COLORADO
Parks and Wildlife
Department of Natural Resources

Water Resources Section
6060 Broadway
Denver, CO 80216

November 1, 2024

Mr. Rob Viehl, Section Chief
Colorado Water Conservation Board
Stream and Lake Protection Section
1313 Sherman Street, 7th Floor
Denver, CO 80203

Subject: Instream Flow Recommendation for East Fork Dry Creek in Water Division 4, Ouray County to be presented at the January 2025 CWCB Meeting

Dear Mr. Viehl:

The information contained within and referred to in this letter forms the scientific and biological basis for an instream flow (ISF) recommendation on East Fork Creek in Water Division 4. Field investigations relating to this ISF recommendation were initiated by CPW staff in 2019. In 2022, Colorado Parks and Wildlife (CPW) and Colorado Water Conservation Board (CWCB) staff completed data collection. East Fork Dry Creek is a first order stream that supports native Colorado River cutthroat trout. This ISF recommendation was first presented to interested parties at the ISF Workshop in January 2020. CPW and CWCB staff conducted outreach to the Ouray County Commissioners in 2024. It is CPW staff's opinion that the information contained in this letter is sufficient for the CWCB's staff to recommend an ISF appropriation to the Board on East Fork Dry Creek as it specifically addresses the findings required in Rule 5(i) of the Instream Flow Program Rules.

CPW participates in the ISF Program and develops ISF recommendations for the Board's consideration in an effort to address CPW's legislative directives "… that the wildlife and their environment are to be protected, preserved, enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its visitors … and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilities for wildlife-related opportunities" [§33-1-101 (1) C.R.S.], and "… that the natural, scenic, scientific, and outdoor recreation areas … be protected, preserved, enhanced and managed for the use, benefit, and enjoyment of the people of this state and (its) visitors … and that, to carry out such program and policy, there shall be a continuous operation of acquisition, development, and management of … lands, waters, and facilities." [§33-10-101 (1) C.R.S.].

In addition to these broad statutory guidelines, CPW's strategic planning document (CPW Strategic Plan, 2015) explains the agency's current goals to, "[c]onserve wildlife and habitat to ensure healthy sustainable populations and ecosystems" in order to, "protect and enhance water resources for fish and wildlife populations," by pursuing, "partnerships and agreements to enhance instream flows,

protect reservoir levels, and influence water management activities," and to, "[a]dvocate for water quality and quantities to conserve aquatic resources." In addition to the CPW Strategic Plan, the agency's fish and wildlife conservation activities are also informed by the State Wildlife Action Plan (2002, Revised 2015). The aforementioned documents direct CPW to advocate for the preservation of the state's fish and wildlife resources and natural environment, and therefore link CPW's mission to the goals and priorities of CWCB's Instream Flow and Natural Lake Level Program.

Recommended Segments & Land Status

CPW is proposing an ISF recommendation on East Fork Dry Creek from the headwaters (located at UTM 12S 225416.86 4245723.89) to the confluence with Beaver Dams Creek (located at UTM 12S 229778.94 4246758.01). The reach is approximately 3.1 miles in length. The upper portion of the proposed reach is on public land managed under the Uncompahgre National Forest. There are approximately 1.7 miles of East Fork Dry Creek under private land ownership toward the lower terminus of the proposed ISF reach.

Colorado Cutthroat Trout Conservation Goals

In 2001, CPW entered into a multi-state and multi-agency conservation agreement and strategy concerning Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*). Colorado's partners in this plan and agreement include the natural resource management agencies from Utah and Wyoming, a number of federal agencies including the USFS, USFWS, BLM and NPS, and the Ute Indian Tribe of the Uintah and Ouray Reservation. The purpose of the strategy is to provide a framework for the long-term conservation of the Colorado River cutthroat trout (CRCT), and to reduce or eliminate the threats that warrant its status as a sensitive species or species of concern by federal resource agencies. Essentially, the parties agreed that in order to prevent listing of the subspecies, and to reach desired recovery goals without hindering further development of our state resources, continued implementation of the conservation strategy was necessary.

The objectives of the strategy are to identify and characterize all CRCT core and conservation populations, secure and enhance conservation populations, restore populations, secure and enhance watershed conditions, public outreach, data sharing, and coordination. CPW believes that flow protection can be achieved by establishing an ISF water right, and this step is a conservation action that will "secure and enhance watershed conditions" and will support the core conservation populations of CRCT which are resident to the East Fork Dry Creek basin. Information about the species and CPW's conservation strategy can be found here: CPW Cutthroat Trout Research. CPW believes that securing ISF water rights for core conservation populations of CRCT is a critical step in the overall preservation of these important native trout.

Natural Environment and Biological Summary

East Fork Dry Creek is a tributary of the Uncompahgre River which flows easterly off the Uncompahgre Plateau towards the town of Montrose. East Fork Dry Creek is a first order headwater stream that is snow-melt dominated and influenced by late-summer monsoonal events. The mean basin elevation is approximately 9,200 feet. The basin receives approximately 27 inches of precipitation a year. The drainage basin contributing to the ISF reach is approximately 5.7 square miles. It is forested with dense stands of pine and some interspersed aspen stands. The creek supports a healthy riparian community. Willows and skunk cabbage were observed in the field.

East Fork Dry Creek is a relatively high-gradient channel with substrate that ranges from small cobble to gravel and sand. Fish habitat in East Fork Dry Creek is complex and includes significant large woody debris in the channel creating deep pools. Log-jams are plentiful throughout the ISF reach which create both pools and long runs. These refuge habitats support fish when flows are periodically low following runoff. Ample overhead shading provides cover and temperature buffering. The creek also supports a healthy riparian area and a diverse macroinvertebrate community. Macroinvertebrates observed in the field include stonefly, case-making caddisfly, midge, and water beetle.

East Fork Dry Creek supports a self-sustaining population of Colorado River cutthroat trout of the Gunnison Basin lineage. CRCT are state species of special concern and considered federally sensitive species (State Wildlife Action Plan, 2015). Length-frequency data indicates multiple age classes surveyed by CPW in 2017 (see attached), which reinforces that the cutthroat trout in East Fork Dry Creek are a self-sustaining population. Multiple cutthroat trout were observed during 2020 and 2022 site visits.

R2Cross Background

Initial biological instream flow recommendations were developed using the R2Cross methodology (Espegren, 1996[1]). R2Cross uses field data that has been collected in a riffle habitat type. Riffles are often the limiting habitat features in streams during low flow events, so maintaining specific hydraulic conditions across riffle habitat types will also maintain aquatic habitat in pools and runs for most life stages of fish and macroinvertebrates (Nehring, 1979[2]). The R2Cross model uses field data, including a survey of cross-sectional channel geometry, a longitudinal slope of the water surface, and a flow measurement, as input to a single transect hydraulic model. R2Cross uses Ferguson's Variable-Power Equation (Ferguson, 2007[3]) to model a stage-discharge relationship and compute corresponding hydraulic parameters of average depth, average velocity, and percent wetted perimeter over modeled stages. Maintaining these three hydraulic parameters at specified levels should ensure conditions that allow movement of fish longitudinally across riffles and adequate depths, velocities, and oxygenation for production of macroinvertebrates and development of trout eggs. Baseflow recommendations are typically developed based on the flows that meet two of three hydraulic criteria and summer flow recommendations are based on hydraulic criteria that meet three of three hydraulic criteria (as described in Nehring 1979 and Espergren 1996).

In 2020 and 2022, CPW and CWCB staff conducted site visits and collected R2Cross datasets on EF Dry Creek. Two cross-sectional datasets from 2020 were not included in preliminary flow recommendations because it was an extremely dry year and streamflow was too low for an accurate flow measurement. The preliminary results of the R2Cross analysis are summarized below using one cross-section from 2022.

[1]Espegren, G.D., 1996, Development of Instream Flow Recommendations in Colorado Using R2CROSS, Colorado Water Conservation Board.

[2]Nehring, B.R., 1979, Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Streams in the State of Colorado, Colorado Division of Wildlife.

[3] Ferguson, R.I., 2007. Flow resistance equations for gravel- and boulder-bed streams. Water Resources Research 43. https://doi.org/10.1029/2006WR005422

	Bankfull Top Width	Date Measured	Flow Measured	Flow Meeting Two Criteria	Flow Meeting Three Criteria
3	14.48 ft	5/26/2022	1.49 cfs	1.8 cfs	2.5 cfs
Recommended Flow Rates:				**1.8 cfs**	**2.5 cfs**

The biological flow recommendation during the baseflow period is 1.8 cfs. This rate will be protective by maintaining an average depth of 0.2 and 50 percent wetted perimeter. The biological flow recommendation in the summer is 2.5 cfs, which will also maintain suitable depth and wetted perimeter, as well as a velocity of 1 foot per second (fps) on average.

In order to make a preliminary determination whether water is available for the R2Cross-based flow recommendations and to determine the appropriate seasonal transition dates, CPW examined basic hydrologic data and water rights information for East Fork Dry Creek. East Fork Dry Creek does not have any gage data, and because it is high-elevation and undeveloped, CWCB staff relied upon regression equations for monthly flow estimates to determine the seasonality of the flow recommendations. CPW is not aware of the any active water rights within the ISF reach.

Water Availability

CPW's analysis indicates that the following flows are needed to protect the natural environment to a reasonable degree. Based on the hydrology from CSUFlow18 (Eurich et al., 2021[4]), there appears to be water availability limitations during the fall and winter periods. Therefore, CPW's adjusted flow recommendations are the following:

- Early Spring Flow Recommendation (March 1 through March 31): **1.5 cfs**
    - Earlier spring snowmelt may be a reality in a changing climate. This flow recommendation will support sufficient wetted perimeter and depth as fish transition to more metabolic activity as they come out of overwintering conditions with warming spring temperatures.
- Spring and Summer Flow Recommendation (April 1 through July 31): **2.5 cfs**
    - Maintains adequate depth, velocity, and wetted perimeter from the start of spring snowmelt through its recession and into late-summer flow conditions. This flow rate will support fish when they are most active and will provide refuge areas when stream temperatures are high following spring runoff. This higher flow rate also supports beneficial spawning conditions for cutthroat trout who spawn in the spring to early summer. It will also allow for streamflow conditions which support feeding and growth.
- Late Summer and Fall Flow Recommendation (August 1 through October 31): **1.2 cfs**
    - This flow recommendation has been reduced due to water availability constraints but will provide sufficient wetted perimeter and habitat availability in pools and glides and may allow fish movement between most riffles.
- Baseflow Recommendation (November 1 through February 28): **0.6 cfs**

[4] Eurich, A., Kampf, S.K., Hammond, J.C., Ross, M., Willi, K., Vorster, A.G. and Pulver, B., 2021, Predicting mean annual and mean monthly streamflow in Colorado ungauged basins, River Research and Applications, 37(4), 569-578.

- This flow recommendation has been reduced due to water availability constraints but will provide sufficient wetted perimeter and refuge habitat is deep pools and glides, especially those holding habitats created from large woody debris in the channel.

The purpose of this letter is to formally transmit this ISF recommendation to CWCB for their Board's consideration. Based on CPW's opinion that there is a flow-dependent natural environment in East Fork Dry Creek Creek that can be preserved to a reasonable degree with an ISF water right in the recommended rates. Please refer to attachments which include; R2Cross field forms, R2Cross output, fish survey information, and photographs at each cross section location.

CPW personnel will be available at the January 2025 CWCB meeting to answer any questions that the Board might have regarding these flow recommendations. We appreciate your consideration.

Sincerely,

Katie Birch
CPW Instream Flow Program Coordinator
Attachments (as stated)

Length Weight Frequency

Water **48618** **Dry Creek, East Fork** Date **8/9/2017**

Station **GU2329** **2.1 Km BLW Hdwtrs**

Drainage **Gunnison River** UtmX **227308** UtmY **4243890** Elevation **2799 m**

Length **143 m** Width Area

Surveyors **Gardunio, Palmer, Temple**

Gear **BPEF LR-24** Effort Metric **PASS** Protocol **TWO-PASS REMOVAL**

Total catch

Species	Count	Length (mm)	Weight (gm)	Status	Mark	Tag ID	Habitat
CRN	1	94		1			
CRN	1	150		1	W		
CRN	1	175		1			
CRN	1	143		1			
CRN	1	140		1			
CRN	1	122		1			
CRN	1	84		1			
CRN	1	184		1			
CRN	1	104		1			
CRN	1	109		1			
CRN	1	115		1			
CRN	1	115		1			
CRN	1	74		1			
CRN	1	150		1			
CRN	1	144		1			
CRN	1	100		2	W		
CRN	1	140		2	W		

Length Weight Frequency

Water **48618** **Dry Creek, East Fork** Date **8/9/2017**

Station **GU2329** **2.1 Km BLW Hdwtrs**

Species	Count	Length (mm)	Weight (gm)	Status	Mark	Tag ID	Habitat
CRN	1	118		2	W		
CRN	1	104		2	W		
CRN	1	104		2			

Notes: Possible RXN, had white fin tips, otherwise looked great. Two pass depletion. Pass 1 (P1) was 1382 seconds and Pass 2 (P2) was 1076 seconds. The total effort was 40.96 minutes. W in mark column indicates fish that had white fin tips.

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: East Fork Dry Creek					CROSS-SECTION NO.: 22-3
CROSS-SECTION LOCATION: Near private property boundary UTM 12S 751916 4245369					
DATE: 5/26/22	OBSERVERS: Birch Fields - Sommers				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY:	WATERSHED:		WATER DIVISION:		DOW WATER CODE:
MAP(S):	USGS:				
	USFS:				

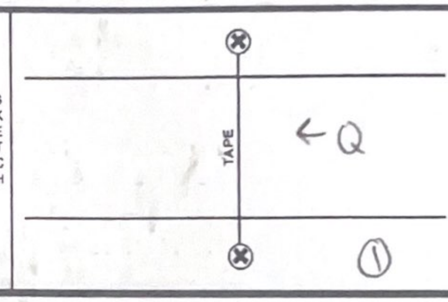
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / (NO)	METER TYPE: F2 . KB taken in u/s glide			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ______ sec	TAPE WEIGHT: ______ lbs/foot	TAPE TENSION: ______ lbs
CHANNEL BED MATERIAL SIZE RANGE: large cobble to large gravel		PHOTOGRAPHS TAKEN: (YES)/NO		NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	X
⊗ Tape @ Stake RB	0.0	X
① WS @ Tape LB/RB	0.0	7.49 / 7.52
② WS Upstream	Δ18.3	7.27
③ WS Downstream		7.88
SLOPE		

SKETCH



LEGEND:

Stake ⊗

Station ①

Photo ◇→

Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED: ______ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/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:

COMMENTS

Signs of beaver. Somewhat cloudy, cool water. Slightly turbulent water
Sandy sections Cobbles to small boulders, Plethroa woody debri
Blue sk, light breeze ~60°F air temp Tricop & [illegible] sp. Mayfly
Q = 1.49 ↑ caddisfly

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO.:	DATE:	SHEET ___ OF ___

BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME:

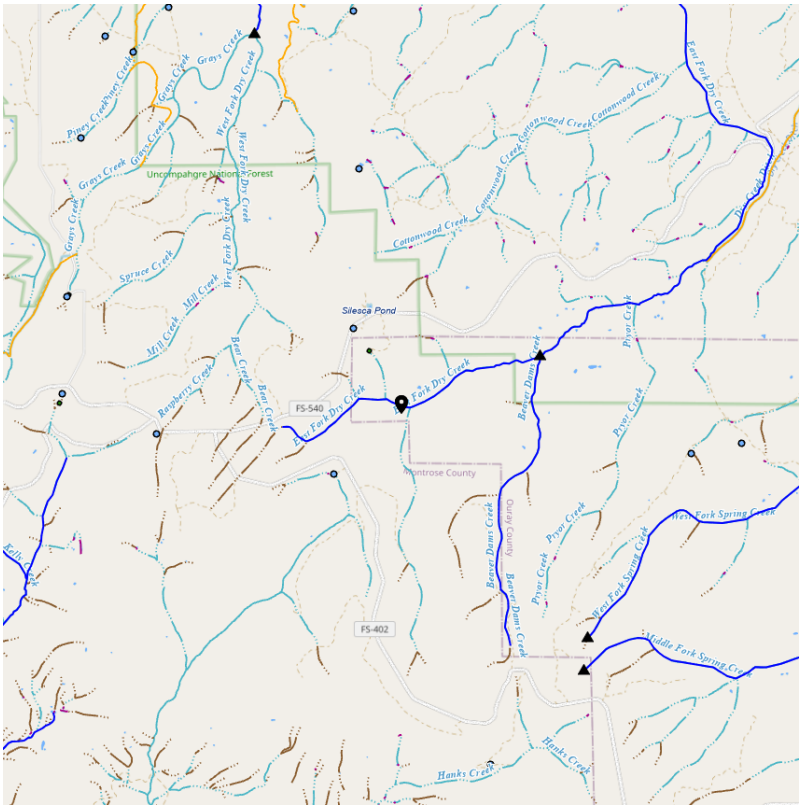
Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft²)	Discharge (cfs)
	2		6.58								
	4.8		6.54								
BF	5.0		6.84								
WS	6.9		7.50								
	7.0		7.54		0.04						
	7.5		7.62		0.16						
	8.0		7.62		0.16						
	8.5		7.62		0.16						
1:1 depositional feat.	9.0		7.48		0.0						
	9.5		7.58		0.13						
	10		7.57		~~0.70~~ ~0.07 [illegible]						
	10.5		7.71		0.38						
	11		7.64		0.21						
	11.5		7.60		0.20						
	12		7.50		0.08						
	12.5		7.51		0.06						
	13		7.51		0.08						
	13.5		7.60		0.10						
	14		7.77		0.27						
	14.5		7.74		0.24						
	15		7.75		0.25						
	15.5		7.69		0.18						
	16		7.76		0.27						
	16.5		7.94		0.43						
	17		7.95		0.43						
	17.5		7.69		0.18						
WS	17.6		7.52								
	17.8		7.37								
	18.4		7.03								
BF	20.1		6.64								
S	21.6		6.41								
*TOTALS:											

End of Measurement	Time:	Gage Reading: _____ ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

R2Cross RESULTS

Stream Name: East Fork Dry Creek
Stream Locations: Near Private Property Boundary
Fieldwork Date: 05/26/2022
Cross-section: 3
Observers: Birch Fields-Sommers
Coordinate System: UTM Zone 12
X (easting): 751916
Y (northing): 4245369
Date Processed: 08/23/2024
Slope: 0.0333
Discharge: Entered Value: 1.49 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: R2Cross_EF_Dry_3_05-26-2022-Q=1.49.xlsx
R2Cross version: 2.0.3

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 14.48

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	1.84
Percent Wetted Perimeter (%)	50.0	0.39
Mean Velocity (ft/s)	1.0	2.54

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	6.84	14.48	0.68	1.11	9.91	15.04	100.0	0.66	0.05	4.12	40.86
	6.87	14.32	0.66	1.08	9.51	14.87	98.83	0.64	0.05	3.98	37.87
	6.92	14.02	0.63	1.03	8.8	14.55	96.74	0.6	0.05	3.73	32.82
	6.97	13.72	0.59	0.98	8.11	14.24	94.66	0.57	0.05	3.47	28.13
	7.02	13.42	0.55	0.93	7.43	13.93	92.57	0.53	0.06	3.21	23.82
	7.07	13.12	0.52	0.88	6.76	13.61	90.44	0.5	0.06	2.94	19.89
	7.12	12.82	0.48	0.83	6.12	13.28	88.3	0.46	0.06	2.67	16.33
	7.17	12.51	0.44	0.78	5.48	12.96	86.16	0.42	0.06	2.4	13.14
	7.22	12.2	0.4	0.73	4.86	12.64	84.03	0.38	0.07	2.12	10.31
	7.27	11.9	0.36	0.68	4.26	12.32	81.89	0.35	0.07	1.84	7.85
	7.32	11.59	0.32	0.63	3.68	12.0	79.75	0.31	0.08	1.56	5.74
	7.37	11.29	0.27	0.58	3.1	11.68	77.61	0.27	0.09	1.28	3.99
	7.42	11.07	0.23	0.53	2.54	11.44	76.02	0.22	0.1	1.0	2.55
Waterline	7.47	10.86	0.18	0.48	2.0	11.2	74.45	0.18	0.12	0.73	1.46
	7.52	9.2	0.16	0.43	1.48	9.5	63.15	0.16	0.13	0.6	0.88
	7.57	7.98	0.13	0.38	1.05	8.23	54.69	0.13	0.15	0.45	0.47
	7.62	6.11	0.11	0.33	0.7	6.3	41.9	0.11	0.17	0.37	0.26
	7.67	4.26	0.11	0.28	0.47	4.41	29.29	0.11	0.18	0.34	0.16
	7.72	3.17	0.09	0.23	0.28	3.27	21.73	0.09	0.21	0.25	0.07
	7.77	1.37	0.12	0.18	0.16	1.44	9.59	0.11	0.17	0.37	0.06
	7.82	1.09	0.09	0.13	0.1	1.15	7.62	0.09	0.21	0.26	0.03
	7.87	0.86	0.06	0.08	0.05	0.89	5.92	0.06	0.29	0.14	0.01
	7.92	0.62	0.02	0.03	0.02	0.63	4.22	0.02	0.6	0.04	0.0
	7.93	0.54	0.01	0.01	0.01	0.55	3.64	0.01	1.29	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) =	1.49	(cfs)
Calculated Flow (Qc) =	1.48	(cfs)
(Qm-Qc)/Qm * 100 =	1.11%	
Measured Waterline (WLm) =	7.51	(ft)
Calculated Waterline (WLc) =	7.47	(ft)
(WLm-WLc)/WLm * 100 =	0.56%	
Max Measured Depth (Dm) =	0.43	(ft)
Max Calculated Depth (Dc) =	0.48	(ft)
(Dm-Dc)/Dm * 100 =	-12.10%	
Mean Velocity =	0.74	(ft/s)
Manning's n =	0.116	
0.4 * Qm =	0.6	(cfs)
2.5 * Qm =	3.73	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	2	6.58		
	4.8	6.54		
Bankfull	5	6.84		
Waterline	6.9	7.5	0	
	7	7.54	0.04	
	7.5	7.62	0.16	
	8	7.62	0.16	
	8.5	7.62	0.16	
	9	7.48	0	
	9.5	7.58	0.13	
	10	7.57	0.07	
	10.5	7.71	0.38	
	11	7.64	0.21	
	11.5	7.6	0.2	
	12	7.5	0.08	
	12.5	7.51	0.06	
	13	7.51	0.08	
	13.5	7.6	0.1	
	14	7.77	0.27	
	14.5	7.74	0.24	
	15	7.75	0.25	
	15.5	7.69	0.18	
	16	7.76	0.27	
	16.5	7.94	0.43	
	17	7.95	0.43	
	17.5	7.69	0.18	
Waterline	17.6	7.52	0	
	17.8	7.37		
	18.9	7.03		
Bankfull	20.1	6.64		

	21.6	6.41	

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
0.11	0.04	0.01	0.01	0.6
0.51	0.16	0.08	0.06	4.01
0.5	0.16	0.08	0.06	4.01
0.5	0.16	0.08	0.06	4.01
0.52	0	0	0	0
0.51	0.13	0.07	0.05	3.26
0.5	0.07	0.04	0.03	1.75
0.52	0.38	0.19	0.14	9.52
0.5	0.21	0.1	0.08	5.26
0.5	0.2	0.1	0.07	5.01
0.51	0.08	0.04	0.03	2
0.5	0.06	0.03	0.02	1.5
0.5	0.08	0.04	0.03	2
0.51	0.1	0.05	0.04	2.5
0.53	0.27	0.14	0.1	6.76
0.5	0.24	0.12	0.09	6.01
0.5	0.25	0.12	0.09	6.26
0.5	0.18	0.09	0.07	4.51
0.5	0.27	0.14	0.1	6.76
0.53	0.43	0.21	0.16	10.77
0.5	0.43	0.21	0.16	10.77
0.56	0.18	0.05	0.04	2.71
0.2	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.

General Site Field Visit Data Report *(Filters: Name begins with East Fork Dry Creek; Division = 4;)*

Type		Div	Name	CWCB Case Number	Segment ID	Visit Date	Location Description	Watershed Name
Stream		4	East Fork Dry Creek		21/4/A-004	5/26/2022	East Fork Dry Creek above the confluence with Beaver Dams Creek	Uncompahgre
	Remarks	Date	Remark					
		26/05/22 12:58	Assisted CPW in collecting R2Cross field data and assested the natural environment.					
	GPS Log	No GPS Log records for this visit.						
	Photo Log	No Photo Log records for this visit.						

Discharge Measurment Field Visit Data Report *(Filters: Name begins with East Fork Dry Creek; Division = 4;)*

Div	Name	CWCB Case Number	Segment ID	Meas. Date	UTM	Location	Flow Amount (cfs)	Meas #	Rating	Station ID
4	East Fork Dry Creek		21/4/A-004	10/13/2020	UTMx: 424861 UTMy: 4394507	Dry Gulch between I-70 and upstream culvert east of Loveland Pass.	1.63	1	Fair	

Discharge Measurement Summary

Site name	Efdry
Site number	052622
Operator(s)	Kb
File name	Efdry_20220526-164419.ft
Comment	

Start time	5/26/2022 4:16 PM
End time	5/26/2022 4:43 PM
Start location latitude	38.327
Start location longitude	-108.125
Calculations engine	FlowTracker2

Sensor type	Top Setting
Handheld serial number	FT2H2113010
Probe serial number	FT2P2114008
Probe firmware	1.30
Handheld software	1.6.4

# Stations	Avg interval (s)	Total discharge (ft³/s)
24	40	1.492

Total width (ft)	Total area (ft²)	Wetted Perimeter (ft)
5.850	2.110	6.154

Mean SNR (dB)	Mean depth (ft)	Mean velocity (ft/s)
47.389	0.361	0.707

Mean temp (°F)	Max depth (ft)	Max velocity (ft/s)
43.496	0.500	1.175

Discharge Uncertainty		
Category	**ISO**	**IVE**
Accuracy	1.0%	1.0%
Depth	0.4%	5.9%
Velocity	0.5%	3.8%
Width	0.1%	0.1%
Method	1.9%	
# Stations	2.1%	
Overall	**3.1%**	**7.1%**

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

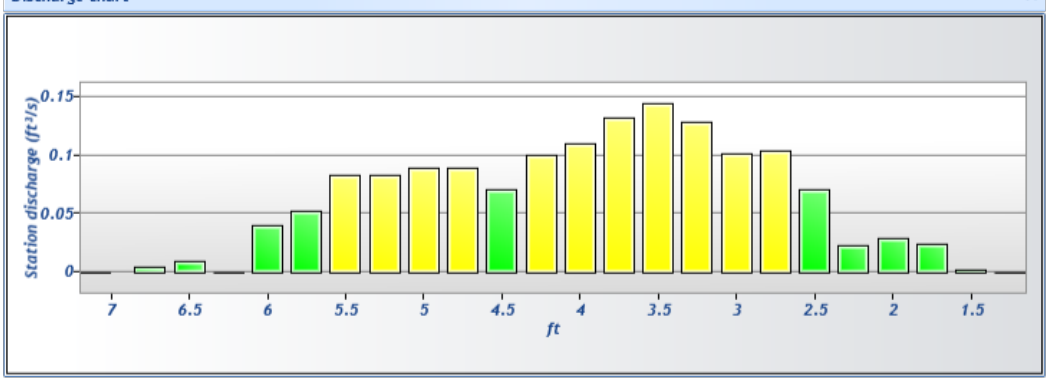
No changes were made to this file
Quality control warnings

Discharge Measurement Summary

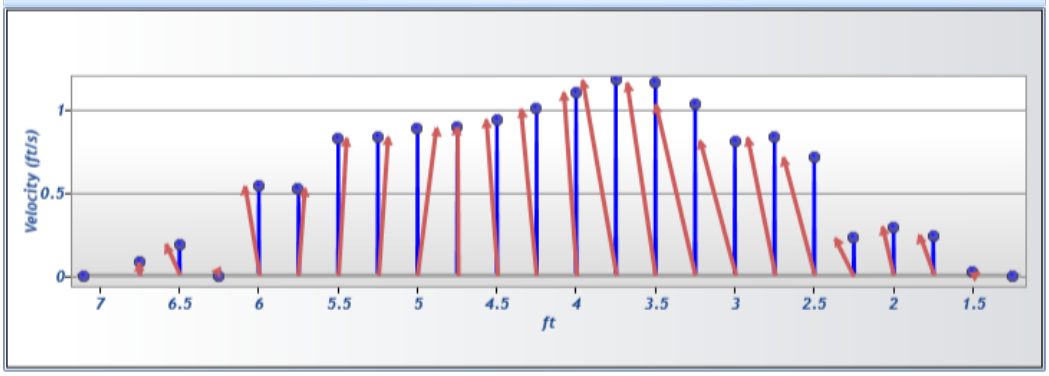
Site name	Efdry
Site number	052622
Operator(s)	Kb
File name	Efdry_20220526-164419.ft
Comment	

Station Warning Settings	
Station discharge OK	Station discharge < 5.000%
Station discharge caution	5.000% >= Station discharge < 10.000%
Station discharge warning	Station discharge >= 10.000%

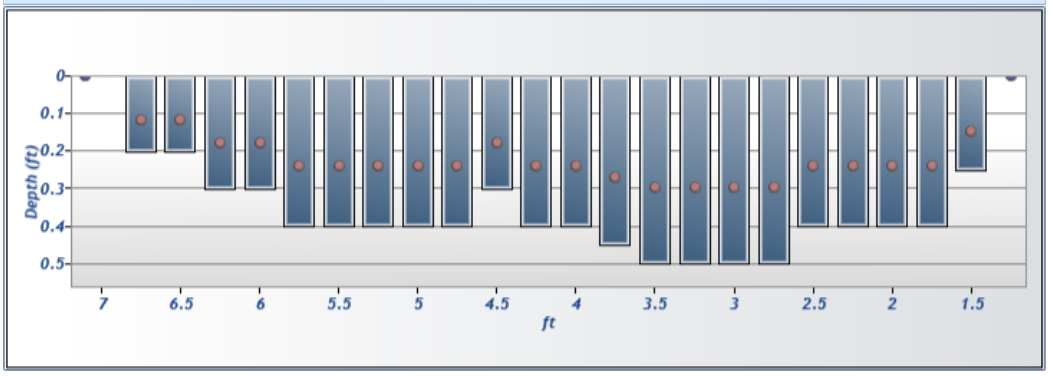
Discharge chart



Velocity chart



Depth chart



Discharge Measurement Summary

Site name	Efdry
Site number	052622
Operator(s)	Kb
File name	Efdry_20220526-164419.ft
Comment	

Measurement results

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	4:16 PM	1.250	None	0.000	0.000	0.000	0	0.000		0.021	0.000	0.000	0.000	✓
1	4:16 PM	1.500	0.6	0.250	0.600	0.150	80	0.021	1.000	0.021	0.063	0.001	0.090	✓
2	4:17 PM	1.750	0.6	0.400	0.600	0.240	80	0.243	1.000	0.243	0.100	0.024	1.627	✓
3	4:19 PM	2.000	0.6	0.400	0.600	0.240	80	0.294	1.000	0.294	0.100	0.029	1.972	✓
4	4:20 PM	2.250	0.6	0.400	0.600	0.240	80	0.229	1.000	0.229	0.100	0.023	1.534	✓
5	4:21 PM	2.500	0.6	0.400	0.600	0.240	80	0.712	1.000	0.712	0.100	0.071	4.774	✓
6	4:22 PM	2.750	0.6	0.500	0.600	0.300	80	0.831	1.000	0.831	0.125	0.104	6.962	✓
7	4:23 PM	3.000	0.6	0.500	0.600	0.300	80	0.810	1.000	0.810	0.125	0.101	6.783	✓
8	4:24 PM	3.250	0.6	0.500	0.600	0.300	80	1.032	1.000	1.032	0.125	0.129	8.644	✓
9	4:25 PM	3.500	0.6	0.500	0.600	0.300	80	1.160	1.000	1.160	0.125	0.145	9.716	✓
10	4:26 PM	3.750	0.6	0.450	0.600	0.270	80	1.175	1.000	1.175	0.113	0.132	8.857	✓
11	4:28 PM	4.000	0.6	0.400	0.600	0.240	80	1.100	1.000	1.100	0.100	0.110	7.372	✓
12	4:29 PM	4.250	0.6	0.400	0.600	0.240	80	1.003	1.000	1.003	0.100	0.100	6.720	✓
13	4:31 PM	4.500	0.6	0.300	0.600	0.180	80	0.938	1.000	0.938	0.075	0.070	4.716	✓
14	4:32 PM	4.750	0.6	0.400	0.600	0.240	80	0.892	1.000	0.892	0.100	0.089	5.981	✓
15	4:33 PM	5.000	0.6	0.400	0.600	0.240	80	0.887	1.000	0.887	0.100	0.089	5.947	✓
16	4:34 PM	5.250	0.6	0.400	0.600	0.240	80	0.833	1.000	0.833	0.100	0.083	5.582	✓
17	4:35 PM	5.500	0.6	0.400	0.600	0.240	80	0.828	1.000	0.828	0.100	0.083	5.548	✓
18	4:36 PM	5.750	0.6	0.400	0.600	0.240	80	0.526	1.000	0.526	0.100	0.053	3.526	✓
19	4:37 PM	6.000	0.6	0.300	0.600	0.180	80	0.538	1.000	0.538	0.075	0.040	2.705	✓
20	4:39 PM	6.250	0.6	0.300	0.600	0.180	80	-0.003	1.000	-0.003	0.075	0.000	-0.014	✓
21	4:41 PM	6.500	0.6	0.200	0.600	0.120	80	0.188	1.000	0.188	0.050	0.009	0.631	✓
22	4:42 PM	6.750	0.6	0.200	0.600	0.120	80	0.081	1.000	0.081	0.060	0.005	0.327	✓
23	4:43 PM	7.100	None	0.000	0.000	0.000	0	0.000		0.081	0.000	0.000	0.000	✓

Discharge Measurement Summary

Site name	Efdry
Site number	052622
Operator(s)	Kb
File name	Efdry_20220526-164419.ft
Comment	

Quality Control Settings	
Maximum depth change	50.000%
Maximum spacing change	100.000%
SNR threshold	10.000 dB
Standard error threshold	0.033 ft/s
Spike threshold	10.000%
Maximum velocity angle	20.000 deg
Maximum tilt angle	5.000 deg

Quality control warnings

St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Warnings
2	4:17 PM	1.750	0.6	0.400	0.600	0.240	Velocity Angle > QC
4	4:20 PM	2.250	0.6	0.400	0.600	0.240	Velocity Angle > QC
19	4:37 PM	6.000	0.6	0.300	0.600	0.180	Standard Error > QC
20	4:39 PM	6.250	0.6	0.300	0.600	0.180	Boundary Interference,Large SNR Variation,SNR Threshold Variation
21	4:41 PM	6.500	0.6	0.200	0.600	0.120	Velocity Angle > QC
22	4:42 PM	6.750	0.6	0.200	0.600	0.120	Boundary Interference

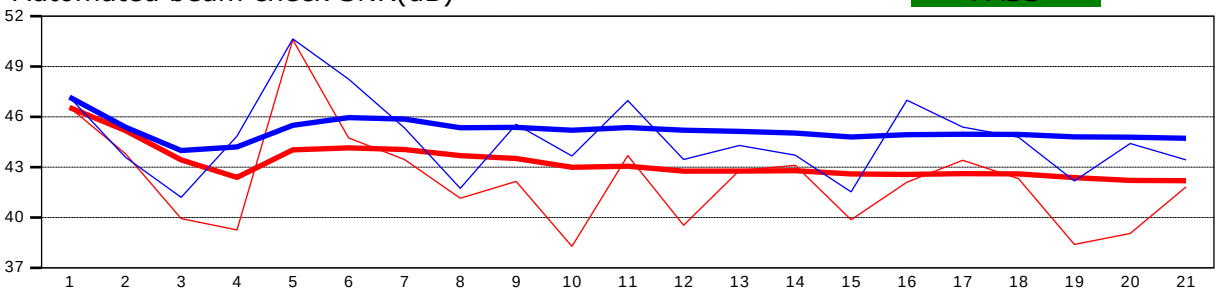
Discharge Measurement Summary

Site name	Efdry
Site number	052622
Operator(s)	Kb
File name	Efdry_20220526-164419.ft
Comment	

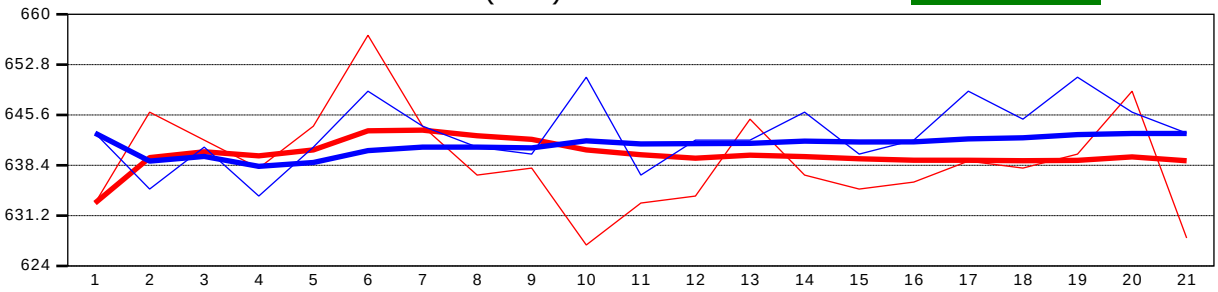
Beam 1	
Beam 2	

Automated beam check Start time 5/26/2022 4:15:33 PM

Automated beam check SNR(dB) PASS



Automated beam check Noise level(cnts) PASS



Automated beam check Quality control warnings

No quality control warnings

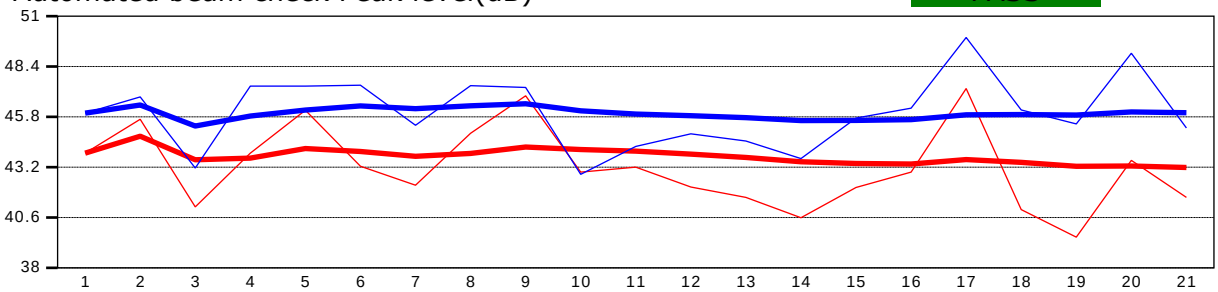
Discharge Measurement Summary

Site name	Efdry
Site number	052622
Operator(s)	Kb
File name	Efdry_20220526-164419.ft
Comment	

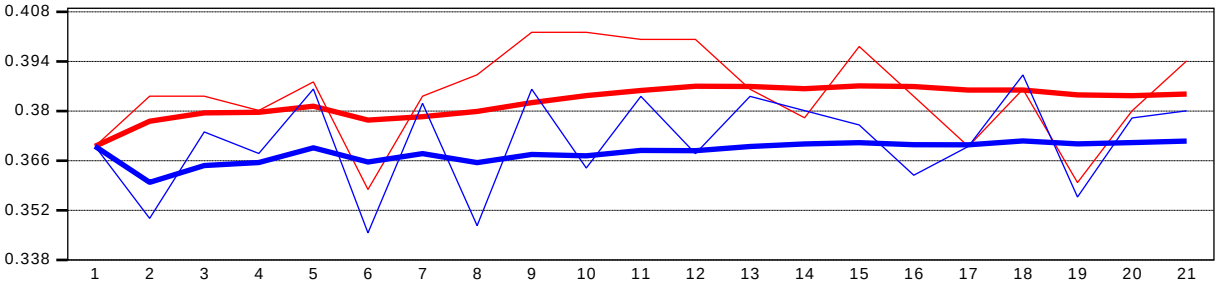
Beam 1	
Beam 2	

Automated beam check Start time 5/26/2022 4:15:33 PM

Automated beam check Peak level(dB) PASS



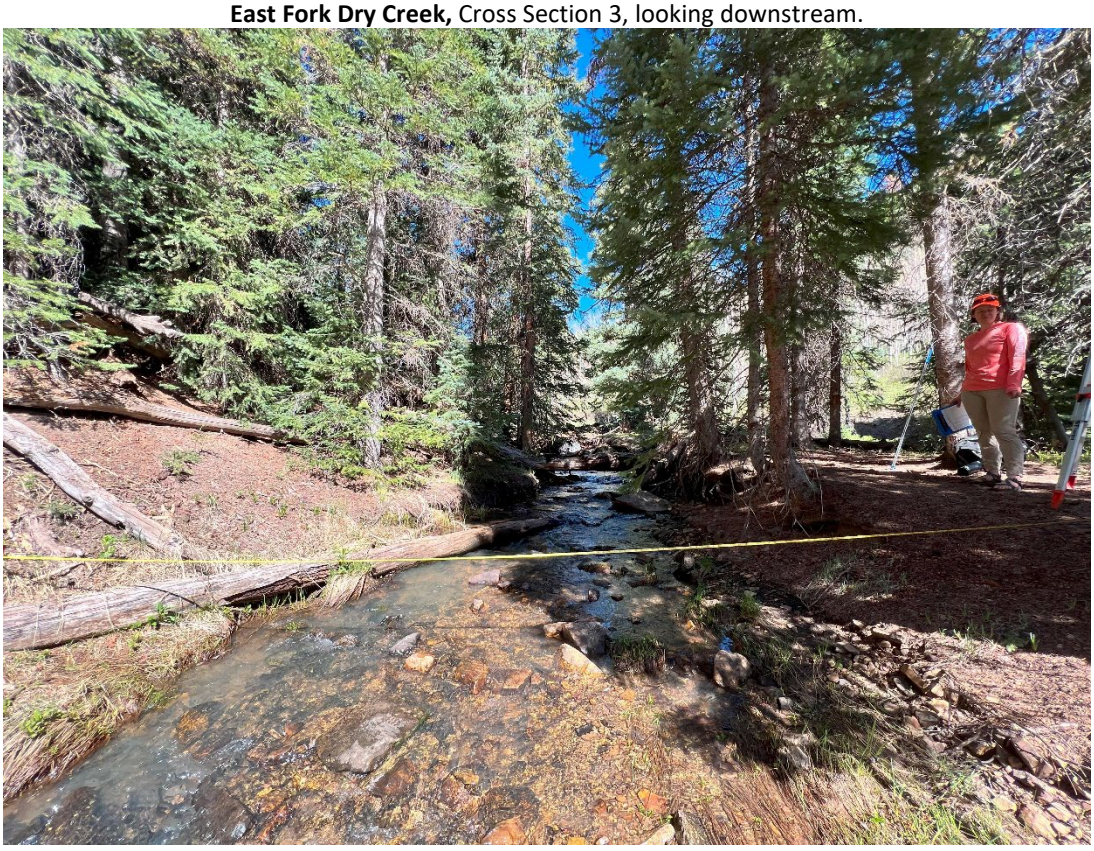
Automated beam check Peak position(ft) PASS



Automated beam check Quality control warnings

No quality control warnings

East Fork Dry Creek, Cross Section 3, looking downstream.



East Fork Dry Creek, Cross Section 3, looking upstream.

East Fork Dry Creek, Cross Section 3, looking downstream.

East Fork Dry Creek, Cross Section 3, looking across from right bank.

East Fork Dry Creek, Fish habitat overview.

East Fork Dry Creek, Large woody debris and outside meander bend..

East Fork Dry Creek, Large woody debris in channel

East Fork Dry Creek, Fish habitat overview.

East Fork Dry Creek, Log jam habitat.

East Fork Dry Creek, Large pool habitat

East Fork Dry Creek, Upstream wetland and large woody debris complex

East Fork Dry Creek, Beaver sign and large woody debris

East Fork Dry Creek, Contributing basin overview