River Cutthroat Trout seasonally use the lower portion of the creek, based on fish fitted with radio transmitters that were detected during a previous fish movement study on Milk Creek. Spot surveys have revealed populations of caddisfly and mayfly. The creek supports a healthy riparian community comprised of narrow leaf cottonwood, willow, and alder.

R2Cross Analysis. The BLM collected the following R2Cross data from Clear Creek:

Cross Section Date	Discharge Rate	Top Width	Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)	Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)
5/24/2022 #1	8.74 cfs	21.32 feet	1.77 cfs	2.93 cfs
5/24/2022 #2	7.94 cfs	27.79 feet	3.00 cfs	6.66 cfs
Averages:			2.39 cfs	4.80 cfs

BLM's analysis of these data indicates that the following flows are needed to protect the natural environment to a reasonable degree.

4.80 cubic feet per second is recommended during the snowmelt runoff period from April 1 through June 30. This recommendation is driven by the average velocity criteria. This flow rate will ensure that pool and riffle habitat can be fully utilized during this high growth period.

1.3 cubic feet per second is recommended during the remainder of the year summer, from July 1 through March 31. This recommendation is limited by water availability. This flow rate comes very close to meeting both the wetted perimeter and average depth criteria. It should also maintain full and sufficiently cool pools during the summer when stream temperatures can still be high and provide sufficient water for passage between pools. During the winter, this flow rate should prevent icing of pools, allowing the fish population to overwinter.

Water Availability. BLM recommends using a variety of data sources to confirm water availability, because BLM is not aware of any historical gage data on this creek. Use of the CSUFlow18 regression model can provide an estimate of natural hydrology. The general pattern of streamflow in this watershed can be confirmed by consulting historical data from the Milk Creek near Thornburgh stream gage (USGS Gage 0925000, CDWR Gage MILTHOCO).

BLM is not aware of any decreed water rights within the proposed reach for an instream flow water right.

Relationship to Land Management Plans. BLM's management plan calls for actions to maintain and enhance habitat that supports fish species. Specifically, the BLM plan calls for making instream flow recommendations to the Colorado Water Conservation Board to meet minimum instream flow requirements to maintain fisheries. Finally, the plan calls for maintaining and improving the function of riparian areas to achieve advanced ecological stage for the riparian community, and it also calls for protecting riparian and wetland systems from activities that could degrade those habitats. Establishing an instream flow water right would assist in meeting these objectives.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2023. BLM thanks both Colorado

Parks and Wildlife and the Colorado Water Conservation Board for their cooperation in this effort.

If you have any questions regarding our instream flow recommendation, please contact Roy Smith at 303-239-3940.

Sincerely,

JOEL
HUMPHRIES

Digitally signed by
JOEL HUMPHRIES
Date: 2024.11.27
09:00:30 -07'00'

for

Alan Bittner
Deputy State Director
Resources

Cc:

Bill Mills, White River Field Office

James Michels, Acting District Manager, Northwest Colorado District Office

White River Field Office

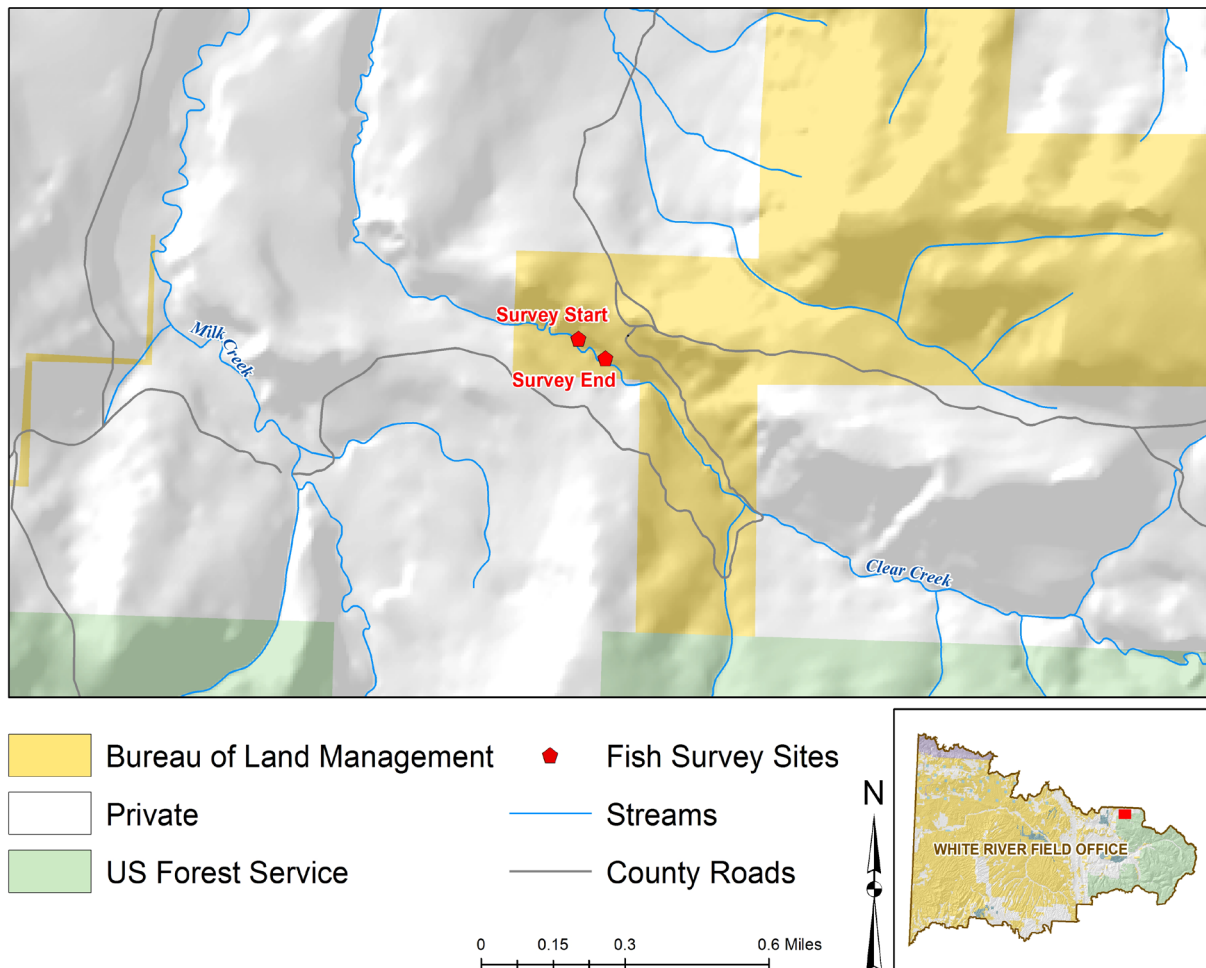
Stream Surveys June 2019

Clear Creek - Water Code #19825

Introduction:

Clear Creek located northeast of Meeker, Colorado on public lands managed by the BLM's White River Field Office was visited and sampled on June 28, 2019. Clear Creek is tributary to Milk Creek. The BLM reach of stream had not been previously sampled for fish. The objectives were to determine if fish were present and if so, determine the species composition, and obtain data on population status.

Map of Clear Creek Survey Site 2019



Methods:

Sampling was conducted using 2 backpack electro-shockers and backup netters and approximately 675' of stream was sampled via a one-pass effort to obtain relative abundance and species composition information. Personnel present were Jenn Logan's Crew, CPW and Tom Fresques and Josh Ryan, BLM.

Results:

Clear Creek at the sample location, contains Mountain Sucker, and Speckled Dace. These were the only fish species seen or collected. A population estimate was not calculated on Mountain Suckers as the data on individual fish was lost during upload from the tablet. Only species composition was determined.

Mountain Sucker**Discussion:**

Based on the limited sampling, Clear Creek at the sample site contains an all native fishery comprised of Mountain Sucker and Speckled Dace. Based on discussions with TU Biologist Brian Hodge, the lower portions of Clear Creek on private land below the BLM sample site have seasonally (Spring) contained Colorado River Cutthroat Trout that have moved up a short distance from Milk Creek. This is based on radio transmitter fitted fish detections as part of a previous movement study of Cutthroat Trout in Milk Creek. It is possible that the BLM reach of

stream is seasonally used by Cutthroat Trout, but additional sampling would be needed to confirm that.

Riparian vegetation is comprised primarily of overstory cottonwood trees with understory willow, alder, sedge, rush, and grasses. Vegetation is dense and provides good stream shading and cover. Stream habitats are comprised of a mix of riffles, small pools, and some runs. Stream substrate is a mix of gravels, cobbles, and larger rocks.

Stream flows are known to get low most years and the severe 2018 drought likely had some level of impact to stream flows, water temperatures, and the resident fishery. It is good to see that native fish persisted through that drought and are still present in the stream.

Speckled Dace



Recommendations:

- Because data and habitat photos were lost during upload from the tablet, resample the reach to obtain data to inform a population estimate on Mountain Sucker
- Consider additional sampling during the spring to try and detect Colorado River Cutthroat Trout within the BLM reach of Clear Creek
- Consider sampling further upstream on BLM to see if fish species composition changes



FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: <u>Clear Creek</u>		CROSS-SECTION NO: <u>1</u>
CROSS-SECTION LOCATION: <u>At upper BLM-private boundary - just below road crossing</u>		
DATE: <u>5-24-72</u>	OBSERVERS: <u>R. Smith, T. Fresques</u>	
LEGAL DESCRIPTION	1/4 SECTION: <u>SE</u>	SECTION: <u>31</u> TOWNSHIP: <u>30N</u> RANGE: <u>91E</u> PM: <u>6:44</u>
COUNTY: <u>Rio Blanco</u>	WATERSHED: <u>Milk Creek</u>	WATER DIVISION: <u>6</u> DOW WATER CODE:
MAP(S):	USGS: <u>UTMS = ZONE 13 E 274755</u> USFS: <u>N 4451553</u>	

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: <u>(YES)</u> /NO	METER TYPE: <u>M-M</u>			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: <u>surveyed</u> lbs/foot	TAPE TENSION: <u>surveyed</u> lbs
CHANNEL BED MATERIAL SIZE RANGE: <u>silt to 2-foot boulders</u>	PHOTOGRAPHS TAKEN: <u>(YES)</u> /NO	NUMBER OF PHOTOGRAPHS: <u>3</u>		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)	SKETCH	
(X) Tape @ Stake LB	0.0	<u>surveyed</u>		
(X) Tape @ Stake RB	0.0	<u>surveyed</u>		
(1) WS @ Tape LB/RB	0.0 <u>24.4</u>	<u>5.40 / 5.40</u>		
(2) WS Upstream	<u>21.5</u>	<u>5.14</u>		
(3) WS Downstream	<u>19.0</u>	<u>5.84</u>		
SLOPE	<u>0.70 / 40.5 = .0173</u>			

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: <u>(YES)</u> /NO	DISTANCE ELECTROFISHED _____ ft	FISH CAUGHT <u>(YES)</u> /NO	WATER CHEMISTRY SAMPLED <u>(YES)</u> /NO														
LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)																	
SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL
AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME																	
<u>too early for sampling</u>																	

COMMENTS

<u>pH = 8.44</u>	<u>CONDUCTIVITY = 181 μS</u>	<u>SAL = 0.1 ppt</u>	<u>11.5°C</u>
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DISCHARGE/CROSS SECTION NO. S

STREAM NAME:						CROSS-SECTION NO.	DATE	SHEET OF	
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE)							Gage Reading:	TIME
Features Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point Mean in Vertical	Area (ft ²) Discharge (cfs)
LS	0.0		3.52						
G	6.2		4.57						
	7.2		4.75						
	7.9		5.28						
	8.0		5.40						
	9.0		5.8	0.4				0.86	
	10.0		5.9	0.5				1.46	
	11.0		5.9	0.5				2.40	
	12.0		5.75	0.35				2.20	
	13.0		5.9	0.5				1.65	
	14.0		6.0	0.6				0.22	
	15.0		5.9	0.5				1.98	
	15.5		5.9	0.5				2.79	
	16.0		5.95	0.55				2.14	
	16.5		5.95	0.55				2.13	
	17.0		6.0	0.6				1.66	
	17.5		5.8	0.4				2.26	
	18.0		5.7	0.3				2.34	
	18.5		5.9	0.5				1.41	
	19.0		5.8	0.4				1.07	
	19.5		5.65	0.25				1.30	
	20.0		5.55	0.15				1.98	
	21.0		5.55	0.15				0.61	
	22.0		5.5	0.1				0.64	
	23.0		5.5	0.1				0.14	
TOTALS:									

End of Measurement	Time:	Gage Reading:	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:
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DISCHARGE/CROSS SECTION NOTES

[illegible]

R2Cross RESULTS

Stream Name: Clear Creek

Stream Locations: At upper BLM-private boundary - downstream from road crossing

Fieldwork Date: 05/24/2022

Cross-section: 1

Observers: R. Smith, T. Fresques

Coordinate System: UTM Zone 13

X (easting): 274755

Y (northing): 4451553

Date Processed: 06/20/2024

Slope: 0.0173

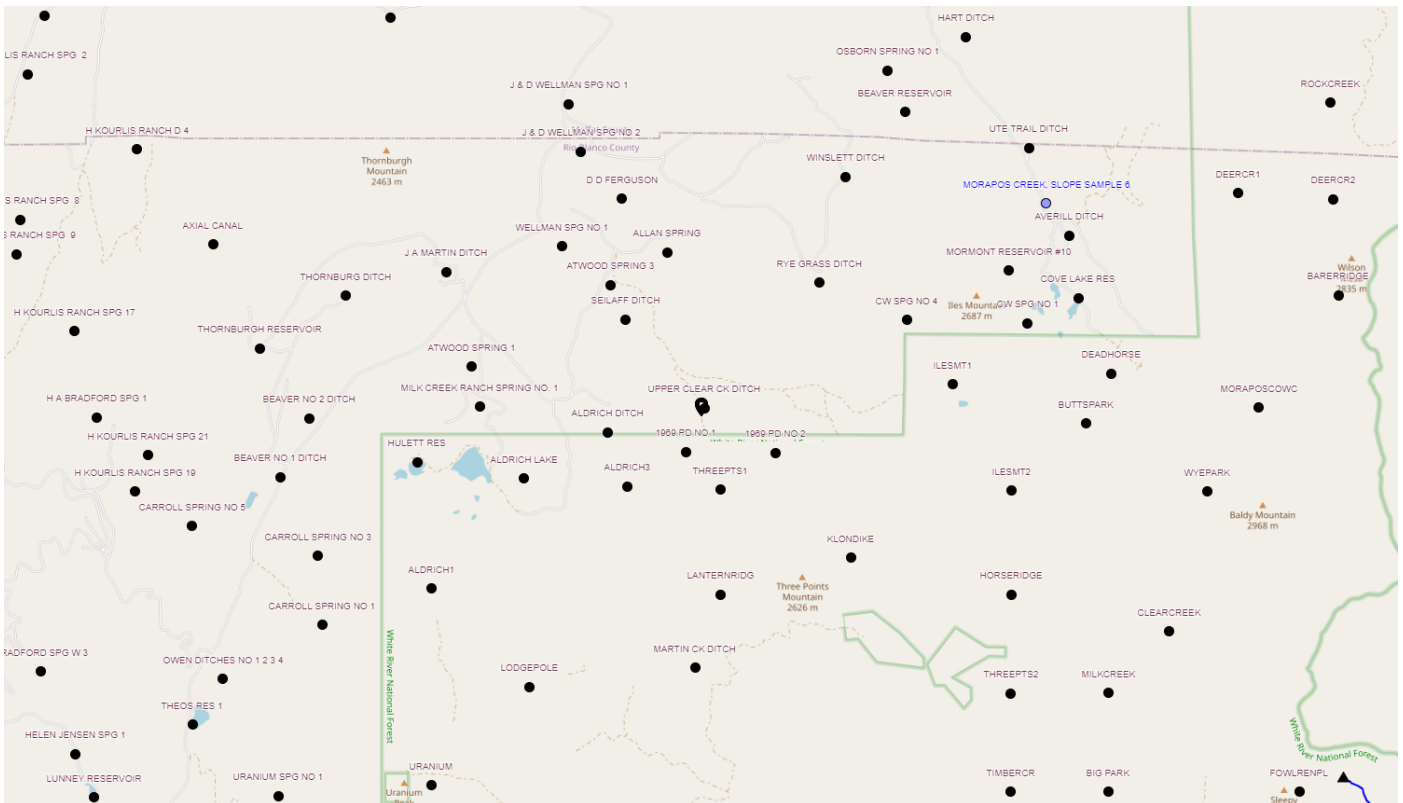
Discharge: R2Cross data file: 8.74 (cfs)

Computation method: Ferguson VPE

R2Cross data filename: Clear Creek near Thornburg 5-24-22 #1.xlsx

R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 21.32

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.77
Percent Wetted Perimeter (%)	50.0	1.71
Mean Velocity (ft/s)	1.0	2.93

STAGING TABLE

Feature	Distance to Water (ft)	Top Width (ft)	Mean Depth (ft)	Maximum Depth (ft)	Area (sq ft)	Wetted Perimeter (ft)	Percent Wetted Perimeter	Hydraulic Radius (ft)	Manning's n	Mean Velocity (ft/s)	Discharge (cfs)
Bankfull	4.57	21.32	1.01	1.43	21.56	22.0	100.0	0.98	0.04	4.92	106.02
	4.6	21.11	0.99	1.4	20.92	21.77	98.98	0.96	0.04	4.83	100.95
	4.65	20.75	0.96	1.35	19.88	21.39	97.27	0.93	0.04	4.67	92.77
	4.7	20.39	0.92	1.3	18.85	21.02	95.56	0.9	0.04	4.51	84.94
	4.75	20.04	0.89	1.25	17.84	20.64	93.85	0.86	0.04	4.34	77.45
	4.8	19.89	0.85	1.2	16.84	20.47	93.05	0.82	0.04	4.13	69.56
	4.85	19.75	0.8	1.15	15.85	20.29	92.25	0.78	0.04	3.91	62.04
	4.9	19.6	0.76	1.1	14.86	20.11	91.45	0.74	0.04	3.69	54.89
	4.95	19.46	0.71	1.05	13.89	19.94	90.65	0.7	0.04	3.47	48.13
	5.0	19.31	0.67	1.0	12.92	19.76	89.84	0.65	0.05	3.23	41.77
	5.05	19.17	0.62	0.95	11.96	19.59	89.04	0.61	0.05	3.0	35.82
	5.1	18.97	0.58	0.9	11.0	19.36	88.0	0.57	0.05	2.76	30.38
	5.15	18.54	0.54	0.85	10.06	18.91	85.98	0.53	0.05	2.56	25.74
	5.2	18.12	0.5	0.8	9.15	18.47	83.97	0.5	0.05	2.35	21.48
	5.25	17.7	0.47	0.75	8.25	18.03	81.95	0.46	0.05	2.14	17.62
	5.3	17.28	0.43	0.7	7.38	17.59	79.97	0.42	0.06	1.92	14.14
	5.35	16.64	0.39	0.65	6.53	16.92	76.93	0.39	0.06	1.72	11.26
Waterline	5.4	16.0	0.36	0.6	5.71	16.25	73.9	0.35	0.06	1.53	8.74
	5.45	15.38	0.32	0.55	4.93	15.62	71.0	0.32	0.07	1.33	6.55
	5.5	13.75	0.3	0.5	4.18	13.98	63.56	0.3	0.07	1.23	5.15
	5.55	11.63	0.3	0.45	3.52	11.84	53.85	0.3	0.07	1.22	4.31
	5.6	11.25	0.26	0.4	2.94	11.45	52.08	0.26	0.08	1.01	2.97
	5.65	10.88	0.22	0.35	2.39	11.07	50.31	0.22	0.09	0.79	1.9
	5.7	10.58	0.18	0.3	1.85	10.76	48.91	0.17	0.11	0.58	1.07
	5.75	9.92	0.14	0.25	1.34	10.06	45.73	0.13	0.13	0.4	0.53

5.8	8.58	0.1	0.2	0.88	8.69	39.49	0.1	0.16	0.27	0.23
5.85	6.92	0.07	0.15	0.49	6.99	31.76	0.07	0.21	0.16	0.08
5.9	3.75	0.05	0.1	0.19	3.79	17.21	0.05	0.28	0.09	0.02
5.95	1.63	0.03	0.05	0.04	1.64	7.47	0.02	0.51	0.03	0.0
5.99	0.49	0.01	0.01	0.0	0.49	2.24	0.01	1.38	0.01	0.0

This Manning's roughness coefficient was calculated based on velocity estimates from the Ferguson VPE method

MODEL SUMMARY

Measured Flow (Qm) =	8.74	(cfs)
Calculated Flow (Qc) =	8.74	(cfs)
$(Qm-Qc)/Qm * 100 =$	-0.01%	
Measured Waterline (WLm) =	5.4	(ft)
Calculated Waterline (WLc) =	5.4	(ft)
$(WLm-WLc)/WLm * 100 =$	0.00%	
Max Measured Depth (Dm) =	0.6	(ft)
Max Calculated Depth (Dc) =	0.6	(ft)
$(Dm-Dc)/Dm * 100 =$	-0.01%	
Mean Velocity =	1.53	(ft/s)
Manning's n =	0.064	
$0.4 * Qm =$	3.5	(cfs)
$2.5 * Qm =$	21.84	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	3.52		
Bankfull	6.2	4.57		
	7.2	4.75		
	7.9	5.28		
Waterline	8	5.4	0	0
	9	5.8	0.4	0.86
	10	5.9	0.5	1.46
	11	5.9	0.5	2.4
	12	5.75	0.35	2.2
	13	5.9	0.5	1.05
	14	6	0.6	0.22
	15	5.9	0.5	1.98
	15.5	5.9	0.5	2.79
	16	5.95	0.55	2.14
	16.5	5.95	0.55	2.13
	17	6	0.6	1.66
	17.5	5.8	0.4	2.26
	18	5.7	0.3	2.34
	18.5	5.9	0.5	1.41
	19	5.8	0.4	1.07
	19.5	5.65	0.25	1.3
	20	5.55	0.15	1.98
	21	5.55	0.15	0.61
	22	5.5	0.1	0.64
	23	5.5	0.1	0.14
Waterline	24	5.4	0	0
	25.2	5.3		
	26.7	5.09		
Bankfull	27.6	4.52		
	31.1	2.66		

COMPUTED FROM MEASURED FIELD DATA

Wetted Perimeter (ft)	Water Depth (ft)	Area (ft^2)	Discharge (cfs)	Percent Discharge
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
1.08	0.4	0.4	0.34	3.94
1	0.5	0.5	0.73	8.36
1	0.5	0.5	1.2	13.73
1.01	0.35	0.35	0.77	8.81
1.01	0.5	0.5	0.53	6.01
1	0.6	0.6	0.13	1.51
1	0.5	0.38	0.74	8.5
0.5	0.5	0.25	0.7	7.98
0.5	0.55	0.28	0.59	6.74
0.5	0.55	0.28	0.59	6.7
0.5	0.6	0.3	0.5	5.7
0.54	0.4	0.2	0.45	5.17
0.51	0.3	0.15	0.35	4.02
0.54	0.5	0.25	0.35	4.03
0.51	0.4	0.2	0.21	2.45
0.52	0.25	0.12	0.16	1.86
0.51	0.15	0.11	0.22	2.55
1	0.15	0.15	0.09	1.05
1	0.1	0.1	0.06	0.73
1	0.1	0.1	0.01	0.16
1	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

DISCLAIMER

"The Colorado Water Conservation Board makes no representations about the use of the software contained in the R2Cross platform for any purpose besides that for which it was designed. To the maximum extent permitted by applicable law, all information, modeling results, and software are provided "as is" without warranty or condition of any kind, including all implied warranties or conditions of merchantability, or fitness for a particular purpose. The user assumes all responsibility for the accuracy and suitability of this program for a specific application. In no event shall the Colorado Water Conservation Board or any state agency, official or employee be liable for any direct, indirect, punitive, incidental, special, consequential damages or any damages whatsoever including, without limitation, damages for loss of use, data, profits, or savings arising from the implementation, reliance on, or use of or inability to use the R2Cross platform.

R2Cross RESULTS

Stream Name: Clear Creek

Stream Locations: At upper BLM-private downstream from road crossing

Fieldwork Date: 05/24/2022

Cross-section: 2

Observers: R. Smith, T. Fresques

Coordinate System: UTM Zone 13

X (easting): 274797

Y (northing): 4451531

Date Processed: 06/20/2024

Slope: 0.0174

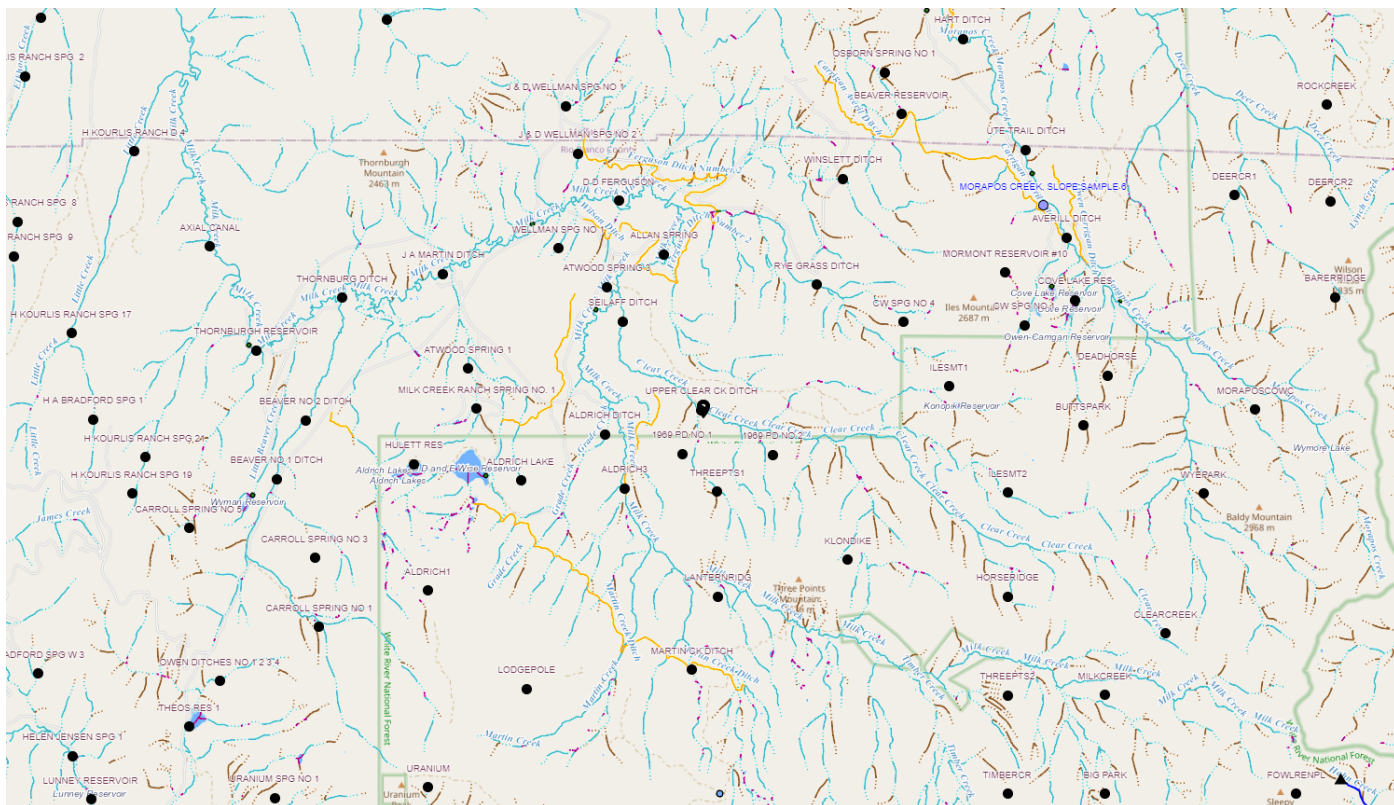
Discharge: R2Cross data file: 7.94 (cfs)

Computation method: Ferguson VPE

R2Cross data filename: Clear Creek near Thornburg 5-24-22 #2.xlsx

R2Cross version: 2.0.2

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 27.79

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.3	3.0
Percent Wetted Perimeter (%)	50.0	0.62
Mean Velocity (ft/s)	1.0	6.66

STAGING TABLE

Feature	Distance to Water (ft)	Top Width (ft)	Mean Depth (ft)	Maximum Depth (ft)	Area (sq ft)	Wetted Perimeter (ft)	Percent Wetted Perimeter	Hydraulic Radius (ft)	Manning's n	Mean Velocity (ft/s)	Discharge (cfs)
Bankfull	5.2	27.79	0.86	1.4	23.93	28.48	100.0	0.84	0.06	2.95	70.51
	5.2	27.79	0.86	1.4	23.93	28.48	100.0	0.84	0.06	2.95	70.51
	5.25	26.97	0.84	1.35	22.56	27.65	97.06	0.82	0.06	2.84	64.16
	5.3	26.15	0.81	1.3	21.23	26.81	94.12	0.79	0.06	2.74	58.2
	5.35	25.33	0.79	1.25	19.94	25.97	91.18	0.77	0.06	2.64	52.63
	5.4	24.51	0.76	1.2	18.7	25.13	88.24	0.74	0.06	2.54	47.42
	5.45	23.69	0.74	1.15	17.49	24.3	85.3	0.72	0.06	2.43	42.58
	5.5	22.87	0.71	1.1	16.33	23.46	82.35	0.7	0.07	2.33	38.08
	5.55	22.29	0.68	1.05	15.2	22.86	80.25	0.66	0.07	2.2	33.43
	5.6	21.72	0.65	1.0	14.1	22.27	78.17	0.63	0.07	2.07	29.12
	5.65	21.14	0.62	0.95	13.03	21.67	76.08	0.6	0.07	1.93	25.14
	5.7	20.57	0.58	0.9	11.98	21.08	74.0	0.57	0.07	1.79	21.49
	5.75	19.99	0.55	0.85	10.97	20.48	71.91	0.54	0.08	1.66	18.17
	5.8	19.42	0.51	0.8	9.98	19.89	69.83	0.5	0.08	1.52	15.16
	5.85	18.85	0.48	0.75	9.03	19.3	67.75	0.47	0.09	1.38	12.46
	5.9	18.27	0.44	0.7	8.1	18.7	65.66	0.43	0.09	1.24	10.05
Waterline	5.95	17.7	0.41	0.65	7.2	18.11	63.58	0.4	0.1	1.1	7.94
	6.0	17.37	0.36	0.6	6.32	17.76	62.37	0.36	0.1	0.94	5.97
	6.05	17.04	0.32	0.55	5.46	17.42	61.15	0.31	0.11	0.79	4.31
	6.1	16.71	0.28	0.5	4.62	17.07	59.94	0.27	0.13	0.64	2.95
	6.15	16.38	0.23	0.45	3.79	16.73	58.73	0.23	0.15	0.49	1.88
	6.2	16.05	0.19	0.4	2.98	16.38	57.51	0.18	0.18	0.36	1.07
	6.25	14.0	0.16	0.35	2.23	14.29	50.16	0.16	0.2	0.29	0.64
	6.3	13.16	0.12	0.3	1.55	13.41	47.1	0.12	0.25	0.18	0.28
	6.35	10.53	0.09	0.25	0.92	10.73	37.68	0.09	0.32	0.12	0.11

6.4	8.43	0.05	0.2	0.45	8.56	30.06	0.05	0.49	0.06	0.02
6.45	2.21	0.06	0.15	0.13	2.27	7.97	0.06	0.45	0.06	0.01
6.5	1.0	0.05	0.1	0.05	1.02	3.59	0.05	0.52	0.05	0.0
6.55	0.5	0.02	0.05	0.01	0.51	1.79	0.02	0.92	0.02	0.0
6.58	0.15	0.01	0.01	0.0	0.15	0.54	0.01	2.5	0.0	0.0

This Manning's roughness coefficient was calculated based on velocity estimates from the Ferguson VPE method

MODEL SUMMARY

Measured Flow (Qm) =	7.94	(cfs)
Calculated Flow (Qc) =	7.94	(cfs)
$(Qm-Qc)/Qm * 100 =$	0.00%	
Measured Waterline (WLm) =	5.95	(ft)
Calculated Waterline (WLc) =	5.95	(ft)
$(WLm-WLc)/WLm * 100 =$	-0.00%	
Max Measured Depth (Dm) =	0.65	(ft)
Max Calculated Depth (Dc) =	0.65	(ft)
$(Dm-Dc)/Dm * 100 =$	0.00%	
Mean Velocity =	1.1	(ft/s)
Manning's n =	0.096	
$0.4 * Qm =$	3.18	(cfs)
$2.5 * Qm =$	19.85	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	3.14		
Bankfull	2.5	5.05		
	3.2	5.55		
Waterline	3.7	5.95	0	0
	5	6.25	0.3	0.16
	6	6.2	0.25	0.55
	7	6.3	0.35	1.06
	8	6.6	0.65	0.93
	9	6.45	0.5	1.24
	10	6.45	0.5	0.25
	11	6.4	0.45	1.64
	12	6.45	0.5	1.3
	13	6.35	0.4	1.18
	13.5	6.35	0.4	0.94
	14	6.45	0.5	1.01
	14.5	6.45	0.5	1
	15	6.35	0.4	1.9
	15.5	6.45	0.5	1.19
	16	6.45	0.5	1.6
	16.5	6.2	0.25	0.75
	17	6.4	0.45	1.76
	17.5	6.5	0.55	1.61
	18	6.35	0.4	1.71
	18.5	6.5	0.55	1.35
	19	6.3	0.35	1.47
	19.5	6.35	0.4	1.46
	20	6.35	0.4	0.98
	20.5	6.35	0.4	0.45
Waterline	21.4	5.95	0	0
	26	5.5		

Bankfull	30.5	5.2
	34.7	1.96

COMPUTED FROM MEASURED FIELD DATA

Wetted Perimeter (ft)	Water Depth (ft)	Area (ft^2)	Discharge (cfs)	Percent Discharge
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
1.33	0.3	0.34	0.06	0.7
1	0.25	0.25	0.14	1.73
1	0.35	0.35	0.37	4.67
1.04	0.65	0.65	0.6	7.61
1.01	0.5	0.5	0.62	7.81
1	0.5	0.5	0.12	1.57
1	0.45	0.45	0.74	9.29
1	0.5	0.5	0.65	8.19
1	0.4	0.3	0.35	4.46
0.5	0.4	0.2	0.19	2.37
0.51	0.5	0.25	0.25	3.18
0.5	0.5	0.25	0.25	3.15
0.51	0.4	0.2	0.38	4.79
0.51	0.5	0.25	0.3	3.75
0.5	0.5	0.25	0.4	5.04
0.56	0.25	0.12	0.09	1.18
0.54	0.45	0.23	0.4	4.99
0.51	0.55	0.28	0.44	5.58
0.52	0.4	0.2	0.34	4.31
0.52	0.55	0.28	0.37	4.68
0.54	0.35	0.17	0.26	3.24
0.5	0.4	0.2	0.29	3.68
0.5	0.4	0.2	0.2	2.47
0.5	0.4	0.28	0.13	1.59
0.98	0	0	0	0
0	0	0	0	0

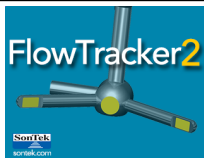
0	0	0	0	0
0	0	0	0	0

DISCLAIMER

"The Colorado Water Conservation Board makes no representations about the use of the software contained in the R2Cross platform for any purpose besides that for which it was designed. To the maximum extent permitted by applicable law, all information, modeling results, and software are provided "as is" without warranty or condition of any kind, including all implied warranties or conditions of merchantability, or fitness for a particular purpose. The user assumes all responsibility for the accuracy and suitability of this program for a specific application. In no event shall the Colorado Water Conservation Board or any state agency, official or employee be liable for any direct, indirect, punitive, incidental, special, consequential damages or any damages whatsoever including, without limitation, damages for loss of use, data, profits, or savings arising from the implementation, reliance on, or use of or inability to use the R2Cross platform.

Discharge Measurment Field Visit Data Report (Filters: Name begins with Clear Creek; Division = 6;)

Div	Name	CWCB Case Number	Segment ID	Meas. Date	UTM	Location	Flow Amount (cfs)	Meas #	Rating	Station ID
6	Clear Creek	24/6/A-008	24/6/A-008	05/16/2024	UTMx: 274817 UTMy: 4451535	Clear Creek above confluence with Milk Creek	26.01	1	3	



Discharge Measurement Summary

Site name Clear cr abv milk cr d6
Site number 05162024C
Operator(s) Lfsc
File name Clear cr abv milk cr d6_20240516-100233.ft
Comment

Start time	5/16/2024 9:43 AM	Sensor type	Top Setting
End time	5/16/2024 10:01 AM	Handheld serial number	FT2H2322005
Start location latitude	40.184	Probe serial number	FT2P2317010
Start location longitude	-107.645	Probe firmware	1.30
Calculations engine	FlowTracker2	Handheld software	1.7

# Stations	Avg interval (s)	Total discharge (ft ³ /s)
27	40	26.0116

Total width (ft)	Total area (ft ²)	Wetted Perimeter (ft)
18.900	13.8340	19.272

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
53	0.732	1.8803

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
41.570	1.000	3.7120

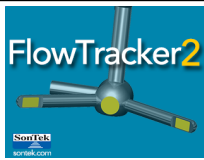
Discharge Uncertainty		
Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.3%	2.9%
Velocity	1.3%	9.6%
Width	0.1%	0.1%
Method	1.7%	
# Stations	1.9%	
Overall	3.0%	10.1%

Discharge equation	Mid Section
Discharge uncertainty	IVE
Discharge reference	Rated

Data Collection Settings	
Salinity	0.000 PSS-78
Temperature	-
Sound speed	-
Mounting correction	0.000 %

Summary overview

No changes were made to this file
Quality control warnings



Discharge Measurement Summary

Site name Clear cr abv milk cr d6
Site number 05162024C
Operator(s) Lfsc
File name Clear cr abv milk cr d6_20240516-100233.ft
Comment

Station Warning Settings

Station discharge OK

Station discharge < 5.00%

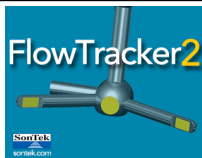
Station discharge caution

5.00% >= Station discharge < 10.00%

Station discharge warning

Station discharge >= 10.00%

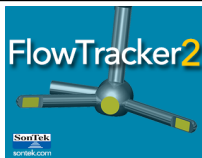




Discharge Measurement Summary

Site name Clear cr abv milk cr d6
Site number 05162024C
Operator(s) Lfsc
File name Clear cr abv milk cr d6_20240516-100233.ft
Comment

Measurement results													
St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correcti on	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q
26	10:01 AM	8.400	None	0.640	0.0000	0.000	0	0.0000	1.0000	0.6152	0.1920	0.1181	0.45 ✓
25	10:00 AM	9.000	0.6	0.780	0.6000	0.468	45	0.6152	1.0000	0.6152	0.8190	0.5039	1.94 ✓
24	9:59 AM	10.500	0.6	0.860	0.6000	0.516	34	1.4559	1.0000	1.4559	1.0750	1.5651	6.02 ✓
23	9:59 AM	11.500	0.6	1.000	0.6000	0.600	12	0.4849	1.0000	0.4849	1.0000	0.4849	1.86 ✓
22	9:58 AM	12.500	0.6	0.650	0.6000	0.390	15	3.4392	1.0000	3.4392	0.6500	2.2355	8.59 ✓
21	9:57 AM	13.500	0.6	0.750	0.6000	0.450	19	2.6010	1.0000	2.6010	0.5625	1.4630	5.62 ✓
20	9:57 AM	14.000	0.6	0.800	0.6000	0.480	24	1.3880	1.0000	1.3880	0.4000	0.5552	2.13 ✓
19	9:56 AM	14.500	0.6	0.800	0.6000	0.480	24	1.2296	1.0000	1.2296	0.4000	0.4918	1.89 ✓
18	9:55 AM	15.000	0.6	0.600	0.6000	0.360	23	2.1260	1.0000	2.1260	0.3000	0.6378	2.45 ✓
17	9:54 AM	15.500	0.6	0.880	0.6000	0.528	42	1.0660	1.0000	1.0660	0.4400	0.4690	1.80 ✓
16	9:53 AM	16.000	0.6	1.000	0.6000	0.600	13	3.7120	1.0000	3.7120	0.5000	1.8560	7.14 ✓
15	9:53 AM	16.500	0.6	1.000	0.6000	0.600	16	1.3978	1.0000	1.3978	0.5000	0.6989	2.69 ✓
14	9:52 AM	17.000	0.6	0.900	0.6000	0.540	37	2.1710	1.0000	2.1710	0.4500	0.9769	3.76 ✓
13	9:52 AM	17.500	0.6	0.950	0.6000	0.570	13	3.4542	1.0000	3.4542	0.4750	1.6408	6.31 ✓
12	9:51 AM	18.000	0.6	1.000	0.6000	0.600	14	3.6179	1.0000	3.6179	0.5000	1.8089	6.95 ✓
11	9:50 AM	18.500	0.6	1.000	0.6000	0.600	33	2.8981	1.0000	2.8981	0.5000	1.4491	5.57 ✓
10	9:50 AM	19.000	0.6	0.950	0.6000	0.570	23	2.7563	1.0000	2.7563	0.4750	1.3092	5.03 ✓
9	9:48 AM	19.500	0.6	0.800	0.6000	0.480	30	2.4288	1.0000	2.4288	0.4000	0.9715	3.73 ✓
8	9:47 AM	20.000	0.6	0.770	0.6000	0.462	20	1.6748	1.0000	1.6748	0.5775	0.9672	3.72 ✓
7	9:47 AM	21.000	0.6	0.740	0.6000	0.444	16	1.8637	1.0000	1.8637	0.7400	1.3791	5.30 ✓
6	9:46 AM	22.000	0.6	0.600	0.6000	0.360	29	1.4401	1.0000	1.4401	0.6000	0.8640	3.32 ✓
5	9:46 AM	23.000	0.6	0.600	0.6000	0.360	13	2.2841	1.0000	2.2841	0.6000	1.3704	5.27 ✓
4	9:45 AM	24.000	0.6	0.700	0.6000	0.420	13	1.9830	1.0000	1.9830	0.5250	1.0411	4.00 ✓
3	9:45 AM	24.500	0.6	0.700	0.6000	0.420	14	1.3804	1.0000	1.3804	0.3500	0.4831	1.86 ✓
2	9:44 AM	25.000	0.6	0.500	0.6000	0.300	12	1.5876	1.0000	1.5876	0.5000	0.7938	3.05 ✓
1	9:43 AM	26.500	0.6	0.260	0.6000	0.156	16	-0.4057	1.0000	-0.4057	0.2990	-0.1213	-0.47 ✓
0	9:43 AM	27.300	None	0.010	0.0000	0.000	0	0.0000	1.0000	-0.4057	0.0040	-0.0016	-0.01 ✓



Discharge Measurement Summary

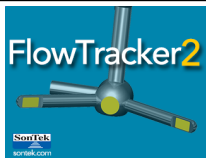
Site name Clear cr abv milk cr d6
Site number 05162024C
Operator(s) Lfsc
File name Clear cr abv milk cr d6_20240516-100233.ft
Comment

Quality Control Settings

Maximum depth change 50.00%
Maximum spacing change 100.00%
SNR threshold 10 dB
Standard error threshold 0.0328 ft/s
Spike threshold 10.00%
Maximum velocity angle 20.0 deg
Maximum tilt angle 5.0 deg

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
24	9:59 AM	10.500	0.6	0.860	0.6000	0.516	Standard Error > QC
23	9:59 AM	11.500	0.6	1.000	0.6000	0.600	Standard Error > QC, Velocity Angle > QC
22	9:58 AM	12.500	0.6	0.650	0.6000	0.390	Standard Error > QC
21	9:57 AM	13.500	0.6	0.750	0.6000	0.450	Standard Error > QC
20	9:57 AM	14.000	0.6	0.800	0.6000	0.480	Standard Error > QC, Velocity Angle > QC
19	9:56 AM	14.500	0.6	0.800	0.6000	0.480	Standard Error > QC, Velocity Angle > QC
18	9:55 AM	15.000	0.6	0.600	0.6000	0.360	Standard Error > QC, Velocity Angle > QC
17	9:54 AM	15.500	0.6	0.880	0.6000	0.528	Standard Error > QC
16	9:53 AM	16.000	0.6	1.000	0.6000	0.600	Standard Error > QC
15	9:53 AM	16.500	0.6	1.000	0.6000	0.600	Standard Error > QC
14	9:52 AM	17.000	0.6	0.900	0.6000	0.540	Standard Error > QC
13	9:52 AM	17.500	0.6	0.950	0.6000	0.570	Standard Error > QC
12	9:51 AM	18.000	0.6	1.000	0.6000	0.600	Standard Error > QC
11	9:50 AM	18.500	0.6	1.000	0.6000	0.600	Standard Error > QC, Velocity Angle > QC
10	9:50 AM	19.000	0.6	0.950	0.6000	0.570	Standard Error > QC, Velocity Angle > QC
9	9:48 AM	19.500	0.6	0.800	0.6000	0.480	Standard Error > QC, Velocity Angle > QC
8	9:47 AM	20.000	0.6	0.770	0.6000	0.462	Standard Error > QC
7	9:47 AM	21.000	0.6	0.740	0.6000	0.444	Standard Error > QC
6	9:46 AM	22.000	0.6	0.600	0.6000	0.360	Standard Error > QC
5	9:46 AM	23.000	0.6	0.600	0.6000	0.360	Standard Error > QC
4	9:45 AM	24.000	0.6	0.700	0.6000	0.420	Standard Error > QC
3	9:45 AM	24.500	0.6	0.700	0.6000	0.420	Standard Error > QC
2	9:44 AM	25.000	0.6	0.500	0.6000	0.300	Standard Error > QC
1	9:43 AM	26.500	0.6	0.260	0.6000	0.156	Velocity Angle > QC



Discharge Measurement Summary

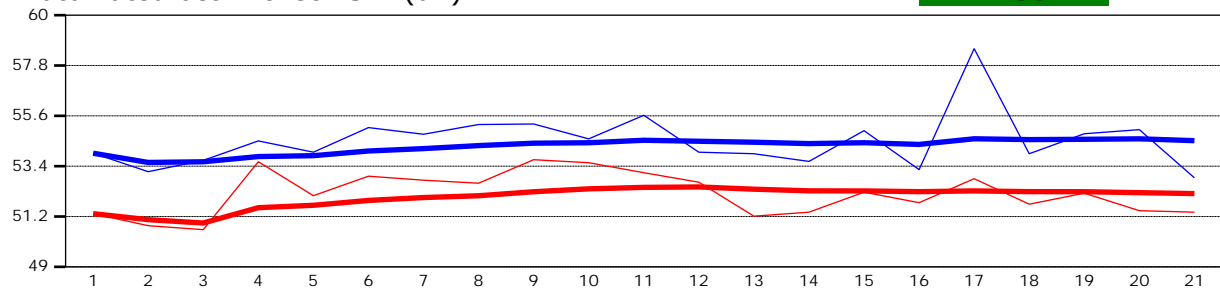
Site name Clear cr abv milk cr d6
Site number 05162024C
Operator(s) Lfsc
File name Clear cr abv milk cr d6_20240516-100233.ft
Comment

Beam 1	
Beam 2	

Automated beam check Start time 5/16/2024 9:43:05 AM

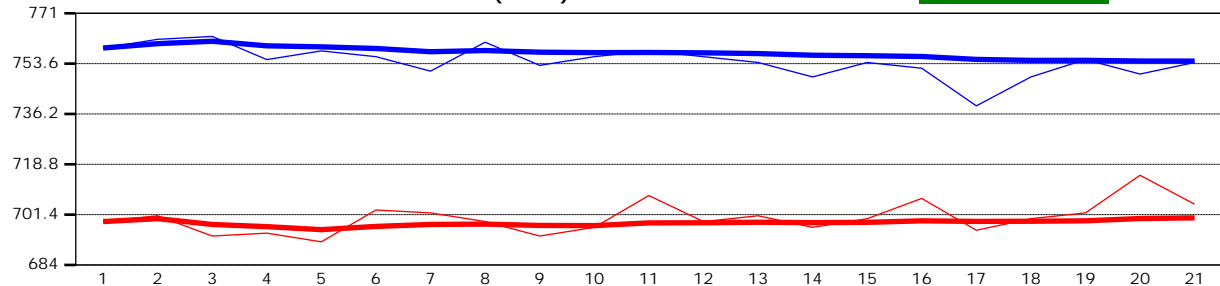
Automated beam check SNR(dB)

PASS



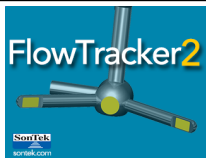
Automated beam check Noise level(cnts)

PASS



Automated beam check Quality control warnings

No quality control warnings



Discharge Measurement Summary

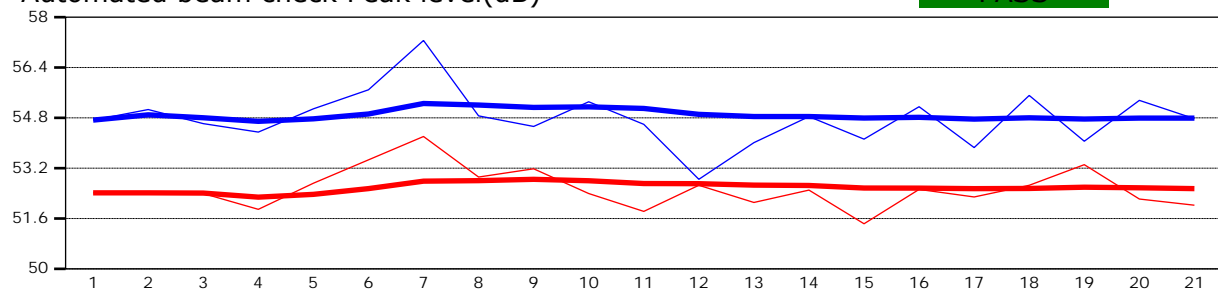
Site name Clear cr abv milk cr d6
Site number 05162024C
Operator(s) Lfsc
File name Clear cr abv milk cr d6_20240516-100233.ft
Comment

Beam 1	
Beam 2	

Automated beam check Start time 5/16/2024 9:43:05 AM

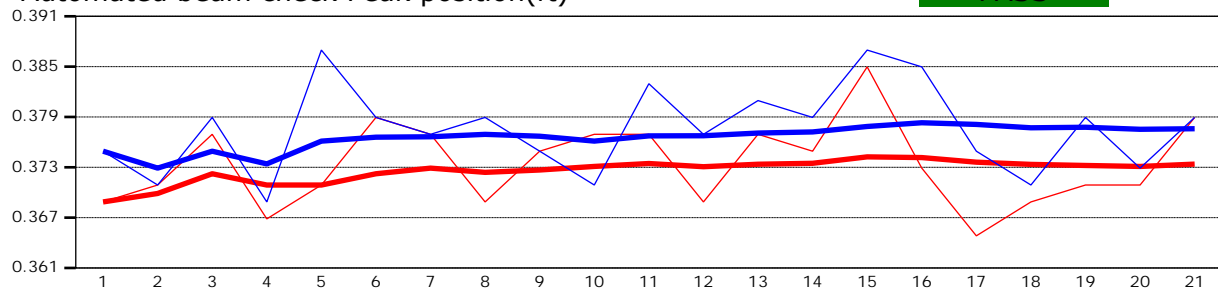
Automated beam check Peak level(dB)

PASS



Automated beam check Peak position(ft)

PASS



Automated beam check Quality control warnings

No quality control warnings



