



COLORADO

Parks and Wildlife

Department of Natural Resources

Aquatic Wildlife Section
6060 Broadway
Denver, CO 80216

January 7, 2026

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

Re: Instream Flow Recommendations for Streams in Water Division 1, Larimer County; East Fork Roaring Creek, to be presented at the January 2026 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 Roaring Creek in Water Division 1. East Fork Roaring Creek is a headwaters stream that supports native greenback cutthroat trout. Field investigations relating to this ISF recommendation were conducted by Colorado Parks and Wildlife (CPW) and Colorado Water Conservation Board staff in 2023 and 2025. This ISF recommendation was first presented to interested parties at the ISF Workshop in 2023. CPW and CWCB staff conducted outreach to the Larimer County Commissioners on numerous occasions but most recently in 2025. 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 Roaring 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.].



Laura Clellan, Acting Director, Colorado Parks and Wildlife

Parks and Wildlife Commission: Richard Reading, Chair · James 'Jay' Tutchtton, Vice-Chair · Eden Vardy, Secretary · Jessica Beaulieu Frances Silva Blaney · John Emerick · Tai Jacober · Dallas May · Jack Murphy · Gabriel Otero

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 (SWAP 2015, Revised 2025). 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 Roaring Creek from its headwaters (13S 440448.44 4511657.49) to the confluence with Roaring Creek (13S 437719.29 4507614.75). The reach is approximately 3.5 miles in length. All of the proposed reach is on Roosevelt National Forest.

Greenback Cutthroat Trout Conservation Goals

The greenback cutthroat trout was designated Colorado's state fish in 1994. This subspecies of cutthroat trout is listed as a threatened species by both the state and federal government and is considered a Tier 1 Species of Greatest Conservation Need according to CPW's SWAP. Following the listing of the greenback cutthroat trout under the authorities of the Endangered Species Act of 1973, state and federal fish and wildlife managers have engaged in efforts to recover the species and establish new populations in its native South Platte River Basin. The greenback cutthroat trout recovery plan's overall goal is as follows:

"Recovery needs for the Greenback Cutthroat Trout include the establishment of conservation populations through stocking efforts into streams and lakes with suitable habitat throughout the South Platte River drainage, and possibly within adjacent drainages east of the Continental Divide. Populations need to be sufficiently robust (i.e. resilient and redundant) to withstand stochastic, catastrophic, and anthropogenic influences such that they can persist into the future. Meeting these goals will require that threats be sufficiently understood and abated, and range-wide monitoring will be required." (Recovery Outline for the Greenback Cutthroat Trout, 2019)

Establishing new conservation populations of greenback cutthroat trout and protecting the habitat where these populations reside are both critical steps to the successful recovery of the species. CPW believes that ISF protection on East Fork Roaring Creek is an important step in the overall conservation of greenback cutthroat trout.

Natural Environment and Biological Summary

East Fork Roaring Creek is a first order tributary of the Cache la Poudre River. Its headwaters originate at 10,500 feet near South and Middle Bald Mountain. The creek flows southerly and directly into the Poudre River near Kinikinik off Cameron Pass. The contributing basin is approximately 6 square miles and is forested and mountainous. In 2020, the Cameron Peak wildfire burned much of the surrounding area. Portions of the Roaring Creek watershed were impacted and precipitation events on the large burn scar area have resulted in debris and sediment flows which reconfigured the channel. Fortunately, much of the stream corridor was not burned and has an intact riparian zone with a high diversity of shrubs and coniferous forest.

Hydrology is driven by snowmelt runoff with perennial baseflows. Mean annual precipitation in the basin is 29 inches. East Fork Roaring Creek is a steep, cascading stream with very coarse substrate (mostly large boulders and some bedrock outcrops). There are many moderately sized pools that provide good habitat for small fish. There are small pockets of gravel that provide the resident fish population with spawning habitat. As part of the greenback cutthroat trout recovery strategy, CPW has stocked greenback cutthroat trout in East Fork Roaring Creek for the past three consecutive years. Despite impacts from the Cameron Peak fire, CPW has observed survival of stocked fish, which provides evidence of overwintering and favorable habitat conditions to support a self-sustaining population of greenback cutthroat trout.

R2Cross Background

Initial biological instream flow rates were developed using the R2Cross methodology (CWCB, 2024¹). 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, 1979²). 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, 2007³) 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

¹Colorado Water Conservation Board, 2024, R2Cross field manual. <https://dnrweblink.state.co.us/cwcbsearch/0/edoc/224685/R2Cross%20Field%20Manual%202024.pdf>

²Nehring, 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.

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

flow recommendations are based on hydraulic criteria that meet three of three hydraulic criteria (as described in Nehring 1979 and CWCB 2024).

In 2025, Jay Skinner with Western Resource Advocates was hired to assist CPW and CWCB in collecting R2Cross data. Jay Skinner is a retired CPW ISF Program Coordinator with extensive R2Cross experience. Mr. Skinner and CWCB staff collected two cross-section data sets on East Roaring Creek. The results of the R2Cross analysis are summarized below.

	Bankfull Top Width	Date Measured	Flow measured	Flow Meeting Two Criteria	Flow Meeting Three Criteria
1	8.3'	6/16/2025	11.4 cfs	0.68 cfs	1.75 cfs
2	13.8'	6/16/2025	11.4 cfs	1.37 cfs	4.06 cfs
Recommended Biological Flow Rates				1.0 cfs	2.9 cfs

The biological flow recommendation during the baseflow period is 1.0 cfs. This flow rate will provide sufficient wetted perimeter and depth to provide overwintering habitat for fish. The biological flow recommendation during the high flow period is 2.9 cfs, which will maintain average depth of at least 0.2 feet, at least 50 percent wetted perimeter of the stream channel, and average velocity of 1.0 feet per second (fps).

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 Roaring Creek. East Fork Roaring 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 any active water rights within the reach.

Final Flow Recommendations:

CPW’s analysis indicates that the following flows are needed to protect the natural environment to a reasonable degree. Based on median hydrology analyzed by CWCB staff, there is sufficient water available to meet the biological flow recommendations, with slight reductions due to water availability during the baseflow period. Therefore CPW’s refined flow recommendations are the following:

- April Flow Recommendation (April 1 through April 30): **1.9 cfs**
 - This flow rate will maintain sufficient depth and wetted perimeter, as well as high velocities, which will support movement of greenback cutthroat trout as they transition from overwintering habitat as snowmelt begins. Earlier start to spring runoff may be a reality in a changing climate.
- Summer Flow Recommendation (May 1 through July 31): **2.9 cfs**

- This flow rate will maintains sufficient depth, velocity, and wetted perimeter during spring runoff, its receding limb, and the summer months. This flow rate supports beneficial feeding and spawning conditions for greenback cutthroat trout as they mature and grow. Increased habitat availability is beneficial during spring and summer when greenback cutthroat trout spawn and have increased activity feeding throughout the stream. This is an important period for cutthroat growth, maturation, and spawning.
- Late Summer Flow Recommendation (August 1 through September 30): **1.5 cfs**
 - This flow rate will support sufficient depth and wetted perimeter, as well as high velocities (less than 1.0 fps at some cross-sections). Most trout growth occurs during summer when longer days and warmer water temperatures facilitate growth. Late summer is an important period for cutthroat trout, so increased aquatic habitat availability for fish and macroinvertebrates is beneficial from early August through the end of September.
- Baseflow Recommendation (October 1 through March 31): **0.60 cfs**
 - This flow rate has been reduced slightly due to water availability, but will still support adequate depth in riffles and will provide sufficient areas of holding habitat in pools and glides to overwinter fish.

The purpose of this letter is to formally transmit this ISF recommendation to CWCB for the Board’s consideration. Based on CPW’s opinion, there is a flow-dependent natural environment in East Fork Roaring 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 2026 CWCB meeting to answer any questions that the Board might have regarding these flow recommendations. We appreciate your consideration.

Sincerely,

Katie Birch
Digitally signed by Katie Birch
Date: 2026.01.07 13:50:44 -07'00'

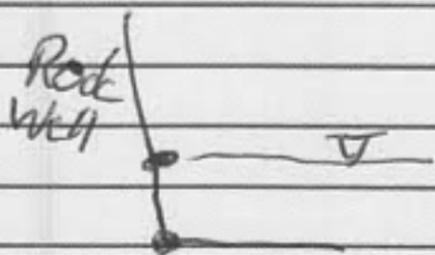
Katie Birch, CPW Instream Flow Program Coordinator

R2CROSS CROSS-SECTION DATA

STREAM NAME: E FR ROARING CK
 CROSS SECTION #: 1 DATE: 6/16/25
 TIME START: 1310 TIME END:
 STAFF GAGE START (ft): STAFF GAGE END (ft):
 BENCHMARK DESCRIPTION:
 BENCHMARK START (ft): BENCHMARK END(ft):

$$S = \frac{0.2}{15} =$$

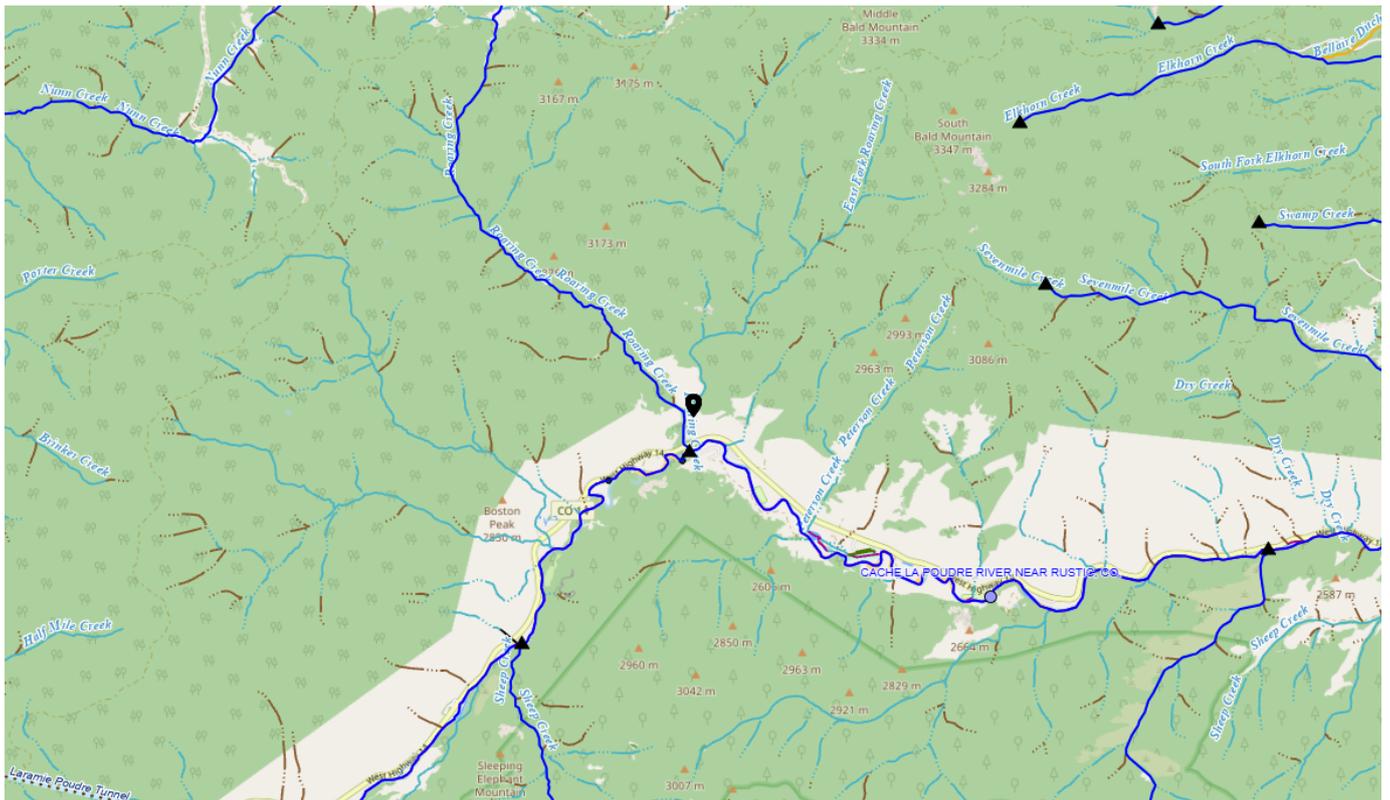
FEATURE:	DISTANCE					
Stake (S)	FROM					
Bankfull (BF)	INITIAL	ROD	WATER	VELOCITY		
Waterline (WL)	POINT	HEIGHT	DEPTH	(ft/sec)	NOTES:	
Rock (R)	(ft)	(ft)	(ft)			
	-0.6	6.15				
WL/BF	0	6.98	0		0 7.5 0.2 (Vert Bank) v=1.42	
	1.05		0.2	1.27		
	1		.3	1.17		
	1.5		.4	2.01		
	2.2	7.5	.35	1.70		
	2.4		.35	1.64		
	2.6	7.55	.45	2.11		
	2.8		.35	1.71 1.71		
	3	7.5	.4	3.32		
	.2		.6	1.31		
	.4	7.3	.6			
	.6		.7	0.62		
	.8	7.65	.7	3.82		
	4		.65	4.01		
	.2	7.7	.6	3.51		
	.4		.6	3.31		
	.6	7.75	.7			
	.8		.8	1.99		
	5	7.85	.85	3.78		
	.2		.85	3.75		
	.4	7.8	.8	3.31		
	.6		.85	2.79		
	.8	7.75	.75	3.45		
	6.2	7.85	.8	3.46	6.0 0.80 3.17	
	6.6	7.75	.9	2.6	6.4 0.85 3.49	
	7	7.75	.6	2.32	6.8 0.8 1.35	
	7.4	7.45	.7	1.57	7.2 0.6 2.64	
	7.8	7.55			8.1 0.5 1.64	
	8.2	7.02	0			
WL/BF	8.4	6.9	0			
S	14.4	6.15				



R2Cross RESULTS

Stream Name: E Fk Roaring Creek
Stream Locations: Ab foot bridge - Larimer County - CLP
Fieldwork Date: 06/16/2025
Cross-section: 1
Observers: WRA CWCB
Coordinate System: UTM Zone 13
X (easting): 437803.38
Y (northing): 4507710.9
Date Processed: 10/09/2025
Slope: 0.133
Discharge: Discharge data file: 11.37 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: EF Roaring Creek R2X.xlsx
R2Cross version: 2.0.4

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 8.27

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.68
Percent Wetted Perimeter (%)	50.0	0.56
Mean Velocity (ft/s)	1.0	1.75

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	6.98	8.27	0.6	0.87	4.92	9.08	100.0	0.54	0.12	3.03	14.92
	7.0	8.23	0.58	0.85	4.74	9.01	99.29	0.53	0.12	2.91	13.78
	7.02	8.2	0.56	0.83	4.56	8.95	98.62	0.51	0.12	2.78	12.68
	7.05	8.18	0.54	0.8	4.38	8.9	98.08	0.49	0.13	2.65	11.6
Waterline	7.05	8.18	0.53	0.8	4.38	8.9	98.05	0.49	0.13	2.64	11.55
	7.07	8.16	0.52	0.78	4.21	8.85	97.54	0.47	0.13	2.51	10.57
	7.09	8.15	0.49	0.76	4.03	8.8	97.0	0.46	0.14	2.38	9.6
	7.11	8.13	0.47	0.74	3.85	8.76	96.46	0.44	0.14	2.25	8.67
	7.13	8.12	0.45	0.72	3.67	8.71	95.92	0.42	0.14	2.12	7.79
	7.15	8.1	0.43	0.7	3.5	8.66	95.38	0.4	0.15	1.99	6.97
	7.18	8.08	0.41	0.67	3.32	8.61	94.84	0.39	0.15	1.86	6.19
	7.2	8.07	0.39	0.65	3.15	8.56	94.3	0.37	0.16	1.74	5.46
	7.22	7.91	0.38	0.63	2.97	8.39	92.4	0.35	0.16	1.65	4.89
	7.24	7.73	0.36	0.61	2.8	8.2	90.33	0.34	0.17	1.56	4.38
	7.26	7.56	0.35	0.59	2.64	8.01	88.25	0.33	0.17	1.48	3.89
	7.28	7.38	0.34	0.57	2.47	7.82	86.18	0.32	0.18	1.39	3.45
	7.31	7.2	0.32	0.54	2.32	7.63	84.11	0.3	0.19	1.31	3.03
	7.33	7.03	0.31	0.52	2.16	7.45	82.03	0.29	0.19	1.23	2.65
	7.35	6.85	0.29	0.5	2.01	7.26	79.96	0.28	0.2	1.15	2.3
	7.37	6.68	0.28	0.48	1.86	7.07	77.89	0.26	0.21	1.07	1.98
	7.39	6.5	0.26	0.46	1.72	6.88	75.81	0.25	0.22	0.99	1.69
	7.42	6.33	0.25	0.43	1.58	6.69	73.74	0.24	0.23	0.91	1.43
	7.44	6.15	0.23	0.41	1.44	6.51	71.66	0.22	0.24	0.83	1.19
	7.46	5.93	0.22	0.39	1.31	6.27	69.05	0.21	0.25	0.76	1.0
7.48	5.64	0.21	0.37	1.19	5.95	65.59	0.2	0.26	0.71	0.84	

7.5	5.32	0.2	0.35	1.07	5.62	61.9	0.19	0.27	0.66	0.7
7.52	4.81	0.2	0.33	0.96	5.08	55.95	0.19	0.27	0.65	0.62
7.55	4.31	0.2	0.3	0.86	4.54	50.0	0.19	0.27	0.65	0.56
7.57	4.15	0.18	0.28	0.77	4.37	48.13	0.18	0.29	0.58	0.45
7.59	4.1	0.17	0.26	0.68	4.3	47.33	0.16	0.32	0.5	0.34
7.61	4.04	0.15	0.24	0.59	4.22	46.53	0.14	0.35	0.41	0.24
7.63	3.98	0.13	0.22	0.5	4.15	45.74	0.12	0.4	0.33	0.17
7.65	3.88	0.11	0.2	0.42	4.03	44.43	0.1	0.45	0.26	0.11
7.68	3.59	0.09	0.17	0.33	3.72	41.01	0.09	0.51	0.21	0.07
7.7	3.3	0.08	0.15	0.26	3.41	37.6	0.08	0.58	0.17	0.04
7.72	3.01	0.06	0.13	0.19	3.1	34.19	0.06	0.69	0.12	0.02
7.74	2.72	0.05	0.11	0.13	2.79	30.78	0.05	0.88	0.08	0.01
7.76	1.89	0.04	0.09	0.08	1.94	21.42	0.04	0.98	0.06	0.01
7.78	1.37	0.03	0.07	0.04	1.4	15.45	0.03	1.23	0.04	0.0
7.81	0.87	0.02	0.04	0.02	0.89	9.79	0.02	1.67	0.02	0.0
7.83	0.43	0.01	0.02	0.0	0.44	4.9	0.01	2.98	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) =	11.37*	(cfs)
Calculated Flow (Qc) =	11.45	(cfs)
$(Qm-Qc)/Qm * 100 =$	-0.74%	
Measured Waterline (WLM) =	7	(ft)
Calculated Waterline (WLC) =	7.05	(ft)
$(WLM-WLC)/WLM * 100 =$	-0.66%	
Max Measured Depth (Dm) =	0.9	(ft)
Max Calculated Depth (Dc) =	0.8	(ft)
$(Dm-Dc)/Dm * 100 =$	10.69%	
Mean Velocity =	2.62	(ft/s)
Manning's n =	0.129	
0.4 * Qm =	4.55	(cfs)
2.5 * Qm =	28.43	(cfs)

*-Measured flow calculated using discharge calculator

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	-0.6	6.15		
Bankfull	0	6.98		
Waterline	0	6.98	0	
	0	7.2	0.2	
	2.2	7.5	0.35	
	2.6	7.55	0.45	
	3	7.5	0.4	
	3.4	7.8	0.6	
	3.8	7.65	0.7	
	4.2	7.7	0.6	
	4.6	7.75	0.7	
	5	7.85	0.85	
	5.4	7.8	0.8	
	5.8	7.75	0.75	
	6.2	7.85	0.8	
	6.6	7.75	0.9	
	7	7.75	0.6	
	7.4	7.45	0.7	
	7.8	7.55	0.4	
	8.2	7.02	0	
Waterline	8.2	7.02	0	
Bankfull	8.4	6.9	0	
	14.4	6.15		

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
0.22	0.2	0.22	0.57	5.03
2.22	0.35	0.46	1.18	10.4
0.4	0.45	0.18	0.47	4.11
0.4	0.4	0.16	0.42	3.66
0.5	0.6	0.24	0.62	5.49
0.43	0.7	0.28	0.73	6.4
0.4	0.6	0.24	0.62	5.49
0.4	0.7	0.28	0.73	6.4
0.41	0.85	0.34	0.88	7.77
0.4	0.8	0.32	0.83	7.31
0.4	0.75	0.3	0.78	6.86
0.41	0.8	0.32	0.83	7.31
0.41	0.9	0.36	0.94	8.23
0.4	0.6	0.24	0.62	5.49
0.5	0.7	0.28	0.73	6.4
0.41	0.4	0.16	0.42	3.66
0.66	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

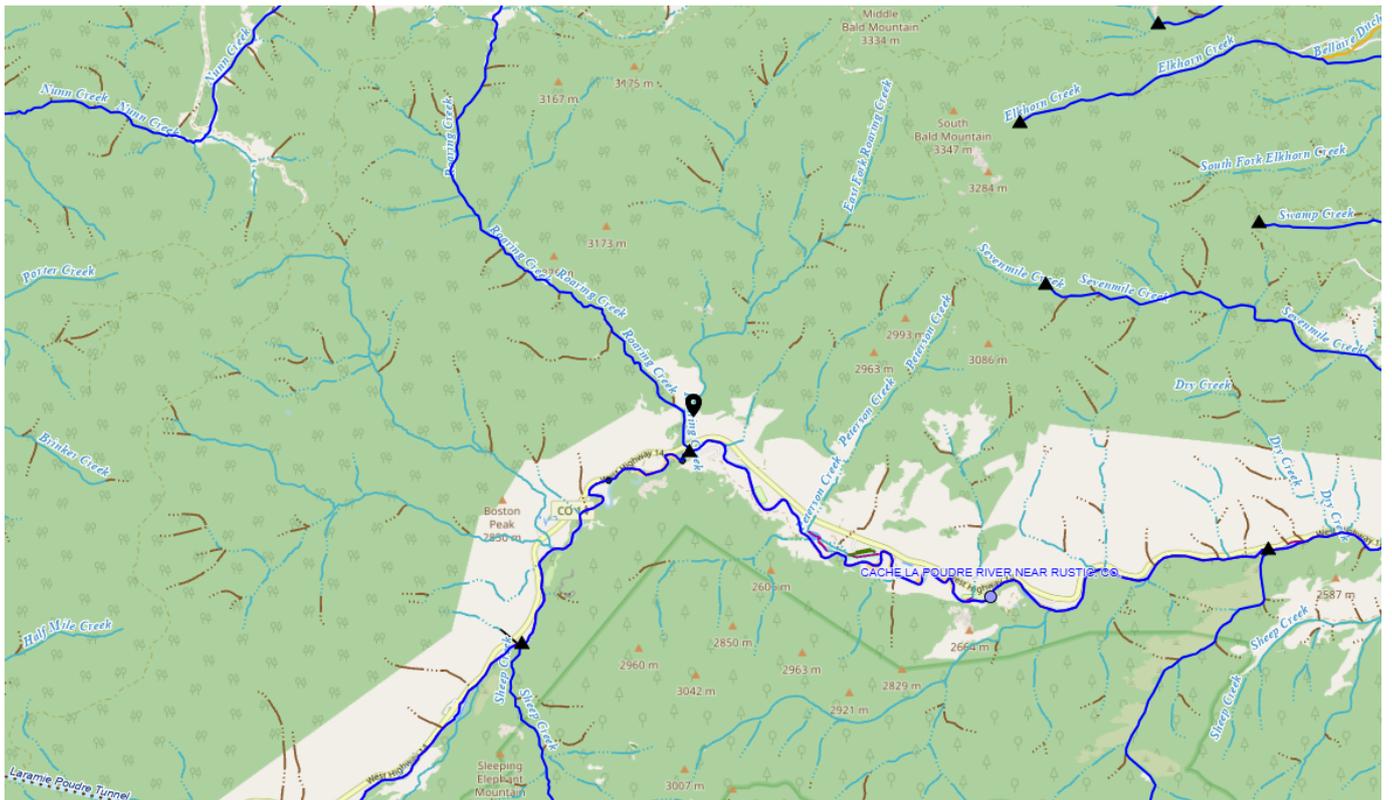
DISCLAIMER

"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: E Fk Roaring Creek
Stream Locations: At Footbridge -- CLP -- Larimer Co
Fieldwork Date: 06/16/2025
Cross-section: 2
Observers: WRA CWCB
Coordinate System: UTM Zone 13
X (easting): 437803.38
Y (northing): 4507710.9
Date Processed: 10/09/2025
Slope: 0.038
Discharge: Entered Value: 11.37 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: EF Roaring Creek 2 R2X.xlsx
R2Cross version: 2.0.4

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 13.79

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.24
Percent Wetted Perimeter (%)	50.0	1.37
Mean Velocity (ft/s)	1.0	4.06

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	10.05	13.79	0.97	1.65	13.31	14.42	100.0	0.92	0.09	2.98	39.71
	10.05	13.76	0.96	1.65	13.26	14.4	99.82	0.92	0.09	2.97	39.39
	10.1	13.47	0.93	1.6	12.57	14.09	97.68	0.89	0.09	2.85	35.82
	10.15	13.18	0.9	1.55	11.91	13.78	95.55	0.86	0.1	2.73	32.46
	10.2	12.89	0.87	1.5	11.26	13.47	93.41	0.84	0.1	2.6	29.3
	10.25	12.6	0.84	1.45	10.62	13.16	91.28	0.81	0.1	2.48	26.33
	10.3	12.31	0.81	1.4	10.0	12.86	89.14	0.78	0.1	2.36	23.56
	10.35	12.02	0.78	1.35	9.39	12.55	87.0	0.75	0.11	2.23	20.98
	10.4	11.73	0.75	1.3	8.79	12.24	84.87	0.72	0.11	2.11	18.57
	10.45	11.44	0.72	1.25	8.22	11.93	82.73	0.69	0.11	1.99	16.34
	10.5	11.15	0.69	1.2	7.65	11.62	80.6	0.66	0.12	1.87	14.28
	10.55	10.86	0.65	1.15	7.1	11.32	78.46	0.63	0.12	1.74	12.39
	Waterline	10.6	10.57	0.62	1.1	6.57	11.01	76.33	0.6	0.13	1.62
10.65		10.27	0.59	1.05	6.04	10.7	74.19	0.56	0.13	1.5	9.08
10.7		10.05	0.55	1.0	5.54	10.45	72.43	0.53	0.14	1.37	7.59
10.75		9.79	0.51	0.95	5.04	10.15	70.37	0.5	0.15	1.25	6.29
10.8		9.53	0.48	0.9	4.56	9.85	68.32	0.46	0.15	1.13	5.13
10.85		9.26	0.44	0.85	4.09	9.55	66.2	0.43	0.16	1.01	4.12
10.9		8.89	0.41	0.8	3.63	9.15	63.46	0.4	0.17	0.9	3.28
10.95		8.53	0.37	0.75	3.2	8.76	60.72	0.37	0.19	0.8	2.55
11.0		8.14	0.34	0.7	2.78	8.33	57.78	0.33	0.2	0.7	1.94
11.05		7.4	0.32	0.65	2.39	7.59	52.65	0.31	0.21	0.64	1.54
11.1		6.67	0.31	0.6	2.04	6.85	47.52	0.3	0.22	0.59	1.21
11.15		4.98	0.35	0.55	1.73	5.15	35.71	0.34	0.2	0.71	1.22
11.2		4.7	0.32	0.5	1.49	4.86	33.66	0.31	0.21	0.62	0.92

11.25	4.42	0.28	0.45	1.26	4.56	31.61	0.28	0.23	0.53	0.67
11.3	4.14	0.25	0.4	1.04	4.26	29.56	0.25	0.26	0.44	0.46
11.35	3.87	0.22	0.35	0.84	3.97	27.51	0.21	0.29	0.36	0.3
11.4	3.59	0.18	0.3	0.66	3.67	25.46	0.18	0.33	0.28	0.18
11.45	3.31	0.15	0.25	0.49	3.37	23.39	0.14	0.4	0.2	0.1
11.5	3.0	0.11	0.2	0.33	3.05	21.11	0.11	0.5	0.13	0.04
11.55	2.68	0.07	0.15	0.19	2.72	18.84	0.07	0.73	0.07	0.01
11.6	1.34	0.05	0.1	0.06	1.36	9.41	0.05	1.0	0.04	0.0
11.65	0.64	0.02	0.05	0.01	0.65	4.49	0.02	1.84	0.01	0.0
11.69	0.21	0.01	0.02	0.0	0.21	1.47	0.01	4.67	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) =	11.37	(cfs)
Calculated Flow (Qc) =	11.03	(cfs)
$(Qm-Qc)/Qm * 100 =$	2.99%	
Measured Waterline (WLM) =	10.68	(ft)
Calculated Waterline (WLC) =	10.6	(ft)
$(WLM-WLC)/WLM * 100 =$	0.71%	
Max Measured Depth (Dm) =	1.2	(ft)
Max Calculated Depth (Dc) =	1.1	(ft)
$(Dm-Dc)/Dm * 100 =$	8.69%	
Mean Velocity =	1.68	(ft/s)
Manning's n =	0.122	
0.4 * Qm =	4.55	(cfs)
2.5 * Qm =	28.43	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	8.45		
Bankfull	4	10.05		
Waterline	6.3	10.7	0	
	7	10.85	0.2	
	8	11	0.4	
	9	11.15	0.55	
	10	11.6	1.1	
	11	11.6	1.05	
	12	11.7	1.2	
	13	11.45	0.8	
	14	11.15	0.5	
	15	11.15	0.5	
	16.2	11	0.35	
Waterline	16.4	10.66	0	
Bankfull	17.9	10		
	19.5	8.75		

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
0.72	0.2	0.17	0.29	2.59
1.01	0.4	0.4	0.69	6.09
1.01	0.55	0.55	0.95	8.38
1.1	1.1	1.1	1.91	16.76
1	1.05	1.05	1.82	15.99
1	1.2	1.2	2.08	18.28
1.03	0.8	0.8	1.39	12.19
1.04	0.5	0.5	0.87	7.62
1	0.5	0.55	0.95	8.38
1.21	0.35	0.24	0.42	3.73
0.39	0	0	0	0
0	0	0	0	0
0	0	0	0	0

DISCLAIMER

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General Site Field Visit Data Report (Filters: Case Number = 24/1/A-002;)

Type	Div	Name	CWCB Case Number	Segment ID	Visit Date	Location Description	Watershed Name
Stream	1	East Fork Roaring Creek	24/1/A-002	24/1/A-002	5/16/2025	R2Cross locations	Cache La Poudre
	Remarks	Date	Remark				
		16/05/25 10:27	Assisted in collection of R2Cross survey data and discharge measurements. Observed the natural environment at the locations.				
	GPS Log	No GPS Log records for this visit.					
	Photo Log	No Photo Log records for this visit.					

