COLORADO
Parks and Wildlife
Department of Natural Resources

Water Resources Section
6060 Broadway
Denver, CO 80216

January 14, 2026

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 Pando Creek in Water Division 7, San Juan County 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 Pando Creek in Water Division 7. Field investigations relating to this ISF recommendation were completed by Colorado Parks and Wildlife (CPW) staff in 2024 and 2025. Pando Creek is a headwaters stream where CPW is working to establish a conservation population of the San Juan cutthroat trout, a rare lineage of Colorado River cutthroat trout (CRCT). CRCT are a Tier 1 Species of Greatest Conservation Need (SGCN) ranked in Colorado's State Wildlife Action Plan. This ISF recommendation was first presented to interested parties at the ISF Workshop in February 2025. CPW and CWCB staff conducted outreach to the San Juan County Commissioners in December 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 Pando 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 (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 Pando Creek from the headwaters (located at UTM 13S 247327 4174104) to confluence with Cascade Creek (located at UTM 13S 249853 4174770). The reach is approximately 1.9 miles in length. The proposed reach is entirely on public lands managed under the San Juan National Forest.

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 species, 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, and secure and enhance watershed conditions they rely upon. CPW believes that flow protection can be achieved by establishing an ISF water right. This is a measurable conservation action aligned with the goal of "securing and enhancing watershed conditions" that will support the conservation populations of CRCT. 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 populations of CRCT is a critical step in the overall preservation of these important native species.

Natural Environment and Biological Summary

Pando Creek is headwaters stream that is tributary to Cascade Creek near Purgatory Ski Area north of the City of Durango. Its headwaters originate at 11,600 feet north of Grayrock Peak. Hydrology of the creek is influenced by snowmelt runoff, monsoonal, and late season storms with perennial baseflows. Mean annual precipitation in the basin is approximately 37 inches. The drainage basin is approximately 1.8 square miles and is high elevation (mean basin elevation is 11,100 feet) and densely forested.

Pando Creek is extremely high-gradient, with substrate that ranges from small gravel to large boulder with bedrock outcroppings. Substrate is predominantly medium to large cobbles, but there are small pockets of gravels suitable for spawning. Large boulders and woody debris create excellent step-pool habitat. Fish habitat includes medium pools and excellent cover features like undercut banks and woody debris in the channel. The creek supports healthy riparian and macroinvertebrate communities.

There are a number of full and partial fish barriers along Cascade Creek and Pando Creek near its confuence with Cascade Creek. For this reason, the stream became a candidate to establish a population of San Juan lineage CRCT. In 2021 through 2024, CPW stocked San Juan lineage cutthroat trout with the goal of establishing a core conservation population. Follow-up monitoring will be conducted in coming years to assess the population and look for evidence of natural recruitment.

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

In 2024 and 2025, CPW collected 3 cross-sectional datasets on Pando Creek. The R2Cross results from are summarized below:

	Bankfull Top Width	Date Measured	Flow Measured	Flow Meeting Two Criteria	Flow Meeting Three Criteria
1	21.7	9/4/2024	1.6 cfs	3.7 cfs (WP)	3.8 cfs (depth)
2	20.3	9/5/2025	~0.35 cfs*	1.0 cfs (WP)	8.94 cfs (velocity)

[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

3	16.7	9/5/2025	~0.35 cfs*	0.63 cfs (depth)	6.08 cfs (velocity)
Recommended Flow Rates:				**3.7 cfs**	**3.8 cfs**

*Approximate flow measurement. Due to imprecise flow measurement, results from cross-section 2 and 3 were omitted from the analysis.

The biological flow recommendation during the baseflow period is 3.7 cfs. This flow rate will be protective by maintaining over 50 percent wetted perimeter and average velocity of 1.0 feet per second (fps). The biological flow recommendation in the summer is 3.9 cfs. This flow rate will also maintain wetted perimeter, average depth of at least 0.2 feet, and average velocity.

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 Pando Creek. Pando Creek does not have any gage data, so CWCB staff used a downstream gage on Cascade Creek (USGS 9359082 "Cascade Creek Diversion near Rockwood CO") which has records from 2011 onwards. Median hydrology was prorated based on a weighted area-precipitation factor. 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 are modifications to the biological flow recommendations due to water availability during the baseflow period, early spring, and later summer through fall periods. Therefore, CPW's refined flow recommendations are the following:

- Baseflow Recommendation (September 1 through March 31): **0.4 cfs**
    - This flow recommendation has been reduced due to water availability constraints but will maintain sufficient holding habitats in deep habitat features like glides and pools. This will support fish during overwintering periods when metabolic activity is limited, and they are overwintering in discrete habitat features (i.e. not moving longitudinally throughout the stream).
- April Flow Recommendation (April 1 through April 30): **1.3 cfs**
    - This flow recommendation has been reduced due to water availability constraints but will maintain sufficient velocity and adequate habitat availability in deep habitat features like pools and glides. As snowmelt begins leading up to spring runoff, this flow rate will support increased movement of trout over cascades and step-pool features.
- High Flow Recommendation (May 1 through June 30): **3.8 cfs**
    - Maintains adequate depth, velocity, and wetted perimeter during snowmelt runoff and its receding limb when cutthroat trout are active feeding and spawning. This flow rate supports ideal conditions for cutthroat trout who spawn in the early months of summer. It also supports sufficient wetted perimeter, depth and velocity to support a productive macroinvertebrate community.

- Late Summer and Fall Flow Recommendation (July 1 through August 31): **1.1 cfs**
    - This flow recommendation has been reduced due to water availability limitations but will maintains sufficient holding habitat is cascades, pools, and glides. This flow rate will provide rearing and refuge habitats during the critical late summer time period when longer days and warmer water temperature facilitate growth.

The purpose of this letter is to formally transmit this ISF recommendation to CWCB for their Board's consideration. Based on CPW's opinion there is a flow-dependent natural environment in Pando 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: 2026.01.14 14:12:18 -07'00'

Katie Birch, CPW Instream Flow Program Coordinator

SAN JUAN COUNTY
COLORADO

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SILVERTON, COLORADO 81433
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December 17, 2025

Colorado Water Conservation Board
Department of Natural Resources

To Whom It May Concern:

During their regular meeting of December 15, 2025, the San Juan County Commissioners reviewed the recommendation for the 2026 Instream Flow streams located within San Juan County. The Commissioners believe it is in the best interest of San Juan County to support the requested Instream Flow rates for Pando Creek and Mill Creek as presented.

Thank you for your consideration.

Sincerely,

William A. Tookey
San Juan County Administrator

CAMP, PANDO, EZ, AND GRAYSILL CREEKS

Waters:	Camp Creek, Pando Creek, EZ Creek, Graysill Creek
Sampling Date:	August 11, 2020
Gear:	Smith Root LR24 Backpack Electrofisher
Drainage:	San Juan River Basin
Water Code:	Camp Creek (38037), Pando Creek (38041), EZ Creek (38038), Graysill Creek (38039)

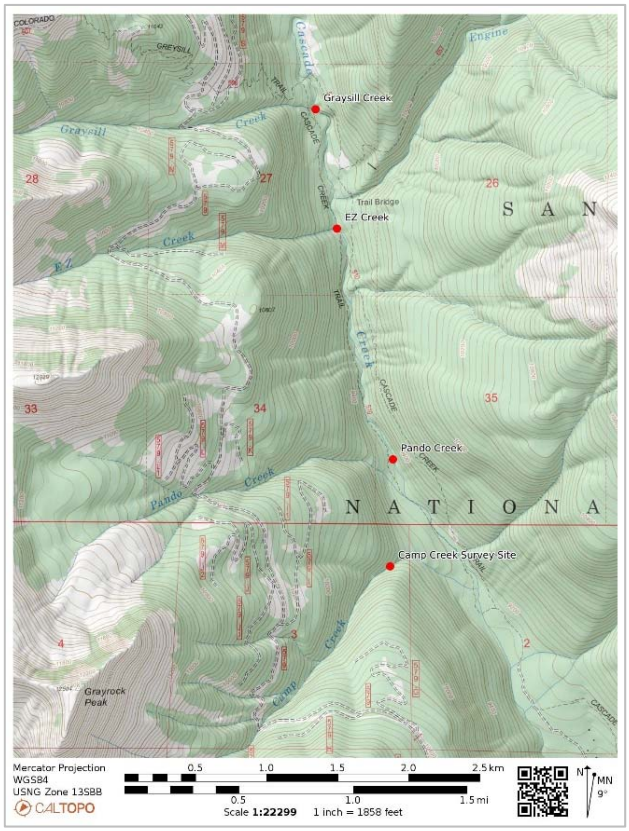


Figure 8. Map of Cascade Creek tributary streams.

Objective:

To assess the presence/absence of fish and fish barriers for possible introduction of San Juan Cutthroat Trout.

History:

All four of these streams flow easterly off the Graysill Mountain range into Cascade Creek, a large tributary to the Animas River (Figure 8). The habitat is characterized by cascading steep gradients creating plunge pools and small riffles. All four of these streams had baseflows of 0.5 cfs or more despite the deep drought we were in this summer. Pando Creek was running about 2 – 3 cfs in August with some pools 2-3 feet deep.

These streams were originally surveyed along an old logging road named Cascade Divide Road. This road is situated at about 10,400 ft in elevation and near the headwaters of these short steep streams. Not surprisingly, no fish were captured up this high; presumably because there are waterfall barriers below. The Cascade Creek Trail runs adjacent to its namesake along the west and east sides of the creek. On the east side all four streams flow across the trail. Surveying each stream starting at the confluence with Cascade Creek was possible in one day. My goal was to characterize the distribution of Brook Trout and document barriers in each one of these streams with the hopes of identifying suitable, barren, habitat for San Juan Cutthroat Trout (Big Bend/Clear Creek broodstock progeny).

Results:

In all four streams, Brook Trout were documented in approximately the first 50 yards of the streams starting at the confluence with Cascade Creek (except Camp Creek). Above this point I found no fish in the next 1,000 feet of stream, despite what appeared to be suitable habitat. There were several steep

boulder cascades as one moves up from the confluences but nothing I would describe as being a “good” barrier to fish movement.

Camp Creek was dry for about the first ½ mile. Above this point there was about 0.25-0.5cfs of flow. There was flow across the Cascade Creek Divide Road in all of these creeks a week earlier so I knew there was probably flow in the lower part of the creek. Camp Creek connects to Cascade Creek during the spring snow melt.

Pando Creek had the best habitat. Flows were at least 2.0 cfs in August. The water is cold and clear. Deep plunge pools characterize the habitat including one right off the trail. Although Cascade Creek is only a couple hundred feet away, this pool was devoid of fish. Only a few Brook Trout were found in the first 50 feet of stream. There is 100 plus yard long bedrock “slide” feature in Cascade Creek where Pando Creek empties into it. There is basically no holding habitat for Brook Trout in this vicinity. That might, at least partially, explain the lack of Brook Trout in Pando Creek.

EZ Creek and Graysill Creek were very similar. Less flow than Pando but fish only occupied the lower 50-100 feet of stream. There were not as many deep pools in either one of these streams and the gradient was consistently steep with evidence of a higher sediment bedload moving through them.

Conclusion:

Pando Creek has suitable, unoccupied habitat for Cutthroat Trout. The creek is not in the Weminuche Wilderness area and can be stocked without undergoing a Minimum Tools Requirement Analysis by the San Juan National Forest Service. The Durango Hatchery Isolation Unit is holding broodstock fish from Big Bend and Clear creeks. Several thousand fertilized eggs were taken from these fish this spring but 90% of the resulting hatched out fish died. The remainder of the offspring (~200 fingerling fish) were taken to Pando Creek in September and stocked from the trail upstream approximately 2,000 feet.

Management Recommendations:

Management	Review management codes and regulations based on stocking and SJN recruitment in these creeks.
Stocking	Stock Pando, EZ and Graysill from the Divide Road if SJN progeny available.
Regulations	No change unless we establish a functioning population
Habitat Improvement	None
Access/ Facilities	None recommended
Comments	Continue to monitor abundance and distribution of SJN stocked fish

Photo 14. Camp Creek

Photo 13. Pando Creek

Photo 16. Bedrock slide at confluence with Pando Creek

Photo 15. Brook Trout in Pando Creek.

Photo 17. Graysill Creek.

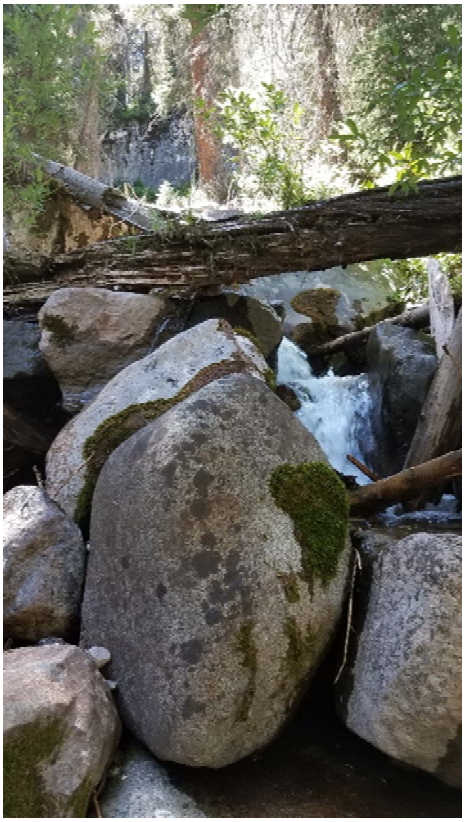


Photo 18. Waterfalls on EZ Creek.

Photo 19. Backpack solo rig.

Photo 20. Stocking San Juan Cutthroat into Pando Creek, Sept. 2020.

Year	Date String	Date Stocked	Water Code	Water Name	Drainage	Bio	Senior Bio	Ownership	Req Species	Stocked Species	Fish Type	Method	Unit	Control	Source Lot
2024	SEP	2024-09-24	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	5976	null
2024	SEP	2024-09-24	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	1709	null
2023	SEP	2023-09-26	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	6010	null
2022	SEP	2022-09-12	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	8864	null
2022	SEP	2022-09-09	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	3171	null
2021	OCT	2021-10-11	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	7376	null
2021	SEP	2021-09-28	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	6587	null
2020	SEP	2020-09-18	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	9806	null

Showing

Biologist	Kade Jackson
Sr Biologist	All
Stocked Min Length	All
Stocked Max Length	All
Stocked Species	All
Req Species	All
Year	All
Fish Type	All
Req Min Length	All
Req Max Length	All
Region	All
Area	15
Req Method	All
Stocking Method	All
Broodfish	All
Special Event	All
Control Number	All
Date String	All
Unit Code	All
Drainage	All
Min Num Stocked	All
Max Num Stocked	All
Date Stocked	All
Water	38040 - Mill Creek, 38041 - Pando Creek
Ownership	All
Source Lot	All

Year	Date String	Date Stocked	Water Code	Water Name	Drainage	Bio	Senior Bio	Ownership	Req Species	Stocked Species	Fish Type	Method	Unit	Control	Source Lot
2024	SEP	2024-09-24	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	5976	null
2024	SEP	2024-09-24	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	1709	null
2023	SEP	2023-09-26	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	6010	null
2022	SEP	2022-09-12	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	8864	null
2022	SEP	2022-09-09	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	3171	null
2021	OCT	2021-10-11	38040	Mill Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	7376	null
2021	SEP	2021-09-28	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	6587	null
2020	SEP	2020-09-18	38041	Pando Creek	SJ - San Juan River	Kade Jackson	Jim White		SJN	SJN	WD- subcatchable	Pack	DQ1	9806	null

Showing

Biologist	Kade Jackson
Sr Biologist	All
Stocked Min Length	All
Stocked Max Length	All
Stocked Species	All
Req Species	All
Year	All
Fish Type	All
Req Min Length	All
Req Max Length	All
Region	All
Area	15
Req Method	All
Stocking Method	All
Broodfish	All
Special Event	All
Control Number	All
Date String	All
Unit Code	All
Drainage	All
Min Num Stocked	All
Max Num Stocked	All
Date Stocked	All
Water	38040 - Mill Creek, 38041 - Pando Creek
Ownership	All
Source Lot	All

Pando Ck 9/5/25

UTM

4.25

RWS 4.32 LWS 4.25

Feature	H	V	depth
~~RWS~~	~~4.25~~		
BC	0	2.65	
~~BP~~	3.3	3.33	
LWS	8.5	4.25	0
	9	4.43	0.1
Rock	9.5	4.35	0
R	10	4.38	0.30
	10.5	4.43	0.15
	11	4.31	0
R	11.5	4.14	0
	12	4.4	0.16
	12.5	4.26	0.02
	13	4.51	0.26
	13.5	4.52	0.27
	14	4.40	0.13
	14.5	4.62	0.39
R	15	4.25	0
	15.5	4.8	0.56
	16	4.83	0.6
	16.5	4.64	0.4
	17	4.58	0.33

FEAT	H	V	DEPTH
R	17.5	~~4.22~~	0
R	18	4.08	0
R	18.5	3.71	0
RWS R	19	4.25	0
BF	20.5	2.4	

length 12.16
WSUP - 4.25
WSDS - 4.47

Pando Creek
UTM

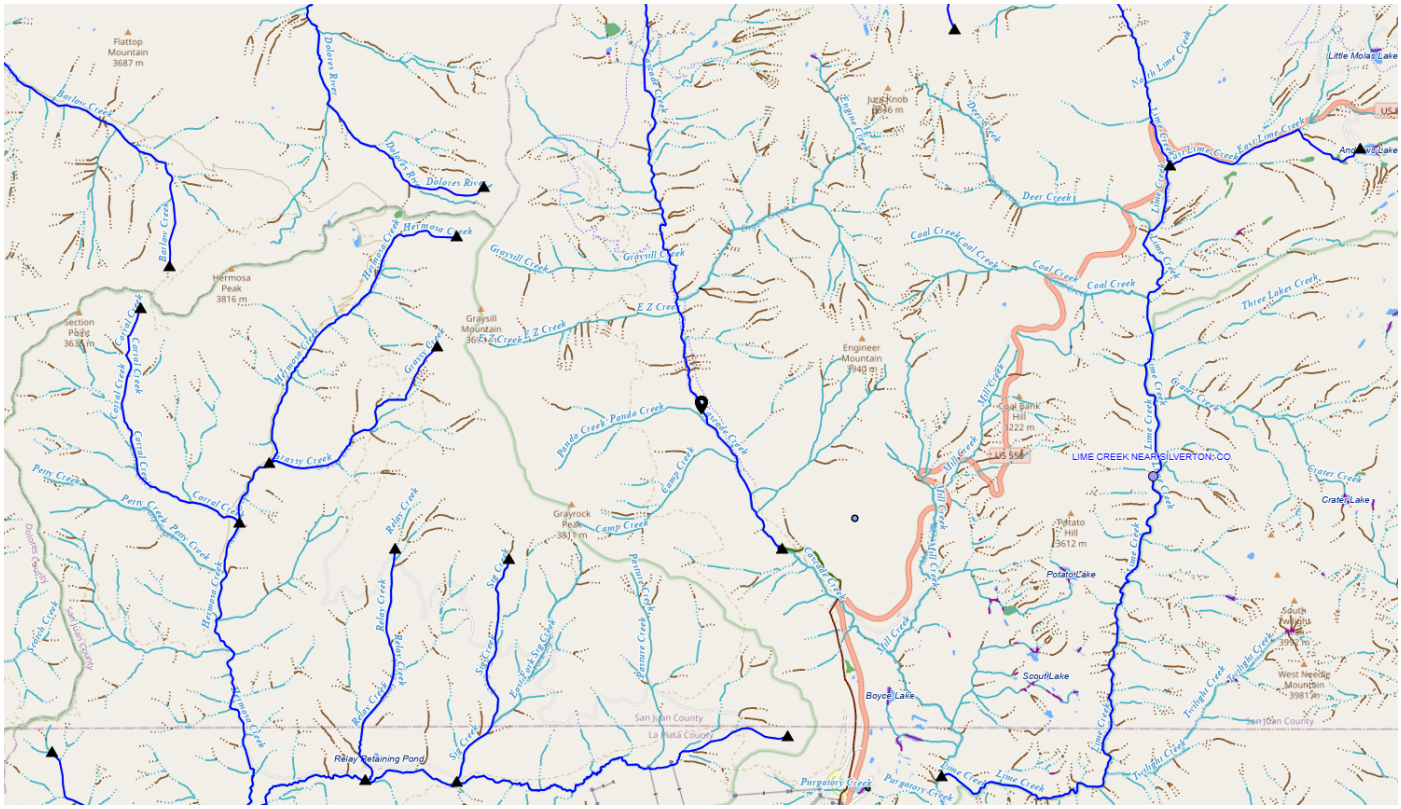
~~UWS~~
LWS

Feature	H
Stake	0
	2.
LWS	U
	4
Rock	
	Rock

R2Cross RESULTS

Stream Name: Pando Creek
Stream Locations: Upstream of trail crossing
Fieldwork Date: 09/05/2025
Cross-section: 2
Observers: KB VW KR DS
Coordinate System: UTM Zone 13
X (easting): 249729
Y (northing): 4175081
Date Processed: 12/04/2025
Slope: 0.0175
Discharge: Entered Value: 0.35 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: Pando_XS2_9-5-25_Q=.xlsx
R2Cross version: 2.0.4

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 20.3

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.203	0.33
Percent Wetted Perimeter (%)	50.0	1.0
Mean Velocity (ft/s)	1.0	8.94

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	2.65	20.3	1.29	2.18	26.28	22.41	100.0	1.17	0.08	2.77	72.7
	2.66	20.23	1.29	2.17	26.04	22.34	99.67	1.17	0.08	2.75	71.5
	2.71	19.95	1.26	2.12	25.04	22.02	98.28	1.14	0.08	2.66	66.51
	2.76	19.66	1.22	2.07	24.05	21.71	96.89	1.11	0.08	2.57	61.73
	2.81	19.38	1.19	2.02	23.07	21.4	95.5	1.08	0.08	2.48	57.15
	2.86	19.1	1.16	1.97	22.11	21.09	94.1	1.05	0.08	2.39	52.78
	2.91	18.82	1.12	1.92	21.16	20.78	92.71	1.02	0.09	2.3	48.61
	2.96	18.53	1.09	1.87	20.23	20.46	91.32	0.99	0.09	2.21	44.64
	3.01	18.25	1.06	1.82	19.31	20.15	89.93	0.96	0.09	2.12	40.86
	3.06	17.97	1.02	1.77	18.4	19.84	88.53	0.93	0.09	2.03	37.27
	3.11	17.68	0.99	1.72	17.51	19.53	87.14	0.9	0.09	1.93	33.88
	3.16	17.4	0.96	1.67	16.63	19.22	85.75	0.87	0.1	1.84	30.67
	3.21	17.12	0.92	1.62	15.77	18.9	84.35	0.83	0.1	1.75	27.64
	3.26	16.83	0.89	1.57	14.92	18.59	82.96	0.8	0.1	1.66	24.8
	3.31	16.55	0.85	1.52	14.09	18.28	81.57	0.77	0.11	1.57	22.13
	3.36	16.24	0.82	1.47	13.27	17.94	80.06	0.74	0.11	1.48	19.67
	3.41	15.92	0.78	1.42	12.46	17.59	78.5	0.71	0.11	1.4	17.41
	3.46	15.59	0.75	1.37	11.68	17.24	76.93	0.68	0.12	1.31	15.31
	3.51	15.27	0.71	1.32	10.9	16.89	75.36	0.65	0.12	1.23	13.36
	3.56	14.95	0.68	1.27	10.15	16.54	73.79	0.61	0.12	1.14	11.57
	3.61	14.63	0.64	1.22	9.41	16.19	72.23	0.58	0.13	1.06	9.93
	3.66	14.3	0.61	1.17	8.69	15.83	70.66	0.55	0.14	0.97	8.44
	3.71	13.98	0.57	1.12	7.98	15.48	69.07	0.52	0.14	0.89	7.09
	3.76	13.54	0.54	1.07	7.29	14.97	66.82	0.49	0.15	0.82	5.97
	3.81	13.1	0.51	1.02	6.63	14.47	64.57	0.46	0.16	0.75	4.96

	3.86	12.66	0.47	0.97	5.98	13.97	62.33	0.43	0.16	0.68	4.06
	3.91	12.23	0.44	0.92	5.36	13.46	60.08	0.4	0.17	0.61	3.27
	3.96	11.79	0.4	0.87	4.76	12.96	57.83	0.37	0.19	0.54	2.58
	4.01	11.35	0.37	0.82	4.18	12.46	55.58	0.34	0.2	0.48	1.99
	4.06	10.92	0.33	0.77	3.62	11.95	53.34	0.3	0.22	0.41	1.48
	4.11	10.41	0.3	0.72	3.09	11.38	50.8	0.27	0.24	0.35	1.07
	4.16	9.76	0.26	0.67	2.58	10.67	47.59	0.24	0.26	0.29	0.76
	4.21	8.96	0.24	0.62	2.12	9.8	43.72	0.22	0.28	0.25	0.52
Waterline	4.26	8.28	0.2	0.57	1.69	9.03	40.29	0.19	0.32	0.2	0.34
	4.31	7.28	0.18	0.52	1.29	7.92	35.33	0.16	0.36	0.16	0.21
	4.36	5.72	0.17	0.47	0.97	6.26	27.92	0.15	0.37	0.15	0.15
	4.41	4.3	0.17	0.42	0.72	4.73	21.09	0.15	0.38	0.15	0.11
	4.46	3.39	0.16	0.37	0.53	3.72	16.58	0.14	0.4	0.13	0.07
	4.51	2.7	0.14	0.32	0.38	2.95	13.16	0.13	0.44	0.11	0.04
	4.56	1.95	0.14	0.27	0.27	2.14	9.53	0.13	0.44	0.11	0.03
	4.61	1.44	0.13	0.22	0.18	1.56	6.97	0.12	0.47	0.1	0.02
	4.66	1.07	0.11	0.17	0.12	1.16	5.18	0.11	0.51	0.09	0.01
	4.71	0.89	0.08	0.12	0.07	0.95	4.25	0.08	0.67	0.05	0.0
	4.76	0.71	0.05	0.07	0.03	0.75	3.32	0.04	1.05	0.02	0.0
	4.81	0.35	0.01	0.02	0.0	0.36	1.6	0.01	3.97	0.0	0.0
	4.82	0.29	0.01	0.01	0.0	0.29	1.31	0.01	4.69	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) =	0.35	(cfs)
Calculated Flow (Qc) =	0.34	(cfs)
(Qm-Qc)/Qm * 100 =	1.76%	
Measured Waterline (WLm) =	4.25	(ft)
Calculated Waterline (WLc) =	4.26	(ft)
(WLm-WLc)/WLm * 100 =	-0.27%	
Max Measured Depth (Dm) =	0.6	(ft)
Max Calculated Depth (Dc) =	0.57	(ft)
(Dm-Dc)/Dm * 100 =	5.28%	
Mean Velocity =	0.2	(ft/s)
Manning's n =	0.314	
0.4 * Qm =	0.14	(cfs)
2.5 * Qm =	0.88	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
Bankfull	0	2.65		
	3.3	3.33		
Waterline	8.5	4.25	0	
	9	4.43	0.1	
	9.5	4.35	0	
	10	4.3	0	
	10.5	4.43	0.15	
	11	4.31	0	
	11.5	4.14	0	
	12	4.4	0.16	
	12.5	4.26	0.02	
	13	4.51	0.26	
	13.5	4.52	0.27	
	14	4.4	0.13	
	14.5	4.62	0.39	
	15	4.25	0	
	15.5	4.8	0.56	
	16	4.83	0.6	
	16.5	4.64	0.4	
	17	4.58	0.33	
	17.5	4.22	0	
	18	4.08	0	
	18.5	3.71	0	
Waterline	19	4.25	0	
Bankfull	20.5	2.4		

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
0.53	0.1	0.05	0.01	2.97
0.51	0	0	0	0
0	0	0	0	0
0.52	0.15	0.07	0.02	4.45
0.51	0	0	0	0
0	0	0	0	0
0.56	0.16	0.08	0.02	4.75
0.52	0.02	0.01	0	0.59
0.56	0.26	0.13	0.03	7.71
0.5	0.27	0.14	0.03	8.01
0.51	0.13	0.07	0.01	3.86
0.55	0.39	0.2	0.04	11.57
0.62	0	0	0	0
0.74	0.56	0.28	0.06	16.62
0.5	0.6	0.3	0.06	17.8
0.53	0.4	0.2	0.04	11.87
0.5	0.33	0.17	0.03	9.79
0.62	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

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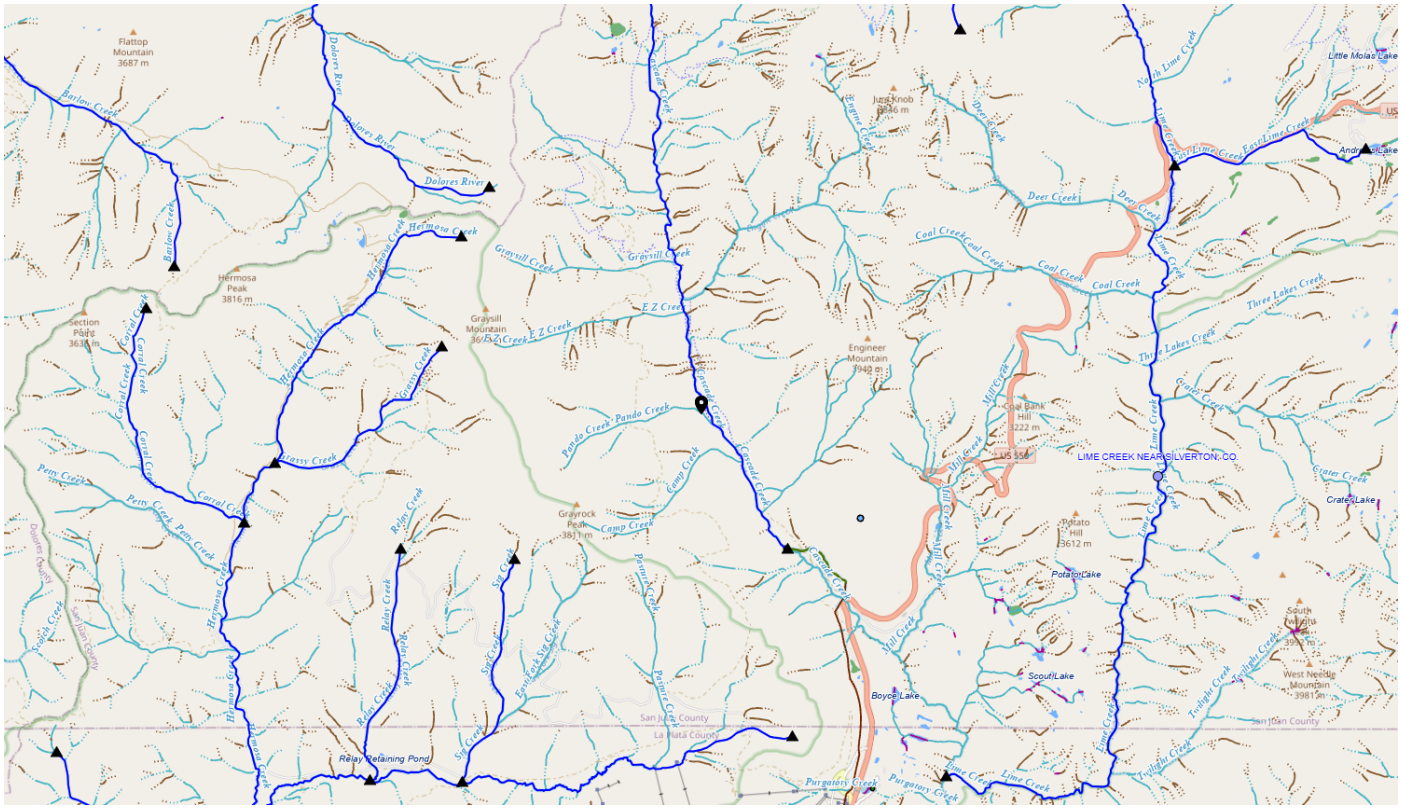
R2Cross RESULTS

Stream Name: Pando Creek
Stream Locations: Upstream of trail crossing
Fieldwork Date: 09/05/2025
Cross-section: 3
Observers: KB VW KR DS
Coordinate System: UTM Zone 13
X (easting): 249707
Y (northing): 4175089
Date Processed: 12/04/2025
Slope: 0.0487
Discharge: Entered Value: 0.35 (cfs)
Computation method: Ferguson VPE
R2Cross data filename: Pando_XS3_9-5-25_Q=.xlsx
R2Cross version: 2.0.4

LOCATION



ANALYSIS RESULTS

Habitat Criteria Results

Bankfull top width (ft) = 16.66

	Habitat Criteria	Discharge (cfs) Meeting Criteria
Mean Depth (ft)	0.2	0.63
Percent Wetted Perimeter (%)	50.0	0.16
Mean Velocity (ft/s)	1.0	6.08

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	7.52	16.66	0.99	1.47	16.45	17.34	100.0	0.95	0.11	2.89	47.48
	7.55	16.5	0.97	1.44	15.93	17.16	98.96	0.93	0.11	2.8	44.56
	7.6	16.23	0.93	1.39	15.11	16.88	97.33	0.89	0.11	2.66	40.19
	7.65	15.97	0.9	1.34	14.3	16.6	95.7	0.86	0.12	2.52	36.08
	7.7	15.71	0.86	1.29	13.51	16.31	94.06	0.83	0.12	2.39	32.23
	7.75	15.45	0.82	1.24	12.73	16.03	92.43	0.79	0.13	2.25	28.63
	7.8	15.19	0.79	1.19	11.97	15.75	90.8	0.76	0.13	2.11	25.27
	7.85	14.92	0.75	1.14	11.21	15.46	89.17	0.73	0.13	1.98	22.15
	7.9	14.66	0.71	1.09	10.47	15.18	87.53	0.69	0.14	1.84	19.27
	7.95	14.4	0.68	1.04	9.75	14.9	85.9	0.65	0.14	1.71	16.62
	8.0	14.14	0.64	0.99	9.03	14.62	84.27	0.62	0.15	1.57	14.19
	8.05	13.87	0.6	0.94	8.33	14.33	82.64	0.58	0.16	1.44	11.99
	8.1	13.61	0.56	0.89	7.65	14.05	81.0	0.54	0.17	1.31	9.99
	8.15	13.35	0.52	0.84	6.97	13.77	79.37	0.51	0.18	1.18	8.21
	8.2	13.09	0.48	0.79	6.31	13.48	77.74	0.47	0.19	1.05	6.62
	8.25	12.83	0.44	0.74	5.66	13.2	76.11	0.43	0.2	0.92	5.23
	8.3	12.54	0.4	0.69	5.03	12.9	74.38	0.39	0.22	0.8	4.03
	8.35	12.2	0.36	0.64	4.41	12.54	72.32	0.35	0.24	0.69	3.04
	8.4	11.86	0.32	0.59	3.81	12.19	70.27	0.31	0.26	0.58	2.2
	8.45	11.52	0.28	0.54	3.22	11.83	68.22	0.27	0.29	0.47	1.52
	8.5	11.18	0.24	0.49	2.66	11.48	66.17	0.23	0.33	0.37	0.98
	8.55	10.84	0.19	0.44	2.11	11.12	64.12	0.19	0.39	0.27	0.58
Waterline	8.6	10.44	0.15	0.39	1.57	10.7	61.72	0.15	0.49	0.19	0.3
	8.65	8.58	0.13	0.34	1.1	8.82	50.85	0.12	0.56	0.15	0.16
	8.7	6.82	0.1	0.29	0.71	7.01	40.42	0.1	0.66	0.11	0.08

	8.75	5.02	0.08	0.24	0.42	5.15	29.72	0.08	0.79	0.08	0.03
	8.8	3.77	0.05	0.19	0.2	3.87	22.32	0.05	1.14	0.04	0.01
	8.85	1.58	0.04	0.14	0.07	1.64	9.47	0.04	1.38	0.03	0.0
	8.9	0.42	0.04	0.09	0.02	0.46	2.63	0.04	1.42	0.03	0.0
	8.95	0.18	0.02	0.04	0.0	0.2	1.14	0.02	2.84	0.01	0.0
	8.97	0.07	0.01	0.02	0.0	0.08	0.45	0.01	6.19	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) =	0.35	(cfs)
Calculated Flow (Qc) =	0.32	(cfs)
(Qm-Qc)/Qm * 100 =	7.25%	
Measured Waterline (WLm) =	8.62	(ft)
Calculated Waterline (WLc) =	8.6	(ft)
(WLm-WLc)/WLm * 100 =	0.15%	
Max Measured Depth (Dm) =	0.41	(ft)
Max Calculated Depth (Dc) =	0.39	(ft)
(Dm-Dc)/Dm * 100 =	5.33%	
Mean Velocity =	0.21	(ft/s)
Manning's n =	0.442	
0.4 * Qm =	0.14	(cfs)
2.5 * Qm =	0.88	(cfs)

FIELD DATA

Feature	Station (ft)	Rod Height (ft)	Water depth (ft)	Velocity (ft/s)
	0	6.2		
Bankfull	2.6	6.95		
	4.8	8.29		
Waterline	5.8	8.6	0	
	6	8.65	0.01	
	6.6	8.79	0.21	
	7.2	8.62	0	
	7.9	8.99	0.41	
	8.5	8.78	0.19	
	9.1	8.65	0	
	9.7	8.81	0.22	
	10.3	8.85	0.25	
	10.9	8.8	0.24	
	11.5	8.86	0.3	
	12.1	8.9	0.31	
	12.7	8.78	0.2	
	13.3	8.71	0.1	
	13.9	8.63	0	
	14.5	8.76	0.15	
	15.1	8.64	0	
	15.7	8.6	0	
Waterline	16.2	8.63	0	
Bankfull	20.2	7.52		
	21.15	5.82		

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
0.21	0.01	0	0	0.25
0.62	0.21	0.13	0.03	8.01
0.62	0	0	0	0
0.79	0.41	0.27	0.06	16.95
0.64	0.19	0.11	0.03	7.25
0.61	0	0	0	0
0.62	0.22	0.13	0.03	8.39
0.6	0.25	0.15	0.03	9.54
0.6	0.24	0.14	0.03	9.16
0.6	0.3	0.18	0.04	11.45
0.6	0.31	0.19	0.04	11.83
0.61	0.2	0.12	0.03	7.63
0.6	0.1	0.06	0.01	3.82
0.61	0	0	0	0
0.61	0.15	0.09	0.02	5.72
0.61	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

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General Site Field Visit Data Report *(Filters: Name begins with Pando Creek;)*

Type		Div	Name	CWCB Case Number	Segment ID	Visit Date	Location Description	Watershed Name
Stream		7	Pando Creek		26/7/A-002	9/5/2025	R2Cross location	Animas

Remarks	Date	Remark	
	05/09/25 14:10	Assissted in R2Cross data collection and observed the natural environment.	
GPS Log	No GPS Log records for this visit.		
Photo Log	No Photo Log records for this visit.