DRAFT RECOMMENDATION– January 2015 Version

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 increase of an existing instream flow water right on a portion of the Little Cimarron River, located in Water Division 4.

Location and Land Status. The Little Cimarron River originates near Silver Mountain within the Uncompahgre Wilderness Area, approximately 23 miles south of Morrow Point Reservoir. This subject of this recommendation is a reach that begins at confluence with Firebox Creek and extends to the confluence with East Fork Little Cimarron River, a distance of approximately 7.0 miles. The BLM manages approximately 1.5 miles of this reach, the U.S. Forest Service manages 2.5 miles, and 3.0 miles are in private ownership.

Existing Instream Flow Water Rights. The Colorado Water Conservation Board appropriated an instream flow water right on the Little Cimarron River in 1984. The water right extends from the headwaters to the headgate of the Butte Ditch, a distance of approximately 16.4 miles. The instream flow water right is for 2.0 cfs, year round.

Biological Summary. The Little Cimarron River is a cold-water, high gradient stream. It flows through a canyon with a valley floor approximately one-fourth mile in width. The stream cuts through alluvial deposits in the narrow valley and is confined by bedrock in many locations. The stream generally has large substrate, consisting of mostly of small cobbles and boulders of up to three feet in size. The stream has a good mix of large pools in meander bends, riffles, and runs with some large woody debris.

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

The riparian community is generally comprised of blue spruce and willow species. The riparian community is in very good condition, and provides abundant shading and cover for fish habitat.

R2Cross Analysis. The BLM collected the following R2Cross data from 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)
07/24/2014 #1	20.7 cfs	37.70 feet	9.64 cfs	10.26 cfs
07/24/2014 #2	22.38 cfs	35.8 feet	Out of range	12.34 cfs
		Averages:	9.64 cfs	11.30 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.

> 11.00 cubic feet per second is recommended during warm weather period from April 1 to October 31. Protecting this flow rate would require an increase of 9.0 cfs to the existing instream flow water right. This recommendation is driven by the average depth criteria. This portion of the river is at high altitude and within a dark canyon, so it experiences significant icing during the winter months. 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 during the warm weather months.
>
> 9.6 cubic feet per second is recommended during cold weather period from November 1 to March 31. Protecting this flow rate would require an increase of 7.6 cfs to the existing instream flow water right. This recommendation is driven by the average velocity criteria. This flow rate should prevent pools from freezing, allowing the fish population to successfully overwinter.

Rationale for Instream Flow Increase. BLM believes an instream flow increase for Little Cimarron River is warranted for because of physical habitat characteristics. The R2Cross data summarized below clearly indicates that the current instream flow water right does not provide sufficient physical habitat during the warm weather portions of the year when the fish populations are feeding, growing, and spawning. When the existing instream flow rights are applied to the cross sections that were collected, the stream would exhibit between 20% and 45% wetted perimeter, so a significant portion of the potential habitat is not available. The available habitat is further reduced when the existing instream flow rates are applied to the cross sections collected, because 2.0 cfs produces average depths ranging from 0.16 to 0.28 feet. These depths occur in a stream that averages 35 feet in width. While 0.28 feet is sufficient for fish passage, 0.16 feet is not. In many portions of the channel, depths may not be usable by the fish population. During the warm weather season, the fish population needs to have access to as much of the stream channel as possible for feeding, resting, and spawning if it to survive the pronounced cold winters in this location.

Water Availability. The BLM recommends relying upon three sources of data for water

availability analysis. A basin apportionment analysis could be performed on USGS Gage 09126000 (Cimarron River near Cimarron, CO) to derive flow rates for this stream reach. In addition, Streamstats should be consulted because it provides similar estimates of flows. Finally, diversion records for downstream diversions can be consulted to help confirm the duration of the snowmelt runoff period.

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

Relationship to Land Management Plans. BLM's land use plan calls for the Little Cimarron River to be managed to maintain, restore, or improve riparian conditions, such that proper functioning conditions are achieved. It also specifies that instream flow appropriations will pursued on fishery streams to ensure sufficient flows rates for fisheries protection. Appropriation of an instream flow water right would assist BLM in long-term management of outstanding riparian values and important fishery values.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2015. 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,

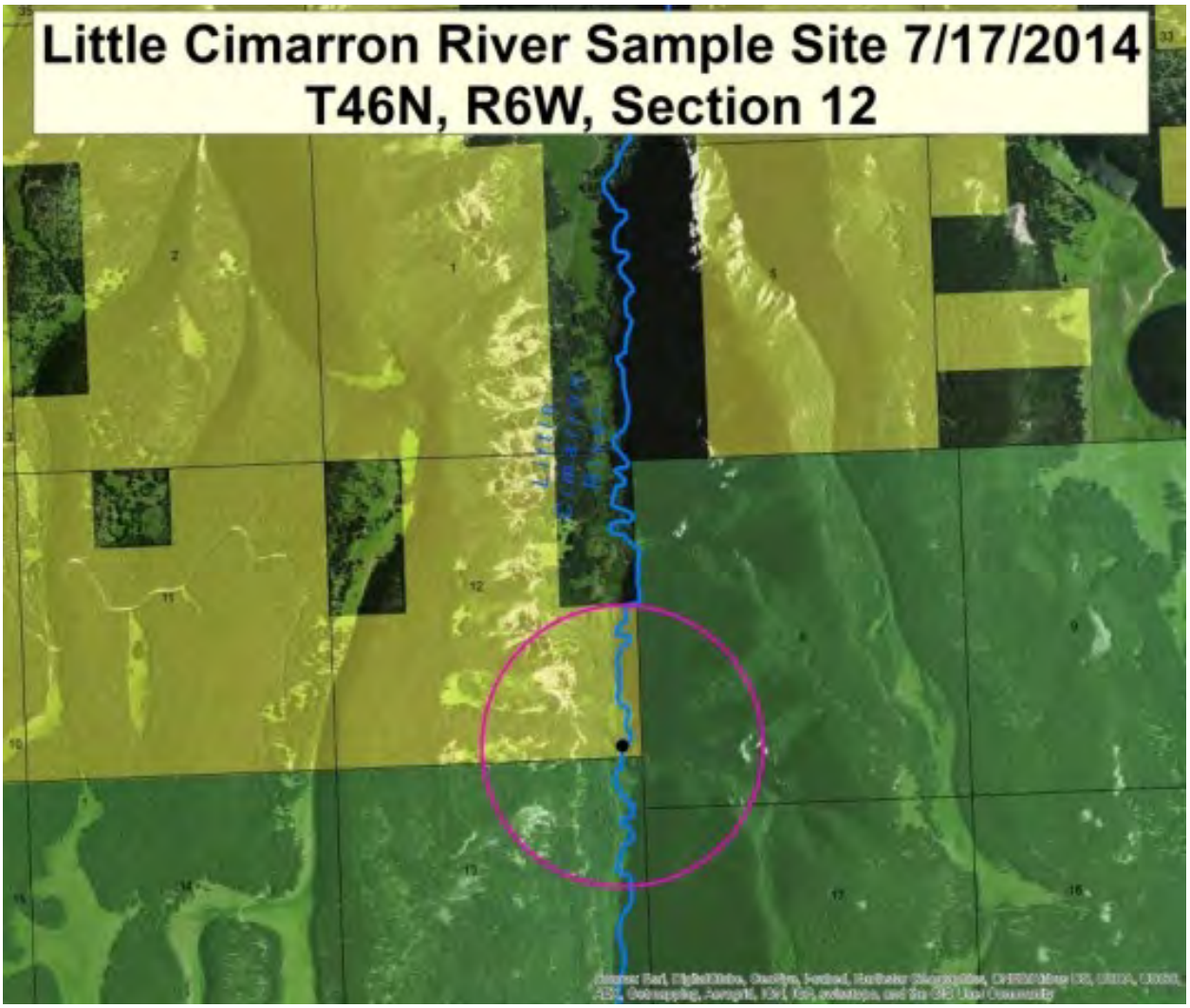
Brian St. George
Deputy State Director
Resources and Fire

Cc: Field Office Manager, Gunnison Field Office
Lori Armstrong, Southwest District Office
Andrew Breibart, Gunnison Field Office

Gunnison Field Office Stream Surveys
July, 2014

Little Cimarron River: Water Code – 39051

The Little Cimarron River, located on BLM lands managed by the Gunnison Field Office, was sampled on July 17, 2014. The Little Cimarron River is tributary to the Cimarron River, which leads to the Gunnison River. The stream was sampled using one backpack electroshocker to determine species presence. The stream was too wide to effectively complete a two-pass population estimate with one shocker. Brook trout (*Salvelinus fontinalis*) and lake trout (*Salvelinus namaycush*) were the only species seen or collected. Personnel present included Tom Fresques, Gregor Dekleva, and Kristen Doyle BLM.



Little Cimarron River

Lake Trout on Left Brook Trout on Right

STREAM SURVEY FISH SAMPLING FORM 2014									
WATER: Little Cimarron River			**DATE: 7/17/14**		**GEAR: BPE-1**				
Crew: Fresques, Dekleva, Doyle					**Location: Upper BLM at USFS boundary**				
#	**Pass**	**Species**	**Length**	**Weight**	**#**	**Pass**	**Species**	**Length**	**Weight**
1		BRK	157	37	26				
2		BRK	143	27	27				
3		BRK	200	88	28				
4		BRK	191	72	29				
5		BRK	221	110	30				
6		BRK	151	36	31				
7		BRK	126	20	32				
8		BRK	178	58	33				
9		BRK	137	21	34				
10		BRK	135	22	35				
11		BRK	124	18	36				
12		BRK	142	30	37				
13		BRK	153	39	38				
14		BRK	128	21	39				
15		BRK	155	41	40				
16		MAC	142	30	41				
17		BRK	87	8	42				
18		BRK	146	30	43				
19		BRK	122	19	44				
20		BRK	136	23	45				
21		BRK	89	6	46				
22		BRK	29	19	47				
23		BRK	101	12	48				
24		BRK	84	7	49				
25					50				

GPS Coordinates: 13S 0284037, 4236071			
H2O Temp:	**Reach Length**: 241’	**Stream Widths**:	1. 27.4
Conductivity:	**Shocker Settings**:		2. 29.2
Habitat (Riparian): Dense willow, spruce, fir, sedge, indian paint brush, elephant’s nose, mayflie, caddisfly, solidago, blue bells, clover, mare’s tail, geranium			3. 23.2 4. 20.3 5. 31.2 Avg: 26.26
Habitat (Stream): B/C Rosgen type, good sinuosity, mostly gravel and cobble, dense riparian, several age classes of brook trout, not much sediment, large woody debris, undercut banks			

Discussion:

The river was sampled to determine species composition on the BLM reach. The river is in good condition and is comprised of a good mix of large meander bend pools, riffles, and runs. Stream substrate is primarily gravels and cobbles with some large woody debris. Riparian vegetation is

dense and consists of willow, blue spruce, sedge, clover, marestail, geranium, and elephant's nose. Brook trout and lake trout were the only species collected or seen. It is interesting that a lake trout was collected in the sample as there is no obvious lake or reservoir habitat in the Little Cimarron River watershed.

Recommendations:

- Consider sampling the site with CPW with additional shockers to effectively determine population status.

- Periodically sample and monitor stream and riparian habitats

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

LOCATION INFORMATION

STREAM NAME:	Little Cimarron River
XS LOCATION:	Approx 0.7 mi upst fr conf w Van Boxel Cr
XS NUMBER:	2
DATE:	22-Jul-14
OBSERVERS:	R. Smith, A. Breibart
1/4 SEC:	NW
SECTION:	29
TWP:	47N
RANGE:	5W
PM:	NM
COUNTY:	Gunnison
WATERSHED:	Gunnison River
DIVISION:	4
DOW CODE:	39051
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

TAPE WT:	0.0106
TENSION:	99999

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

CHANNEL PROFILE DATA

SLOPE:	0.028

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

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

STREAM NAME: Little Cimarron River
XS LOCATION: Approx 0.7 mi upst fr conf w Van Boxel Cr
XS NUMBER: 2

DATA POINTS= 37

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	3.00			0.00		0.00	0.00	0.0%
1	G	2.70	3.85			0.00		0.00	0.00	0.0%
	W	3.10	5.05	0.00	0.00	0.00		0.00	0.00	0.0%
		4.00	5.25	0.20	0.10	0.92	0.20	0.19	0.02	0.1%
		5.00	5.45	0.40	0.48	1.02	0.40	0.40	0.19	0.9%
		6.00	5.80	0.75	1.25	1.06	0.75	0.75	0.94	4.2%
		7.00	5.60	0.55	1.31	1.02	0.55	0.55	0.72	3.2%
		8.00	5.85	0.80	1.40	1.03	0.80	0.80	1.12	5.0%
		9.00	5.75	0.70	0.36	1.00	0.70	0.70	0.25	1.1%
		10.00	5.35	0.30	1.95	1.08	0.30	0.30	0.59	2.6%
		11.00	5.80	0.75	1.53	1.10	0.75	0.75	1.15	5.1%
		12.00	5.25	0.20	1.84	1.14	0.20	0.20	0.37	1.6%
		13.00	5.85	0.80	2.61	1.17	0.80	0.80	2.09	9.3%
		14.00	5.85	0.80	1.98	1.00	0.80	0.80	1.58	7.1%
		15.00	5.80	0.75	1.63	1.00	0.75	0.75	1.22	5.5%
		16.00	5.85	0.80	1.48	1.00	0.80	0.80	1.18	5.3%
		17.00	5.70	0.65	2.08	1.01	0.65	0.65	1.35	6.0%
		18.00	5.50	0.45	2.23	1.02	0.45	0.45	1.00	4.5%
		19.00	5.60	0.55	2.60	1.00	0.55	0.55	1.43	6.4%
		20.00	5.15	0.10	0.00	1.10	0.10	0.10	0.00	0.0%
		21.00	5.60	0.50	0.00	1.10	0.50	0.50	0.00	0.0%
		22.00	5.65	0.55	0.05	1.00	0.55	0.55	0.03	0.1%
		23.00	5.85	0.75	0.00	1.02	0.75	0.75	0.00	0.0%
		24.00	5.80	0.70	2.63	1.00	0.70	0.70	1.84	8.2%
		25.00	5.50	0.40	2.90	1.04	0.40	0.40	1.16	5.2%
		26.00	5.60	0.50	1.10	1.00	0.50	0.50	0.55	2.5%
		27.00	5.65	0.55	2.95	1.00	0.55	0.55	1.62	7.2%
		28.00	5.45	0.35	2.47	1.02	0.35	0.35	0.86	3.9%
		29.00	5.45	0.35	1.69	1.00	0.35	0.35	0.59	2.6%
		30.00	5.45	0.35	1.34	1.00	0.35	0.35	0.47	2.1%
		31.00	5.30	0.20	0.26	1.01	0.20	0.20	0.05	0.2%
		32.00	5.10	0.00	0.00	1.02		0.00	0.00	0.0%
		33.00	5.15	0.05	0.00	1.00	0.05	0.06	0.00	0.0%
	W	34.50	5.10	0.00	0.00	1.50		0.00	0.00	0.0%
		36.20	4.52			0.00		0.00	0.00	0.0%
1	G	38.50	3.85			0.00		0.00	0.00	0.0%
	RS	43.00	3.75			0.00		0.00	0.00	0.0%
	TOTALS ----------					32.39	0.8 (Max.)	14.80	22.38	100.0%

Manning's n = 0.0976
Hydraulic Radius= 0.45693804

STREAM NAME: Little Cimarron River
XS LOCATION: Approx 0.7 mi upst fr conf w Van Boxel Cr
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	14.80	13.94	-5.8%
4.85	14.80	21.88	47.8%
4.87	14.80	21.24	43.5%
4.89	14.80	20.60	39.1%
4.91	14.80	19.95	34.8%
4.93	14.80	19.32	30.5%
4.95	14.80	18.68	26.2%
4.97	14.80	18.04	21.9%
4.99	14.80	17.40	17.6%
5.01	14.80	16.77	13.3%
5.03	14.80	16.14	9.0%
5.05	14.80	15.51	4.8%
5.06	14.80	15.19	2.6%
5.07	14.80	14.88	0.5%
5.08	14.80	14.56	-1.6%
5.09	14.80	14.25	-3.7%
5.10	14.80	13.94	-5.8%
5.11	14.80	13.63	-7.9%
5.12	14.80	13.33	-10.0%
5.13	14.80	13.03	-12.0%
5.14	14.80	12.74	-13.9%
5.15	14.80	12.45	-15.9%
5.17	14.80	11.89	-19.7%
5.19	14.80	11.34	-23.4%
5.21	14.80	10.79	-27.1%
5.23	14.80	10.24	-30.8%
5.25	14.80	9.70	-34.4%
5.27	14.80	9.17	-38.0%
5.29	14.80	8.65	-41.6%
5.31	14.80	8.13	-45.1%
5.33	14.80	7.62	-48.5%
5.35	14.80	7.11	-51.9%

WATERLINE AT ZERO
AREA ERROR = 5.072

STREAM NAME: Little Cimarron River
XS LOCATION: Approx 0.7 mi upst fr conf w Van Boxel Cr
XS NUMBER: 2 Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	3.85	35.80	1.56	2.00	55.83	37.85	100.0%	1.47	184.37	3.30
	4.07	34.96	1.37	1.78	47.96	36.82	97.3%	1.30	145.79	3.04
	4.12	34.77	1.33	1.73	46.21	36.59	96.7%	1.26	137.64	2.98
	4.17	34.59	1.29	1.68	44.48	36.36	96.1%	1.22	129.69	2.92
	4.22	34.40	1.24	1.63	42.76	36.13	95.4%	1.18	121.93	2.85
	4.27	34.21	1.20	1.58	41.04	35.90	94.8%	1.14	114.38	2.79
	4.32	34.02	1.16	1.53	39.33	35.66	94.2%	1.10	107.03	2.72
	4.37	33.83	1.11	1.48	37.64	35.43	93.6%	1.06	99.88	2.65
	4.42	33.64	1.07	1.43	35.95	35.20	93.0%	1.02	92.93	2.59
	4.47	33.46	1.02	1.38	34.27	34.97	92.4%	0.98	86.20	2.52
	4.52	33.27	0.98	1.33	32.61	34.74	91.8%	0.94	79.67	2.44
	4.57	33.11	0.93	1.28	30.95	34.53	91.2%	0.90	73.32	2.37
	4.62	32.94	0.89	1.23	29.29	34.32	90.7%	0.85	67.19	2.29
	4.67	32.78	0.84	1.18	27.65	34.12	90.1%	0.81	61.27	2.22
	4.72	32.62	0.80	1.13	26.02	33.91	89.6%	0.77	55.58	2.14
	4.77	32.45	0.75	1.08	24.39	33.70	89.0%	0.72	50.11	2.05
	4.82	32.29	0.71	1.03	22.77	33.49	88.5%	0.68	44.88	1.97
	4.87	32.13	0.66	0.98	21.16	33.29	87.9%	0.64	39.88	1.88
	4.92	31.96	0.61	0.93	19.56	33.08	87.4%	0.59	35.12	1.80
	4.97	31.80	0.56	0.88	17.97	32.87	86.8%	0.55	30.61	1.70
	5.02	31.64	0.52	0.83	16.38	32.66	86.3%	0.50	26.35	1.61
WL	5.07	31.38	0.47	0.78	14.80	32.38	85.5%	0.46	22.39	1.51
	5.12	29.84	0.44	0.73	13.26	30.83	81.4%	0.43	19.25	1.45
	5.17	27.89	0.42	0.68	11.83	28.85	76.2%	0.41	16.63	1.41
	5.22	27.19	0.38	0.63	10.45	28.12	74.3%	0.37	13.77	1.32
	5.27	26.40	0.34	0.58	9.11	27.29	72.1%	0.33	11.17	1.23
	5.32	25.47	0.31	0.53	7.81	26.30	69.5%	0.30	8.86	1.13
	5.37	24.39	0.27	0.48	6.56	25.15	66.4%	0.26	6.83	1.04
	5.42	23.17	0.23	0.43	5.37	23.86	63.0%	0.23	5.07	0.94
	5.47	20.04	0.21	0.38	4.29	20.65	54.5%	0.21	3.84	0.89
	5.52	18.38	0.18	0.33	3.32	18.90	49.9%	0.18	2.66	0.80
	5.57	15.94	0.15	0.28	2.46	16.36	43.2%	0.15	1.78	0.72
	5.62	12.95	0.13	0.23	1.73	13.27	35.1%	0.13	1.14	0.66
	5.67	10.17	0.11	0.18	1.17	10.41	27.5%	0.11	0.69	0.59
	5.72	8.46	0.08	0.13	0.70	8.62	22.8%	0.08	0.34	0.48
	5.77	6.54	0.05	0.08	0.32	6.62	17.5%	0.05	0.11	0.34
	5.82	3.41	0.02	0.03	0.06	3.43	9.1%	0.02	0.01	0.17

STREAM NAME: Little Cimarron River
XS LOCATION: Approx 0.7 mi upst fr conf w Van Boxel Cr
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	22.38	cfs
CALCULATED FLOW (Qc)=	22.39	cfs
(Qm-Qc)/Qm * 100 =	0.0	%
MEASURED WATERLINE (WLm)=	5.10	ft
CALCULATED WATERLINE (WLc)=	5.07	ft
(WLm-WLc)/WLm * 100 =	0.5	%
MAX MEASURED DEPTH (Dm)=	0.80	ft
MAX CALCULATED DEPTH (Dc)=	0.78	ft
(Dm-Dc)/Dm * 100	2.8	%
MEAN VELOCITY=	1.51	ft/sec
MANNING'S N=	0.098	
SLOPE=	0.028	ft/ft
.4 * Qm =	9.0	cfs
2.5 * Qm=	56.0	cfs

RECOMMENDED INSTREAM FLOW:
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FLOW (CFS)	PERIOD
___________	________
___________	________
___________	________
___________	________

RATIONALE FOR RECOMMENDATION:
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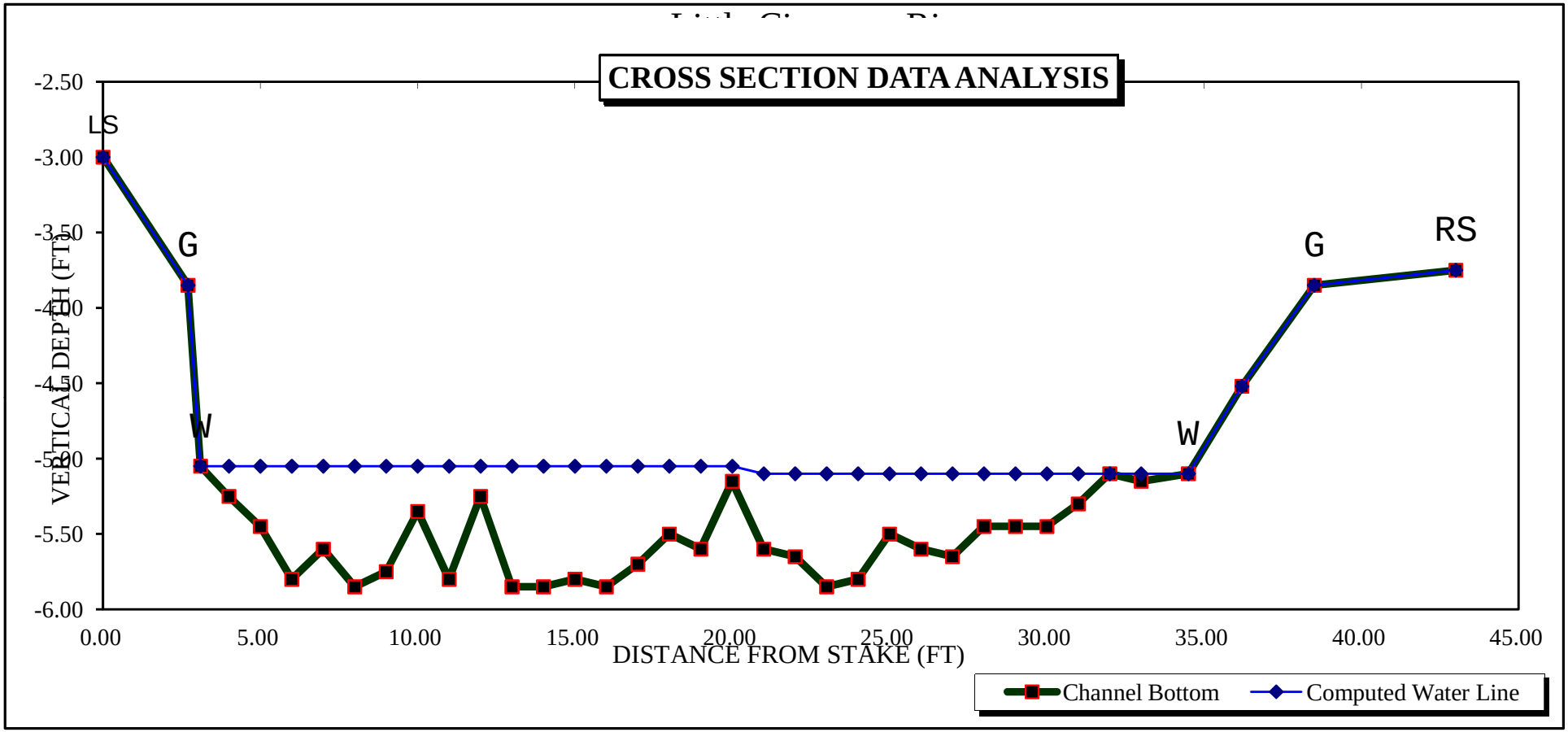
RECOMMENDATION BY: ……………………………………… AGENCY……………………………………… DATE:………………………

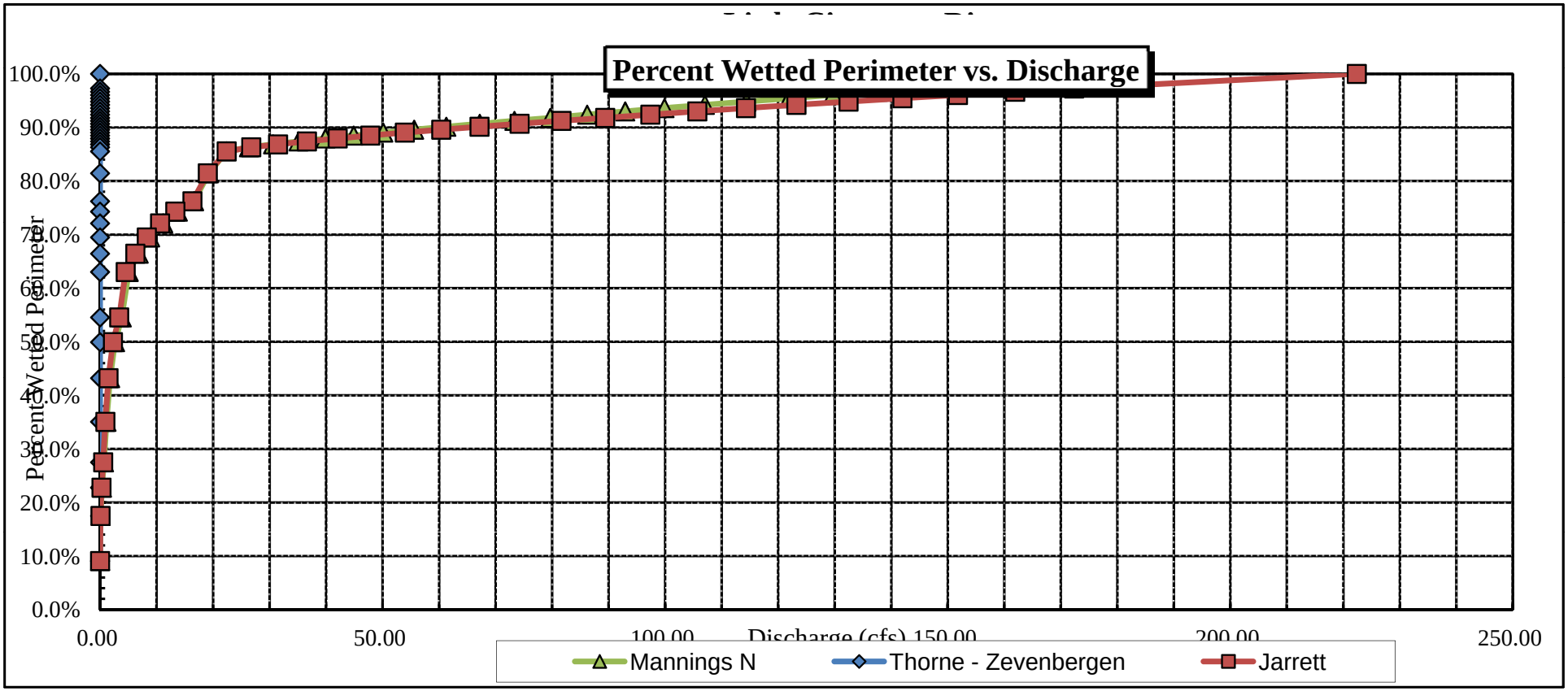
CWCB REVIEW BY: …………………………………………………………………………………………… DATE:………………………

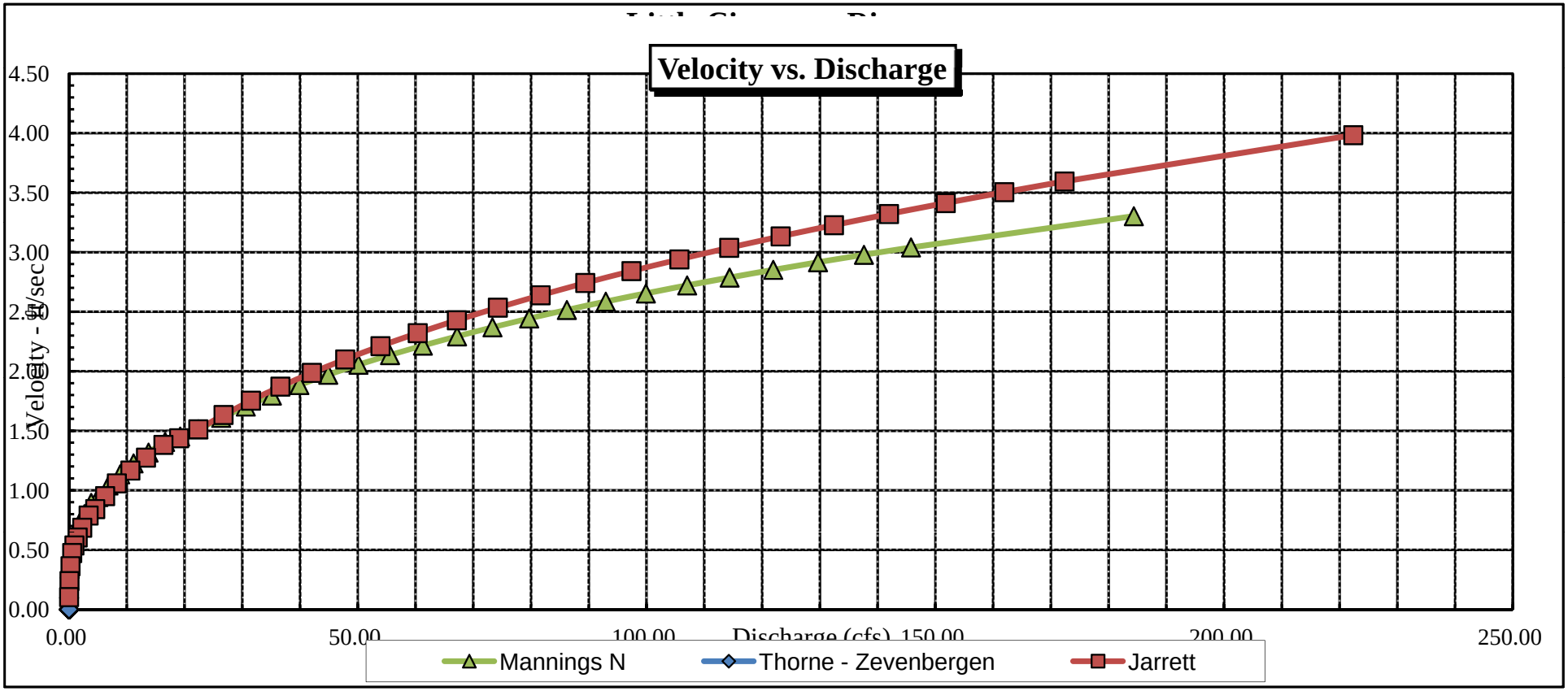
STREAM NAME: Little Cimarron River
XS LOCATION: Approx 0.7 mi upst fr conf w Van Boxel Cr
XS NUMBER: 2 Jarrett Variable Manning's n Correction Applied

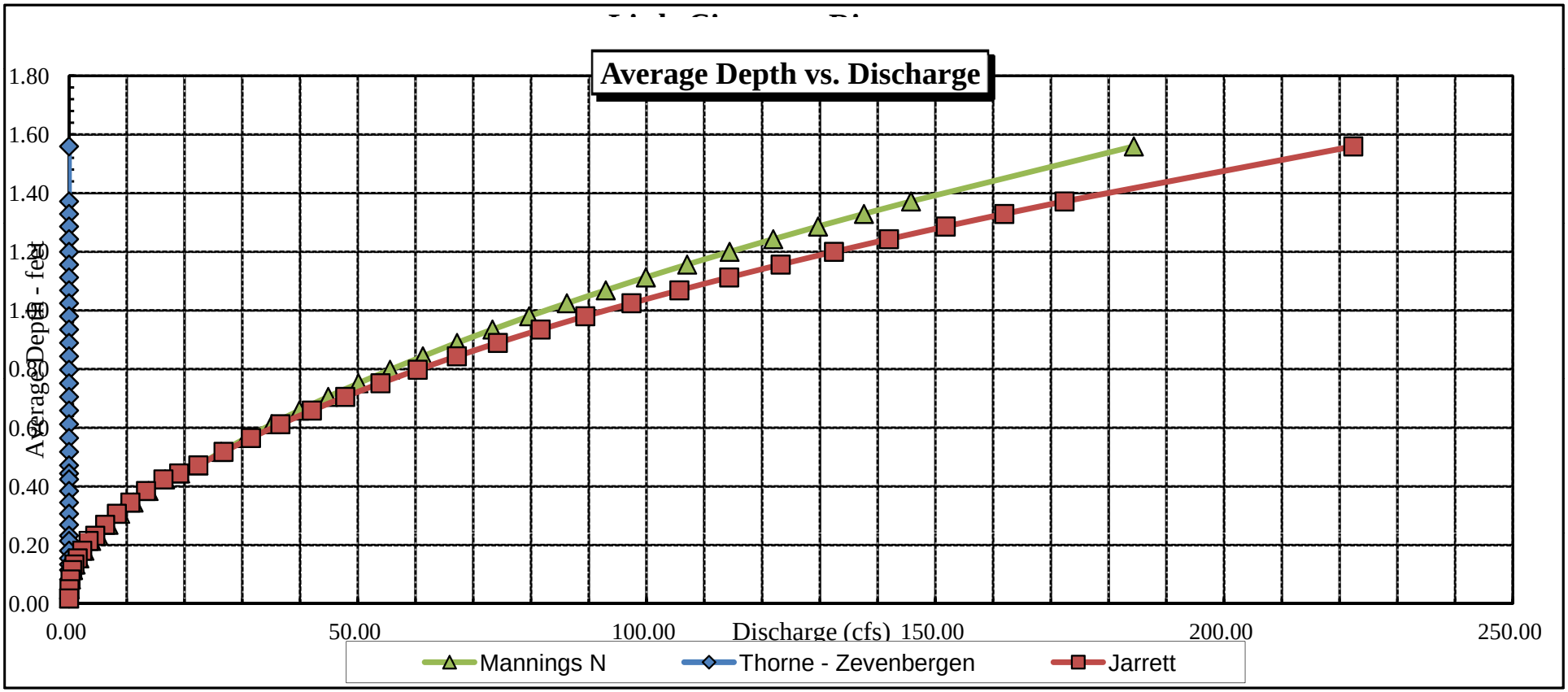
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

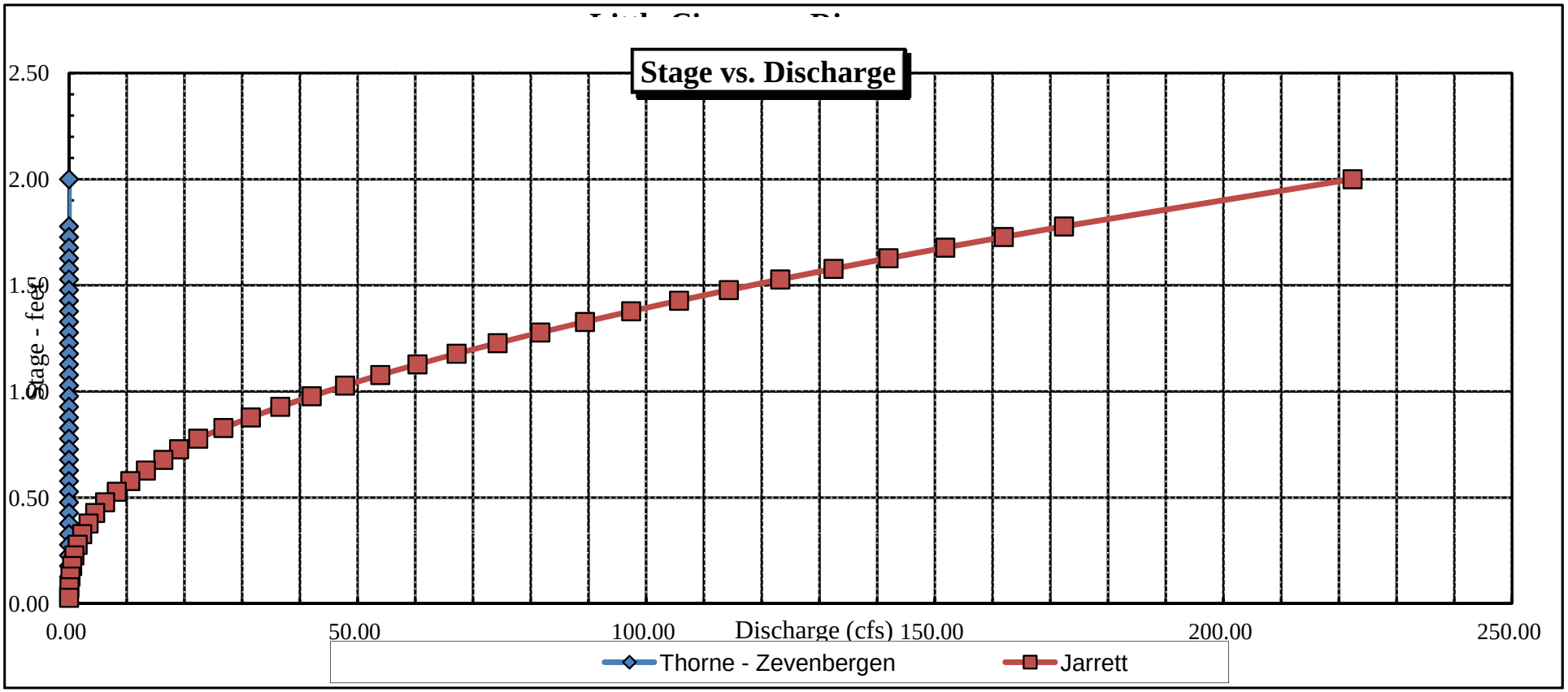
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	3.85	35.80	1.56	2.00	55.83	37.85	100.0%	1.47	222.37	3.98
	4.07	34.96	1.37	1.78	47.96	36.82	97.3%	1.30	172.37	3.59
	4.12	34.77	1.33	1.73	46.21	36.59	96.7%	1.26	161.94	3.50
	4.17	34.59	1.29	1.68	44.48	36.36	96.1%	1.22	151.81	3.41
	4.22	34.40	1.24	1.63	42.76	36.13	95.4%	1.18	141.98	3.32
	4.27	34.21	1.20	1.58	41.04	35.90	94.8%	1.14	132.45	3.23
	4.32	34.02	1.16	1.53	39.33	35.66	94.2%	1.10	123.22	3.13
	4.37	33.83	1.11	1.48	37.64	35.43	93.6%	1.06	114.30	3.04
	4.42	33.64	1.07	1.43	35.95	35.20	93.0%	1.02	105.69	2.94
	4.47	33.46	1.02	1.38	34.27	34.97	92.4%	0.98	97.38	2.84
	4.52	33.27	0.98	1.33	32.61	34.74	91.8%	0.94	89.39	2.74
	4.57	33.11	0.93	1.28	30.95	34.53	91.2%	0.90	81.66	2.64
	4.62	32.94	0.89	1.23	29.29	34.32	90.7%	0.85	74.24	2.53
	4.67	32.78	0.84	1.18	27.65	34.12	90.1%	0.81	67.15	2.43
	4.72	32.62	0.80	1.13	26.02	33.91	89.6%	0.77	60.38	2.32
	4.77	32.45	0.75	1.08	24.39	33.70	89.0%	0.72	53.93	2.21
	4.82	32.29	0.71	1.03	22.77	33.49	88.5%	0.68	47.82	2.10
	4.87	32.13	0.66	0.98	21.16	33.29	87.9%	0.64	42.04	1.99
	4.92	31.96	0.61	0.93	19.56	33.08	87.4%	0.59	36.60	1.87
	4.97	31.80	0.56	0.88	17.97	32.87	86.8%	0.55	31.50	1.75
	5.02	31.64	0.52	0.83	16.38	32.66	86.3%	0.50	26.74	1.63
WL	5.07	31.38	0.47	0.78	14.80	32.38	85.5%	0.46	22.39	1.51
	5.12	29.84	0.44	0.73	13.26	30.83	81.4%	0.43	19.06	1.44
	5.17	27.89	0.42	0.68	11.83	28.85	76.2%	0.41	16.35	1.38
	5.22	27.19	0.38	0.63	10.45	28.12	74.3%	0.37	13.32	1.27
	5.27	26.40	0.34	0.58	9.11	27.29	72.1%	0.33	10.62	1.17
	5.32	25.47	0.31	0.53	7.81	26.30	69.5%	0.30	8.27	1.06
	5.37	24.39	0.27	0.48	6.56	25.15	66.4%	0.26	6.25	0.95
	5.42	23.17	0.23	0.43	5.37	23.86	63.0%	0.23	4.53	0.84
	5.47	20.04	0.21	0.38	4.29	20.65	54.5%	0.21	3.38	0.79
	5.52	18.38	0.18	0.33	3.32	18.90	49.9%	0.18	2.28	0.69
	5.57	15.94	0.15	0.28	2.46	16.36	43.2%	0.15	1.49	0.60
	5.62	12.95	0.13	0.23	1.73	13.27	35.1%	0.13	0.93	0.54
	5.67	10.17	0.11	0.18	1.17	10.41	27.5%	0.11	0.55	0.47
	5.72	8.46	0.08	0.13	0.70	8.62	22.8%	0.08	0.25	0.36
	5.77	6.54	0.05	0.08	0.32	6.62	17.5%	0.05	0.08	0.24
	5.82	3.41	0.02	0.03	0.06	3.43	9.1%	0.02	0.01	0.10


CROSS SECTION DATA ANALYSIS
LS
G
W
W
G
RS
-2.50
-3.00
-3.50
-4.00
-4.50
-5.00
-5.50
-6.00
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
50.00
100.00
Discharge (cfs)
150.00
200.00
250.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
50.00
100.00
150.00
200.00
250.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
50.00
100.00
150.00
200.00
250.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
2.50
2.00
1.50
1.00
0.50
0.00
Stage - feet
0.00
50.00
100.00
Discharge (cfs)
150.00
200.00
250.00
Thorne - Zevenbergen
Jarrett

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

LOCATION INFORMATION

STREAM NAME:	Little Cimarron River
XS LOCATION:	Approx. 1 mi upst from conf Van Boxel Cr
XS NUMBER:	1
DATE:	24-Jul-14
OBSERVERS:	R. Smith, A. Breibart
1/4 SEC:	SW
SECTION:	29
TWP:	47N
RANGE:	5W
PM:	NM
COUNTY:	Gunnison
WATERSHED:	Gunnison River
DIVISION:	4
DOW CODE:	39051
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

SLOPE:	0.058

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

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

STREAM NAME: Little Cimarron River
XS LOCATION: Approx. 1 mi upst from conf Van Boxel Cr
XS NUMBER: 1

DATA POINTS= 39

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	0.00			0.00		0.00	0.00	0.0%
		3.00	0.72			0.00		0.00	0.00	0.0%
1	G	3.20	2.25			0.00		0.00	0.00	0.0%
	W	3.25	4.25	0.00	0.00	0.00		0.00	0.00	0.0%
		4.00	4.35	0.10	0.78	0.76	0.10	0.09	0.07	0.3%
		5.00	4.55	0.30	0.00	1.02	0.30	0.30	0.00	0.0%
		6.00	4.65	0.40	0.79	1.00	0.40	0.40	0.32	1.5%
		7.00	4.45	0.20	0.00	1.02	0.20	0.20	0.00	0.0%
		8.00	4.70	0.45	0.13	1.03	0.45	0.45	0.06	0.3%
		9.00	4.85	0.60	0.43	1.01	0.60	0.60	0.26	1.2%
		10.00	4.65	0.40	1.76	1.02	0.40	0.40	0.70	3.4%
		11.00	4.60	0.35	1.79	1.00	0.35	0.35	0.63	3.0%
		12.00	5.05	0.80	0.98	1.10	0.80	0.80	0.78	3.8%
		13.00	4.65	0.40	2.26	1.08	0.40	0.40	0.90	4.4%
		14.00	5.05	0.80	2.80	1.08	0.80	0.80	2.24	10.8%
		15.00	5.05	0.80	2.72	1.00	0.80	0.80	2.18	10.5%
		16.00	4.85	0.60	3.33	1.02	0.60	0.60	2.00	9.7%
		17.00	4.95	0.70	1.76	1.00	0.70	0.70	1.23	6.0%
		18.00	5.60	1.35	1.45	1.19	1.35	1.35	1.96	9.5%
		19.00	5.75	1.50	1.73	1.01	1.50	1.50	2.60	12.5%
		20.00	5.35	1.10	1.07	1.08	1.10	1.10	1.18	5.7%
		21.00	5.00	0.75	1.23	1.06	0.75	0.75	0.92	4.5%
		22.00	4.70	0.45	1.80	1.04	0.45	0.45	0.81	3.9%
		23.00	4.75	0.50	1.65	1.00	0.50	0.50	0.83	4.0%
		24.00	4.65	0.40	0.81	1.00	0.40	0.40	0.32	1.6%
		25.00	4.55	0.30	0.14	1.00	0.30	0.30	0.04	0.2%
		26.00	4.60	0.35	0.18	1.00	0.35	0.35	0.06	0.3%
		27.00	4.65	0.40	0.25	1.00	0.40	0.40	0.10	0.5%
		28.00	4.85	0.60	0.03	1.02	0.60	0.60	0.02	0.1%
		29.00	5.20	0.95	0.30	1.06	0.95	0.95	0.29	1.4%
		30.00	5.00	0.75	0.00	1.02	0.75	0.75	0.00	0.0%
		31.00	4.30	0.05	0.00	1.22	0.05	0.04	0.00	0.0%
		31.50	4.55	0.30	1.43	0.56	0.30	0.15	0.21	1.0%
		32.00	4.30	0.05	0.00	0.56	0.05	0.04	0.00	0.0%
		33.00	4.45	0.20	0.00	1.01	0.20	0.20	0.00	0.0%
	W	34.00	4.25	0.00	0.00	1.02		0.00	0.00	0.0%
		39.00	3.45			0.00		0.00	0.00	0.0%
1	G	40.90	2.40			0.00		0.00	0.00	0.0%
	RS	43.50	1.71			0.00		0.00	0.00	0.0%
	TOTALS ----------					32.01	1.5 (Max.)	16.71	20.70	100.0%

Manning's n = 0.1874
Hydraulic Radius= 0.52215788

STREAM NAME: Little Cimarron River
XS LOCATION: Approx. 1 mi upst from conf Van Boxel Cr
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	16.71	16.71	0.0%
4.00	16.71	24.60	47.2%
4.02	16.71	23.95	43.3%
4.04	16.71	23.31	39.5%
4.06	16.71	22.67	35.6%
4.08	16.71	22.03	31.8%
4.10	16.71	21.40	28.0%
4.12	16.71	20.76	24.2%
4.14	16.71	20.13	20.5%
4.16	16.71	19.51	16.7%
4.18	16.71	18.88	13.0%
4.20	16.71	18.26	9.2%
4.21	16.71	17.95	7.4%
4.22	16.71	17.64	5.5%
4.23	16.71	17.33	3.7%
4.24	16.71	17.02	1.8%
4.25	16.71	16.71	0.0%
4.26	16.71	16.41	-1.8%
4.27	16.71	16.10	-3.7%
4.28	16.71	15.80	-5.5%
4.29	16.71	15.49	-7.3%
4.30	16.71	15.19	-9.1%
4.32	16.71	14.59	-12.7%
4.34	16.71	14.01	-16.2%
4.36	16.71	13.43	-19.7%
4.38	16.71	12.86	-23.1%
4.40	16.71	12.30	-26.4%
4.42	16.71	11.75	-29.7%
4.44	16.71	11.20	-33.0%
4.46	16.71	10.67	-36.2%
4.48	16.71	10.14	-39.3%
4.50	16.71	9.63	-42.4%

WATERLINE AT ZERO
AREA ERROR = 4.250

STREAM NAME: Little Cimarron River
XS LOCATION: Approx. 1 mi upst from conf Van Boxel Cr
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	2.40	37.70	2.17	3.35	81.89	41.09	100.0%	1.99	247.71	3.02
	3.25	36.14	1.40	2.50	50.51	38.48	93.7%	1.31	115.66	2.29
	3.30	36.05	1.35	2.45	48.71	38.33	93.3%	1.27	109.14	2.24
	3.35	35.95	1.30	2.40	46.91	38.18	92.9%	1.23	102.78	2.19
	3.40	35.86	1.26	2.35	45.11	38.02	92.5%	1.19	96.56	2.14
	3.45	35.77	1.21	2.30	43.32	37.87	92.2%	1.14	90.50	2.09
	3.50	35.46	1.17	2.25	41.54	37.50	91.3%	1.11	84.94	2.04
	3.55	35.14	1.13	2.20	39.77	37.14	90.4%	1.07	79.53	2.00
	3.60	34.83	1.09	2.15	38.03	36.77	89.5%	1.03	74.27	1.95
	3.65	34.51	1.05	2.10	36.29	36.40	88.6%	1.00	69.18	1.91
	3.70	34.20	1.01	2.05	34.57	36.04	87.7%	0.96	64.24	1.86
	3.75	33.89	0.97	2.00	32.87	35.67	86.8%	0.92	59.46	1.81
	3.80	33.57	0.93	1.95	31.19	35.30	85.9%	0.88	54.84	1.76
	3.85	33.26	0.89	1.90	29.51	34.94	85.0%	0.84	50.38	1.71
	3.90	32.95	0.85	1.85	27.86	34.57	84.1%	0.81	46.08	1.65
	3.95	32.63	0.80	1.80	26.22	34.21	83.2%	0.77	41.95	1.60
	4.00	32.32	0.76	1.75	24.60	33.84	82.4%	0.73	37.98	1.54
	4.05	32.00	0.72	1.70	22.99	33.47	81.5%	0.69	34.18	1.49
	4.10	31.69	0.68	1.65	21.40	33.11	80.6%	0.65	30.55	1.43
	4.15	31.38	0.63	1.60	19.82	32.74	79.7%	0.61	27.09	1.37
	4.20	31.06	0.59	1.55	18.26	32.37	78.8%	0.56	23.80	1.30
WL	4.25	30.75	0.54	1.50	16.71	32.01	77.9%	0.52	20.70	1.24
	4.30	30.12	0.50	1.45	15.19	31.37	76.3%	0.48	17.89	1.18
	4.35	28.90	0.47	1.40	13.72	30.09	73.2%	0.46	15.51	1.13
	4.40	27.79	0.44	1.35	12.30	28.93	70.4%	0.43	13.28	1.08
	4.45	26.69	0.41	1.30	10.94	27.78	67.6%	0.39	11.22	1.03
	4.50	25.71	0.37	1.25	9.63	26.75	65.1%	0.36	9.30	0.97
	4.55	24.74	0.34	1.20	8.36	25.72	62.6%	0.33	7.55	0.90
	4.60	22.22	0.32	1.15	7.19	23.17	56.4%	0.31	6.30	0.88
	4.65	18.59	0.33	1.10	6.17	19.49	47.4%	0.32	5.47	0.89
	4.70	16.96	0.31	1.05	5.28	17.79	43.3%	0.30	4.49	0.85
	4.75	14.02	0.32	1.00	4.51	14.79	36.0%	0.30	3.90	0.86
	4.80	12.59	0.31	0.95	3.84	13.29	32.3%	0.29	3.21	0.83
	4.85	11.16	0.29	0.90	3.25	11.79	28.7%	0.28	2.63	0.81
	4.90	9.67	0.28	0.85	2.73	10.23	24.9%	0.27	2.16	0.79
	4.95	8.17	0.28	0.80	2.28	8.67	21.1%	0.26	1.79	0.78
	5.00	7.11	0.27	0.75	1.90	7.52	18.3%	0.25	1.45	0.76
	5.05	4.88	0.32	0.70	1.57	5.22	12.7%	0.30	1.35	0.86
	5.10	4.27	0.32	0.65	1.35	4.58	11.1%	0.29	1.14	0.84
	5.15	3.66	0.31	0.60	1.15	3.93	9.6%	0.29	0.97	0.84
	5.20	3.04	0.32	0.55	0.98	3.28	8.0%	0.30	0.84	0.85
	5.25	2.82	0.30	0.50	0.83	3.03	7.4%	0.27	0.67	0.81
	5.30	2.60	0.27	0.45	0.70	2.79	6.8%	0.25	0.53	0.76
	5.35	2.38	0.24	0.40	0.57	2.55	6.2%	0.23	0.40	0.71
	5.40	2.18	0.21	0.35	0.46	2.32	5.6%	0.20	0.30	0.65
	5.45	1.98	0.18	0.30	0.35	2.09	5.1%	0.17	0.21	0.58
	5.50	1.78	0.15	0.25	0.26	1.87	4.5%	0.14	0.13	0.51
	5.55	1.58	0.11	0.20	0.18	1.64	4.0%	0.11	0.08	0.43
	5.60	1.38	0.08	0.15	0.10	1.42	3.4%	0.07	0.03	0.33
	5.65	0.92	0.05	0.10	0.05	0.94	2.3%	0.05	0.01	0.25
	5.70	0.46	0.03	0.05	0.01	0.47	1.1%	0.02	0.00	0.16
	5.75	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

STREAM NAME: Little Cimarron River
XS LOCATION: Approx. 1 mi upst from conf Van Boxel Cr
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	20.70	cfs
CALCULATED FLOW (Qc)=	20.70	cfs
(Qm-Qc)/Qm * 100 =	0.0	%
MEASURED WATERLINE (WLm)=	4.25	ft
CALCULATED WATERLINE (WLc)=	4.25	ft
(WLm-WLc)/WLm * 100 =	0.0	%
MAX MEASURED DEPTH (Dm)=	1.50	ft
MAX CALCULATED DEPTH (Dc)=	1.50	ft
(Dm-Dc)/Dm * 100	0.0	%
MEAN VELOCITY=	1.24	ft/sec
MANNING'S N=	0.187	
SLOPE=	0.058	ft/ft
.4 * Qm =	8.3	cfs
2.5 * Qm=	51.7	cfs

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

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

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

_____
_____
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_____

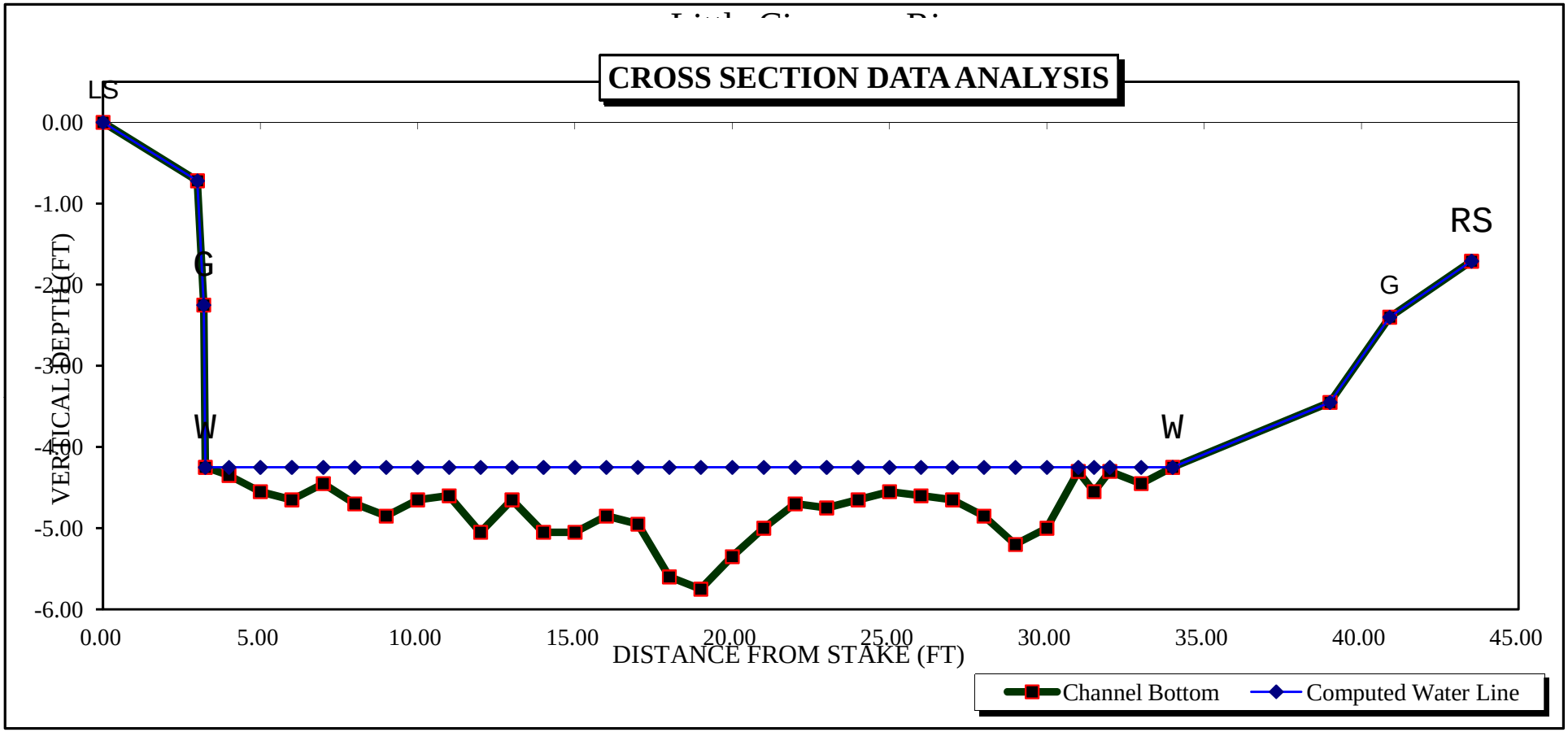
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

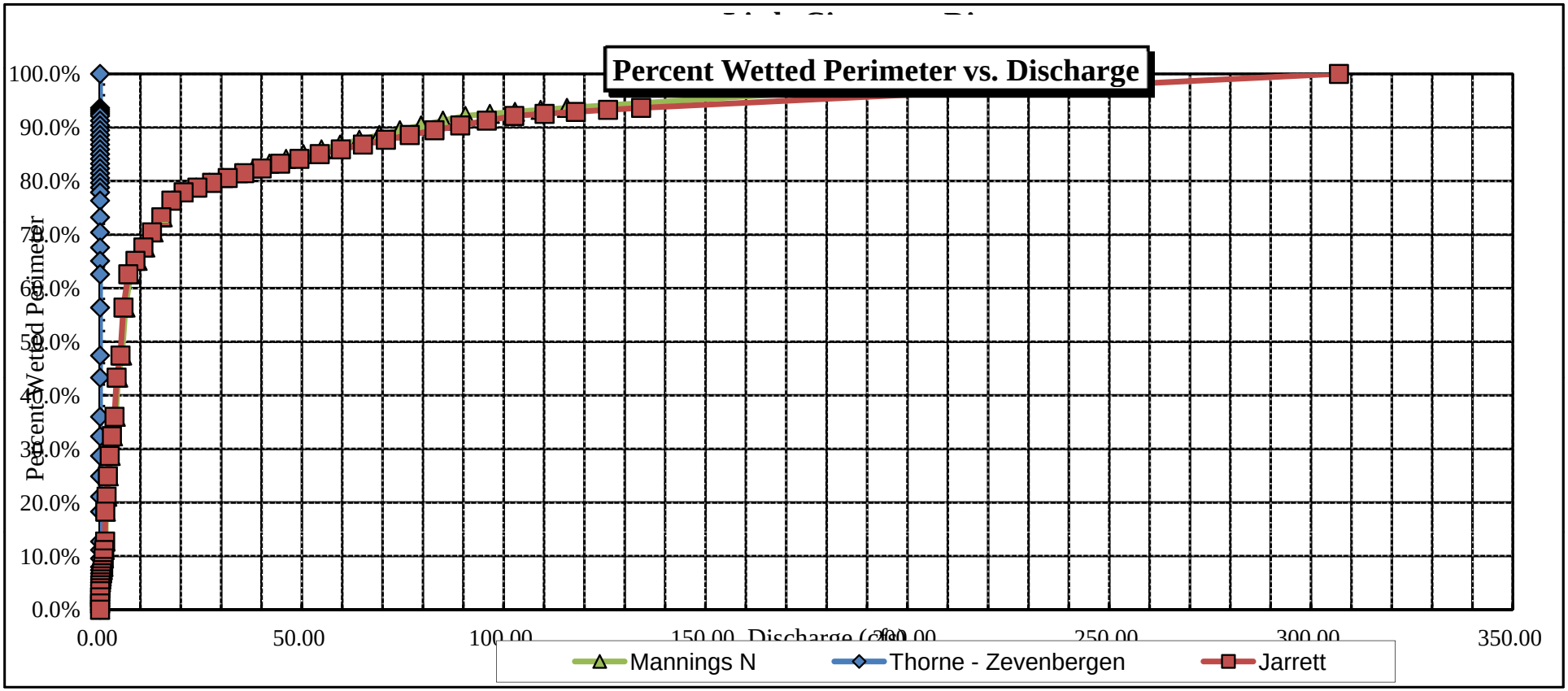
CWCB REVIEW BY: ..... DATE:.....

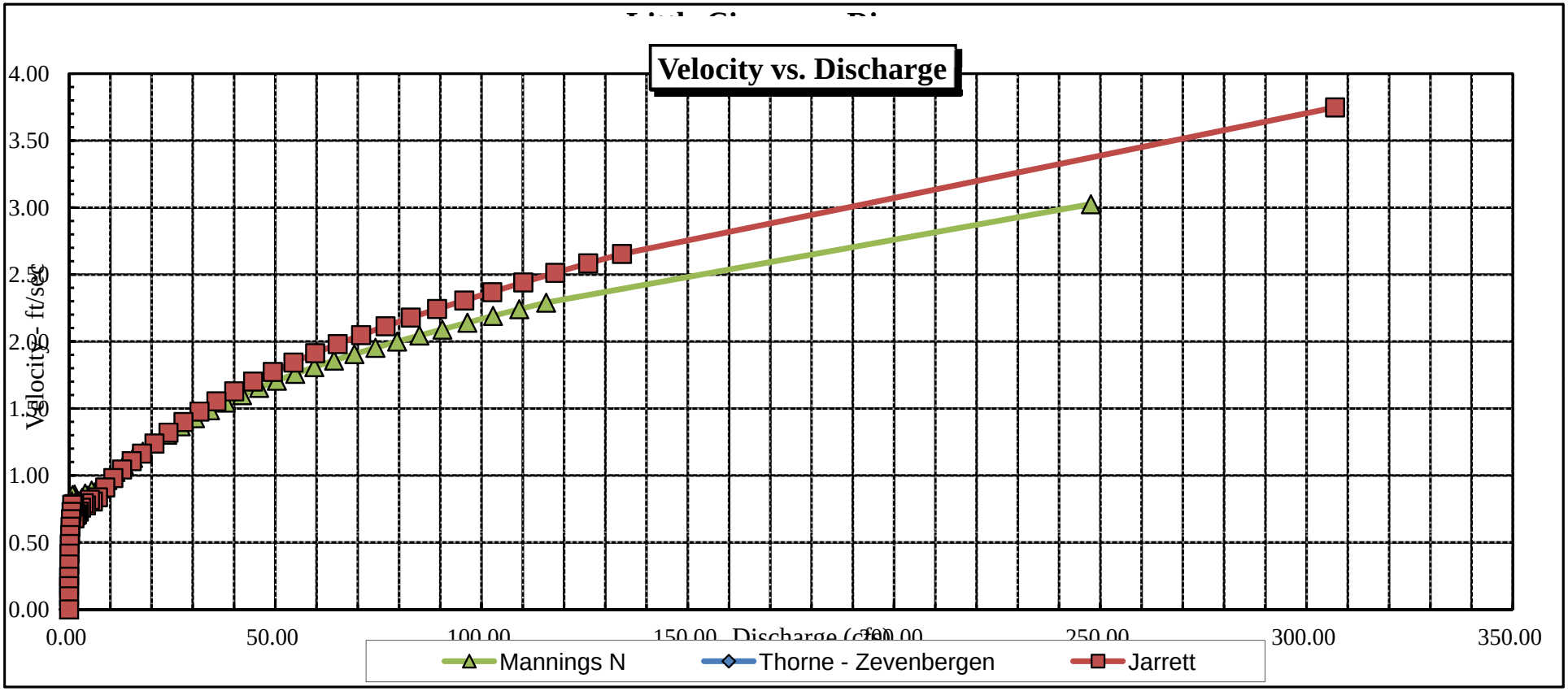
STREAM NAME: Little Cimarron River
XS LOCATION: Approx. 1 mi upst from conf Van Boxel Cr
XS NUMBER: 1 Jarrett Variable Manning's n Correction Applied

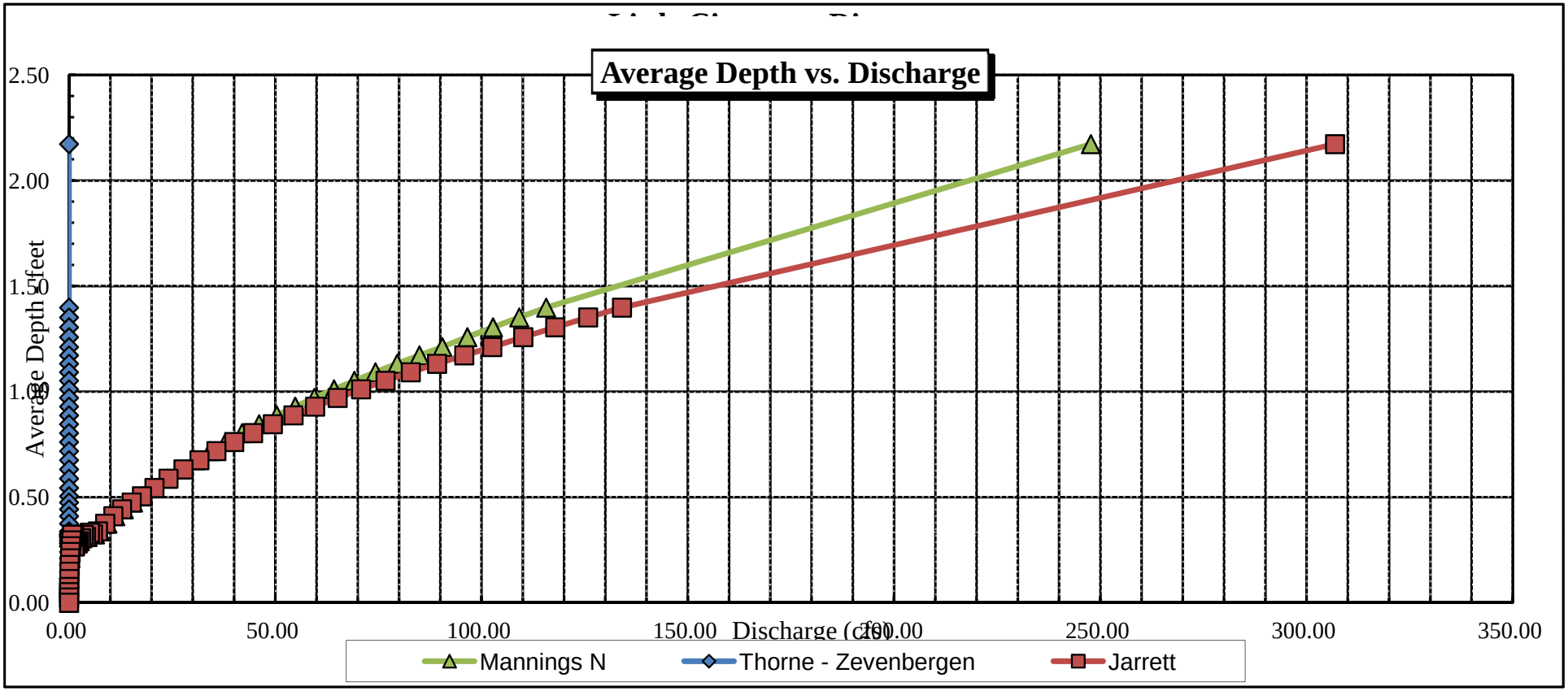
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

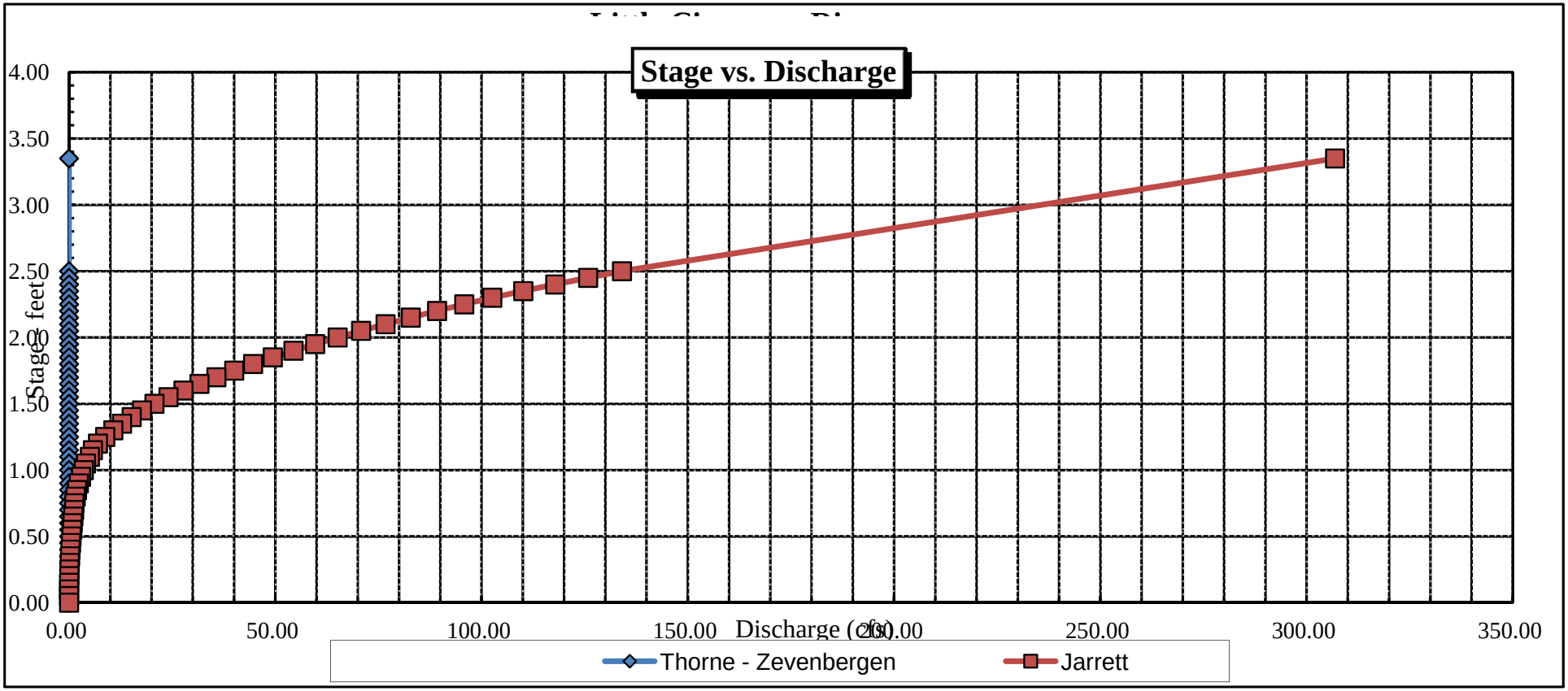
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	2.40	37.70	2.17	3.35	81.89	41.09	100.0%	1.99	306.91	3.75
	3.25	36.14	1.40	2.50	50.51	38.48	93.7%	1.31	134.04	2.65
	3.30	36.05	1.35	2.45	48.71	38.33	93.3%	1.27	125.83	2.58
	3.35	35.95	1.30	2.40	46.91	38.18	92.9%	1.23	117.86	2.51
	3.40	35.86	1.26	2.35	45.11	38.02	92.5%	1.19	110.11	2.44
	3.45	35.77	1.21	2.30	43.32	37.87	92.2%	1.14	102.60	2.37
	3.50	35.46	1.17	2.25	41.54	37.50	91.3%	1.11	95.80	2.31
	3.55	35.14	1.13	2.20	39.77	37.14	90.4%	1.07	89.21	2.24
	3.60	34.83	1.09	2.15	38.03	36.77	89.5%	1.03	82.85	2.18
	3.65	34.51	1.05	2.10	36.29	36.40	88.6%	1.00	76.72	2.11
	3.70	34.20	1.01	2.05	34.57	36.04	87.7%	0.96	70.80	2.05
	3.75	33.89	0.97	2.00	32.87	35.67	86.8%	0.92	65.11	1.98
	3.80	33.57	0.93	1.95	31.19	35.30	85.9%	0.88	59.65	1.91
	3.85	33.26	0.89	1.90	29.51	34.94	85.0%	0.84	54.41	1.84
	3.90	32.95	0.85	1.85	27.86	34.57	84.1%	0.81	49.39	1.77
	3.95	32.63	0.80	1.80	26.22	34.21	83.2%	0.77	44.60	1.70
	4.00	32.32	0.76	1.75	24.60	33.84	82.4%	0.73	40.04	1.63
	4.05	32.00	0.72	1.70	22.99	33.47	81.5%	0.69	35.71	1.55
	4.10	31.69	0.68	1.65	21.40	33.11	80.6%	0.65	31.61	1.48
	4.15	31.38	0.63	1.60	19.82	32.74	79.7%	0.61	27.74	1.40
	4.20	31.06	0.59	1.55	18.26	32.37	78.8%	0.56	24.10	1.32
WL	4.25	30.75	0.54	1.50	16.71	32.01	77.9%	0.52	20.70	1.24
	4.30	30.12	0.50	1.45	15.19	31.37	76.3%	0.48	17.68	1.16
	4.35	28.90	0.47	1.40	13.72	30.09	73.2%	0.46	15.18	1.11
	4.40	27.79	0.44	1.35	12.30	28.93	70.4%	0.43	12.85	1.04
	4.45	26.69	0.41	1.30	10.94	27.78	67.6%	0.39	10.72	0.98
	4.50	25.71	0.37	1.25	9.63	26.75	65.1%	0.36	8.76	0.91
	4.55	24.74	0.34	1.20	8.36	25.72	62.6%	0.33	7.00	0.84
	4.60	22.22	0.32	1.15	7.19	23.17	56.4%	0.31	5.79	0.81
	4.65	18.59	0.33	1.10	6.17	19.49	47.4%	0.32	5.05	0.82
	4.70	16.96	0.31	1.05	5.28	17.79	43.3%	0.30	4.10	0.78
	4.75	14.02	0.32	1.00	4.51	14.79	36.0%	0.30	3.58	0.79
	4.80	12.59	0.31	0.95	3.84	13.29	32.3%	0.29	2.92	0.76
	4.85	11.16	0.29	0.90	3.25	11.79	28.7%	0.28	2.37	0.73
	4.90	9.67	0.28	0.85	2.73	10.23	24.9%	0.27	1.94	0.71
	4.95	8.17	0.28	0.80	2.28	8.67	21.1%	0.26	1.60	0.70
	5.00	7.11	0.27	0.75	1.90	7.52	18.3%	0.25	1.29	0.68
	5.05	4.88	0.32	0.70	1.57	5.22	12.7%	0.30	1.24	0.79
	5.10	4.27	0.32	0.65	1.35	4.58	11.1%	0.29	1.04	0.77
	5.15	3.66	0.31	0.60	1.15	3.93	9.6%	0.29	0.88	0.77
	5.20	3.04	0.32	0.55	0.98	3.28	8.0%	0.30	0.77	0.78
	5.25	2.82	0.30	0.50	0.83	3.03	7.4%	0.27	0.61	0.73
	5.30	2.60	0.27	0.45	0.70	2.79	6.8%	0.25	0.47	0.67
	5.35	2.38	0.24	0.40	0.57	2.55	6.2%	0.23	0.35	0.62
	5.40	2.18	0.21	0.35	0.46	2.32	5.6%	0.20	0.25	0.56
	5.45	1.98	0.18	0.30	0.35	2.09	5.1%	0.17	0.17	0.49
	5.50	1.78	0.15	0.25	0.26	1.87	4.5%	0.14	0.11	0.42
	5.55	1.58	0.11	0.20	0.18	1.64	4.0%	0.11	0.06	0.34
	5.60	1.38	0.08	0.15	0.10	1.42	3.4%	0.07	0.03	0.24
	5.65	0.92	0.05	0.10	0.05	0.94	2.3%	0.05	0.01	0.17
	5.70	0.46	0.03	0.05	0.01	0.47	1.1%	0.02	0.00	0.10
	5.75	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!


CROSS SECTION DATA ANALYSIS
LS
G
W
W
G
RS
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
50.00
100.00
150.00
250.00
300.00
350.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
Velocity - ft/sec
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth (feet)
2.50
2.00
1.50
1.00
0.50
0.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
Stage - feet
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Little Gmarron River						CROSS-SECTION NO.: 2
CROSS-SECTION LOCATION: Approx. .7 mile upstream from confluence with Van Boxel Creek						
DATE: 7-24-14	OBSERVERS: R. Smith, A. Breibart					
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 29	TOWNSHIP: 47 (N)/S	RANGE: 5 E/(W)	PM: NM	
COUNTY: Gunnison	WATERSHED: Gunnison	WATER DIVISION: 4	DOW WATER CODE: 39051			
MAP(S): USGS:	GPS Zone 13 284317					
USFS:	4241681					

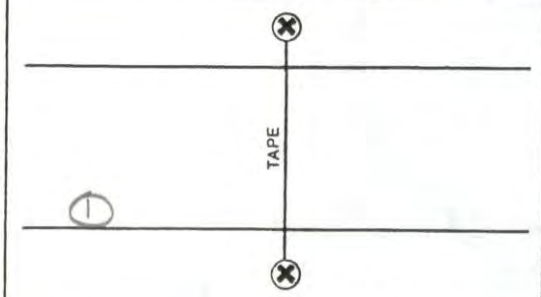
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES)/NO	METER TYPE: M-M			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: 5 ____ lbs/foot	TAPE TENSION: ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: gravel - 3 foot boulders	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 3		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
(⊗) Tape @ Stake LB	0.0	surveyed
(⊗) Tape @ Stake RB	0.0	surveyed
(1) WS @ Tape LB/RB	0.0 3.10	5.05/5.10
(2) WS Upstream	28.0	4.50
(3) WS Downstream	35.7	6.30
SLOPE	1.80 / 63.7 = 0.028	

SKETCH



LEGEND:
Stake (⊗)
Station (1)
Photo (1)
Direction of Flow

AQUATIC SAMPLING SUMMARY

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

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL

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

COMMENTS

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Little Cimarron River	CROSS-SECTION NO. 3	DATE: 7-24-14	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME:

Features: Stake (S), Grassline (G), Waterline (W), Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft) ✓	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.0		3.0								
G	2.7		3.85								
W	3.1		5.05								
	4		5.25	0.20				0.10			
	5		5.45	0.40				0.48			
	6		5.80	0.75				1.25			
	7		5.60	0.55				1.31			
	8		5.85	0.80				1.40			
	9		5.75	0.70				0.36			
	10		5.35	0.30				1.95			
	11		5.80	0.75				1.53			
	12		5.25	0.20				1.84			
	13		5.85	0.80				2.61			
	14		5.85	0.80				1.98			
	15		5.80	0.75				1.63			
	16		5.85	0.80				1.48			
	17		5.70	0.65				2.08			
	18		5.50	0.45				2.23			
	19		5.60	0.55				2.60			
	20		5.15	0.10				0.0			
	21		5.60	0.50				0.0			
	22		5.65	0.55				0.05			
	23		5.85	0.75				0.0			
	24		5.80	0.70				2.63			
	25		5.50	0.40				2.90			
	26		5.60	0.50				1.10			
	27		5.65	0.55				2.95			
	28		5.45	0.35				2.47			
	29		5.45	0.35				1.69			
	30		5.45	0.35				1.34			
	31		5.30	0.20				0.26			
	32		5.10	0.0				0.0			
	33		5.15	0.05				0			
W	34.5		5.10								
	36.2		4.57								
G	38.5		3.85								
RS	43.0		3.75								
TOTALS:											

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Little Cimarron River						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: Approx. 1 mile upstream from confluence with Van Boxel Creek						
DATE: 7-24-14	OBSERVERS: R. Smith, A. Breibart					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 29	TOWNSHIP: 47 (N)/S	RANGE: 5 E/(W)	PM: NM	
COUNTY: Gunnison	WATERSHED: Gunnison	WATER DIVISION: 4	DOW WATER CODE: 39051			
MAP(S): USGS:			UTM Z13S 284249E 4241400N			
USFS:						

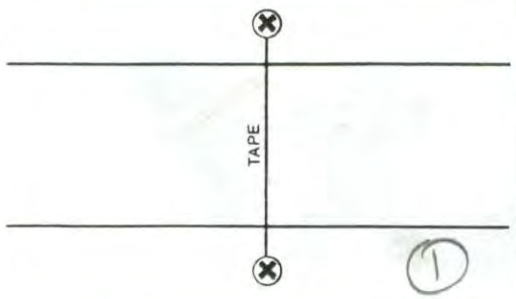
SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
(X) Tape @ Stake LB	0.0	surveyed
(X) Tape @ Stake RB	0.0	surveyed
(1) WS @ Tape LB/RB	0.0	4.23 / 4.25
(2) WS Upstream	32.5	3.00
(3) WS Downstream	20.2	6.04
SLOPE	3.04 / 52.5 = 0.058	

SKETCH



LEGEND:
Stake (X)
Station (1)
Photo (1)
Direction of Flow

AQUATIC SAMPLING SUMMARY

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

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL

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

COMMENTS

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Little Cimarron River	CROSS-SECTION NO.: 1	DATE: 7-24-14	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME:

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.0		0.0								
	3.0		0.72								
G	3.2		2.25								
W	3.75		4.25	ϕ							
	4		4.35	0.10				0.78			
	5		4.55	0.30				0.0			
	6		4.65	0.40				0.79			
	7		4.45	0.20				0.0			
	8		4.70	0.45				0.13			
	9		4.85	0.60				0.43			
	10		4.65	0.40				1.76			
	11		4.60	0.35				1.79			
	12		5.05	0.8				0.98			
	13		4.65	0.4				2.26			
	14		5.05	0.8				2.80			
	15		5.05	0.8				2.72			
	16		4.85	0.6				3.33			
	17		4.95	0.7				1.76			
	18		5.60	1.35				1.45			
	19		5.75	1.5				1.73			
	20		5.35	1.1				1.07			
	21		5.00	0.75				1.23			
	22		4.70	0.45				1.80			
	23		4.75	0.50				1.65			
	24		4.65	0.40				0.81			
	25		4.55	0.30				0.14			
	26		4.60	0.35				0.18			
	27		4.65	0.40				0.25			
	28		4.85	0.60				0.03			
	29		5.20	0.95				0.30			
	30		5.00	0.75				0.00			
	31		4.30	0.05				0.0			
	31.5		4.55	0.30				1.43			
	32		4.30	0.05				0			
	33		4.45	0.20				0			
W	34.0		4.25	ϕ							
W	39.0		3.45								
G	40.9		2.40								
RLS	43.5		1.71								
TOTALS:											

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