



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:
7250 (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 East Fork Little Cimarron River, located in Water Division 4.

Location and Land Status. East Fork Little Cimarron River originates near the north boundary of the Uncompahgre Wilderness, approximately six miles east of Silver Jack Reservoir. This reach begins at the headwaters of the creek and extends downstream to the confluence with the Little Cimarron River, a distance of approximately 6.4 stream miles. The BLM manages approximately 1.33 miles of this reach, the U.S. Forest Service manages approximately 2.9 miles, and approximately 2.21 miles are in private ownership.

Biological Summary. East Fork Little Cimarron River is a cold-water, high gradient stream. It flows through a canyon with a valley floor averaging one-eighth mile in width. In the upper four miles, the stream flows through several meadows with alluvial deposits. In the lower two miles, it flows through a narrow valley and is confined by bedrock. The stream generally has medium to large-sized substrate, consisting of gravels, small cobbles, and small boulders. The stream has a good mix of pools, small riffles, and runs.

Fisheries surveys have revealed a self-sustaining population of brook trout. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

In open meadow areas, the riparian community is generally comprised of willows, grasses, and sedges. In more confined reaches, the riparian community is generally comprised of blue spruce, aspen, willow species, and alder. The riparian community is in very good condition, and provides shading and cover for fish habitat.

R2Cross Analysis. The BLM collected the following R2Cross data from East Fork Little Cimarron River:

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)
07/28/2015 #1	0.45 cfs	11.50 feet	0.59 cfs	Out of range
07/28/2015 #2	0.49 cfs	11.35 feet	0.82 cfs	Out of range
07/12/2016 #1	0.64 cfs	11.30 feet	1.13 cfs	Out of range
07/12/2016 #2	0.58 cfs	10.45 feet	0.65 cfs	Out of range
06/28/2017 #1	1.76 cfs	23.59 feet	2.40 cfs	2.84 cfs
06/28/2017 #2	2.21 cfs	12.50 feet	1.63 cfs	2.84 cfs

Averages: 1.20 cfs

2.84 cfs

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

2.80 cubic feet per second is recommended during the snowmelt runoff period from May 1 to June 30. This recommendation is driven by the average velocity criteria. This creek is narrow and has limited physical habitat, so it is important to protect a flow rate that makes most of this habitat available to the fish population while they are completing critical life history functions.

1.2 cubic feet per second is recommended from July 1 to December 31. This recommendation is driven by the depth and wetted perimeter criteria. As mentioned above, this creek is narrow and has very limited physical habitat. This flow rate will allow passage between pools for full usage of the limited habitat.

1.0 cubic per second is recommended from January 1 to April 30. This flow is recommended because of naturally limited water availability. 1.0 cubic feet per second should prevent pools from freezing, allowing the fish population to successfully overwinter. Even though the base flow in this creek is small, it is extremely consistent, allowing the fishery to persist.

Water Availability. The BLM recommends relying upon Streamstats for water availability analysis because this stream has not historically been gaged. BLM does not recommend relying upon stream gages located along the Cimarron River. The data collected by those gages is heavily influenced by reservoir releases, irrigation diversions, and irrigation returns flows. These gages would not accurately reflect the hydrology of the East Fork Little Cimarron River watershed, which has not been developed for agricultural purposes.

The BLM is not aware of any water rights within the proposed instream flow reach.

Relationship to Land Management Plans. The BLM land use plan calls for managing this creek to support fishery, 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

BLM Gunnison Field Office Stream Surveys

June 2017

East Fork Little Cimarron River – Water Code 44892

Introduction:

The East Fork of the Little Cimarron River is a small mountain stream located to the west of Gunnison. It is a tributary to the Little Cimarron River, which is a part of the Gunnison River watershed. The river itself is mostly on private and the only access is by a private road that ends at a private cabin (figures 1 and 2). Survey records for this stream are unknown.

Methods:

The stream was surveyed using one backpack shocker and one netter. Only a presence/absence survey was performed in conjunction with a survey completed by hydrologists to gain instream flows on BLM for the Colorado Waterboard. The survey reach was 475 ft in length. Personnel present for the survey was Russ Japuntich Fish Biologist and Josh Ryan Fisheries Technician.

Analysis:

A total of 35 brook trout (*Salvelinus fontinalis*) were captured during the survey (table 1). Brook trout lengths ranged from 83-220 mm and weights ranged from 3-114g (figures 3 and 4).

Discussion:

Efficiency was good, with several fish captured in a short stretch. The stream was narrow with some decent pool habitat and undercut banks. The fish seemed fairly healthy and proportionately sized for the stream. An awesome stream that could be a potential candidate for cutthroat reintroduction.

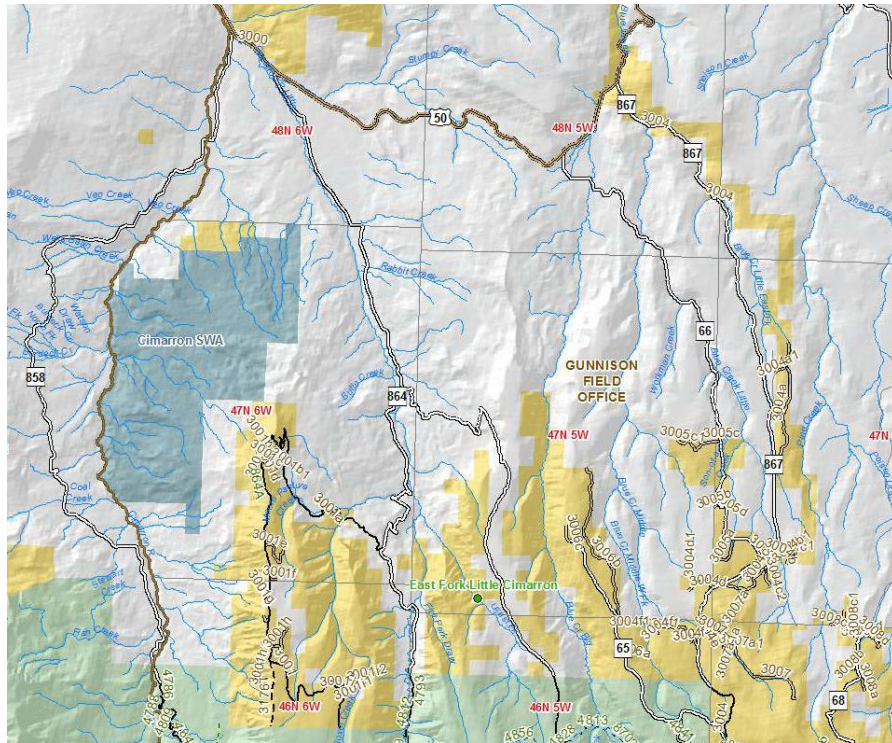


Figure 1. Mapped location of the survey site on the East Fork of the Little Cimarron.

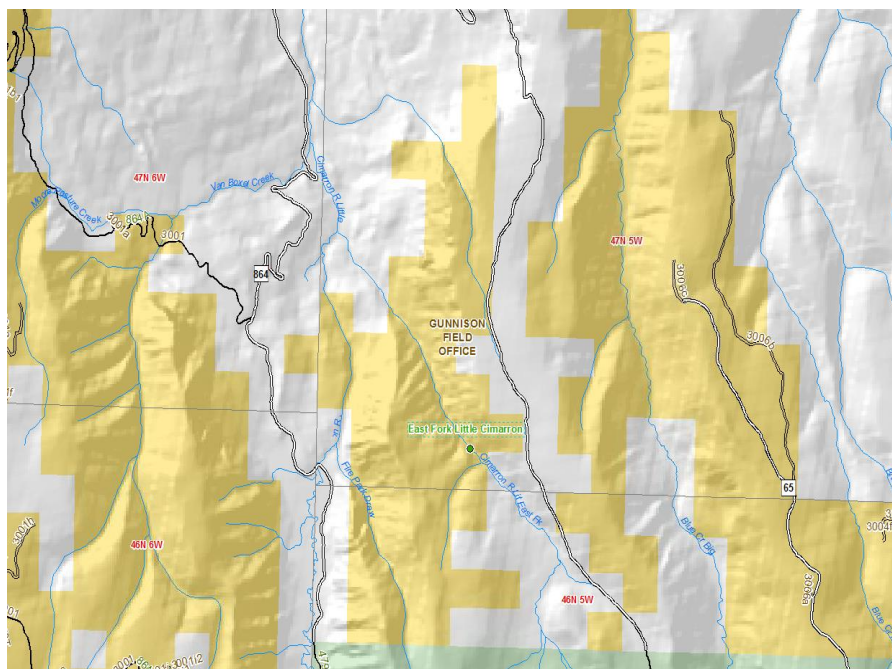


Figure 2. Zoomed in mapped location of the survey location.

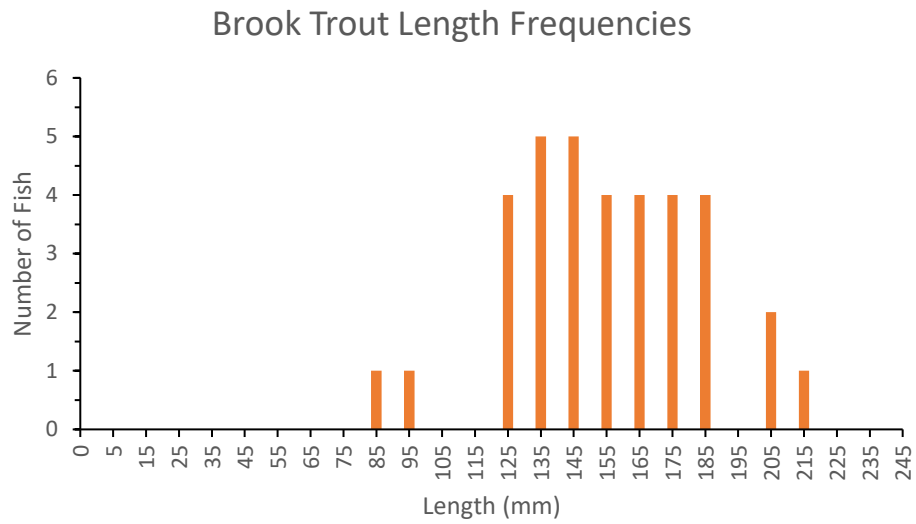


Figure 3. Length frequencies for brook trout.

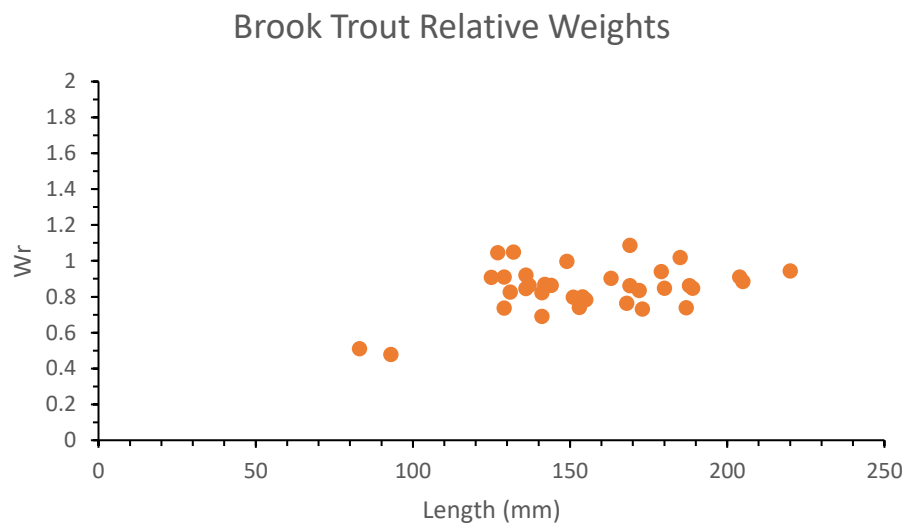


Figure 4. Relative weights for brook trout.

Table 1. Datasheet showing species, length (mm), and weight (g).

#	Species	Length (mm)	Weight (g)	#	Species	Length (mm)	Weight (g)
1	BRK	149	36	19	BRK	83	3
2	BRK	204	87	20	BRK	141	21
3	BRK	185	72	21	BRK	173	42
4	BRK	169	58	22	BRK	131	20
5	BRK	155	32	23	BRK	144	28
6	BRK	93	4	24	BRK	179	60
7	BRK	189	64	25	BRK	127	23
8	BRK	163	43	26	BRK	172	47
9	BRK	188	64	27	BRK	137	24
10	BRK	205	86	28	BRK	180	55
11	BRK	220	114	29	BRK	136	25
12	BRK	153	29	30	BRK	129	21
13	BRK	125	19	31	BRK	129	17
14	BRK	187	54	32	BRK	141	25
15	BRK	151	30	33	BRK	132	26
16	BRK	142	27	34	BRK	136	23
17	BRK	169	46	35	BRK	154	32
18	BRK	168	40				



Photo Left: Reach start.



Photo Right: Reach end.



Photo Left: Narrow stretch of the creek.
reach.

Photo Right: Decent pool in the middle of the



Photos of brook trout captured during the survey.



FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: <u>East Fork Little Cimarron River</u>						CROSS-SECTION NO.: <u>1</u>	
CROSS-SECTION LOCATION: <u>At BLN-private boundary</u>							
DATE: <u>6-28-17</u>		OBSERVERS: <u>R. Smith, A. Breitbart</u>					
LEGAL DESCRIPTION	% SECTION: <u>SW</u>	SECTION: <u>33</u>	TOWNSHIP: <u>47 N/S</u>	RANGE: <u>5 E/W</u>	PM: <u>NM</u>		
COUNTY: <u>Gunnison</u>	WATERSHED: <u>Gunnison</u>		WATER DIVISION: <u>4</u>		DOW WATER CODE: <u>44892</u>		
MAP(S):	USGS: <u>UTM Zone 13S 286542</u>		USFS: <u>4239043</u>				

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	TAPE TENSION: <u>surveyed</u> lbs			
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel to 1-foot boulder</u>			PHOTOGRAPHS TAKEN: <u>0</u> YES/NO	NUMBER OF PHOTOGRAPHS: <u>3</u>			

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)	SKETCH	LEGEND:
⊗ Tape @ Stake LB	0.0	<u>surveyed</u>		
⊗ Tape @ Stake RB	0.0	<u>surveyed</u>		
① WS @ Tape LB/RB	0.0 <u>20.0</u>	<u>7.35 / 7.35</u>		
② WS Upstream	<u>14.0</u>	<u>7.25</u>		
③ WS Downstream	<u>2.9</u>	<u>7.38</u>		
SLOPE: <u>0.13 / 16.9' = .0076</u>				

TAPE

①

②

③

9.5

47

Stake ⊗

Station ①

Photo ①

Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: <u>YES/NO</u>	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
<u>see separate survey results</u>																	
AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME:																	

COMMENTS

<u>Cond = 55</u>
<u>Temp = 15°C</u>

DISCHARGE/CROSS SECTION NOTES

DISCHARGE / CROSS SECTION						CROSS-SECTION NO.: 1	DATE: 6-28-17	SHEET ____ OF ____		
STREAM NAME: East Fork Little Cinnamon River		EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE)		LEFT / RIGHT	Gage Reading: _____ ft	TIME: 1:40 pm				
BEGINNING OF MEASUREMENT	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point Mean in Vertical	Area (ft ²)	Discharge (cfs)
RS&G	0.0		6.02							
	3.0		6.84							
	5.0		7.38							
RW	9.5		7.35							
	11.6		7.59	.24				.27		
	11.9		7.53	.18				.47		
	12.2		7.57	.22				.30		
	12.5		7.59	.24				.09		
	12.8		7.61	.26				.04		
	13.1		7.62	.27				.03		
	13.4		7.52	.17				.28		
	13.7		7.54	.19				.33		
	14		7.70	.35				.56		
	14.3		7.69	.34				.51		
	14.6		7.71	.36				.31		
	14.9		7.49	.14				1.03		
	15.2		7.49	.14				1.16		
	15.5		7.83	.48				0.75		
	15.8		7.83	.48				0.65		
	16.1		7.82	.47				1.14		
	16.4		7.72	.37				1.36		
	16.7		7.78	.43				1.02		
	17.0		7.73	.38				1.50		
	17.3		7.56	.21				1.12		
	17.6		7.57	.22				1.43		
	18		7.68	.33				1.44		
	18.3		7.83	.48				.05		
	18.6		7.67	.32				.43		
	18.9		7.61	.26				.46		
	19.5		7.58	.23				.74		
LW	20.0		7.35	φ				φ		
	22.0		7.02							
G	23.7		6.05							
LS	24.7		5.60							
TOTALS:										
End of Measurement	Time:	Gage Reading: _____ ft		CALCULATIONS PERFORMED BY:				CALCULATIONS CHECKED BY:		

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

LOCATION INFORMATION

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 1

DATE: 28-Jun-17
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
SECTION: 33
TWP: 47N
RANGE: 5W
PM: N.M.

COUNTY: Gunnison
WATERSHED: Gunnison
DIVISION: 4
DOW CODE: 44892

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: 0.0076

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 1

DATA POINTS= 34

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1 RS & G	0.00	6.02			0.00		0.00	0.00	0.0%
	3.00	6.84			0.00		0.00	0.00	0.0%
	5.00	7.38			0.00		0.00	0.00	0.0%
RW	9.50	7.35	0.00	0.00	0.00		0.00	0.00	0.0%
	11.60	7.59	0.24	0.27	2.11	0.24	0.29	0.08	4.4%
	11.90	7.53	0.18	0.47	0.31	0.18	0.05	0.03	1.4%
	12.20	7.57	0.22	0.30	0.30	0.22	0.07	0.02	1.1%
	12.50	7.59	0.24	0.09	0.30	0.24	0.07	0.01	0.4%
	12.80	7.61	0.26	0.04	0.30	0.26	0.08	0.00	0.2%
	13.10	7.62	0.27	0.03	0.30	0.27	0.08	0.00	0.1%
	13.40	7.52	0.17	0.28	0.32	0.17	0.05	0.01	0.8%
	13.70	7.54	0.19	0.33	0.30	0.19	0.06	0.02	1.1%
	14.00	7.70	0.35	0.56	0.34	0.35	0.11	0.06	3.3%
	14.30	7.69	0.34	0.51	0.30	0.34	0.10	0.05	3.0%
	14.60	7.71	0.36	0.31	0.30	0.36	0.11	0.03	1.9%
	14.90	7.49	0.14	1.03	0.37	0.14	0.04	0.04	2.5%
	15.20	7.49	0.14	1.16	0.30	0.14	0.04	0.05	2.8%
	15.50	7.83	0.48	0.75	0.45	0.48	0.14	0.11	6.1%
	15.80	7.83	0.48	0.65	0.30	0.48	0.14	0.09	5.3%
	16.10	7.82	0.47	1.14	0.30	0.47	0.14	0.16	9.1%
	16.40	7.72	0.37	1.36	0.32	0.37	0.11	0.15	8.6%
	16.70	7.78	0.43	1.02	0.31	0.43	0.13	0.13	7.5%
	17.00	7.73	0.38	1.50	0.30	0.38	0.11	0.17	9.7%
	17.30	7.56	0.21	1.12	0.34	0.21	0.06	0.07	4.0%
	17.60	7.57	0.22	1.43	0.30	0.22	0.08	0.11	6.2%
	18.00	7.68	0.33	1.44	0.41	0.33	0.12	0.17	9.4%
	18.30	7.83	0.48	0.05	0.34	0.48	0.14	0.01	0.4%
	18.60	7.67	0.32	0.43	0.34	0.32	0.10	0.04	2.3%
	18.90	7.61	0.26	0.46	0.31	0.26	0.12	0.05	3.1%
	19.50	7.58	0.23	0.74	0.60	0.23	0.13	0.09	5.3%
LW	20.00	7.35	0.00	0.00	0.55		0.00	0.00	0.0%
	22.00	7.02			0.00		0.00	0.00	0.0%
1 G	23.70	6.05			0.00		0.00	0.00	0.0%
LS	24.70	5.60			0.00		0.00	0.00	0.0%

TOTALS -----

11.03	0.48	2.67	1.76	100.0%
(Max.)				

Manning's n = 0.0761
 Hydraulic Radius= 0.24197974

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	2.67	2.74	2.6%
7.10	2.67	6.82	155.6%
7.12	2.67	6.47	142.5%
7.14	2.67	6.13	129.6%
7.16	2.67	5.78	116.8%
7.18	2.67	5.45	104.2%
7.20	2.67	5.11	91.7%
7.22	2.67	4.78	79.3%
7.24	2.67	4.46	67.1%
7.26	2.67	4.14	55.0%
7.28	2.67	3.82	43.1%
7.30	2.67	3.50	31.4%
7.31	2.67	3.35	25.5%
7.32	2.67	3.19	19.7%
7.33	2.67	3.04	14.0%
7.34	2.67	2.89	8.3%
7.35	2.67	2.74	2.6%
7.36	2.67	2.59	-2.8%
7.37	2.67	2.47	-7.5%
7.38	2.67	2.36	-11.6%
7.39	2.67	2.26	-15.4%
7.40	2.67	2.16	-19.2%
7.42	2.67	1.96	-26.5%
7.44	2.67	1.77	-33.8%
7.46	2.67	1.58	-40.8%
7.48	2.67	1.40	-47.7%
7.50	2.67	1.22	-54.3%
7.52	2.67	1.05	-60.6%
7.54	2.67	0.89	-66.6%
7.56	2.67	0.75	-72.0%
7.58	2.67	0.62	-76.7%
7.60	2.67	0.52	-80.7%

WATERLINE AT ZERO

AREA ERROR = 7.355

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 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	6.05	23.59	1.21	1.78	28.59	24.58	100.0%	1.16	53.82	1.88
	6.35	21.94	0.99	1.48	21.65	22.81	92.8%	0.95	35.59	1.64
	6.40	21.67	0.95	1.43	20.56	22.52	91.6%	0.91	32.94	1.60
	6.45	21.40	0.91	1.38	19.48	22.23	90.4%	0.88	30.38	1.56
	6.50	21.13	0.87	1.33	18.42	21.94	89.2%	0.84	27.91	1.51
	6.55	20.86	0.83	1.28	17.37	21.64	88.1%	0.80	25.53	1.47
	6.60	20.59	0.79	1.23	16.34	21.35	86.9%	0.76	23.25	1.42
	6.65	20.32	0.75	1.18	15.31	21.06	85.7%	0.73	21.07	1.38
	6.70	20.05	0.71	1.13	14.30	20.77	84.5%	0.69	18.98	1.33
	6.75	19.78	0.67	1.08	13.31	20.48	83.3%	0.65	16.99	1.28
	6.80	19.51	0.63	1.03	12.33	20.19	82.2%	0.61	15.10	1.22
	6.85	19.23	0.59	0.98	11.36	19.90	81.0%	0.57	13.30	1.17
	6.90	18.96	0.55	0.93	10.40	19.61	79.8%	0.53	11.60	1.12
	6.95	18.69	0.51	0.88	9.46	19.32	78.6%	0.49	10.01	1.06
	7.00	18.42	0.46	0.83	8.53	19.02	77.4%	0.45	8.51	1.00
	7.05	17.99	0.42	0.78	7.62	18.59	75.6%	0.41	7.16	0.94
	7.10	17.50	0.38	0.73	6.74	18.09	73.6%	0.37	5.93	0.88
	7.15	17.02	0.35	0.68	5.87	17.59	71.6%	0.33	4.81	0.82
	7.20	16.53	0.30	0.63	5.03	17.09	69.5%	0.29	3.79	0.75
	7.25	16.04	0.26	0.58	4.22	16.59	67.5%	0.25	2.88	0.68
	7.30	15.55	0.22	0.53	3.43	16.09	65.5%	0.21	2.08	0.61
WL	7.35	14.31	0.19	0.48	2.67	14.84	60.4%	0.18	1.44	0.54
	7.40	9.90	0.21	0.43	2.11	10.41	42.4%	0.20	1.24	0.59
	7.45	9.35	0.17	0.38	1.63	9.85	40.1%	0.17	0.83	0.51
	7.50	8.48	0.14	0.33	1.18	8.95	36.4%	0.13	0.52	0.44
	7.55	7.07	0.11	0.28	0.78	7.48	30.4%	0.10	0.30	0.38
	7.60	4.54	0.11	0.23	0.49	4.86	19.8%	0.10	0.18	0.37
	7.65	3.31	0.09	0.18	0.31	3.55	14.4%	0.09	0.10	0.33
	7.70	2.22	0.07	0.13	0.16	2.38	9.7%	0.07	0.04	0.28
	7.75	1.43	0.05	0.08	0.07	1.52	6.2%	0.04	0.01	0.21
	7.80	0.77	0.02	0.03	0.02	0.79	3.2%	0.02	0.00	0.12

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.76 cfs
CALCULATED FLOW (Qc)=	1.44 cfs
(Qm-Qc)/Qm * 100 =	18.1 %
MEASURED WATERLINE (WLm)=	7.35 ft
CALCULATED WATERLINE (WLc)=	7.35 ft
(WLm-WLc)/WLm * 100 =	-0.1 %
MAX MEASURED DEPTH (Dm)=	0.48 ft
MAX CALCULATED DEPTH (Dc)=	0.48 ft
(Dm-Dc)/Dm * 100	1.0 %
MEAN VELOCITY=	0.54 ft/sec
MANNING'S N=	0.076
SLOPE=	0.0076 ft/ft
.4 * Qm =	0.7 cfs
2.5 * Qm=	4.4 cfs

RECOMMENDED INSTREAM FLOW:
=====

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

RATIONALE FOR RECOMMENDATION:
=====

[illegible]

RECOMMENDATION BY: AGENCY DATE:

CWCB REVIEW BY: DATE:

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 1

Jarrett Variable Manning's n Correction Applied

GL = lowest Grassline elevation corrected for sag

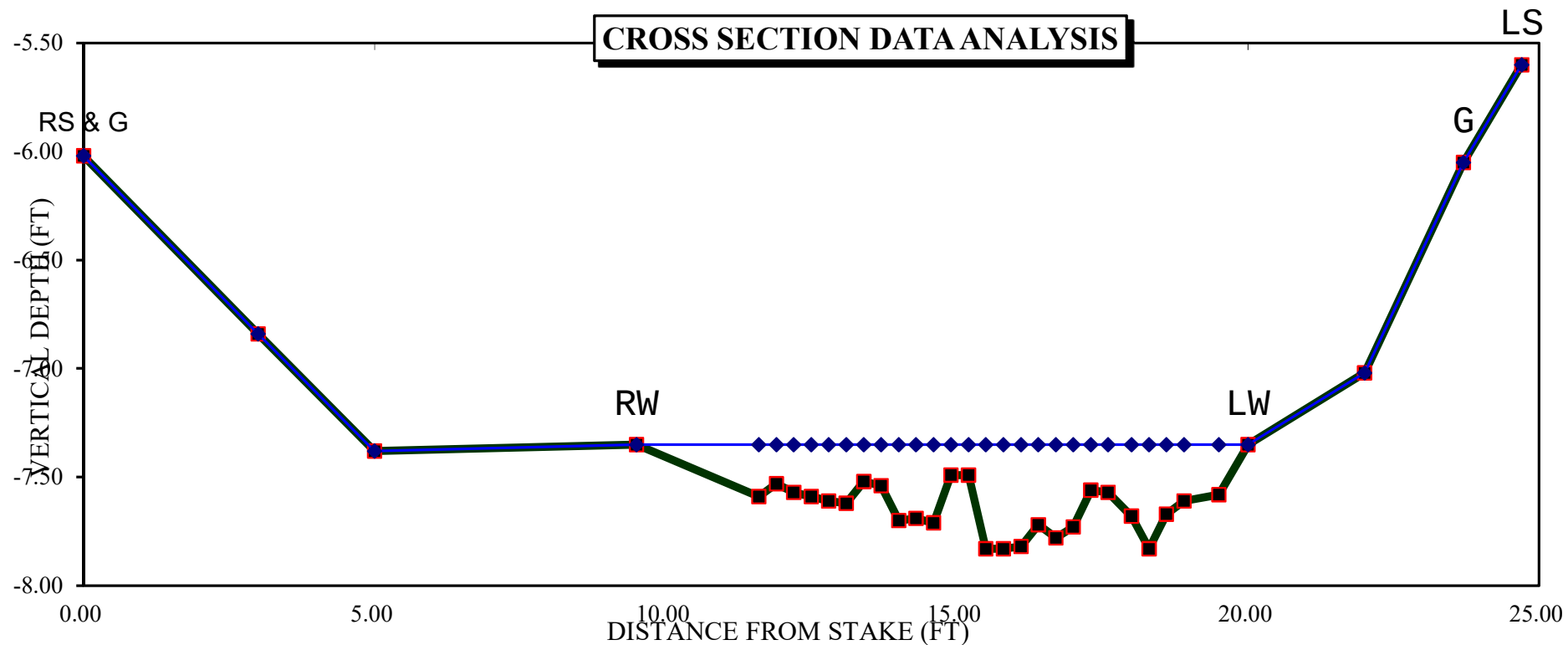
STAGING TABLE

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

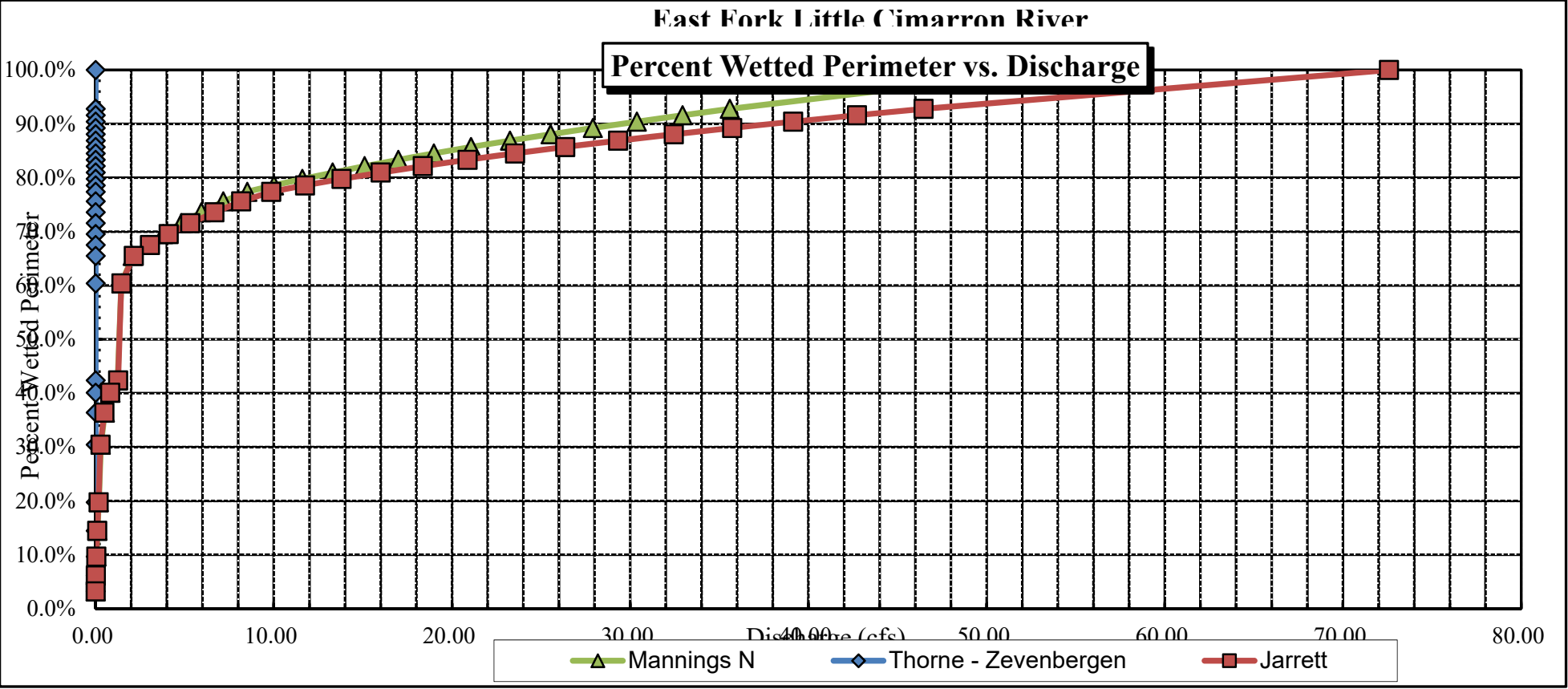
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	6.05	23.59	1.21	1.78	28.59	24.58	100.0%	1.16	72.57	2.54
	6.35	21.94	0.99	1.48	21.65	22.81	92.8%	0.95	46.46	2.15
	6.40	21.67	0.95	1.43	20.56	22.52	91.6%	0.91	42.73	2.08
	6.45	21.40	0.91	1.38	19.48	22.23	90.4%	0.88	39.14	2.01
	6.50	21.13	0.87	1.33	18.42	21.94	89.2%	0.84	35.72	1.94
	6.55	20.86	0.83	1.28	17.37	21.64	88.1%	0.80	32.44	1.87
	6.60	20.59	0.79	1.23	16.34	21.35	86.9%	0.76	29.32	1.79
	6.65	20.32	0.75	1.18	15.31	21.06	85.7%	0.73	26.35	1.72
	6.70	20.05	0.71	1.13	14.30	20.77	84.5%	0.69	23.54	1.65
	6.75	19.78	0.67	1.08	13.31	20.48	83.3%	0.65	20.87	1.57
	6.80	19.51	0.63	1.03	12.33	20.19	82.2%	0.61	18.36	1.49
	6.85	19.23	0.59	0.98	11.36	19.90	81.0%	0.57	16.00	1.41
	6.90	18.96	0.55	0.93	10.40	19.61	79.8%	0.53	13.80	1.33
	6.95	18.69	0.51	0.88	9.46	19.32	78.6%	0.49	11.75	1.24
	7.00	18.42	0.46	0.83	8.53	19.02	77.4%	0.45	9.85	1.15
	7.05	17.99	0.42	0.78	7.62	18.59	75.6%	0.41	8.17	1.07
	7.10	17.50	0.38	0.73	6.74	18.09	73.6%	0.37	6.67	0.99
	7.15	17.02	0.35	0.68	5.87	17.59	71.6%	0.33	5.31	0.90
	7.20	16.53	0.30	0.63	5.03	17.09	69.5%	0.29	4.10	0.82
	7.25	16.04	0.26	0.58	4.22	16.59	67.5%	0.25	3.05	0.72
	7.30	15.55	0.22	0.53	3.43	16.09	65.5%	0.21	2.14	0.62
WL	7.35	14.31	0.19	0.48	2.67	14.84	60.4%	0.18	1.44	0.54
	7.40	9.90	0.21	0.43	2.11	10.41	42.4%	0.20	1.26	0.60
	7.45	9.35	0.17	0.38	1.63	9.85	40.1%	0.17	0.82	0.51
	7.50	8.48	0.14	0.33	1.18	8.95	36.4%	0.13	0.49	0.42
	7.55	7.07	0.11	0.28	0.78	7.48	30.4%	0.10	0.27	0.35
	7.60	4.54	0.11	0.23	0.49	4.86	19.8%	0.10	0.17	0.34
	7.65	3.31	0.09	0.18	0.31	3.55	14.4%	0.09	0.09	0.29
	7.70	2.22	0.07	0.13	0.16	2.38	9.7%	0.07	0.04	0.24
	7.75	1.43	0.05	0.08	0.07	1.52	6.2%	0.04	0.01	0.17
	7.80	0.77	0.02	0.03	0.02	0.79	3.2%	0.02	0.00	0.09

Fast Fork Little Cimarron River

CROSS SECTION DATA ANALYSIS

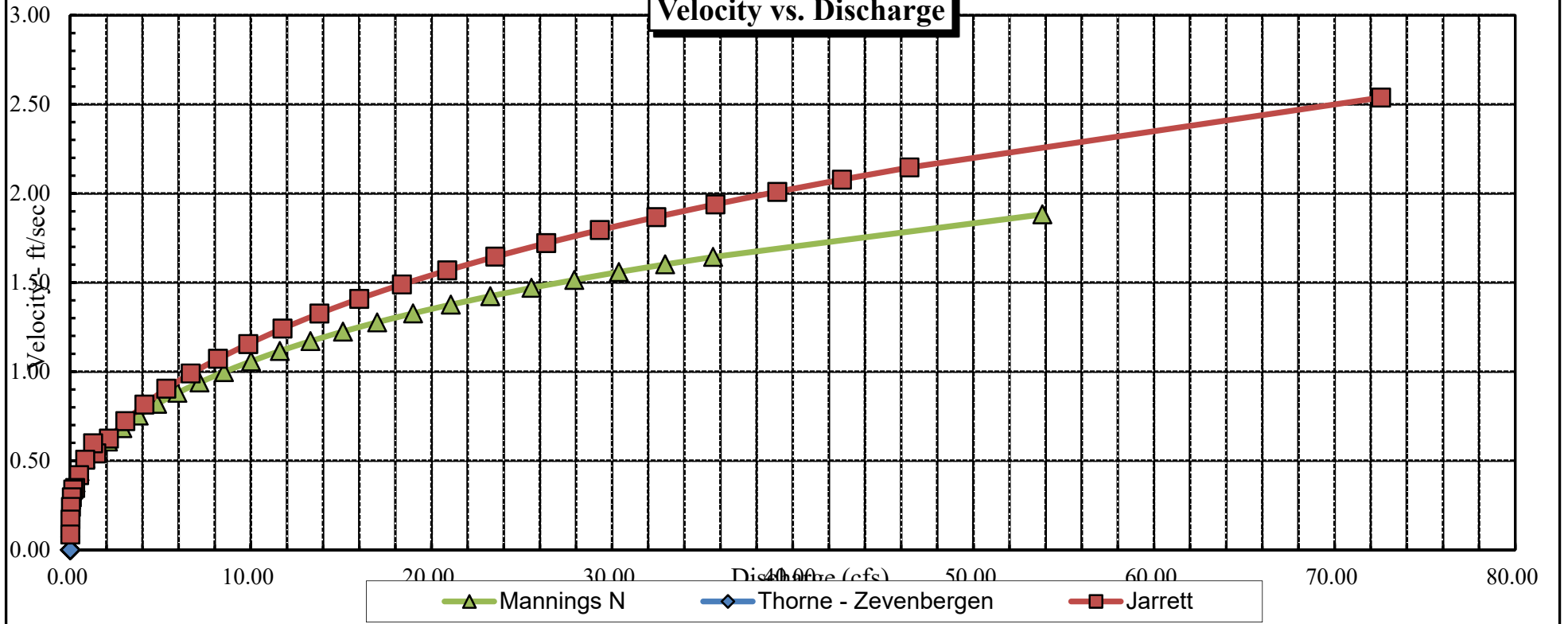


Channel Bottom Computed Water Line



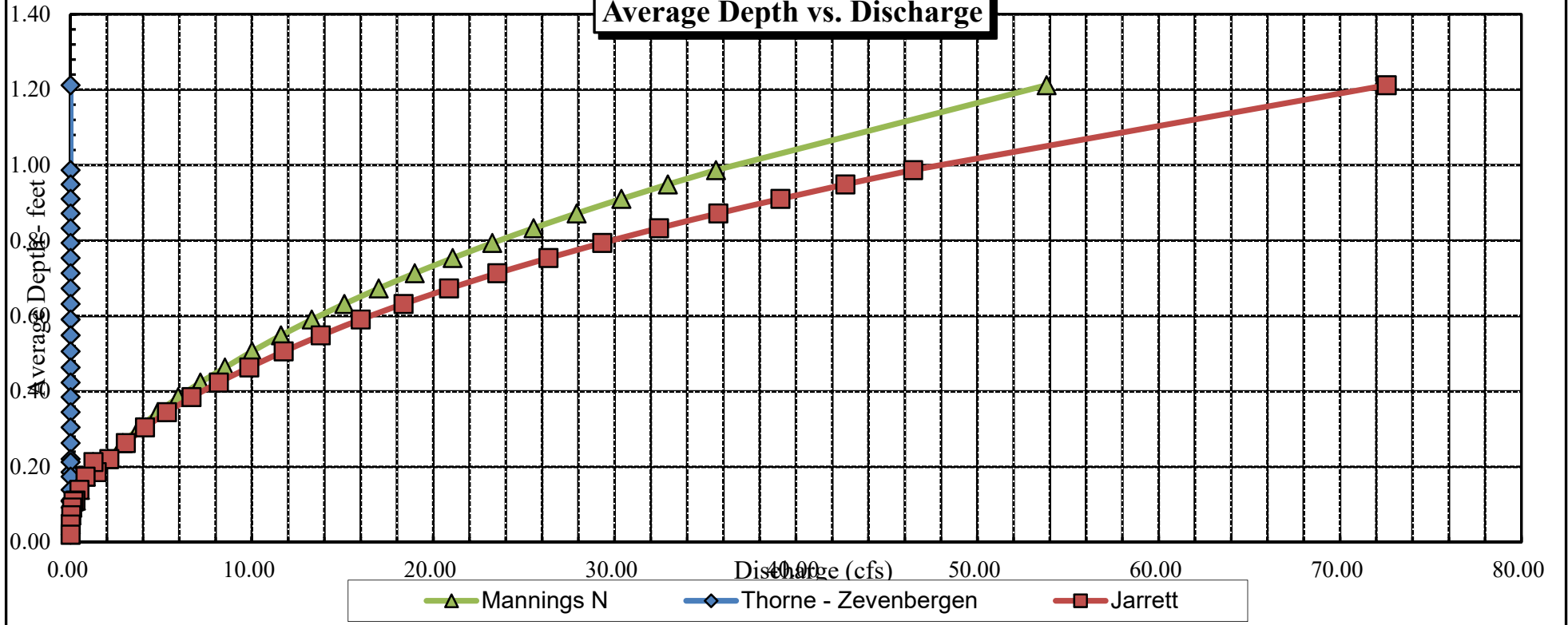
East Fork Little Cimarron River

Velocity vs. Discharge



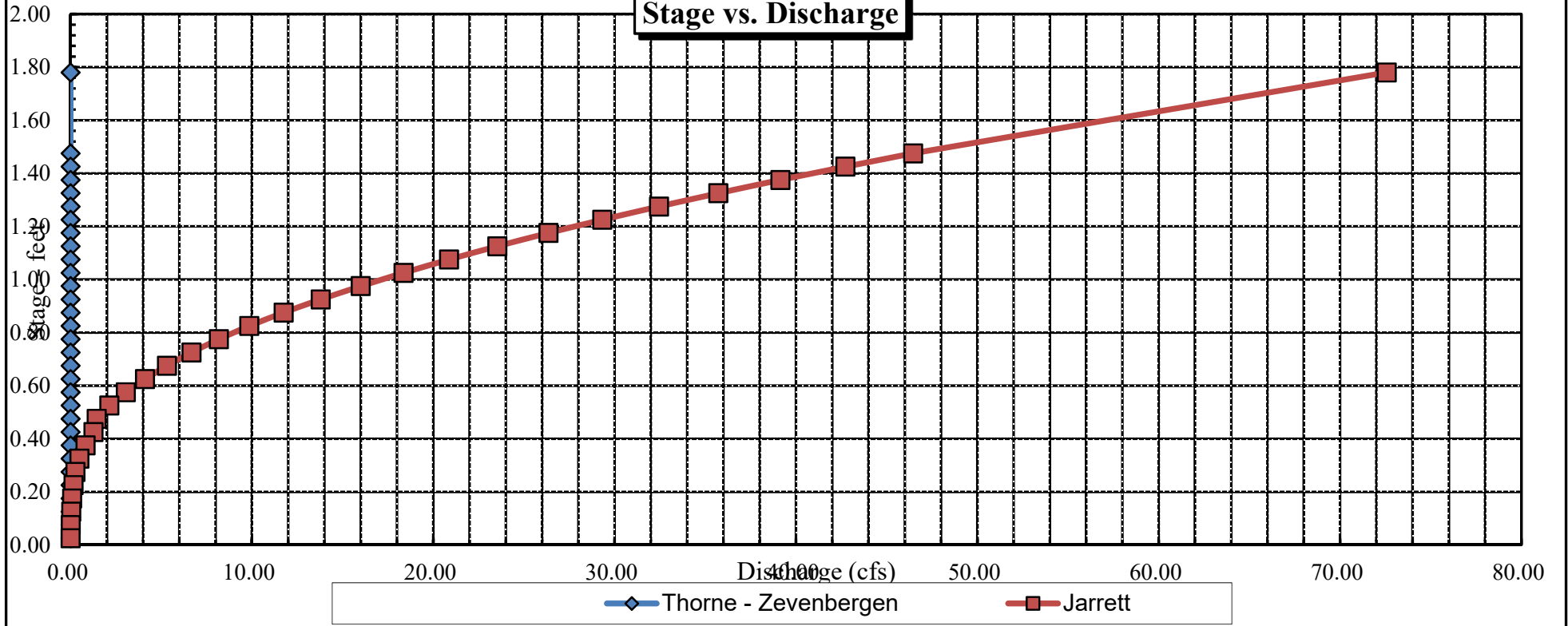
East Fork Little Cimarron River

Average Depth vs. Discharge



East Fork Little Cimarron River

Stage vs. Discharge



Data Input & Proofing

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 1
 DATE: 6/28/2017
 OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
 SECTION: 33
 TWP: 47N
 RANGE: 5W
 PM: N.M.

COUNTY: Gunnison
 WATERSHED: Gunnison
 DIVISION: 4
 DOW CODE: 44892
 USGS MAP:
 USFS MAP:

TAPE WT: 0.0106 lbs / ft
 TENSION: 99999 lbs

SLOPE: 0.0076 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 = 34								
1	RS & G	0.00	6.02			0.00	0.00	0.00
		3.00	6.84			0.00	0.00	0.00
		5.00	7.38			0.00	0.00	0.00
		9.50	7.35	0.00	0.00	0.00	0.00	0.00
		11.60	7.59	0.24	0.27	0.29	0.08	7.35
		11.90	7.53	0.18	0.47	0.05	0.03	7.35
		12.20	7.57	0.22	0.30	0.07	0.02	7.35
		12.50	7.59	0.24	0.09	0.07	0.01	7.35
		12.80	7.61	0.26	0.04	0.08	0.00	7.35
		13.10	7.62	0.27	0.03	0.08	0.00	7.35
		13.40	7.52	0.17	0.28	0.05	0.01	7.35
		13.70	7.54	0.19	0.33	0.06	0.02	7.35
		14.00	7.70	0.35	0.56	0.11	0.06	7.35
		14.30	7.69	0.34	0.51	0.10	0.05	7.35
		14.60	7.71	0.36	0.31	0.11	0.03	7.35
		14.90	7.49	0.14	1.03	0.04	0.04	7.35
		15.20	7.49	0.14	1.16	0.04	0.05	7.35
		15.50	7.83	0.48	0.75	0.14	0.11	7.35
		15.80	7.83	0.48	0.65	0.14	0.09	7.35
		16.10	7.82	0.47	1.14	0.14	0.16	7.35
		16.40	7.72	0.37	1.36	0.11	0.15	7.35
		16.70	7.78	0.43	1.02	0.13	0.13	7.35
		17.00	7.73	0.38	1.50	0.11	0.17	7.35
		17.30	7.56	0.21	1.12	0.06	0.07	7.35
		17.60	7.57	0.22	1.43	0.08	0.11	7.35
1	LW	18.00	7.68	0.33	1.44	0.12	0.17	7.35
		18.30	7.83	0.48	0.05	0.14	0.01	7.35
		18.60	7.67	0.32	0.43	0.10	0.04	7.35
		18.90	7.61	0.26	0.46	0.12	0.05	7.35
		19.50	7.58	0.23	0.74	0.13	0.09	7.35
		20.00	7.35	0.00	0.00	0.00	0.00	0.00
		22.00	7.02			0.00	0.00	0.00
		23.70	6.05			0.00	0.00	0.00
	LS	24.70	5.60			0.00	0.00	0.00

Totals	2.67	1.76
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COLORADO WATER
CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



LOCATION INFORMATION

STREAM NAME: <u>East Fork Little Cimarron River</u>							CROSS-SECTION NO.: <u>2</u>
CROSS-SECTION LOCATION: <u>At BLM-private boundary</u>							
DATE: <u>6-28-17</u>	OBSERVERS: <u>R. Smith, A. Breibart</u>						
LEGAL DESCRIPTION	% SECTION: <u>SW</u>	SECTION: <u>33</u>	TOWNSHIP: <u>47(N)S</u>	RANGE: <u>5 E(W)</u>	PM: <u>NM</u>		
COUNTY: <u>Gunnison</u>	WATERSHED: <u>Gunnison R.</u>		WATER DIVISION: <u>4</u>	DOW WATER CODE: <u>44892</u>			
MAP(S):	USGS: <u>UTM Zone 286549</u>		USFS: <u>13 4238979</u>				

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	TAPE TENSION: <u>surveyed</u> lbs
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel to 1-foot boulder</u>		PHOTOGRAPHS TAKEN: ☒ YES / NO	NUMBER OF PHOTOGRAPHS: <u>3</u>	

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)	S K E T C H 	LEGEND: Stake (X) Station (1) Photo (1) → Direction of Flow ← →
(X) Tape @ Stake LB	0.0	<u>surveyed</u>		
(X) Tape @ Stake RB	0.0	<u>surveyed</u>		
(1) WS @ Tape LB/RB	0.0	<u>4.75 / 4.75</u>		
(2) WS Upstream	<u>10.0</u>	<u>4.62</u>		
(3) WS Downstream	<u>10.7</u>	<u>4.85</u>		
SLOPE: <u>0.23 ÷ 20.7 = .011</u>				

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
<u>see separate survey results</u>																	
AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME:																	

COMMENTS

Cond. = 55
Temp = 15°C

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: East Fork Little Cimarron River
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 2

DATE: 28-Jun-17
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
SECTION: 33
TWP: 47N
RANGE: 5W
PM: N.M.

COUNTY: Gunnison
WATERSHED: Gunnison
DIVISION: 4
DOW CODE: 44892

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: 0.011

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

DATA POINTS= 30

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
RS	0.00	3.38		
1 G	3.20	3.95		
	3.60	4.00		
	6.00	4.54		
RW	6.50	4.75	0.00	0.00
	6.70	4.75	0.00	0.00
	7.30	5.12	0.37	0.10
	7.70	5.13	0.38	0.35
	8.10	5.23	0.48	0.24
	8.30	5.21	0.46	0.49
	8.60	5.22	0.47	0.32
	8.90	5.17	0.42	0.36
	9.20	5.31	0.56	0.30
	9.50	5.35	0.60	0.66
	9.80	5.40	0.65	0.70
	10.10	5.29	0.54	1.23
	10.40	5.28	0.53	2.21
	10.70	5.24	0.49	1.96
	11.00	5.05	0.30	2.35
	11.30	5.01	0.26	1.96
	11.60	4.97	0.22	2.43
	11.90	4.95	0.20	2.30
	12.20	4.94	0.19	1.98
	12.50	4.94	0.19	0.47
	12.80	4.92	0.17	0.22
LW	13.30	4.75	0.00	0.00
	15.00	4.45		
1 G	15.70	3.95		
	16.90	3.60		
LS	18.50	3.26		

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%
0.70	0.37	0.19	0.02	0.8%
0.40	0.38	0.15	0.05	2.4%
0.41	0.48	0.14	0.03	1.6%
0.20	0.46	0.12	0.06	2.5%
0.30	0.47	0.14	0.05	2.0%
0.30	0.42	0.13	0.05	2.0%
0.33	0.56	0.17	0.05	2.3%
0.30	0.60	0.18	0.12	5.4%
0.30	0.65	0.20	0.14	6.2%
0.32	0.54	0.16	0.20	9.0%
0.30	0.53	0.16	0.35	15.9%
0.30	0.49	0.15	0.29	13.0%
0.36	0.30	0.09	0.21	9.5%
0.30	0.26	0.08	0.15	6.9%
0.30	0.22	0.07	0.16	7.2%
0.30	0.20	0.06	0.14	6.2%
0.30	0.19	0.06	0.11	5.1%
0.30	0.19	0.06	0.03	1.2%
0.30	0.17	0.07	0.01	0.7%
0.53		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 -----

6.87	0.65	2.35	2.21	100.0%
(Max.)				

Manning's n = 0.0809
 Hydraulic Radius= 0.34192375

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	2.35	2.35	0.0%
4.50	2.35	4.30	83.1%
4.52	2.35	4.13	75.6%
4.54	2.35	3.96	68.3%
4.56	2.35	3.79	61.2%
4.58	2.35	3.62	54.1%
4.60	2.35	3.46	47.3%
4.62	2.35	3.30	40.5%
4.64	2.35	3.15	33.9%
4.66	2.35	2.99	27.4%
4.68	2.35	2.85	21.1%
4.70	2.35	2.70	14.9%
4.71	2.35	2.63	11.8%
4.72	2.35	2.56	8.8%
4.73	2.35	2.49	5.9%
4.74	2.35	2.42	2.9%
4.75	2.35	2.35	0.0%
4.76	2.35	2.28	-2.8%
4.77	2.35	2.22	-5.6%
4.78	2.35	2.15	-8.3%
4.79	2.35	2.09	-11.1%
4.80	2.35	2.03	-13.8%
4.82	2.35	1.90	-19.2%
4.84	2.35	1.77	-24.5%
4.86	2.35	1.65	-29.7%
4.88	2.35	1.53	-34.9%
4.90	2.35	1.41	-39.9%
4.92	2.35	1.29	-44.9%
4.94	2.35	1.18	-49.8%
4.96	2.35	1.08	-53.9%
4.98	2.35	0.99	-57.8%
5.00	2.35	0.90	-61.5%

WATERLINE AT ZERO

AREA ERROR = 4.750

STREAM NAME: East Fork Little Cimarron River
 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	3.95	12.50	0.82	1.45	10.20	13.06	100.0%	0.78	16.66	1.63
	3.95	12.50	0.82	1.45	10.20	13.06	100.0%	0.78	16.66	1.63
	4.00	12.03	0.80	1.40	9.58	12.58	96.3%	0.76	15.41	1.61
	4.05	11.74	0.77	1.35	8.99	12.26	93.9%	0.73	14.08	1.57
	4.10	11.45	0.73	1.30	8.41	11.95	91.5%	0.70	12.82	1.53
	4.15	11.15	0.70	1.25	7.84	11.63	89.1%	0.67	11.62	1.48
	4.20	10.86	0.67	1.20	7.29	11.32	86.6%	0.64	10.49	1.44
	4.25	10.57	0.64	1.15	6.76	11.01	84.2%	0.61	9.41	1.39
	4.30	10.28	0.61	1.10	6.24	10.69	81.8%	0.58	8.39	1.35
	4.35	9.98	0.57	1.05	5.73	10.38	79.4%	0.55	7.43	1.30
	4.40	9.69	0.54	1.00	5.24	10.07	77.0%	0.52	6.53	1.25
	4.45	9.40	0.51	0.95	4.76	9.75	74.6%	0.49	5.69	1.20
	4.50	8.89	0.48	0.90	4.30	9.24	70.7%	0.47	4.98	1.16
	4.55	8.41	0.46	0.85	3.87	8.74	66.9%	0.44	4.34	1.12
	4.60	8.01	0.43	0.80	3.46	8.32	63.7%	0.42	3.72	1.07
	4.65	7.60	0.40	0.75	3.07	7.91	60.5%	0.39	3.15	1.03
	4.70	7.20	0.37	0.70	2.70	7.49	57.3%	0.36	2.64	0.98
WL	4.75	6.60	0.36	0.65	2.35	6.87	52.6%	0.34	2.21	0.94
	4.80	6.37	0.32	0.60	2.03	6.62	50.7%	0.31	1.77	0.88
	4.85	6.14	0.28	0.55	1.71	6.37	48.8%	0.27	1.38	0.80
	4.90	5.92	0.24	0.50	1.41	6.12	46.9%	0.23	1.02	0.72
	4.95	4.88	0.23	0.45	1.13	5.06	38.8%	0.22	0.80	0.71
	5.00	4.27	0.21	0.40	0.90	4.44	34.0%	0.20	0.60	0.67
	5.05	3.81	0.18	0.35	0.70	3.97	30.4%	0.18	0.43	0.61
	5.10	3.65	0.14	0.30	0.52	3.78	28.9%	0.14	0.26	0.51
	5.15	3.06	0.11	0.25	0.35	3.16	24.2%	0.11	0.15	0.44
	5.20	2.54	0.08	0.20	0.20	2.61	20.0%	0.08	0.07	0.35
	5.25	1.55	0.07	0.15	0.11	1.60	12.2%	0.07	0.03	0.32
	5.30	0.89	0.05	0.10	0.05	0.92	7.0%	0.05	0.01	0.26
	5.35	0.44	0.03	0.05	0.01	0.45	3.4%	0.02	0.00	0.16
	5.40	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	2.21 cfs
CALCULATED FLOW (Qc)=	2.21 cfs
(Qm-Qc)/Qm * 100 =	0.0 %
MEASURED WATERLINE (WLm)=	4.75 ft
CALCULATED WATERLINE (WLc)=	4.75 ft
(WLm-WLc)/WLm * 100 =	0.0 %
MAX MEASURED DEPTH (Dm)=	0.65 ft
MAX CALCULATED DEPTH (Dc)=	0.65 ft
(Dm-Dc)/Dm * 100	0.0 %
MEAN VELOCITY=	0.94 ft/sec
MANNING'S N=	0.081
SLOPE=	0.011 ft/ft
.4 * Qm =	0.9 cfs
2.5 * Qm=	5.5 cfs

RECOMMENDED INSTREAM FLOW:
=====[illegible]

RATIONALE FOR RECOMMENDATION:
=====

[illegible]

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

CWCB REVIEW BY: DATE:

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

Jarrett Variable Manning's n Correction Applied

GL = lowest Grassline elevation corrected for sag

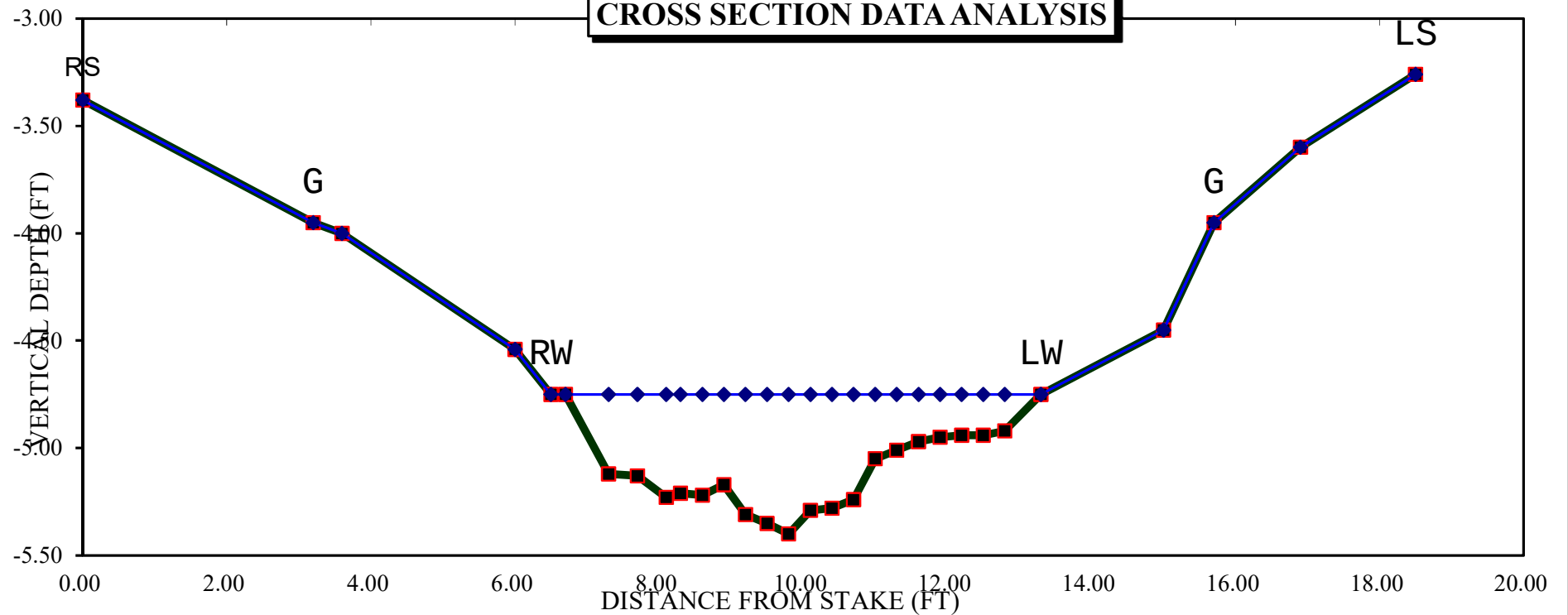
STAGING TABLE

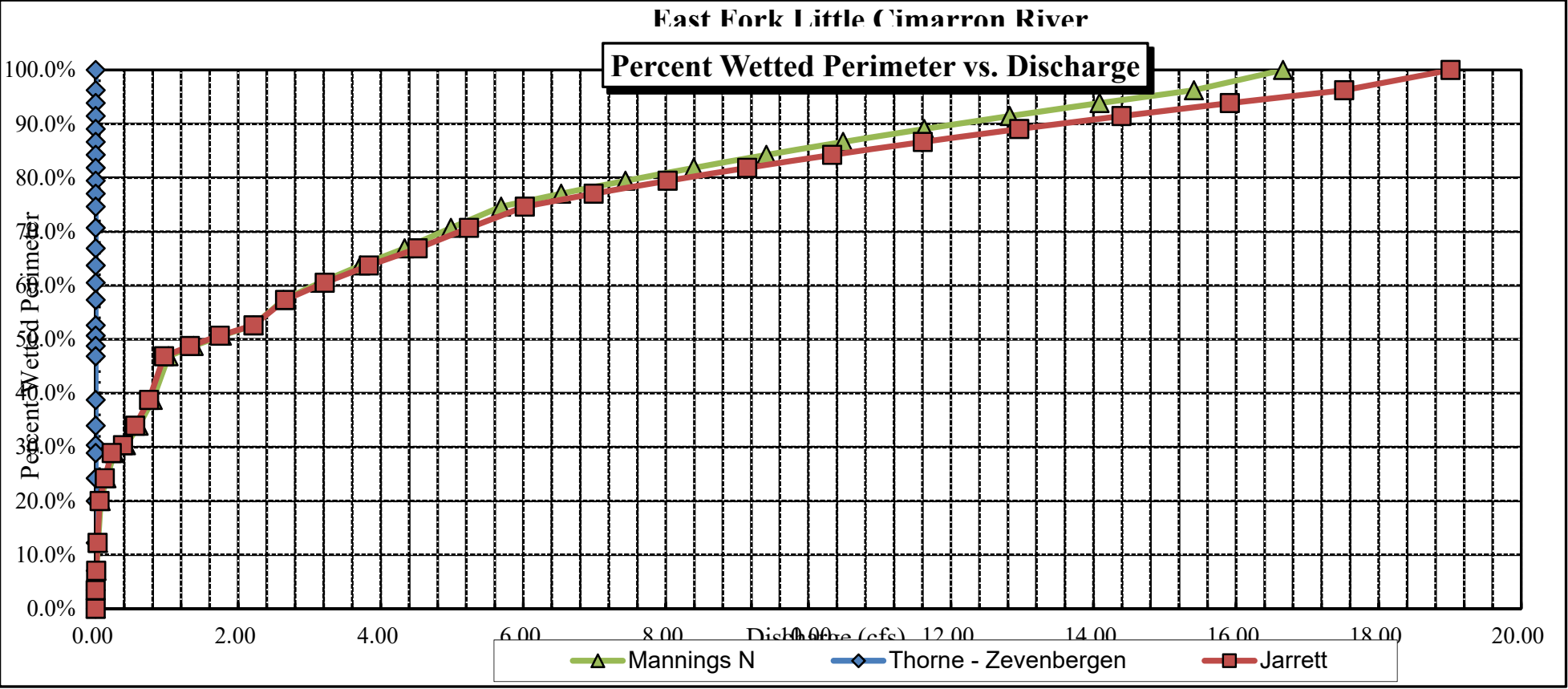
WL = Waterline corrected for variations in field measured water surface elevations and sag

	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	3.95	12.50	0.82	1.45	10.20	13.06	100.0%	0.78	19.01	1.86
	3.95	12.50	0.82	1.45	10.20	13.06	100.0%	0.78	19.01	1.86
	4.00	12.03	0.80	1.40	9.58	12.58	96.3%	0.76	17.52	1.83
	4.05	11.74	0.77	1.35	8.99	12.26	93.9%	0.73	15.91	1.77
	4.10	11.45	0.73	1.30	8.41	11.95	91.5%	0.70	14.39	1.71
	4.15	11.15	0.70	1.25	7.84	11.63	89.1%	0.67	12.96	1.65
	4.20	10.86	0.67	1.20	7.29	11.32	86.6%	0.64	11.61	1.59
	4.25	10.57	0.64	1.15	6.76	11.01	84.2%	0.61	10.33	1.53
	4.30	10.28	0.61	1.10	6.24	10.69	81.8%	0.58	9.14	1.47
	4.35	9.98	0.57	1.05	5.73	10.38	79.4%	0.55	8.02	1.40
	4.40	9.69	0.54	1.00	5.24	10.07	77.0%	0.52	6.99	1.33
	4.45	9.40	0.51	0.95	4.76	9.75	74.6%	0.49	6.02	1.27
	4.50	8.89	0.48	0.90	4.30	9.24	70.7%	0.47	5.24	1.22
	4.55	8.41	0.46	0.85	3.87	8.74	66.9%	0.44	4.52	1.17
	4.60	8.01	0.43	0.80	3.46	8.32	63.7%	0.42	3.83	1.11
	4.65	7.60	0.40	0.75	3.07	7.91	60.5%	0.39	3.21	1.05
	4.70	7.20	0.37	0.70	2.70	7.49	57.3%	0.36	2.66	0.98
WL	4.75	6.60	0.36	0.65	2.35	6.87	52.6%	0.34	2.21	0.94
	4.80	6.37	0.32	0.60	2.03	6.62	50.7%	0.31	1.74	0.86
	4.85	6.14	0.28	0.55	1.71	6.37	48.8%	0.27	1.32	0.77
	4.90	5.92	0.24	0.50	1.41	6.12	46.9%	0.23	0.96	0.68
	4.95	4.88	0.23	0.45	1.13	5.06	38.8%	0.22	0.75	0.66
	5.00	4.27	0.21	0.40	0.90	4.44	34.0%	0.20	0.56	0.61
	5.05	3.81	0.18	0.35	0.70	3.97	30.4%	0.18	0.38	0.55
	5.10	3.65	0.14	0.30	0.52	3.78	28.9%	0.14	0.23	0.44
	5.15	3.06	0.11	0.25	0.35	3.16	24.2%	0.11	0.13	0.37
	5.20	2.54	0.08	0.20	0.20	2.61	20.0%	0.08	0.06	0.28
	5.25	1.55	0.07	0.15	0.11	1.60	12.2%	0.07	0.03	0.25
	5.30	0.89	0.05	0.10	0.05	0.92	7.0%	0.05	0.01	0.19
	5.35	0.44	0.03	0.05	0.01	0.45	3.4%	0.02	0.00	0.11
	5.40	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

Fast Fork Little Cimarron River

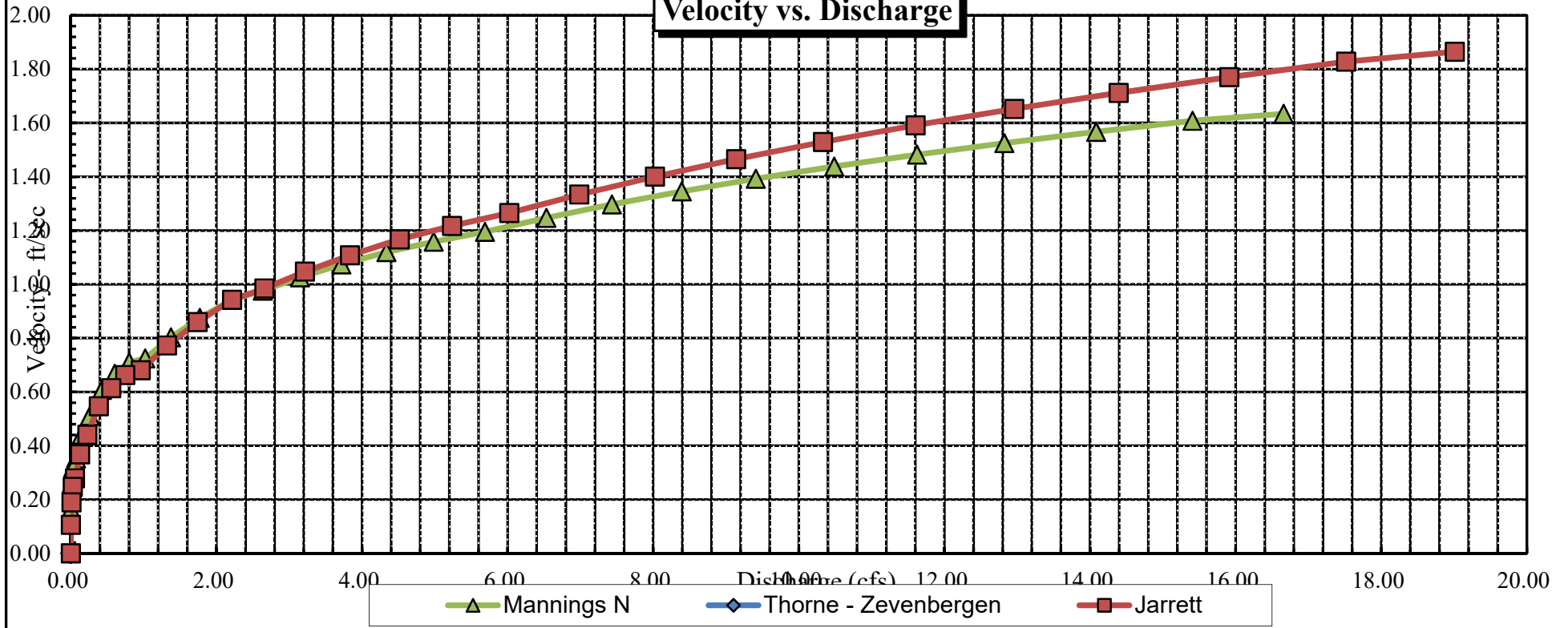
CROSS SECTION DATA ANALYSIS





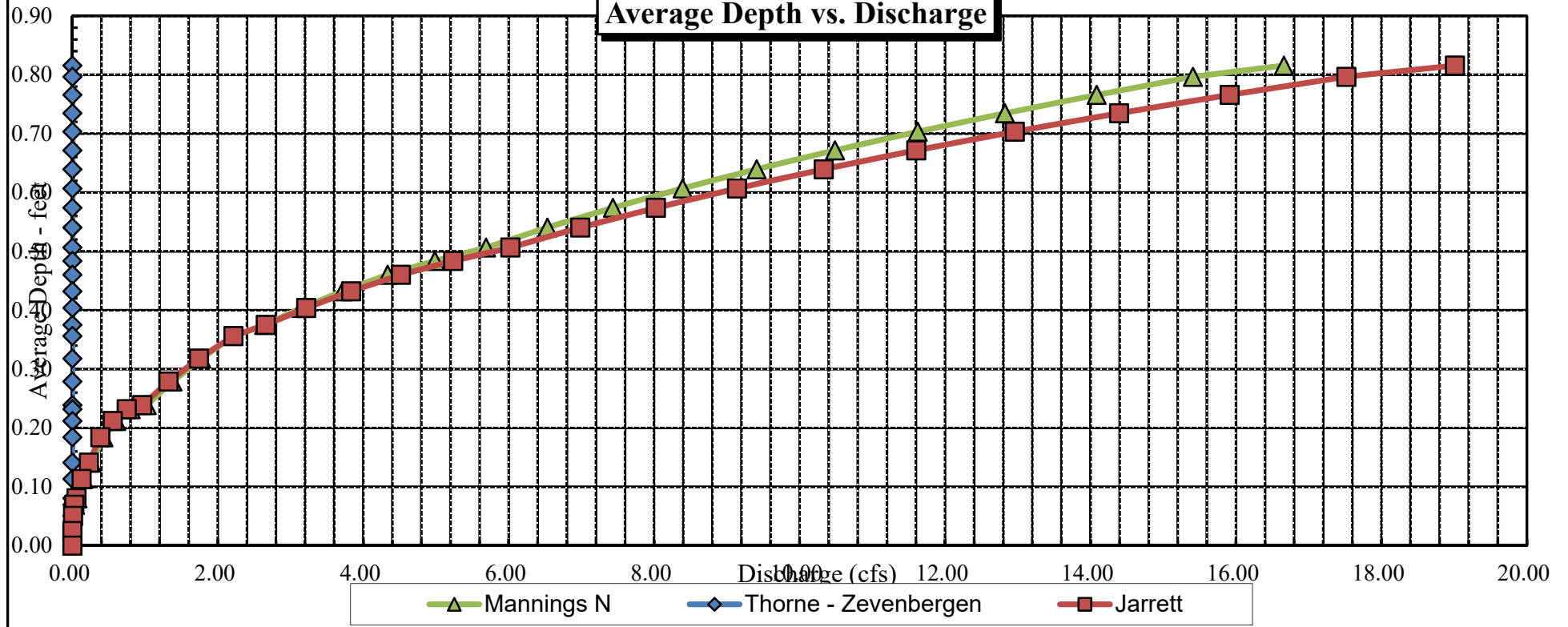
East Fork Little Cimarron River

Velocity vs. Discharge



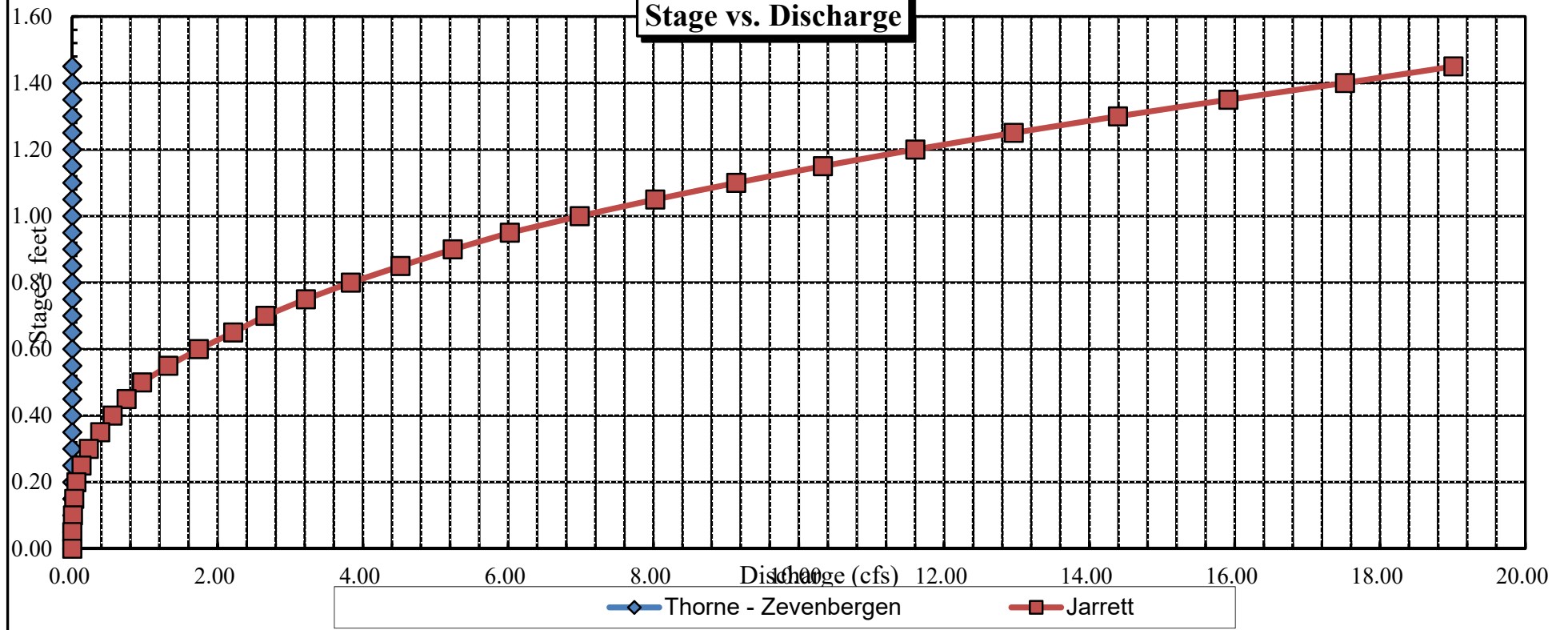
East Fork Little Cimarron River

Average Depth vs. Discharge



East Fork Little Cimarron River

Stage vs. Discharge



Data Input & Proofing

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2
 DATE: 6/28/2017
 OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
 SECTION: 33
 TWP: 47N
 RANGE: 5W
 PM: N.M.

COUNTY: Gunnison
 WATERSHED: Gunnison
 DIVISION: 4
 DOW CODE: 44892
 USGS MAP:
 USFS MAP:

TAPE WT: 0.0106 lbs / ft
 TENSION: 99999 lbs

SLOPE: 0.011 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 = 30								
1	RS	0.00	3.38			0.00	0.00	0.00
	G	3.20	3.95			0.00	0.00	0.00
		3.60	4.00			0.00	0.00	0.00
		6.00	4.54			0.00	0.00	0.00
	RW	6.50	4.75	0.00	0.00	0.00	0.00	0.00
		6.70	4.75	0.00	0.00	0.00	0.00	0.00
		7.30	5.12	0.37	0.10	0.19	0.02	4.75
		7.70	5.13	0.38	0.35	0.15	0.05	4.75
		8.10	5.23	0.48	0.24	0.14	0.03	4.75
		8.30	5.21	0.46	0.49	0.12	0.06	4.75
		8.60	5.22	0.47	0.32	0.14	0.05	4.75
		8.90	5.17	0.42	0.36	0.13	0.05	4.75
		9.20	5.31	0.56	0.30	0.17	0.05	4.75
		9.50	5.35	0.60	0.66	0.18	0.12	4.75
		9.80	5.40	0.65	0.70	0.20	0.14	4.75
		10.10	5.29	0.54	1.23	0.16	0.20	4.75
		10.40	5.28	0.53	2.21	0.16	0.35	4.75
		10.70	5.24	0.49	1.96	0.15	0.29	4.75
		11.00	5.05	0.30	2.35	0.09	0.21	4.75
		11.30	5.01	0.26	1.96	0.08	0.15	4.75
		11.60	4.97	0.22	2.43	0.07	0.16	4.75
		11.90	4.95	0.20	2.30	0.06	0.14	4.75
		12.20	4.94	0.19	1.98	0.06	0.11	4.75
		12.50	4.94	0.19	0.47	0.06	0.03	4.75
		12.80	4.92	0.17	0.22	0.07	0.01	4.75
	LW	13.30	4.75	0.00	0.00	0.00	0.00	0.00
		15.00	4.45			0.00	0.00	0.00
	G	15.70	3.95			0.00	0.00	0.00
		16.90	3.60			0.00	0.00	0.00

Totals	2.35	2.21
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FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: <u>East Fork Little Cimarron River</u>		CROSS-SECTION NO.: <u>1</u>	
CROSS-SECTION LOCATION: <u>At BLM-Private boundary</u>			
DATE: <u>7-12-16</u>	OBSERVERS: <u>R. Smith, A. Breibart</u>		
LEGAL DESCRIPTION	1/4 SECTION: <u>SW</u>	SECTION: <u>33</u>	TOWNSHIP: <u>47N/S</u>
COUNTY: <u>Gunnison</u>	WATERSHED: <u>Cimarron R.</u>	WATER DIVISION: <u>4</u>	RANGE: <u>5 E/W</u> PM: <u>NM</u>
USGS:		DOW WATER CODE: <u>44892</u>	
MAP(S):		USFS:	

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: <u>YES</u> NO	METER TYPE: <u>1111</u>			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: <u>surveyed</u> lbs/foot	TAPE TENSION: <u>surveyed</u> lbs
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel to 2-foot boulders</u>		PHOTOGRAPHS TAKEN: <u>YES</u> NO	NUMBER OF PHOTOGRAPHS: <u>3</u>	

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
① Tape @ Stake LB	0.0	<u>surveyed</u>
② Tape @ Stake RB	0.0	<u>surveyed</u>
③ WS @ Tape LB/RB	0.0 <u>10.8</u>	<u>5.75 / 5.75</u>
④ WS Upstream	<u>6.8</u>	<u>5.54</u>
⑤ WS Downstream	<u>5.0</u>	<u>5.77</u>
SLOPE	<u>0.23 / 11.8 = 0.019</u>	

SKETCH

LEGEND:

Stake (X)

Station (1)

Photo (1)

Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: <u>YES</u> NO	DISTANCE ELECTROFISHED: _____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: <u>YES</u> 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

<u>pH = 6.22</u>
<u>Temp = 10.9°C</u>
<u>Cond = 51</u>
<u>Salinity = 0.0</u>

[illegible]

CALCULATIONS PERFORMED BY:

CALCULATIONS CHECKED BY:

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

LOCATION INFORMATION

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM-Private boundary
XS NUMBER: 1

DATE: 12-Jul-16
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
SECTION: 33
TWP: 47N
RANGE: 5W
PM: New Mexico

COUNTY: Gunnison
WATERSHED: Cimarron River
DIVISION: 4
DOW CODE: 44892

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: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private boundary
 XS NUMBER: 1

DATA POINTS= 28

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
RS	0.00	4.35		
1 G	2.60	4.90		
	3.30	5.05		
	4.00	5.27		
	4.50	5.51		
	5.00	5.50		
	5.50	5.62		
W	5.80	5.75	0.00	0.00
	6.00	5.90	0.15	0.04
	6.30	6.00	0.25	0.27
	6.60	6.03	0.28	0.34
	6.90	5.92	0.17	0.19
	7.20	5.97	0.22	0.53
	7.50	5.95	0.20	0.51
	7.80	6.03	0.28	0.30
	8.10	6.01	0.26	0.47
	8.40	6.02	0.27	0.69
	8.70	6.19	0.44	0.18
	9.00	6.05	0.30	1.16
	9.30	6.11	0.36	0.81
	9.60	5.93	0.18	0.90
	9.90	6.00	0.25	0.51
	10.20	5.84	0.09	2.37
	10.80	5.75	0.00	0.00
	12.20	5.40	0.00	0.00
	12.80	5.38	0.00	0.00
	13.60	5.08	0.00	0.00
1 G	13.90	4.90	0.00	0.00

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%
0.00		0.00	0.00	0.0%
0.25	0.15	0.04	0.00	0.2%
0.32	0.25	0.08	0.02	3.2%
0.30	0.28	0.08	0.03	4.4%
0.32	0.17	0.05	0.01	1.5%
0.30	0.22	0.07	0.03	5.5%
0.30	0.20	0.06	0.03	4.8%
0.31	0.28	0.08	0.03	3.9%
0.30	0.26	0.08	0.04	5.7%
0.30	0.27	0.08	0.06	8.7%
0.34	0.44	0.13	0.02	3.7%
0.33	0.30	0.09	0.10	16.3%
0.31	0.36	0.11	0.09	13.6%
0.35	0.18	0.05	0.05	7.6%
0.31	0.25	0.08	0.04	6.0%
0.34	0.09	0.04	0.10	15.0%
0.61		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 -----

5.29 0.44 1.12 0.64 100.0%
 (Max.)

Manning's n = 0.1262
 Hydraulic Radius= 0.21097119

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private boundary
 XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.12	1.12	0.0%
5.50	1.12	2.58	131.1%
5.52	1.12	2.44	118.8%
5.54	1.12	2.31	107.1%
5.56	1.12	2.18	95.6%
5.58	1.12	2.06	84.5%
5.60	1.12	1.94	73.6%
5.62	1.12	1.82	63.0%
5.64	1.12	1.70	52.7%
5.66	1.12	1.59	42.6%
5.68	1.12	1.48	32.7%
5.70	1.12	1.37	23.1%
5.71	1.12	1.32	18.4%
5.72	1.12	1.27	13.7%
5.73	1.12	1.22	9.1%
5.74	1.12	1.17	4.5%
5.75	1.12	1.12	0.0%
5.76	1.12	1.07	-4.4%
5.77	1.12	1.02	-8.8%
5.78	1.12	0.97	-13.1%
5.79	1.12	0.92	-17.3%
5.80	1.12	0.88	-21.5%
5.82	1.12	0.79	-29.6%
5.84	1.12	0.70	-37.4%
5.86	1.12	0.61	-45.0%
5.88	1.12	0.53	-52.5%
5.90	1.12	0.45	-59.9%
5.92	1.12	0.37	-67.2%
5.94	1.12	0.29	-74.0%
5.96	1.12	0.22	-80.2%
5.98	1.12	0.17	-85.1%
6.00	1.12	0.12	-89.3%

WATERLINE AT ZERO

AREA ERROR = 5.750

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private boundary
 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	4.90	11.30	0.73	1.29	8.24	11.88	100.0%	0.69	10.48	1.27
	4.90	11.30	0.73	1.29	8.24	11.88	100.0%	0.69	10.48	1.27
	4.95	10.98	0.70	1.24	7.69	11.55	97.2%	0.67	9.51	1.24
	5.00	10.67	0.67	1.19	7.15	11.21	94.3%	0.64	8.59	1.20
	5.05	10.35	0.64	1.14	6.62	10.88	91.5%	0.61	7.72	1.17
	5.10	10.09	0.61	1.09	6.11	10.59	89.1%	0.58	6.87	1.12
	5.15	9.80	0.57	1.04	5.61	10.28	86.5%	0.55	6.08	1.08
	5.20	9.50	0.54	0.99	5.13	9.98	83.9%	0.51	5.34	1.04
	5.25	9.21	0.51	0.94	4.66	9.67	81.3%	0.48	4.65	1.00
	5.30	8.95	0.47	0.89	4.21	9.39	79.0%	0.45	4.00	0.95
	5.35	8.71	0.43	0.84	3.77	9.13	76.8%	0.41	3.39	0.90
	5.40	7.93	0.42	0.79	3.34	8.33	70.1%	0.40	2.95	0.88
	5.45	7.62	0.39	0.74	2.95	8.01	67.4%	0.37	2.46	0.83
	5.50	7.32	0.35	0.69	2.58	7.68	64.7%	0.34	2.02	0.78
	5.55	6.39	0.35	0.64	2.25	6.74	56.7%	0.33	1.75	0.78
	5.60	5.98	0.32	0.59	1.94	6.32	53.2%	0.31	1.43	0.74
	5.65	5.63	0.29	0.54	1.65	5.95	50.1%	0.28	1.14	0.69
	5.70	5.32	0.26	0.49	1.37	5.62	47.3%	0.24	0.87	0.63
WL	5.75	5.00	0.22	0.44	1.12	5.29	44.5%	0.21	0.64	0.58
	5.80	4.60	0.19	0.39	0.88	4.87	41.0%	0.18	0.45	0.52
	5.85	4.25	0.15	0.34	0.66	4.50	37.8%	0.15	0.29	0.45
	5.90	4.09	0.11	0.29	0.45	4.31	36.2%	0.10	0.16	0.36
	5.95	3.46	0.07	0.24	0.25	3.64	30.7%	0.07	0.07	0.27
	6.00	2.18	0.05	0.19	0.12	2.30	19.4%	0.05	0.03	0.23
	6.05	0.95	0.05	0.14	0.05	1.04	8.7%	0.05	0.01	0.22
	6.10	0.42	0.04	0.09	0.02	0.47	3.9%	0.03	0.00	0.17
	6.15	0.16	0.02	0.04	0.00	0.18	1.5%	0.02	0.00	0.11

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM-Private boundary
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.64 cfs
CALCULATED FLOW (Qc)=	0.64 cfs
(Qm-Qc)/Qm * 100 =	0.0 %

MEASURED WATERLINE (W _{Lm})=	5.75 ft
CALCULATED WATERLINE (W _{Lc})=	5.75 ft
(W _{Lm} -W _{Lc})/W _{Lm} * 100 =	0.0 %

MAX MEASURED DEPTH (Dm)=	0.44 ft
MAX CALCULATED DEPTH (Dc)=	0.44 ft
(Dm-Dc)/Dm * 100	0.0 %

MEAN VELOCITY=	0.58 ft/sec
MANNING'S N=	0.126
SLOPE=	0.019 ft/ft

.4 * Qm =	0.3 cfs
2.5 * Qm=	1.6 cfs

RECOMMENDED INSTREAM FLOW:

FLOW (CFS)

PERIOD

RATIONALE FOR RECOMMENDATION:

=====

[illegible]

RECOMMENDATION BY: AGENCY DATE:

CWCB REVIEW BY: DATE:

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private boundary
 XS NUMBER: 1

Jarrett Variable Manning's n Correction Applied

GL = lowest Grassline elevation corrected for sag

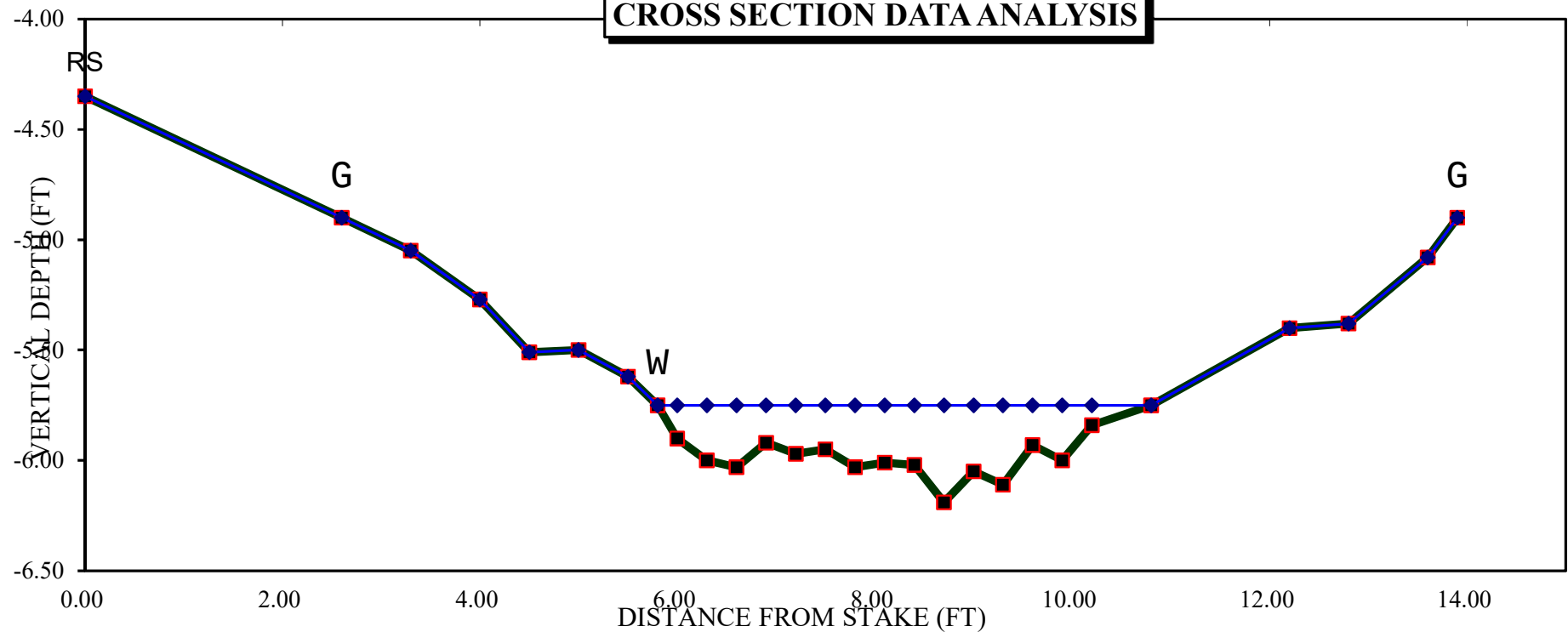
STAGING TABLE

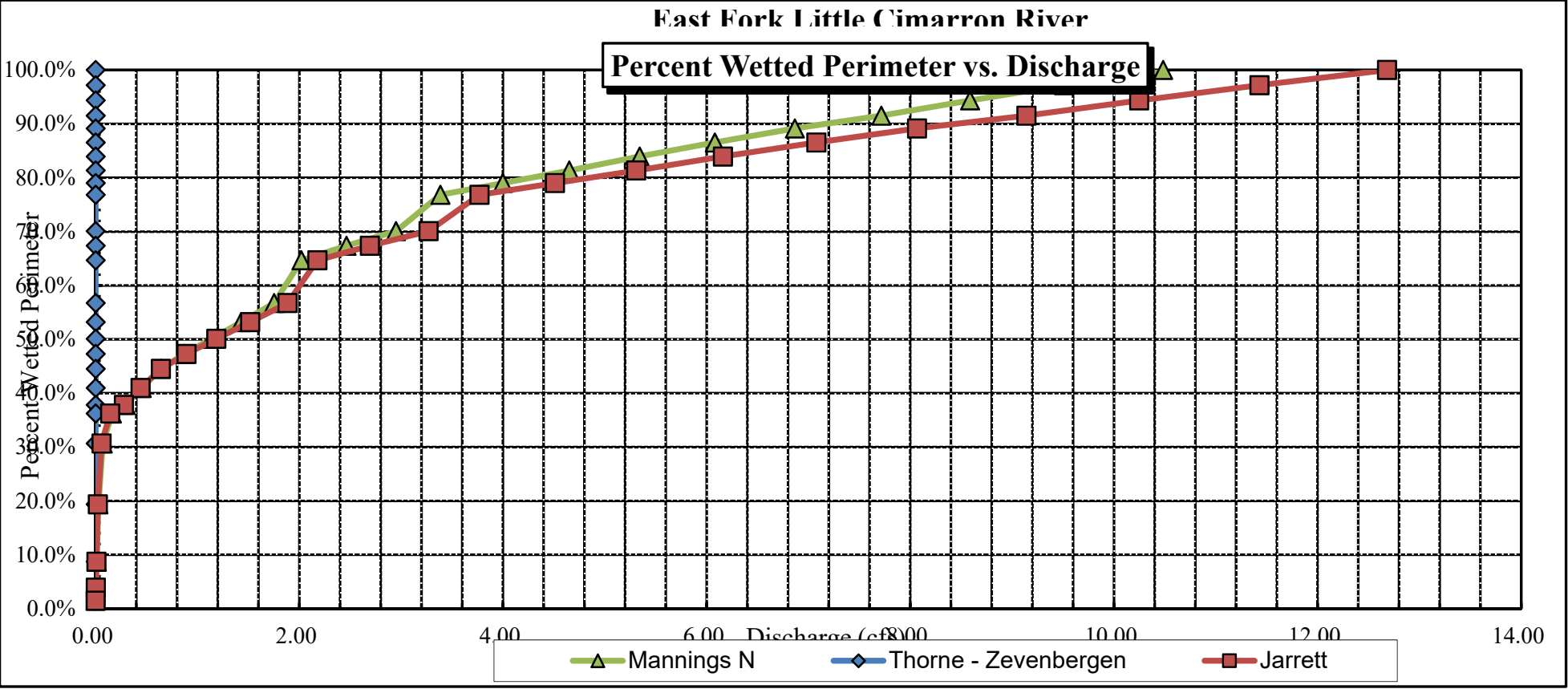
WL = Waterline corrected for variations in field measured water surface elevations and sag

	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	4.90	11.30	0.73	1.29	8.24	11.88	100.0%	0.69	12.68	1.54
	4.90	11.30	0.73	1.29	8.24	11.88	100.0%	0.69	12.68	1.54
	4.95	10.98	0.70	1.24	7.69	11.55	97.2%	0.67	11.43	1.49
	5.00	10.67	0.67	1.19	7.15	11.21	94.3%	0.64	10.25	1.43
	5.05	10.35	0.64	1.14	6.62	10.88	91.5%	0.61	9.14	1.38
	5.10	10.09	0.61	1.09	6.11	10.59	89.1%	0.58	8.07	1.32
	5.15	9.80	0.57	1.04	5.61	10.28	86.5%	0.55	7.08	1.26
	5.20	9.50	0.54	0.99	5.13	9.98	83.9%	0.51	6.16	1.20
	5.25	9.21	0.51	0.94	4.66	9.67	81.3%	0.48	5.31	1.14
	5.30	8.95	0.47	0.89	4.21	9.39	79.0%	0.45	4.51	1.07
	5.35	8.71	0.43	0.84	3.77	9.13	76.8%	0.41	3.77	1.00
	5.40	7.93	0.42	0.79	3.34	8.33	70.1%	0.40	3.27	0.98
	5.45	7.62	0.39	0.74	2.95	8.01	67.4%	0.37	2.69	0.91
	5.50	7.32	0.35	0.69	2.58	7.68	64.7%	0.34	2.18	0.84
	5.55	6.39	0.35	0.64	2.25	6.74	56.7%	0.33	1.89	0.84
	5.60	5.98	0.32	0.59	1.94	6.32	53.2%	0.31	1.52	0.78
	5.65	5.63	0.29	0.54	1.65	5.95	50.1%	0.28	1.19	0.72
	5.70	5.32	0.26	0.49	1.37	5.62	47.3%	0.24	0.89	0.65
WL	5.75	5.00	0.22	0.44	1.12	5.29	44.5%	0.21	0.64	0.58
	5.80	4.60	0.19	0.39	0.88	4.87	41.0%	0.18	0.44	0.50
	5.85	4.25	0.15	0.34	0.66	4.50	37.8%	0.15	0.28	0.42
	5.90	4.09	0.11	0.29	0.45	4.31	36.2%	0.10	0.14	0.32
	5.95	3.46	0.07	0.24	0.25	3.64	30.7%	0.07	0.06	0.23
	6.00	2.18	0.05	0.19	0.12	2.30	19.4%	0.05	0.02	0.18
	6.05	0.95	0.05	0.14	0.05	1.04	8.7%	0.05	0.01	0.17
	6.10	0.42	0.04	0.09	0.02	0.47	3.9%	0.03	0.00	0.13
	6.15	0.16	0.02	0.04	0.00	0.18	1.5%	0.02	0.00	0.07

Fast Fork Little Cimarron River

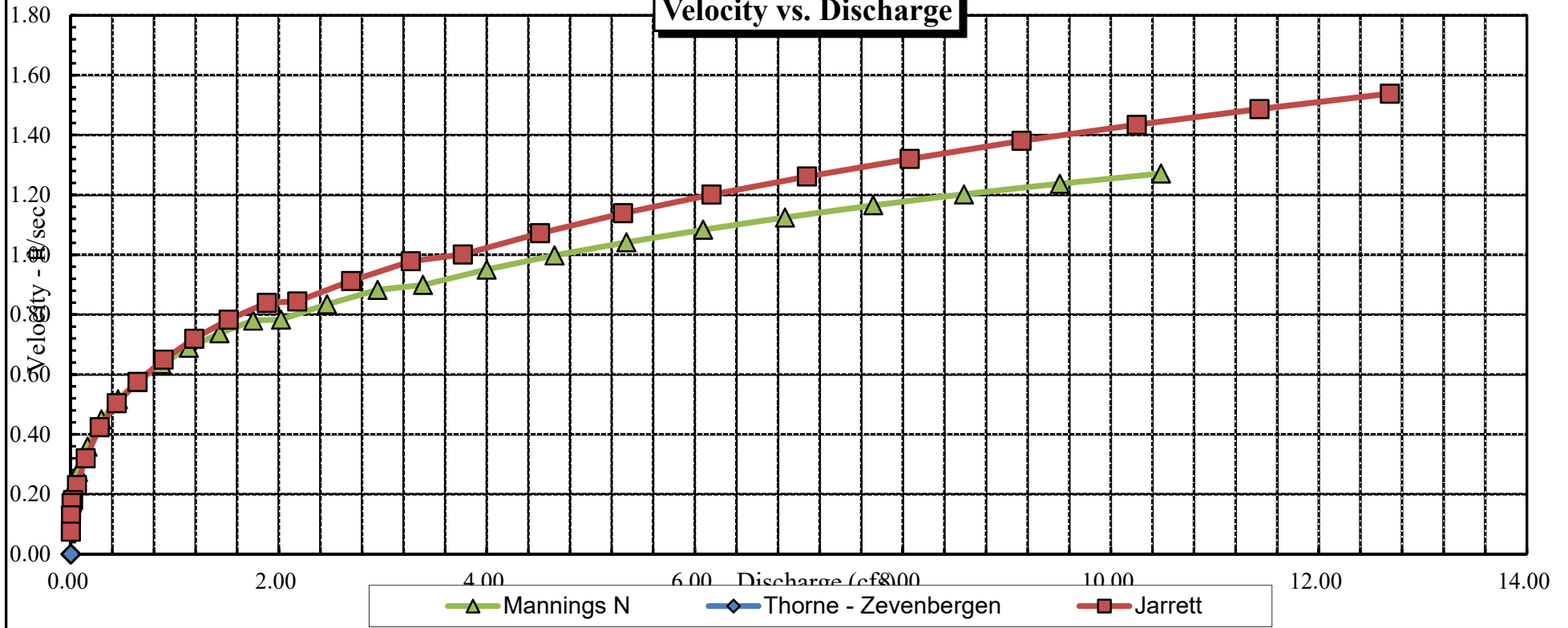
CROSS SECTION DATA ANALYSIS





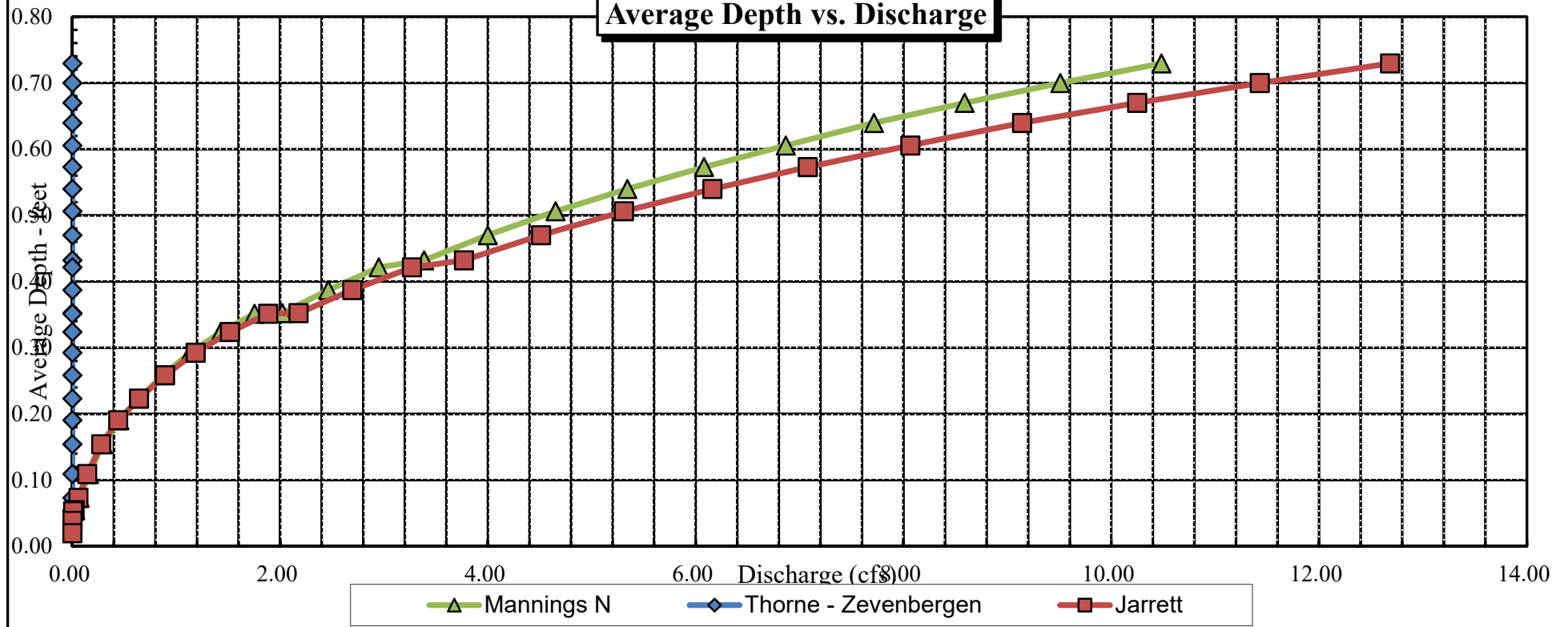
East Fork Little Cimarron River

Velocity vs. Discharge



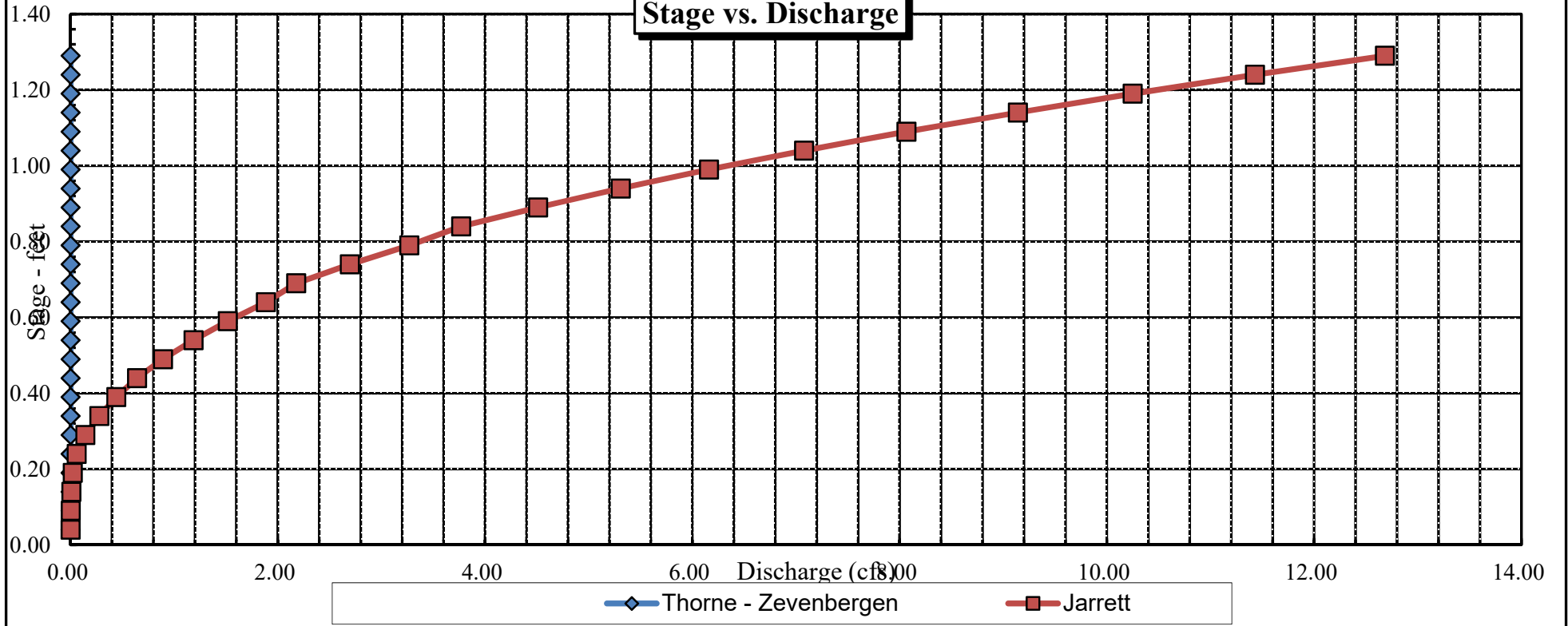
East Fork Little Cimarron River

Average Depth vs. Discharge



East Fork Little Cimarron River

Stage vs. Discharge



Data Input & Proofing

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private boundary
 XS NUMBER: 1
 DATE: 7/12/2016
 OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
 SECTION: 33
 TWP: 47N
 RANGE: 5W
 PM: New Mexico

COUNTY: Gunnison
 WATERSHED: Cimarron River
 DIVISION: 4
 DOW CODE: 44892
 USGS MAP:
 USFS MAP:

TAPE WT: 0.0106 lbs / ft
 TENSION: 99999 lbs

SLOPE: 0.019 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 = 28								
1	RS	0.00	4.35			0.00	0.00	0.00
	G	2.60	4.90			0.00	0.00	0.00
		3.30	5.05			0.00	0.00	0.00
		4.00	5.27			0.00	0.00	0.00
		4.50	5.51			0.00	0.00	0.00
		5.00	5.50			0.00	0.00	0.00
		5.50	5.62			0.00	0.00	0.00
	W	5.80	5.75	0.00	0.00	0.00	0.00	0.00
		6.00	5.90	0.15	0.04	0.04	0.00	5.75
		6.30	6.00	0.25	0.27	0.08	0.02	5.75
		6.60	6.03	0.28	0.34	0.08	0.03	5.75
		6.90	5.92	0.17	0.19	0.05	0.01	5.75
		7.20	5.97	0.22	0.53	0.07	0.03	5.75
		7.50	5.95	0.20	0.51	0.06	0.03	5.75
		7.80	6.03	0.28	0.30	0.08	0.03	5.75
		8.10	6.01	0.26	0.47	0.08	0.04	5.75
1	G	8.40	6.02	0.27	0.69	0.08	0.06	5.75
		8.70	6.19	0.44	0.18	0.13	0.02	5.75
		9.00	6.05	0.30	1.16	0.09	0.10	5.75
		9.30	6.11	0.36	0.81	0.11	0.09	5.75
		9.60	5.93	0.18	0.90	0.05	0.05	5.75
		9.90	6.00	0.25	0.51	0.08	0.04	5.75
		10.20	5.84	0.09	2.37	0.04	0.10	5.75
		10.80	5.75	0.00	0.00	0.00	0.00	0.00
		12.20	5.40	0.00	0.00	0.00	0.00	0.00
		12.80	5.38	0.00	0.00	0.00	0.00	0.00
1	G	13.60	5.08	0.00	0.00	0.00	0.00	0.00
		13.90	4.90	0.00	0.00	0.00	0.00	0.00
	LS	16.20	4.14	0.00	0.00	0.00	0.00	0.00
Totals						1.12	0.64	



FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME:		East Fork Little Cimarron River				CROSS-SECTION NO.:		2		
CROSS-SECTION LOCATION:		At BLH - private boundary								
DATE:		7-12-16								
OBSERVERS:		R. Smith, A. Breibant								
LEGAL DESCRIPTION	1/4 SECTION:	SW	SECTION:	33	TOWNSHIP:	47 N	RANGE:	5 E	PM:	NM
COUNTY:	Gunnison	WATERSHED:	Cimarron R.	WATER DIVISION:	4	DOW WATER CODE:		44892		
MAP(S):	USGS: 135 286557 USFS: 4239043									

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION:		YES ☒ NO ☐	METER TYPE: M-M	
METER NUMBER:		DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot
CHANNEL BED MATERIAL SIZE RANGE: gravel to 2-foot cobbles		PHOTOGRAPHS TAKEN: YES/NO ☒		TAPE TENSION: _____ lbs
				NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION		DISTANCE FROM TAPE (ft)	ROD READING (ft)
✕	Tape @ Stake LB	0.0	sunken
✕	Tape @ Stake RB	0.0	sunken
①	WS @ Tape LB/RB	0.0	12.1 - 5.95 / 5.95
②	WS Upstream	8.0	5.75
③	WS Downstream	7.2	6.33
SLOPE		0.58 / 15.2 = 0.038	

S
S
I
C
H

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:

mayfly, stonefly, caddisfly

COMMENTS

Abundant brook trout sighted. Spruce Willow Riparian

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: East Fork Little Cimarron River
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 2

DATE: 12-Jul-16
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
SECTION: 33
TWP: T47N
RANGE: R5W
PM: New Mexico

COUNTY: Gunnison
WATERSHED: Cimarron River
DIVISION: 4
DOW CODE: 44892

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: 0.038

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

DATA POINTS= 29

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
RS	0.00	3.33		
1 G	3.80	5.00		
	4.50	5.11		
	5.00	5.21		
	5.50	5.27		
	6.00	5.68		
W	6.20	5.95	0.00	0.00
	6.80	6.15	0.20	0.49
	7.10	6.15	0.20	0.64
	7.40	6.25	0.30	0.63
	7.70	6.25	0.30	0.72
	8.00	6.25	0.30	0.57
	8.30	6.20	0.25	0.61
	8.60	6.15	0.20	0.58
	8.90	6.15	0.20	0.50
	9.20	6.15	0.20	0.51
	9.50	6.25	0.30	0.71
	9.80	6.15	0.20	0.52
	10.10	6.15	0.20	0.58
	10.40	6.10	0.15	0.46
	10.70	6.10	0.15	0.18
	11.00	6.10	0.15	0.06
	11.30	6.05	0.10	0.28
	11.60	6.05	0.10	0.36
	11.90	6.05	0.10	0.15
W	12.10	5.95	0.00	0.00
	12.50	5.30		
	13.50	5.06		
1 G	14.50	5.04		

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%
0.63	0.20	0.09	0.04	7.6%
0.30	0.20	0.06	0.04	6.6%
0.32	0.30	0.09	0.06	9.8%
0.30	0.30	0.09	0.06	11.2%
0.30	0.30	0.09	0.05	8.8%
0.30	0.25	0.08	0.05	7.9%
0.30	0.20	0.06	0.03	6.0%
0.30	0.20	0.06	0.03	5.2%
0.30	0.20	0.06	0.03	5.3%
0.32	0.30	0.09	0.06	11.0%
0.32	0.20	0.06	0.03	5.4%
0.30	0.20	0.06	0.03	6.0%
0.30	0.15	0.05	0.02	3.6%
0.30	0.15	0.05	0.01	1.4%
0.30	0.15	0.05	0.00	0.5%
0.30	0.10	0.03	0.01	1.4%
0.30	0.10	0.03	0.01	1.9%
0.30	0.10	0.03	0.00	0.6%
0.22		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 -----

6.02 0.3 1.11 0.58 100.0%
 (Max.)

Manning's n = 0.1780
 Hydraulic Radius= 0.18351524

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.11	1.11	0.0%
5.70	1.11	2.62	137.3%
5.72	1.11	2.50	126.1%
5.74	1.11	2.37	114.8%
5.76	1.11	2.25	103.7%
5.78	1.11	2.13	92.5%
5.80	1.11	2.01	81.5%
5.82	1.11	1.88	70.4%
5.84	1.11	1.76	59.5%
5.86	1.11	1.64	48.6%
5.88	1.11	1.52	37.7%
5.90	1.11	1.40	26.9%
5.91	1.11	1.34	21.5%
5.92	1.11	1.28	16.1%
5.93	1.11	1.22	10.7%
5.94	1.11	1.16	5.3%
5.95	1.11	1.11	0.0%
5.96	1.11	1.05	-5.3%
5.97	1.11	0.99	-10.6%
5.98	1.11	0.93	-15.8%
5.99	1.11	0.87	-21.0%
6.00	1.11	0.82	-26.1%
6.02	1.11	0.70	-36.3%
6.04	1.11	0.59	-46.2%
6.06	1.11	0.49	-55.4%
6.08	1.11	0.40	-63.8%
6.10	1.11	0.31	-71.8%
6.12	1.11	0.24	-78.5%
6.14	1.11	0.17	-84.8%
6.16	1.11	0.11	-89.6%
6.18	1.11	0.08	-92.9%
6.20	1.11	0.05	-95.6%

WATERLINE AT ZERO

AREA ERROR = 5.950

STREAM NAME: East Fork Little Cimarron River
 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	5.04	10.45	0.71	1.21	7.41	11.26	100.0%	0.66	9.12	1.23
	5.05	9.88	0.74	1.20	7.30	10.70	95.0%	0.68	9.22	1.26
	5.10	8.90	0.77	1.15	6.84	9.70	86.2%	0.71	8.83	1.29
	5.15	8.42	0.76	1.10	6.41	9.22	81.9%	0.70	8.19	1.28
	5.20	7.97	0.75	1.05	6.00	8.75	77.7%	0.69	7.60	1.27
	5.25	7.37	0.76	1.00	5.62	8.15	72.4%	0.69	7.13	1.27
	5.30	6.96	0.76	0.95	5.26	7.72	68.6%	0.68	6.63	1.26
	5.35	6.87	0.72	0.90	4.92	7.58	67.3%	0.65	5.99	1.22
	5.40	6.78	0.67	0.85	4.57	7.44	66.1%	0.61	5.38	1.18
	5.45	6.69	0.63	0.80	4.24	7.31	64.9%	0.58	4.80	1.13
	5.50	6.60	0.59	0.75	3.91	7.17	63.7%	0.54	4.24	1.09
	5.55	6.50	0.55	0.70	3.58	7.03	62.5%	0.51	3.71	1.04
	5.60	6.41	0.51	0.65	3.25	6.89	61.2%	0.47	3.21	0.99
	5.65	6.32	0.46	0.60	2.94	6.76	60.0%	0.43	2.74	0.93
	5.70	6.24	0.42	0.55	2.62	6.63	58.8%	0.40	2.30	0.88
	5.75	6.17	0.37	0.50	2.31	6.51	57.8%	0.36	1.89	0.82
	5.80	6.10	0.33	0.45	2.01	6.38	56.7%	0.31	1.51	0.75
	5.85	6.04	0.28	0.40	1.70	6.26	55.6%	0.27	1.16	0.68
	5.90	5.97	0.23	0.35	1.40	6.14	54.5%	0.23	0.85	0.61
WL	5.95	5.90	0.19	0.30	1.10	6.02	53.5%	0.18	0.58	0.53
	6.00	5.65	0.14	0.25	0.82	5.75	51.1%	0.14	0.36	0.44
	6.05	4.80	0.11	0.20	0.54	4.88	43.4%	0.11	0.20	0.38
	6.10	3.75	0.08	0.15	0.31	3.82	33.9%	0.08	0.10	0.31
	6.15	2.10	0.06	0.10	0.14	2.16	19.2%	0.06	0.03	0.26
	6.20	1.35	0.04	0.05	0.05	1.38	12.2%	0.04	0.01	0.18
	6.25	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM-Private Boundary
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.58 cfs
CALCULATED FLOW (Qc)=	0.58 cfs
(Qm-Qc)/Qm * 100 =	0.0 %

MEASURED WATERLINE (W _{Lm})=	5.95 ft
CALCULATED WATERLINE (W _{Lc})=	5.95 ft
(W _{Lm} -W _{Lc})/W _{Lm} * 100 =	0.0 %

MAX MEASURED DEPTH (Dm)=	0.30 ft
MAX CALCULATED DEPTH (Dc)=	0.30 ft
(Dm-Dc)/Dm * 100	0.0 %

MEAN VELOCITY=	0.53 ft/sec
MANNING'S N=	0.178
SLOPE=	0.038 ft/ft

.4 * Qm =	0.2 cfs
2.5 * Qm=	1.5 cfs

RECOMMENDED INSTREAM FLOW:

FLOW (CFS)

PERIOD

RATIONALE FOR RECOMMENDATION:

=====

[illegible]

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

CWCB REVIEW BY: DATE:

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2

Jarrett Variable Manning's n Correction Applied

GL = lowest Grassline elevation corrected for sag

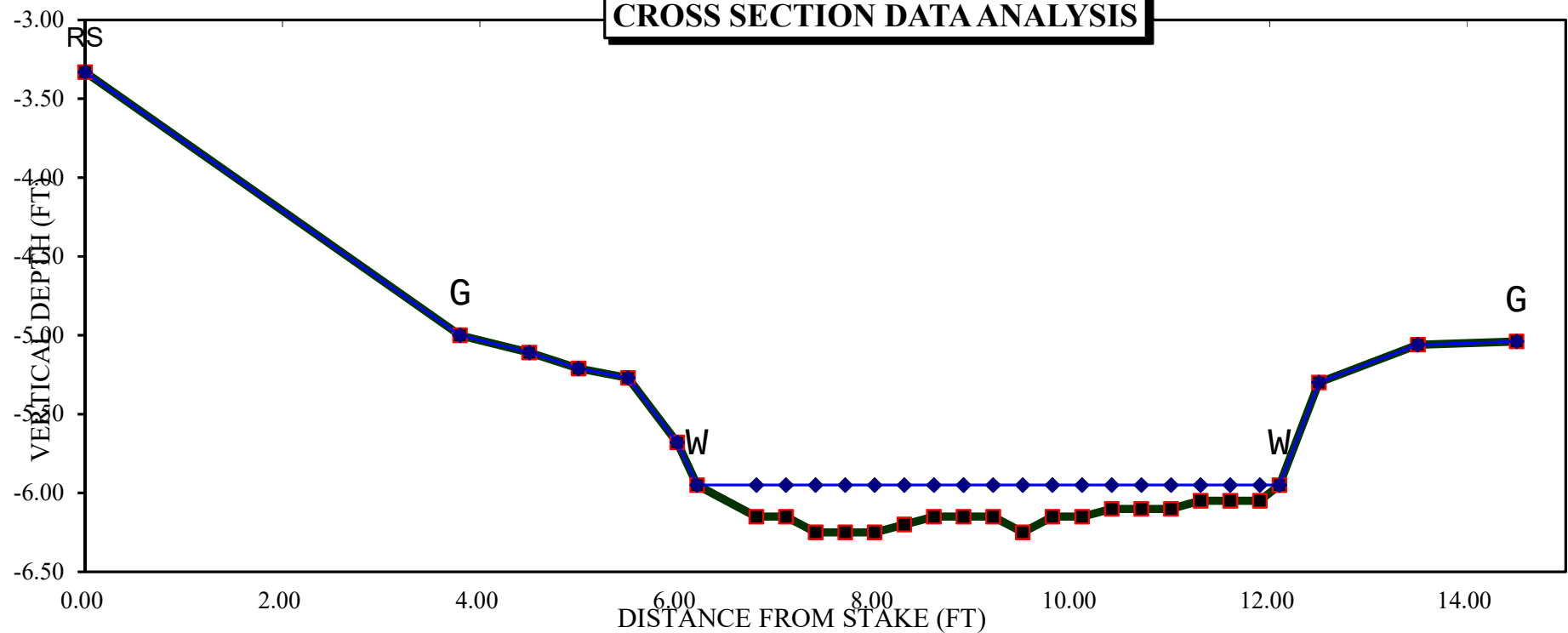
STAGING TABLE

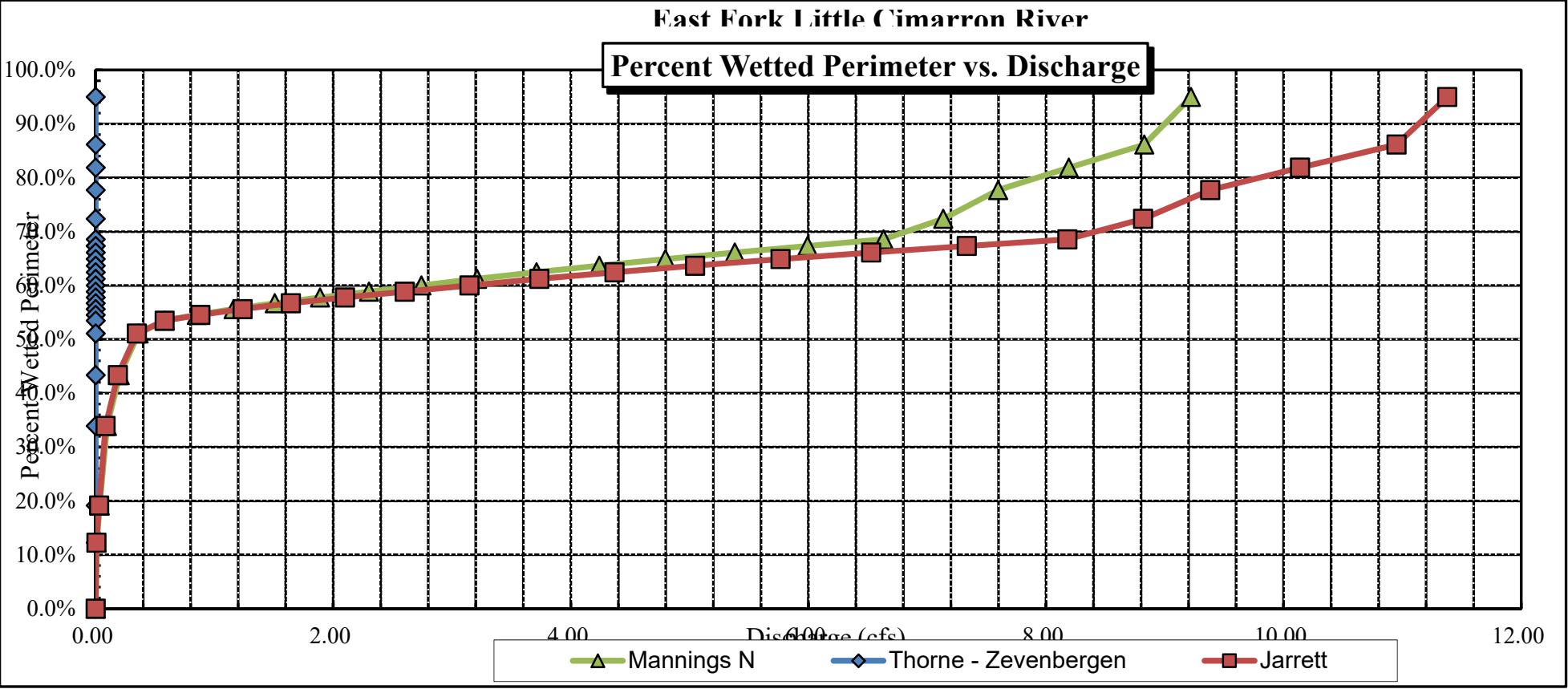
WL = Waterline corrected for variations in field measured water surface elevations and sag

	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	5.04	10.45	0.71	1.21	7.41	11.26	100.0%	0.66	11.18	1.51
	5.05	9.88	0.74	1.20	7.30	10.70	95.0%	0.68	11.38	1.56
	5.10	8.90	0.77	1.15	6.84	9.70	86.2%	0.71	10.95	1.60
	5.15	8.42	0.76	1.10	6.41	9.22	81.9%	0.70	10.14	1.58
	5.20	7.97	0.75	1.05	6.00	8.75	77.7%	0.69	9.38	1.56
	5.25	7.37	0.76	1.00	5.62	8.15	72.4%	0.69	8.82	1.57
	5.30	6.96	0.76	0.95	5.26	7.72	68.6%	0.68	8.18	1.55
	5.35	6.87	0.72	0.90	4.92	7.58	67.3%	0.65	7.33	1.49
	5.40	6.78	0.67	0.85	4.57	7.44	66.1%	0.61	6.53	1.43
	5.45	6.69	0.63	0.80	4.24	7.31	64.9%	0.58	5.77	1.36
	5.50	6.60	0.59	0.75	3.91	7.17	63.7%	0.54	5.05	1.29
	5.55	6.50	0.55	0.70	3.58	7.03	62.5%	0.51	4.37	1.22
	5.60	6.41	0.51	0.65	3.25	6.89	61.2%	0.47	3.74	1.15
	5.65	6.32	0.46	0.60	2.94	6.76	60.0%	0.43	3.15	1.07
	5.70	6.24	0.42	0.55	2.62	6.63	58.8%	0.40	2.60	0.99
	5.75	6.17	0.37	0.50	2.31	6.51	57.8%	0.36	2.10	0.91
	5.80	6.10	0.33	0.45	2.01	6.38	56.7%	0.31	1.64	0.82
	5.85	6.04	0.28	0.40	1.70	6.26	55.6%	0.27	1.24	0.73
	5.90	5.97	0.23	0.35	1.40	6.14	54.5%	0.23	0.88	0.63
WL	5.95	5.90	0.19	0.30	1.10	6.02	53.5%	0.18	0.58	0.53
	6.00	5.65	0.14	0.25	0.82	5.75	51.1%	0.14	0.35	0.42
	6.05	4.80	0.11	0.20	0.54	4.88	43.4%	0.11	0.19	0.35
	6.10	3.75	0.08	0.15	0.31	3.82	33.9%	0.08	0.08	0.27
	6.15	2.10	0.06	0.10	0.14	2.16	19.2%	0.06	0.03	0.22
	6.20	1.35	0.04	0.05	0.05	1.38	12.2%	0.04	0.01	0.13
	6.25	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

Fast Fork Little Cimarron River

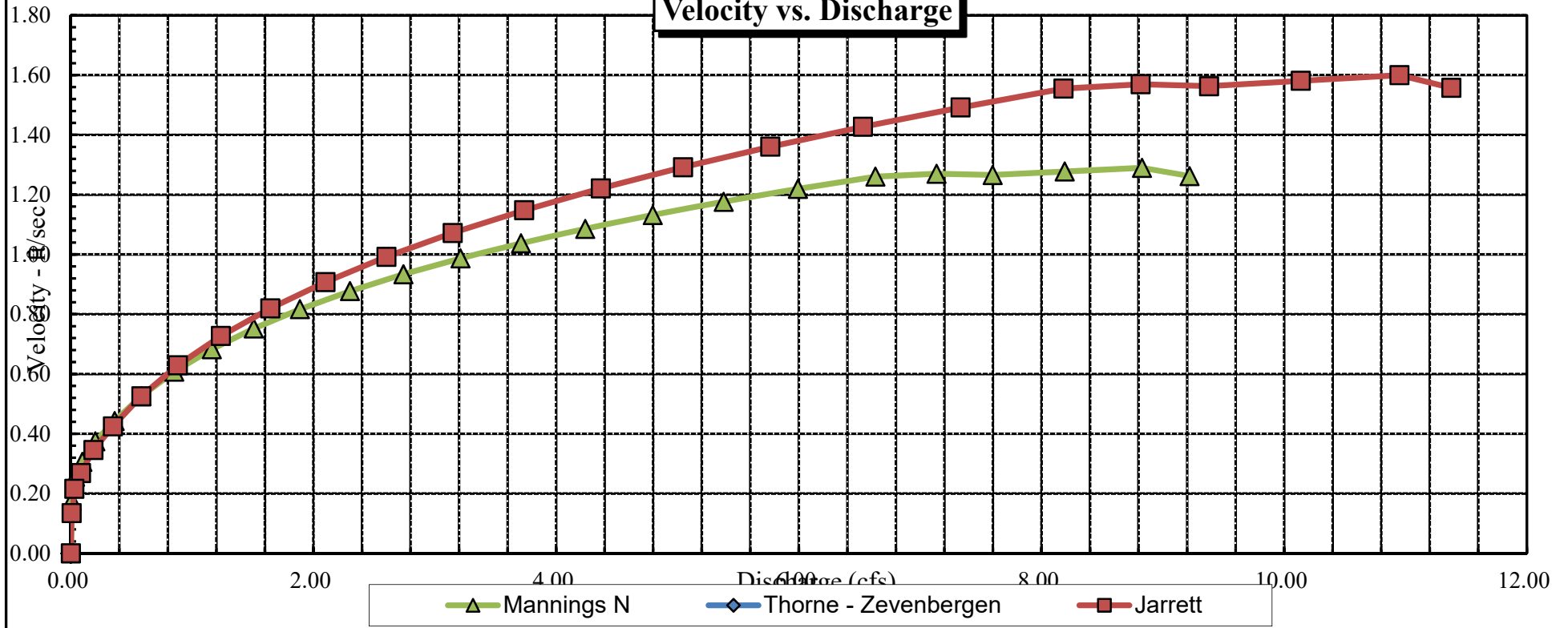
CROSS SECTION DATA ANALYSIS





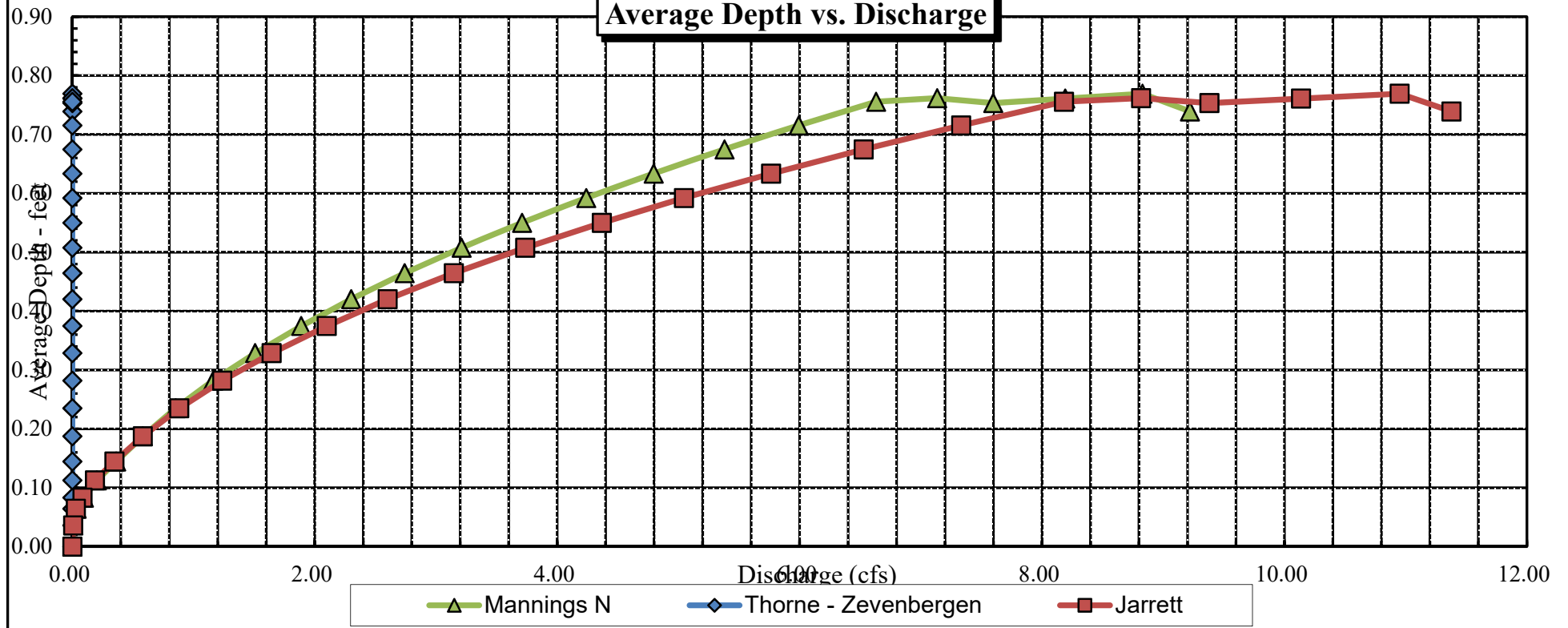
East Fork Little Cimarron River

Velocity vs. Discharge



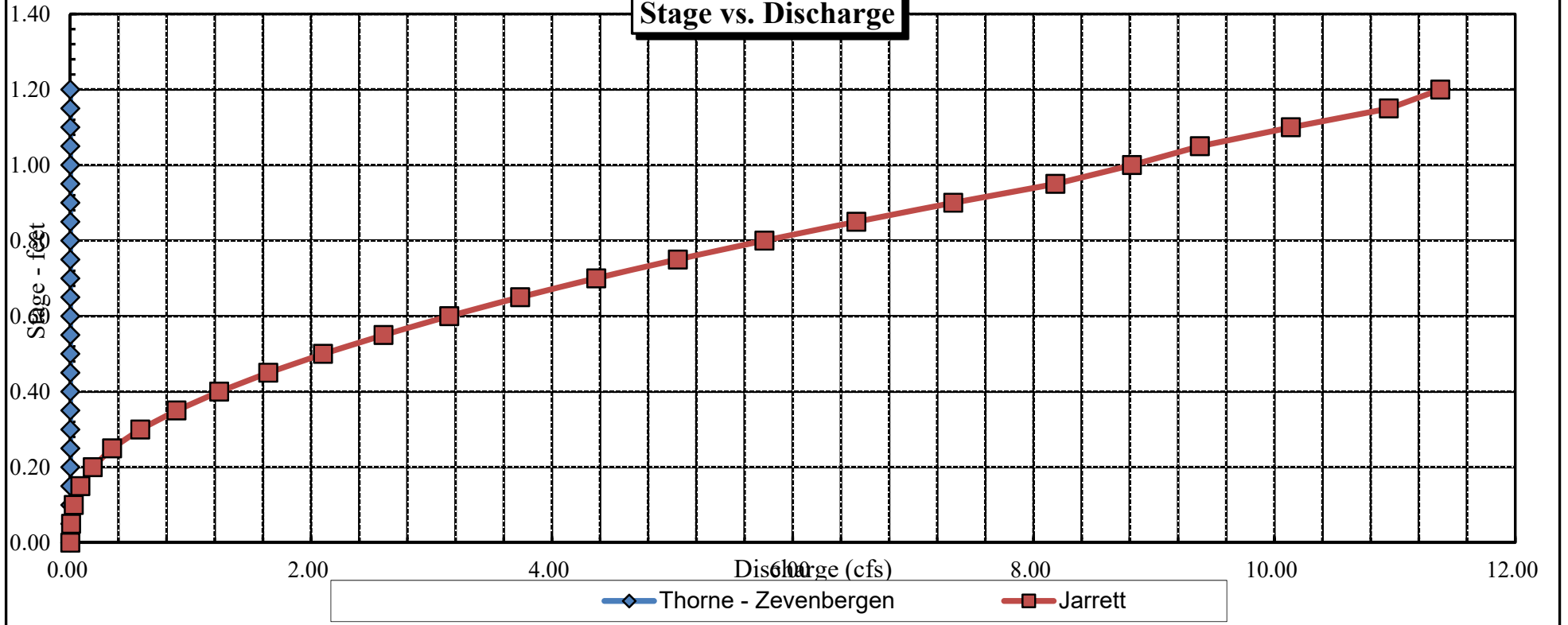
East Fork Little Cimarron River

Average Depth vs. Discharge



East Fork Little Cimarron River

Stage vs. Discharge



Data Input & Proofing

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-Private Boundary
 XS NUMBER: 2
 DATE: 7/12/2016
 OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
 SECTION: 33
 TWP: T47N
 RANGE: R5W
 PM: New Mexico

COUNTY: Gunnison
 WATERSHED: Cimarron River
 DIVISION: 4
 DOW CODE: 44892
 USGS MAP:
 USFS MAP:

TAPE WT: 0.0106 lbs / ft
 TENSION: 99999 lbs

SLOPE: 0.038 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 = 29								
1	RS	0.00	3.33			0.00	0.00	0.00
	G	3.80	5.00			0.00	0.00	0.00
		4.50	5.11			0.00	0.00	0.00
		5.00	5.21			0.00	0.00	0.00
		5.50	5.27			0.00	0.00	0.00
		6.00	5.68			0.00	0.00	0.00
	W	6.20	5.95	0.00	0.00	0.00	0.00	0.00
		6.80	6.15	0.20	0.49	0.09	0.04	5.95
		7.10	6.15	0.20	0.64	0.06	0.04	5.95
		7.40	6.25	0.30	0.63	0.09	0.06	5.95
		7.70	6.25	0.30	0.72	0.09	0.06	5.95
		8.00	6.25	0.30	0.57	0.09	0.05	5.95
		8.30	6.20	0.25	0.61	0.08	0.05	5.95
		8.60	6.15	0.20	0.58	0.06	0.03	5.95
1		8.90	6.15	0.20	0.50	0.06	0.03	5.95
		9.20	6.15	0.20	0.51	0.06	0.03	5.95
		9.50	6.25	0.30	0.71	0.09	0.06	5.95
		9.80	6.15	0.20	0.52	0.06	0.03	5.95
		10.10	6.15	0.20	0.58	0.06	0.03	5.95
		10.40	6.10	0.15	0.46	0.05	0.02	5.95
		10.70	6.10	0.15	0.18	0.05	0.01	5.95
		11.00	6.10	0.15	0.06	0.05	0.00	5.95
		11.30	6.05	0.10	0.28	0.03	0.01	5.95
		11.60	6.05	0.10	0.36	0.03	0.01	5.95
		11.90	6.05	0.10	0.15	0.03	0.00	5.95
	W	12.10	5.95	0.00	0.00	0.00	0.00	0.00
		12.50	5.30			0.00	0.00	0.00
		13.50	5.06			0.00	0.00	0.00
	G	14.50	5.04			0.00	0.00	0.00
Totals						1.11	0.58	



FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: <u>East Fork Little Cimarron River</u>		CROSS-SECTION NO.: <u>1</u>
CROSS-SECTION LOCATION: <u>At BLM-private boundary</u>		
DATE: <u>7-28-15</u>	OBSERVERS: <u>R. Smith, A. Breibart</u>	
LEGAL DESCRIPTION:	1/4 SECTION: <u>SW</u>	SECTION: <u>33</u>
	TOWNSHIP: <u>47N</u>	RANGE: <u>5E</u>
COUNTY: <u>Gunnison</u>	WATERSHED: <u>Gunnison R.</u>	WATER DIVISION: <u>4</u>
		DOW WATER CODE: <u>44892</u>
MAP(S):	USGS: <u>13S 286557</u>	USFS: <u>9790 ft. 4239043</u>

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: <u>YES/NO</u>	METER TYPE: <u>M-M</u>
METER NUMBER:	DATE RATED:
	CALIB/SPIN: <u>sec</u>
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel to 1-foot boulder</u>	TAPE WEIGHT: <u>surveyed</u> lbs/foot
	TAPE TENSION: <u>surveyed</u> lbs
	PHOTOGRAPHS TAKEN: <u>YES/NO</u>
	NUMBER OF PHOTOGRAPHS: <u>2</u>

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	<u>surveyed</u>
⊗ Tape @ Stake RB	0.0	<u>surveyed</u>
① WS @ Tape LB/RB	0.0	<u>5.20/5.20</u>
② WS Upstream	<u>14.3</u>	<u>4.66</u>
③ WS Downstream	<u>26.9</u>	<u>6.34</u>
SLOPE	<u>1.68/41.2 = .041</u>	

SKETCH

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

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO <u>NO</u>	DISTANCE ELECTROFISHED: _____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO <u>YES</u>														
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

<u>Raparian =</u>	<u>PH = 7.44</u>
<u>spice</u>	<u>Cond = 55</u>
<u>willow</u>	<u>Temp = 13°C</u>
	<u>Salinity = 0 ppt</u>

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: East Fork Little Cimarron River
XS LOCATION: At BLM-private boundary
XS NUMBER: 1

DATE: 28-Jul-15
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
SECTION: 33
TWP: 47N
RANGE: 5W
PM: NM

COUNTY: Gunnison
WATERSHED: Gunnison R.
DIVISION: 4
DOW CODE: 44892

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: 0.041

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-private boundary
 XS NUMBER: 1

DATA POINTS= 33

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
LS	0.00	4.00			0.00		0.00	0.00	0.0%
	3.00	4.07			0.00		0.00	0.00	0.0%
1 G	3.80	4.25			0.00		0.00	0.00	0.0%
	5.90	4.55			0.00		0.00	0.00	0.0%
W	6.20	5.20	0.00	0.00	0.00		0.00	0.00	0.0%
	6.50	5.30	0.10	0.00	0.32	0.10	0.03	0.00	0.0%
	6.80	5.30	0.10	0.11	0.30	0.10	0.03	0.00	0.7%
	7.10	5.35	0.15	0.00	0.30	0.15	0.05	0.00	0.0%
	7.40	5.30	0.10	0.00	0.30	0.10	0.03	0.00	0.0%
	7.70	5.35	0.15	0.49	0.30	0.15	0.05	0.02	4.9%
	8.00	5.40	0.20	0.09	0.30	0.20	0.06	0.01	1.2%
	8.30	5.40	0.20	0.60	0.30	0.20	0.06	0.04	7.9%
	8.60	5.40	0.20	1.21	0.30	0.20	0.06	0.07	16.0%
	8.90	5.40	0.20	0.67	0.30	0.20	0.06	0.04	8.9%
	9.20	5.40	0.20	0.88	0.30	0.20	0.06	0.05	11.7%
	9.50	5.40	0.20	0.77	0.30	0.20	0.06	0.05	10.2%
	9.80	5.30	0.10	0.44	0.32	0.10	0.03	0.01	2.9%
	10.10	5.30	0.10	0.25	0.30	0.10	0.03	0.01	1.7%
	10.40	5.30	0.10	0.37	0.30	0.10	0.03	0.01	2.4%
	10.70	5.35	0.15	0.42	0.30	0.15	0.05	0.02	4.2%
	11.00	5.30	0.10	0.48	0.30	0.10	0.03	0.01	3.2%
	11.30	5.40	0.20	0.45	0.32	0.20	0.06	0.03	6.0%
	11.60	5.40	0.20	0.73	0.30	0.20	0.06	0.04	9.7%
	11.90	5.50	0.30	0.30	0.32	0.30	0.09	0.03	6.0%
	12.20	5.55	0.35	0.06	0.30	0.35	0.11	0.01	1.4%
	12.50	5.50	0.30	0.06	0.30	0.30	0.09	0.01	1.2%
	12.80	5.40	0.20	0.00	0.32	0.20	0.06	0.00	0.0%
	13.10	5.40	0.20	0.00	0.30	0.20	0.06	0.00	0.0%
	13.40	5.40	0.20	0.00	0.30	0.20	0.07	0.00	0.0%
W	13.80	5.20	0.00	0.00	0.45		0.00	0.00	0.0%
	14.10	4.96			0.00		0.00	0.00	0.0%
1 G	15.30	4.25			0.00		0.00	0.00	0.0%
RS	17.00	3.10			0.00		0.00	0.00	0.0%

TOTALS -----

7.76 0.35 1.30 0.45 100.0%
 (Max.)

Manning's n = 0.2623
 Hydraulic Radius= 0.16749432

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-private boundary
 XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.30	1.30	0.0%
4.95	1.30	3.25	150.3%
4.97	1.30	3.09	137.9%
4.99	1.30	2.93	125.7%
5.01	1.30	2.77	113.5%
5.03	1.30	2.62	101.3%
5.05	1.30	2.46	89.2%
5.07	1.30	2.30	77.1%
5.09	1.30	2.15	65.1%
5.11	1.30	1.99	53.1%
5.13	1.30	1.84	41.2%
5.15	1.30	1.68	29.4%
5.16	1.30	1.61	23.5%
5.17	1.30	1.53	17.6%
5.18	1.30	1.45	11.7%
5.19	1.30	1.38	5.9%
5.20	1.30	1.30	0.0%
5.21	1.30	1.22	-5.8%
5.22	1.30	1.15	-11.6%
5.23	1.30	1.07	-17.4%
5.24	1.30	1.00	-23.1%
5.25	1.30	0.93	-28.7%
5.27	1.30	0.78	-40.0%
5.29	1.30	0.64	-51.1%
5.31	1.30	0.50	-61.2%
5.33	1.30	0.40	-69.5%
5.35	1.30	0.30	-76.7%
5.37	1.30	0.22	-83.1%
5.39	1.30	0.14	-89.1%
5.41	1.30	0.09	-92.8%
5.43	1.30	0.07	-94.5%
5.45	1.30	0.05	-96.0%

WATERLINE AT ZERO

AREA ERROR = 5.200

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-private boundary
 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	4.25	11.50	0.84	1.30	9.70	12.38	100.0%	0.78	9.46	0.98
	4.25	11.50	0.84	1.30	9.70	12.38	100.0%	0.78	9.46	0.98
	4.30	11.07	0.83	1.25	9.13	11.93	96.4%	0.77	8.77	0.96
	4.35	10.63	0.81	1.20	8.59	11.47	92.7%	0.75	8.13	0.95
	4.40	10.20	0.79	1.15	8.07	11.02	89.1%	0.73	7.52	0.93
	4.45	9.76	0.78	1.10	7.57	10.57	85.4%	0.72	6.95	0.92
	4.50	9.33	0.76	1.05	7.09	10.12	81.8%	0.70	6.42	0.91
	4.55	8.89	0.75	1.00	6.64	9.67	78.1%	0.69	5.93	0.89
	4.60	8.79	0.71	0.95	6.20	9.51	76.9%	0.65	5.34	0.86
	4.65	8.68	0.66	0.90	5.76	9.36	75.6%	0.62	4.78	0.83
	4.70	8.57	0.62	0.85	5.33	9.21	74.4%	0.58	4.25	0.80
	4.75	8.46	0.58	0.80	4.90	9.05	73.1%	0.54	3.74	0.76
	4.80	8.36	0.54	0.75	4.48	8.90	71.9%	0.50	3.26	0.73
	4.85	8.25	0.49	0.70	4.07	8.75	70.7%	0.47	2.80	0.69
	4.90	8.14	0.45	0.65	3.66	8.59	69.4%	0.43	2.37	0.65
	4.95	8.03	0.41	0.60	3.25	8.44	68.2%	0.39	1.98	0.61
	5.00	7.94	0.36	0.55	2.85	8.30	67.1%	0.34	1.61	0.56
	5.05	7.86	0.31	0.50	2.46	8.17	66.0%	0.30	1.27	0.52
	5.10	7.77	0.27	0.45	2.07	8.03	64.9%	0.26	0.96	0.46
	5.15	7.69	0.22	0.40	1.68	7.90	63.8%	0.21	0.69	0.41
WL	5.20	7.60	0.17	0.35	1.30	7.76	62.7%	0.17	0.45	0.35
	5.25	7.35	0.13	0.30	0.93	7.49	60.5%	0.12	0.26	0.28
	5.30	6.20	0.09	0.25	0.57	6.32	51.1%	0.09	0.13	0.23
	5.35	4.30	0.07	0.20	0.30	4.37	35.3%	0.07	0.06	0.19
	5.40	1.20	0.09	0.15	0.11	1.24	10.0%	0.08	0.02	0.22
	5.45	0.90	0.06	0.10	0.05	0.92	7.5%	0.06	0.01	0.17
	5.50	0.60	0.02	0.05	0.01	0.61	4.9%	0.02	0.00	0.10

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM-private boundary
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)= 0.45 cfs
CALCULATED FLOW (Qc)= 0.45 cfs
(Qm-Qc)/Qm * 100 = 0.0 %

MEASURED WATERLINE (WLm)= 5.20 ft
CALCULATED WATERLINE (WLc)= 5.20 ft
(WLm-WLc)/WLm * 100 = 0.0 %

MAX MEASURED DEPTH (Dm)= 0.35 ft
MAX CALCULATED DEPTH (Dc)= 0.35 ft
(Dm-Dc)/Dm * 100 = 0.0 %

MEAN VELOCITY= 0.35 ft/sec
MANNING'S N= 0.262
SLOPE= 0.041 ft/ft

.4 * Qm = 0.2 cfs
2.5 * Qm= 1.1 cfs

RECOMMENDED INSTREAM FLOW:
=====

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

RATIONALE FOR RECOMMENDATION:
=====

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

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-private boundary
 XS NUMBER: 1

Jarrett Variable Manning's n Correction Applied

GL = lowest Grassline elevation corrected for sag

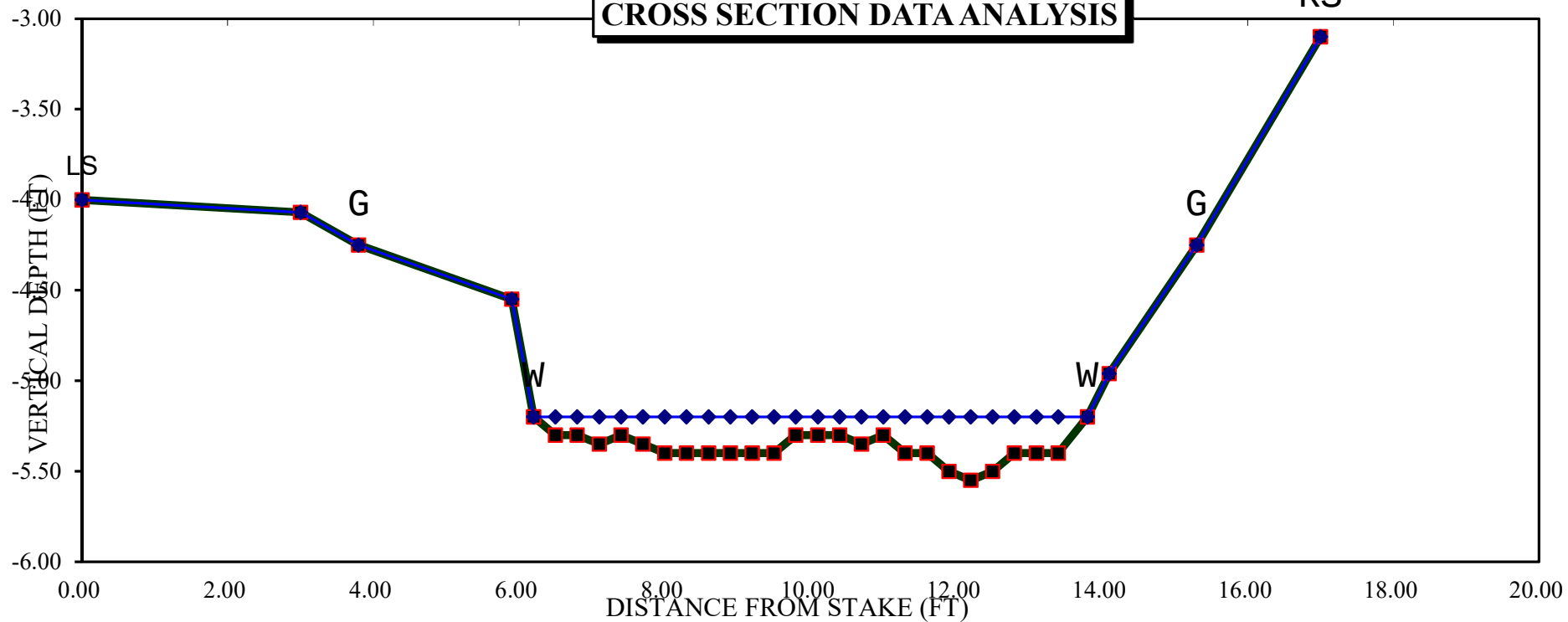
STAGING TABLE

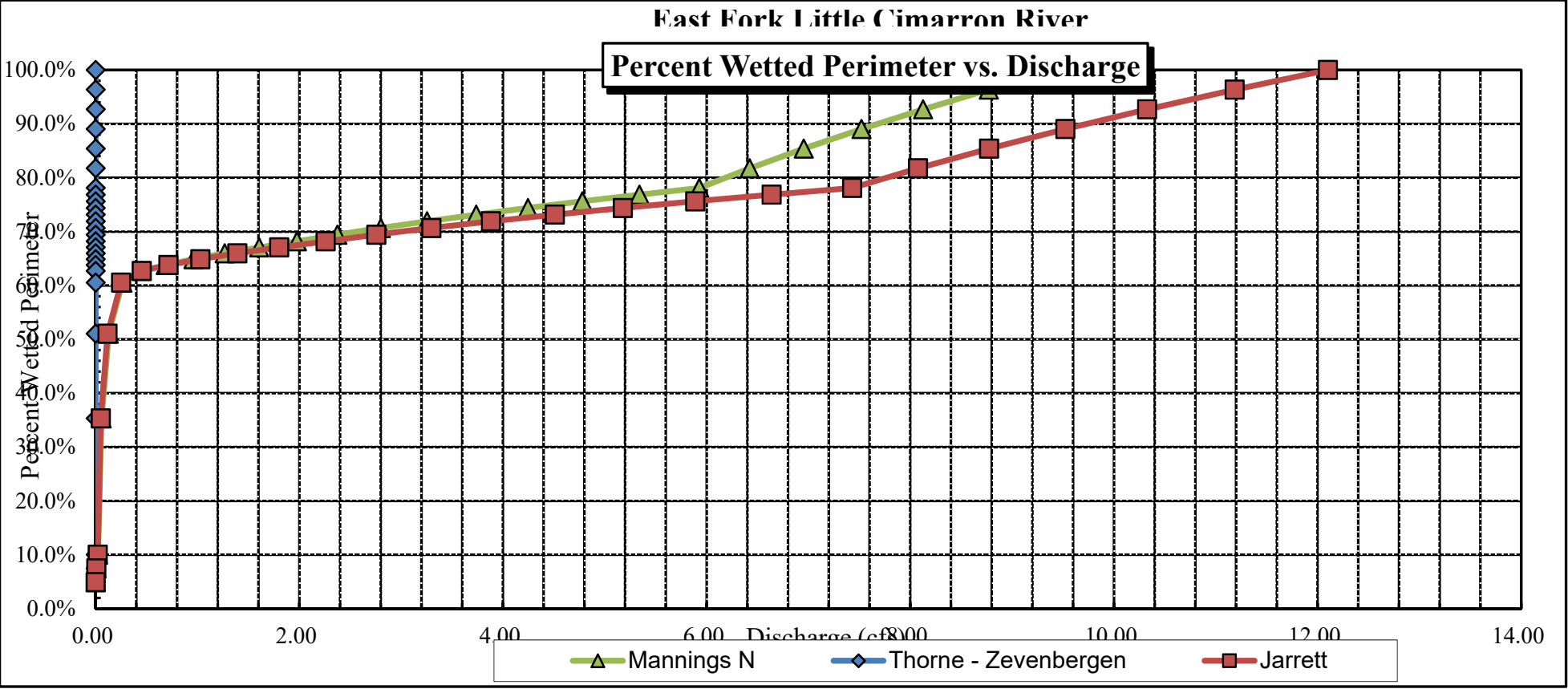
WL = Waterline corrected for variations in field measured water surface elevations and sag

	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	4.25	11.50	0.84	1.30	9.70	12.38	100.0%	0.78	12.10	1.25
	4.25	11.50	0.84	1.30	9.70	12.38	100.0%	0.78	12.10	1.25
	4.30	11.07	0.83	1.25	9.13	11.93	96.4%	0.77	11.19	1.22
	4.35	10.63	0.81	1.20	8.59	11.47	92.7%	0.75	10.33	1.20
	4.40	10.20	0.79	1.15	8.07	11.02	89.1%	0.73	9.52	1.18
	4.45	9.76	0.78	1.10	7.57	10.57	85.4%	0.72	8.77	1.16
	4.50	9.33	0.76	1.05	7.09	10.12	81.8%	0.70	8.08	1.14
	4.55	8.89	0.75	1.00	6.64	9.67	78.1%	0.69	7.43	1.12
	4.60	8.79	0.71	0.95	6.20	9.51	76.9%	0.65	6.64	1.07
	4.65	8.68	0.66	0.90	5.76	9.36	75.6%	0.62	5.89	1.02
	4.70	8.57	0.62	0.85	5.33	9.21	74.4%	0.58	5.18	0.97
	4.75	8.46	0.58	0.80	4.90	9.05	73.1%	0.54	4.51	0.92
	4.80	8.36	0.54	0.75	4.48	8.90	71.9%	0.50	3.88	0.87
	4.85	8.25	0.49	0.70	4.07	8.75	70.7%	0.47	3.30	0.81
	4.90	8.14	0.45	0.65	3.66	8.59	69.4%	0.43	2.76	0.75
	4.95	8.03	0.41	0.60	3.25	8.44	68.2%	0.39	2.26	0.69
	5.00	7.94	0.36	0.55	2.85	8.30	67.1%	0.34	1.80	0.63
	5.05	7.86	0.31	0.50	2.46	8.17	66.0%	0.30	1.39	0.57
	5.10	7.77	0.27	0.45	2.07	8.03	64.9%	0.26	1.03	0.50
	5.15	7.69	0.22	0.40	1.68	7.90	63.8%	0.21	0.72	0.43
WL	5.20	7.60	0.17	0.35	1.30	7.76	62.7%	0.17	0.45	0.35
	5.25	7.35	0.13	0.30	0.93	7.49	60.5%	0.12	0.25	0.27
	5.30	6.20	0.09	0.25	0.57	6.32	51.1%	0.09	0.12	0.21
	5.35	4.30	0.07	0.20	0.30	4.37	35.3%	0.07	0.05	0.17
	5.40	1.20	0.09	0.15	0.11	1.24	10.0%	0.08	0.02	0.20
	5.45	0.90	0.06	0.10	0.05	0.92	7.5%	0.06	0.01	0.14
	5.50	0.60	0.02	0.05	0.01	0.61	4.9%	0.02	0.00	0.07

Fast Fork Little Cimarron River

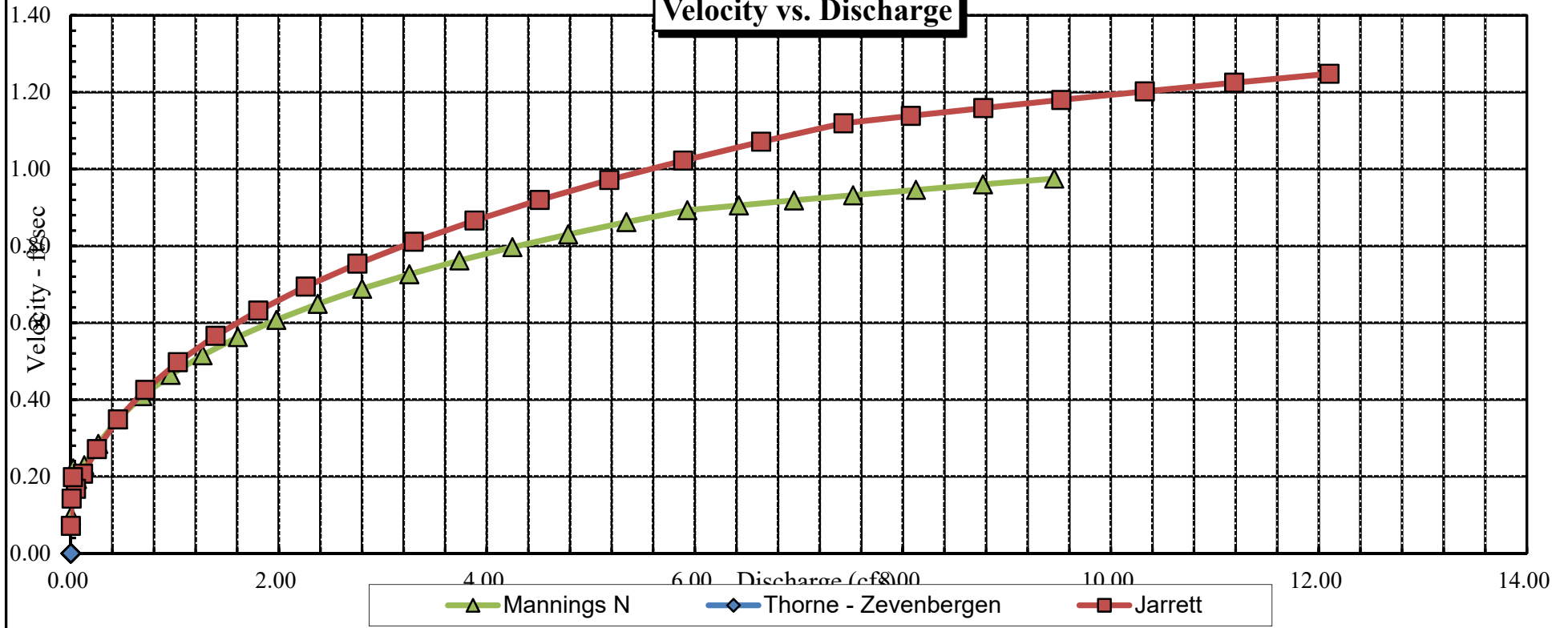
CROSS SECTION DATA ANALYSIS





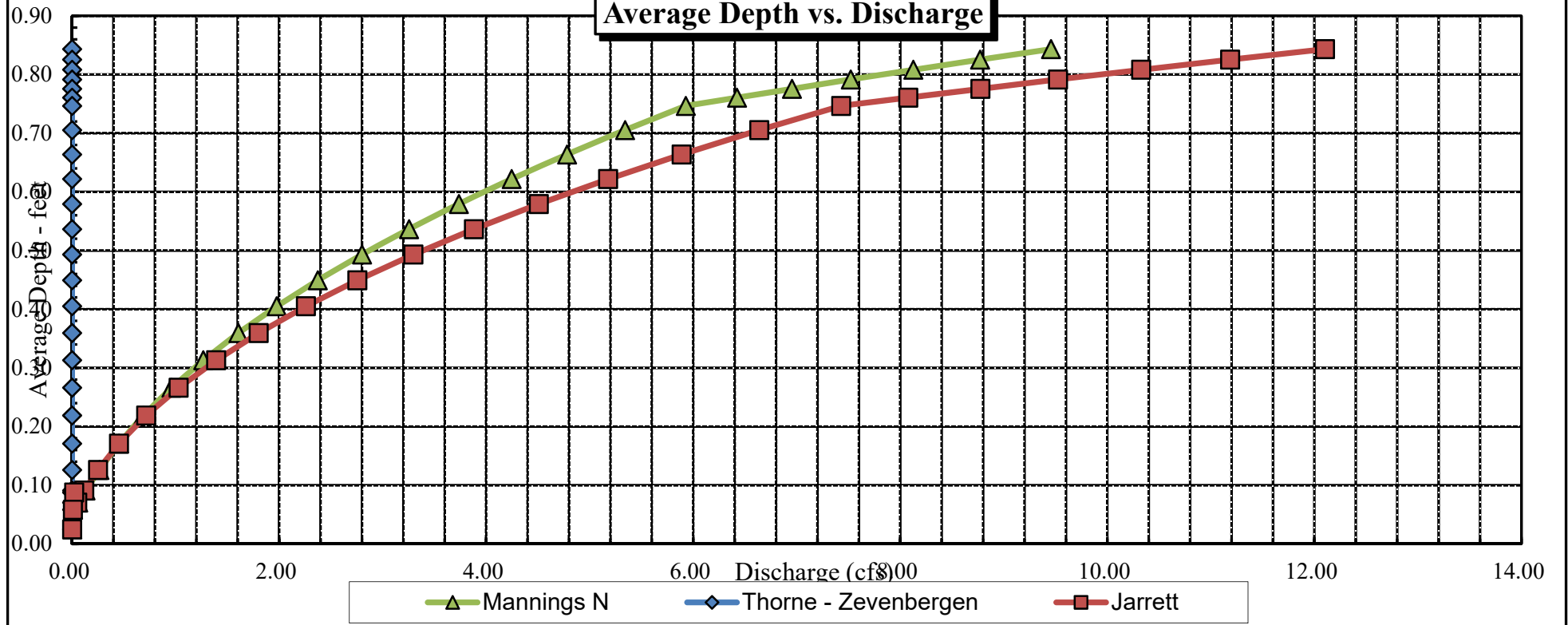
East Fork Little Cimarron River

Velocity vs. Discharge



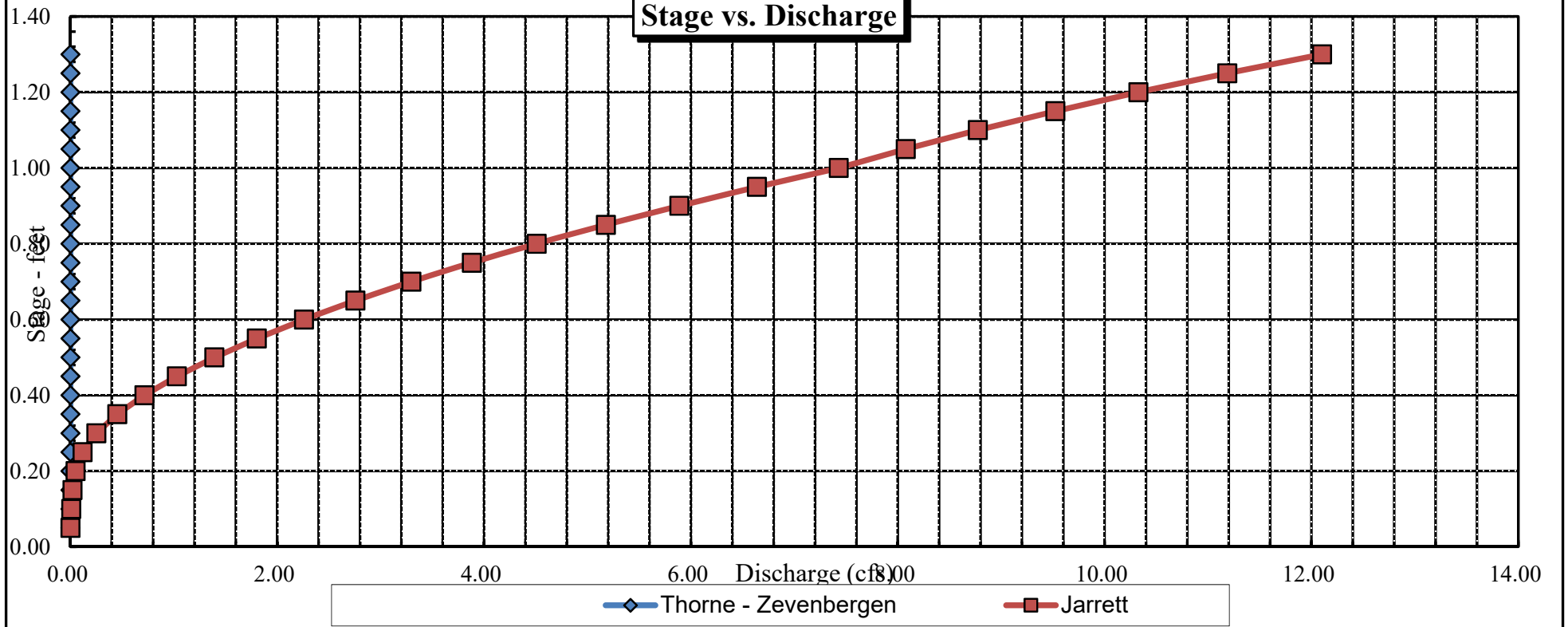
East Fork Little Cimarron River

Average Depth vs. Discharge



East Fork Little Cimarron River

Stage vs. Discharge



Data Input & Proofing

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM-private boundary
 XS NUMBER: 1
 DATE: 7/28/2015
 OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
 SECTION: 33
 TWP: 47N
 RANGE: 5W
 PM: NM

COUNTY: Gunnison
 WATERSHED: Gunnison R.
 DIVISION: 4
 DOW CODE: 44892
 USGS MAP:
 USFS MAP:

TAPE WT: 0.0106 lbs / ft
 TENSION: 99999 lbs

SLOPE: 0.041 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 = 33								
1	LS	0.00	4.00			0.00	0.00	0.00
		3.00	4.07			0.00	0.00	0.00
	G	3.80	4.25			0.00	0.00	0.00
		5.90	4.55			0.00	0.00	0.00
	W	6.20	5.20	0.00	0.00	0.00	0.00	0.00
		6.50	5.30	0.10	0.00	0.03	0.00	5.20
		6.80	5.30	0.10	0.11	0.03	0.00	5.20
		7.10	5.35	0.15	0.00	0.05	0.00	5.20
		7.40	5.30	0.10	0.00	0.03	0.00	5.20
		7.70	5.35	0.15	0.49	0.05	0.02	5.20
		8.00	5.40	0.20	0.09	0.06	0.01	5.20
		8.30	5.40	0.20	0.60	0.06	0.04	5.20
		8.60	5.40	0.20	1.21	0.06	0.07	5.20
		8.90	5.40	0.20	0.67	0.06	0.04	5.20
		9.20	5.40	0.20	0.88	0.06	0.05	5.20
		9.50	5.40	0.20	0.77	0.06	0.05	5.20
		9.80	5.30	0.10	0.44	0.03	0.01	5.20
		10.10	5.30	0.10	0.25	0.03	0.01	5.20
		10.40	5.30	0.10	0.37	0.03	0.01	5.20
		10.70	5.35	0.15	0.42	0.05	0.02	5.20
1		11.00	5.30	0.10	0.48	0.03	0.01	5.20
		11.30	5.40	0.20	0.45	0.06	0.03	5.20
		11.60	5.40	0.20	0.73	0.06	0.04	5.20
		11.90	5.50	0.30	0.30	0.09	0.03	5.20
		12.20	5.55	0.35	0.06	0.11	0.01	5.20
		12.50	5.50	0.30	0.06	0.09	0.01	5.20
		12.80	5.40	0.20	0.00	0.06	0.00	5.20
		13.10	5.40	0.20	0.00	0.06	0.00	5.20
1	W	13.40	5.40	0.20	0.00	0.07	0.00	5.20
		13.80	5.20	0.00	0.00	0.00	0.00	0.00
		14.10	4.96			0.00	0.00	0.00
	G	15.30	4.25			0.00	0.00	0.00
	RS	17.00	3.10			0.00	0.00	0.00

Totals	1.30	0.45
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FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME: <u>East Fork Little Cimarron River</u>		CROSS-SECTION NO.: <u>2</u>
CROSS-SECTION LOCATION: <u>At BLM-private boundary</u>		
DATE: <u>7-28-15</u>	OBSERVERS: <u>R. Smith, A. Breibart</u>	
LEGAL DESCRIPTION	1/4 SECTION: <u>SW</u>	SECTION: <u>33</u>
	TOWNSHIP: <u>47N</u>	RANGE: <u>5E</u> PM: <u>NM</u>
COUNTY: <u>Gunnison</u>	WATERSHED: <u>Gunnison R.</u>	WATER DIVISION: <u>4</u>
		DOW WATER CODE: <u>44892</u>
MAP(S):	USGS: <u>280542</u>	USFS: <u>9,900 ft. 4238973</u>

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	TAPE TENSION: <u>surveyed</u> lbs
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel to 1-foot boulders</u>	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS: <u>3</u>		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	<u>surveyed</u>
⊗ Tape @ Stake RB	0.0	<u>surveyed</u>
① WS @ Tape LB/RB	0.0	<u>6.70 / 6.70</u>
② WS Upstream	<u>20.7</u>	<u>6.28</u>
③ WS Downstream	<u>19.0</u>	<u>7.30</u>
SLOPE	<u>1.02 / 39.7 / = .026</u>	

SKETCH

Sketch showing a vertical line labeled 'TAPE' with stakes at the top and bottom. Water surface elevation points are marked with circles and numbers 1, 2, and 3. Arrows indicate the direction of flow.

LEGEND:

Stake ⊗

Station ①

Photo ◇

Direction of Flow →

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO <u>NO</u>	DISTANCE ELECTROFISHED: _____ ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO <u>NO</u>														
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:																	
<u>mayfly, caddisfly, stonefly</u>																	

COMMENTS

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: East Fork Little Cimarron River
XS LOCATION: At BLM - Private Boundary
XS NUMBER: 2

DATE: 28-Jul-15
OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
SECTION: 33
TWP: 47N
RANGE: 5W
PM: NM

COUNTY: Gunnison
WATERSHED: Gunnison R.
DIVISION: 4
DOW CODE: 44892

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: 0.026

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM - Private Boundary
 XS NUMBER: 2

DATA POINTS= 26

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
RS	0.00	5.40		
1 G	1.70	5.75		
	3.00	5.99		
	4.30	6.56		
W	4.60	6.70	0.00	0.00
	4.90	6.80	0.10	0.00
	5.20	6.80	0.10	0.16
	5.50	6.90	0.20	0.27
	5.80	6.90	0.20	0.21
	6.10	6.95	0.25	0.40
	6.40	6.90	0.20	0.32
	6.70	7.00	0.30	0.71
	7.00	7.00	0.30	0.77
	7.30	7.00	0.30	1.21
	7.60	6.90	0.20	0.98
	7.90	6.95	0.25	0.47
	8.20	6.90	0.20	0.48
	8.50	6.90	0.20	0.12
	8.80	6.80	0.10	0.38
	9.10	6.80	0.10	0.80
	9.40	6.80	0.10	0.00
W	9.80	6.70	0.00	0.00
	12.00	6.34		
	13.00	5.76		
1 G	13.40	5.68		
LS	16.60	4.95		

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%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.32	0.10	0.03	0.00	0.0%
0.30	0.10	0.03	0.00	1.0%
0.32	0.20	0.06	0.02	3.3%
0.30	0.20	0.06	0.01	2.6%
0.30	0.25	0.08	0.03	6.1%
0.30	0.20	0.06	0.02	3.9%
0.32	0.30	0.09	0.06	13.0%
0.30	0.30	0.09	0.07	14.1%
0.30	0.30	0.09	0.11	22.2%
0.32	0.20	0.06	0.06	12.0%
0.30	0.25	0.08	0.04	7.2%
0.30	0.20	0.06	0.03	5.9%
0.30	0.20	0.06	0.01	1.5%
0.32	0.10	0.03	0.01	2.3%
0.30	0.10	0.03	0.02	4.9%
0.30	0.10	0.04	0.00	0.0%
0.41		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%

5.31 0.3 0.94 0.49 100.0%
 (Max.)

Manning's n = 0.1435
 Hydraulic Radius= 0.1760828

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM - Private Boundary
 XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.94	0.94	0.0%
6.45	0.94	2.49	166.7%
6.47	0.94	2.35	151.3%
6.49	0.94	2.21	136.3%
6.51	0.94	2.07	121.6%
6.53	0.94	1.94	107.3%
6.55	0.94	1.81	93.4%
6.57	0.94	1.68	79.8%
6.59	0.94	1.56	66.5%
6.61	0.94	1.44	53.6%
6.63	0.94	1.32	41.1%
6.65	0.94	1.21	28.9%
6.66	0.94	1.15	23.0%
6.67	0.94	1.09	17.1%
6.68	0.94	1.04	11.3%
6.69	0.94	0.99	5.6%
6.70	0.94	0.94	0.0%
6.71	0.94	0.88	-5.5%
6.72	0.94	0.83	-11.0%
6.73	0.94	0.78	-16.3%
6.74	0.94	0.73	-21.6%
6.75	0.94	0.68	-26.9%
6.77	0.94	0.59	-37.1%
6.79	0.94	0.50	-47.0%
6.81	0.94	0.41	-55.7%
6.83	0.94	0.34	-63.1%
6.85	0.94	0.28	-70.3%
6.87	0.94	0.21	-77.3%
6.89	0.94	0.15	-83.9%
6.91	0.94	0.10	-89.6%
6.93	0.94	0.06	-93.4%
6.95	0.94	0.04	-96.0%

WATERLINE AT ZERO

AREA ERROR = 6.700

STREAM NAME: East Fork Little Cimarron River
 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	5.75	11.35	0.79	1.25	8.97	11.82	100.0%	0.76	12.46	1.39
	5.75	11.35	0.79	1.25	8.97	11.82	100.0%	0.76	12.46	1.39
	5.80	10.96	0.77	1.20	8.41	11.41	96.6%	0.74	11.46	1.36
	5.85	10.60	0.74	1.15	7.88	11.04	93.4%	0.71	10.50	1.33
	5.90	10.25	0.72	1.10	7.35	10.66	90.2%	0.69	9.58	1.30
	5.95	9.89	0.69	1.05	6.85	10.29	87.0%	0.67	8.72	1.27
	6.00	9.56	0.67	1.00	6.37	9.94	84.1%	0.64	7.89	1.24
	6.05	9.36	0.63	0.95	5.89	9.72	82.2%	0.61	7.05	1.20
	6.10	9.16	0.59	0.90	5.43	9.49	80.3%	0.57	6.24	1.15
	6.15	8.96	0.56	0.85	4.98	9.27	78.4%	0.54	5.49	1.10
	6.20	8.76	0.52	0.80	4.53	9.05	76.5%	0.50	4.77	1.05
	6.25	8.56	0.48	0.75	4.10	8.82	74.6%	0.46	4.11	1.00
	6.30	8.36	0.44	0.70	3.68	8.60	72.7%	0.43	3.48	0.95
	6.35	8.12	0.40	0.65	3.26	8.33	70.5%	0.39	2.92	0.89
	6.40	7.70	0.37	0.60	2.87	7.90	66.8%	0.36	2.44	0.85
	6.45	7.28	0.34	0.55	2.49	7.46	63.1%	0.33	2.00	0.80
	6.50	6.86	0.31	0.50	2.14	7.03	59.5%	0.30	1.62	0.76
	6.55	6.44	0.28	0.45	1.81	6.59	55.8%	0.27	1.27	0.70
	6.60	6.03	0.25	0.40	1.50	6.17	52.2%	0.24	0.97	0.65
	6.65	5.61	0.21	0.35	1.21	5.74	48.5%	0.21	0.71	0.59
WL	6.70	5.20	0.18	0.30	0.93	5.31	44.9%	0.18	0.49	0.52
	6.75	4.85	0.14	0.25	0.68	4.95	41.8%	0.14	0.31	0.45
	6.80	3.60	0.13	0.20	0.45	3.68	31.1%	0.12	0.19	0.41
	6.85	3.30	0.08	0.15	0.28	3.37	28.5%	0.08	0.09	0.32
	6.90	2.40	0.05	0.10	0.12	2.45	20.7%	0.05	0.03	0.22
	6.95	0.90	0.04	0.05	0.04	0.92	7.8%	0.04	0.01	0.20
	7.00	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

STREAM NAME: East Fork Little Cimarron River
XS LOCATION: At BLM - Private Boundary
XS NUMBER: 2

SUMMARY SHEET

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

MEASURED WATERLINE (WLm)= 6.70 ft
CALCULATED WATERLINE (WLc)= 6.70 ft
(WLm-WLc)/WLm * 100 = 0.0 %

MAX MEASURED DEPTH (Dm)= 0.30 ft
MAX CALCULATED DEPTH (Dc)= 0.30 ft
(Dm-Dc)/Dm * 100 = 0.0 %

MEAN VELOCITY= 0.52 ft/sec
MANNING'S N= 0.144
SLOPE= 0.026 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: East Fork Little Cimarron River
 XS LOCATION: At BLM - Private Boundary
 XS NUMBER: 2

Jarrett Variable Manning's n Correction Applied

GL = lowest Grassline elevation corrected for sag

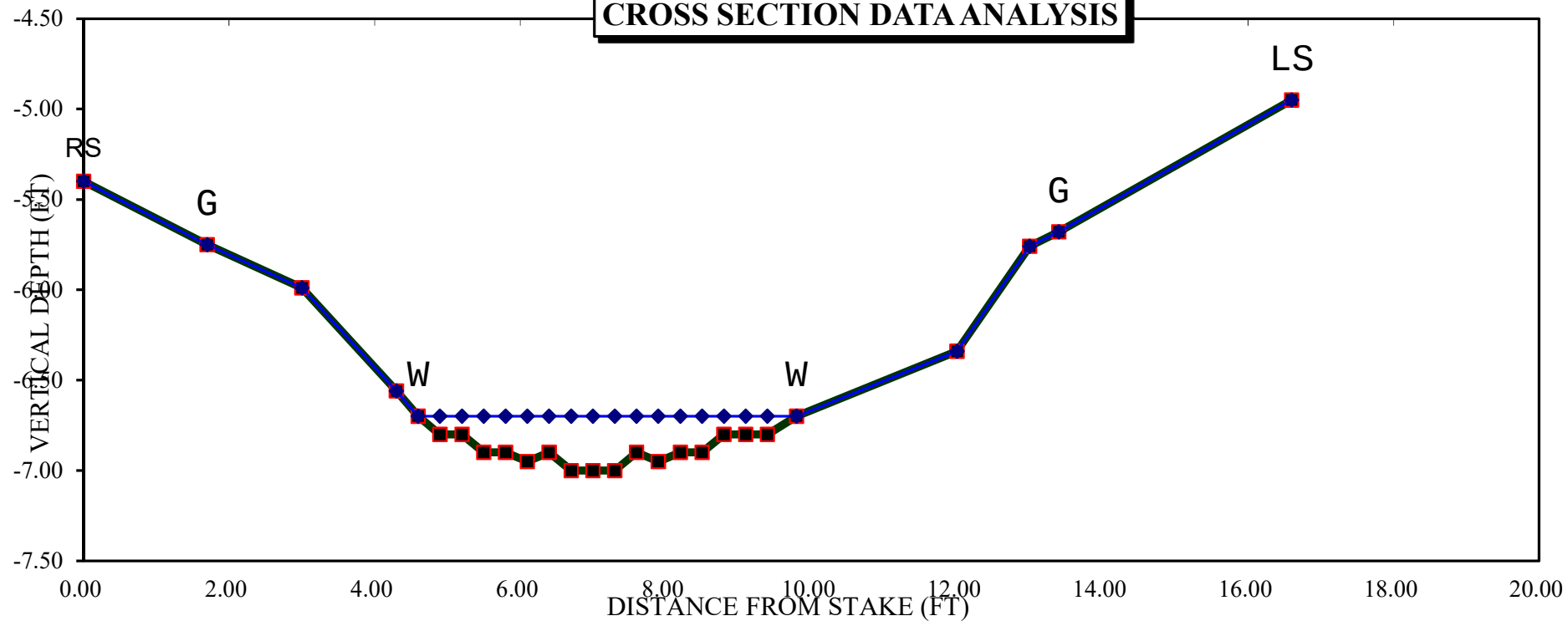
STAGING TABLE

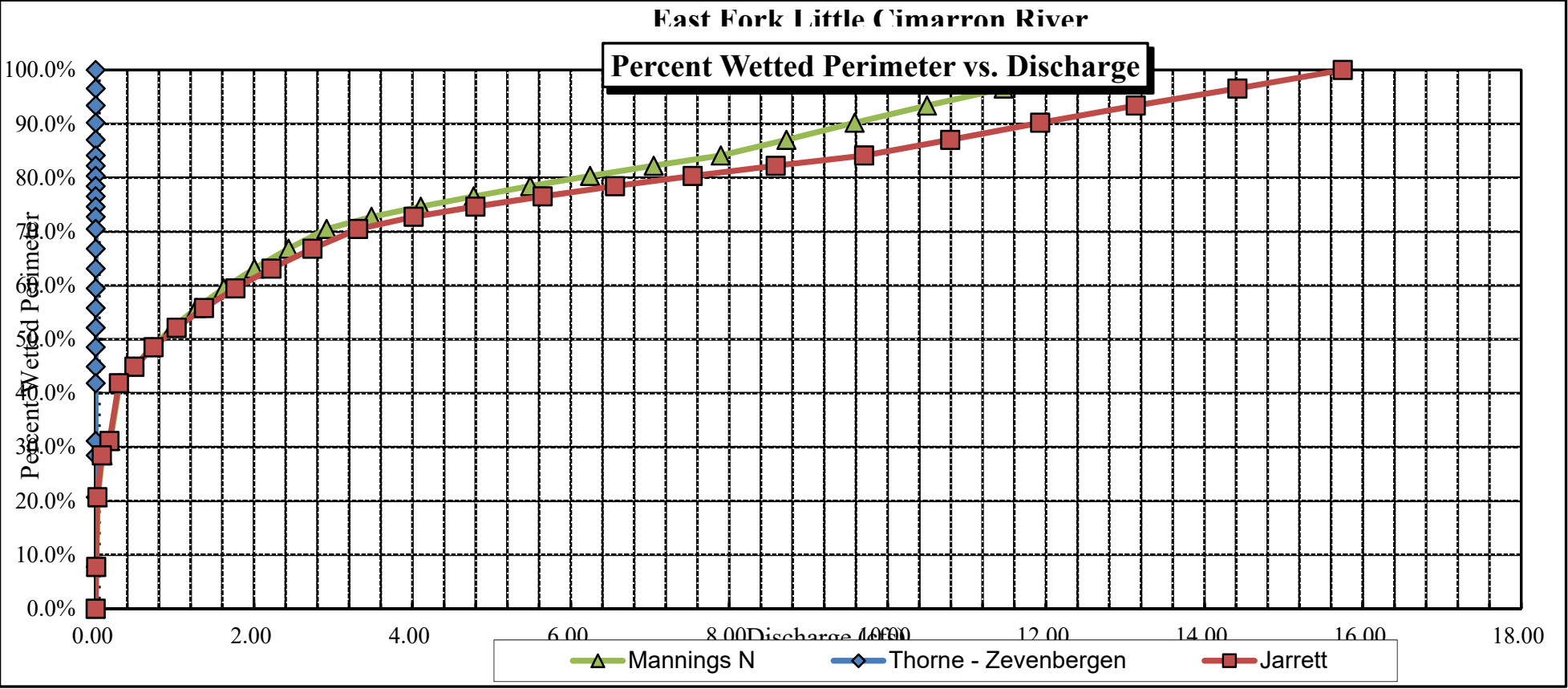
WL = Waterline corrected for variations in field measured water surface elevations and sag

	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	5.75	11.35	0.79	1.25	8.97	11.82	100.0%	0.76	15.75	1.76
	5.75	11.35	0.79	1.25	8.97	11.82	100.0%	0.76	15.75	1.76
	5.80	10.96	0.77	1.20	8.41	11.41	96.6%	0.74	14.42	1.71
	5.85	10.60	0.74	1.15	7.88	11.04	93.4%	0.71	13.13	1.67
	5.90	10.25	0.72	1.10	7.35	10.66	90.2%	0.69	11.92	1.62
	5.95	9.89	0.69	1.05	6.85	10.29	87.0%	0.67	10.79	1.58
	6.00	9.56	0.67	1.00	6.37	9.94	84.1%	0.64	9.70	1.52
	6.05	9.36	0.63	0.95	5.89	9.72	82.2%	0.61	8.59	1.46
	6.10	9.16	0.59	0.90	5.43	9.49	80.3%	0.57	7.54	1.39
	6.15	8.96	0.56	0.85	4.98	9.27	78.4%	0.54	6.56	1.32
	6.20	8.76	0.52	0.80	4.53	9.05	76.5%	0.50	5.64	1.25
	6.25	8.56	0.48	0.75	4.10	8.82	74.6%	0.46	4.80	1.17
	6.30	8.36	0.44	0.70	3.68	8.60	72.7%	0.43	4.02	1.09
	6.35	8.12	0.40	0.65	3.26	8.33	70.5%	0.39	3.31	1.02
	6.40	7.70	0.37	0.60	2.87	7.90	66.8%	0.36	2.74	0.95
	6.45	7.28	0.34	0.55	2.49	7.46	63.1%	0.33	2.22	0.89
	6.50	6.86	0.31	0.50	2.14	7.03	59.5%	0.30	1.77	0.82
	6.55	6.44	0.28	0.45	1.81	6.59	55.8%	0.27	1.37	0.76
	6.60	6.03	0.25	0.40	1.50	6.17	52.2%	0.24	1.02	0.68
	6.65	5.61	0.21	0.35	1.21	5.74	48.5%	0.21	0.73	0.61
WL	6.70	5.20	0.18	0.30	0.93	5.31	44.9%	0.18	0.49	0.52
	6.75	4.85	0.14	0.25	0.68	4.95	41.8%	0.14	0.29	0.43
	6.80	3.60	0.13	0.20	0.45	3.68	31.1%	0.12	0.17	0.39
	6.85	3.30	0.08	0.15	0.28	3.37	28.5%	0.08	0.08	0.28
	6.90	2.40	0.05	0.10	0.12	2.45	20.7%	0.05	0.02	0.18
	6.95	0.90	0.04	0.05	0.04	0.92	7.8%	0.04	0.01	0.16
	7.00	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

Fast Fork Little Cimarron River

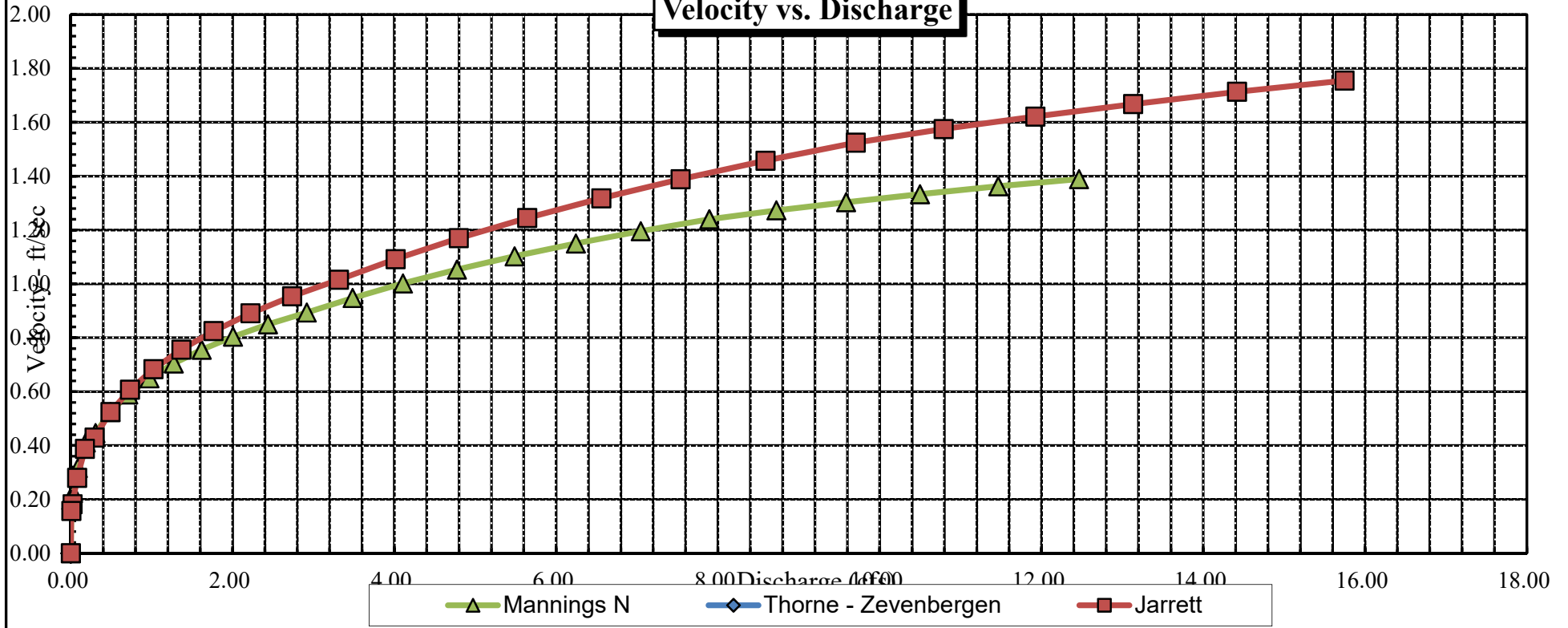
CROSS SECTION DATA ANALYSIS





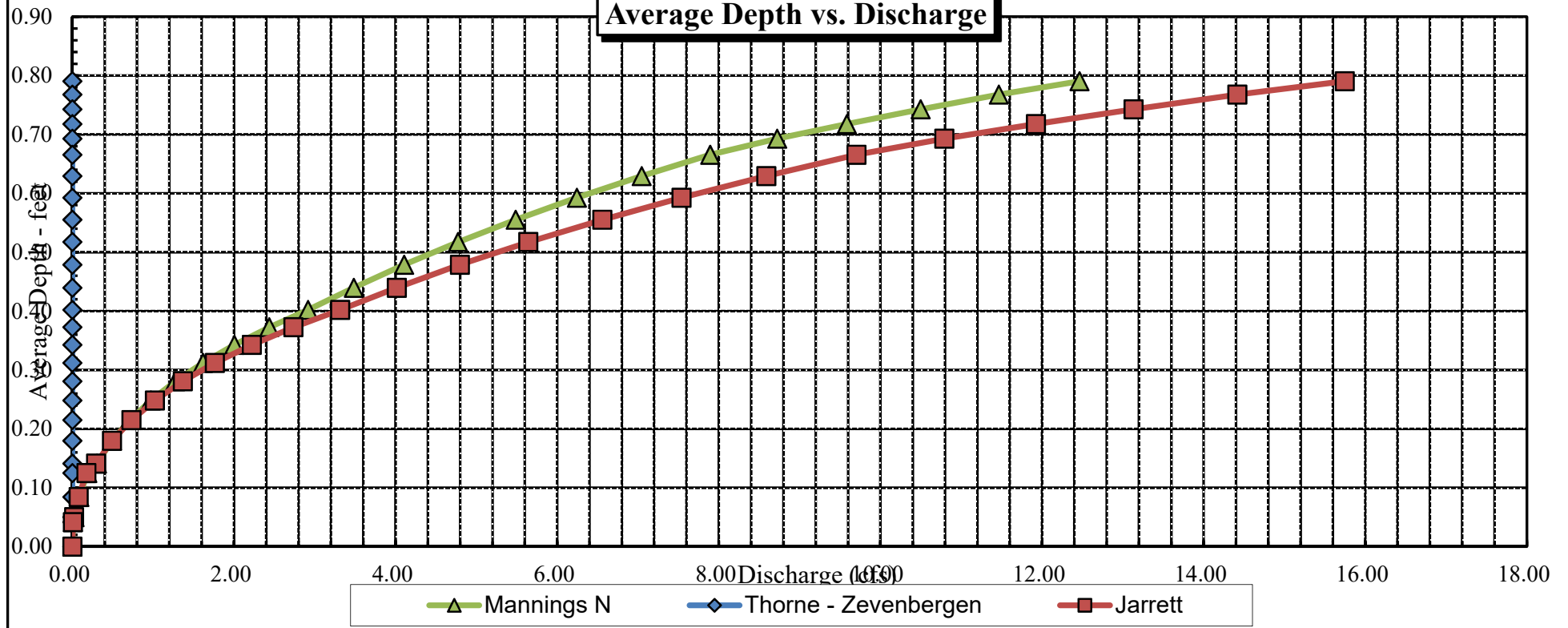
East Fork Little Cimarron River

Velocity vs. Discharge



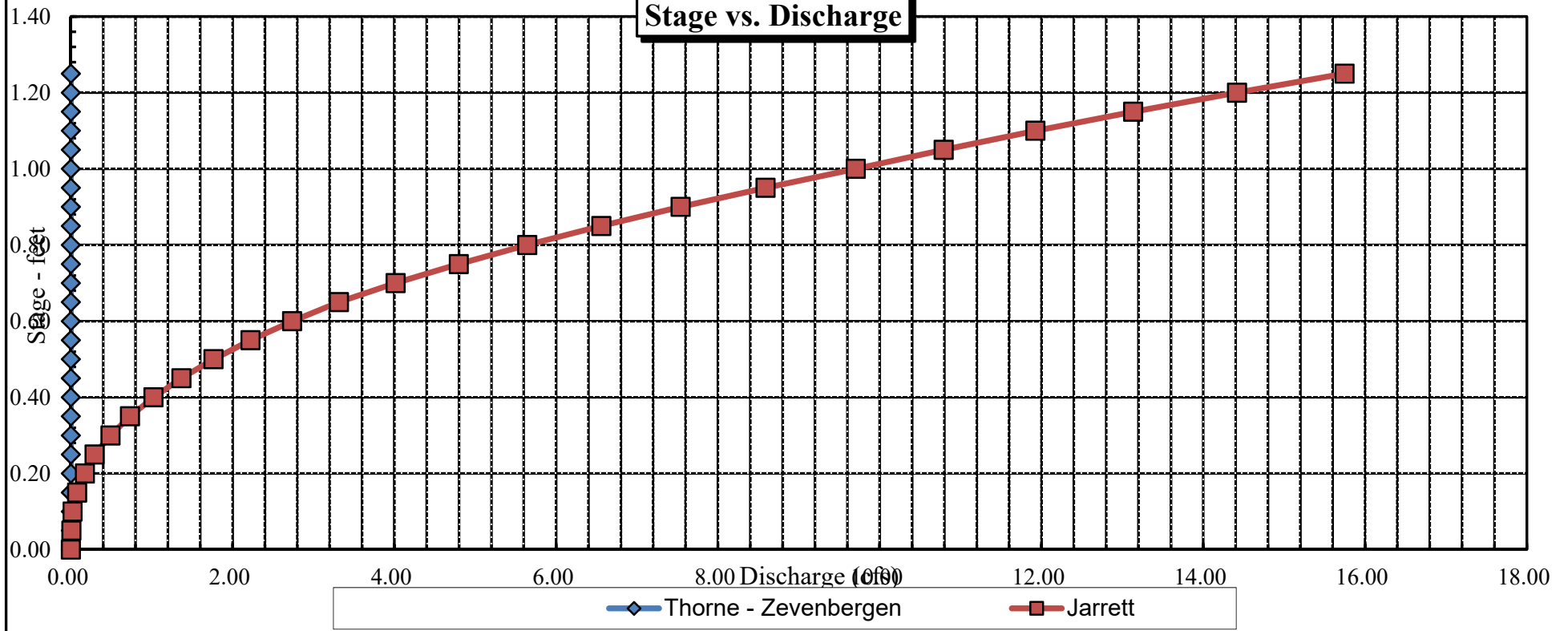
East Fork Little Cimarron River

Average Depth vs. Discharge



East Fork Little Cimarron River

Stage vs. Discharge



Data Input & Proofing

STREAM NAME: East Fork Little Cimarron River
 XS LOCATION: At BLM - Private Boundary
 XS NUMBER: 2
 DATE: 7/28/2015
 OBSERVERS: R. Smith, A. Breibart

1/4 SEC: SW
 SECTION: 33
 TWP: 47N
 RANGE: 5W
 PM: NM

COUNTY: Gunnison
 WATERSHED: Gunnison R.
 DIVISION: 4
 DOW CODE: 44892
 USGS MAP:
 USFS MAP:

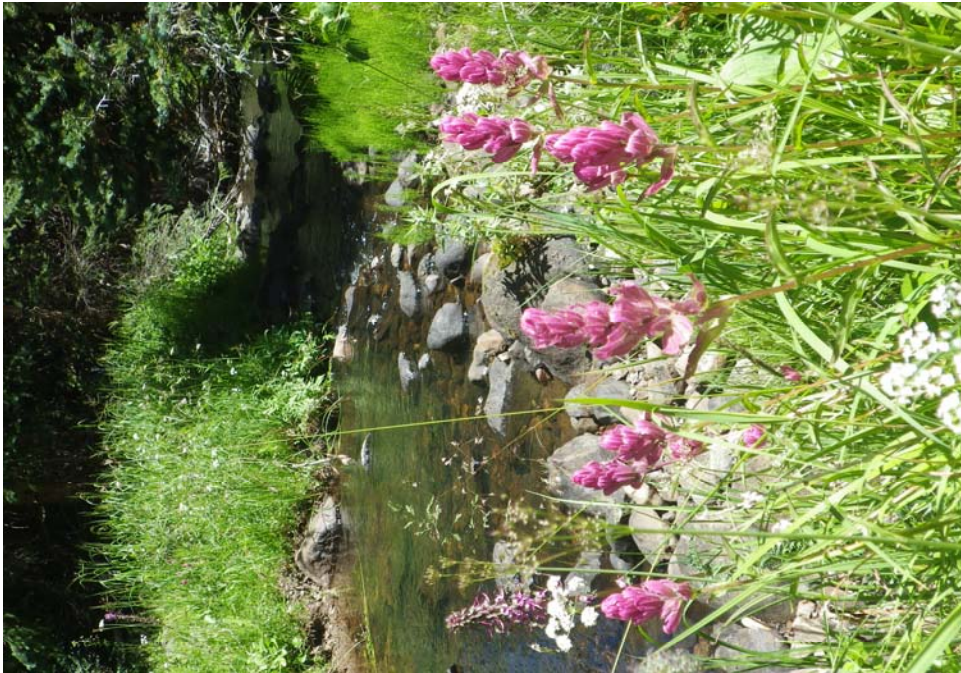
TAPE WT: 0.0106 lbs / ft
 TENSION: 99999 lbs
 SLOPE: 0.026 ft / ft

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

ASSIGNED TO:DATE.....

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
Total Data Points = 26								
1	RS	0.00	5.40			0.00	0.00	0.00
	G	1.70	5.75			0.00	0.00	0.00
		3.00	5.99			0.00	0.00	0.00
		4.30	6.56			0.00	0.00	0.00
	W	4.60	6.70	0.00	0.00	0.00	0.00	0.00
		4.90	6.80	0.10	0.00	0.03	0.00	6.70
		5.20	6.80	0.10	0.16	0.03	0.00	6.70
		5.50	6.90	0.20	0.27	0.06	0.02	6.70
		5.80	6.90	0.20	0.21	0.06	0.01	6.70
		6.10	6.95	0.25	0.40	0.08	0.03	6.70
		6.40	6.90	0.20	0.32	0.06	0.02	6.70
		6.70	7.00	0.30	0.71	0.09	0.06	6.70
		7.00	7.00	0.30	0.77	0.09	0.07	6.70
		7.30	7.00	0.30	1.21	0.09	0.11	6.70
		7.60	6.90	0.20	0.98	0.06	0.06	6.70
		7.90	6.95	0.25	0.47	0.08	0.04	6.70
1		8.20	6.90	0.20	0.48	0.06	0.03	6.70
		8.50	6.90	0.20	0.12	0.06	0.01	6.70
		8.80	6.80	0.10	0.38	0.03	0.01	6.70
		9.10	6.80	0.10	0.80	0.03	0.02	6.70
		9.40	6.80	0.10	0.00	0.04	0.00	6.70
	W	9.80	6.70	0.00	0.00	0.00	0.00	0.00
		12.00	6.34			0.00	0.00	0.00
		13.00	5.76			0.00	0.00	0.00
	G	13.40	5.68			0.00	0.00	0.00
	LS	16.60	4.95			0.00	0.00	0.00

Totals	0.94	0.49
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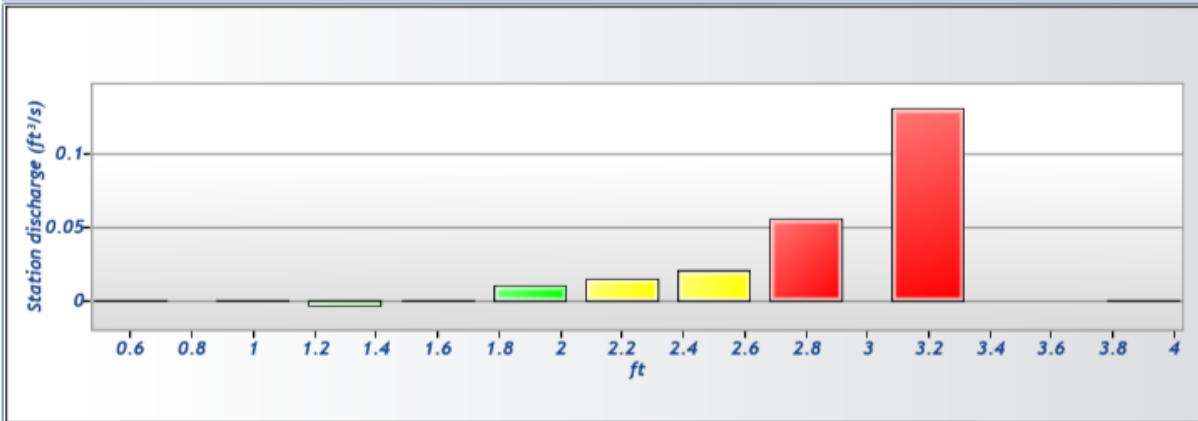




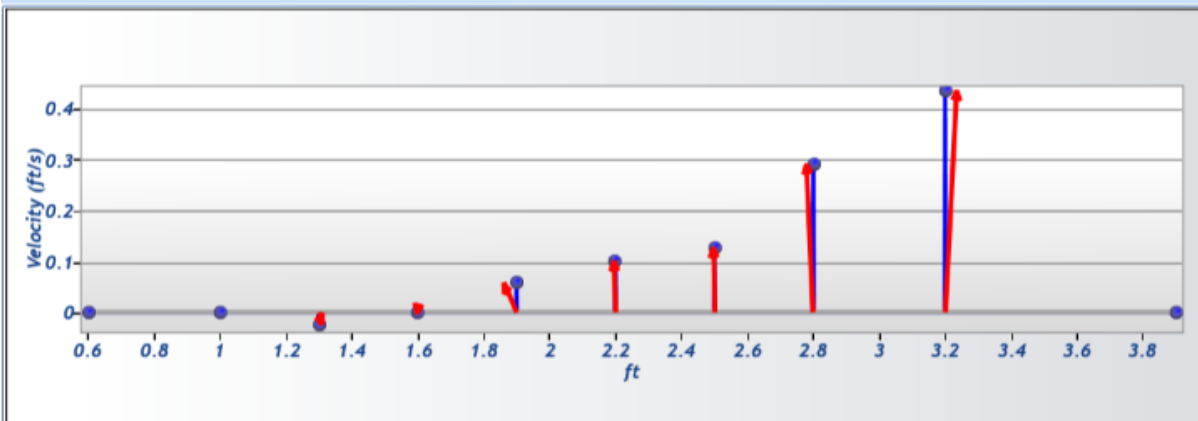
Discharge Measurement Summary

File Information		Discharge Summary	
File name	EFLCD4_20180627-125324.ft	Start time	6/27/2018 12:42:03 PM
Start date and time	6/27/2018 12:40 PM	End time	6/27/2018 12:52:05 PM
Calculations engine	FlowTracker2	# Stations	10
Data collection mode	Discharge	Avg interval	40
		Mean depth	0.434 ft
		Mean velocity	0.1605 ft/s
		Total width	3.300 ft
		Mean SNR	38 dB
		Total area	1.4325 ft ²
		Mean temp	60.843 °F
		Total discharge	0.2299 ft ³ /s
System Information		Site Details	
Sensor type	Top Setting	Site name	East Fork Little Cimarron River
Handheld serial number	FT2H1747037	Site number	2
Probe serial number	FT2P1747048	Operator(s)	Jack Landers
Probe firmware	1.23	Comment	Upstream of small reservoir
Handheld software	1.4		
Discharge Uncertainty		Discharge Settings	
Category	ISO IVE	Discharge equation	Mid Section
Accuracy	1.0% 1.0%	Discharge uncertainty	IVE
Depth	0.9% 11.5%	Discharge reference	Rated
Velocity	2.9% 6.8%		
Width	0.3% 0.3%		
Method	4.7%		
# Stations	5.1%		
Overall	7.7% 13.4%		
		Station Warning Settings	
		Station discharge caution	5.00 %
		Station discharge warning	10.00 %
		Maximum depth change	50.00 %
		Maximum spacing change	100.00 %
Summary overview		Data Collection Settings	
No changes were made to this file Quality control warnings		Salinity	0.000 PSS-78
		Temperature	°F
		Sound speed	ft/s
		Mounting correction	0.00 %
		Quality Control Settings	
		SNR threshold	10 dB
		Standard error threshold	0.0328 ft/s
		Spike threshold	10.00 %
		Maximum velocity angle	20.0 deg
		Maximum tilt angle	5.0 deg

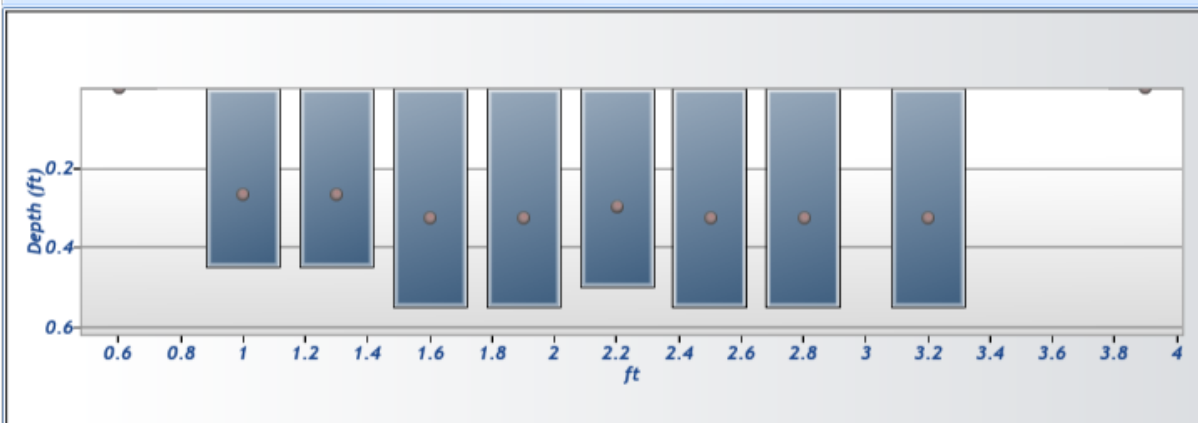
Discharge chart



Velocity chart



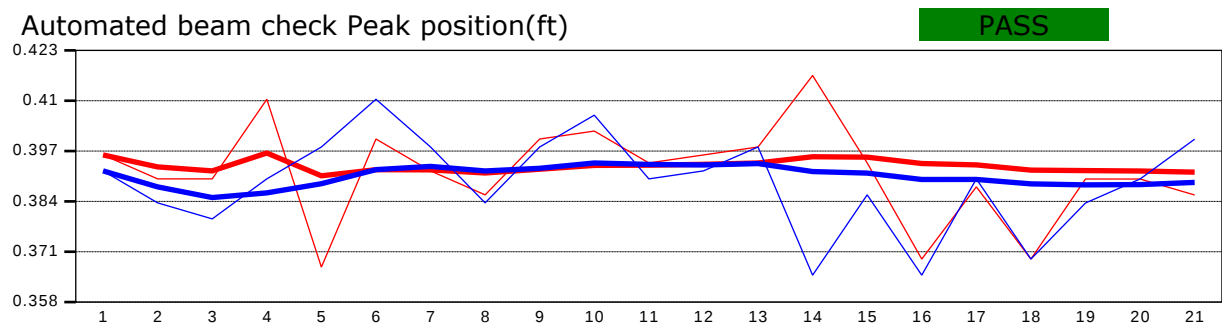
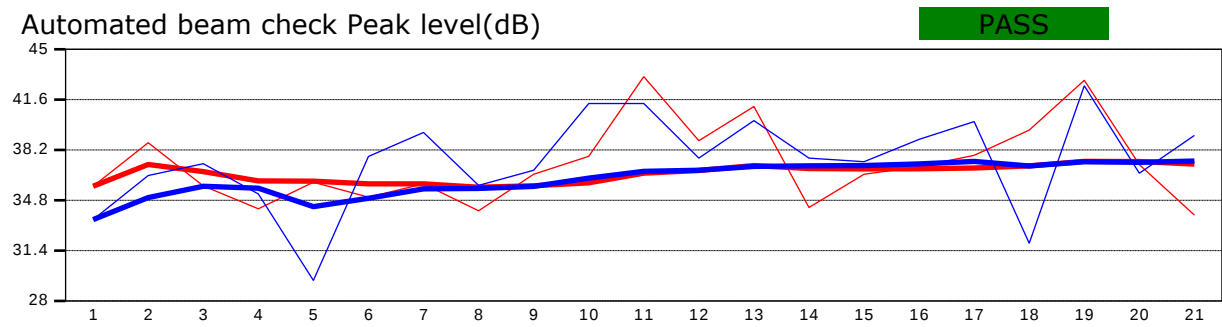
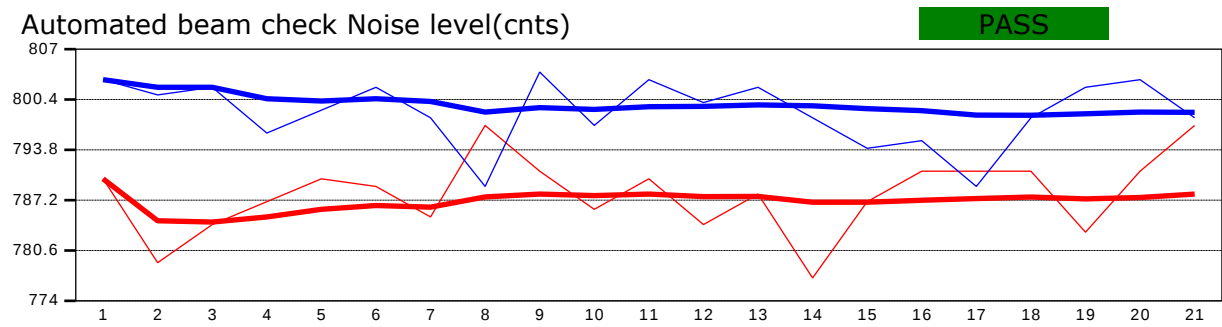
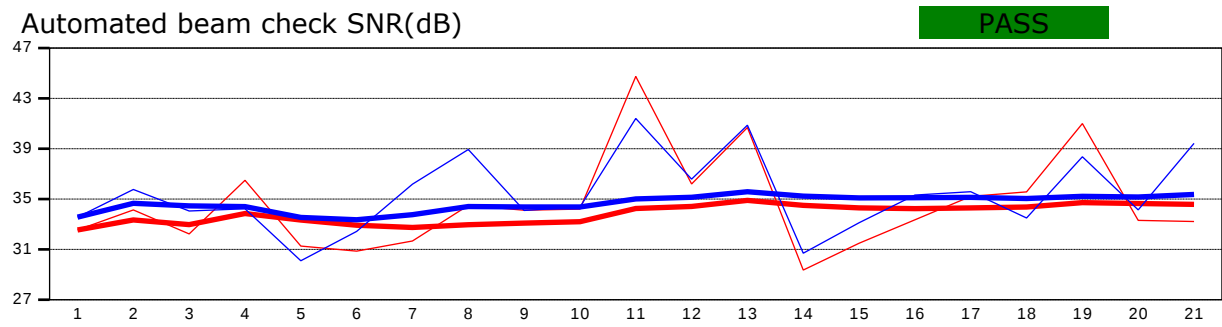
Depth chart



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	12:42 PM	0.600	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0002	0.0000	0.0000	0.00	✓	
1	12:42 PM	1.000	0.6	0.450	0.6000	0.270	80	0.0002	1.0000	0.0002	0.1575	0.0000	0.02	✓	
2	12:43 PM	1.300	0.6	0.450	0.6000	0.270	80	-0.0233	1.0000	-0.0233	0.1350	-0.0031	-1.37	✓	
3	12:44 PM	1.600	0.6	0.550	0.6000	0.330	80	-0.0013	1.0000	-0.0013	0.1650	-0.0002	-0.09	✓	
4	12:46 PM	1.900	0.6	0.550	0.6000	0.330	80	0.0594	1.0000	0.0594	0.1650	0.0098	4.26	✓	
5	12:47 PM	2.200	0.6	0.500	0.6000	0.300	80	0.1009	1.0000	0.1009	0.1500	0.0151	6.58	✓	
6	12:48 PM	2.500	0.6	0.550	0.6000	0.330	80	0.1270	1.0000	0.1270	0.1650	0.0210	9.12	✓	
7	12:49 PM	2.800	0.6	0.550	0.6000	0.330	80	0.2901	1.0000	0.2901	0.1925	0.0558	24.29	✓	
8	12:50 PM	3.200	0.6	0.550	0.6000	0.330	80	0.4345	1.0000	0.4345	0.3025	0.1314	57.18	✓	
9	12:52 PM	3.900	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.4345	0.0000	0.0000	0.00	✓	

Quality control warnings							
St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measure d Depth (ft)	Warnings
1	12:42 PM	1.000	0.6	0.450	0.6000	0.270	Beam SNRs Not Similar,SNR Threshold Variation
2	12:43 PM	1.300	0.6	0.450	0.6000	0.270	Boundary Interference
3	12:44 PM	1.600	0.6	0.550	0.6000	0.330	Boundary Interference,Beam SNRs Not Similar
7	12:49 PM	2.800	0.6	0.550	0.6000	0.330	High Stn % Discharge
8	12:50 PM	3.200	0.6	0.550	0.6000	0.330	High Stn % Discharge

Automated beam check Start time 6/27/2018 12:41:16 PM



Automated beam check Quality control warnings

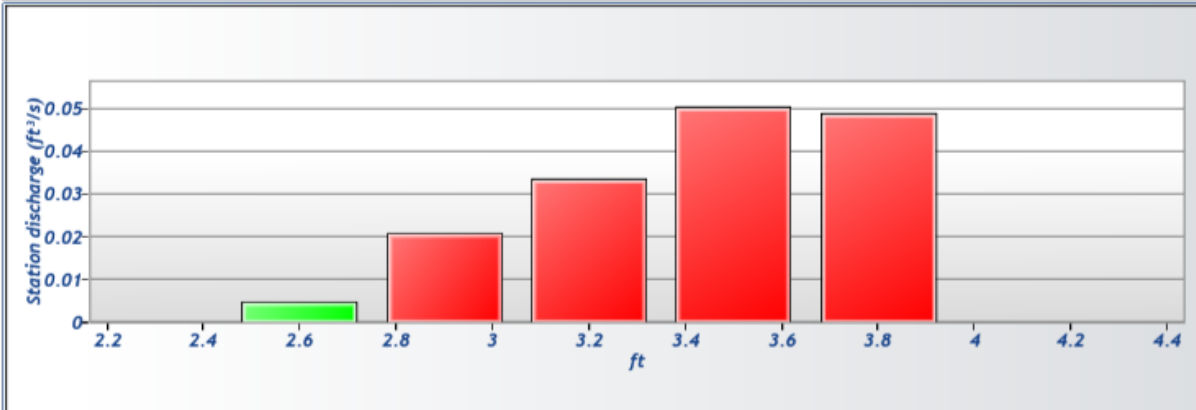
No quality control warnings



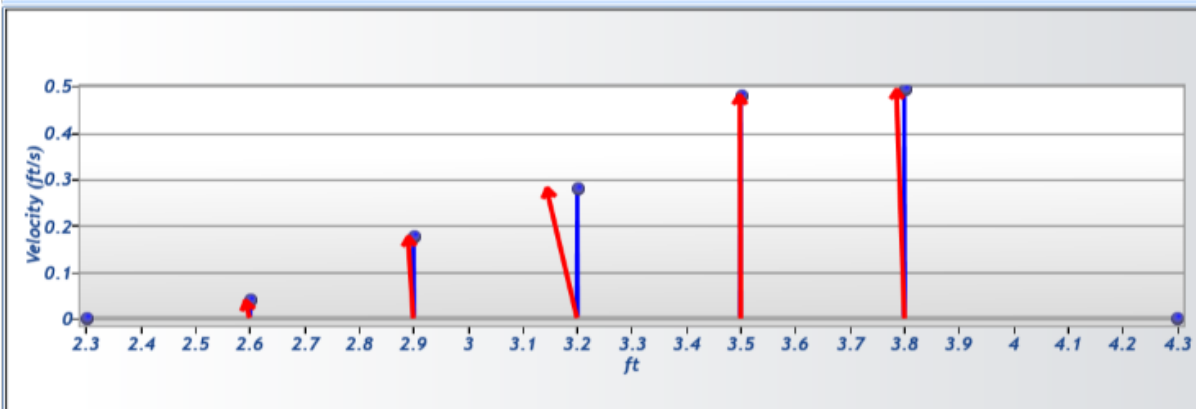
Discharge Measurement Summary

File Information		Discharge Summary	
File name	Efk lil Cim_20180627-115515.ft	Start time	6/27/2018 11:45:27 AM
Start date and time	6/27/2018 11:43 AM	End time	6/27/2018 11:52:11 AM
Calculations engine	FlowTracker2	# Stations	7
Data collection mode	Discharge	Avg interval	40
		Mean depth	0.283 ft
		Mean velocity	0.2820 ft/s
		Total width	2.000 ft
		Mean SNR	49 dB
		Total area	0.5650 ft ²
		Mean temp	54.449 °F
		Total discharge	0.1593 ft ³ /s
System Information		Site Details	
Sensor type	Top Setting	Site name	East Fork Little Cimarron River
Handheld serial number	FT2H1747037	Site number	1
Probe serial number	FT2P1747048	Operator(s)	Jack Landers
Probe firmware	1.23	Comment	BLM land downstream of small reservoir
Handheld software	1.4		
Discharge Uncertainty		Discharge Settings	
Category	ISO IVE	Discharge equation	Mid Section
Accuracy	1.0% 1.0%	Discharge uncertainty	IVE
Depth	0.8% 16.6%	Discharge reference	Rated
Velocity	1.2% 9.9%		
Width	0.3% 0.3%		
Method	3.8%		
# Stations	7.8%		
Overall	8.8% 19.3%		
Summary overview		Station Warning Settings	
No changes were made to this file		Station discharge caution	5.00 %
Quality control warnings		Station discharge warning	10.00 %
		Maximum depth change	50.00 %
		Maximum spacing change	100.00 %
		Data Collection Settings	
		Salinity	0.000 PSS-78
		Temperature	°F
		Sound speed	ft/s
		Mounting correction	0.00 %
		Quality Control Settings	
		SNR threshold	10 dB
		Standard error threshold	0.0328 ft/s
		Spike threshold	10.00 %
		Maximum velocity angle	20.0 deg
		Maximum tilt angle	5.0 deg

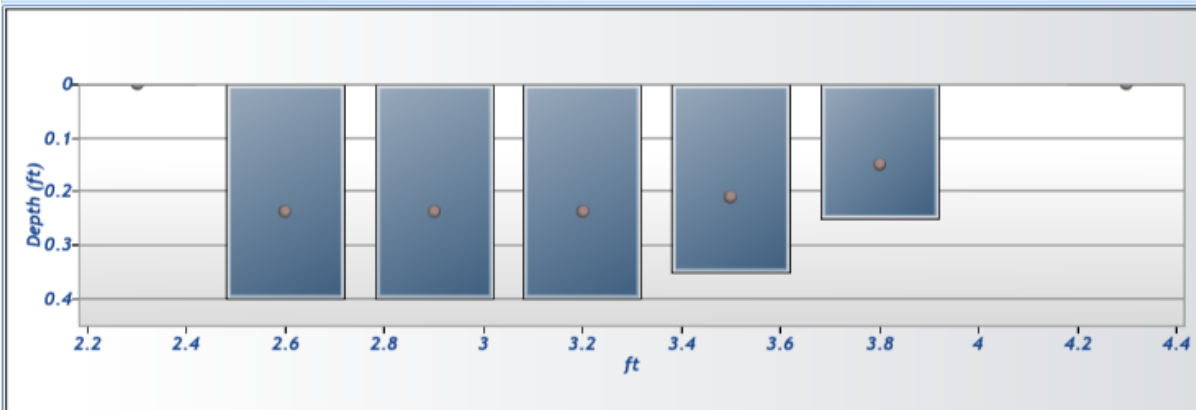
Discharge chart



Velocity chart



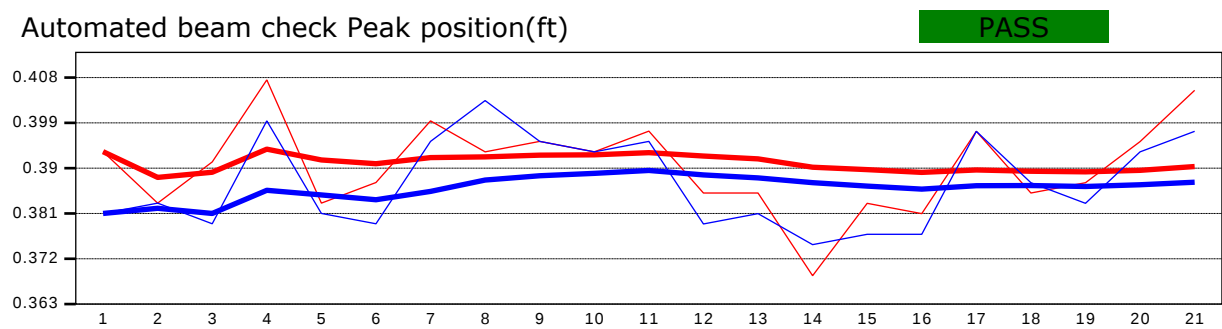
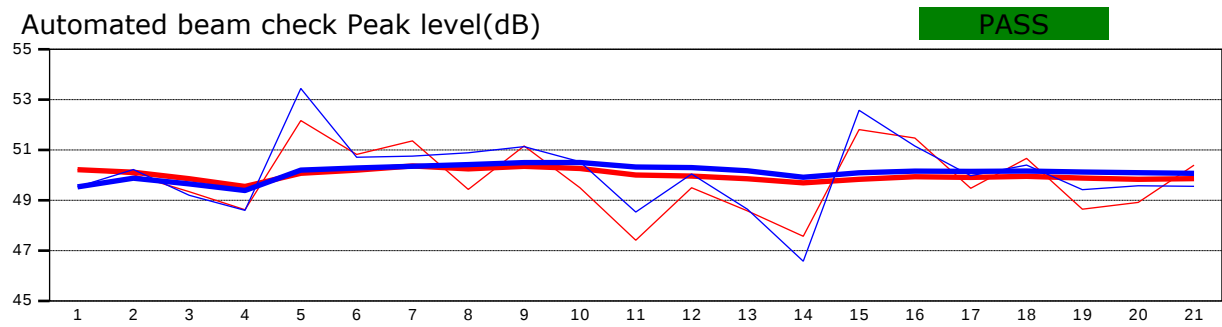
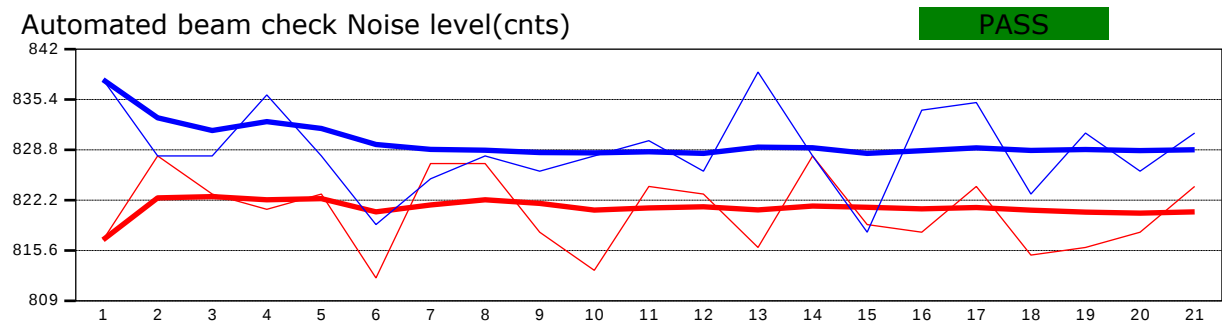
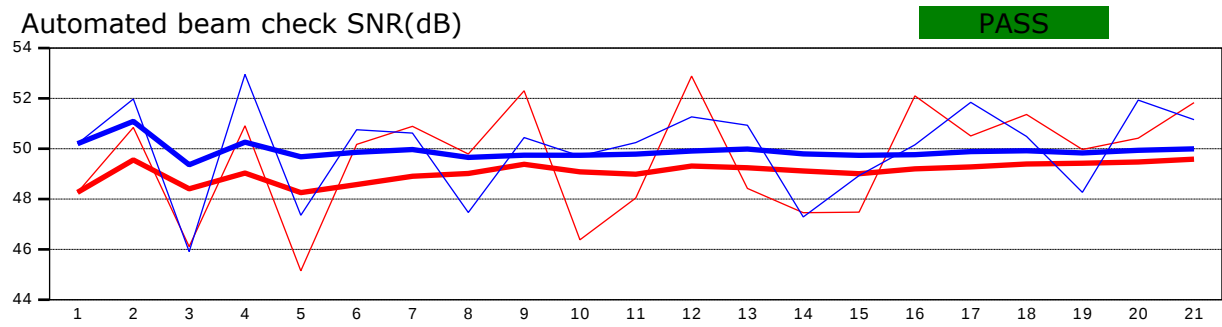
Depth chart



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	11:45 AM	2.300	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.0401	0.0000	0.0000	0.00	✓
1	11:45 AM	2.600	0.6	0.400	0.6000	0.240	80	0.0401	1.0000	0.0401	0.1200	0.0048	3.02	✓
2	11:47 AM	2.900	0.6	0.400	0.6000	0.240	80	0.1761	1.0000	0.1761	0.1200	0.0211	13.27	✓
3	11:48 AM	3.200	0.6	0.400	0.6000	0.240	80	0.2799	1.0000	0.2799	0.1200	0.0336	21.08	✓
4	11:49 AM	3.500	0.6	0.350	0.6000	0.210	80	0.4812	1.0000	0.4812	0.1050	0.0505	31.71	✓
5	11:50 AM	3.800	0.6	0.250	0.6000	0.150	80	0.4927	1.0000	0.4927	0.1000	0.0493	30.92	✓
6	11:52 AM	4.300	None	0.000	0.0000	0.000	0	0.0000	1.0000	0.4927	0.0000	0.0000	0.00	✓

Quality control warnings							
St#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measure d Depth (ft)	Warnings
1	11:45 AM	2.600	0.6	0.400	0.6000	0.240	Boundary Interference
2	11:47 AM	2.900	0.6	0.400	0.6000	0.240	High Stn % Discharge
3	11:48 AM	3.200	0.6	0.400	0.6000	0.240	High Stn % Discharge
4	11:49 AM	3.500	0.6	0.350	0.6000	0.210	High Stn % Discharge
5	11:50 AM	3.800	0.6	0.250	0.6000	0.150	High Stn % Discharge

Automated beam check Start time 6/27/2018 11:44:50 AM



Automated beam check Quality control warnings

No quality control warnings



COLORADO

Colorado Water
Conservation Board

Department of Natural Resources

CWCB ISF site visit notes

Collected using the ESRI Survey123 app on a Samsung tablet

Location description	East Fork Little Cimarron
Water division	4
Visit date	6/27/2018
Collected by	Jack Landers
General observations	Hiked from private land to BLM land. Channel flows through open meadows on PVT before entering steep, narrow canyon. Channel steepens from approx 3-5% to 5-7%. Substrate is primarily large boulders and cobbles. Lots of large wood in channel. Channel appea
Wildlife observations	Observed lots of fish, confirmed brook trout for many fish throughout section observed. Good pool habitat formed by wood and large boulders, multiple fish in each pool. Larger pools had 15 or more fish. Spawning gravels may be limiting factor due to large substrate.
Location	13N 285900 4239668



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	East Fork Little Cimarron River
Location description	East Fork Little Cimarron above private reservoir
Water division	4
Visit date	6/27/2018
Collected by CWCB staff	Jack Landers
Collected by non-CWCB staff	N/A
Non-CWCB entity	N/A
Measurement method	wadingADV
Equipment	Flowtracker2_sn_2H1747037
Site name	EFLCD4
Measurement number	2
Weather	clear
Wind	N, moderate
Cross-section description	glide, silt gravel substrate
Flow conditions	calm
Measurement start time	13:37
Flow amount	0.2299
Measurement rating	Fair(8%)
Discharge comments:	aquatic veg and algae obstructed beam on edges
Location	13N 286985 4238271



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	East Fork Little Cimarron River
Location description	East Fork Little Cimarron - BLM property
Water division	4
Visit date	6/27/2018
Collected by CWCB staff	Jack Landers
Collected by non-CWCB staff	N/A
Non-CWCB entity	N/A
Measurement method	wadingADV
Equipment	Flowtracker2_sn_2H1747037
Site name	EFk lil Cim
Measurement number	1
Weather	clear, no recent precip
Wind	calm
Cross-section description	glide, bedrock and cobble
Flow conditions	calm
Measurement start time	12:54
Flow amount	0.1593
Measurement rating	Poor(>8%)
Discharge comments:	Hard to find good xsec with large boulder substrate. Channel confined by bedrock
Location	13N 286085 4239491