



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7210
www.co.blm.gov



In Reply Refer To:
7520 (CO-932)

OCT 21 2018

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

Dear Ms. Bassi:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its recommendation for an instream flow water right on Cold Spring Creek, located in Water Division 4.

Location and Land Status. Cold Spring Creek is located approximately 4.0 miles south of McDonough Reservoir. The headwaters of the Cold Spring Creek are located in the Gunnison National Forest and it flows into Cochetopa Creek approximately 4.0 miles southwest of Dome Lake State Wildlife Area. This recommendation addresses only the portion of Cold Spring Creek that is perennial. The perennial reach begins at Amala Spring, located in the NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 20, T45N R2E, New Mexico P.M., and extends downstream to the confluence with Cochetopa Creek, a distance of approximately 1.22 stream miles. The BLM manages 0.47 miles of this reach, and approximately 0.75 miles are in private ownership.

Biological Summary. Cold Spring Creek is a moderate gradient stream that flows through a shallow valley approximately averaging one-eighth mile in width. The upper part of the reach has large substrate, including many boulders. The lower part of reach has small substrate consisting of sands and gravels.

Cold Spring Creek supports a natural environment that is highly reliant on consistent discharge from Amala Spring. The creek is not known to support a fishery. However, the creek supports an abundant and diverse macroinvertebrate community, abundant aquatic vegetation such as watercress, and a very healthy riparian community that includes willow species, blue spruce, and gooseberry.

R2Cross Analysis. The BLM collected the following R2Cross data from Cold Spring Creek:

Cross Section Date	Discharge Rate	Top Width	Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)	Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)
06/30/2016 #1	0.49 cfs	6.57 feet	0.43 cfs	Out of range
06/30/2016 #2	0.39 cfs	7.00 feet	0.40 cfs	Out of range

Averages: 0.42 cfs Out of range

BLM's analysis of this data, coordinated with Colorado Parks and Wildlife, indicates that the following flows are needed to protect the natural environment to a reasonable degree.

0.4 cubic feet per second is recommended during the snowmelt runoff period from May 1 to June 30. This recommendation is driven by the wetted perimeter criteria. The higher flows that occur during snowmelt recharge the alluvial aquifer that supports the healthy riparian community.

0.25 cubic feet per second is recommended from July 1 to April 30. This recommendation is driven by limited water availability. The base flow provided by the spring maintains aquatic vegetation that requires fairly consistent flow rates and high water quality. In addition, the consistent discharge of high quality water from the spring provides ideal macroinvertebrate habitat.

Water Availability. The hydrology of Cold Spring Creek is supported by a brief period of low elevation snowmelt runoff combined with reliable discharge from Amala Spring, which supports base flows in the creek for the remainder of the year. The BLM recommends relying upon Streamstats for an indication of the magnitude and timing of snowmelt runoff. A number of flow measurements were made by the BLM and CWCB downstream from Amala Spring; these provide an indication of base flows from Amala Spring. The BLM does not recommend reliance upon stream gages located along Cochetopa Creek as an indicator of water availability, because the hydrology of Cold Spring Creek is distinctive, with a combination of snowmelt and spring discharge.

The BLM is aware of one water right on Cold Spring Creek, located approximately one-half mile upstream from Amala Spring.

Coleman Ranches Spring No. 1 – 0.5 cfs, absolute, 1982 priority.

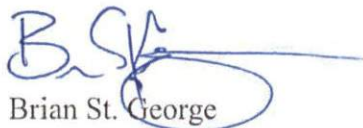
This water right is located upstream from the proposed instream flow reach, in a portion of the creek that appears to have only seasonal flow.

Relationship to Land Management Plans. The BLM land use plan calls for managing this creek to support riparian, and wildlife values and to continue meeting land health standards. Establishing an instream flow water right would assist in meeting these objectives.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2018. We thank both Colorado Parks and Wildlife and the Colorado Water Conservation Board for their cooperation in this effort.

If you have any questions regarding our instream flow recommendation, please contact Roy Smith at 303-239-3940.

Sincerely,

A handwritten signature in blue ink, appearing to read "B. St. George", with a long horizontal flourish extending to the right.

Brian St. George
Deputy State Director
Division of Resources and Fire Management

Cc: Elijah Waters, Gunnison Field Office
Andrew Breibart, Gunnison Field Office
Cathy Cook, Rocky Mountain District Manager



COLORADO WATER
CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



LOCATION INFORMATION

STREAM NAME: Cold Spring Creek		CROSS-SECTION NO.: 1	
CROSS-SECTION LOCATION: 800 ft. downstream from Amala Spring (source of creek)			
DATE: 6-30-16	OBSERVERS: R. Smith, A. Breitbart		
LEGAL DESCRIPTION	1/4 SECTION: NW SE	SECTION: 20	TOWNSHIP: 45 N/S
			RANGE: 20 E/W
COUNTY: Saguache	WATERSHED: Cochetopa Ck.	WATER DIVISION: 4	PM: N.M.
			DOW WATER CODE: none.
MAP(S):	USGS: Zone 13S	343641	
	USFS: Elev. 9675	4223334	

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES/NO	METER TYPE: M-M
METER NUMBER:	DATE RATED:
	CALIB/SPIN: sec
	TAPE WEIGHT: surveyed lbs/foot
	TAPE TENSION: surveyed lbs
CHANNEL BED MATERIAL SIZE RANGE: gravel to 1-foot boulders	PHOTOGRAPHS TAKEN: YES/NO
	NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
① Tape @ Stake LB	0.0	surveyed
② Tape @ Stake RB	0.0	surveyed
③ WS @ Tape LB/RB	0.0	6.08/6.08
④ WS Upstream	3.7'	6.06
⑤ WS Downstream	13.2'	6.30
SLOPE	0.24 / 16.9' = 0.014	

SKETCH

Sketch showing channel profile with tape line, stakes, and water surface elevation points.

LEGEND:

Stake (X)

Station (1)

Photo (1)

Direction of Flow (arrow)

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:																	
mayfly, caddisfly, stonefly																	

COMMENTS

Super abundant caddisfly + stonefly	Temp: 8.1°C
Riparian = Willow, Spruce, Gooseberry	pH: 6.59
Abundant aquatic vegetation	Cond = 100
	Salinity = 0 ppt

DISCHARGE/CROSS SECTION NOTES

[illegible]

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

LOCATION INFORMATION

STREAM NAME: Cold Spring Creek
XS LOCATION: 800 ft. dwnstr from Amala Spring
XS NUMBER: 1

DATE: 30-Jun-16
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: NW SE
SECTION: 20
TWP: 45N
RANGE: 2E
PM: New Mexico

COUNTY: Saguache
WATERSHED: Cochetopa Creek
DIVISION: 4
DOW CODE: none

USGS MAP: 0
USFS MAP: 0

SUPPLEMENTAL DATA

*** NOTE ***

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

TAPE WT: 0.0106
TENSION: 99999

CHANNEL PROFILE DATA

SLOPE: 0.014

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: Cold Spring Creek
 XS LOCATION: 800 ft. dwnstr from Amala Spring
 XS NUMBER: 1

DATA POINTS= 25

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
1 RS & G	0.00	5.64		
	0.50	5.68		
	1.00	5.85		
	1.50	5.90		
	2.00	5.98		
W	2.50	6.04		
	3.10	6.15	0.00	0.00
	3.40	6.30	0.15	0.04
	3.70	6.39	0.24	0.22
	4.00	6.42	0.27	0.34
	4.30	6.48	0.33	0.62
	4.60	6.51	0.36	0.61
	4.90	6.51	0.36	0.64
	5.20	6.48	0.33	0.73
	5.50	6.46	0.31	0.89
W	5.80	6.47	0.32	0.73
	6.10	6.47	0.32	0.24
	6.40	6.44	0.29	0.06
	6.60	6.15	0.00	0.00
1 G	6.70	5.65		
	7.00	5.48		
	7.50	5.38		
	8.00	5.35		
	8.50	5.26		
	9.00	5.25		

WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.34	0.15	0.05	0.00	0.4%
0.31	0.24	0.07	0.02	3.2%
0.30	0.27	0.08	0.03	5.6%
0.31	0.33	0.10	0.06	12.4%
0.30	0.36	0.11	0.07	13.3%
0.30	0.36	0.11	0.07	14.0%
0.30	0.33	0.10	0.07	14.6%
0.30	0.31	0.09	0.08	16.8%
0.30	0.32	0.10	0.07	14.2%
0.30	0.32	0.10	0.02	4.7%
0.30	0.29	0.07	0.00	0.9%
0.35		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%

TOTALS -----

3.71	0.36	0.97	0.49	100.0%
(Max.)				

Manning's n = 0.1409
 Hydraulic Radius= 0.26106346

STREAM NAME: Cold Spring Creek
 XS LOCATION: 800 ft. dwnstr from Amala Spring
 XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.97	0.97	0.0%
5.90	0.97	2.04	110.7%
5.92	0.97	1.94	100.2%
5.94	0.97	1.84	90.0%
5.96	0.97	1.75	80.0%
5.98	0.97	1.65	70.3%
6.00	0.97	1.56	61.0%
6.02	0.97	1.47	51.9%
6.04	0.97	1.39	43.2%
6.06	0.97	1.31	34.9%
6.08	0.97	1.23	26.7%
6.10	0.97	1.15	18.8%
6.11	0.97	1.11	14.9%
6.12	0.97	1.08	11.1%
6.13	0.97	1.04	7.3%
6.14	0.97	1.00	3.6%
6.15	0.97	0.97	0.0%
6.16	0.97	0.93	-3.6%
6.17	0.97	0.90	-7.2%
6.18	0.97	0.87	-10.7%
6.19	0.97	0.83	-14.2%
6.20	0.97	0.80	-17.7%
6.22	0.97	0.73	-24.6%
6.24	0.97	0.67	-31.4%
6.26	0.97	0.60	-38.0%
6.28	0.97	0.54	-44.6%
6.30	0.97	0.47	-51.0%
6.32	0.97	0.41	-57.3%
6.34	0.97	0.35	-63.5%
6.36	0.97	0.30	-69.4%
6.38	0.97	0.24	-75.3%
6.40	0.97	0.19	-80.9%

WATERLINE AT ZERO

AREA ERROR = 6.150

STREAM NAME: Cold Spring Creek
 XS LOCATION: 800 ft. dwnstr from Amala Spring
 XS NUMBER: 1

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	5.65	6.57	0.53	0.86	3.51	7.25	100.0%	0.48	2.70	0.77
	5.65	6.57	0.53	0.86	3.51	7.25	100.0%	0.48	2.70	0.77
	5.70	6.13	0.52	0.81	3.20	6.76	93.3%	0.47	2.42	0.76
	5.75	5.97	0.48	0.76	2.89	6.55	90.4%	0.44	2.09	0.72
	5.80	5.82	0.45	0.71	2.60	6.35	87.6%	0.41	1.79	0.69
	5.85	5.66	0.41	0.66	2.31	6.14	84.7%	0.38	1.50	0.65
	5.90	5.15	0.40	0.61	2.04	5.59	77.1%	0.37	1.30	0.64
	5.95	4.83	0.37	0.56	1.79	5.22	72.0%	0.34	1.10	0.61
	6.00	4.46	0.35	0.51	1.56	4.81	66.4%	0.32	0.92	0.59
	6.05	4.07	0.33	0.46	1.35	4.37	60.3%	0.31	0.77	0.57
	6.10	3.78	0.30	0.41	1.15	4.04	55.7%	0.28	0.62	0.54
WL	6.15	3.50	0.28	0.36	0.97	3.71	51.2%	0.26	0.49	0.51
	6.20	3.37	0.24	0.31	0.80	3.54	48.8%	0.23	0.37	0.46
	6.25	3.23	0.20	0.26	0.63	3.37	46.5%	0.19	0.26	0.41
	6.30	3.10	0.15	0.21	0.47	3.20	44.1%	0.15	0.17	0.35
	6.35	2.90	0.11	0.16	0.32	2.96	40.8%	0.11	0.09	0.29
	6.40	2.63	0.07	0.11	0.19	2.66	36.7%	0.07	0.04	0.21
	6.45	2.15	0.03	0.06	0.07	2.16	29.8%	0.03	0.01	0.12
	6.50	0.50	0.01	0.01	0.00	0.50	6.9%	0.01	0.00	0.05

STREAM NAME: Cold Spring Creek
XS LOCATION: 800 ft. dwnstr from Amala Spring
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)= 0.49 cfs
CALCULATED FLOW (Qc)= 0.49 cfs
(Qm-Qc)/Qm * 100 = 0.0 %

MEASURED WATERLINE (WLm)= 6.15 ft
CALCULATED WATERLINE (WLc)= 6.15 ft
(WLm-WLc)/WLm * 100 = 0.0 %

MAX MEASURED DEPTH (Dm)= 0.36 ft
MAX CALCULATED DEPTH (Dc)= 0.36 ft
(Dm-Dc)/Dm * 100 = 0.0 %

MEAN VELOCITY= 0.51 ft/sec
MANNING'S N= 0.141
SLOPE= 0.014 ft/ft

.4 * Qm = 0.2 cfs
2.5 * Qm= 1.2 cfs

RECOMMENDED INSTREAM FLOW:
=====

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

RATIONALE FOR RECOMMENDATION:
=====

RECOMMENDATION BY: AGENCY..... DATE:.....
CWCB REVIEW BY: DATE:.....

STREAM NAME: Cold Spring Creek
 XS LOCATION: 800 ft. dwnstr from Amala Spring
 XS NUMBER: 1 Jarrett Variable Manning's n Correction Applied

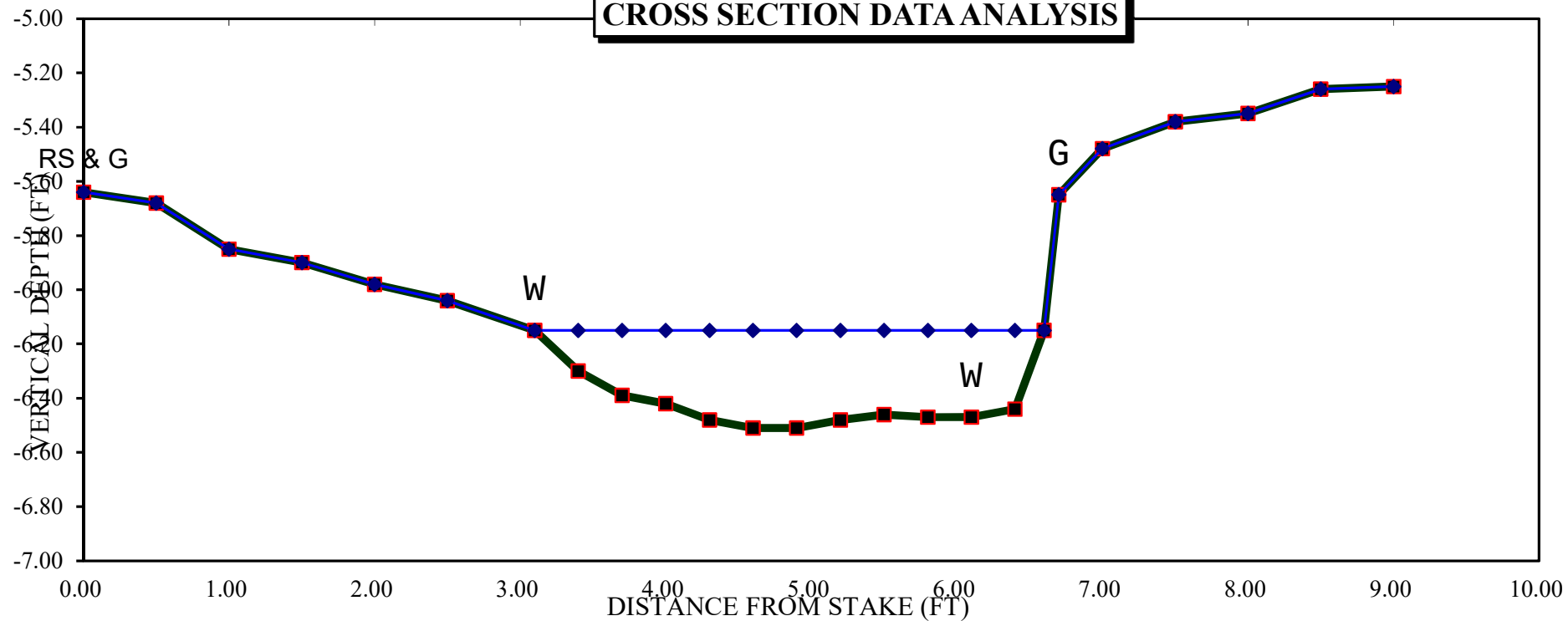
GL = lowest Grassline elevation corrected for sag

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	5.65	6.57	0.53	0.86	3.51	7.25	100.0%	0.48	2.98	0.85
	5.65	6.57	0.53	0.86	3.51	7.25	100.0%	0.48	2.98	0.85
	5.70	6.13	0.52	0.81	3.20	6.76	93.3%	0.47	2.66	0.83
	5.75	5.97	0.48	0.76	2.89	6.55	90.4%	0.44	2.28	0.79
	5.80	5.82	0.45	0.71	2.60	6.35	87.6%	0.41	1.92	0.74
	5.85	5.66	0.41	0.66	2.31	6.14	84.7%	0.38	1.60	0.69
	5.90	5.15	0.40	0.61	2.04	5.59	77.1%	0.37	1.37	0.67
	5.95	4.83	0.37	0.56	1.79	5.22	72.0%	0.34	1.15	0.64
	6.00	4.46	0.35	0.51	1.56	4.81	66.4%	0.32	0.95	0.61
	6.05	4.07	0.33	0.46	1.35	4.37	60.3%	0.31	0.79	0.58
	6.10	3.78	0.30	0.41	1.15	4.04	55.7%	0.28	0.63	0.55
WL	6.15	3.50	0.28	0.36	0.97	3.71	51.2%	0.26	0.49	0.51
	6.20	3.37	0.24	0.31	0.80	3.54	48.8%	0.23	0.36	0.45
	6.25	3.23	0.20	0.26	0.63	3.37	46.5%	0.19	0.25	0.39
	6.30	3.10	0.15	0.21	0.47	3.20	44.1%	0.15	0.15	0.32
	6.35	2.90	0.11	0.16	0.32	2.96	40.8%	0.11	0.08	0.25
	6.40	2.63	0.07	0.11	0.19	2.66	36.7%	0.07	0.03	0.17
	6.45	2.15	0.03	0.06	0.07	2.16	29.8%	0.03	0.01	0.09
	6.50	0.50	0.01	0.01	0.00	0.50	6.9%	0.01	0.00	0.03

Cold Spring Creek

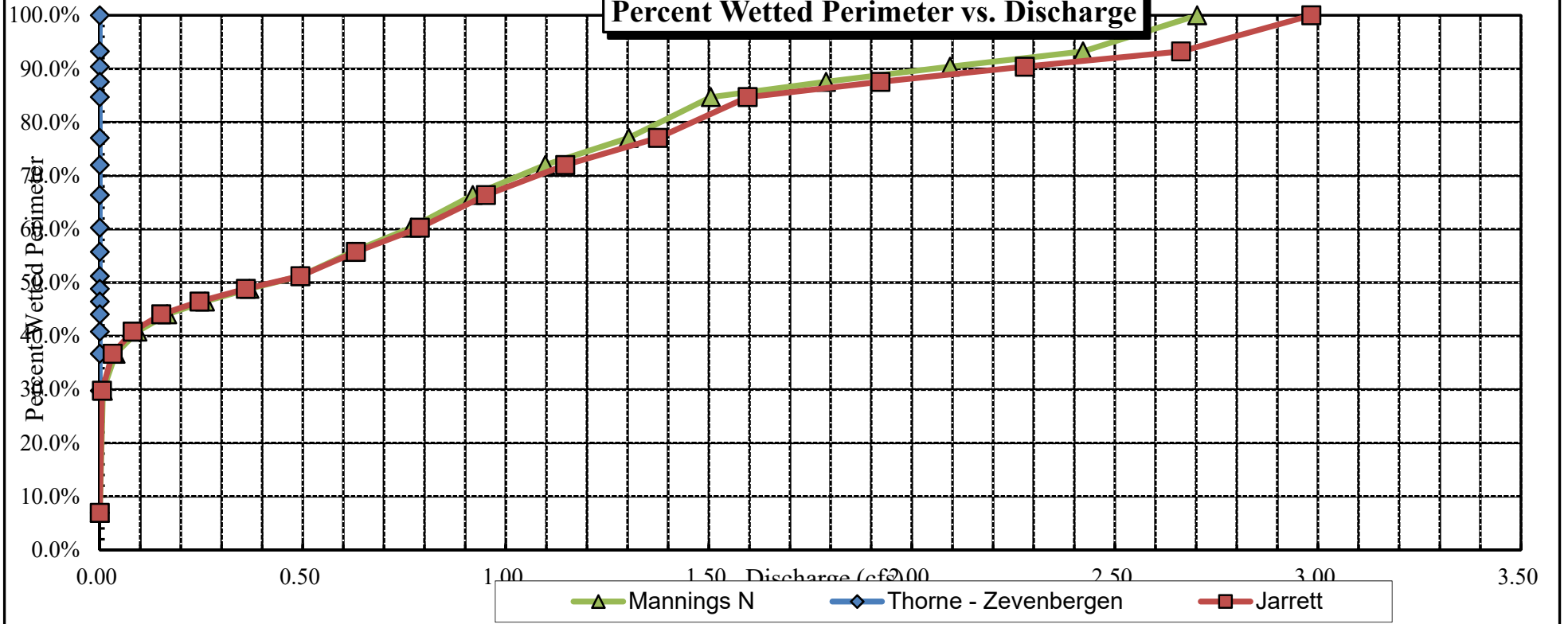
CROSS SECTION DATA ANALYSIS



Channel Bottom Computed Water Line

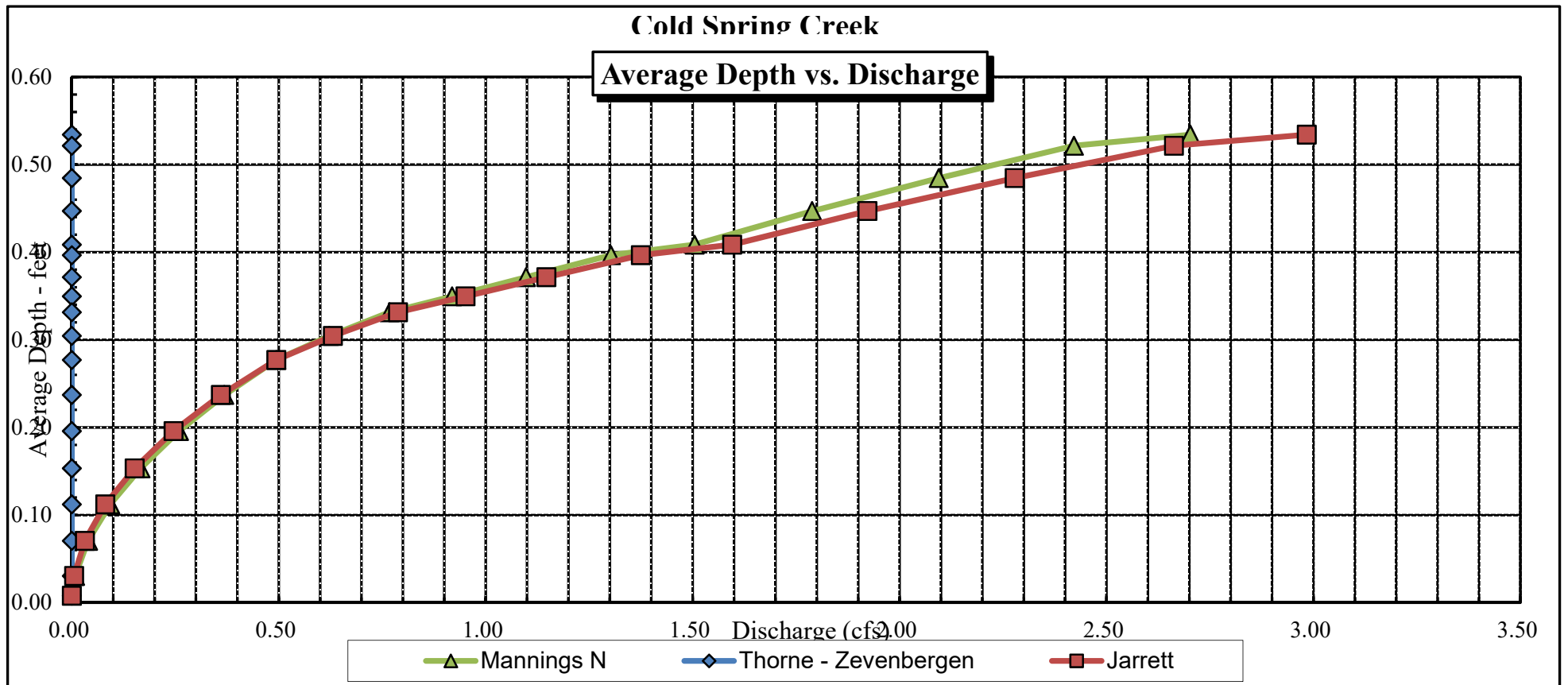
Cold Spring Creek

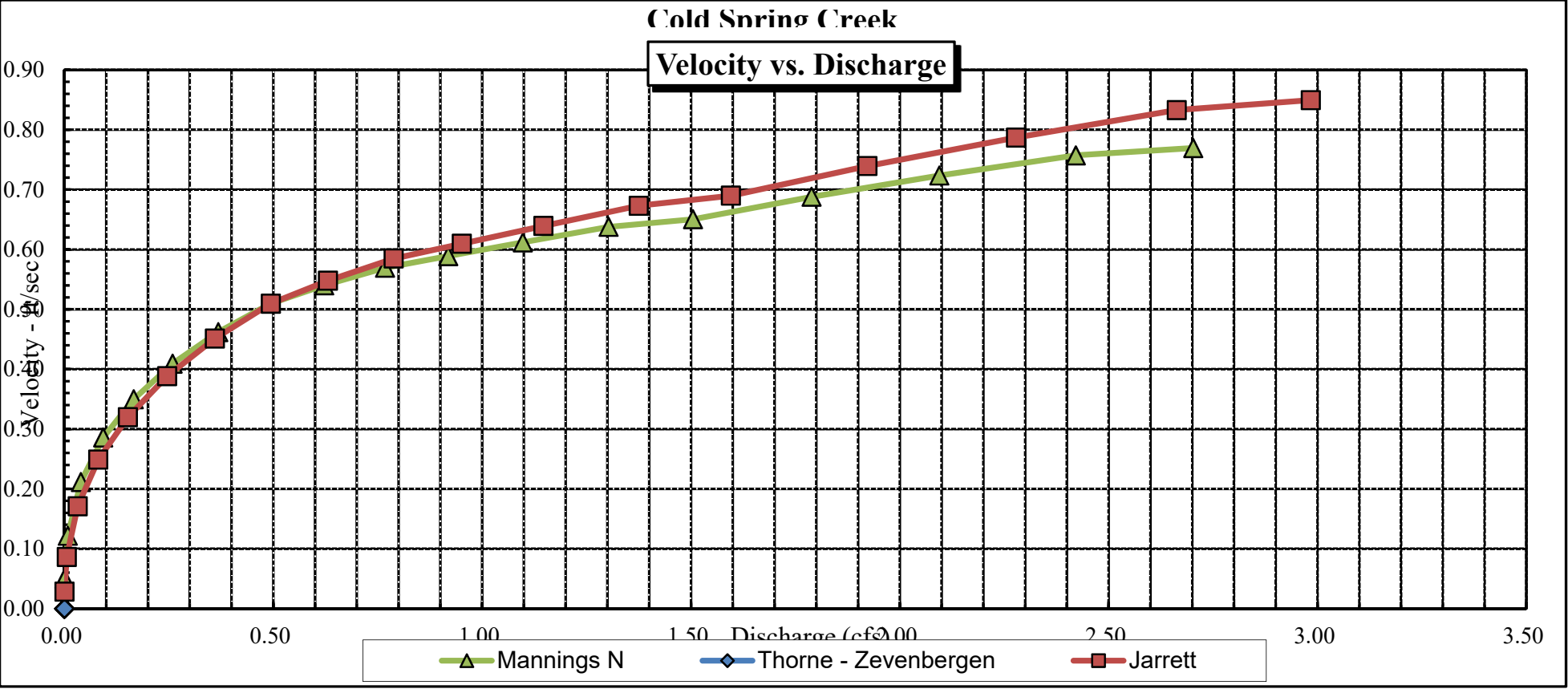
Percent Wetted Perimeter vs. Discharge



Cold Spring Creek

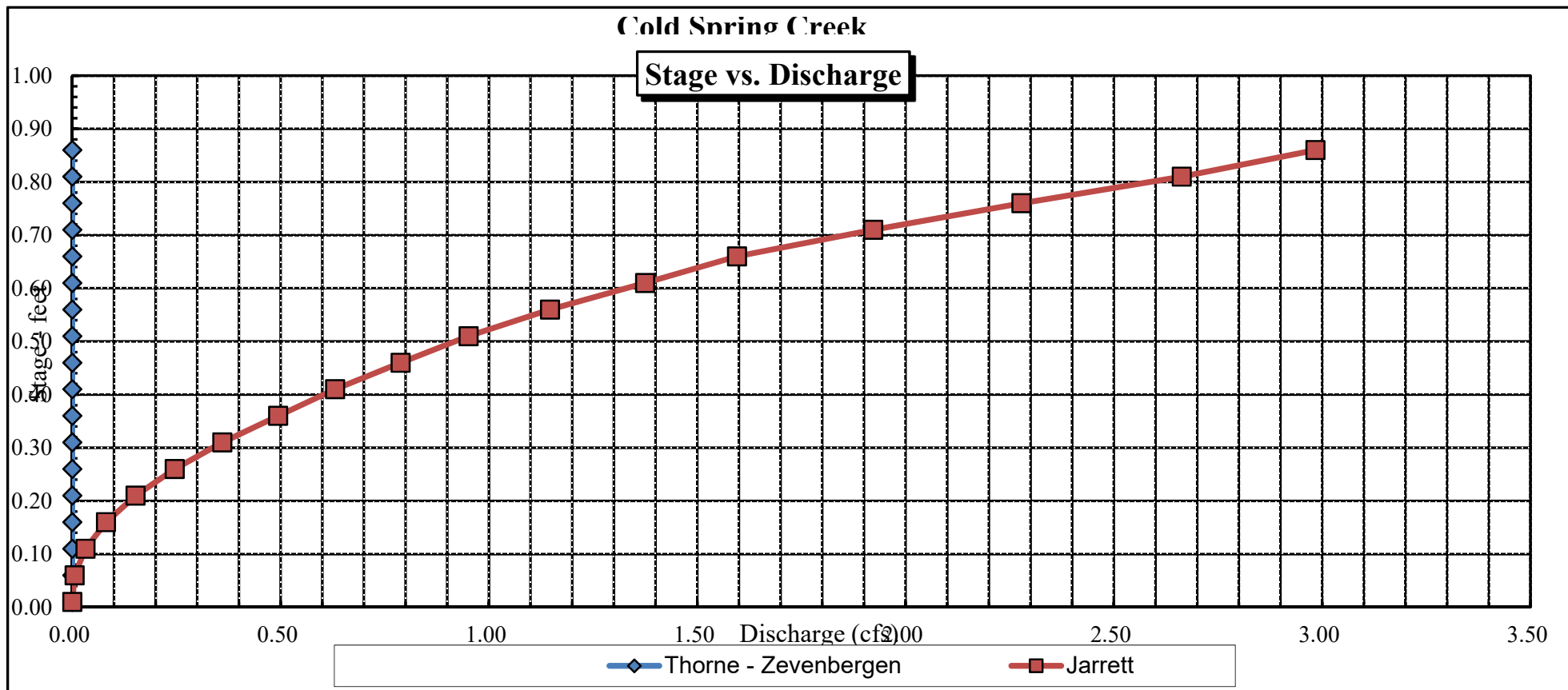
Average Depth vs. Discharge





Cold Spring Creek

Stage vs. Discharge



Data Input & Proofing

STREAM NAME: Cold Spring Creek
 XS LOCATION: 800 ft. dwnstr from Amala Spring
 XS NUMBER: 1
 DATE: 6/30/2016
 OBSERVERS: R. Smith, A. Breibart

1/4 SEC: NW SE
 SECTION: 20
 TWP: 45N
 RANGE: 2E
 PM: New Mexico

COUNTY: Saguache
 WATERSHED: Cochetopa Creek
 DIVISION: 4
 DOW CODE: none
 USGS MAP:
 USFS MAP:

TAPE WT: 0.0106 lbs / ft
 TENSION: 99999 lbs

SLOPE: 0.014 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 = 25								
1	RS & G	0.00	5.64			0.00	0.00	0.00
		0.50	5.68			0.00	0.00	0.00
		1.00	5.85			0.00	0.00	0.00
		1.50	5.90			0.00	0.00	0.00
		2.00	5.98			0.00	0.00	0.00
		2.50	6.04			0.00	0.00	0.00
	W	3.10	6.15	0.00	0.00	0.00	0.00	0.00
		3.40	6.30	0.15	0.04	0.05	0.00	6.15
		3.70	6.39	0.24	0.22	0.07	0.02	6.15
		4.00	6.42	0.27	0.34	0.08	0.03	6.15
		4.30	6.48	0.33	0.62	0.10	0.06	6.15
		4.60	6.51	0.36	0.61	0.11	0.07	6.15
		4.90	6.51	0.36	0.64	0.11	0.07	6.15
		5.20	6.48	0.33	0.73	0.10	0.07	6.15
		5.50	6.46	0.31	0.89	0.09	0.08	6.15
		5.80	6.47	0.32	0.73	0.10	0.07	6.15
	W	6.10	6.47	0.32	0.24	0.10	0.02	6.15
		6.40	6.44	0.29	0.06	0.07	0.00	6.15
		6.60	6.15	0.00	0.00	0.00	0.00	0.00
1	G	6.70	5.65			0.00	0.00	0.00
		7.00	5.48			0.00	0.00	0.00
		7.50	5.38			0.00	0.00	0.00
		8.00	5.35			0.00	0.00	0.00
		8.50	5.26			0.00	0.00	0.00
		9.00	5.25			0.00	0.00	0.00
	LS	10.00	5.24					

Totals	0.97	0.49
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COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: Cold Spring Creek		CROSS-SECTION NO.: 2	
CROSS-SECTION LOCATION: At BLM-private boundary			
DATE: 6-30-16		OBSERVERS: R. Smith, A. Breibart	
LEGAL DESCRIPTION	1/4 SECTION: NE SE	SECTION: 20	TOWNSHIP: 45 N S
			RANGE: 2 E W
COUNTY: Saguache	WATERSHED: Cochetopa Cr.	WATER DIVISION: 4	PM: N.M.
			DOW WATER CODE: none
MAP(S):	USGS: Zone 13 S	344879	
	USFS: 9,250 ft.	4223266	

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: ☒ YES ☐ NO		METER TYPE: <u>M-M</u>	
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: <u>surveyed</u> _____ lbs/foot
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel & sand</u>		PHOTOGRAPHS TAKEN ☒ YES ☐ NO	TAPE TENSION: <u>surveyed</u> _____ lbs
		NUMBER OF PHOTOGRAPHS: <u>3</u>	

CHANNEL PROFILE DATA

STATION		DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗	Tape @ Stake LB	0.0	surveyed
⊗	Tape @ Stake RB	0.0	surveyed
①	WS @ Tape LB/RB	0.0	7.00 / 7.00
②	WS Upstream	33.0	6.30
③	WS Downstream	4.5	7.03
SLOPE		0.73 / 37.5 = 0.019	

S K E T C H

The sketch shows a cross-section of a channel. Two horizontal lines represent the channel boundaries. A vertical line labeled 'TAPE' connects the two boundaries. At the top and bottom of the tape are circles with an 'X' inside, representing stakes. To the right of the tape, there are two points labeled '1' and '2' with arrows pointing to them. Point '1' is at the top boundary, and point '2' is at the bottom boundary. A curved line represents the water surface, with points '1' and '2' marked on it. A legend on the right explains the symbols: Stake (⊗), Station (①), Photo (① with arrow), and Direction of Flow (curved arrow).

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

Extremely dense riparian - very few riffles.

DISCHARGE/CROSS SECTION NOTES

[illegible]

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

LOCATION INFORMATION

STREAM NAME: Cold Spring Creek
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 2

DATE: 30-Jun-16
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: NE SE
SECTION: 20
TWP: 45N
RANGE: 2E
PM: New Mexico

COUNTY: Saguache
WATERSHED: Cochetopa Creek
DIVISION: 4
DOW CODE: none

USGS MAP: 0
USFS MAP: 0

SUPPLEMENTAL DATA

*** NOTE ***

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

TAPE WT: 0.0106
TENSION: 99999

CHANNEL PROFILE DATA

SLOPE: 0.019

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: Cold Spring Creek
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

DATA POINTS= 17

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
1 RS & G	0.00	6.20		
	0.90	6.47		
W	1.30	7.00	0.00	0.00
	1.40	7.45	0.45	0.16
	1.70	7.49	0.49	0.14
	2.00	7.53	0.53	0.32
	2.30	7.60	0.60	0.60
	2.60	7.65	0.65	0.29
	2.90	7.67	0.67	0.38
	3.20	7.55	0.55	0.19
	3.50	7.60	0.60	0.18
	3.80	7.36	0.36	0.00
W	4.40	7.00	0.00	0.00
	5.00	6.86		
	5.50	6.88		
	6.00	7.02		
	7.00	6.53		

TOTALS -----

WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.46	0.45	0.09	0.01	3.7%
0.30	0.49	0.15	0.02	5.3%
0.30	0.53	0.16	0.05	13.0%
0.31	0.60	0.18	0.11	27.7%
0.30	0.65	0.20	0.06	14.5%
0.30	0.67	0.20	0.08	19.6%
0.32	0.55	0.17	0.03	8.0%
0.30	0.60	0.18	0.03	8.3%
0.38	0.36	0.16	0.00	0.0%
0.70		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%

3.69	0.67	1.48	0.39	100.0%
(Max.)				

Manning's n = 0.4217
 Hydraulic Radius= 0.40078051

STREAM NAME: Cold Spring Creek
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.48	1.48	0.1%
6.75	1.48	2.62	77.1%
6.77	1.48	2.51	69.8%
6.79	1.48	2.40	62.6%
6.81	1.48	2.30	55.4%
6.83	1.48	2.19	48.3%
6.85	1.48	2.09	41.3%
6.87	1.48	1.99	34.5%
6.89	1.48	1.90	28.3%
6.91	1.48	1.81	22.5%
6.93	1.48	1.73	17.0%
6.95	1.48	1.65	11.8%
6.96	1.48	1.62	9.3%
6.97	1.48	1.58	6.9%
6.98	1.48	1.55	4.6%
6.99	1.48	1.51	2.3%
7.00	1.48	1.48	0.1%
7.01	1.48	1.45	-2.1%
7.02	1.48	1.42	-4.2%
7.03	1.48	1.39	-6.2%
7.04	1.48	1.36	-8.3%
7.05	1.48	1.33	-10.3%
7.07	1.48	1.27	-14.4%
7.09	1.48	1.21	-18.3%
7.11	1.48	1.15	-22.3%
7.13	1.48	1.09	-26.2%
7.15	1.48	1.04	-30.0%
7.17	1.48	0.98	-33.8%
7.19	1.48	0.92	-37.5%
7.21	1.48	0.87	-41.2%
7.23	1.48	0.82	-44.8%
7.25	1.48	0.76	-48.4%

WATERLINE AT ZERO

AREA ERROR = 7.000

STREAM NAME: Cold Spring Creek
 XS LOCATION: At BLM-Private Boundary
 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	6.20	7.00	0.86	1.47	6.02	8.04	100.0%	0.75	2.41	0.40
	6.20	7.00	0.86	1.47	6.02	8.04	100.0%	0.75	2.41	0.40
	6.25	6.83	0.83	1.42	5.67	7.87	97.8%	0.72	2.21	0.39
	6.30	6.67	0.80	1.37	5.33	7.69	95.7%	0.69	2.03	0.38
	6.35	6.50	0.77	1.32	5.00	7.52	93.5%	0.67	1.85	0.37
	6.40	6.33	0.74	1.27	4.68	7.35	91.3%	0.64	1.68	0.36
	6.45	6.17	0.71	1.22	4.37	7.17	89.2%	0.61	1.53	0.35
	6.50	6.08	0.67	1.17	4.06	7.07	87.8%	0.58	1.37	0.34
	6.55	6.00	0.63	1.12	3.76	6.96	86.5%	0.54	1.21	0.32
	6.60	5.86	0.59	1.07	3.47	6.78	84.3%	0.51	1.08	0.31
	6.65	5.72	0.56	1.02	3.18	6.60	82.1%	0.48	0.95	0.30
	6.70	5.58	0.52	0.97	2.89	6.43	79.9%	0.45	0.83	0.29
	6.75	5.44	0.48	0.92	2.62	6.25	77.7%	0.42	0.71	0.27
	6.80	5.30	0.44	0.87	2.35	6.08	75.5%	0.39	0.61	0.26
	6.85	5.16	0.40	0.82	2.09	5.90	73.3%	0.35	0.51	0.24
	6.90	4.27	0.43	0.77	1.85	4.97	61.8%	0.37	0.47	0.25
	6.95	3.74	0.44	0.72	1.65	4.39	54.5%	0.38	0.42	0.25
WL	7.00	3.21	0.46	0.67	1.48	3.81	47.3%	0.39	0.38	0.26
	7.05	3.00	0.44	0.62	1.33	3.54	44.0%	0.37	0.33	0.25
	7.10	2.91	0.40	0.57	1.18	3.39	42.2%	0.35	0.28	0.24
	7.15	2.82	0.37	0.52	1.03	3.24	40.3%	0.32	0.23	0.23
	7.20	2.72	0.33	0.47	0.90	3.10	38.5%	0.29	0.19	0.21
	7.25	2.63	0.29	0.42	0.76	2.95	36.6%	0.26	0.15	0.20
	7.30	2.53	0.25	0.37	0.63	2.80	34.8%	0.23	0.11	0.18
	7.35	2.44	0.21	0.32	0.51	2.65	33.0%	0.19	0.08	0.16
	7.40	2.36	0.16	0.27	0.39	2.52	31.3%	0.15	0.05	0.14
	7.45	2.28	0.12	0.22	0.27	2.38	29.6%	0.11	0.03	0.11
	7.50	1.85	0.09	0.17	0.17	1.92	23.9%	0.09	0.02	0.10
	7.55	1.47	0.06	0.12	0.09	1.53	19.0%	0.06	0.01	0.07
	7.60	0.77	0.04	0.07	0.03	0.79	9.8%	0.04	0.00	0.06
	7.65	0.34	0.01	0.02	0.00	0.35	4.3%	0.01	0.00	0.02

STREAM NAME: Cold Spring Creek
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)= 0.39 cfs
CALCULATED FLOW (Qc)= 0.38 cfs
(Qm-Qc)/Qm * 100 = 2.1 %

MEASURED WATERLINE (WLm)= 7.00 ft
CALCULATED WATERLINE (WLc)= 7.00 ft
(WLm-WLc)/WLm * 100 = 0.0 %

MAX MEASURED DEPTH (Dm)= 0.67 ft
MAX CALCULATED DEPTH (Dc)= 0.67 ft
(Dm-Dc)/Dm * 100 = 0.1 %

MEAN VELOCITY= 0.26 ft/sec
MANNING'S N= 0.422
SLOPE= 0.019 ft/ft

.4 * Qm = 0.2 cfs
2.5 * Qm= 1.0 cfs

RECOMMENDED INSTREAM FLOW:
=====

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

RATIONALE FOR RECOMMENDATION:
=====

RECOMMENDATION BY: AGENCY..... DATE:.....
CWCB REVIEW BY: DATE:.....

STREAM NAME: Cold Spring Creek
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

Jarrett Variable Manning's n Correction Applied

GL = lowest Grassline elevation corrected for sag

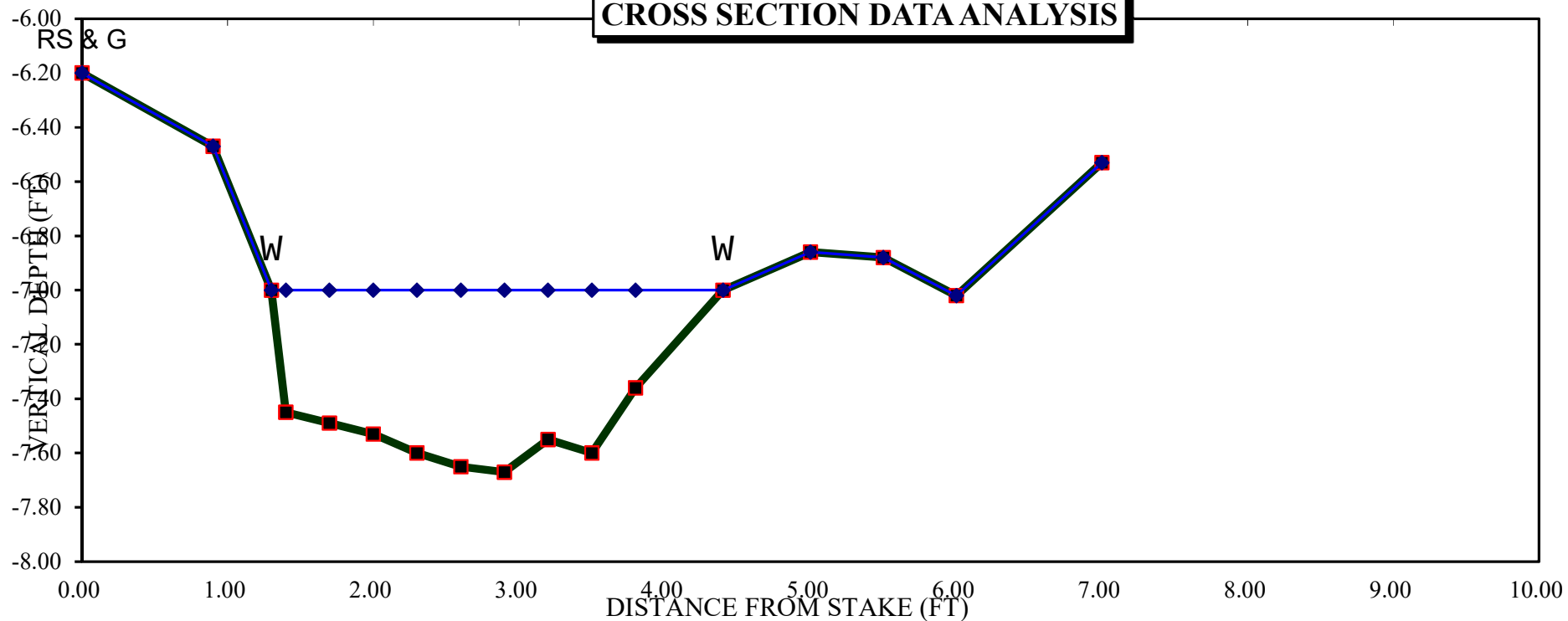
STAGING TABLE

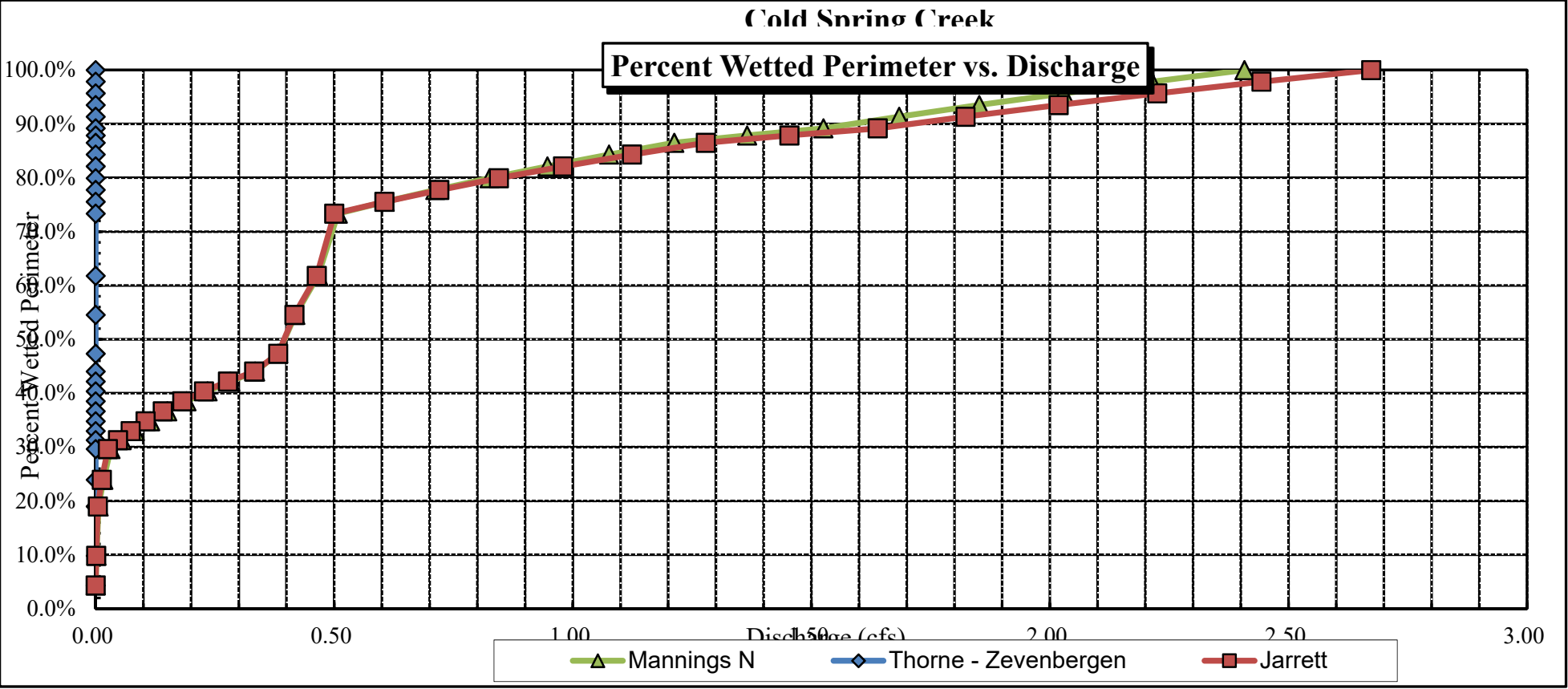
WL = Waterline corrected for variations in field measured water surface elevations and sag

	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	6.20	7.00	0.86	1.47	6.02	8.04	100.0%	0.75	2.68	0.44
	6.20	7.00	0.86	1.47	6.02	8.04	100.0%	0.75	2.67	0.44
	6.25	6.83	0.83	1.42	5.67	7.87	97.8%	0.72	2.44	0.43
	6.30	6.67	0.80	1.37	5.33	7.69	95.7%	0.69	2.23	0.42
	6.35	6.50	0.77	1.32	5.00	7.52	93.5%	0.67	2.02	0.40
	6.40	6.33	0.74	1.27	4.68	7.35	91.3%	0.64	1.82	0.39
	6.45	6.17	0.71	1.22	4.37	7.17	89.2%	0.61	1.64	0.38
	6.50	6.08	0.67	1.17	4.06	7.07	87.8%	0.58	1.45	0.36
	6.55	6.00	0.63	1.12	3.76	6.96	86.5%	0.54	1.28	0.34
	6.60	5.86	0.59	1.07	3.47	6.78	84.3%	0.51	1.12	0.32
	6.65	5.72	0.56	1.02	3.18	6.60	82.1%	0.48	0.98	0.31
	6.70	5.58	0.52	0.97	2.89	6.43	79.9%	0.45	0.85	0.29
	6.75	5.44	0.48	0.92	2.62	6.25	77.7%	0.42	0.72	0.28
	6.80	5.30	0.44	0.87	2.35	6.08	75.5%	0.39	0.61	0.26
	6.85	5.16	0.40	0.82	2.09	5.90	73.3%	0.35	0.50	0.24
	6.90	4.27	0.43	0.77	1.85	4.97	61.8%	0.37	0.46	0.25
	6.95	3.74	0.44	0.72	1.65	4.39	54.5%	0.38	0.42	0.25
WL	7.00	3.21	0.46	0.67	1.48	3.81	47.3%	0.39	0.38	0.26
	7.05	3.00	0.44	0.62	1.33	3.54	44.0%	0.37	0.33	0.25
	7.10	2.91	0.40	0.57	1.18	3.39	42.2%	0.35	0.28	0.24
	7.15	2.82	0.37	0.52	1.03	3.24	40.3%	0.32	0.23	0.22
	7.20	2.72	0.33	0.47	0.90	3.10	38.5%	0.29	0.18	0.20
	7.25	2.63	0.29	0.42	0.76	2.95	36.6%	0.26	0.14	0.18
	7.30	2.53	0.25	0.37	0.63	2.80	34.8%	0.23	0.10	0.17
	7.35	2.44	0.21	0.32	0.51	2.65	33.0%	0.19	0.07	0.14
	7.40	2.36	0.16	0.27	0.39	2.52	31.3%	0.15	0.05	0.12
	7.45	2.28	0.12	0.22	0.27	2.38	29.6%	0.11	0.03	0.09
	7.50	1.85	0.09	0.17	0.17	1.92	23.9%	0.09	0.01	0.08
	7.55	1.47	0.06	0.12	0.09	1.53	19.0%	0.06	0.00	0.05
	7.60	0.77	0.04	0.07	0.03	0.79	9.8%	0.04	0.00	0.04
	7.65	0.34	0.01	0.02	0.00	0.35	4.3%	0.01	0.00	0.01

Cold Spring Creek

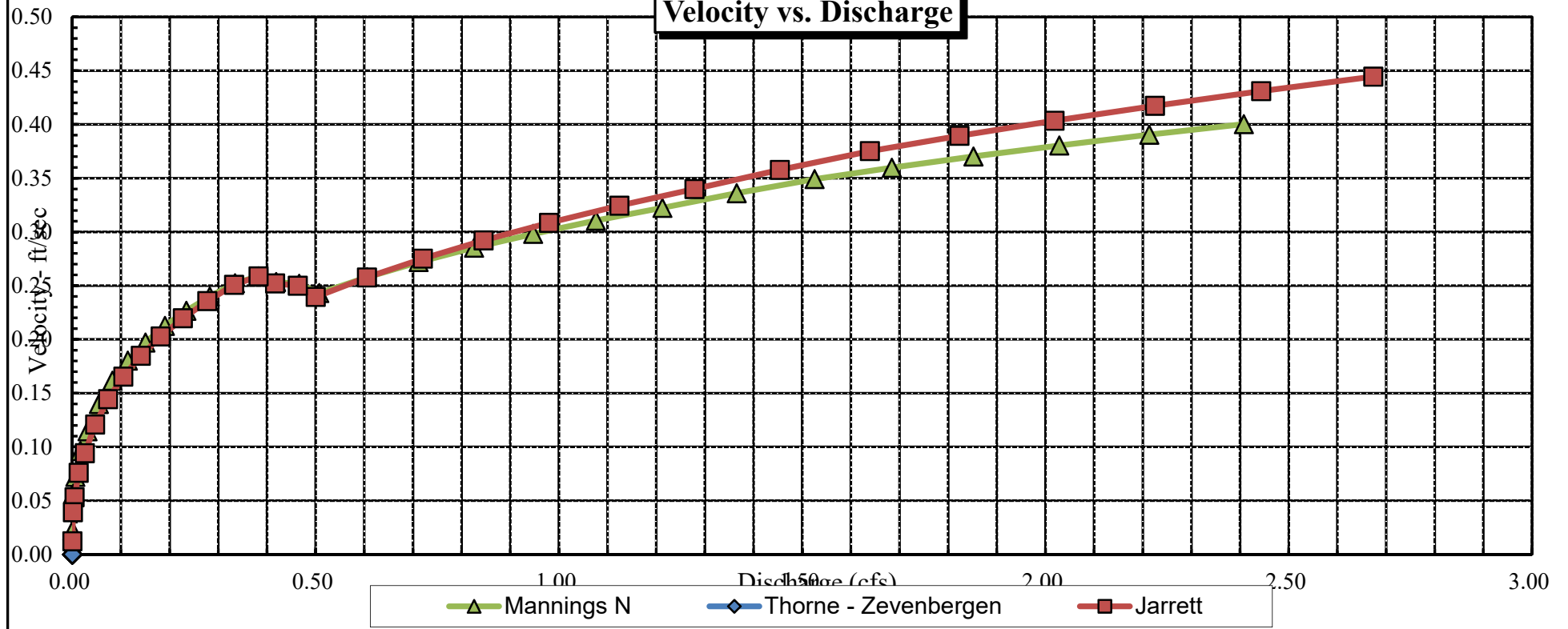
CROSS SECTION DATA ANALYSIS





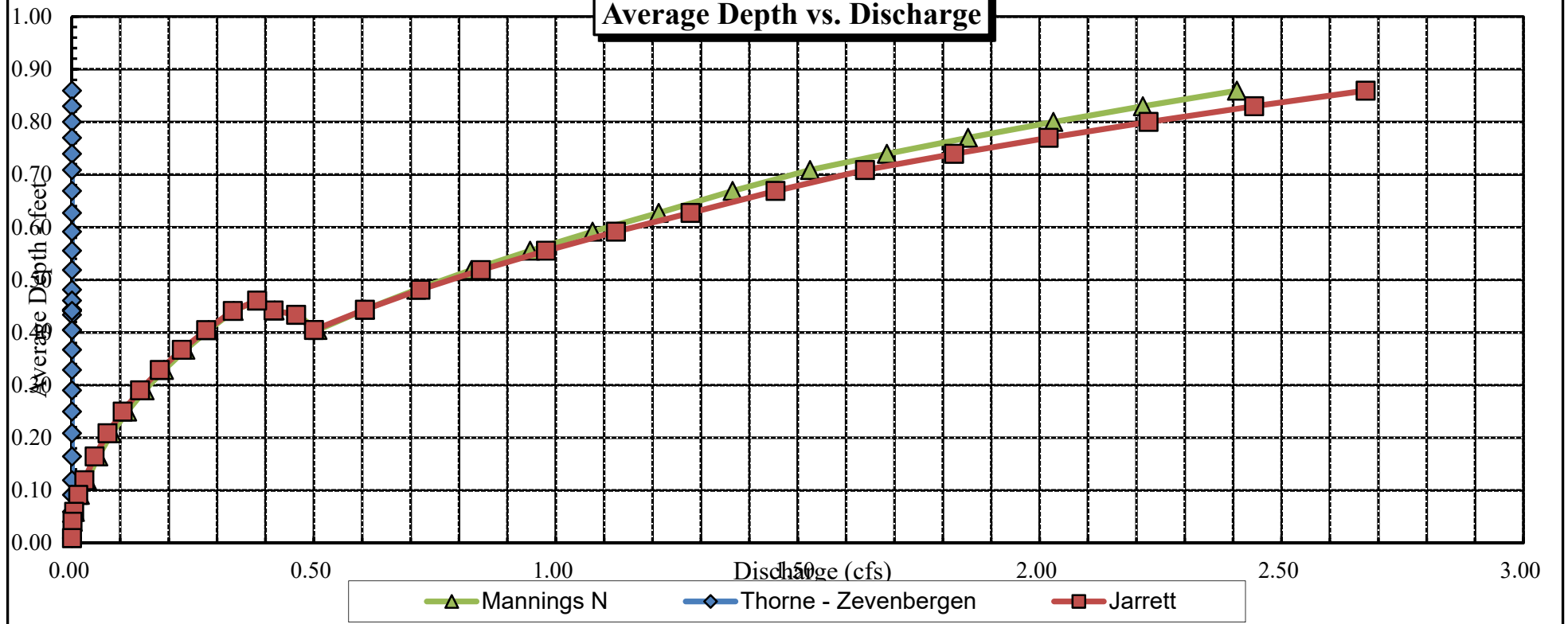
Cold Spring Creek

Velocity vs. Discharge



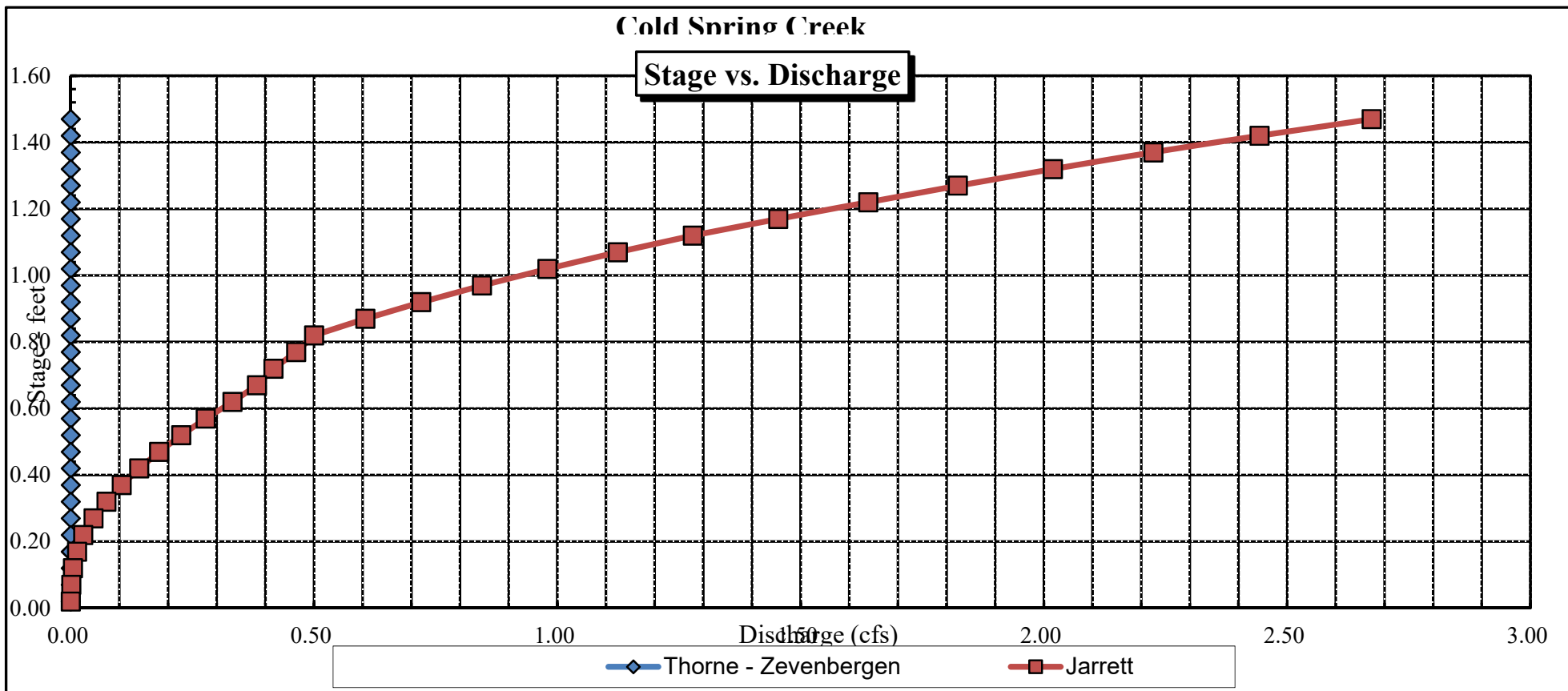
Cold Spring Creek

Average Depth vs. Discharge



Cold Spring Creek

Stage vs. Discharge



Data Input & Proofing

STREAM NAME:	Cold Spring Creek
XS LOCATION:	At BLM-Private Boundary
XS NUMBER:	2
DATE:	6/30/2016
OBSERVERS:	R. Smith, A. Breibart
1/4 SEC:	NE SE
SECTION:	20
TWP:	45N
RANGE:	2E
PM:	New Mexico
COUNTY:	Saguache
WATERSHED:	Cochetopa Creek
DIVISION:	4
DOW CODE:	none
USGS MAP:	
USFS MAP:	
TAPE WT:	0.0106
TENSION:	99999
SLOPE:	0.019

Level and Rod Survey

lbs / ft
lbs

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								
1	RS & G	0.00	6.20			0.00	0.00	0.00
		0.90	6.47			0.00	0.00	0.00
	W	1.30	7.00	0.00	0.00	0.00	0.00	0.00
		1.40	7.45	0.45	0.16	0.09	0.01	7.00
		1.70	7.49	0.49	0.14	0.15	0.02	7.00
		2.00	7.53	0.53	0.32	0.16	0.05	7.00
		2.30	7.60	0.60	0.60	0.18	0.11	7.00
		2.60	7.65	0.65	0.29	0.20	0.06	7.00
		2.90	7.67	0.67	0.38	0.20	0.08	7.00
		3.20	7.55	0.55	0.19	0.17	0.03	7.00
		3.50	7.60	0.60	0.18	0.18	0.03	7.00
		3.80	7.36	0.36	0.00	0.16	0.00	7.00
	W	4.40	7.00	0.00	0.00	0.00	0.00	0.00
		5.00	6.86			0.00	0.00	0.00
		5.50	6.88			0.00	0.00	0.00
		6.00	7.02			0.00	0.00	0.00
		7.00	6.53			0.00	0.00	0.00
1	LS & G	8.00	6.16					

Totals	1.48	0.39
--------	------	------



STATE OF
COLORADO

Epstein - DNR, Brian <brian.epstein@state.co.us>

cold springs creek-Amalla spring

1 message

Breibart, Andrew <abreibart@blm.gov>

Thu, Jun 8, 2017 at 6:12 PM

To: "Epstein - DNR, Brian" <brian.epstein@state.co.us>, Roy Smith <r20smith@blm.gov>

Brian,

I need to be brief:

June 8, 2017, 10AM
Gage height 0.82 feet

Discharge 0.44 cfs at 11:15AM

Stage at at 11:20 AM 0.82 feet

UTMs:
Staff gage: NAD 83 Zone 13
343551-E
4223325-N

Cross Section:

343588-E
4223339-N

GPS: Garmin 62SX

I'll get you pics.

See attached.

AB

Andrew Breibart, Hydrologist
Bureau of Land Management
210 West Spencer Street, Suite A
Gunnison, CO 81230

Phone: [970-642-4944](tel:970-642-4944)
Fax: [970-642-4990](tel:970-642-4990)

abreibart@blm.gov

"All things in watersheds are connected (John Wesley Powell)".



coldcreek_amallaspring.xlsx
10K

Profile Name: COL3
Operator Name: ADB
10:59:38 06.08.2017

Stage Reference: 0.00 ft

Model: FH950
s/n: 141971002074
Boot: v1.00
Application: v1.03

Sensor Type: Velocity and Depth
s/n: 151610301073
Boot: v1.00
Application: v1.02

Filter: FPA Parameter: 10 s
Pre-filter: On Rank: 5
EMI: 60Hz.

Station Entry: Non-fixed
Flow Calculation: Mid-section
Start Edge: Right edge water
of Stations: 12
Stream Width: 2.93 ft
Total Discharge: 0.44 ft³/s
Total Area: 1.71 ft²
Mean Depth: 0.58 ft

Measurement Results:

Station	Location (ft)	Method	Depth (ft)	Edge Factor	Surface (ft/0.2 (ft/s)	0.4 (ft/s)	0.6 (ft/s)	0.8 (ft/s)	Bed (ft/s)	Average V	Area (ft^2)	Flow (ft^3/s)
1	0.85	0 point	0.39	-	0	0	0	0	0	0	0.03	0
2	1	1 point	0.43	-	0	0	0	0.07	0	0	0.07	0.01
3	1.3	1 point	0.43	-	0	0	0	0.02	0	0	0.02	0
4	1.6	1 point	0.46	-	0	0	0	0.18	0	0	0.18	0.02
5	1.9	1 point	0.55	-	0	0	0	0.42	0	0	0.42	0.07
6	2.2	1 point	0.65	-	0	0	0	0.47	0	0	0.47	0.09
7	2.5	1 point	0.68	-	0	0	0	0.43	0	0	0.43	0.09
8	2.8	1 point	0.75	-	0	0	0	0.34	0	0	0.34	0.08
9	3.1	1 point	0.65	-	0	0	0	0.28	0	0	0.28	0.05
10	3.4	1 point	0.57	-	0	0	0	0.1	0	0	0.1	0.02
11	3.7	1 point	0.69	-	0	0	0	0.02	0	0	0.02	0
12	3.78	0 point	0.7	-	0	0	0	0	0	0	0.03	0

DO	8.92 mg/L
DO Saturation	105.6 %
Water Temperature	7.9 Centigrade
HACH PRO 20 DO meter	
Air Temperature	20 Centigrade

[illegible]

Profile Name: COLD071017
Operator Name: ADB
12:37:20 07.10.2017

CWCB
Stage
Before 0.82
After 0.82

Stage Reference: 0.00 ft

Model: FH950
s/n: 141971002074
Boot: v1.00
Application: v1.03

Sensor Type: Velocity and Depth
s/n: 151610301073
Boot: v1.00
Application: v1.02

Filter: FPA Parameter: 10 s
Pre-filter: On Rank: 5
EMI: 60Hz.

Station Entry: Non-fixed
Flow Calculation: Mid-section
Start Edge: Right edge water
of Stations: 11
Stream Width: 3.02 ft

Total Discharge: 0.31 ft³/s

Total Area: 1.58 ft²
Mean Depth: 0.52 ft

Measurement Results:

Station	Location (ft)	Method	Depth (ft)	Edge Factor	Surface (ft)	0.2 (ft/s)	0.4 (ft/s)	0.6 (ft/s)	0.8 (ft/s)	Bed (ft/s)	Average Velocity	Area (ft ²)	Flow (ft ³ /s)
1	3.9	0 point	0	-	0	0	0	0	0	0	0	0	0
2	4.3	1 point	0.38	-	0	0	0	0.01	0	0	0.01	0.13	0
3	4.6	1 point	0.36	-	0	0	0	0.01	0	0	0.01	0.11	0
4	4.9	1 point	0.5	-	0	0	0	0.16	0	0	0.16	0.15	0.02
5	5.2	1 point	0.64	-	0	0	0	0.34	0	0	0.34	0.19	0.06
6	5.5	1 point	0.65	-	0	0	0	0.29	0	0	0.29	0.19	0.06
7	5.8	1 point	0.83	-	0	0	0	0.28	0	0	0.28	0.25	0.07
8	6.1	1 point	0.7	-	0	0	0	0.19	0	0	0.19	0.21	0.04
9	6.4	1 point	0.57	-	0	0	0	0.18	0	0	0.18	0.17	0.03
10	6.7	1 point	0.67	-	0	0	0	0.12	0	0	0.12	0.17	0.02

Operator Name: MM

09:30:21 07.25.2017

Stage Reference: 1.00 ft

Model: FH950

s/n: 141971002074

Boot: v1.00

Application: v1.03

Sensor Type: Velocity and Depth

s/n: 151610301073

Boot: v1.00

Application: v1.02

Filter: FPA Parameter: 10 s

Pre-filter: On Rank: 5

EMI: 60Hz.

Station Entry: Non-fixed

Flow Calculation: Mid-section

Start Edge: Left edge water

of Stations: 11

Stream Width: 2.90 ft

Total Discharge: 0.32 ft³/s

Total Area: 1.89 ft²

Mean Depth: 0.65 ft

Measurement Results:

Station	Location (f Method	Depth (ft)	Edge Facto	Surface (ft, 0.2 (ft/s)	0.4 (ft/s)	0.6 (ft/s)	0.8 (ft/s)	Bed (ft/s)	Average V	Area (ft^2)	Flow (ft^3/s)
1	1.0 point	0.41 -		0	0	0	0	0	0	0.06	0
2	1.3 1 point	0.66 -		0	0	0	0.03	0	0	0.03	0.01
3	1.6 1 point	0.56 -		0	0	0	0.24	0	0	0.24	0.04
4	1.9 1 point	0.5 -		0	0	0	0.38	0	0	0.38	0.06
5	2.2 1 point	0.63 -		0	0	0	0.19	0	0	0.19	0.04
6	2.5 1 point	0.71 -		0	0	0	0.12	0	0	0.12	0.03
7	2.8 1 point	0.74 -		0	0	0	0.19	0	0	0.19	0.04
8	3.1 1 point	0.78 -		0	0	0	0.24	0	0	0.24	0.06
9	3.4 1 point	0.7 -		0	0	0	0.16	0	0	0.16	0.03
10	3.7 1 point	0.67 -		0	0	0	0.06	0	0	0.06	0.01
11	3.9 0 point	0.73 -		0	0	0	0	0	0	0.07	0

isuring flow that may have slowed the velocit

Page <u>2</u> of <u>2</u>	State of Colorado		Meas. No.: <u>005</u>	
YYY: <u>2017</u>	Colorado Water Conservation Board		Division: <u>4</u>	
MM-DD: <u>08-02</u>	ADV Discharge Measurement Notes		District: <u>28</u>	

Station Name:	<u>CSCBASTG</u>			
	<u>Cold Springs</u>		River, Creek, Canal, Ditch	
At, Near, Above, Below	<u>Below</u> <u>Amalg Springs Temo Gage</u>			
Latitude:	Longitude:			
Party:	<u>Brinkerton</u>			

Conditions	
Weather: <u>sunny 75°F</u>	
Wind Spd / Dir: <u>light / upstream</u>	Water Temp: <u>76°F</u>
X-Sec Desc: <u>cobble bed</u>	
Flow Conds: <u>steady, slight turbulence</u>	
Control Desc.: <u>heavy aquatic veg growth</u>	

Measurement Rated: Excellent (2%) / Good (5%) / Fair (8%) / Poor (>8%) [based on the above conditions]

Water Level Reading					
Time	Staff Gage	Pressure Trans.	Time	Staff Gage	Pressure Trans.
<u>08:30</u>	<u>0.895'</u>		<u>11:00</u>	<u>0.890</u>	
<u>09:08</u>	<u>0.895'</u>				
<u>09:30</u>	<u>0.892'</u>				
<u>09:45</u>	<u>0.892'</u>				

Pressure Transducer Download		Weighted MGH	
File Name: <u>ColdSprGageAmalgasp</u>		GH Corr.	
Time: <u>see notes</u>		Correct MGH	

Discharge Measurement				
Manufacturer: <u>SonTek</u>	Model:	FlowTracker	S/N:	P2354 / P2355
Firmware: <u>3.9</u>	Software:	<u>2.20</u>		
Diag Test File: <u>Yes or No</u>	Raw Data File:	<u>CSCBASTG.005</u>		
Meas Type: <u>Wading / Boat / Bridge / Cableway</u>		Method:	<u>0.6</u>	
	<u>50</u>	ft. or mi / upstream or downstream of gage		
Start Edge: <u>RWL. 4</u>	End Edge: <u>3.6 LEW</u>	Total Width:	<u>2.2</u>	
Start Time: <u>09:17</u>	End Time: <u>09:45</u>			
Discharge: <u>0.185</u>	Uncertainty: <u>8.9</u>	# Stations:	<u>8</u>	
Mean v: <u>0.311</u>	Width: <u>2.2</u>	Mean d:	<u>0.27</u>	
Max v: <u>1.051</u>	Area: <u>0.6</u>	Max d:	<u>0.40</u>	
Mean SNR: <u>13.6</u>	σv: <u>0.021</u>	Mean Temp:	<u>76.0°F</u>	

Meas. By: <u>JUL</u>	Notes By: <u>NDJ</u>
Processed By:	Reviewed By: <u>JEL</u>

Remarks:

8:30 arrive Cold Springs Creek below Amalla
Springs Temporary Gage

8:30 Staff plate = 0.90' (glassy water 0.895')

8:32 connected to logger

8:33 download logger file name: ColSprCrBlwAmallaSp

8:35 disconnected from logger 2017-08-02 08:34:00-0600.xl

8:42 Pic 0037 gage on arrival ... 11:00

8:42 Pic 0038 staff plate

8:47 Pic 0039 plant growth in gage pool downstream
of temporary gage

8:49 Vid 0040 plant growth on control, ~35' downstream
of gage

09:05 Pic 0041 @ new x-section pulled back
aquatic veg

10:07 Began Survey					
<u>Shot #</u>	<u>Loc</u>	<u>depth</u>	<u>height not</u> <u>water level</u>	<u>waterland</u> <u>Staff</u>	<u>water land</u> <u>PI</u>
1	at staff plate	5.67'	0.80	0.87	0.89
2	30' ds gage	5.46'	0.60	0.89	0.89
(lowest point on control)					

10:29 End Survey

11:01 connect to logger

11:02 download logger

11:03 disconnected from logger

11:09 departed site

Station	Location (ft)	Method	Depth (ft)	Edge Factor	Surface (ft/0.2 (ft/s)	0.4 (ft/s)	0.6 (ft/s)	0.8 (ft/s)	Bed (ft/s)	Average V	Area (ft^2)	Flow (ft^3/s)
1	0.9	0 point	0.34	-	0	0	0	0	0	0	0.05	0
2	1.2	1 point	0.67	-	0	0	0	-0.01	0	0	-0.01	0
3	1.5	1 point	0.58	-	0	0	0	0.04	0	0	0.04	0.01
4	1.8	1 point	0.55	-	0	0	0	0.06	0	0	0.06	0.01
5	2.1	1 point	0.61	-	0	0	0	0.19	0	0	0.19	0.03
6	2.4	1 point	0.8	-	0	0	0	0.25	0	0	0.25	0.06
7	2.7	1 point	0.7	-	0	0	0	0.32	0	0	0.32	0.07
8	3	1 point	0.8	-	0	0	0	0.29	0	0	0.29	0.07
9	3.3	1 point	0.83	-	0	0	0	0.15	0	0	0.15	0.04
10	3.6	1 point	0.71	-	0	0	0	0.03	0	0	0.03	0.01
11	3.9	0 point	0.76	-	0	0	0	0	0	0	0	0

l and 0.32 at the bottom.

s)



STATE OF
COLORADO

Epstein - DNR, Brian <brian.epstein@state.co.us>

cold springs

Breibart, Andrew <abreibart@blm.gov>

Tue, Sep 12, 2017 at 6:16 PM

To: "Epstein - DNR, Brian" <brian.epstein@state.co.us>, Roy Smith <r20smith@blm.gov>

Brian,

The channel is completely choked with vegetation now. I moved the flow measurements 100 feet downstream and moved about 160 lbs of rock from the channel to try to get some flow.

I also inputted one of the stations incorrectly as 32 instead of 3.2. Calculated discharge is 0.08 cfs.

Staff gage height: 0.96 feet
Bottom of gage: 0.36 feet

I attached photos, the text file, and my messes in excel. I have a disorganized method of calculating flows.

I have no technicians.

Next sample day may be the last week of September otherwise, second week of October.

See attached.

AB

Andrew Breibart, Hydrologist
Bureau of Land Management
210 West Spencer Street, Suite A
Gunnison, CO 81230

Phone: [970-642-4944](tel:970-642-4944)
Fax: [970-642-4990](tel:970-642-4990)

abreibart@blm.gov

"All things in watersheds are connected (John Wesley Powell)".



coldsprings09122017.zip
4238K

Profile Name: COLD0912
Operator Name: ADB
15:46:49 09.12.2017

Stage Reference: 0.00 ft

Model: FH950
s/n: 141971002074
Boot: v1.00
Application: v1.03

Sensor Type: Velocity and Depth
s/n: 151610301073
Boot: v1.00
Application: v1.02

Filter: FPA Parameter: 10 s
Pre-filter: On Rank: 5

EMI: 60Hz.

Station Entry: Non-fixed
Flow Calculation: Mid-section

Start Edge: Right edge water
of Stations: 12
Stream Width: 3.60 ft

Total Area: 20.25 ft^2
Mean Depth: 5.63 ft

Measurement Results:

Station	Location (ft Method	Depth (ft)	Edge Facto	Surface (ft, 0.2 (ft/s)	0.4 (ft/s)	0.6 (ft/s)	0.8 (ft/s)	Bed (ft/s)	Average Velocity (ft/s)	Area (ft^2)	Flow (ft^3/s)
1	2 0 point	0 -		0	0	0	0	0	0	0	0
2	2.4 1 point	0.26 -		0	0	0	0.01	0	0	0.01	0.09
3	2.7 1 point	0.1 -		0	0	0	-0.01	0	0	-0.01	1.47
4	3.2 1 point	0.4 -		0	0	0	0	0	0	0	11.6
5	3.5 1 point	0.45 -		0	0	0	0.09	0	0	0.09	6.42
6	3.8 1 point	0.56 -		0	0	0	0.18	0	0	0.18	0.17
7	4.1 1 point	0.31 -		0	0	0	0.45	0	0	0.45	0.09
8	4.4 1 point	0.36 -		0	0	0	0.18	0	0	0.18	0.11
9	4.7 1 point	0.36 -		0	0	0	0.29	0	0	0.29	0.11
10	5 1 point	0.36 -		0	0	0	0.21	0	0	0.21	0.11
11	5.3 1 point	0.3 -		0	0	0	0.12	0	0	0.12	0.09
12	5.6 0 point	0 -		0	0	0	0	0	0	0	0

Section	depth		distance from REW	velocity		discharge				Channel St	REW
section 1	0	feet	0	feet	0	feet/secon	0	cubic feet/second		REW	2
section 2	0.26	feet	0.4	feet	0.01	feet/secon	0.00039	cubic feet/second			2.4
section 3	0.1	feet	0.7	feet	-0.01	feet/secon	-0.00025	cubic feet/second			2.7
section 4	0.4	feet	1.2	feet	0	feet/secon	0	cubic feet/second			3.2
section 5	0.45	feet	1.5	feet	0.09	feet/secon	0.006075	cubic feet/second			3.5
section 6	0.56	feet	1.8	feet	0.18	feet/secon	0.01512	cubic feet/second			3.8
section 7	0.31	feet	2.1	feet	0.45	feet/secon	0.020925	cubic feet/second			4.1
section 8	0.36	feet	2.4	feet	0.18	feet/secon	0.00972	cubic feet/second			4.4
section 9	0.36	feet	2.7	feet	0.29	feet/secon	0.01566	cubic feet/second			4.7
section 10	0.36	feet	3	feet	0.21	feet/secon	0.01134	cubic feet/second			5
section 11	0.3	feet	3.3	feet	0.12	feet/secon	0.0054	cubic feet/second			5.3
section 12	0	feet	3.6	feet	0	feet/secon	0	cubic feet/second	LEW		5.6
							0.08	cubic feet/second			

CWCB Stage: 0.96ft CWCB Bottom of staff gauge: 0.36ft	DO (mg/L): 6.73	YSI Pro 20 Meter
	DO (%): 896.5	
	pH: 7.16	YSI 1030
	Conductivi ty (us/cm): 86.5	
	TDS (mg/L): 557	
	Water Temp (C): 13.2	
	Air Temp (C): 20.5	
	mostly cloudy skies	light breeze

DO (mg/L):9.47	YSI Pro 20 Meter	
DO (%): 103.1		
pH: 6.97		
Conductivity (us/cm): 95.7		
TDS (mg/L): 62.3		
Water Temp (C):4.3	YSI 1030	
Air Temp (C):8	light breeze	clear

Taken immediately downstream of Amalla Spring

Operator Name: Andrew Breibart, BLM Hydrologist
13:19:13 05.10.2018

Stage Reference: 0.00 ft

Model: FH950
s/n: 141971002074
Boot: v1.00
Application: v1.03

Sensor Type: Velocity and Depth
s/n: **151610301073**
Boot: v1.00
Application: v1.02

Filter: FPA Parameter: 10 s
Pre-filter: On Rank: 5
EMI: 60Hz.

Station Entry: Non-fixed
Flow Calculation: Mid-section
Start Edge: Right edge water
of Stations: 8
Stream Width: 2.02 ft

Total Discharge: 0.11 ft³/s

Total Area: 0.34 ft²

Mean Depth: 0.17 ft

Measurement Results:

Station	Location (ft Method)	Depth (ft)	Edge Factor	Surface (ft/0.2 (ft/s))	0.4 (ft/s)	0.6 (ft/s)	0.8 (ft/s)	Bed (ft/s)	Average Vc	Area (ft^2)	Flow (ft^3/s)
1	2.12 0 point	0 -		0	0	0	0	0	0	0	0
2	2.4 1 point	0.19 -		0	0	0	0.09	0	0	0.09	0.05
3	2.7 1 point	0.18 -		0	0	0	0.67	0	0	0.67	0.05
4	3 1 point	0.23 -		0	0	0	0.33	0	0	0.33	0.07
5	3.3 1 point	0.2 -		0	0	0	0.32	0	0	0.32	0.06
6	3.6 1 point	0.17 -		0	0	0	0.28	0	0	0.28	0.05
7	3.9 1 point	0.19 -		0	0	0	0.32	0	0	0.32	0.05
8	4.14 0 point	0 -		0	0	0	0	0	0	0	0

CWCB Stage: 076ft	
CWCB Bottom of staff gauge: 0.36ft	

[illegible]

Air Temp (F):65 (estimated)	light breeze	obscured skies
---------------------------------------	--------------	----------------

[illegible]

7/10/18

Amala Spring w/AB
Hydro

15:15

77°F

DO 7.22

SAT 83.2%

7.1°C

pH 6.76

133.7 μ ec

86.8 TDS

7.

0.07 cfs



COLORADO

Colorado Water
Conservation Board

Department of Natural Resources

CWCB discharge measurement data

Collected using the ESRI Survey123 app on a Samsung tablet

Stream name	Cold Spring Creek
Location description	Cold Spring Creek 100ft DS of gage
Water division	4
Visit date	5/11/2018
Collected by CWCB staff	Jack Landers
Collected by non-CWCB staff	N/A
Non-CWCB entity	N/A
Measurement method	wadingADV
Equipment	Flowtracker1_P2355
Site name	COLDSPCR
Measurement number	1
Weather	partly sunny, no recent precip
Wind	W gusty
Cross-section description	run, cobble gravel substrate
Flow conditions	calm
Measurement start time	12:29
Flow amount	0.069
Measurement rating	Poor(>8%)
Discharge comments:	Difficult to find good xsec, large rocks braid channel upstream. Lots of macros (stoneflies, caddisflies cased and uncased).
Location	13N 343566 4223322

Profile Name: COLD
Operator Name: Andrew Breibart, BLM Gunnison Hydrologist
13:12:31 09.10.2018

Stage Reference: 0.00 ft

Model: FH950
s/n: 141971002074
Boot: v1.00
Application: v1.03

Sensor Type: Velocity and Depth
s/n: 151610301073
Boot: v1.00
Application: v1.02

Filter: FPA Parameter: 10 s
Pre-filter: On Rank: 5
EML: 60Hz.

Station Entry: Non-fixed
Flow Calculation: Mid-section
Start Edge: Right edge water
of Stations: 7
Stream Width: 1.60 ft
Total Discharge: 0.09 ft³/s
Total Area: 0.37 ft²
Mean Depth: 0.23 ft

Measurement Results:
Station

Location (ft Method		Depth (ft)	Edge Facto	Surface (ft/s)	0.2 (ft/s)	0.4 (ft/s)	0.6 (ft/s)	0.8 (ft/s)	Bed (ft/s)	Average Ve	Area (ft^2)	Flow (ft^3/
1	2.7 0 point	0 -		0	0	0	0	0	0	0	0	0
2	3 1 point	0.24 -		0	0	0	0	0	0	0	0.07	0
3	3.3 1 point	0.27 -		0	0	0	0.01	0	0	0.01	0.08	0
4	3.6 1 point	0.27 -		0	0	0	0.57	0	0	0.57	0.08	0.05
5	3.9 1 point	0.28 -		0	0	0	0.36	0	0	0.36	0.08	0.03
6	4.2 1 point	0.25 -		0	0	0	0.22	0	0	0.22	0.05	0.01
7	4.3 0 point	0 -		0	0	0	0	0	0	0	0	0

Air Temp (F):70	light breeze	partly cloudy
pH	6.22	
SPC	102.9 us/cm	
TDS	66.8 mg/L	
DO	7.12 mg/L	
DO	83.2 %	
water temp	7.3 C	

Profile Name: COLD at Amalla spring
 Operator Name: Andrew Breibart, BLM Gunnison Hydrologist
 11/7/2018 14:00

Stage not done. Stage was problematic with the flow meter.
 Manually measured depth.
 depth sensor didn't work correctly. Velocity measurements were reasonable.
 data were recorded manually

Air Temp (F):38	calm	obsucured
pH	6.22	
SPC	131.00	us/cm
TDS	85.20	mg/L
DO	7.00	mg/L
DO	82.40	%
water temp	7.00	C

Model: FH950
s/n: 141971002074
 Boot: v1.00
 Application: v1.03

Sensor Type: Velocity and Depth
 s/n: 151610301073
 Boot: v1.00
 Application: v1.02

Filter: FPA Parameter: 10 s
 Pre-filter: On Rank: 5
 EMI: 60Hz.

Station Entry: Non-fixed
 Flow Calculation: Mid-section
 Start Edge: Right edge water
 # of Stations: 7
 Stream Width: 1.60 ft

Discharge = 0.09 cfs

REW

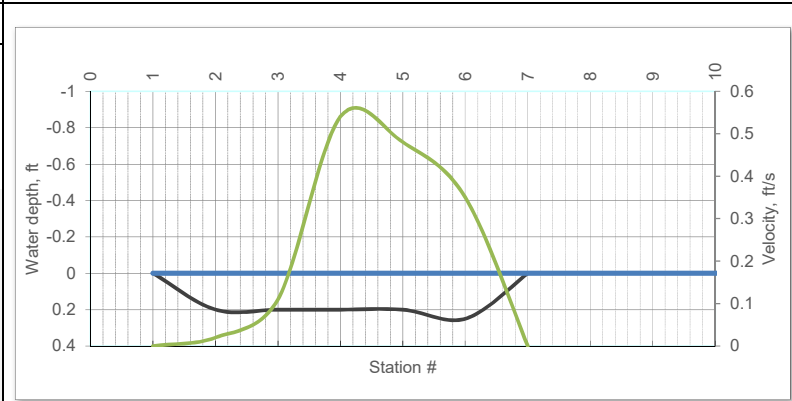
Measurement Results:

Station	Location (ft)	Method	Depth (ft)	0.6 (ft/s)
1	10	0 point	0	0
2	10.3	1 point	0.2	0.02
3	10.6	1 point	0.2	0.11 LEW
4	10.9	1 point	0.2	0.54
5	11.2	1 point	0.2	0.48
6	11.5	1 point	0.25	0.35
7	11.7	0 point	0	0

Flow Measurement Calculations			
<u>Site information</u>		<u>Discharge summary</u>	
Stream:	Cold Spring Creek	Total discharge (cfs):	0.09
Date:	11/7/2018	Total width (ft):	1.45
Time:	14:00	Total area (ft ²):	0.30
Observers:	Andrew Breibart, BLM	Mean depth (ft):	0.15
County:		Mean velocity (ft/s):	0.21
Water Division:		Max % Q:	19.20%
UTM coordinates:			
Location Description			
Comments:			
Other:			

** Enter cross-section data in blue highlighted cells. Password to unlock workbook is "CWCB" **

Vertical #	Station, ft	Width, ft	Depth, ft	Velocity, ft/s	Area, ft2	Subsection discharge, cfs	% Q
1	10	water line	0	0			
2	10.3	0.3	0.2	0.02	0.06	0.0012	1.3%
3	10.6	0.3	0.2	0.11	0.06	0.0066	0.5%
4	10.9	0.3	0.2	0.54	0.06	0.0324	10.7%
5	11.2	0.3	0.2	0.48	0.06	0.0288	19.2%
6	11.5	0.25	0.25	0.35	0.0625	0.021875	10.2%
7	11.7	water line	0	0			
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							



[illegible]

Discharge Measurement Summary

Date Generated: Mon Dec 18 2017

File Information

File Name CSCBASTG.005.WAD
Start Date and Time 2017/08/02 09:18:50

Site Details

Site Name COLD SPG CR B AMALLA
Operator(s) BRIAN EPSTEIN

System Information

Sensor Type FlowTracker
Serial # P2355
CPU Firmware Version 3.9
Software Ver 2.30
Mounting Correction 0.0%

Units (Metric Units)

Distance m
Velocity m/s
Area m²
Discharge m³/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	1.0%	9.8%
Velocity	3.2%	45.7%
Width	0.3%	0.3%
Method	4.8%	-
# Stations	6.6%	-
Overall	8.8%	46.7%

Summary

Averaging Int. 40 # Stations 8
Start Edge LEW Total Width 0.671
Mean SNR 13.6 dB Total Area 0.055
Mean Temp 7.77 °C Mean Depth 0.082
Disch. Equation Mid-Section Mean Velocity 0.0947
Total Discharge 0.0052

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	09:18	0.43	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	09:25	0.52	0.6	0.101	0.6	0.040	0.0052	1.00	0.0052	0.009	0.0000	0.9
2	09:26	0.61	0.6	0.101	0.6	0.040	0.1106	1.00	0.1106	0.009	0.0010	19.4
3	09:28	0.70	0.6	0.104	0.6	0.041	0.3202	1.00	0.3202	0.009	0.0030	58.0
4	09:33	0.79	0.6	0.107	0.6	0.043	0.0777	1.00	0.0777	0.010	0.0008	14.5
5	09:41	0.88	0.6	0.122	0.6	0.049	-0.0032	1.00	-0.0032	0.011	0.0000	-0.7
6	09:42	0.98	0.6	0.061	0.6	0.024	0.0633	1.00	0.0633	0.006	0.0004	7.9
7	09:42	1.10	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Discharge Measurement Summary

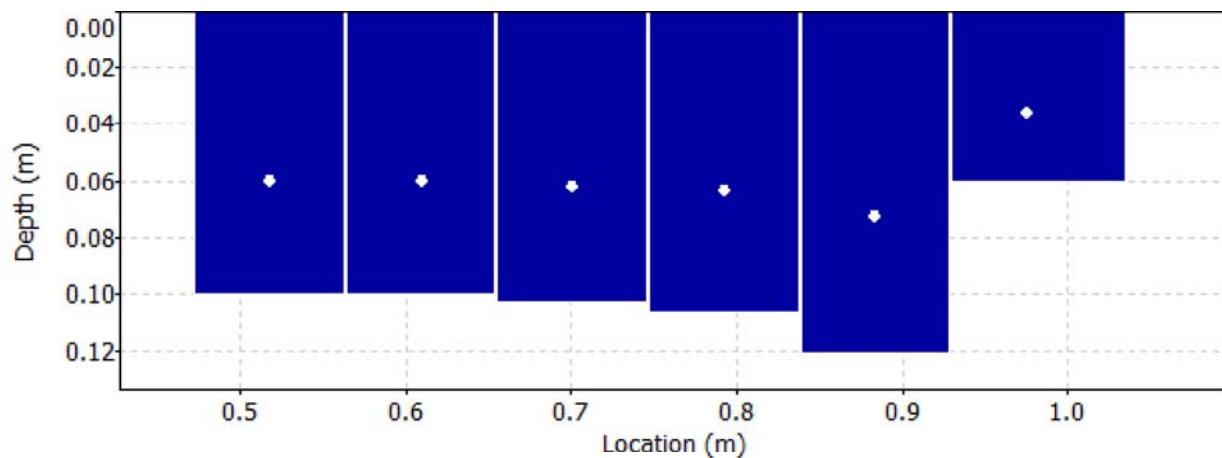
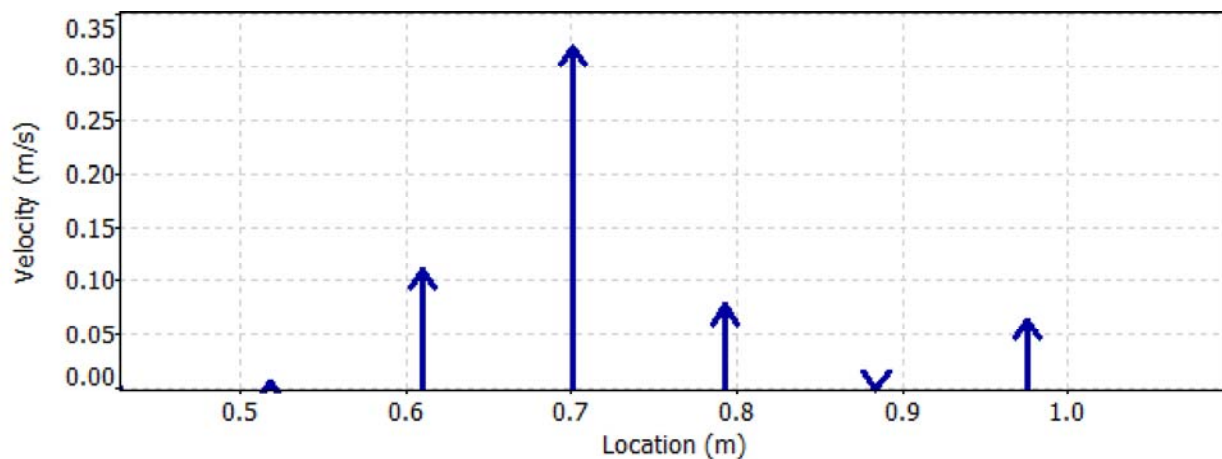
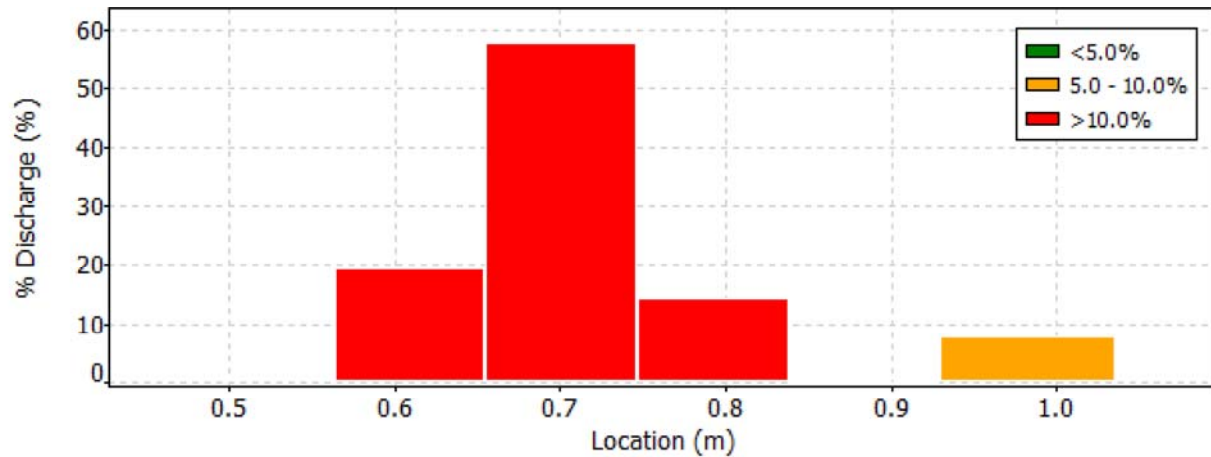
Date Generated: Mon Dec 18 2017

File Information

File Name CSCBASTG.005.WAD
Start Date and Time 2017/08/02 09:18:50

Site Details

Site Name COLD SPG CR B AMALLA
Operator(s) BRIAN EPSTEIN



Discharge Measurement Summary

Date Generated: Mon Dec 18 2017

File Information

File Name CSCBASTG.005.WAD
Start Date and Time 2017/08/02 09:18:50

Site Details

Site Name COLD SPG CR B AMALLA
Operator(s) BRIAN EPSTEIN

Quality Control

St	Loc	%Dep	Message
5	0.88	0.6	High SNR variation during measurement: 4.3,6.0
6	0.98	0.6	High angle: -26

Discharge Measurement Summary

Date Generated: Mon Dec 18 2017

File Information

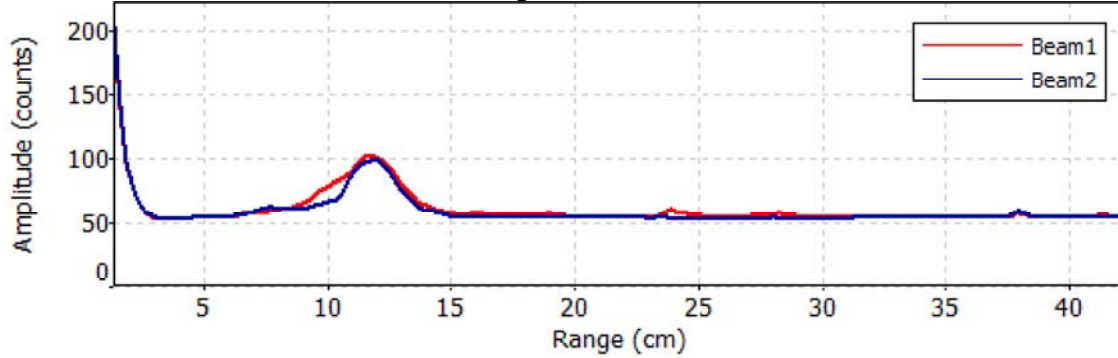
File Name CSCBASTG.005.WAD
Start Date and Time 2017/08/02 09:18:50

Site Details

Site Name COLD SPG CR B AMALLA
Operator(s) BRIAN EPSTEIN

Automatic Quality Control Test (BeamCheck)

Wed Aug 2 09:16:57 MDT 2017

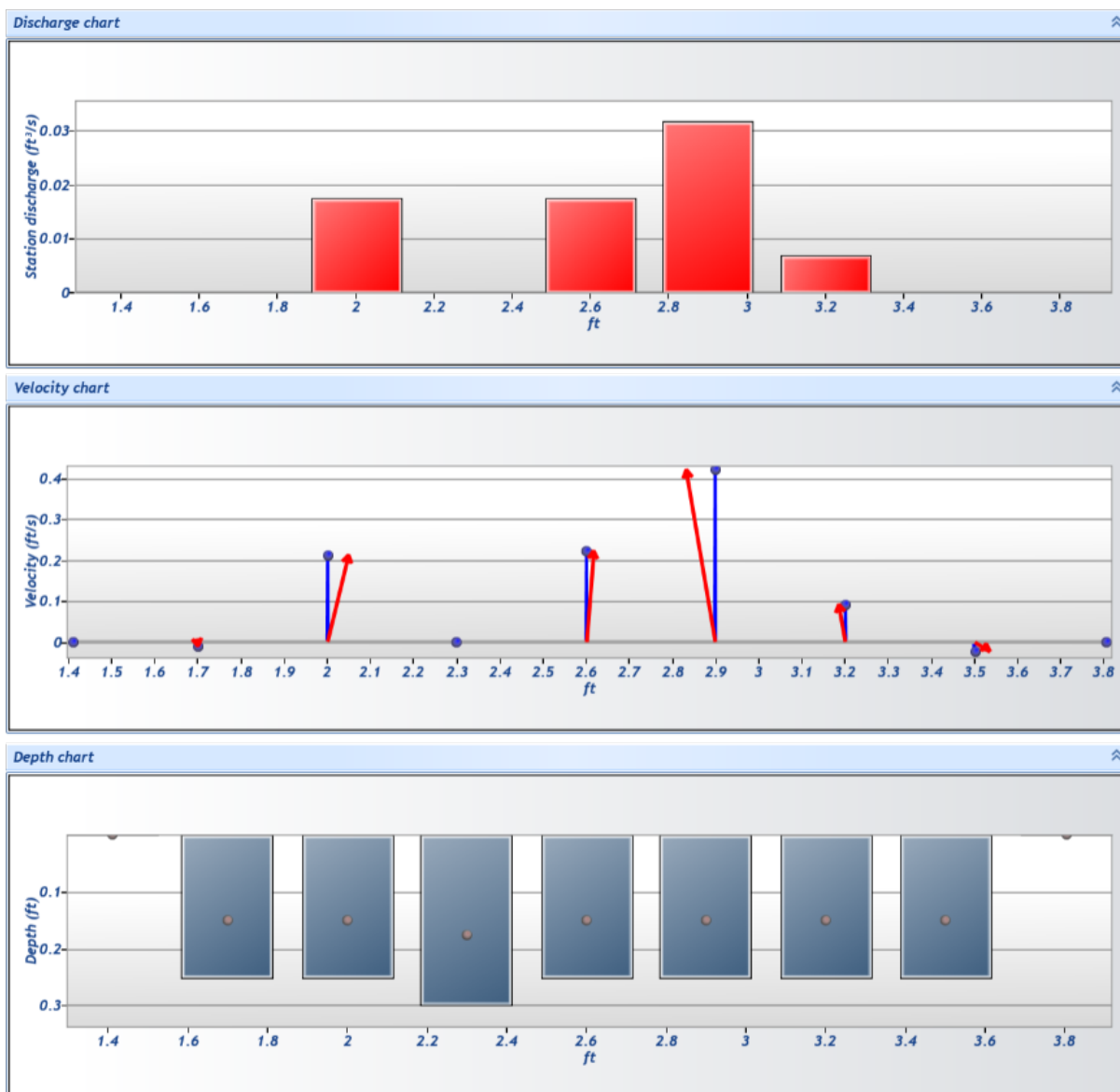


- ✓ Noise level check - Pass
- ✓ SNR check - Pass
- ✓ Peak location check - Pass
- ✓ Peak shape check - Pass



Discharge Measurement Summary

File Information		Discharge Summary			
File name	COLDSPCR.001.FlowTracker1.ft	Start time	5/11/2018 12:29:00 PM		
Start date and time	5/11/2018 12:29 PM	End time	5/11/2018 12:37:00 PM		
Calculations engine	FlowTracker1	# Stations	9		
Data collection mode	Discharge	Avg interval	40		
		Mean depth	0.226 ft		
		Mean velocity	0.1247 ft/s		
		Mean SNR	35 dB		
		Mean temp	55.400 °F		
		Total width	2.402 ft		
		Total area	0.5382 ft²		
		Total discharge	0.0671 ft³/s		
System Information		Site Details			
Sensor type	Unknown	Site name	COLD SPRING CR GAGE		
Handheld serial number	P2355	Site number			
Probe serial number	P2355	Operator(s)	JACK LANDERS		
Probe firmware	3.9	Comment			
Handheld software	3.9				
Discharge Uncertainty		Discharge Settings			
Category	ISO IVE	Discharge equation	Mid Section		
Accuracy	1.0% 1.0%	Discharge uncertainty	IVE		
Depth	0.9% 5.2%	Discharge reference	Rated		
Velocity	3.5% 45.7%				
Width	0.3% 0.3%				
Method	4.3%				
# Stations	5.8%				
Overall	8.1% 46.0%				
Station Warning Settings		Summary overview			
Station discharge caution	5.00 %				
Station discharge warning	10.00 %				
Maximum depth change	50.00 %				
Maximum spacing change	100.00 %				
Data Collection Settings		Quality Control Settings			
Salinity	0.000 PSS-78	SNR threshold	10 dB		
Temperature	°F	Standard error threshold	0.0328 ft/s		
Sound speed	ft/s	Spike threshold	10.00 %		
Mounting correction	0.00 %	Maximum velocity angle	20.0 deg		
		Maximum tilt angle	5.0 deg		
Supplemental data summary					
Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
5/11/2018 12:27:27 PM	0.761				



Measurement results														
St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correction	Mean Velocity (ft/s)	Area (ft ²)	Flow (ft ³ /s)	%Q	
0	12:29 PM	1.411	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0000	0.0000	0.0000	0.00	✓
1	12:29 PM	1.699	0.6	0.249	0.6000	0.151	40	-0.0092	1.0000	-0.0092	0.0753	0.0000	-1.00	✓
2	12:30 PM	2.001	0.6	0.249	0.6000	0.151	40	0.2126	1.0000	0.2126	0.0753	0.0177	23.30	✓
3	12:31 PM	2.300	0.6	0.299	0.6000	0.177	40	-0.0003	1.0000	-0.0003	0.0861	0.0000	0.00	✓
4	12:33 PM	2.602	0.6	0.249	0.6000	0.151	40	0.2224	1.0000	0.2224	0.0753	0.0177	24.30	✓
5	12:34 PM	2.900	0.6	0.249	0.6000	0.151	40	0.4203	1.0000	0.4203	0.0753	0.0318	46.00	✓
6	12:35 PM	3.202	0.6	0.249	0.6000	0.151	40	0.0912	1.0000	0.0912	0.0753	0.0071	10.00	✓
7	12:37 PM	3.501	0.6	0.249	0.6000	0.151	40	-0.0233	1.0000	-0.0233	0.0753	0.0000	-2.50	✓
8	12:37 PM	3.806	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0000	0.0000	0.0000	0.00	✓

Quality control warnings							
St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measure d Depth (ft)	Warnings
2	12:30 PM	2.001	0.6	0.249	0.6000	0.151	High Stn % Discharge
3	12:31 PM	2.300	0.6	0.299	0.6000	0.177	SNR Threshold Variation
4	12:33 PM	2.602	0.6	0.249	0.6000	0.151	High Stn % Discharge
5	12:34 PM	2.900	0.6	0.249	0.6000	0.151	High Stn % Discharge
6	12:35 PM	3.202	0.6	0.249	0.6000	0.151	High Stn % Discharge















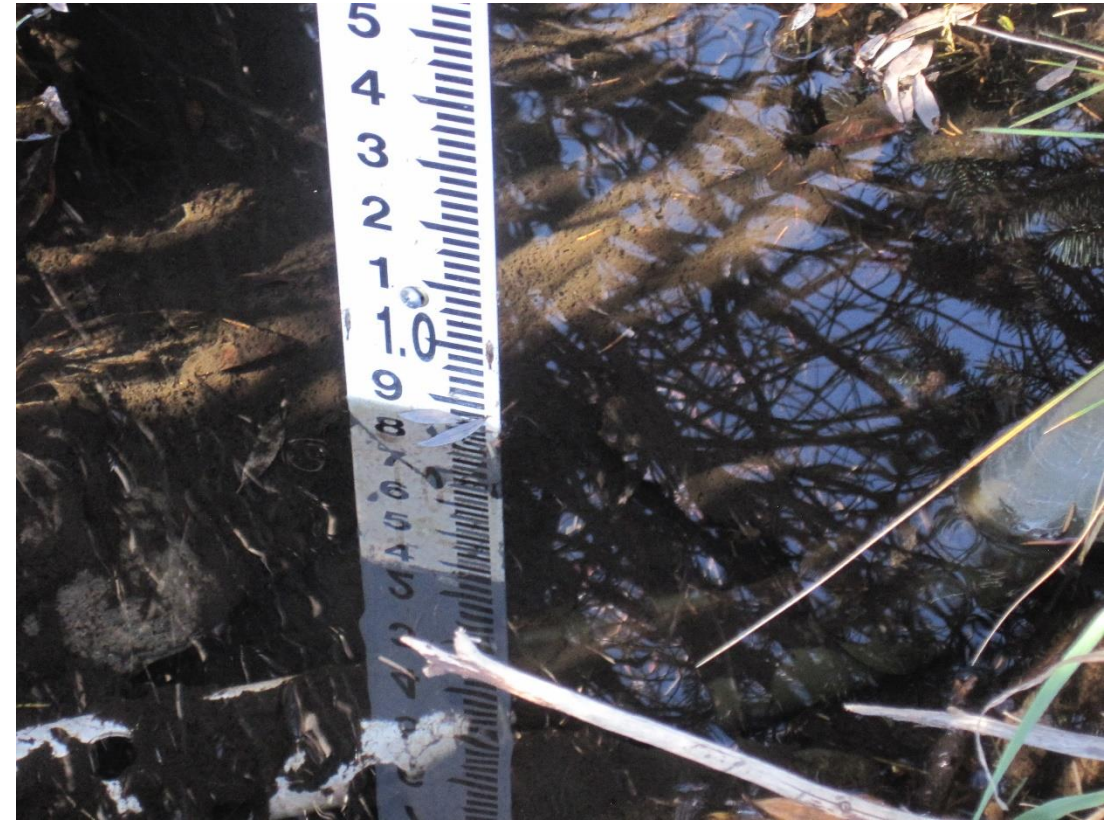
Cold Spring Creek-Amalla Spring 10/17/17

Bureau of Land Management, Gunnison Field Office

Andrew Breibart, Hydrologist

abreibart@blm.gov or 970-642-4944

CWCB Staff gage



Flow measurement downstream of CWCB equipment (0.12 cfs)

Right bank to left bank perspective



Upstream to downstream perspective



Flow measurement downstream of CWCB equipment (0.12 cfs)

Flow measurement (downstream to upstream perspective)



Channel between flow measurement site and CWCB equipment



Flow measurement upstream of CWCB equipment (0.14 cfs)

Spring head is in the willow

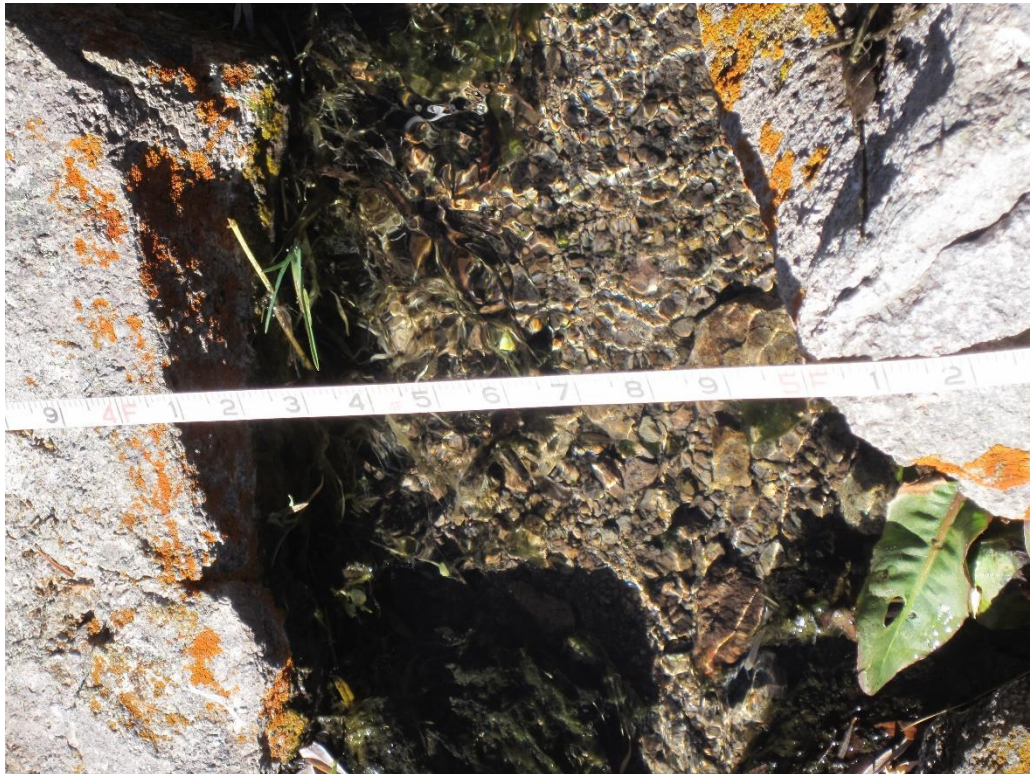


Downstream to upstream perspective



Flow measurement upstream of CWCB equipment (0.14 cfs)

Channel cross section



Upstream to downstream perspective

