Instream Flow Recommendation:

Unnamed Tributary to Rough and Tumbling Creek (Headwaters to the confluence with Rough and Tumbling Creek)

Contact Information:

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Introduction:

This document contains the necessary information to form the scientific and biological basis for an instream flow (ISF) recommendation for an unnamed tributary to Rough and Tumbling Creek in Park County, Colorado. The Unnamed Tributary to Rough and Tumbling Creek (Unnamed Tributary) watershed provides critical habitat for the boreal toad (*Bufo boreas boreas*). In 2014, CPW and CWCB were contacted by members of the Park County Advisory Board on the Environment (ABE); ABE is a citizen advisory sub-committee that was established by the Park County Board of County Commissioners (BOCC) to assist them with community outreach on environmental issues in the county. ABE's initial interest in ISF protection in the county was triggered by some of the Colorado Water Plan public meetings that were going on at that time in various locations around the state. CPW and CWCB met with ABE and the Park County BOCC to discuss existing ISF water rights in the county and places where significant resource values exist in the county without ISF protection. After several meetings that included ABE, the BOCC and local representatives of the Colorado Cattlemen Association, a list of priority streams and lakes in Park County was generated by CPW, CWCB and ABE; the Unnamed Tributary was one of the priority streams that emerged from this collaborative process. CPW believes that the information compiled in this document provides the basis for the findings necessary for an ISF appropriation as stated by the ISF statutes and in ISF Program Rule 5(i).

The State of Colorado's Instream Flow and Natural Lake Level Program (ISF/NLL Program) was created in 1973 when the Colorado General Assembly passed Senate Bill 97. This bill recognized, "the need to correlate the activities of mankind with some reasonable preservation of the natural environment (C.R.S. §37-92-102 (3))." Creation of this state program identified the CWCB as the only state agency with the ability to appropriate and acquire instream flow and natural lake level water rights. In an effort to promote participation in the ISF/NLL Program by other entities, the state statute requires the Board to consider instream flow recommendations by local, state, or federal agencies. CPW is recommending this reach of an unnamed tributary to Rough and Tumbling Creek for inclusion in the ISF/NLL Program because

we believe that there is a natural environment that can be preserved to a reasonable degree with an instream flow water right.
CPW is sending this instream flow recommendation to the Board in order to meet CPW's legislative declaration, "… 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 it's 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 (C.R.S. § 33-1-101 (1))," and, "… that the natural, scenic, scientific, and outdoor recreation areas of this state are to be protected, preserved, enhanced and managed for the use, benefit, and enjoyment of the people of this state and visitors of this state… and that to carry such program and policy there shall be a continuous operation of acquisition, development, and management of outdoor recreation lands, waters, and facilities (C.R.S. §33-10-101 (1))."

In addition to these broad statutory guidelines, CPW's current strategic planning document (*CPW Strategic Plan*, 2015) explains current agency 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 directed by the State Wildlife Action Plan (2002, Revised 2015). The goals and priorities from these 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 ISF/NLL Program.

Stream Reach and Location Information

Recommended Reach: Unnamed Tributary to Rough and Tumbling Creek from its headwaters to the confluence with Rough and Tumbling Creek (Figure 1)

Upper Terminus: Headwaters
UTM North: 4318074.93951; UTM East: 401245.58891
Elevation: 11,776 feet

Lower terminus: Confluence with Rough and Tumbling Creek
UTM North: 4321559.18652; UTM East: 403468.051847
Elevation: 10,157 feet

Water Division: 1
Water District: 23
CPW Water Code: none

Approximate segment length in miles: 2.8 miles
County: Park County
Major Drainage Basin: South Platte River
USGS quad maps: South Peak and Jones Hill

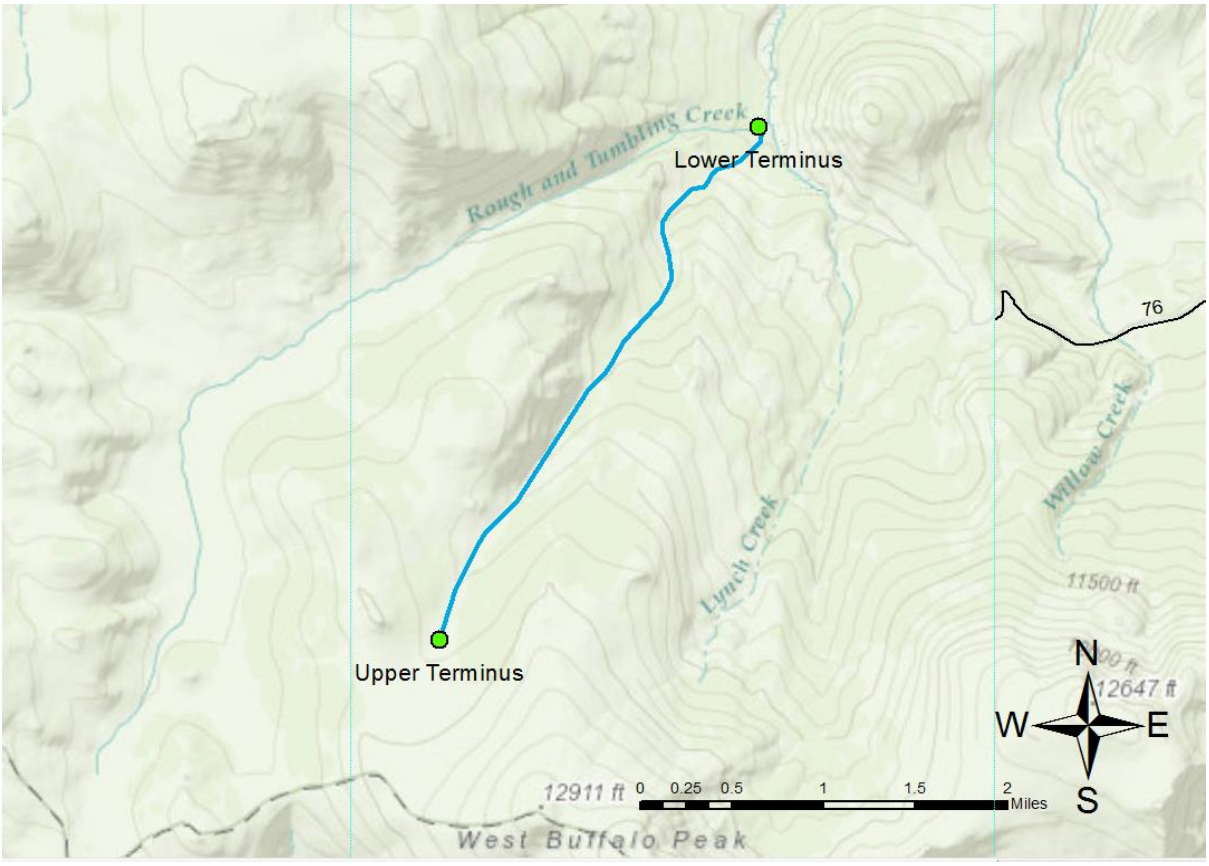


Figure 1. Map of the recommended reach of the Unnamed Tributary to Rough and Tumbling Creek (blue line), the green dots are the upper and lower termini of the ISF recommendation.

Natural Environment

The boreal toad is Colorado's only alpine species of toad, and is a genetically distinct species of toad apart from species found in other parts of the western United States. This species has been classified as an endangered species by Colorado Parks and Wildlife. Two of the biggest factors that are caused a decline in species abundance are the loss of habitat and infections from chytrid fungus (*Batrachochytrium dendrobatidis*), also referred to as Bd (CPW 2016). Continued persistence of this unique species is crucial in maintaining Colorado's biodiversity; state actions to protect usable occupied habitat for the boreal toad can be an effective conservation strategy. Since boreal toads need aquatic habitat for successful reproduction, ISF/NLL water rights are an effective tool to protect habitat. Boreal toad conservation issues have been addressed within the CWCB's ISF program before in the context of inundation settlements, injury with mitigation proposals, and ISF appropriations.

Rough and Tumbling Creek Watershed:

As stated above, the ISF reach being recommended in this report is an unnamed headwater tributary to Rough and Tumbling Creek. This watershed is located southwest of Fairplay, CO and west of Antero Reservoir. Rough and Tumbling Creek is a headwater tributary stream to the South Fork of the South Platte River. The watershed area of Rough and Tumbling Creek is approximately 24.5 square miles, has a mean basin elevation of 9,497 feet, and a mean annual precipitation of 23.5 inches. Watershed area for the Unnamed Tributary is approximately 2.1 square miles; mean basin elevation is 11,500 feet that receives 26.4 inches of annual precipitation. Overall, the Rough and Tumbling Creek watershed is a high elevation watershed that is mostly forested (approximately 90 to 95%) with a small part of the watershed (about 5 to 10%) situated above timberline. 100% of the watershed is owned and managed by the USFS.

Recommended Segment:

As summarized above, this recommended reach is a headwaters stream. The recommended ISF covers the entire length of the stream. The entire length of the Unnamed Tributary is a first order stream – there are no other tributaries; this is a very small stream with very little flow. This high elevation stream's hydrology is almost completely snow-melt driven; since the watershed is so small, the peak runoff season is very brief and this is likely the only time during the hydrologic year when flow in the creek extends outside of the main channel and into the floodplain. This stream exhibits a well defined, single thread channel in the lower portion of the reach. The headwaters of the creek are alpine wetland habitat where multiple channels of flowing water are present. As the stream travels downstream the valley becomes more confined and, as a consequence, the stream channel becomes more defined; these lower portions of the creek have a well defined forest canopy. In general, the Unnamed Tributary is quite steep – the overall average slope of the stream is nearly 10%; therefore, the majority of the stream has plunge-pool aquatic habitat with very few riffles or runs. The substrate of the creek is highly variable ranging from sand and silt to large cobble. High amounts of detritus and organic matter was observed during field visits to the creek. This is indicative of good connectivity between the terrestrial and aquatic environment. The primary riparian vegetation was observed to be dominated by willows and alders.

Table 1. Estimate of the percentage of public and private land within the unnamed tributary to Rough and Tumbling Creek.

Upper Terminus	Lower Terminus	Total Length (miles)	Approximate Land Ownership	
			%Private	%Public
Headwaters	Confluence with Rough and Tumbling Creek	2.8	0	100+

+ = 100% of the public lands are managed by the USFS.

Aquatic Environment

As noted above, this stream reach is a mix alpine and forested/montane habitat types with snowmelt driven hydrology. The aquatic habitat of the Unnamed Tributary is very typical of headwaters boreal toad habitat; no fish have ever been sampled in the Unnamed Tributary. On 7/28/2004, CPW aquatic biologist Jeff Spohn captured an adult boreal toad in the Unnamed Tributary. Ever since this initial discovery of toads in 2004, CPW, the USFS, and the Colorado Natural Heritage Program (CNHP) have engaged in studies of toad populations here and elsewhere in the South Platte drainage.

The boreal toad is present throughout most of western North America, but it's believed that there is a distinct Southern Rocky Mountain population of this species. This species ranges from Wyoming to Southern Colorado; the toad is believed to be extirpated from New Mexico. Colorado, New Mexico, and Wyoming have all placed state designations on the boreal toad (State Endangered or Protected) (Jackson 2006). In Colorado, the boreal toad is found throughout the Rocky Mountains from the northern state border south to Hinsdale and Mineral County (CPW 2016). Toads are found from 7,500 to 12,000 feet in elevation, but are more commonly found at 8,500 to 11,500 feet (CPW 2016). Boreal toads prefer habitats in close proximity to ponds, mountain lakes, wetlands, meadows, and subalpine forests (CPW 2016). It is thought that the main limiting factor to this species is proximity to suitable breeding habitat (CPW 2016). Breeding habitat consists of shallow lakes, ponds, marshes and bogs that have plentiful exposure to solar radiation (CPW 2016). Two boreal toad breeding sites have been documented in the Rough and Tumbling Creek drainage. These breeding sites seem to follow beaver activity and therefore come and go as beaver ponds come and go. Fortunately, the Rough and Tumbling Creek sites have tested negative for chytrid fungus, which makes these breeding sites and the drainage as a whole even more valuable from a conservation perspective. The toads have also been found from time to time outside of the usual monitoring sites in this drainage.

Most of the suitable boreal toad habitats in the Unnamed Tributary are found in the upper half of the recommended ISF reach (see the description of habitat preferences above). The riparian corridor that follows the Unnamed Tributary has potential toad habitat in the form of areas with low water velocities and disconnected pools (these habitat features are also important for toad survival). These habitat features are also prominent in and around the confluence with the Rough and Tumbling mainstem (the lower terminus of the Unnamed Tributary ISF recommendation). In summary, CPW believes that boreal toads are utilizing a number of sites within the ISF segment proposed herein; therefore we believe that there is a natural environment in the form of critical boreal toad habitat that could benefit from the protection afforded by a CWCB ISF water right.

Table 2. Natural environment information the Unnamed Tributary to Rough and Tumbling Creek.

Species Name	Scientific Name	Status
boreal toad	*Bufo boreas boreas*	State Endangered+

+ = A State of Colorado species recovery plan is in place for the boreal toad

ISF Quantification

R2CROSS Results:

In 2016, CPW staff collected stream cross-section data at two sites within this reach of the Unnamed Tributary. Initial biological instream flow recommendations were developed utilizing the standard application of the R2CROSS methodology (Espegren 1996). R2CROSS uses field data that has been collected in a riffle stream habitat types; riffles are the limiting habitat type in streams during low flow events. The field data includes a survey of stream channel geometry, a longitudinal slope of the water surface, and a streamflow measurement at the designated cross section. After processing this data with R2CROSS, both a winter and summer flow recommendation was developed utilizing the typical R2CROSS criteria described in Nehring (1979) and Espergren (1996); the R2CROSS hydraulic criteria are average depth, average velocity and wetted perimeter – depth and wetted perimeter are probably most important to boreal toad habitat. Specific to this flow recommendation for the unnamed tributary and its natural environment indicator (boreal toad), CPW believes that the maintenance of an ISF in the channel supports all the appurtenant habitats important for boreal toad survival. Table 3 (below) summarizes the R2CROSS results for the two data collection sites for the Unnamed Tributary ISF recommendation discussed herein.

Table 3. Summary of the R2CROSS transect measurements and results for the Unnamed Tributary to Rough and Tumbling Creek. Q measured is the discharge measured in the field, 40%-250% is the confidence interval in which flow criteria must be met, flow meeting two criteria leads to a winter season flow recommendation, and flow meeting three criteria leads to a summer season flow recommendation

Entity	Date Measured	Q measured	40%-250%	Flow Meeting Two Criteria	Flow Meeting Three Criteria
CPW	9/27/16	0.14 cfs	0.1 – 0.3 cfs	0.77 cfs[1]	Not Applicable[2]
CPW	9/27/16	0.18 cfs	0.1 – 0.4 cfs	0.52 cfs[1]	1.69 cfs[1]

1 = Flow recommendations outside the range of R2CROSS model accuracy for this site measurement.
2 = The third R2CROSS hydraulic criterion (average velocity) was never met on the R2CROSS staging table - due to low gradient.

ISF Recommendation:

Based on of the R2CROSS results (see Table 3) and the natural environment of the Unnamed Tributary, CPW believes that a single year-round flow in the 0.3 to 0.4 cfs range is both necessary and appropriate for the Unnamed Tributary. Flows in this range are the highest flows that can be accurately predicted with the R2CROSS data sets that we currently have. The average of these two values is 0.35 cfs. It is important to note that flows in this range fall short

of the flows needed to meet even two of the R2CROSS hydraulic criteria but we believe that flows in this range will be adequate to protect the boreal toad habitat present in this stream segment. We also believe that flows in this very small watershed will be limited by water availability considerations and that this small amount of flow protection is important for the survival of the state endangered boreal toad; these issues will be addressed in the Water Availability section (below).

Water Availability:

Division of Water Resources data indicates that there are no existing water rights on the Unnamed Tributary. Since there is not a nearby stream gage and the Unnamed Tributary's watershed is so small, CPW staff believes we believe that the USGS StreamStats tool is marginally appropriate for a preliminary water availability determination.

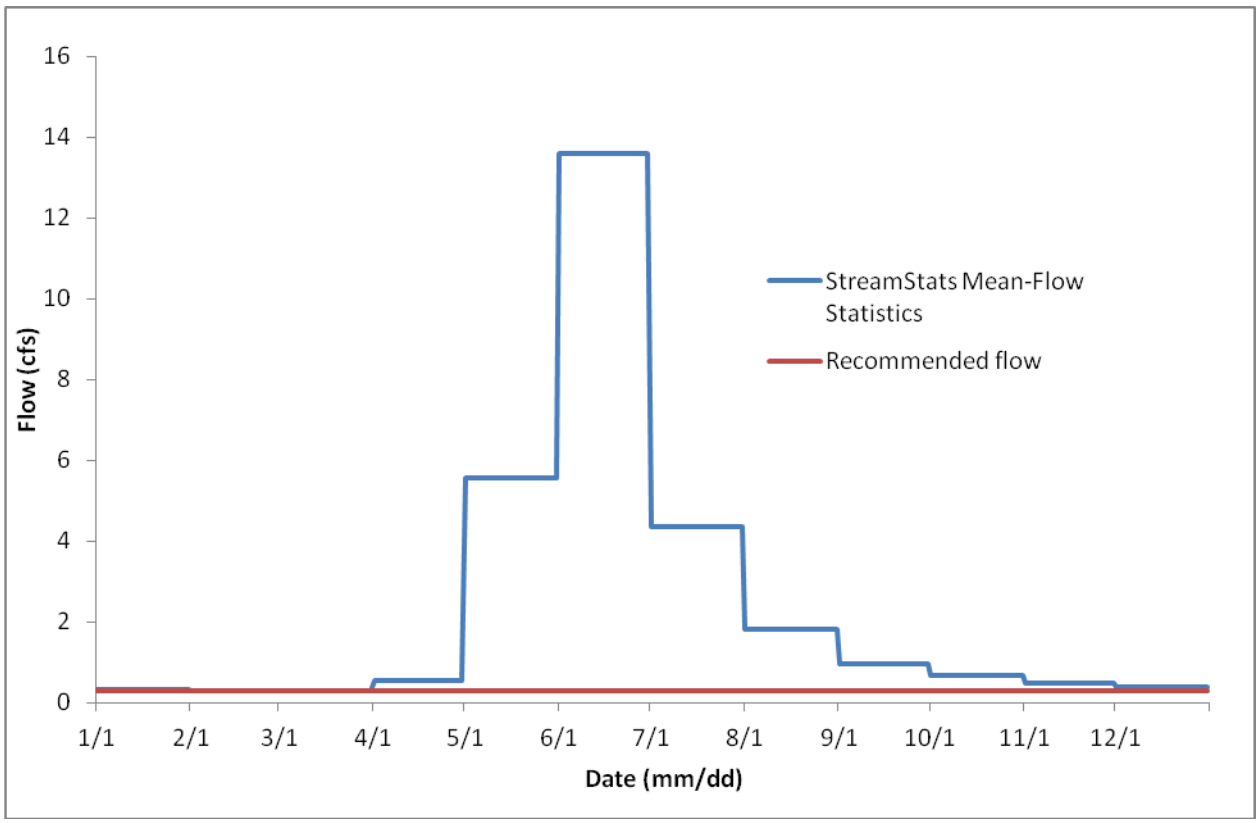


Figure 2. Hydrograph showing the StreamStats mean monthly flows statistics and the R2CROSS ISF recommendation for the Unnamed Tributary to Rough and Tumbling Creek.

Seasonal ISF Recommendation

The above hydrograph (Figure 2) shows that any flow above 0.3 cfs is not available for an ISF appropriation in this very small creek. Therefore, CPW revises and refines the above range of acceptable flows and concludes that a 0.3 cfs year-round ISF

recommendation (see Table 3 and the discussion above) appears to be both necessary and available for appropriation on the Unnamed Tributary of Rough and Tumbling Creek. CPW is of the opinion that (for the reasons described in this report) this flow is necessary to preserve the natural environment to a reasonable degree.

Citations

Capesius, J.P. and V.C. Stephens, 2009, Regional regression equations for estimation of natural streamflow statistics in Colorado, Scientific Investigations Report 2009-5136. (USGS StreamStats)

Colorado Parks and Wildlife. *Colorado Parks & Wildlife - Species Profiles*. N.p., n.d. Web. 29 Nov. 2016.

Colorado Parks and Wildlife. *Colorado Parks & Wildlife - Boreal Toad Research*. N.p., n.d. Web. 29 Nov. 2016.

Jackson, T. (ed.), 2006, Report on the status and conservation of the boreal toad (*Bufo boreas boreas*) in the Southern Rocky Mountains 2006. Boreal Toad Recovery Team. 134 pp.

Epegren, G.D., 1996, Development of Instream Flow Recommendations in Colorado Using R2CROSS, Colorado Water Conservation Board.

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.

Appendices

Appendices A: R2CROSS output for two cross-sections performed on this reach of the unnamed tributary to Rough and Tumbling Creek.

Photos:

Figure 3: View of the R2CROSS sites on the Unnamed Tributary to Rough and Tumbling Creek looking downstream at cross-section number one (in the background) and number two (closest).

Figure 4: Unnamed Tributary to Rough and Tumbling Creek at R2CROSS site number two.

Figure 5: Unnamed Tributary to Rough and Tumbling Creek at R2CROSS site number two, looking downstream.

Figure 6: Unnamed Tributary to Rough and Tumbling Creek at R2CROSS site number one.

Figure 7: View of Unnamed Tributary to Rough and Tumbling Creek looking upstream at R2CROSS site number one (closest) and site number two (in background).

Figure 8: Unnamed Tributary to Rough and Tumbling Creek – typical bed/substrate material.

Figure 9: The surrounding terrestrial near the lower terminus of Unnamed Tributary to rough and Tumbling Creek.

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Unnamed Tributary to Rough and Tumbling					CROSS-SECTION NO.: 1 & 2
CROSS-SECTION LOCATION: 200 m upstream from confluence w/ Lynch Creek.					
DATE: 9/27/16	OBSERVERS: CT, JS, TN				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY: Park	WATERSHED: S. Fk S. Platte		WATER DIVISION: 1		DOW WATER CODE: 13944
MAP(S):	USGS: XS 1 = Lat: 39.036731 Long: -106.115645				
	USFS: XS 2 = Lat: 39.036707 Long: -106.115703				

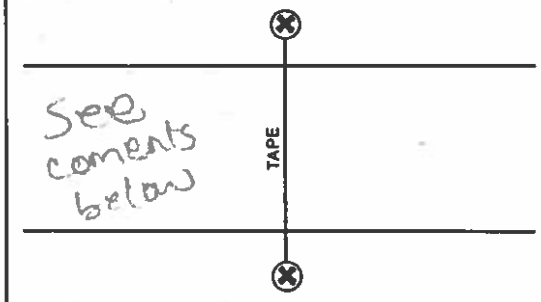
SUPPLEMENTAL DATA

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	See below
① WS @ Tape LB/RB	0.0	
② WS Upstream		
③ WS Downstream		
SLOPE	XS1 = 0.38/11 = 0.035	XS2 = 0.24/7.4 = 0.032

SKETCH



LEGEND: Stake ⊗, Station ①, Photo ①→, Direction of Flow

AQUATIC SAMPLING SUMMARY

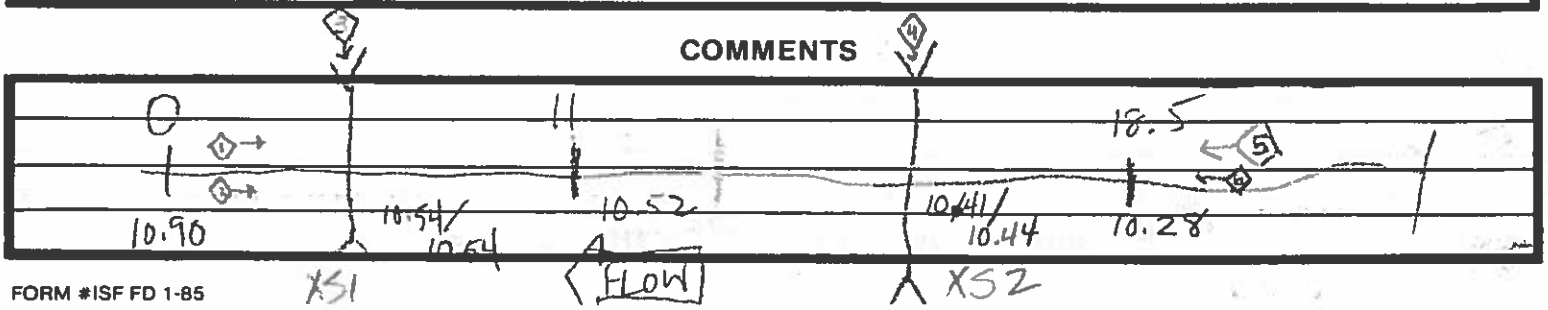
STREAM ELECTROFISHED: YES/(NO)	DISTANCE ELECTROFISHED: ____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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



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 Obser-vation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S	0.0		9.20								
GL	1.6		9.75								
	3.2		10.05								
WL	3.6		10.54	0					0		
	3.9		10.65	0.05					0		
	4.2		10.65	0.15					0.09		
	4.5		10.70	0.2					0.28		
	4.8		10.85	0.25					0.19		
	5.1		10.70	0.25					0.27		
	5.4		10.65	0.3					0.44		
	5.7		10.75	0.25					0.42		
	6		10.65	0.15					0.21		
WL	6.4		10.54	0					0		
	7.2		10.20								
	9.3		9.85								
GL	10.8		9.65								
S	12.8		9.45								
S	0		8.95								
GL	2.1		9.60								
	3.3		9.70								
	4		10.10								
WL	4.5		10.44	0					0		
	.8		10.55	0.1					0.18		
	5.1		10.55	0.1					0.91		
	.4		10.55	0.2					1.27		
	.7		10.50	0.15					0.52		
	6		10.50	0.2					0.80		
W	6.3		10.41	0					0		
	6.9		10.30								
	7.5		9.85								
GL	9		9.55								
	10.4		9.40								
S	12.2		9.20								
TOTALS:											

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

Data Input & Proofing

STREAM NAME:	Unamed Trib. to Rough and Tumbling
XS LOCATION:	200 m U/S from confl. w/ Lynch Cr.
XS NUMBER:	2
DATE:	9/27/2016
OBSERVERS:	CT, JS, TD
1/4 SEC:	Lat: 39.036707
SECTION:	Long: -106.115703
TWP:	
RANGE:	
PM:	
COUNTY:	Park
WATERSHED:	South Fork South Platte
DIVISION:	1
DOW CODE:	
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.032 ft / ft

CHECKED BY:.....DATE.....

ASSIGNED TO: .....DATE.....

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
			Total Data Points = 16					
	S	0.00	8.95			0.00	0.00	0.00
1	GL	2.10	9.60			0.00	0.00	0.00
		3.30	9.70			0.00	0.00	0.00
		4.00	10.10			0.00	0.00	0.00
	WL	4.50	10.44	0.00	0.00	0.00	0.00	0.00
		4.80	10.55	0.10	0.18	0.03	0.01	10.45
		5.10	10.55	0.10	0.81	0.03	0.02	10.45
		5.40	10.55	0.20	1.27	0.06	0.08	10.35
		5.70	10.50	0.15	0.52	0.05	0.02	10.35
		6.00	10.50	0.20	0.80	0.06	0.05	10.30
	WL	6.30	10.41	0.00	0.00	0.00	0.00	0.00
		6.90	10.30			0.00	0.00	0.00
		7.50	9.85			0.00	0.00	0.00
1	GL	9.00	9.55			0.00	0.00	0.00
		10.40	9.40			0.00	0.00	0.00
	S	12.20	9.20			0.00	0.00	0.00
					Totals	0.23	0.18	

COLORADO WATER CONSERVATION BOARD
INSTREAM FLOW / NATURAL LAKE LEVEL PROGRAM
STREAM CROSS-SECTION AND FLOW ANALYSIS

LOCATION INFORMATION

STREAM NAME:	Unamed Trib. to Rough and Tumbling
XS LOCATION:	200 m U/S from confl. w/ Lynch Cr.
XS NUMBER:	2
DATE:	27-Sep-16
OBSERVERS:	CT, JS, TD
1/4 SEC:	Lat: 39.036707
SECTION:	Long: -106.115703
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Park
WATERSHED:	South Fork South Platte
DIVISION:	1
DOW CODE:	0
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

CHANNEL PROFILE DATA

SLOPE:	0.032

INPUT DATA CHECKED BY: .....DATE.....

ASSIGNED TO: .....DATE.....

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 2

DATA POINTS= 16

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
S	0.00	8.95			0.00		0.00	0.00	0.0%
1 GL	2.10	9.60			0.00		0.00	0.00	0.0%
	3.30	9.70			0.00		0.00	0.00	0.0%
	4.00	10.10			0.00		0.00	0.00	0.0%
WL	4.50	10.44	0.00	0.00	0.00		0.00	0.00	0.0%
	4.80	10.55	0.10	0.18	0.32	0.10	0.03	0.01	3.0%
	5.10	10.55	0.10	0.81	0.30	0.10	0.03	0.02	13.7%
	5.40	10.55	0.20	1.27	0.30	0.20	0.06	0.08	43.0%
	5.70	10.50	0.15	0.52	0.30	0.15	0.05	0.02	13.2%
	6.00	10.50	0.20	0.80	0.30	0.20	0.06	0.05	27.1%
WL	6.30	10.41	0.00	0.00	0.31		0.00	0.00	0.0%
	6.90	10.30			0.00		0.00	0.00	0.0%
	7.50	9.85			0.00		0.00	0.00	0.0%
1 GL	9.00	9.55			0.00		0.00	0.00	0.0%
	10.40	9.40			0.00		0.00	0.00	0.0%
S	12.20	9.20			0.00		0.00	0.00	0.0%
TOTALS ----------					1.84	0.2 (Max.)	0.23	0.18	100.0%

Manning's n = 0.0832
Hydraulic Radius= 0.12249043

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.23	0.16	-29.8%
10.18	0.23	0.78	245.6%
10.20	0.23	0.72	219.5%
10.22	0.23	0.66	194.0%
10.24	0.23	0.61	169.0%
10.26	0.23	0.55	144.5%
10.28	0.23	0.50	120.4%
10.30	0.23	0.44	96.9%
10.32	0.23	0.39	74.0%
10.34	0.23	0.34	52.4%
10.36	0.23	0.30	32.0%
10.38	0.23	0.25	12.9%
10.39	0.23	0.23	3.7%
10.40	0.23	0.21	-5.1%
10.41	0.23	0.19	-13.6%
10.42	0.23	0.18	-21.8%
10.43	0.23	0.16	-29.8%
10.44	0.23	0.14	-37.5%
10.45	0.23	0.12	-45.1%
10.46	0.23	0.11	-52.4%
10.47	0.23	0.09	-59.4%
10.48	0.23	0.08	-66.1%
10.50	0.23	0.05	-78.8%
10.52	0.23	0.03	-88.3%
10.54	0.23	0.01	-95.6%
10.56	0.23	0.00	-100.0%
10.58	0.23	0.00	-100.0%
10.60	0.23	0.00	-100.0%
10.62	0.23	0.00	-100.0%
10.64	0.23	0.00	-100.0%
10.66	0.23	0.00	-100.0%
10.68	0.23	0.00	-100.0%

WATERLINE AT ZERO
AREA ERROR = 10.389

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 2

Constant Manning's n

GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	9.60	6.65	0.47	0.95	3.14	7.09	100.0%	0.44	5.84	1.86
	9.64	5.98	0.48	0.91	2.89	6.41	90.5%	0.45	5.44	1.88
	9.69	5.13	0.51	0.86	2.62	5.56	78.4%	0.47	5.06	1.93
	9.74	4.69	0.51	0.81	2.37	5.09	71.9%	0.47	4.56	1.92
	9.79	4.35	0.49	0.76	2.15	4.74	66.9%	0.45	4.05	1.88
	9.84	4.01	0.48	0.71	1.94	4.38	61.8%	0.44	3.59	1.85
	9.89	3.82	0.46	0.66	1.74	4.16	58.7%	0.42	3.12	1.79
	9.94	3.66	0.42	0.61	1.56	3.98	56.1%	0.39	2.66	1.71
	9.99	3.51	0.39	0.56	1.38	3.79	53.5%	0.36	2.24	1.63
	10.04	3.35	0.36	0.51	1.21	3.61	50.9%	0.33	1.85	1.54
	10.09	3.20	0.33	0.46	1.04	3.42	48.3%	0.30	1.50	1.44
	10.14	3.06	0.29	0.41	0.89	3.25	45.9%	0.27	1.19	1.34
	10.19	2.92	0.25	0.36	0.74	3.08	43.4%	0.24	0.91	1.23
	10.24	2.78	0.21	0.31	0.59	2.91	41.0%	0.20	0.66	1.11
	10.29	2.64	0.17	0.26	0.46	2.73	38.6%	0.17	0.44	0.97
	10.34	2.33	0.14	0.21	0.33	2.41	34.0%	0.14	0.28	0.85
WL	10.39	1.99	0.11	0.16	0.22	2.04	28.8%	0.11	0.17	0.73
	10.44	1.70	0.08	0.11	0.13	1.74	24.5%	0.08	0.08	0.58
	10.49	1.40	0.04	0.06	0.06	1.42	20.0%	0.04	0.02	0.37
	10.54	0.69	0.01	0.01	0.01	0.70	9.8%	0.01	0.00	0.15

0.1 – 0.4

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.18	cfs
CALCULATED FLOW (Qc)=	0.17	cfs
(Qm-Qc)/Qm * 100 =	6.9	%
MEASURED WATERLINE (WLm)=	10.43	ft
CALCULATED WATERLINE (WLc)=	10.39	ft
(WLm-WLc)/WLm * 100 =	0.3	%
MAX MEASURED DEPTH (Dm)=	0.20	ft
MAX CALCULATED DEPTH (Dc)=	0.16	ft
(Dm-Dc)/Dm * 100	19.6	%
MEAN VELOCITY=	0.73	ft/sec
MANNING'S N=	0.083	
SLOPE=	0.032	ft/ft
.4 * Qm =	0.1	cfs
2.5 * Qm=	0.4	cfs

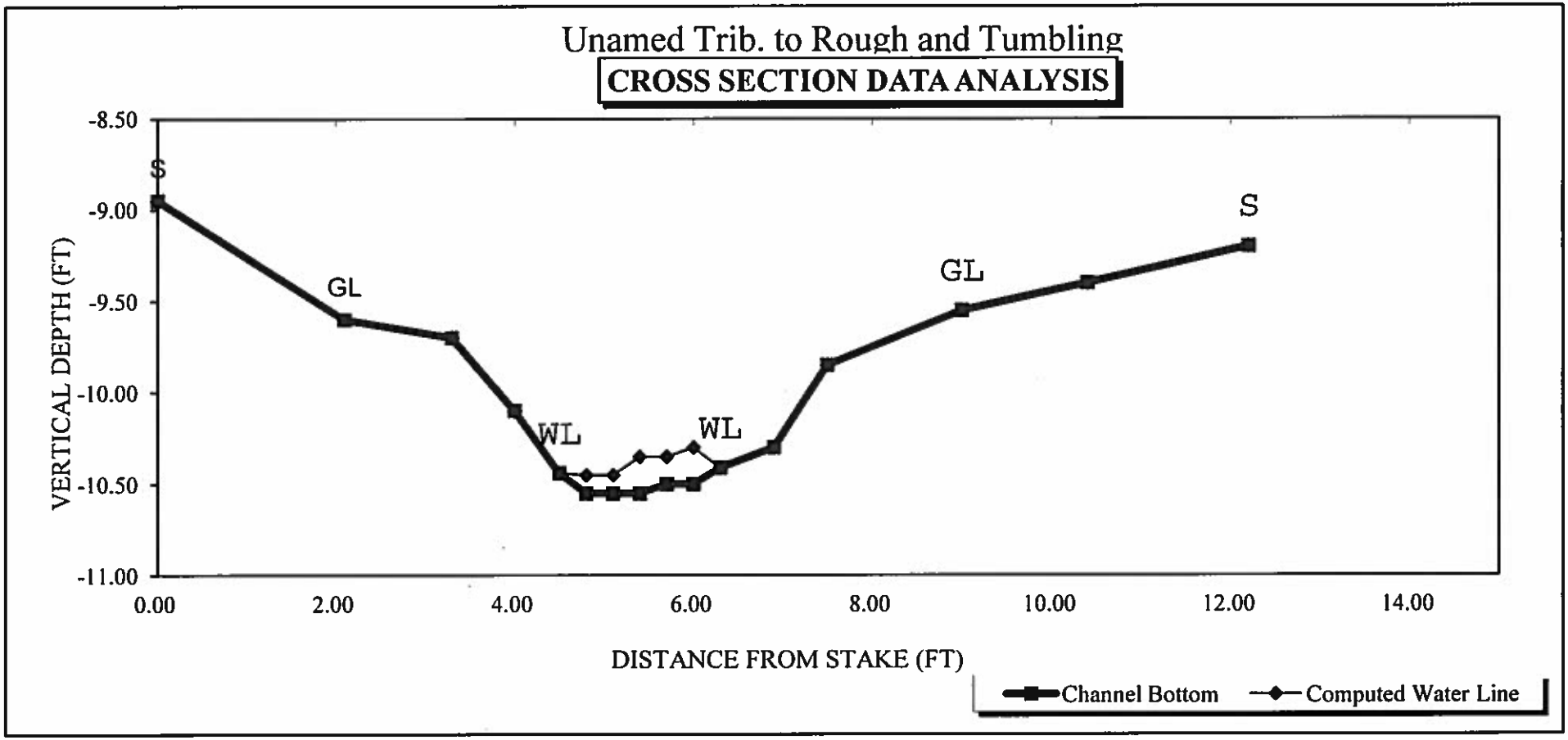
RECOMMENDED INSTREAM FLOW:
==========

FLOW (CFS)	PERIOD
==========	=========

RATIONALE FOR RECOMMENDATION:
==========

RECOMMENDATION BY: ..... AGENCY..... DATE:.....

CWCB REVIEW BY: ..... DATE:.....


Unamed Trib. to Rough and Tumbling
CROSS SECTION DATA ANALYSIS
-8.50
-9.00
-9.50
-10.00
-10.50
-11.00
VERTICAL DEPTH (FT)
S
GL
WL
WL
GL
S
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line

Data Input & Proofing

STREAM NAME:	Unamed Trib. to Rough and Tumbling
XS LOCATION:	200 m U/S from confl. w/ Lynch Cr.
XS NUMBER:	1
DATE:	9/27/2016
OBSERVERS:	CT, JS, TD
1/4 SEC:	Lat: 39.036731
SECTION:	Long: -106.115645
TWP:	
RANGE:	
PM:	
COUNTY:	Park
WATERSHED:	South Fork South Platte
DIVISION:	1
DOW CODE:	
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.035 ft / ft

CHECKED BY:.....DATE.....

ASSIGNED TO: .....DATE.....

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
			Total Data Points = 17					
	S	0.00	9.20			0.00	0.00	0.00
1	GL	1.60	9.75			0.00	0.00	0.00
		3.20	10.05			0.00	0.00	0.00
	WL	3.60	10.54	0.00	0.00	0.00	0.00	0.00
		3.90	10.65	0.05	0.00	0.02	0.00	10.60
		4.20	10.65	0.15	0.09	0.05	0.00	10.50
		4.50	10.70	0.20	0.28	0.06	0.02	10.50
		4.80	10.85	0.25	0.19	0.08	0.01	10.60
		5.10	10.70	0.25	0.27	0.08	0.02	10.45
		5.40	10.65	0.30	0.44	0.09	0.04	10.35
		5.70	10.75	0.25	0.42	0.08	0.03	10.50
		6.00	10.65	0.15	0.21	0.05	0.01	10.50
	WL	6.40	10.54	0.00	0.00	0.00	0.00	0.00
		7.20	10.20			0.00	0.00	0.00
		9.30	9.85			0.00	0.00	0.00
1	GL	10.80	9.65			0.00	0.00	0.00
	S	12.80	9.45			0.00	0.00	0.00
	Totals					0.49	0.14	

COLORADO WATER CONSERVATION BOARD
INSTREAM FLOW / NATURAL LAKE LEVEL PROGRAM
STREAM CROSS-SECTION AND FLOW ANALYSIS

LOCATION INFORMATION

STREAM NAME:	Unamed Trib. to Rough and Tumbling
XS LOCATION:	200 m U/S from confl. w/ Lynch Cr.
XS NUMBER:	1
DATE:	27-Sep-16
OBSERVERS:	CT, JS, TD
1/4 SEC:	Lat: 39.036731
SECTION:	Long: -106.115645
TWP:	0
RANGE:	0
PM:	0
COUNTY:	Park
WATERSHED:	South Fork South Platte
DIVISION:	1
DOW CODE:	0
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

*** NOTE ***
Leave TAPE WT and TENSION at defaults for data collected with a survey level and rod

CHANNEL PROFILE DATA

SLOPE:	0.035

INPUT DATA CHECKED BY: .....DATE.....

ASSIGNED TO: .....DATE.....

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 1

DATA POINTS= 17

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	S	0.00	9.20			0.00		0.00	0.00	0.0%
1	GL	1.60	9.75			0.00		0.00	0.00	0.0%
		3.20	10.05			0.00		0.00	0.00	0.0%
	WL	3.60	10.54	0.00	0.00	0.00		0.00	0.00	0.0%
		3.90	10.65	0.05	0.00	0.32	0.05	0.02	0.00	0.0%
		4.20	10.65	0.15	0.09	0.30	0.15	0.05	0.00	2.9%
		4.50	10.70	0.20	0.28	0.30	0.20	0.06	0.02	12.2%
		4.80	10.85	0.25	0.19	0.34	0.25	0.08	0.01	10.4%
		5.10	10.70	0.25	0.27	0.34	0.25	0.08	0.02	14.7%
		5.40	10.65	0.30	0.44	0.30	0.30	0.09	0.04	28.8%
		5.70	10.75	0.25	0.42	0.32	0.25	0.08	0.03	22.9%
		6.00	10.65	0.15	0.21	0.32	0.15	0.05	0.01	8.0%
	WL	6.40	10.54	0.00	0.00	0.41		0.00	0.00	0.0%
		7.20	10.20			0.00		0.00	0.00	0.0%
		9.30	9.85			0.00		0.00	0.00	0.0%
1	GL	10.80	9.65			0.00		0.00	0.00	0.0%
	S	12.80	9.45			0.00		0.00	0.00	0.0%
	TOTALS ----------					2.95	0.3 (Max.)	0.49	0.14	100.0%

Manning's n = 0.2971
Hydraulic Radius= 0.16548241

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.49	0.39	-20.1%
10.29	0.49	1.19	143.8%
10.31	0.49	1.12	129.2%
10.33	0.49	1.05	114.8%
10.35	0.49	0.98	100.8%
10.37	0.49	0.91	86.9%
10.39	0.49	0.85	73.4%
10.41	0.49	0.78	60.1%
10.43	0.49	0.72	47.0%
10.45	0.49	0.65	34.2%
10.47	0.49	0.59	21.7%
10.49	0.49	0.53	9.4%
10.50	0.49	0.50	3.4%
10.51	0.49	0.47	-2.6%
10.52	0.49	0.45	-8.5%
10.53	0.49	0.42	-14.3%
10.54	0.49	0.39	-20.1%
10.55	0.49	0.36	-25.8%
10.56	0.49	0.33	-31.3%
10.57	0.49	0.31	-36.7%
10.58	0.49	0.28	-42.0%
10.59	0.49	0.26	-47.2%
10.61	0.49	0.21	-57.1%
10.63	0.49	0.16	-66.5%
10.65	0.49	0.12	-75.4%
10.67	0.49	0.09	-82.0%
10.69	0.49	0.06	-87.2%
10.71	0.49	0.04	-91.0%
10.73	0.49	0.03	-93.8%
10.75	0.49	0.02	-95.9%
10.77	0.49	0.01	-97.4%
10.79	0.49	0.01	-98.5%

WATERLINE AT ZERO AREA ERROR = 10.506

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 1

Constant Manning's n

STAGING TABLE

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field measured water surface elevations and sag

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG VELOCITY (FT/SEC)
GL	9.75	8.45	0.49	1.10	4.17	8.96	100.0%	0.47	2.34	0.56
	9.76	8.38	0.49	1.09	4.12	8.89	99.2%	0.46	2.31	0.56
	9.81	7.74	0.48	1.04	3.72	8.24	91.9%	0.45	2.05	0.55
	9.86	7.10	0.47	0.99	3.35	7.60	84.8%	0.44	1.82	0.54
	9.91	6.54	0.46	0.94	3.01	7.02	78.3%	0.43	1.60	0.53
	9.96	5.97	0.45	0.89	2.70	6.45	71.9%	0.42	1.41	0.52
	10.01	5.40	0.45	0.84	2.41	5.87	65.5%	0.41	1.25	0.52
	10.06	4.86	0.44	0.79	2.16	5.32	59.3%	0.41	1.10	0.51
	10.11	4.52	0.42	0.74	1.92	4.95	55.2%	0.39	0.96	0.50
	10.16	4.18	0.41	0.69	1.70	4.58	51.1%	0.37	0.82	0.48
	10.21	3.86	0.39	0.64	1.50	4.23	47.2%	0.36	0.70	0.47
	10.26	3.70	0.35	0.59	1.31	4.04	45.1%	0.33	0.58	0.44
	10.31	3.54	0.32	0.54	1.13	3.85	42.9%	0.29	0.47	0.41
	10.36	3.38	0.28	0.49	0.96	3.66	40.8%	0.26	0.37	0.38
	10.41	3.23	0.25	0.44	0.79	3.46	38.6%	0.23	0.28	0.35
	10.46	3.07	0.21	0.39	0.64	3.27	36.5%	0.19	0.20	0.31
WL	10.51	2.91	0.17	0.34	0.49	3.08	34.3%	0.16	0.13	0.27
	10.56	2.70	0.13	0.29	0.35	2.84	31.7%	0.12	0.08	0.23
	10.61	2.38	0.09	0.24	0.22	2.51	28.0%	0.09	0.04	0.18
	10.66	1.70	0.06	0.19	0.11	1.81	20.2%	0.06	0.02	0.14
	10.71	0.84	0.06	0.14	0.05	0.93	10.3%	0.05	0.01	0.13
	10.76	0.38	0.05	0.09	0.02	0.42	4.7%	0.04	0.00	0.11
	10.81	0.18	0.02	0.04	0.00	0.20	2.2%	0.02	0.00	0.07

1/3 · 0.19
RR = 0.30

0.3 cfs year-round

STREAM NAME: Unamed Trib. to Rough and Tumbling
XS LOCATION: 200 m U/S from confl. w/ Lynch Cr.
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.14	cfs
CALCULATED FLOW (Qc)=	0.13	cfs
(Qm-Qc)/Qm * 100 =	2.9	%
MEASURED WATERLINE (WLm)=	10.54	ft
CALCULATED WATERLINE (WLc)=	10.51	ft
(WLm-WLc)/WLm * 100 =	0.3	%
MAX MEASURED DEPTH (Dm)=	0.30	ft
MAX CALCULATED DEPTH (Dc)=	0.34	ft
(Dm-Dc)/Dm * 100	-14.8	%
MEAN VELOCITY=	0.27	ft/sec
MANNING'S N=	0.297	
SLOPE=	0 035	ft/ft
.4 * Qm =	0.1	cfs
2.5 * Qm=	0.3	cfs

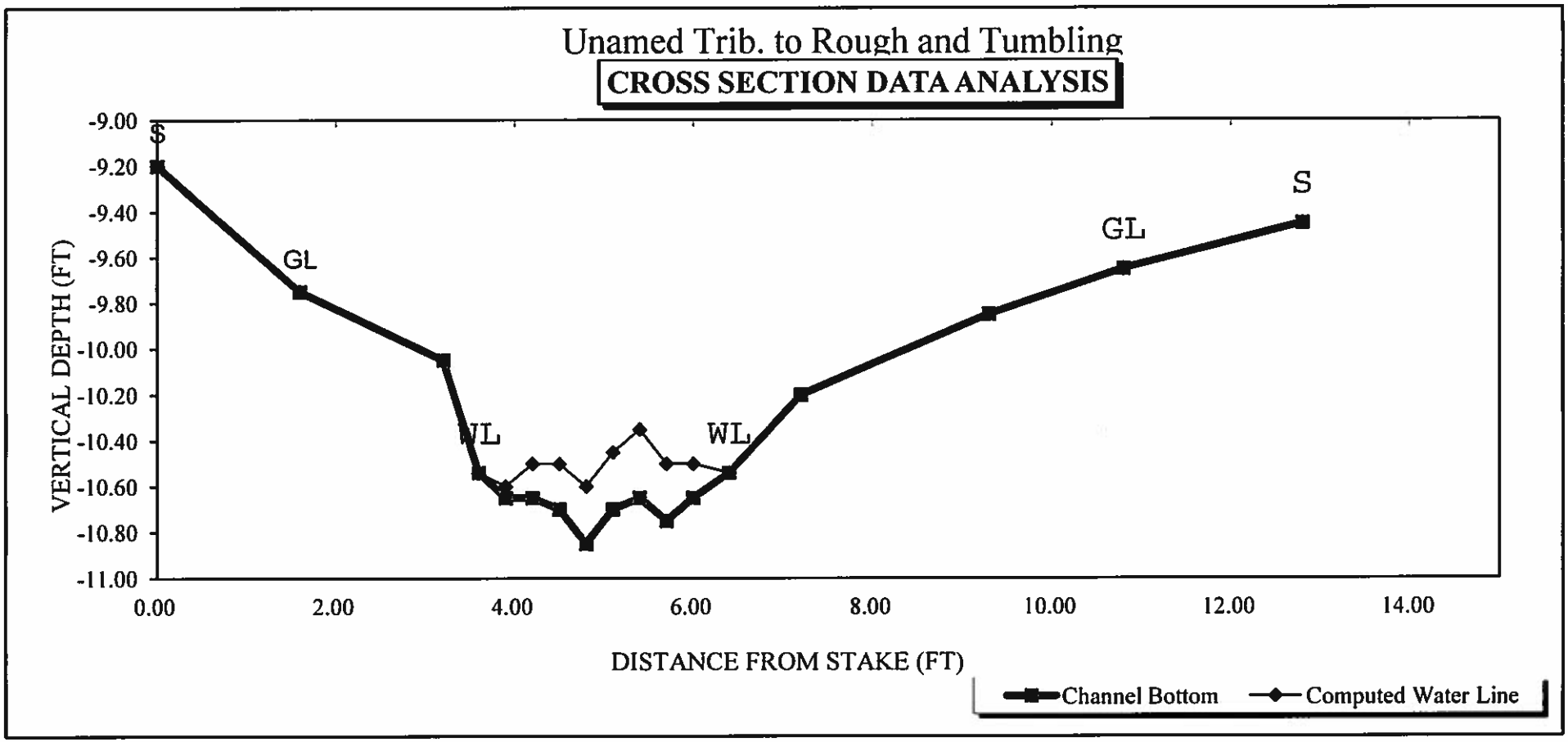
RECOMMENDED INSTREAM FLOW:

FLOW (CFS)	PERIOD

RATIONALE FOR RECOMMENDATION:

RECOMMENDATION BY: ..... AGENCY ..... DATE: .....

CWCB REVIEW BY: ..... DATE: .....


Unamed Trib. to Rough and Tumbling
CROSS SECTION DATA ANALYSIS
-9.00
-9.20
-9.40
-9.60
-9.80
-10.00
-10.20
-10.40
-10.60
-10.80
-11.00
VERTICAL DEPTH (FT)
S
GL
WL
WL
GL
S
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line

Discharge Measurment Field Visit Data Report *(Filters: Name begins with Rough and Tumbling;)*

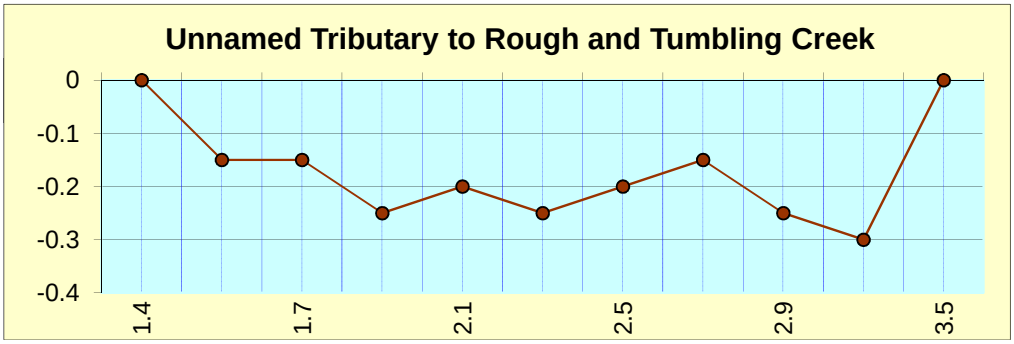
Div	Name	CWCB Case Number	Segment ID	Meas. Date	UTM	Location	Flow Amount (cfs)	Meas #	Rating	Station ID
1	Rough and Tumbling Creek		16/1/A-005	08/27/2015	UTMx: 403474.769 UTMy: 4321538.382		0.19			
1	Rough and Tumbling Creek		16/1/A-005	07/28/2016	UTMx: 403431.2615 UTMy: 4321437.6043	Unnamed Tributary to Rough and Tumbling Creek Above Confluence with Rough and Tumbling	0.78	.001	Poor (>8%)	UTRTNRLT
1	Rough and Tumbling Creek		16/1/A-005	08/26/2016	UTMx: 403428.4981 UTMy: 4321431.0897	Unnamed Tributary to Rough and Tumbling Creek Near Confluence with Rough and Tumbling Creek	0.59	.002	Poor (>8%)	UTRTNRLT

Flow Mesaurement Calculations

Unnamed Trib to Rough and Tumbling Creek

Date: 8/27/2015 **Time:** 11:44 AM
Observers: Baessler / (intern) Cunningham
County: Gunnison
Water Division: 4 *Note: Photos Taken*
Location: ***Latitude:*** 39 02 15.28
Longitude: 106 06 55.07
Comments: Sunny, Clear

Distance from bank	Width	Depth	Velocity	Area	Discharge
1.4	water line	0	0		
1.5	0.15	0.15	0.38	0.0225	0.00855
1.7	0.2	0.15	0.33	0.03	0.0099
1.9	0.2	0.25	0.28	0.05	0.014
2.1	0.2	0.2	0.43	0.04	0.0172
2.3	0.2	0.25	0.31	0.05	0.0155
2.5	0.2	0.2	0.62	0.04	0.0248
2.7	0.2	0.15	0.58	0.03	0.0174
2.9	0.2	0.25	0.65	0.05	0.0325
3.1	0.3	0.3	0.51	0.09	0.0459
3.5	water line	0	0		
				FLOW =	**0.19 CFS**



Graph Data

1.4	0
1.5	-0.15
1.7	-0.15
1.9	-0.25
2.1	-0.2
2.3	-0.25
2.5	-0.2
2.7	-0.15
2.9	-0.25
3.1	-0.3
3.5	0

General Site Field Visit Data Report *(Filters: Name begins with Rough and Tumbling;)*

Type		Div	Name	CWCB Case Number	Segment ID	Visit Date	Location Description
Stream		1	Rough and Tumbling Creek		16/1/A-005	8/26/2016	Unnamed Tributary to Rough and Tumbling Creek

Remarks

Date	Remark
26/08/16 12:00	Depart truck to hike to Unnamed Tributary to Rough and Tumbling Measurement location.
26/08/16 12:35	Arrive at Unnamed Tributary to Rough and Tumbling.
26/08/16 12:51	Ground on hike in and at Q measurement site damp and vegetation in the shade has water droplets.
26/08/16 13:01	Set up x-section for spot discharge measurement, UTRTNRLT.002
26/08/16 14:04	There is snow on the Buffalo Peaks, the headwaters of Rough and Tumbling Creek.

GPS Log

GPS Date	Device	GPSPoint Name	Latitude	Longitude	UTM Zone	UTM Easting	UTMNorthing	Horizontal Accuracy	GPSDescription
26/08/16 11:57	Phone (BJE)	UTRT005	39.030934	-106.105137				5.000000	Truck parking location, at the end of Forest Service Road 431.
26/08/16 12:18	Phone (BJE)	UTRT006	39.032374	-106.109436				5.000000	Lynch Creek at Lynch Creek Trail crossing.
26/08/16 12:49	Phone (BJE)	UTRT007	39.036660	-106.115753				5.000000	Discharge measurement cross-section.

Photo Log

Photo Date	Camera	Media Type	Photo Video ID	Caption	Photo Comment
26/08/16 12:19	iPhone (BJE)	Photograph		Lynch Creek at Lynch Creek Trail crossing.	Flowing, gravel, cobble and boulder bed, abundant riparian vegetation, and sinuous.
Link: https://1b679d435a9c0cb855a4-5e783ede762bf508243fd6d1ba1484df.ssl.cf2.rackcdn.com/iformbuilder.com/461577/_data461577_cwcb_general_subform_photos/field_1189406587582b9546bc311.jpg					
26/08/16 13:29	iPhone (BJE)	Photograph		Unnamed Trib to Rough and Tumbling Q meas X sec	
Link: https://1b679d435a9c0cb855a4-5e783ede762bf508243fd6d1ba1484df.ssl.cf2.rackcdn.com/iformbuilder.com/461577/_data461577_cwcb_general_subform_photos/field_1085409855582b95483e7ae.jpg					

	Div	Name	CWCB Case Number	Segment ID	Visit Date	Location Description
	1	Rough and Tumbling Creek		16/1/A-005	7/28/2016	Unnamed Tributary to Rough amd Tumbling Creek

Remarks

Date	Remark
28/07/16 12:42	Arrive at Rich Creek trailhead, GPS UTRT001.
28/07/16 14:48	Arrive Unnamed Trib Rough and Tumbling. From Rich Creek trailhead. The hike takes one hour.
28/07/16 15:11	Angler encountered slightly below Rough and Tumbling trail crossing. She was tying a fly and stated that she pulled some nice broke trout out of the creek. In big pool below trail crossing without the bridge, I observed some trout swim by but they sheltered before I could identify.
28/07/16 17:07	Begin hike out of field site.

Stream

GPS Log

GPS Date	Device	GPSPoint Name	Latitude	Longitude	UTM Zone	UTM Easting	UTMNorthing	Horizontal Accuracy	GPSDescription
28/07/16 12:43	Phone (BJE)	UTRT001	39.068259	-106.116281				5.000000	Parking location to access Unnamed Trib Rough & Tumbling, "Rich Creek Trailhead"
28/07/16 14:51	Phone (BJE)	UTRT002	39.038018	-106.115267				5.000000	Arrive Unnamed Tributary to Rough and Tumbling Creek confluence with Rough and Tumbling Creek. Just above log bridge trail crossing over R&T. Actual location of proposed lower terminus.
28/07/16 15:21	Phone (BJE)	UTRT003	39.038153	-106.114637				5.000000	Actual location of confluence of Lynch Creek and Rough and Tumbling Creek.
28/07/16 16:05	Phone (BJE)	UTRT004	39.036578	-106.115805				5.000000	UTRTNRLT.001 Streamflow measurement cross section.

Photo Log

Photo Date	Camera	Media Type	Photo Video ID	Caption	Photo Comment
28/07/16 14:53	iPhone (BJE)	Photograph		Rough and Tumbling Creek	Photo taken just below trail crossing log bridge. Plunge pool environment. Abundant riparian vegetation. Single thread channel. Bed is predominantly boulders with interspersed cobble and sand. Little sinuosity.
Link: https://620638672b84d7ed4da9-bca54e529e5752f1e6d63fb4a534334b.ssl.cf2.rackcdn.com/iformbuilder.com/461577/_data461577_cwcb_general_subform_photos/field_63800248657e1c3eea633d.jpg					
28/07/16 15:17	iPhone (BJE)	Photograph		Lynch Creek Conflu w/ Rough & Tumbling	Standing in water on left edge of Rough and Tumbling Creek and photographing the Inflow from Lynch Creek (center of photograph). Photo of UTRT003.
Link: https://620638672b84d7ed4da9-bca54e529e5752f1e6d63fb4a534334b.ssl.cf2.rackcdn.com/iformbuilder.com/461577/_data461577_cwcb_general_subform_photos/field_171676441057e1c3f01640b.jpg					
28/07/16 15:46	Panasonic Lumix DMC-TS2 (BJE)	Photograph	719	Unnamed Tributary to Rough and Tumbling Creek	Photo taken between confluence and streamflow measurement section. From center of creek looking upstream.
Link:					
28/07/16 15:47	Panasonic Lumix DMC-TS2 (BJE)	Photograph	720	Unnamed Tributary to Rough and Tumbling Creek	Photo taken between confluence and streamflow measurement section. From center of creek looking upstream.
Link:					
28/07/16 16:11	iPhone (BJE)	Photograph		UTRTNRLT.001 Measurement Cross Section	From center of creek looking upstream.
Link: https://620638672b84d7ed4da9-bca54e529e5752f1e6d63fb4a534334b.ssl.cf2.rackcdn.com/iformbuilder.com/461577/_data461577_cwcb_general_subform_photos/field_52867122957e1c3f3caa57.jpg					
28/07/16 17:05	iPhone (BJE)	Photograph		Confluence UTRT and Rough & Tumbling Creeks	Photo left UTRT and right Rough and Tumbling Creek.
Link: https://620638672b84d7ed4da9-bca54e529e5752f1e6d63fb4a534334b.ssl.cf2.rackcdn.com/iformbuilder.com/461577/_data461577_cwcb_general_subform_photos/field_133277613857e1c3f57a492.jpg					