Rob Firth
Colorado River Headwaters Project Coordinator
PO Box 92
Hot Sulphur Springs, CO 80451
(970) 531-3939

December 7, 2010

Ms. Linda Bassi
Mr. Jeff Baessler
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Ms. Bassi and Mr. Baessler,

Trout Unlimited in conjunction with the Colorado Division of Wildlife (CDOW) is submitting this final instream flow recommendation for an unnamed tributary to Muddy Creek, located in Routt and Grand Counties, Water Division 5.

Location and Land Status. This unnamed tributary to Muddy Creek originates in the headwaters of the Gore Range at an elevation of approximately 9,800 feet. Over the next 1.75 miles it flows generally east through the Arapahoe National Forest as it drops to its confluence with Muddy Creek at an elevation of 8,760 feet. The proposed ISF reach covers this entire 1.75 mile segment and the entire reach is located on Forest Service Land (Fig. 1).

Biological Summary and R2CROSS Analysis. In September 2009, TU collected stream cross sectional data, natural environment data, and other data needed to quantify instream flow needs. Previous survey data collected by CDOW and rod and reel sampling by TU staff indicates that the stream supports healthy populations of Colorado River cutthroat trout.

Stream cross sectional data were analyzed using the R2CROSS program, and the output was evaluated using the methods described in Nehring (1979) and Espegren (1996). The R2CROSS model shows average depth, percent wetted perimeter and average velocity vary with discharge. According to the criteria established by Nehring (1979), the relevant minimum requirements are an average depth of 0.2 feet, a wetted perimeter of 50%, and an average velocity of 1.0 ft/sec. Protecting salmonids during the summer season is accomplished by insuring all three hydraulic criteria are met and winter protection is accomplished by protecting two of three hydraulic criteria. Thus, R2CROSS indicates that the fishery of this unnamed tributary to Muddy Creek can be protected with minimum summer flows of 1.25 cfs and minimum winter flows of 0.40 cfs. However, because spring and fall water availability is often insufficient for meeting these requirements, we recommend adjusting the summer and winter ISF requirements to reflect water availability. Therefore, TU recommends that the CWCB appropriate the following flow amounts

to preserve the natural environment of unnamed tributary to Muddy Creek to a reasonable degree:

- From **April 15 through June 30** a flow appropriation of **1.25 cfs** is recommended to maintain the three principal criteria of average depth, average velocity, and percent wetted perimeter;
- From **July 1 through August 15 a** flow appropriation of **0.4 cfs** is recommended to maintain the wetted perimeter and average depth criteria;
- From **August 16 through October 31** a flow of **0.2 cfs** based on water availability limitations;
- From **November 1 through March 31**, a flow appropriation of **0.1 cfs** is recommended based on water availability limitations;
- From April 1**through April 14** a flow appropriation of **0.4 cfs** is recommended to maintain the wetted perimeter and average depth criteria.

Water Availability. The preliminary instream flow recommendation we submitted in February 2010 was based on preliminary water availability analyses. Subsequent to those preliminary analyses, the CWCB provided us with a geometric mean analysis of daily flows at unnamed tributary to Muddy Creek. We used the CWCB's water availability analysis to adjust the seasonality and quantities of the instream flow recommendation so that the estimated daily flow exceeds the recommended instream flow for the unnamed tributary to Muddy Creek . These seasonal adjustments are reflected in the final instream flow recommendation above.

Relationship to Existing State Policy. TU is forwarding this stream flow recommendation to the CWCB to meet the State of Colorado's policy "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." C.R.S. 33-1-101(1). Further, the CDOW Strategic Plan states "Healthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The Division desires to protect and enhance the quality and quantity of aquatic habitats." TU recommends that this unnamed tributary to Muddy Creek be considered for inclusion in the Instream Flow Program because doing so would help meet these stated policies. Specifically, establishing minimum flows through this reach would preserve the natural environment of the stream to a reasonable degree.

Attached in Appendix A, please find copies of the field data sheets, the R2CROSS modeling runs, and stream photographs. If you have any questions regarding the attached information or the instream flow recommendations, please feel free to contact me at (970) 531-3939.

Trout Unlimited thanks the Colorado Division of Wildlife and the Colorado Water Conservation Board Staff for their support in preparing this recommendation.

Sincerely,

Rob Firth

Trout Unlimited
Colorado River Headwaters Project Coordinator

Cc: Jay Skinner, CDOW Water Unit Program Manager – w/o attachments
Mark Uppendahl, CDOW Instream Flow Program Coordinator

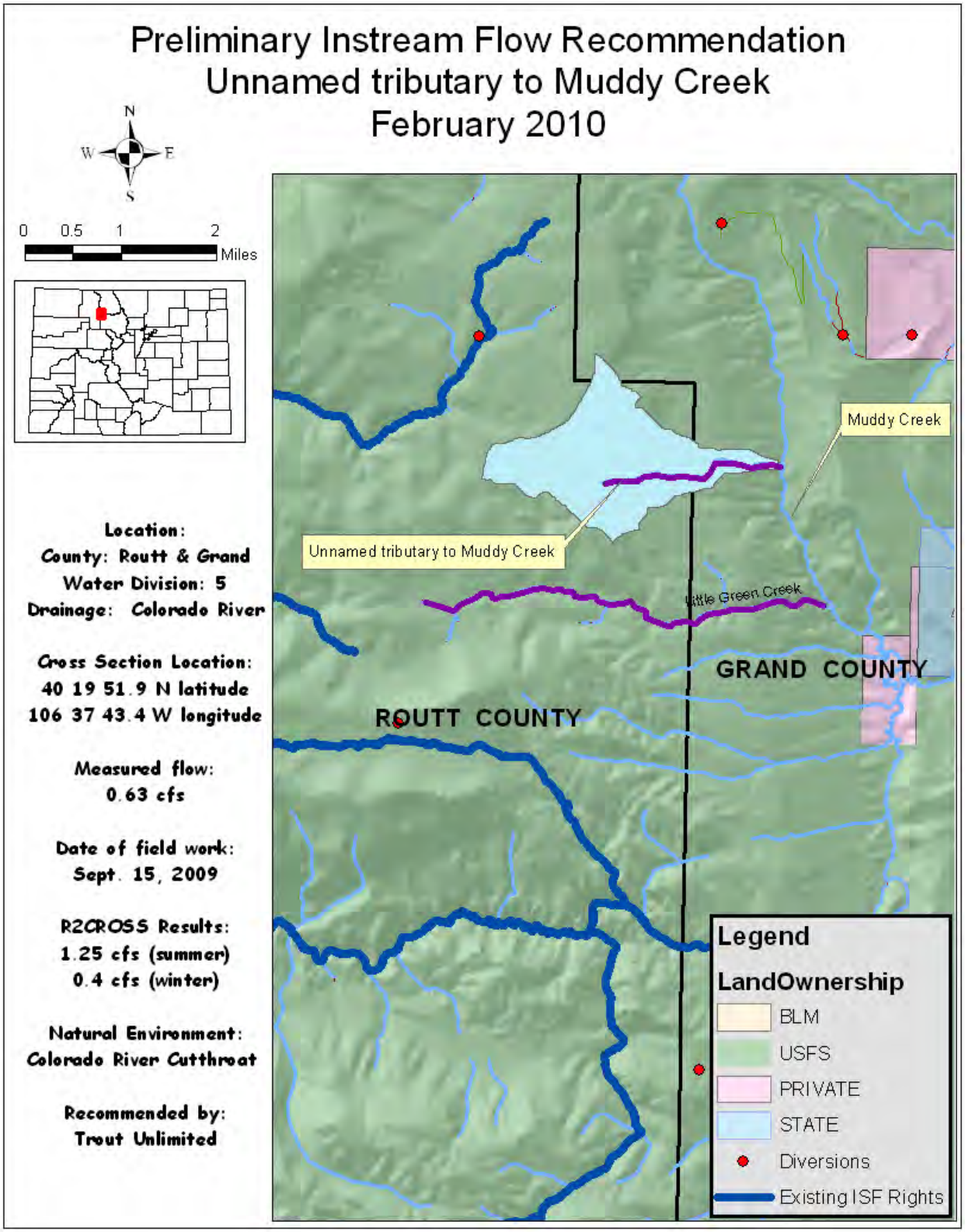


Figure 1.. Map of unnamed tributary to Muddy Creek watershed. The watershed's location within Division 5 is indicated by the red box on the inset map of Colorado

Greg Espegren
Aquatics Specialist
Colorado Water Project
1320 Pearl Street, Suite 320
Boulder, CO 80302
303.440.2937

February 18, 2010

Ms. Linda Bassi
Mr. Jeff Baessler
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Ms. Bassi and Mr. Baessler,

Trout Unlimited in conjunction with the Colorado Division of Wildlife (CDOW) is submitting this instream flow recommendation for an unnamed tributary to Muddy Creek, located in Routt and Grand Counties, Water Division 5.

Location and Land Status. This unnamed tributary to Muddy Creek originates in the headwaters of the Gore Range at an elevation of approximately 9,800 feet. Over the next 1.75 miles it flows generally east through the Arapahoe National Forest as it drops to its confluence with Muddy Creek at an elevation of 8,760 feet. The proposed ISF reach covers this entire 1.75 mile segment and the entire reach is located on Forest Service Land (Fig. 1).

Biological Summary and R2CROSS Analysis. In September 2009, TU collected stream cross sectional data, natural environment data, and other data needed to quantify instream flow needs. Previous survey data collected by CDOW and rod and reel sampling by TU staff indicates that the stream supports healthy populations of Colorado River cutthroat trout.

Stream cross sectional data were analyzed using the R2CROSS program, and the output was evaluated using the methods described in Nehring (1979) and Espegren (1996). The R2CROSS models how average depth, percent wetted perimeter and average velocity vary with discharge. According to the criteria established by Nehring (1979), the relevant minimum requirements are an average depth of 0.2 feet, a wetted perimeter of 50%, and an average velocity of 1.0 ft/sec. Protecting salmonids during the summer season is accomplished by insuring all three criteria are met while during the winter protection can be accomplished by protecting 2 of three criteria. Thus, R2CROSS indicates that the fishery of this unnamed tributary to Muddy Creek can be protected with minimum summer flows of 1.25 cfs and minimum winter flows of 0.40 cfs.

Water Availability. There are no stream gages on this unnamed tributary to Muddy Creek so we used the USGS StreamStats methodology to estimate the discharge passing through the

proposed ISF reach. This allowed us to estimate how much water would have flowed through this unnamed tributary to Muddy Creek in the absence of any diversions.

The Colorado State Engineer's CDSS Diversion Structures, Division 5, Database (version 20090701) indicates that there are no diversion structures located within this unnamed tributary to Muddy Creek watershed. Therefore, no adjustments to the StreamStats modeled flows were necessary.

We used this water availability analysis to adjust the recommended ISF so that our estimate of average monthly flows through this unnamed tributary to Muddy Creek typically exceeded the recommended flows (Fig. 2).

Preliminary ISF Recommendation. Our StreamStats water availability analysis indicates that streamflows are available to satisfy the flows that resulted from our R2CROSS analysis. Therefore, TU makes a preliminary recommendation for the following flow amounts to preserve the natural environment of this unnamed tributary to Muddy Creek to a reasonable degree:

- From **April 15 through October 15** a flow appropriation of **1.25 cfs** is recommended to maintain the three principal criteria of average depth, average velocity, and percent wetted perimeter;

- From **October 16 through April 14**, a flow appropriation of **0.40 cfs** is recommended to maintain the wetted perimeter and average depth criteria.

We understand that the CWCB staff will evaluate water availability in more detail during the coming months and the seasonality of these flow recommendations may change as a result of the CWCB staffs' analysis.

Relationship to Existing State Policy. TU is forwarding this stream flow recommendation to the CWCB to meet the State of Colorado's policy "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." C.R.S. 33-1-101(1). Further, the CDOW Strategic Plan states "Healthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The Division desires to protect and enhance the quality and quantity of aquatic habitats." TU recommends that this unnamed tributary to Muddy Creek be considered for inclusion in the Instream Flow Program because doing so would help meet these stated policies. Specifically, establishing minimum flows through this reach would preserve the natural environment of the stream to a reasonable degree.

Attached in Appendix A, please find copies of the field data sheets, the R2CROSS modeling runs, and stream photographs. If you have any questions regarding the attached information or the instream flow recommendations, please feel free to contact me at (303) 440-2937.

Trout Unlimited thanks the Colorado Division of Wildlife and the Colorado Water Conservation Board Staff for their support in preparing this recommendation.

Sincerely,

Greg Espegren

Greg Espegren
Trout Unlimited
Aquatic Specialist

Cc: Jay Skinner, CDOW Water Unit Program Manager – w/o attachments
Mark Uppendahl, CDOW Instream Flow Program Coordinator

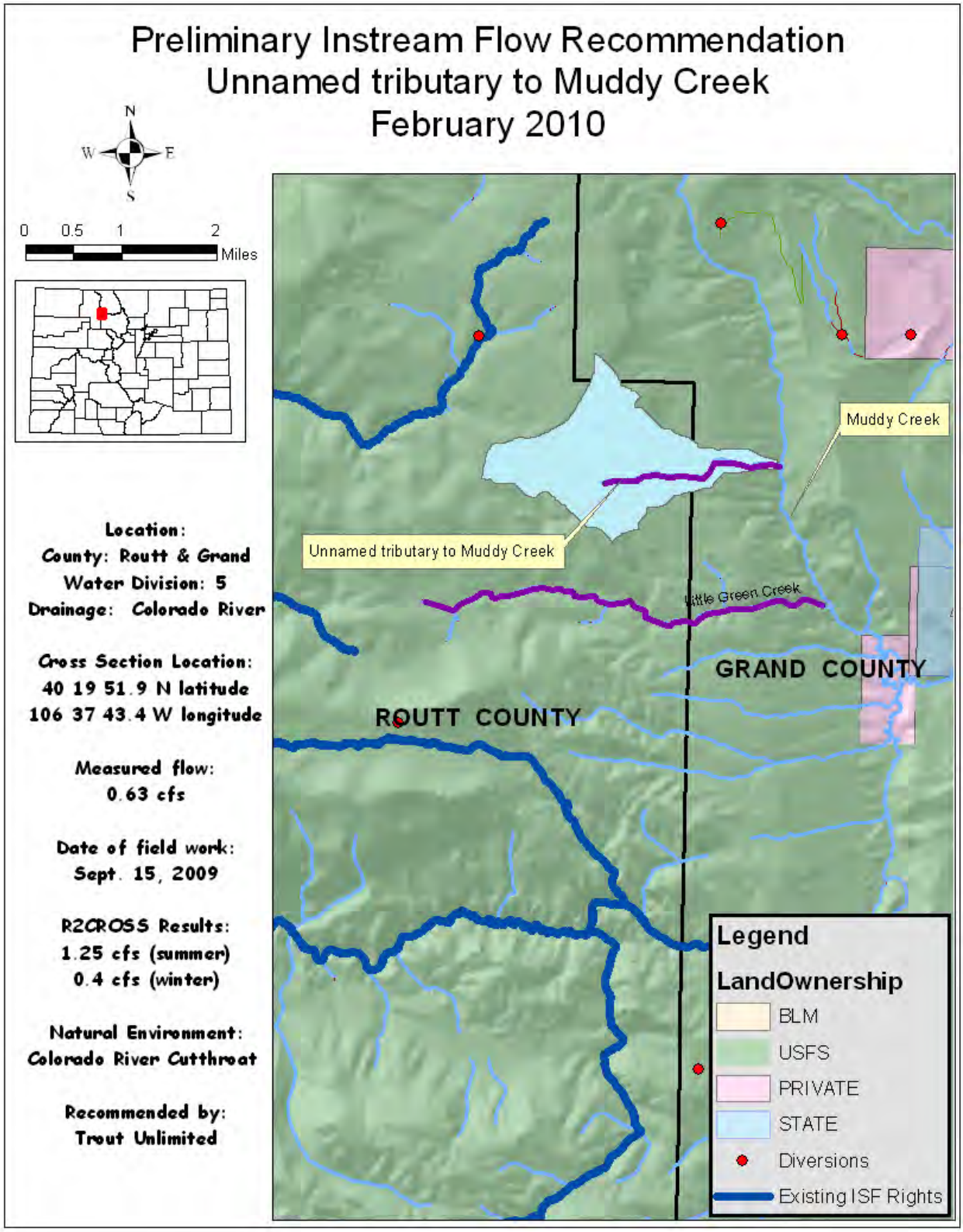


Figure 1.. Map of unnamed tributary to Muddy Creek watershed. The watershed's location within Division 5 is indicated by the red box on the inset map of Colorado

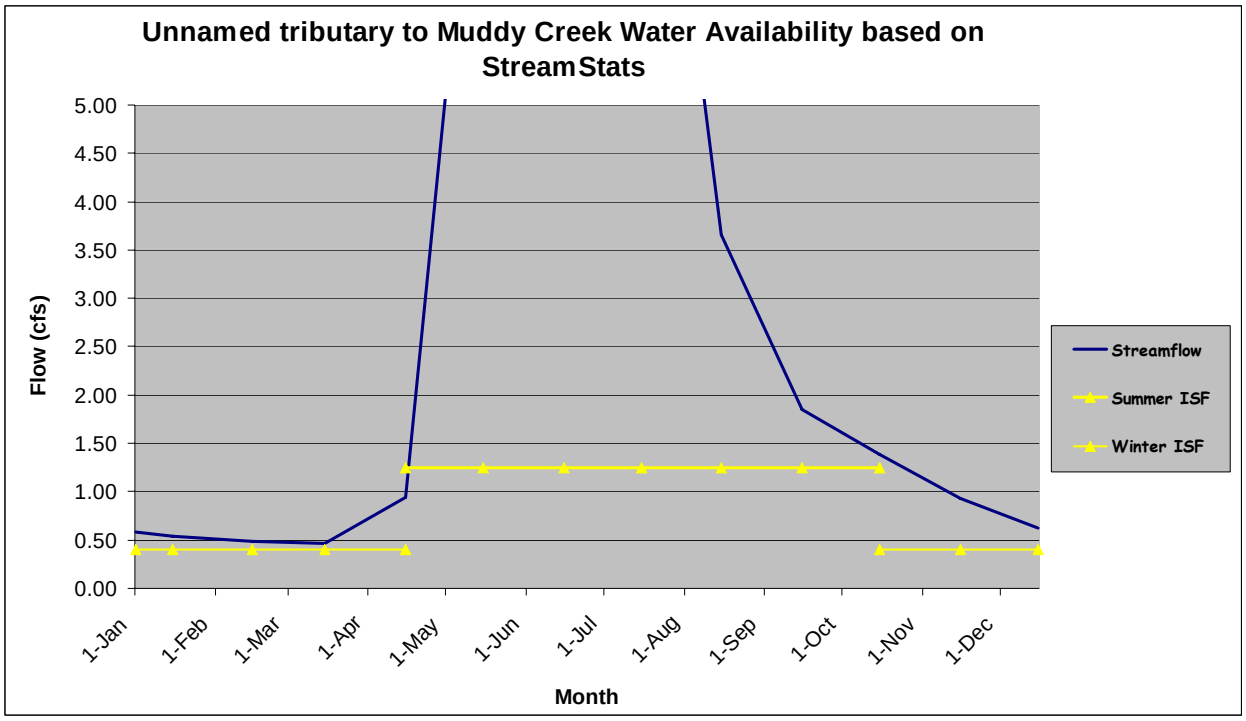


Figure 2. Recommended instream flow appropriations (yellow lines) as compared to estimated average monthly discharge at Lower Terminus of proposed ISF reach on unnamed tributary of Muddy Creek.

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

STREAM NAME: Unnamed Trib to Little Muddy Creek					CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: Downstream of Forest Road 100 Crossing / Parallel 4 to Trail					
N 40° 19' 51.9" W 106° 37' 47.4"					
DATE: 9-15	OBSERVERS: Greg Espersen + Drew Peterson II				
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 7	TOWNSHIP: 4 (N)/S	RANGE: 82 E/(W)	PM: 6th
COUNTY: Routt	WATERSHED: Colorado	WATER DIVISION: 5	DOW WATER CODE:		
MAP(S): USGS: Walton Peak					
USFS: Arapahoe					

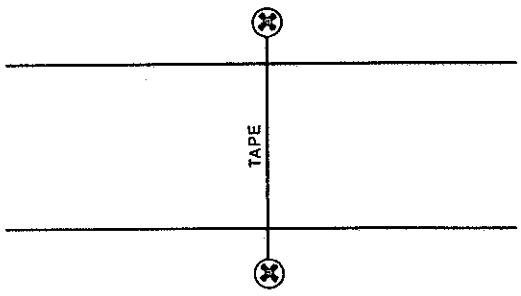
SUPPLEMENTAL DATA

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: 3		

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	RB=6.89 LB=6.89
② WS Upstream	3.5'	6.70
③ WS Downstream	2'	6.96
SLOPE		

SKETCH



LEGEND:
- Stake ⊗
- Station ①
- Photo ◇
- Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/(NO)	DISTANCE ELECTROFISHED: _____ ft	FISH CAUGHT: (YES)/NO FLY ROD	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
CRCT		II	I	II	IIII	IIII	II	II	III	IIII	II	I					

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

COMMENTS

NO BROOK TROUT !

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:	CROSS-SECTION NO.:	DATE:	SHEET 1 OF 1

BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: ____ ft	TIME: 2:00 PM

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S	0		5.51								
	0.7		5.79								
G	1.0		6.04								
W	1.3		6.90	Ø				-			
	1.5		7.12	0.2				0.06			
	1.8		7.10	0.2				0.10			
Behind Rock	2		7.15	0.25				0.0			
	2.2		7.25	0.35				0.05			
	2.4		7.26	0.35				0.74			
	2.6		7.16	0.25				1.25			
	2.8		7.42	0.52				1.53			
	3		7.35	0.45				1.07			
	3.2		7.43	0.55				1.69			
	3.4		7.10	0.20				0.89			
	3.6		7.09	0.20				0.28			
	3.8		7.04	0.15				0.17			
	4		7.03	0.15				0.26			
W	4.3		6.87	Ø							
	5.0		6.58								
G	6.7		6.48								
	7.4		5.70								
S	8.2		4.60								
TOTALS:											

End of Measurement	Time: 2:15	Gage Reading: ____ ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

Data Input & Proofing

STREAM NAME: Unnamed trib to Muddy Creek
XS LOCATION: downstream of FS Road 100
XS NUMBER: 1
DATE: 9/15/2009
OBSERVERS: Espegren, Peternell

1/4 SEC: NW
SECTION: 7
TWP: 4N
RANGE: 82W
PM: 6th

COUNTY: Routt
WATERSHED: Muddy Creek, Colorado River
DIVISION: 5
DOW CODE:
USGS MAP: Walton Peak, Lake Agnes
USFS MAP: Arapahoe

Level and Rod Survey

TAPE WT: 0.0106 lbs / ft
TENSION: 99999 lbs

SLOPE: 0.047272727 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 = 22					
	Stake	0.00	5.51			0.00	0.00	0.00
		0.70	5.79			0.00	0.00	0.00
1	G	1.00	6.04			0.00	0.00	0.00
	W	1.30	6.90	0.00		0.00	0.00	0.00
		1.50	7.12	0.20	0.06	0.05	0.00	6.92
		1.80	7.10	0.20	0.10	0.05	0.01	6.90
		2.00	7.15	0.25	0.00	0.05	0.00	6.90
		2.20	7.25	0.35	0.05	0.07	0.00	6.90
		2.40	7.26	0.35	0.74	0.07	0.05	6.91
		2.60	7.16	0.25	1.25	0.05	0.06	6.91
		2.80	7.42	0.52	1.53	0.10	0.16	6.90
		3.00	7.35	0.45	1.07	0.09	0.10	6.90
		3.20	7.43	0.55	1.69	0.11	0.19	6.88
		3.40	7.10	0.20	0.89	0.04	0.04	6.90
		3.60	7.09	0.20	0.28	0.04	0.01	6.89
		3.80	7.04	0.15	0.17	0.03	0.01	6.89
		4.00	7.03	0.15	0.26	0.04	0.01	6.88
	W	4.30	6.87	0.00		0.00	0.00	0.00
		5.00	6.58			0.00	0.00	0.00
1	G	6.70	6.48			0.00	0.00	0.00
		7.40	5.70			0.00	0.00	0.00
	Stake	8.20	4.60			0.00	0.00	0.00

Totals	0.79	0.63

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

LOCATION INFORMATION

STREAM NAME:	Unnamed trib to Muddy Creek
XS LOCATION:	downstream of FS Road 100
XS NUMBER:	1
DATE:	15-Sep-09
OBSERVERS:	Espegren, Peternell
1/4 SEC:	NW
SECTION:	7
TWP:	4N
RANGE:	82W
PM:	6th
COUNTY:	Routt
WATERSHED:	Muddy Creek, Colorado River
DIVISION:	5
DOW CODE:	0
USGS MAP:	Walton Peak, Lake Agnes
USFS MAP:	Arapahoe

SUPPLEMENTAL DATA

		*** NOTE ***
		Leave TAPE WT and TENSION
		at defaults for data collected
TAPE WT:	0.0106	with a survey level and rod
TENSION:	99999	

CHANNEL PROFILE DATA

SLOPE:	0.04727273

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

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

STREAM NAME: Unnamed trib to Muddy Creek
XS LOCATION: downstream of FS Road 100
XS NUMBER: 1

DATA POINTS= 22

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
Stake	0.00	5.51			0.00		0.00	0.00	0.0%
	0.70	5.79			0.00		0.00	0.00	0.0%
1 G	1.00	6.04			0.00		0.00	0.00	0.0%
W	1.30	6.90	0.00		0.00		0.00	0.00	0.0%
	1.50	7.12	0.20	0.06	0.30	0.20	0.05	0.00	0.5%
	1.80	7.10	0.20	0.10	0.30	0.20	0.05	0.01	0.8%
	2.00	7.15	0.25	0.00	0.21	0.25	0.05	0.00	0.0%
	2.20	7.25	0.35	0.05	0.22	0.35	0.07	0.00	0.6%
	2.40	7.26	0.35	0.74	0.20	0.35	0.07	0.05	8.2%
	2.60	7.16	0.25	1.25	0.22	0.25	0.05	0.06	9.9%
	2.80	7.42	0.52	1.53	0.33	0.52	0.10	0.16	25.3%
	3.00	7.35	0.45	1.07	0.21	0.45	0.09	0.10	15.3%
	3.20	7.43	0.55	1.69	0.22	0.55	0.11	0.19	29.6%
	3.40	7.10	0.20	0.89	0.39	0.20	0.04	0.04	5.7%
	3.60	7.09	0.20	0.28	0.20	0.20	0.04	0.01	1.8%
	3.80	7.04	0.15	0.17	0.21	0.15	0.03	0.01	0.8%
	4.00	7.03	0.15	0.26	0.20	0.15	0.04	0.01	1.6%
W	4.30	6.87	0.00		0.34		0.00	0.00	0.0%
	5.00	6.58			0.00		0.00	0.00	0.0%
1 G	6.70	6.48			0.00		0.00	0.00	0.0%
	7.40	5.70			0.00		0.00	0.00	0.0%
Stake	8.20	4.60			0.00		0.00	0.00	0.0%
TOTALS ----------					3.54	0.55 (Max.)	0.79	0.63	100.0%

Manning's n = 0.1498
Hydraulic Radius= 0.223621442

STREAM NAME: Unnamed trib to Muddy Creek
XS LOCATION: downstream of FS Road 100
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.79	0.83	4.6%
6.64	0.79	1.66	109.3%
6.66	0.79	1.58	100.2%
6.68	0.79	1.51	91.1%
6.70	0.79	1.44	82.2%
6.72	0.79	1.37	73.5%
6.74	0.79	1.30	64.8%
6.76	0.79	1.24	56.4%
6.78	0.79	1.17	48.0%
6.80	0.79	1.11	39.8%
6.82	0.79	1.04	31.8%
6.84	0.79	0.98	23.8%
6.85	0.79	0.95	19.9%
6.86	0.79	0.92	16.1%
6.87	0.79	0.89	12.2%
6.88	0.79	0.86	8.4%
6.89	0.79	0.83	4.6%
6.90	0.79	0.80	0.9%
6.91	0.79	0.77	-2.8%
6.92	0.79	0.74	-6.5%
6.93	0.79	0.71	-10.2%
6.94	0.79	0.68	-13.8%
6.96	0.79	0.63	-20.9%
6.98	0.79	0.57	-27.9%
7.00	0.79	0.52	-34.7%
7.02	0.79	0.46	-41.4%
7.04	0.79	0.41	-47.9%
7.06	0.79	0.36	-53.9%
7.08	0.79	0.32	-59.6%
7.10	0.79	0.28	-65.0%
7.12	0.79	0.24	-69.6%
7.14	0.79	0.21	-73.4%

WATERLINE AT ZERO
AREA ERROR = 6.897

STREAM NAME: Unnamed trib to Muddy Creek
XS LOCATION: downstream of FS Road 100
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	6.48	5.55	0.42	0.95	2.33	6.44	100.0%	0.36	2.55	1.09	
	6.50	5.24	0.43	0.93	2.24	6.13	95.1%	0.36	2.46	1.10	
	6.55	4.38	0.46	0.88	2.00	5.23	81.1%	0.38	2.27	1.14	
	6.60	3.76	0.48	0.83	1.80	4.57	70.9%	0.39	2.08	1.16	
	6.65	3.63	0.44	0.78	1.61	4.39	68.1%	0.37	1.78	1.11	
	6.70	3.49	0.41	0.73	1.43	4.20	65.2%	0.34	1.51	1.05	
	6.75	3.35	0.38	0.68	1.26	4.02	62.4%	0.31	1.26	1.00	1.25
	6.80	3.21	0.34	0.63	1.10	3.84	59.5%	0.29	1.03	0.94	
	6.85	3.07	0.31	0.58	0.94	3.65	56.7%	0.26	0.82	0.87	
WL	6.90	2.95	0.27	0.53	0.79	3.48	54.1%	0.23	0.64	0.80	
	6.95	2.81	0.23	0.48	0.65	3.31	51.4%	0.20	0.47	0.73	0.4
	7.00	2.67	0.19	0.43	0.51	3.14	48.7%	0.16	0.33	0.64	
	7.05	2.34	0.16	0.38	0.38	2.77	43.0%	0.14	0.22	0.58	
	7.10	1.97	0.14	0.33	0.27	2.38	36.9%	0.11	0.14	0.51	
	7.15	1.38	0.14	0.28	0.19	1.74	27.1%	0.11	0.10	0.50	
	7.20	1.14	0.11	0.23	0.13	1.44	22.3%	0.09	0.06	0.43	
	7.25	0.87	0.09	0.18	0.08	1.09	17.0%	0.07	0.03	0.38	
	7.30	0.57	0.08	0.13	0.05	0.74	11.4%	0.06	0.02	0.34	
	7.35	0.51	0.04	0.08	0.02	0.62	9.5%	0.03	0.00	0.22	
	7.40	0.18	0.01	0.03	0.00	0.22	3.5%	0.01	0.00	0.11	

STREAM NAME: Unnamed trib to Muddy Creek
XS LOCATION: downstream of FS Road 100
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.63	cfs
CALCULATED FLOW (Qc)=	0.64	cfs
(Qm-Qc)/Qm * 100 =	-1.1	%
MEASURED WATERLINE (WLm)=	6.89	ft
CALCULATED WATERLINE (WLc)=	6.90	ft
(WLm-WLc)/WLm * 100 =	-0.2	%
MAX MEASURED DEPTH (Dm)=	0.55	ft
MAX CALCULATED DEPTH (Dc)=	0.53	ft
(Dm-Dc)/Dm * 100	3.2	%
MEAN VELOCITY=	0.80	ft/sec
MANNING'S N=	0.150	
SLOPE=	0.04727273	ft/ft
.4 * Qm =	0.3	cfs
2.5 * Qm=	1.6	cfs

RECOMMENDED INSTREAM FLOW:
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FLOW (CFS)	PERIOD
1.25 (3:3)	
0.40 (2:3)	

RATIONALE FOR RECOMMENDATION:
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RECOMMENDATION BY: [signature] AGENCY T.U. DATE: 1/20/10

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