COLORADO
Parks and Wildlife

Department of Natural Resources

Aquatic Wildlife Section
6060 Broadway
Denver, CO 80216

January 8, 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 6, Garfield County; Picket Pin 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 Picket Pin Creek in Water Division 6. Field investigations relating to this ISF recommendation were conducted by Colorado Parks and Wildlife (CPW) staff in 2017 and 2018. This ISF recommendation was first presented to interested parties at the ISF Workshop in January 2017. CPW and CWCB staff conducted outreach to the Garfield 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 Picket Pin 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' Tutchton, 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 Picket Pin Creek from its headwaters (13T 307733 4435803) to the confluence with the North Fork White River (13T 304812 4434082). The reach is approximately 2.7 miles in length. Approximately 89% of the proposed reach is White River National Forest lands managed as Flat Tops Wilderness. Near the North Fork White River confluence, approximately 0.3 miles of the proposed reach is on private lands owned by the Rio Blanco Ranch.

Natural Environment and Biological Summary
Picket Pin Creek is a tributary of the North Fork of the White River located east of the Town of Meeker. Its headwaters originate at over 10,200 feet in the Flat Tops Wilderness. The hydrology of Picket Pin Creek is snowmelt-driven with stable baseflows following spring runoff. Average annual precipitation in the basin is approximately 30 inches. The watershed is approximately 1.7 square miles of forested land cover containing stands of aspen, lodgepole pine, spruce, and conifer. Picket Pin Creek supports a healthy riparian area with robust plants and mosses, including watercress and nettle. Upland and riparian communities support plenty of overhead cover and shading of the stream.

Picket Pin Creek is a first to second order stream that is moderate to high gradient. The channel type is typical of a headwaters stream with an entrenched V-shaped channel and substrate that is predominantly medium and coarse cobble. Large cobble and small boulder features creates pocket pool habitat for fish. The channel over the observed reach is mainly single thread. There is considerable wood in the creek which supports habitat complexity, shading, and nutrient cycling. Much of the aquatic habitat observed by CPW staff includes high gradient riffles, cascades, and pool features that offer good holding habitat. Fish sampling conducted by CPW in 2016 indicates the stream supports brook trout. Macroinvertebrates were noted during R2Cross investigations and include mayflies and caddisfly larvae.

R2Cross Background

Initial biological instream flow rates were developed using the R2Cross methodology (CWCB, 2024[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 CWCB 2024).

In 2018, CPW collected two cross-section data sets on Bear 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	9.0'	7/11/2017	0.91 cfs	0.97 cfs	2.15 cfs
2	4.9'	7/11//2018	0.12 cfs	0.27 cfs	2.15 cfs
	Recommended Biological Flow Rates			**0.62 cfs**	**2.15 cfs**

The biological flow recommendation during the baseflow period is 0.62 cfs. This flow rate will provide sufficient wetted perimeter and depth and will provide overwintering habitat for fish. The biological flow recommendation during the high flow period is 2.2 cfs(rounded), which will maintain average depth of at least 0.2 feet, and 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 biological flow recommendations and to determine the appropriate seasonal transition dates, CPW examined basic hydrologic data and water rights information for the North Fork White River basin. Median hydrology was analyzed by CWCB staff using prorated gage data from the historic gage on the North Fork White River (USGS 09302420 "North Fork White River above Ripple Creek near Trappers Lake"). This gage operated between 1965 to 1973. CPW is aware

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

[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

of the following active water rights within the proposed reach: Picket Pin Ditch. Diversions from this ditch were accounted for in the CWCB's water availability analysis.

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. Therefore CPW's refined flow recommendations are the following:

- Summer Flow Recommendation (May 16 through July 20): **2.2 cfs**
  - This flow rate supports adequate depth, velocity, and wetted perimeter criteria which will benefit aquatic habitat availability in riffles, pools, glides, and runs. Ample habitat availability is beneficial to fish during spring and summer periods when fish are active feeding and moving longitudinally throughout the channel.

- Late Summer Flow Recommendation (July 21 through September 30): **1.2 cfs**
  - This flow rate will support sufficient depth and wetted perimeter, as well as higher velocities. Most trout growth occurs during summer, following peak runoff, when longer days and warmer water temperatures facilitate growth. Late summer is an important period for fish, so increased aquatic habitat availability for fish and macroinvertebrates is beneficial from late July through the end of September.

- Baseflow Recommendation (October 1 through May 15): **0.6 cfs**
  - This flow rate supports adequate wetted perimeter and depth in the channel to provide sufficient areas of holding habitat necessary to overwinter fish. It also provides enough water to support longitudinal movement of fish over riffles to overwintering habitat.

The purpose of this letter is to formally transmit this ISF recommendation to CWCB for the Board's consideration. Based on CPW's opinion that there is a flow-dependent natural environment in Picket Pin 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: 2026.01.08 13:37:51 -07'00'

Katie Birch, CPW Instream Flow Program Coordinator

Picket Pin Creek

Water **23008**	**Picket Pin Creek**			Date **7/28/2016**
Station **WR0192**	**ABV N Fk White River**			

Drainage	**White River**		UtmX	**304838**	UtmY	**4434101**	Elevation **2622 m**
			Length **99 m**		Width **1.51 m**		Area **0.01 Ha**
Surveyors	**Thompson, Reynolds**						
Gear	**BPEF 1 X LR-24**		Effort	**3.00**	Metric **PASS**	Protocol	**THREE-PASS REMOVAL**
Total catch	**9**						

Species	Count	Length (mm)	Weight (gm)	Status	Mark	Tag ID	Habitat
BRK	1	173	55	1			
BRK	1	155	47	1			
BRK	1	166	49	1			
BRK	1	150	35	1			
BRK	1	100	11	1			
BRK	1	109	15	1			
BRK	1	160	43	2			
BRK	1	180	60	2			
BRK	1	110	13	2			

Notes: Fish found freshly killed on bank with two puncture marks on side: BRK 147mm 29g. No fish captured on 3rd pass. Reach started on a split channel and ended at the beginning of another split. UTMs for both start points are: 13T 304927, 4434515 and 13T 304969, 4434576. Effort: Pass 1: 1094 sec, Pass 2: 1006 sec, Pass 3: 949 sec

10/09/2025

FIELD DATA
FOR
INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: Picket Pin Creek	CROSS-SECTION NO.:
CROSS-SECTION LOCATION: Bel Road	

DATE: 7/11/17	OBSERVERS: Skinner (Lisa Level)

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:

METER NUMBER:	DATE RATED:		
		CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs

CHANNEL BED MATERIAL SIZE RANGE:	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS:

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	
② WS Upstream		
③ WS Downstream		
SLOPE	0.025	

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

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME:

COMMENTS

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Picket Pin Creek		CROSS-SECTION NO.:	DATE: 7/11/17	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	Mean in Vertical	Area (ft²)	Discharge (cfs)
	S	0		4.1								
		1		5.3								
	GL	2		5.6								
	WL	2.5		5.7	0							
		3		5.8	.1					0		
		4		5.9	.1					.76		
		5		6.0	.2					.26		
		6		6.2	.5					.33		
		7		6.1	.4					1.41		
	R	8		5.6	0					0		
		9		5.8	.1					.33		
		10		5.8	.1					.20		
	WL	10.5		5.7	0							
	GL	11		5.6								
		12		5.1								
	S	13		4.1								

TOTALS:										

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

FIELD DATA
FOR
INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Picket Pin	CROSS-SECTION NO.:

CROSS-SECTION LOCATION: Abv Rd

DATE: 7/11/18	OBSERVERS: KB JS Meeker Crew

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: Marsh MCB

METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs

CHANNEL BED MATERIAL SIZE RANGE:	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS:

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	5.83/5.79
② WS Upstream	5.0	5.32
③ WS Downstream	6.0	6.33
SLOPE	1.01 / 11 =	

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

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL
LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)																	
Mayflies																	
Caddis Larvae																	

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME:

COMMENTS

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 Obser- vation (ft)	Revolutions		Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft²)	Discharge (cfs)
	S	0		4.10									
		1.1		4.65									
		1.6		5.50									
	W	1.6		5.83	0								
		2		6.10	0.15								
		.4		5.90	0.05								
		.8		5.90	0.05								
		3.2		5.95	0.20								
		.6		5.90	0.20								
		4		6.00	0.20								
		.4		6.05	0.30								
		.8		5.90	0.10								
		5.2		5.90	0.15								
		5.6		5.90	0.15								
	WL	5.9		5.79	0								
	GL	6.1		4.85									
		7		4.30									
	S	8.1		3.60									
			$Q =$	0.12 cfs									
				Measured in chute									
												$\frac{Q}{0}$	
	wL	0			0							0	$\frac{Q}{0}$
		.3			0.2				0.55			0.06	0.03
		.6			0.2				0.55			0.06	0.03
		.9			0.2				0.99			0.05	0.05
	WL	1.1			0							0	0
	TOTALS:												=0.12

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

| Site: Picket Pin				Reach: Abv Rd.						Reach:				Reach:		
Party:				Date: 7/11/13						Date:				Date:		
Inches	**PARTICLE**	**Millimeters**		**PARTICLE COUNT** 1 — 2 — 3				**TOT #**	**ITEM %**	**% CUM**	**TOT #**	**ITEM %**	**% CUM**	**TOT #**	**ITEM %**	**% CUM**
	Silt / Clay	< .062	S/C													
	Very Fine	.062 - .125	S A N D													
	Fine	.125 - .25														
	Medium	.25 - .50														
	Coarse	.50 - 1.0														
.04 - .08	Very Coarse	1.0 - 2		|||				3								
.08 - .16	Very Fine	2 - 4	G R A V E L	⊬⊬ ⊬⊬				10								
.16 - .22	Fine	4 - 5.7		⊬⊬ ||				7								
.22 - .31	Fine	5.7 - 8		|||				3								
.31 - .44	Medium	8 - 11.3		||||				4								
.44 - .63	Medium	11.3 - 16		⊬⊬ ⊬⊬ ⊬⊬ |||				18								
.63 - .89	Coarse	16 - 22.6		⊬⊬ |||				8								
.89 - 1.26	Coarse	22.6 - 32		⊬⊬ ⊬⊬ |||				13								
1.26 - 1.77	Very Coarse	32 - 45		⊬⊬ ⊬⊬ ||				12								
1.77 - 2.5	Very Coarse	45 - 64		⊬⊬ ⊬⊬ |				11								
2.5 - 3.5	Small	64 - 90	C O B B L E	⊬⊬ |				6								
3.5 - 5.0	Small	90 - 128		||||				4								
5.0 - 7.1	Large	128 - 180		||				2								
7.1 - 10.1	Large	180 - 256		||				2								
10.1 - 14.3	Small	256 - 362	B O U L D E R					0								
14.3 - 20	Small	362 - 512		|				1								
20 - 40	Medium	512 - 1024														
40 - 80	Large-Vry Large	1024 - 2048														
	Bedrock		BDRK													
						TOTALS →										
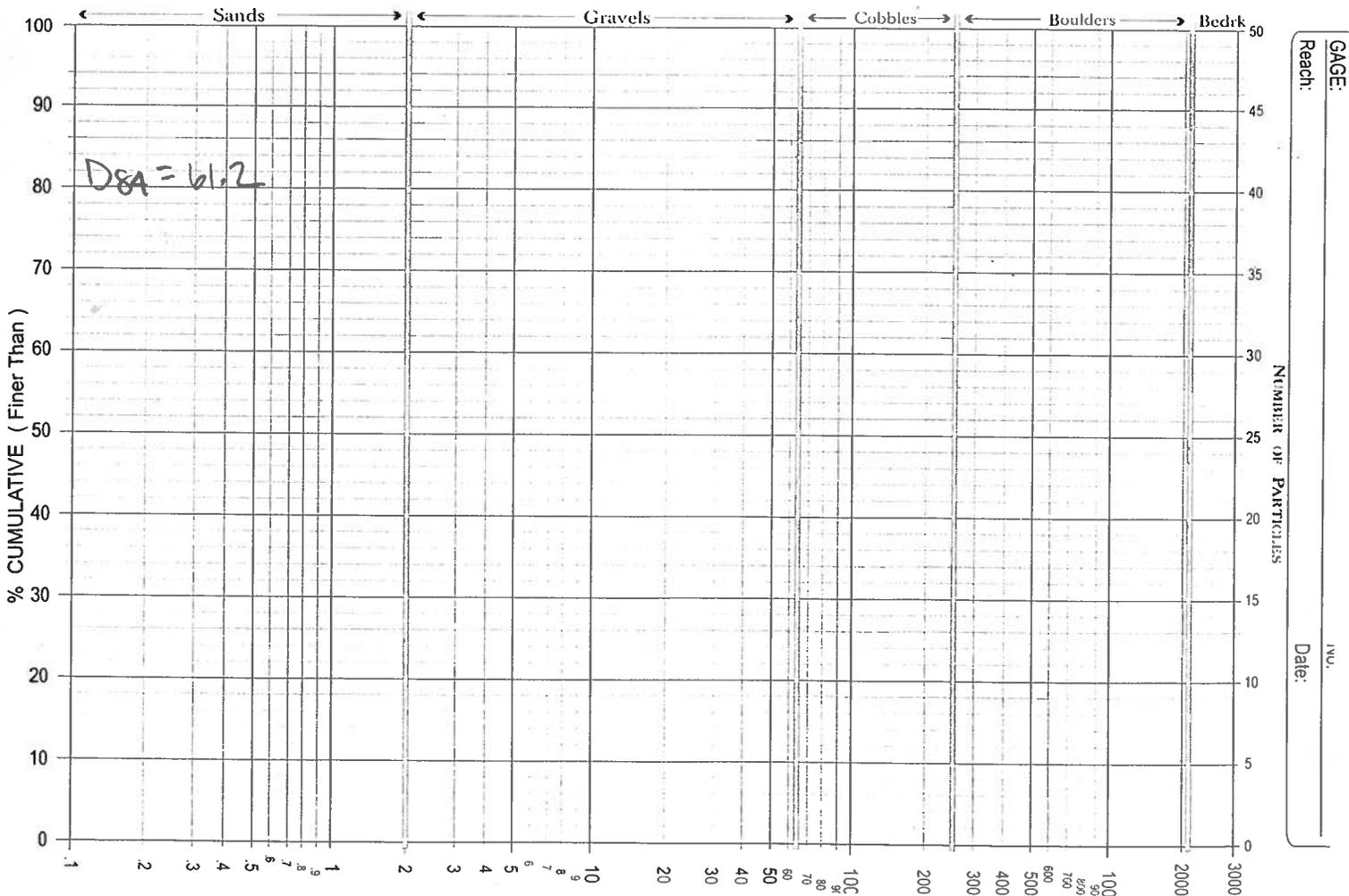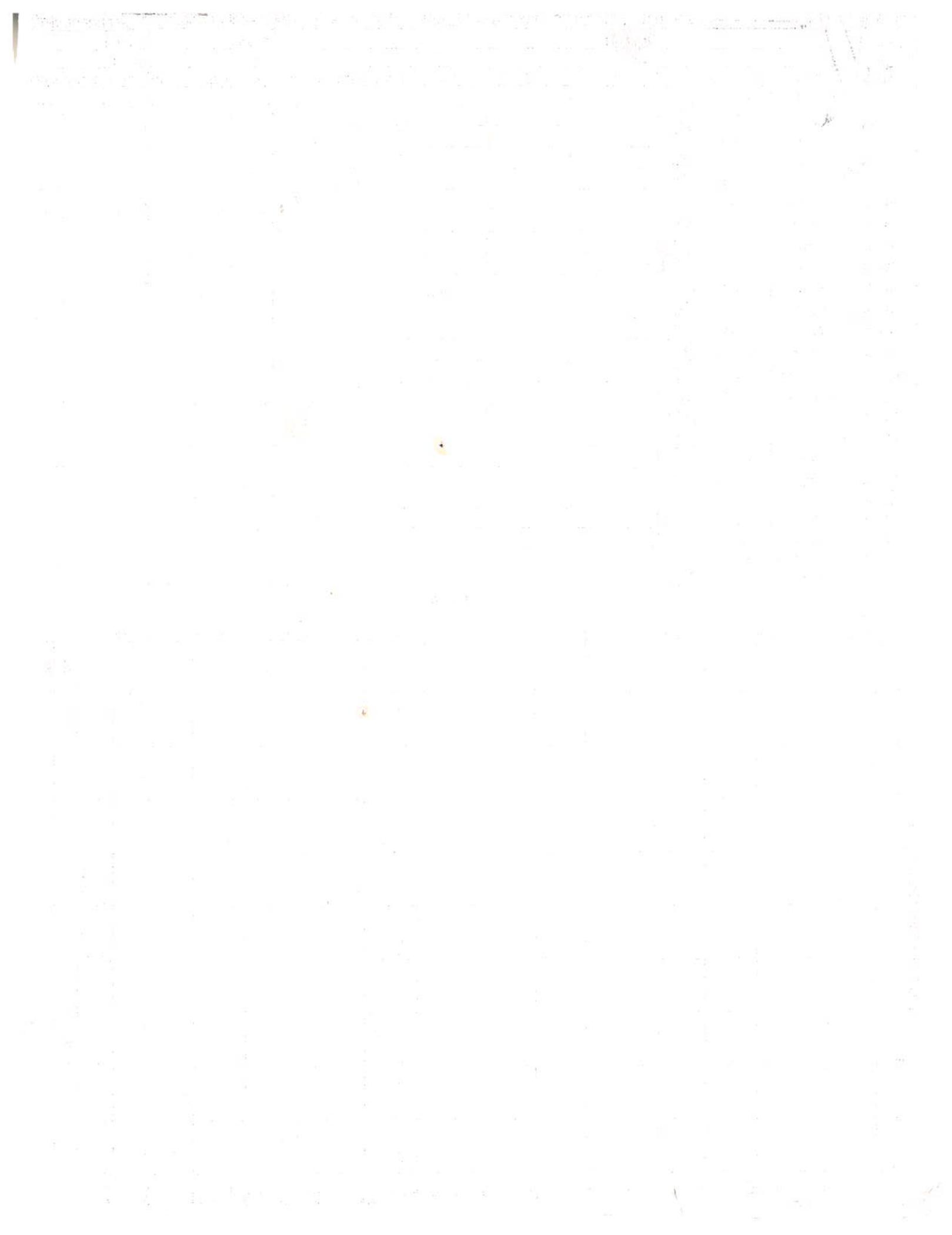
D84 = 61.2

R2Cross RESULTS

Stream Name: Picket Pin
Stream Locations: Above Trapper's Lake Road
Fieldwork Date: 07/11/2017
Cross-section: 1
Observers: Skinner
Coordinate System: UTM Zone 13
X (easting): 304892
Y (northing): 4434494
Date Processed: 08/26/2025
Slope: 0.025
Discharge: R2Cross data file: 0.91 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: R2CrossData_PicketPin_1-07-11-2017.xlsx
R2Cross version: 2.0.4

LOCATION
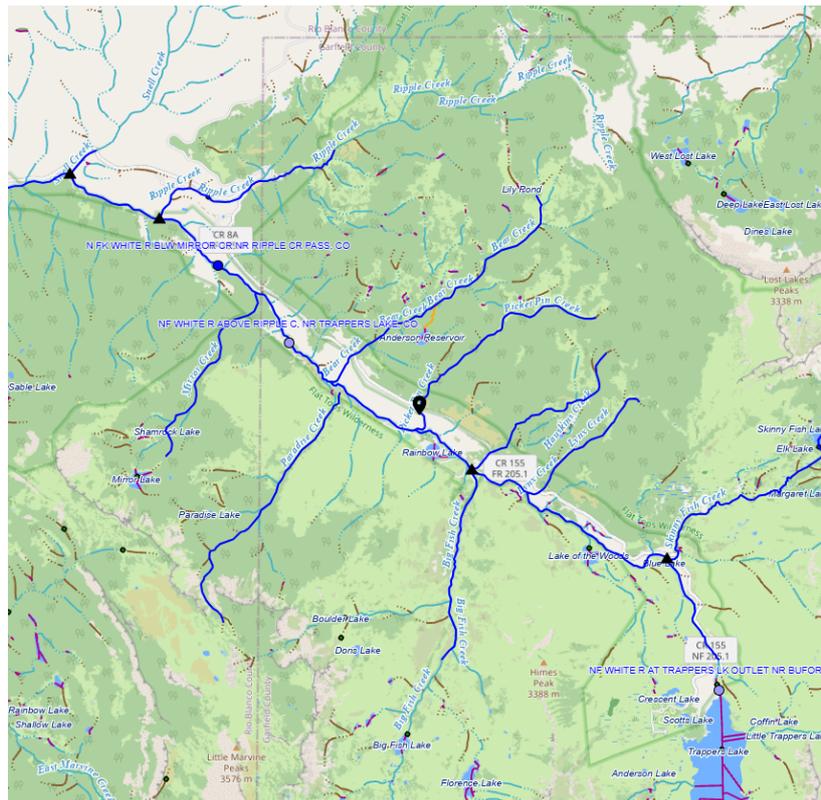
ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 9.0

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.97
Percent Wetted Perimeter (%)	50.0	0.64
Mean Velocity (ft/s)	1.0	2.15

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	5.6	9.0	0.27	0.6	2.4	9.21	100.0	0.26	0.09	1.08	2.59
	5.62	8.75	0.26	0.59	2.27	8.95	97.15	0.25	0.09	1.04	2.35
	5.63	8.49	0.25	0.57	2.14	8.69	94.29	0.25	0.09	1.0	2.13
	5.64	8.23	0.24	0.56	2.01	8.42	91.44	0.24	0.09	0.96	1.92
	5.66	7.98	0.24	0.54	1.89	8.16	88.58	0.23	0.1	0.92	1.73
	5.67	7.72	0.23	0.53	1.77	7.9	85.73	0.22	0.1	0.88	1.55
	5.69	7.47	0.22	0.51	1.66	7.63	82.87	0.22	0.1	0.84	1.39
	5.71	7.21	0.21	0.49	1.55	7.37	80.02	0.21	0.1	0.8	1.24
Waterline	5.72	6.98	0.21	0.48	1.45	7.13	77.37	0.2	0.11	0.76	1.1
	5.72	6.96	0.21	0.48	1.44	7.11	77.16	0.2	0.11	0.76	1.09
	5.74	6.71	0.2	0.47	1.34	6.85	74.31	0.2	0.11	0.72	0.97
	5.75	6.45	0.19	0.45	1.24	6.58	71.45	0.19	0.11	0.68	0.85
	5.76	6.2	0.19	0.43	1.15	6.32	68.6	0.18	0.12	0.65	0.74
	5.78	5.94	0.18	0.42	1.06	6.06	65.74	0.17	0.12	0.61	0.64
	5.79	5.68	0.17	0.41	0.97	5.79	62.89	0.17	0.12	0.57	0.56
	5.81	4.48	0.2	0.39	0.89	4.58	49.75	0.2	0.11	0.72	0.64
	5.83	4.3	0.19	0.38	0.83	4.4	47.75	0.19	0.11	0.68	0.57
	5.84	4.12	0.19	0.36	0.77	4.21	45.75	0.18	0.12	0.65	0.5
	5.86	3.94	0.18	0.35	0.71	4.03	43.74	0.17	0.12	0.61	0.43
	5.87	3.76	0.17	0.33	0.65	3.85	41.74	0.17	0.12	0.58	0.38
	5.88	3.58	0.17	0.32	0.59	3.66	39.74	0.16	0.13	0.55	0.32
	5.9	3.4	0.16	0.3	0.54	3.48	37.74	0.16	0.13	0.52	0.28
	5.92	3.22	0.15	0.28	0.49	3.29	35.74	0.15	0.14	0.49	0.24
	5.93	3.04	0.15	0.27	0.44	3.11	33.74	0.14	0.14	0.46	0.2
	5.95	2.86	0.14	0.26	0.4	2.92	31.74	0.14	0.15	0.43	0.17

5.96	2.68	0.13	0.24	0.36	2.74	29.74	0.13	0.15	0.4	0.14
5.97	2.5	0.13	0.23	0.32	2.56	27.74	0.12	0.16	0.38	0.12
5.99	2.32	0.12	0.21	0.28	2.37	25.74	0.12	0.16	0.35	0.1
6.0	2.17	0.12	0.2	0.25	2.21	24.01	0.11	0.17	0.32	0.08
6.02	2.06	0.11	0.18	0.22	2.1	22.81	0.1	0.18	0.29	0.06
6.04	1.96	0.1	0.17	0.19	1.99	21.62	0.09	0.2	0.25	0.05
6.05	1.85	0.09	0.15	0.16	1.88	20.43	0.08	0.21	0.21	0.03
6.07	1.75	0.08	0.14	0.13	1.77	19.23	0.07	0.24	0.18	0.02
6.08	1.64	0.06	0.12	0.11	1.66	18.04	0.06	0.27	0.14	0.01
6.09	1.53	0.05	0.1	0.08	1.55	16.84	0.05	0.31	0.11	0.01
6.11	1.35	0.04	0.09	0.06	1.36	14.8	0.04	0.36	0.08	0.0
6.12	1.12	0.04	0.08	0.04	1.14	12.33	0.04	0.42	0.06	0.0
6.14	0.9	0.03	0.06	0.03	0.91	9.87	0.03	0.51	0.04	0.0
6.16	0.67	0.02	0.04	0.02	0.68	7.4	0.02	0.64	0.03	0.0
6.17	0.45	0.01	0.03	0.01	0.45	4.93	0.01	0.9	0.02	0.0
6.18	0.22	0.01	0.01	0.0	0.23	2.47	0.01	1.61	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) =	0.91	(cfs)
Calculated Flow (Qc) =	0.99	(cfs)
(Qm-Qc)/Qm * 100 =	-9.73%	
Measured Waterline (WLm) =	5.7	(ft)
Calculated Waterline (WLc) =	5.72	(ft)
(WLm-WLc)/WLm * 100 =	-0.33%	
Max Measured Depth (Dm) =	0.5	(ft)
Max Calculated Depth (Dc) =	0.48	(ft)
(Dm-Dc)/Dm * 100 =	3.78%	
Mean Velocity =	0.68	(ft/s)
Manning's n =	0.119	
0.4 * Qm =	0.36	(cfs)
2.5 * Qm =	2.26	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	4.1		
	1	5.3		
Bankfull	2	5.6		
Waterline	2.5	5.7	0	0
	3	5.8	0.1	0
	4	5.9	0.1	0.76
	5	6	0.2	0.26
	6	6.2	0.5	0.33
	7	6.1	0.4	1.41
	8	5.6	0	0
	9	5.8	0.1	0.33
	10	5.8	0.1	0.2
Waterline	10.5	5.7	0	0
Bankfull	11	5.6		
	12	5.1		
	13	4.1		

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
0.51	0.1	0.07	0	0
1	0.1	0.1	0.08	8.4
1	0.2	0.2	0.05	5.75
1.02	0.5	0.5	0.17	18.23
1	0.4	0.4	0.56	62.32
1.12	0	0	0	0
1.02	0.1	0.1	0.03	3.65
1	0.1	0.07	0.01	1.66
0.51	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

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"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: Picket Pin
Stream Locations: Above Trapper's Lake Road
Fieldwork Date: 07/11/2018
Cross-section: 2
Observers: Birch Skinner
Coordinate System: UTM Zone 13
X (easting): 304892
Y (northing): 4434494
Date Processed: 08/04/2025
Slope: 0.0918
Discharge: R2Cross data file: 0.12 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: R2CrossData_PicketPin_2-07-11-2018.xlsx
R2Cross version: 2.0.4

LOCATION

ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 4.91

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.27
Percent Wetted Perimeter (%)	50.0	0.01
Mean Velocity (ft/s)	1.0	2.15

R2Cross RESULTS: Picket Pin - 07/11/2018 XS 2, Analysis Method: [Ferguson VPE]

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	4.85	4.91	1.01	1.25	4.96	6.52	100.0	0.76	0.15	2.46	12.22
	4.9	4.87	0.97	1.2	4.73	6.42	98.47	0.74	0.16	2.35	11.13
	4.95	4.84	0.93	1.15	4.49	6.32	96.84	0.71	0.16	2.23	10.03
	5.0	4.81	0.88	1.1	4.25	6.21	95.2	0.68	0.17	2.11	8.98
	5.05	4.77	0.84	1.05	4.01	6.1	93.57	0.66	0.17	1.99	7.98
	5.1	4.74	0.8	1.0	3.77	6.0	91.94	0.63	0.18	1.87	7.05
	5.15	4.7	0.75	0.95	3.53	5.89	90.31	0.6	0.18	1.75	6.17
	5.2	4.67	0.71	0.9	3.3	5.78	88.68	0.57	0.19	1.62	5.35
	5.25	4.63	0.66	0.85	3.07	5.68	87.05	0.54	0.2	1.5	4.59
	5.3	4.6	0.62	0.8	2.83	5.57	85.42	0.51	0.21	1.37	3.89
	5.35	4.57	0.57	0.75	2.61	5.46	83.79	0.48	0.22	1.25	3.25
	5.4	4.53	0.52	0.7	2.38	5.36	82.16	0.44	0.23	1.12	2.67
	5.45	4.5	0.48	0.65	2.15	5.25	80.53	0.41	0.25	1.0	2.15
	5.5	4.46	0.43	0.6	1.93	5.15	78.89	0.37	0.27	0.88	1.69
	5.55	4.44	0.38	0.55	1.71	5.04	77.31	0.34	0.29	0.75	1.28
	5.6	4.41	0.34	0.5	1.48	4.94	75.72	0.3	0.32	0.63	0.94
	5.65	4.39	0.29	0.45	1.26	4.84	74.14	0.26	0.36	0.51	0.65
	5.7	4.36	0.24	0.4	1.05	4.73	72.55	0.22	0.41	0.4	0.42
	5.75	4.33	0.19	0.35	0.83	4.63	70.97	0.18	0.49	0.29	0.24
Waterline	5.8	4.29	0.14	0.3	0.61	4.51	69.18	0.14	0.62	0.19	0.12
	5.85	4.12	0.1	0.25	0.4	4.3	65.96	0.09	0.84	0.11	0.04
	5.9	3.91	0.05	0.2	0.2	4.07	62.36	0.05	1.43	0.04	0.01
	5.95	1.47	0.06	0.15	0.09	1.58	24.2	0.06	1.25	0.05	0.0
	6.0	0.91	0.04	0.1	0.03	0.98	15.03	0.03	1.95	0.02	0.0
	6.05	0.22	0.02	0.05	0.0	0.25	3.77	0.02	3.03	0.01	0.0

6.08	0.05	0.01	0.01	0.0	0.06	0.93	0.01	7.76	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) =	0.12	(cfs)
Calculated Flow (Qc) =	0.12	(cfs)
(Qm-Qc)/Qm * 100 =	0.20%	
Measured Waterline (WLm) =	5.81	(ft)
Calculated Waterline (WLc) =	5.8	(ft)
(WLm-WLc)/WLm * 100 =	0.22%	
Max Measured Depth (Dm) =	0.3	(ft)
Max Calculated Depth (Dc) =	0.3	(ft)
(Dm-Dc)/Dm * 100 =	-0.99%	
Mean Velocity =	0.19	(ft/s)
Manning's n =	0.616	
0.4 * Qm =	0.05	(cfs)
2.5 * Qm =	0.3	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	4.1		
Bankfull	1.1	4.65		
	1.5	5.5		
Waterline	1.6	5.83	0	0
	2	6.1	0.15	0.19354838709677416
	2.4	5.9	0.05	0.19354838709677416
	2.8	5.9	0.05	0.19354838709677416
	3.2	5.95	0.2	0.19354838709677416
	3.6	5.9	0.2	0.19354838709677416
	4	6	0.2	0.19354838709677416
	4.4	6.05	0.3	0.19354838709677416
	4.8	5.9	0.1	0.19354838709677416
	5.2	5.9	0.15	0.19354838709677416
	5.6	5.9	0.15	0.19354838709677416
Waterline	5.9	5.79	0	0
Bankfull	6.1	4.85		
	7	4.3		
	8.1	3.6		

R2Cross RESULTS: Picket Pin - 07/11/2018 XS 2, Analysis Method: [Ferguson VPE]

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
0.48	0.15	0.06	0.01	9.8
0.45	0.05	0.02	0	3.27
0.4	0.05	0.02	0	3.27
0.4	0.2	0.08	0.02	13.06
0.4	0.2	0.08	0.02	13.06
0.41	0.2	0.08	0.02	13.06
0.4	0.3	0.12	0.02	19.59
0.43	0.1	0.04	0.01	6.53
0.4	0.15	0.06	0.01	9.8
0.4	0.15	0.05	0.01	8.57
0.32	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

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Picket Pin Creek Cross Section 1, looking upstream.

Picket Pin Creek, Cross-Section 2 Looking upstream and downstream

Picket Pin, Cross-Section 2 Looking downstream from left bank

Map and Statement

of

The Bear Creek Ditch and The Lynx Creek Ditch.

Scale 1/15840
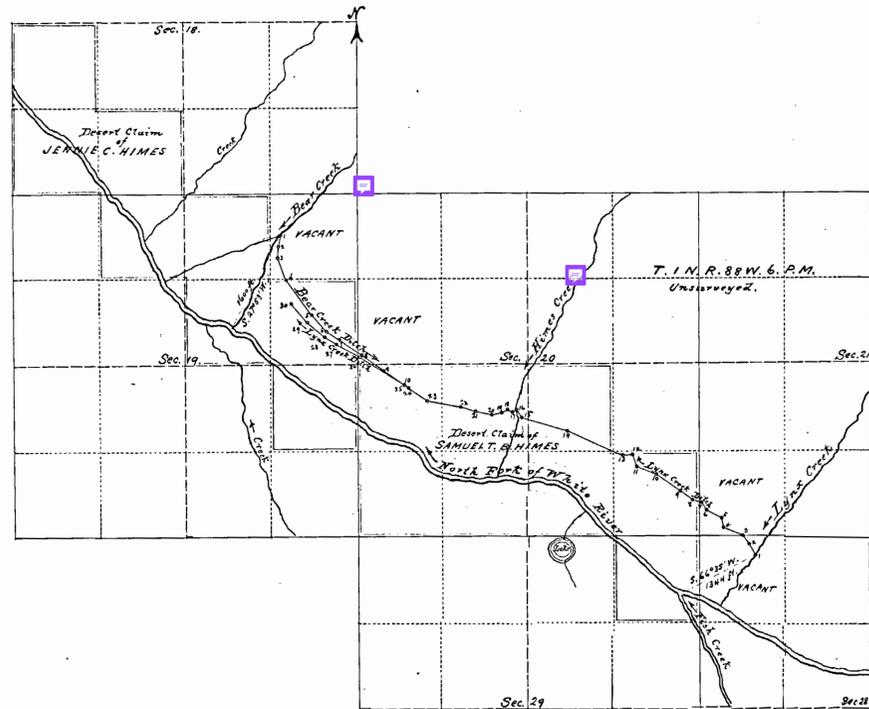
Samuel T. B. Himes and Jennie C. Himes the owners of the following described ditches, in compliance with the requirements of the provisions of chapter 126 of the Session Laws of 1903 of the State of Colorado, do hereby make this statement for filing.

The names of the said ditches are The Lynx Creek Ditch and The Bear Creek Ditch.

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