

DRAFT INSTREAM FLOW RECOMMENDATION

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 instream flow water rights on East Fork Parachute Creek, located in Water Division 5.

Location and Land Status. East Fork Parachute Creek originates on the Roan Plateau approximately seven miles northwest of Rifle, CO and flows into Parachute Creek approximately 10 miles northwest of Parachute. This recommendation covers the stream reach beginning at the confluence with Bull Gulch and extends downstream to the confluence with Ben Good Creek, a distance of approximately 2.4 miles. BLM manages 1.3 miles of this stream reach, while 1.1 miles are in private ownership. (Pauline - Please verify.)

Biological Summary. East Fork Parachute Creek is a cold-water, high gradient stream in a narrow canyon. The stream is confined by bedrock and generally has large substrate. The stream has a good mix of run and deep pool habitats to support a salmonid fishery, but the limiting factor on the creek is riffle habitat for spawning.

Fishery surveys indicate the creek supports a self-sustaining population of brook trout. Intensive macroinvertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, stonefly, and black fly.

The riparian community along East Fork Parachute Creek is very robust, providing good cover and shading for the stream. The riparian community is comprised mainly of box elder and maple. The Colorado Natural Heritage Program reports that four significant plant communities have been identified along this reach, including hanging Garden Sullivantia (rare Colorado endemic species), box elder/narrowleaf cottonwood/red osier dogwood (rare globally and statewide), blue spruce/red osier dogwood, and Utah fescue.

R2Cross Analysis. BLM collected the following R2Cross data from this portion of East Fork Parachute Creek:

Cross Section Date	Discharge Rate	Top Width	Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)	Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)
08/24/2001 #1	0.28 cfs	9.8 feet	0.70 cfs	Out of range
08/15/2011 #1	0.36 cfs	14.0 feet	0.66 cfs	Out or range

08/15/2011 #2	0.43 cfs	8.4 feet	0.62 cfs	Out of range
05/17/2012 #1	2.14 cfs	24.4 feet	2.61 cfs	Out of range
05/17/2012 #2	1.99 cfs	16.8 feet	1.69 cfs	8.27 cfs
05/17/2012 #3	2.43 cfs	20.7 feet	2.14 cfs	10.44 cfs

Averages: 1.40 cfs 9.35 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.

9.35 cubic feet per second is recommended for the snowmelt runoff and high temperature period from April 1 through June 30. This recommendation is driven by the average velocity criteria. This creek experiences consistently low flows during late summer and fall, so it is important to protect as much physical habitat as possible during the very limited time when snowmelt runoff and early summer flows are available.

1.0 cubic feet per second is recommended for the late summer period, from July 1 to August 31. This recommendation is driven by limited water availability, but will meet the wetted perimeter and depth criteria in many of the riffles that were surveyed. This flow rate is capable of maintaining pool habitat in the creek and preventing excessively water high temperatures.

0.65 cubic feet per second is recommended for the late fall and winter period from September 1 to March 31. This recommendation is driven by limited water availability, but will meet the wetted perimeter and depth criteria in many of the riffles that were surveyed. It should provide sufficient flow to prevent pools from freezing and protect overwintering fish.

Water Availability. There are several sources of water availability information that could be used for this creek. USGS Gage 09092960 (Parachute Creek near Anvil Points) is recommended for water availability analysis because this gage appears to have the most reliable record of winter flow rates. BLM does not recommend reliance upon data from USGS Gage 09092970 (East Fork Parachute Creek near Rulison), even though it was operated in the reach that is being recommended for an instream flow recommendation. BLM doesn't recommend use of this gage because it was located in the bottom of a narrow and dark canyon, and appeared to experience icing problems during the winter. BLM notes that there is good congruence between flow rates measured by these two gages during the March through November period. However, gage 09092970 often recorded no flow during the November through February period when gage 0909260, located only 2.5 miles upstream, showed consistent flow. Gage 0909260 is not located in a narrow and deep canyon, and was less likely to experience winter icing problems.

BLM also recommends consulting the StreamStats package developed jointly between the U.S. Geological Survey and the CWCB.

BLM is not aware of any decreed water rights within the proposed instream flow reach. Immediately upstream from this reach, the CWCB appropriated an instream flow right in case number 2000 CW 133 in the following amounts:

1.3 cfs March 15-April 14
5.0 cfs April 15 to June 30
2.0 cfs July 1 to August 31
0.8 cfs September 1 to March 14

Relationship to Land Management Plans. BLM's plan for the Roan Plateau strongly emphasizes maintenance of aquatic and riparian resource while allowing limited oil and gas development. This accomplished through establishment of an Area of Critical Environmental Concern, where surface disturbances are strictly limited and directed toward ridgetops away from sensitive creek zones. 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 2013. 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,

Leigh Espy
Deputy State Director
Resources and Fire

Cc: Steve Bennett, Colorado River Valley Field Office
Pauline Adams, Colorado River Valley Field Office

Water	East Fork of Parachute Creek		Date	7/19/2007
Location	"Private (oil and gas); upstream of Pete Spring Gulch,			
Drainage	Colorado River		Water Code	
Crew	"Martin, Talley, Krizman"			21460
Notes	"The purpose of the sample was to determine fish species presence and composition, specifically related to outthroat trout. Creek was electrofished with two Smith-Root LR 24 backpack electrofishers across two passes (depletion). Twenty-two young of the year brown trout were collected in addition to those trout measured for total length and weighed. Conductivity and temperature = 491 microsiemens at 9.9 C and pH = 8.02 at 9.4 C. Photos available."		UTM Zone	12
			UTM X 	749830
			UTM Y 	4385330
			Station Length (ft)	
				195
			Station Width (ft)	
				12.3

LEVEL 2 - STREAM SURVEY (2 PASS REMOVAL)

SAVE

PRINT

PRINT

DONE

SUMMARY INFORMATION

[illegible]

LENGTH FREQUENCY RECORD (cm)

[illegible]



COLORADO WATER
CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



LOCATION INFORMATION

STREAM NAME: <u>East Fork Parachute Creek</u>		CROSS-SECTION NO.: <u>2</u>
CROSS-SECTION LOCATION: <u>80 yds. upstream from BLM-private boundary</u>		
DATE: <u>8-15-11</u>	OBSERVERS: <u>R. Smith, P. Adams</u>	
LEGAL DESCRIPTION:	% SECTION: <u>NW</u>	SECTION: <u>35</u>
	TOWNSHIP: <u>5 N 13</u>	RANGE: <u>95 E 10 W</u>
COUNTY: <u>Garfield</u>	WATERSHED: <u>Parachute Creek</u>	WATER DIVISION: <u>5</u>
		DOW WATER CODE: <u>21460</u>
MAP(S):	USGS:	USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: ☒ YES / ☐ NO	METER TYPE: <u>M - M</u>			
METER NUMBER:	DATE RATED:	CALIB/SPIN: <u>sec</u>	TAPE WEIGHT: <u>surveyed</u> lbs/foot	TAPE TENSION: <u>surveyed</u> lbs
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel to 1 ft. boulders</u>	PHOTOGRAPHS TAKEN: ☒ YES / ☐ NO	NUMBER OF PHOTOGRAPHS: <u>8</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>7.9 -</u>	<u>8.25 / 8.30</u>
② WS Upstream	<u>93.0</u>	<u>4.84</u>
③ WS Downstream	<u>4.0</u>	<u>8.80</u>
SLOPE	<u>3.96 / 97.0 = .041</u>	

SKETCH

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES / ☒ NO	DISTANCE ELECTROFISHED: <u> </u> 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:																	
<u>stonefly, caddisfly, black fly</u>																	

COMMENTS

<u>pH: 8.52</u>
<u>Cond: 464</u>
<u>Temp: 14.4°C</u>
<u>Salinity: 0.2 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 Parachute Creek
XS LOCATION: 80 yds up from BLM-private boundary
XS NUMBER: 2

DATE: 15-Aug-11
OBSERVERS: R. Smith, P. Adams

1/4 SEC: NW
SECTION: 35
TWP: 5S
RANGE: 95W
PM: 6th

COUNTY: Garfield
WATERSHED: Parachute Creek
DIVISION: 5
DOW CODE: 21460

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 Parachute Creek
 XS LOCATION: 80 yds up from BLM-private boundary
 XS NUMBER: 2

DATA POINTS= 24

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE		DIST	VERT DEPTH	WATER DEPTH	VEL
1	RS	1.00	6.50		
	G	1.30	7.30		
		2.30	7.48		
W		2.80	8.30	0.00	0.00
		3.10	8.50	0.20	0.00
		3.40	8.50	0.20	0.00
		3.70	8.40	0.10	0.01
		4.00	8.40	0.10	0.08
		4.30	8.45	0.15	0.05
		4.60	8.45	0.15	0.37
		4.90	8.45	0.15	0.62
		5.20	8.40	0.10	0.52
		5.50	8.40	0.10	0.74
		5.80	8.40	0.10	1.56
		6.10	8.55	0.30	0.26
		6.40	8.55	0.30	0.39
		6.70	8.45	0.20	0.55
		7.00	8.50	0.25	1.47
		7.30	8.40	0.15	0.92
		7.60	8.40	0.15	1.16
W		7.90	8.25	0.00	0.00
		8.50	7.80		
1	G	9.70	7.30		
	RS	13.20	6.68		

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%
0.36	0.20	0.06	0.00	0.0%
0.30	0.20	0.06	0.00	0.0%
0.32	0.10	0.03	0.00	0.1%
0.30	0.10	0.03	0.00	0.6%
0.30	0.15	0.05	0.00	0.5%
0.30	0.15	0.05	0.02	3.9%
0.30	0.15	0.05	0.03	6.5%
0.30	0.10	0.03	0.02	3.6%
0.30	0.10	0.03	0.02	5.2%
0.30	0.10	0.03	0.05	10.9%
0.34	0.30	0.09	0.02	5.4%
0.30	0.30	0.09	0.04	8.2%
0.32	0.20	0.06	0.03	7.7%
0.30	0.25	0.08	0.11	25.7%
0.32	0.15	0.05	0.04	9.6%
0.30	0.15	0.05	0.05	12.2%
0.34		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%

5.29 0.3 0.81 0.43 100.0%
 (Max.)

Manning's n = 0.1624
 Hydraulic Radius= 0.15304754

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: 80 yds up from BLM-private boundary
 XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.81	0.84	3.8%
8.03	0.81	2.17	168.1%
8.05	0.81	2.06	154.4%
8.07	0.81	1.95	140.8%
8.09	0.81	1.84	127.3%
8.11	0.81	1.73	113.9%
8.13	0.81	1.62	100.6%
8.15	0.81	1.52	87.4%
8.17	0.81	1.41	74.2%
8.19	0.81	1.31	61.2%
8.21	0.81	1.20	48.3%
8.23	0.81	1.10	35.4%
8.24	0.81	1.05	29.1%
8.25	0.81	0.99	22.7%
8.26	0.81	0.94	16.4%
8.27	0.81	0.89	10.1%
8.28	0.81	0.84	3.8%
8.29	0.81	0.79	-2.4%
8.30	0.81	0.74	-8.6%
8.31	0.81	0.69	-14.8%
8.32	0.81	0.64	-20.9%
8.33	0.81	0.59	-27.0%
8.35	0.81	0.49	-39.1%
8.37	0.81	0.40	-50.9%
8.39	0.81	0.30	-62.6%
8.41	0.81	0.22	-73.4%
8.43	0.81	0.15	-81.1%
8.45	0.81	0.10	-87.8%
8.47	0.81	0.06	-92.3%
8.49	0.81	0.04	-95.5%
8.51	0.81	0.02	-97.7%
8.53	0.81	0.01	-98.9%

WATERLINE AT ZERO

AREA ERROR = 8.281

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: 80 yds up from 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	7.30	8.40	0.83	1.25	6.93	9.32	100.0%	0.74	10.55	1.52
	7.33	8.15	0.82	1.22	6.68	9.06	97.2%	0.74	10.09	1.51
	7.38	7.75	0.81	1.17	6.28	8.65	92.8%	0.73	9.39	1.50
	7.43	7.36	0.80	1.12	5.90	8.24	88.4%	0.72	8.75	1.48
	7.48	6.96	0.80	1.07	5.54	7.83	84.0%	0.71	8.16	1.47
	7.53	6.81	0.76	1.02	5.20	7.64	82.0%	0.68	7.45	1.43
	7.58	6.66	0.73	0.97	4.86	7.45	80.0%	0.65	6.77	1.39
	7.63	6.51	0.70	0.92	4.53	7.27	78.0%	0.62	6.13	1.35
	7.68	6.36	0.66	0.87	4.21	7.08	75.9%	0.59	5.52	1.31
	7.73	6.21	0.63	0.82	3.89	6.89	73.9%	0.57	4.93	1.27
	7.78	6.06	0.59	0.77	3.59	6.70	71.9%	0.54	4.38	1.22
	7.83	5.94	0.55	0.72	3.29	6.54	70.2%	0.50	3.85	1.17
	7.88	5.85	0.51	0.67	2.99	6.40	68.7%	0.47	3.34	1.12
	7.93	5.75	0.47	0.62	2.70	6.26	67.1%	0.43	2.86	1.06
	7.98	5.65	0.43	0.57	2.42	6.11	65.6%	0.40	2.41	1.00
	8.03	5.56	0.38	0.52	2.14	5.97	64.1%	0.36	2.00	0.93
	8.08	5.46	0.34	0.47	1.86	5.83	62.6%	0.32	1.61	0.87
	8.13	5.36	0.30	0.42	1.59	5.69	61.0%	0.28	1.26	0.79
	8.18	5.26	0.25	0.37	1.33	5.55	59.5%	0.24	0.95	0.71
	8.23	5.17	0.21	0.32	1.07	5.40	58.0%	0.20	0.67	0.63
WL	8.28	5.05	0.16	0.27	0.81	5.25	56.3%	0.15	0.43	0.53
	8.33	4.89	0.11	0.22	0.56	5.06	54.2%	0.11	0.24	0.43
	8.38	4.72	0.07	0.17	0.32	4.85	52.1%	0.07	0.10	0.30
	8.43	2.78	0.05	0.12	0.14	2.88	30.9%	0.05	0.03	0.24
	8.48	1.20	0.03	0.07	0.04	1.24	13.3%	0.03	0.01	0.19
	8.53	0.39	0.02	0.02	0.01	0.40	4.3%	0.02	0.00	0.12

STREAM NAME: East Fork Parachute Creek
XS LOCATION: 80 yds up from BLM-private boundary
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)= 0.43 cfs
CALCULATED FLOW (Qc)= 0.43 cfs
(Qm-Qc)/Qm * 100 = -0.6 %

MEASURED WATERLINE (WLm)= 8.28 ft
CALCULATED WATERLINE (WLc)= 8.28 ft
(WLm-WLc)/WLm * 100 = -0.1 %

MAX MEASURED DEPTH (Dm)= 0.30 ft
MAX CALCULATED DEPTH (Dc)= 0.27 ft
(Dm-Dc)/Dm * 100 = 10.4 %

MEAN VELOCITY= 0.53 ft/sec
MANNING'S N= 0.162
SLOPE= 0.041 ft/ft

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

RECOMMENDED INSTREAM FLOW:
=====

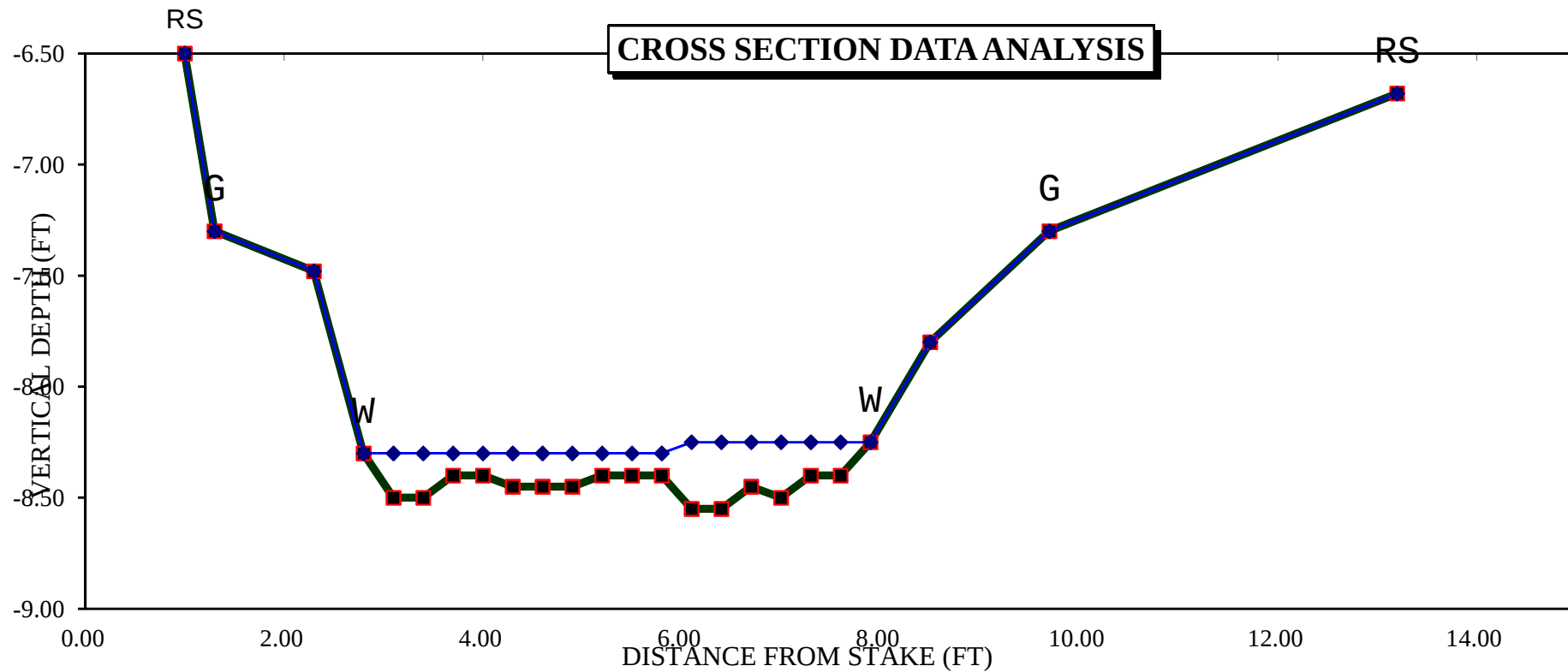
FLOW (CFS)	PERIOD
=====	=====
_____	_____
_____	_____
_____	_____
_____	_____

RATIONALE FOR RECOMMENDATION:
=====

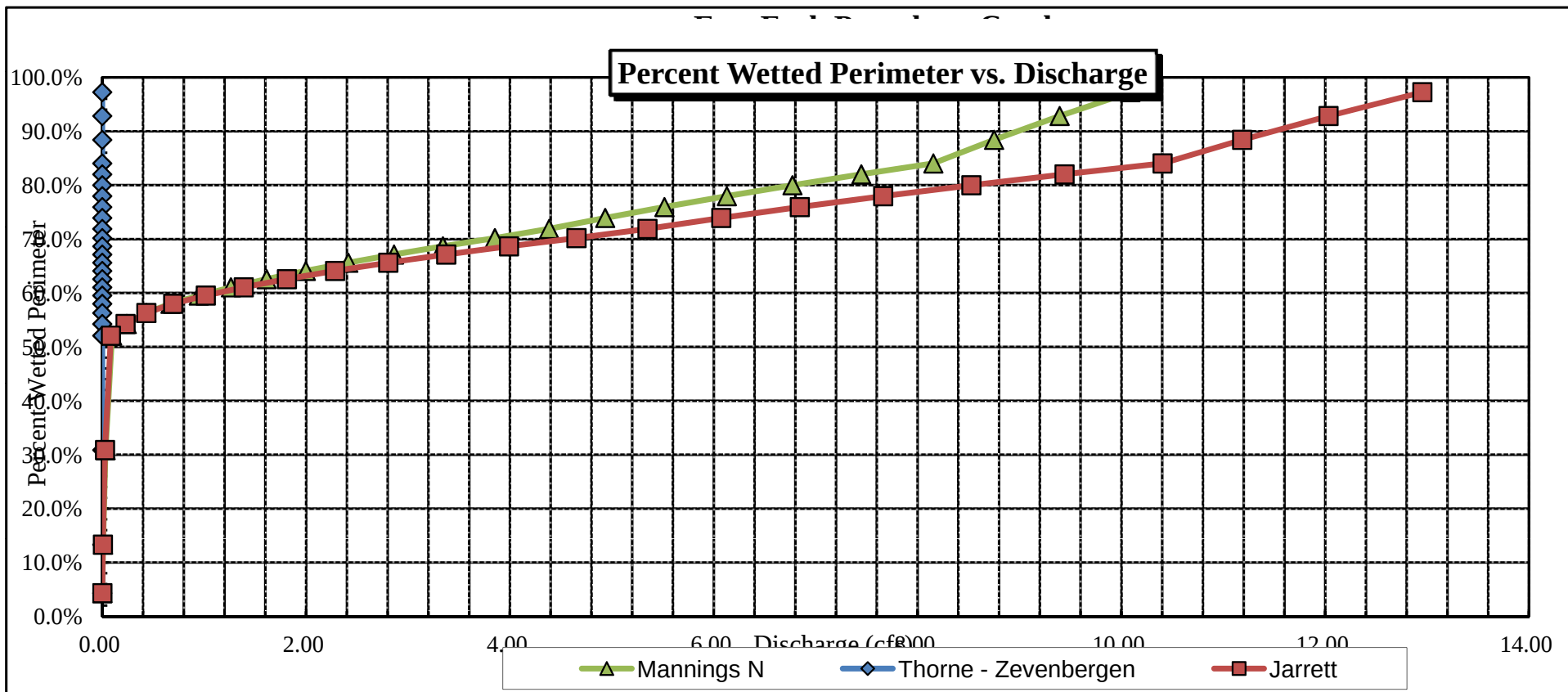
RECOMMENDATION BY: AGENCY..... DATE:.....
CWCB REVIEW BY: DATE:.....

FIELD DATA

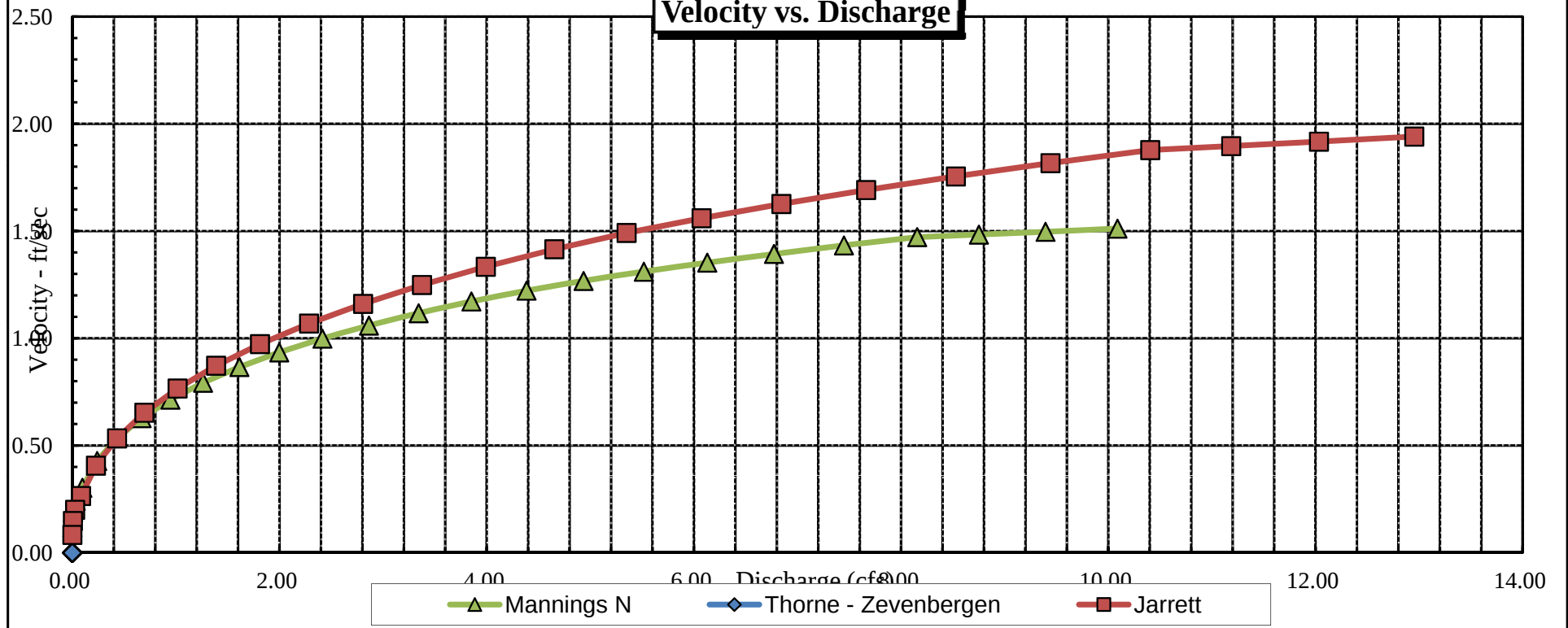
CROSS SECTION DATA ANALYSIS

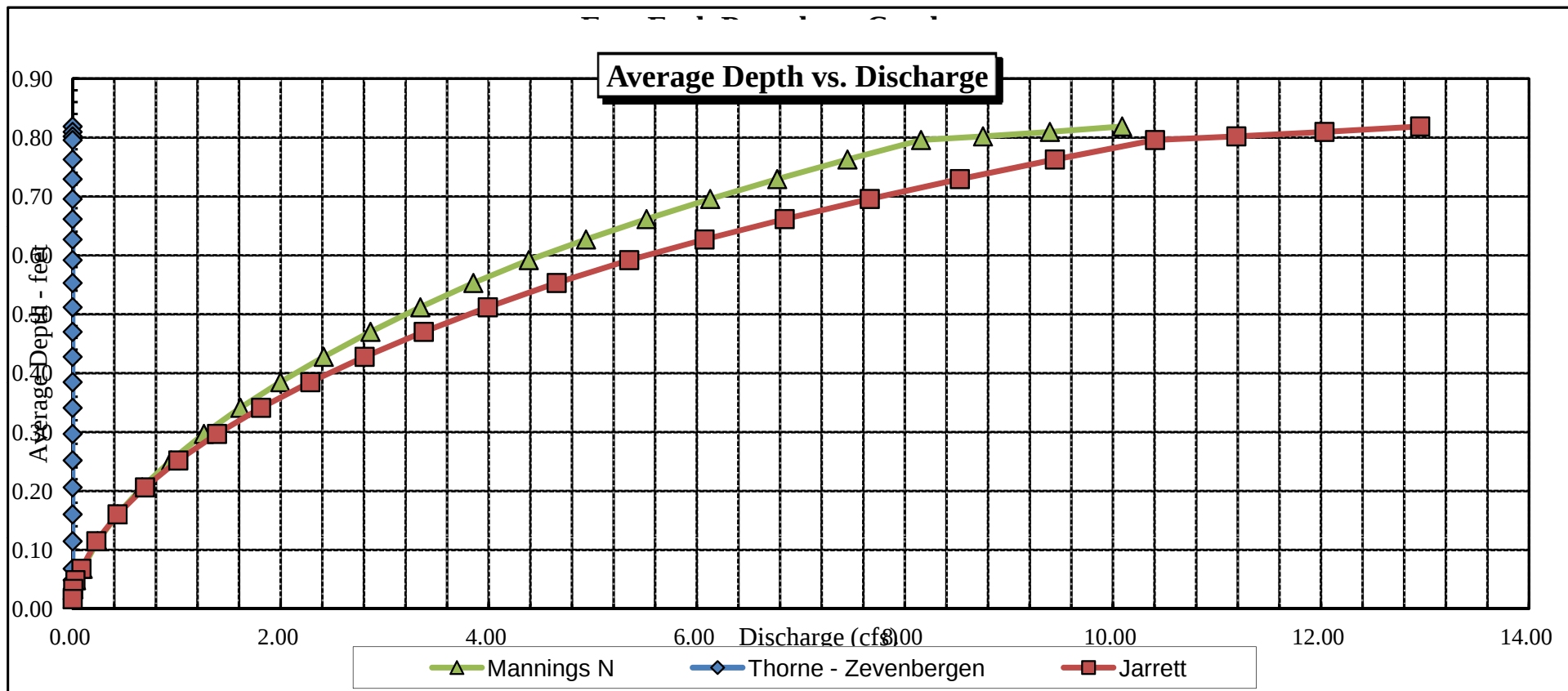


Channel Bottom Computed Water Line

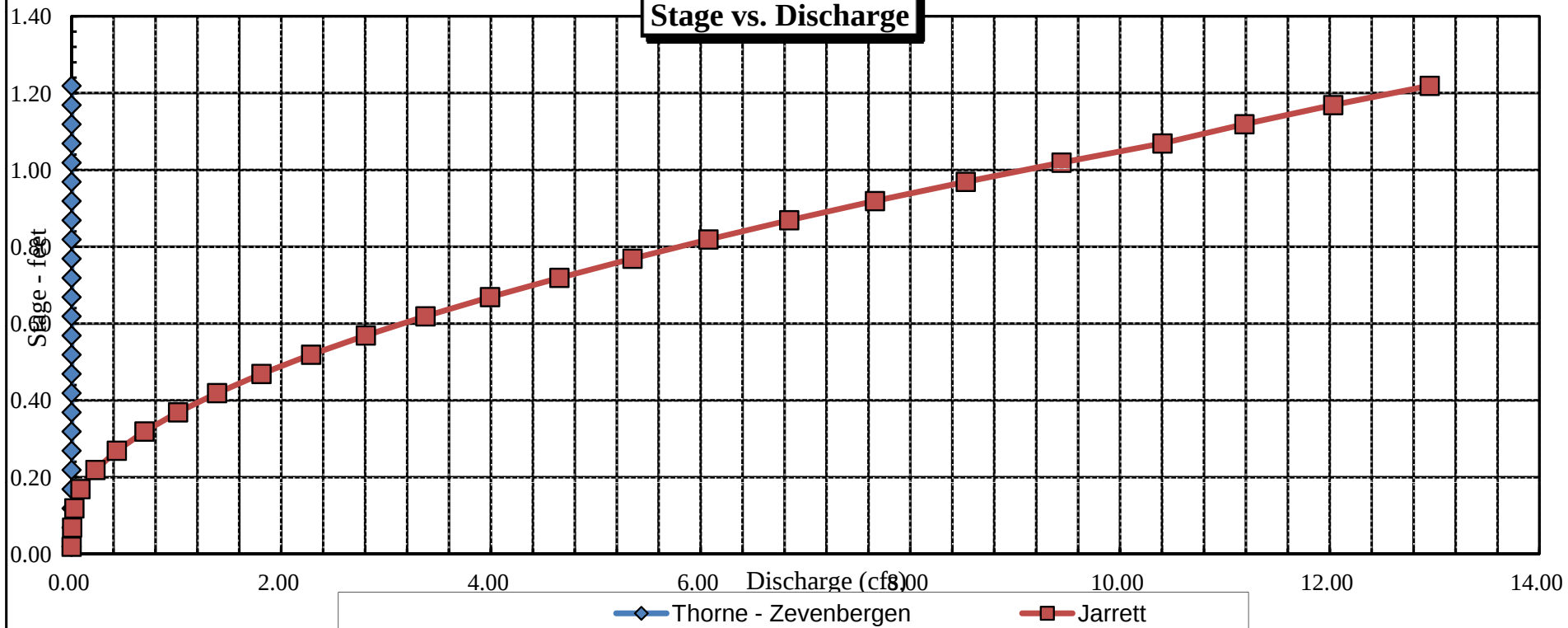


Velocity vs. Discharge





Stage vs. Discharge





FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME:		East Fork Parachute Creek - below falls				CROSS-SECTION NO.: 1	
CROSS-SECTION LOCATION:		100 yds upstream from BLM-private boundary					
DATE: 8-15-11		OBSERVERS: R. Smith, P. Adams					
LEGAL DESCRIPTION	1/4 SECTION:	NW	SECTION:	35	TOWNSHIP:	5 N(S)	RANGE: 95 E(W) PM: 6th
COUNTY:	Garfield	WATERSHED:	Parachute Ck	WATER DIVISION:	5	DOW WATER CODE:	21460
MAP(S):	USGS: 750209 E 4385305 N USFS:						

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION:		YES ☒ NO ☐	METER TYPE: <i>March 100 Series</i>	
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE: <i>Gravel to 1.00 boulders</i>		PHOTOGRAPHS TAKEN: YES ☒ NO ☐	NUMBER OF PHOTOGRAPHS: <i>8</i>	

CHANNEL PROFILE DATA

STATION		DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗	Tape @ Stake LB	0.0	5.11
⊗	Tape @ Stake RB	0.0	5.11
①	WS @ Tape LB/RB	0.0	6.78 / 6.82
②	WS Upstream	54.0	4.84
③	WS Downstream	43.0	8.80
SLOPE		396 / 97.0 = .041	

SURFACE

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:

Stonefly, caddisfly, blackfly, water snails

COMMENTS

conductivity = 246 μ S, Temp = 14.3°C, pH = 8.52, Salinity = 0.2 ppt

Box Elder - Maple Riparian Community

[illegible]

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

LOCATION INFORMATION

STREAM NAME: East Fork Parachute Creek
XS LOCATION: 100 yds up fr BLM-private boundary
XS NUMBER: 1

DATE: 15-Aug-11
OBSERVERS: R. Smith, P. Adams

1/4 SEC: NW
SECTION: 35
TWP: 5S
RANGE: 95W
PM: 6th

COUNTY: Garfield
WATERSHED: Parachute Creek
DIVISION: 5
DOW CODE: 21460

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.....

DATA POINTS= 35

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE		VERT	WATER	
	DIST	DEPTH	DEPTH	VEL
RS	0.50	4.91		
1 G	2.00	5.76		
	2.60	6.55		
W	2.80	6.80	0.00	0.00
	3.10	6.85	0.05	0.00
	3.40	7.05	0.25	0.19
	3.70	7.10	0.30	0.27
	4.00	7.10	0.30	0.50
	4.30	7.00	0.20	0.46
	4.60	7.00	0.20	0.34
	4.90	6.95	0.15	0.30
	5.20	7.00	0.20	0.34
	5.50	6.95	0.15	0.52
	5.80	6.95	0.15	0.46
	6.10	6.95	0.15	0.28
	6.40	7.00	0.20	0.15
	6.70	6.95	0.15	0.29
	7.00	6.95	0.15	0.52
	7.30	6.90	0.10	0.53
	7.60	6.90	0.10	0.52
	7.90	6.90	0.10	0.40
	8.20	6.90	0.10	0.51
	8.50	7.00	0.20	0.28
	8.80	6.90	0.10	0.28
	9.10	6.90	0.10	0.16
	9.40	6.85	0.05	0.00
	9.70	6.80	0.00	0.00
	10.00	6.80	0.00	0.00
	10.30	6.80	0.00	0.00
W	10.50	6.80		
	11.60	6.34		
	13.70	6.13		
1 G	16.00	5.76		
	18.00	5.46		
LS	21.00	4.90		

[illegible]

TOTALS -----

7.05	0.3	1.04	0.36	100.0%
(Max.)				

Manning's n = 0.2431
Hydraulic Radius= 0.14679561

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: 100 yds up fr BLM-private boundary
 XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.04	1.04	0.0%
6.55	1.04	3.06	195.6%
6.57	1.04	2.89	179.3%
6.59	1.04	2.72	163.0%
6.61	1.04	2.56	146.9%
6.63	1.04	2.39	130.9%
6.65	1.04	2.23	115.1%
6.67	1.04	2.06	99.3%
6.69	1.04	1.90	83.7%
6.71	1.04	1.74	68.2%
6.73	1.04	1.58	52.8%
6.75	1.04	1.42	37.6%
6.76	1.04	1.35	30.0%
6.77	1.04	1.27	22.5%
6.78	1.04	1.19	14.9%
6.79	1.04	1.11	7.5%
6.80	1.04	1.04	0.0%
6.81	1.04	0.97	-6.6%
6.82	1.04	0.90	-13.1%
6.83	1.04	0.83	-19.5%
6.84	1.04	0.77	-25.7%
6.85	1.04	0.71	-31.9%
6.87	1.04	0.58	-43.9%
6.89	1.04	0.46	-55.7%
6.91	1.04	0.35	-65.9%
6.93	1.04	0.26	-74.5%
6.95	1.04	0.18	-82.6%
6.97	1.04	0.12	-88.0%
6.99	1.04	0.08	-91.9%
7.01	1.04	0.06	-94.2%
7.03	1.04	0.04	-95.9%
7.05	1.04	0.03	-97.5%

WATERLINE AT ZERO

AREA ERROR = 6.800

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: 100 yds up fr 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	5.76	14.00	0.84	1.34	11.78	14.80	100.0%	0.80	12.52	1.06
	5.80	13.72	0.82	1.30	11.22	14.49	98.0%	0.77	11.71	1.04
	5.85	13.37	0.79	1.25	10.55	14.12	95.4%	0.75	10.74	1.02
	5.90	13.02	0.76	1.20	9.89	13.74	92.9%	0.72	9.82	0.99
	5.95	12.67	0.73	1.15	9.24	13.36	90.3%	0.69	8.95	0.97
	6.00	12.33	0.70	1.10	8.62	12.98	87.7%	0.66	8.12	0.94
	6.05	11.98	0.67	1.05	8.01	12.61	85.2%	0.64	7.33	0.91
	6.10	11.63	0.64	1.00	7.42	12.23	82.6%	0.61	6.58	0.89
	6.15	11.20	0.61	0.95	6.85	11.77	79.6%	0.58	5.90	0.86
	6.20	10.67	0.59	0.90	6.30	11.21	75.8%	0.56	5.31	0.84
	6.25	10.13	0.57	0.85	5.78	10.64	71.9%	0.54	4.76	0.82
	6.30	9.59	0.55	0.80	5.29	10.08	68.1%	0.52	4.26	0.81
	6.35	9.13	0.53	0.75	4.82	9.59	64.8%	0.50	3.77	0.78
	6.40	8.97	0.49	0.70	4.37	9.40	63.5%	0.47	3.25	0.74
	6.45	8.81	0.45	0.65	3.93	9.20	62.2%	0.43	2.75	0.70
	6.50	8.66	0.40	0.60	3.49	9.01	60.9%	0.39	2.29	0.66
	6.55	8.50	0.36	0.55	3.06	8.82	59.6%	0.35	1.87	0.61
	6.60	8.34	0.32	0.50	2.64	8.63	58.3%	0.31	1.48	0.56
	6.65	8.18	0.27	0.45	2.23	8.43	57.0%	0.26	1.13	0.51
	6.70	8.02	0.23	0.40	1.82	8.24	55.7%	0.22	0.82	0.45
	6.75	7.86	0.18	0.35	1.42	8.04	54.4%	0.18	0.56	0.39
WL	6.80	6.90	0.15	0.30	1.03	7.05	47.7%	0.15	0.36	0.34
	6.85	6.30	0.11	0.25	0.70	6.44	43.5%	0.11	0.20	0.28
	6.90	4.73	0.08	0.20	0.40	4.85	32.8%	0.08	0.09	0.23
	6.95	3.15	0.06	0.15	0.18	3.24	21.9%	0.06	0.03	0.18
	7.00	0.97	0.07	0.10	0.07	1.01	6.8%	0.07	0.01	0.21
	7.05	0.75	0.03	0.05	0.03	0.76	5.2%	0.03	0.00	0.13

STREAM NAME: East Fork Parachute Creek
XS LOCATION: 100 yds up fr BLM-private boundary
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.36 cfs
CALCULATED FLOW (Qc)=	0.36 cfs
(Qm-Qc)/Qm * 100 =	0.0 %
MEASURED WATERLINE (WLm)=	6.80 ft
CALCULATED WATERLINE (WLc)=	6.80 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=	0.34 ft/sec
MANNING'S N=	0.243
SLOPE=	0.041 ft/ft
.4 * Qm =	0.1 cfs
2.5 * Qm=	0.9 cfs

RECOMMENDED INSTREAM FLOW:
=====

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

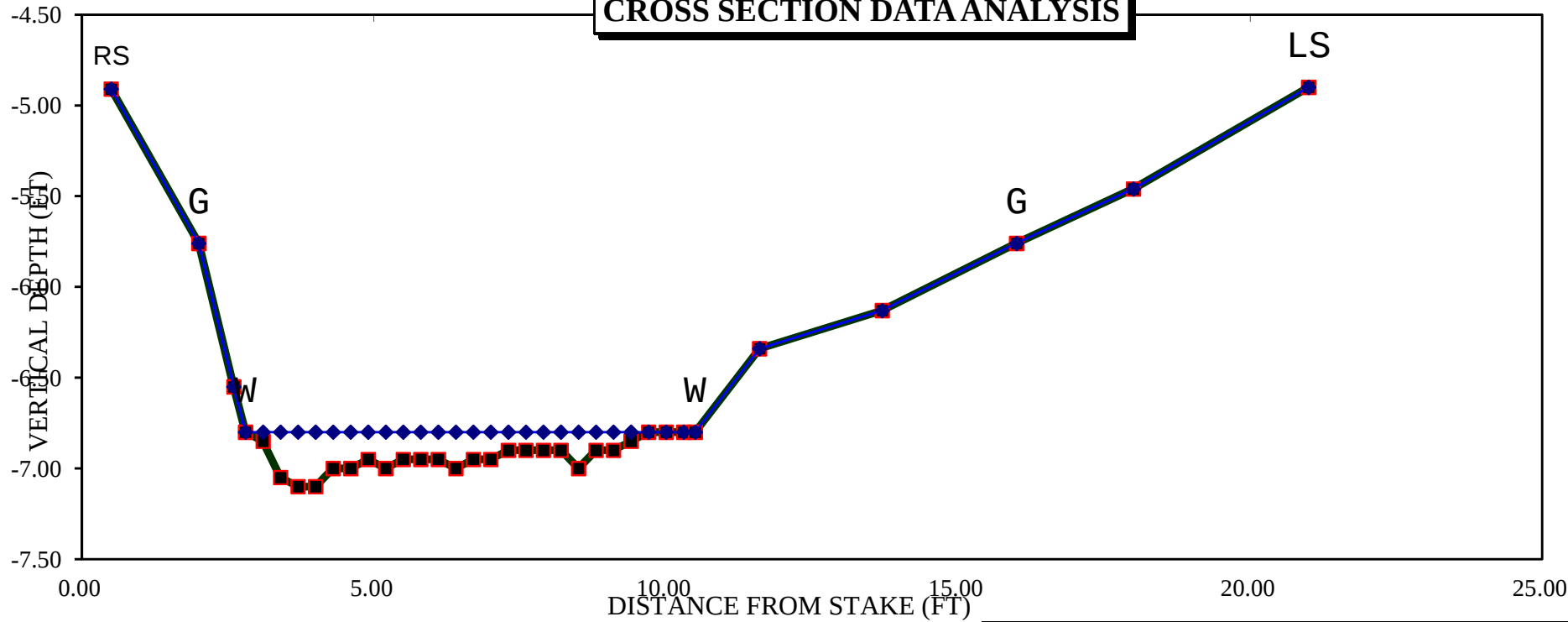
RATIONALE FOR RECOMMENDATION:
=====

[illegible]

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

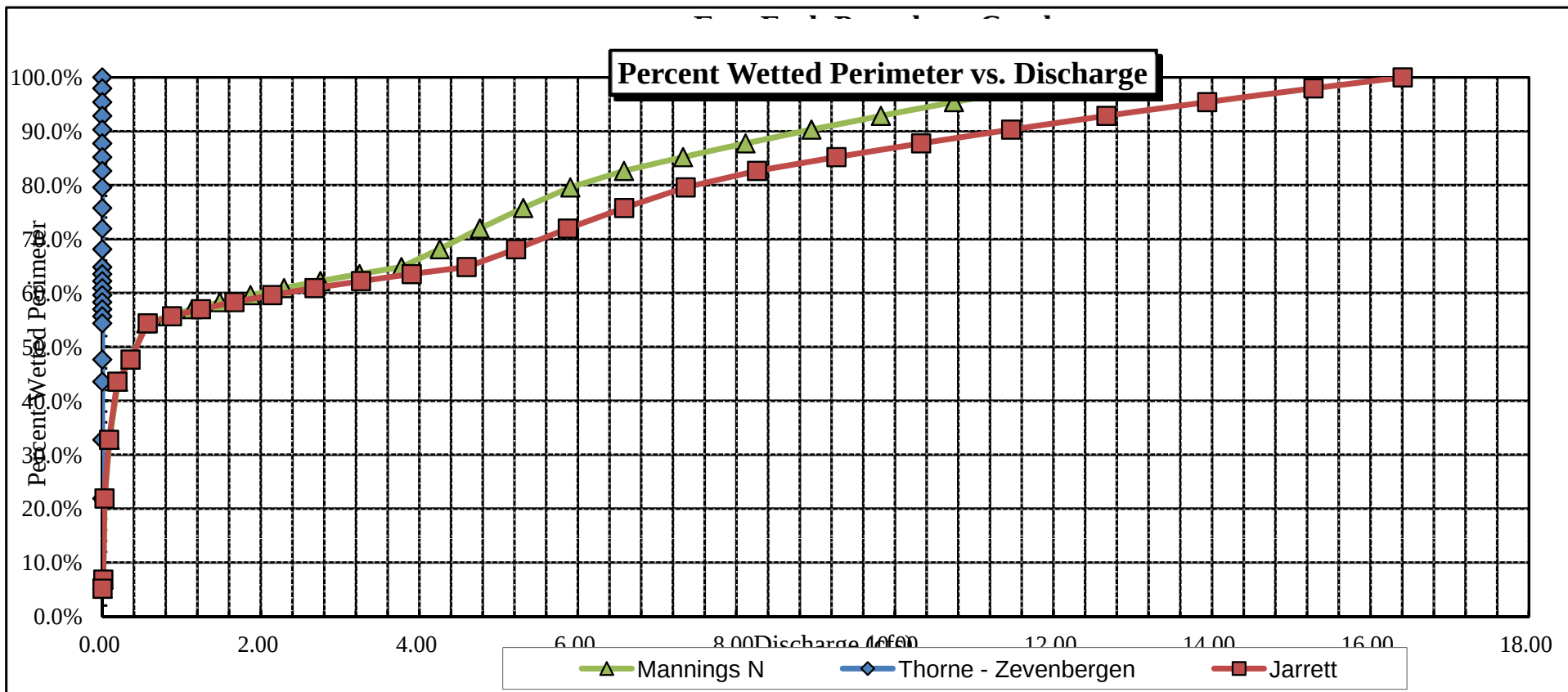
CWCB REVIEW BY: DATE:

CROSS SECTION DATA ANALYSIS

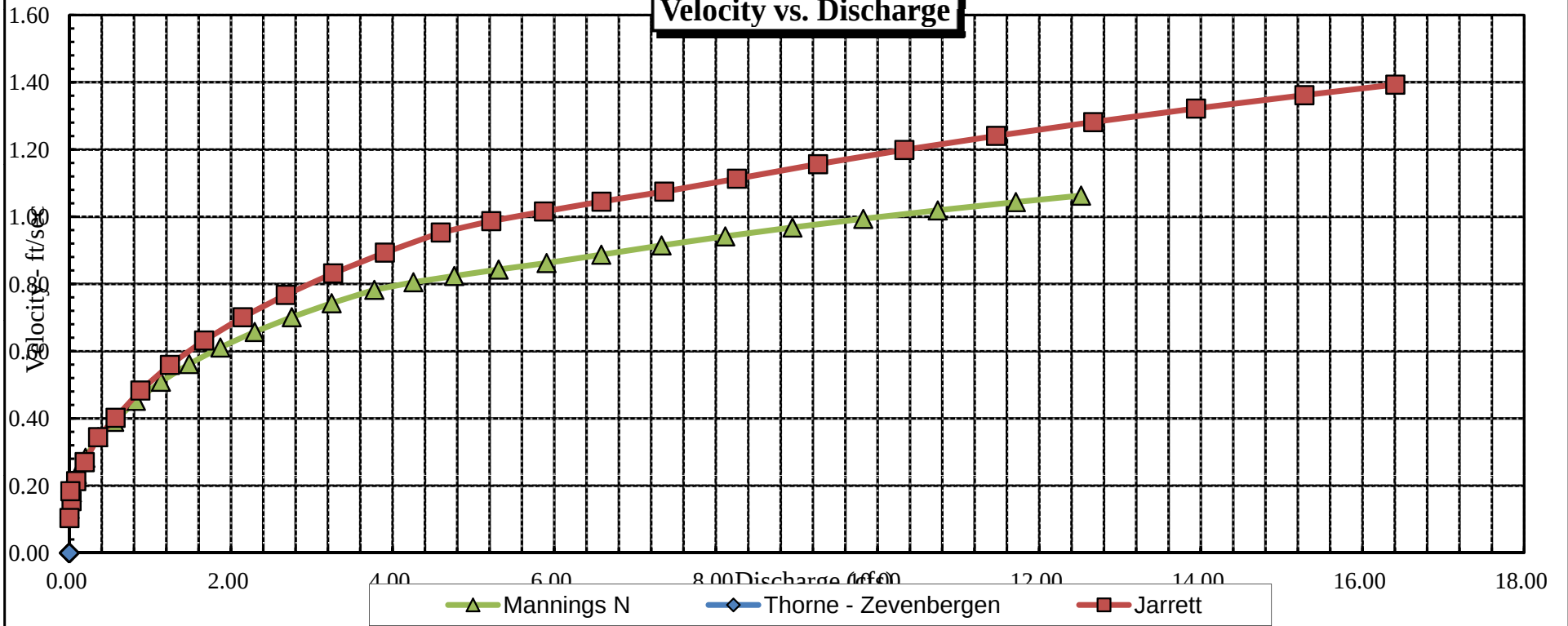


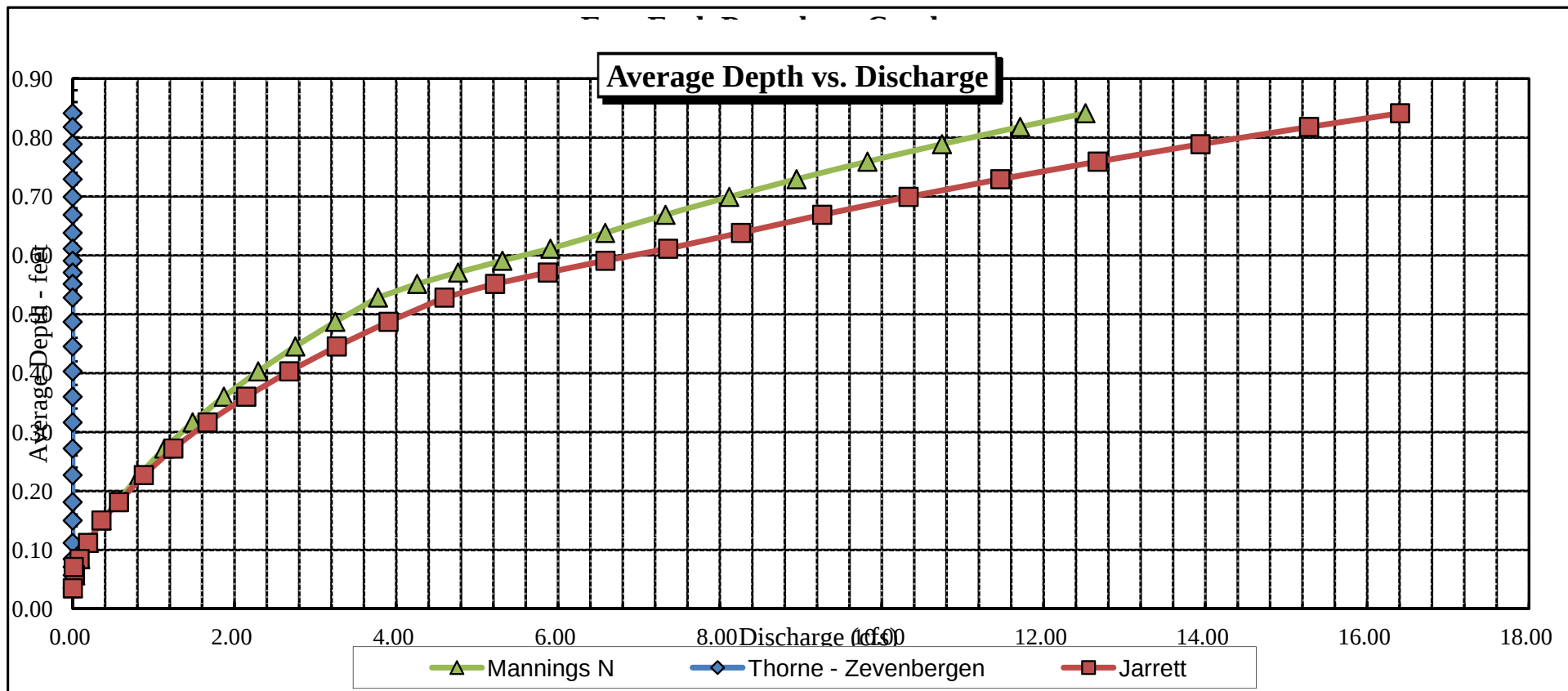
Channel Bottom

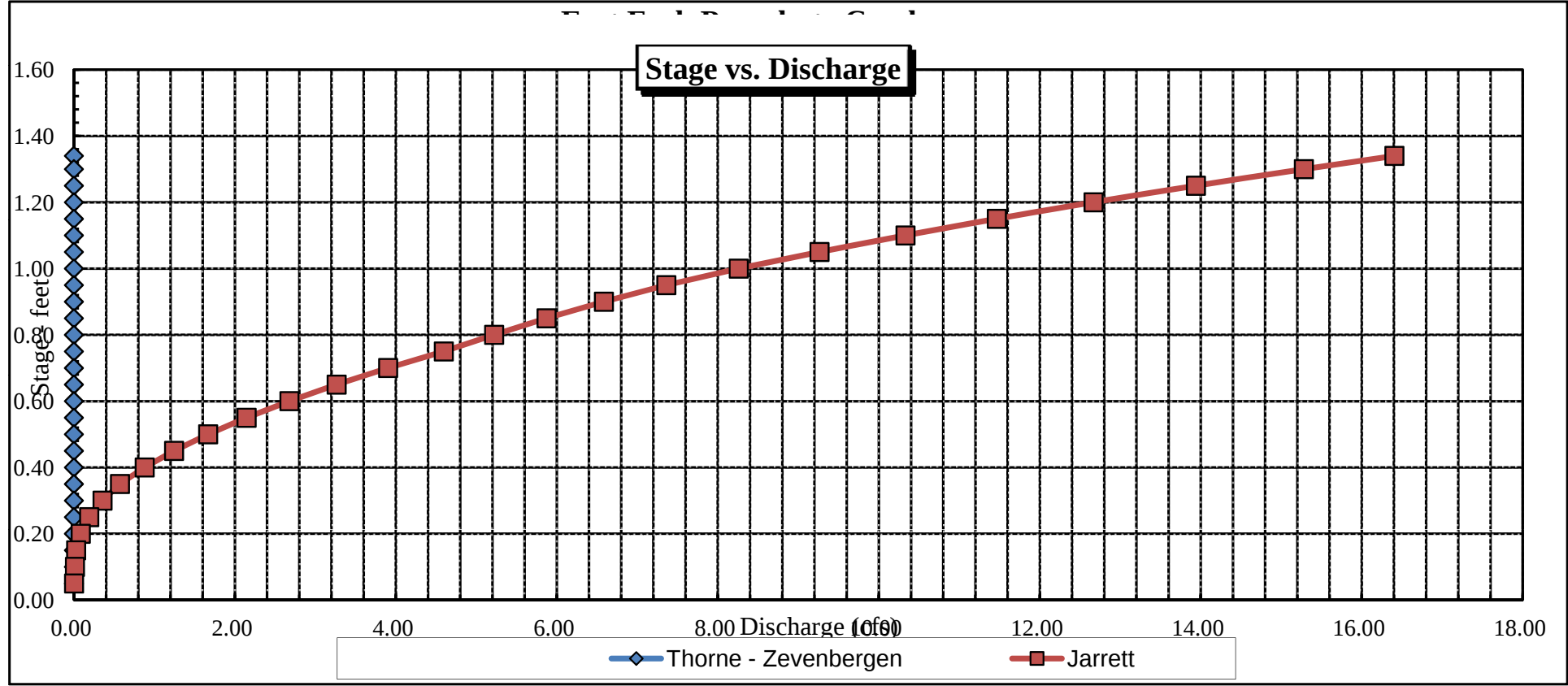
Computed Water Line



Velocity vs. Discharge









COLORADO WATER
CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



LOCATION INFORMATION

STREAM NAME: <u>East Fork Parachute Creek</u>		CROSS-SECTION NO.: <u>3</u>
CROSS-SECTION LOCATION: <u>Approx. 0.5 miles below East Fork Falls</u>		
DATE: <u>5-17-12</u>	OBSERVERS: <u>R. Smith, P. Adams</u>	
LEGAL DESCRIPTION:	1/4 SECTION: <u>NW</u>	SECTION: <u>35</u>
	TOWNSHIP: <u>5 N/S</u>	RANGE: <u>95 E/W</u>
	PM: <u>6:11</u>	
COUNTY: <u>Garfield</u>	WATERSHED: <u>Parachute Creek</u>	WATER DIVISION: <u>5</u>
	DOW WATER CODE: <u>21460</u>	
MAP(S):	USGS:	USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: ☒ YES ☐ NO	METER TYPE: <u>M-M</u>		
METER NUMBER:	DATE RATED:	CALIB/SPIN: <u>_____</u> sec	TAPE WEIGHT: <u>_____</u> lbs/foot
		TAPE TENSION: <u>_____</u> lbs	
CHANNEL BED MATERIAL SIZE RANGE: <u>4" cobbles to 2-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>1.6</u>	<u>4.80/4.77</u>
② WS Upstream	<u>32.3</u>	<u>3.50</u>
③ WS Downstream	<u>39.8</u>	<u>6.19</u>
SLOPE	<u>2.69/72.1 = .037</u>	

SKETCH

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

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO ☒	DISTANCE ELECTROFISHED: <u>_____</u> 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:																	
<u>mayfly, caddisfly, stonefly, black fly</u>																	

COMMENTS

<u>Ph = 8.81</u>
<u>Temp = 6.5° C</u>
<u>Cond = 292</u>
<u>Salinity = 0.2 ppt</u>

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:

East Fork Parachute Creek

CROSS-SECTION NO.:

3

DATE:

5-17-12

SHEET ___ OF ___

BEGINNING OF MEASUREMENT

EDGE OF WATER LOOKING DOWNSTREAM:
(0.0 AT STAKE)

LEFT / RIGHT

Gage Reading: _____ ft

TIME: 11:15 am

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)		Area (ft ²)	Discharge (cfs)
									At Point	Mean in Vertical		
G+LS		0.0		3.66								
		0.6		4.17								
		1.3		4.51								
W		1.6		4.80								
		2.0		5.00	.2				0.08			
		2.4		5.00	.2				0.09			
		2.8		5.05	.25				0.20			
		3.2		5.15	.35				0			
		3.6		5.10	.30				0			
		4.0		5.10	.30				.45			
		4.4		5.20	.40				.48			
		4.8		5.20	.40				.80			
		5.2		5.25	.45				.41			
		5.6		5.30	.50				.60			
		6.0		5.30	.50				.81			
		6.4		5.30	.50				.23			
		6.8		5.30	.50				.41			
		7.2		5.35	.55				.21			
		7.6		5.20	.40				.86			
		8.0		5.10	.30				.96			
		8.4		5.15	.35				1.52			
		8.8		5.10	.30				1.64			
		9.2		5.15	.35				1.60			
		9.6		5.20	.40				.85			
		10		5.15	.35				1.19			
		10.4		5.20	.40				.99			
		10.8		5.15	.35				.76			
		11.2		5.15	.35				.46			
		11.6		5.20	.40				.57			
		12		4.80	0				0			
		12.4		4.85	.10				0			
		12.8		4.80	.05				0			
W		13.3		4.76								
		13.6		4.40								
		15.0		4.50								
		16.8		4.32								
		17.9		4.05								
		19.3		3.90								
G		21.0		3.60								
RS		23.0		2.38								
TOTALS:												
End of Measurement		Time	Gage Reading		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 Parachute Creek
XS LOCATION: Approx. 0.5 mile below E Fk Falls
XS NUMBER: 3

DATE: 17-May-12
OBSERVERS: R. Smith, P. Adams

1/4 SEC: NW
SECTION: 35
TWP: 5S
RANGE: 95W
PM: Sixth

COUNTY: Garfield
WATERSHED: Parachute Creek
DIVISION: 5
DOW CODE: 21460

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: 0.037

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 mile below E Fk Falls
 XS NUMBER: 3

DATA POINTS= 40

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1 G&LS	0.00	3.66			0.00		0.00	0.00	0.0%
	0.60	4.17			0.00		0.00	0.00	0.0%
	1.30	4.51			0.00		0.00	0.00	0.0%
W	1.60	4.80	0.00	0.00	0.00		0.00	0.00	0.0%
	2.00	5.00	0.20	0.08	0.45	0.20	0.08	0.01	0.3%
	2.40	5.00	0.20	0.09	0.40	0.20	0.08	0.01	0.3%
	2.80	5.05	0.25	0.20	0.40	0.25	0.10	0.02	0.8%
	3.20	5.15	0.35	0.00	0.41	0.35	0.14	0.00	0.0%
	3.60	5.10	0.30	0.00	0.40	0.30	0.12	0.00	0.0%
	4.00	5.10	0.30	0.45	0.40	0.30	0.12	0.05	2.2%
	4.40	5.20	0.40	0.48	0.41	0.40	0.16	0.08	3.2%
	4.80	5.20	0.40	0.80	0.40	0.40	0.16	0.13	5.3%
	5.20	5.25	0.45	0.41	0.40	0.45	0.18	0.07	3.0%
	5.60	5.30	0.50	0.60	0.40	0.50	0.20	0.12	4.9%
	6.00	5.30	0.50	0.81	0.40	0.50	0.20	0.16	6.7%
	6.40	5.30	0.50	0.23	0.40	0.50	0.20	0.05	1.9%
	6.80	5.30	0.50	0.41	0.40	0.50	0.20	0.08	3.4%
	7.20	5.35	0.55	0.21	0.40	0.55	0.22	0.05	1.9%
	7.60	5.20	0.40	0.86	0.43	0.40	0.16	0.14	5.7%
	8.00	5.10	0.30	0.96	0.41	0.30	0.12	0.12	4.7%
	8.40	5.15	0.35	1.52	0.40	0.35	0.14	0.21	8.8%
	8.80	5.10	0.30	1.64	0.40	0.30	0.12	0.20	8.1%
	9.20	5.15	0.35	1.60	0.40	0.35	0.14	0.22	9.2%
	9.60	5.20	0.40	0.85	0.40	0.40	0.16	0.14	5.6%
	10.00	5.15	0.35	1.19	0.40	0.35	0.14	0.17	6.9%
	10.40	5.20	0.40	0.99	0.40	0.40	0.16	0.16	6.5%
	10.80	5.15	0.35	0.76	0.40	0.35	0.14	0.11	4.4%
	11.20	5.15	0.35	0.46	0.40	0.35	0.14	0.06	2.6%
	11.60	5.20	0.40	0.57	0.40	0.40	0.16	0.09	3.8%
	12.00	4.80	0.00	0.00	0.57		0.00	0.00	0.0%
	12.40	4.85	0.10	0.00	0.40	0.10	0.04	0.00	0.0%
	12.80	4.80	0.05	0.00	0.40	0.05	0.02	0.00	0.0%
W	13.30	4.76	0.00	0.00	0.50		0.00	0.00	0.0%
	13.60	4.40			0.00		0.00	0.00	0.0%
	15.00	4.56			0.00		0.00	0.00	0.0%
	16.80	4.32			0.00		0.00	0.00	0.0%
	17.90	4.05			0.00		0.00	0.00	0.0%
	19.30	3.90			0.00		0.00	0.00	0.0%
1 G	21.00	3.60			0.00		0.00	0.00	0.0%
RS	23.00	2.38			0.00		0.00	0.00	0.0%

TOTALS -----

12.03 0.55 3.80 2.43 100.0%
 (Max.)

Manning's n = 0.2074
 Hydraulic Radius= 0.31620776

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 mile below E Fk Falls
 XS NUMBER: 3

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	3.80	3.76	-1.1%
4.55	3.80	6.73	76.9%
4.57	3.80	6.48	70.5%
4.59	3.80	6.24	64.2%
4.61	3.80	6.00	57.8%
4.63	3.80	5.76	51.5%
4.65	3.80	5.52	45.2%
4.67	3.80	5.28	38.9%
4.69	3.80	5.05	32.7%
4.71	3.80	4.81	26.4%
4.73	3.80	4.57	20.2%
4.75	3.80	4.34	14.0%
4.76	3.80	4.22	10.9%
4.77	3.80	4.10	7.9%
4.78	3.80	3.99	4.8%
4.79	3.80	3.87	1.8%
4.80	3.80	3.76	-1.1%
4.81	3.80	3.65	-4.0%
4.82	3.80	3.54	-6.9%
4.83	3.80	3.43	-9.7%
4.84	3.80	3.33	-12.5%
4.85	3.80	3.22	-15.2%
4.87	3.80	3.02	-20.6%
4.89	3.80	2.82	-25.9%
4.91	3.80	2.61	-31.3%
4.93	3.80	2.41	-36.5%
4.95	3.80	2.21	-41.8%
4.97	3.80	2.02	-47.0%
4.99	3.80	1.82	-52.2%
5.01	3.80	1.63	-57.2%
5.03	3.80	1.44	-62.1%
5.05	3.80	1.26	-66.8%

WATERLINE AT ZERO

AREA ERROR = 4.796

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 mile below E Fk Falls
 XS NUMBER: 3

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	3.66	20.66	1.07	1.69	22.03	21.62	100.0%	1.02	30.72	1.39
	3.80	19.73	0.98	1.55	19.27	20.63	95.4%	0.93	25.38	1.32
	3.85	19.39	0.94	1.50	18.30	20.26	93.7%	0.90	23.55	1.29
	3.90	19.04	0.91	1.45	17.34	19.90	92.0%	0.87	21.79	1.26
	3.95	18.53	0.88	1.40	16.40	19.37	89.6%	0.85	20.22	1.23
	4.00	18.01	0.86	1.35	15.48	18.82	87.0%	0.82	18.73	1.21
	4.05	17.48	0.83	1.30	14.60	18.27	84.5%	0.80	17.31	1.19
	4.10	17.20	0.80	1.25	13.73	17.97	83.1%	0.76	15.81	1.15
	4.15	16.94	0.76	1.20	12.88	17.68	81.8%	0.73	14.36	1.12
	4.20	16.65	0.72	1.15	12.04	17.37	80.3%	0.69	12.98	1.08
	4.25	16.34	0.69	1.10	11.21	17.05	78.8%	0.66	11.68	1.04
	4.30	16.04	0.65	1.05	10.40	16.73	77.3%	0.62	10.44	1.00
	4.35	15.64	0.61	1.00	9.61	16.31	75.4%	0.59	9.30	0.97
	4.40	15.16	0.58	0.95	8.84	15.82	73.2%	0.56	8.26	0.93
	4.45	14.24	0.57	0.90	8.10	14.86	68.7%	0.55	7.45	0.92
	4.50	13.28	0.56	0.85	7.41	13.86	64.1%	0.53	6.73	0.91
	4.55	12.36	0.55	0.80	6.77	12.89	59.6%	0.53	6.08	0.90
	4.60	12.05	0.51	0.75	6.17	12.53	58.0%	0.49	5.30	0.86
	4.65	11.95	0.47	0.70	5.57	12.39	57.3%	0.45	4.50	0.81
	4.70	11.86	0.42	0.65	4.97	12.26	56.7%	0.41	3.75	0.75
	4.75	11.77	0.37	0.60	4.38	12.12	56.1%	0.36	3.06	0.70
WL	4.80	11.25	0.34	0.55	3.80	11.58	53.5%	0.33	2.49	0.66
	4.85	10.32	0.32	0.50	3.26	10.61	49.1%	0.31	2.05	0.63
	4.90	10.11	0.27	0.45	2.75	10.37	47.9%	0.27	1.57	0.57
	4.95	9.96	0.23	0.40	2.25	10.18	47.1%	0.22	1.13	0.50
	5.00	9.81	0.18	0.35	1.76	10.00	46.3%	0.18	0.76	0.43
	5.05	8.98	0.14	0.30	1.30	9.15	42.3%	0.14	0.48	0.37
	5.10	8.72	0.10	0.25	0.85	8.86	41.0%	0.10	0.25	0.29
	5.15	6.22	0.08	0.20	0.48	6.31	29.2%	0.08	0.12	0.25
	5.20	3.38	0.07	0.15	0.25	3.43	15.8%	0.07	0.06	0.24
	5.25	2.31	0.05	0.10	0.12	2.33	10.8%	0.05	0.02	0.19
	5.30	1.77	0.01	0.05	0.02	1.79	8.3%	0.01	0.00	0.07
	5.35	0.04	0.00	0.00	0.00	0.04	0.2%	0.00	0.00	0.02

STREAM NAME: East Fork Parachute Creek
XS LOCATION: Approx. 0.5 mile below E Fk Falls
XS NUMBER: 3

SUMMARY SHEET

MEASURED FLOW (Qm)= 2.43 cfs
CALCULATED FLOW (Qc)= 2.49 cfs
(Qm-Qc)/Qm * 100 = -2.6 %

MEASURED WATERLINE (WLm)= 4.80 ft
CALCULATED WATERLINE (WLc)= 4.80 ft
(WLm-WLc)/WLm * 100 = 0.1 %

MAX MEASURED DEPTH (Dm)= 0.55 ft
MAX CALCULATED DEPTH (Dc)= 0.55 ft
(Dm-Dc)/Dm * 100 = -0.7 %

MEAN VELOCITY= 0.66 ft/sec
MANNING'S N= 0.207
SLOPE= 0.037 ft/ft

.4 * Qm = 1.0 cfs
2.5 * Qm= 6.1 cfs

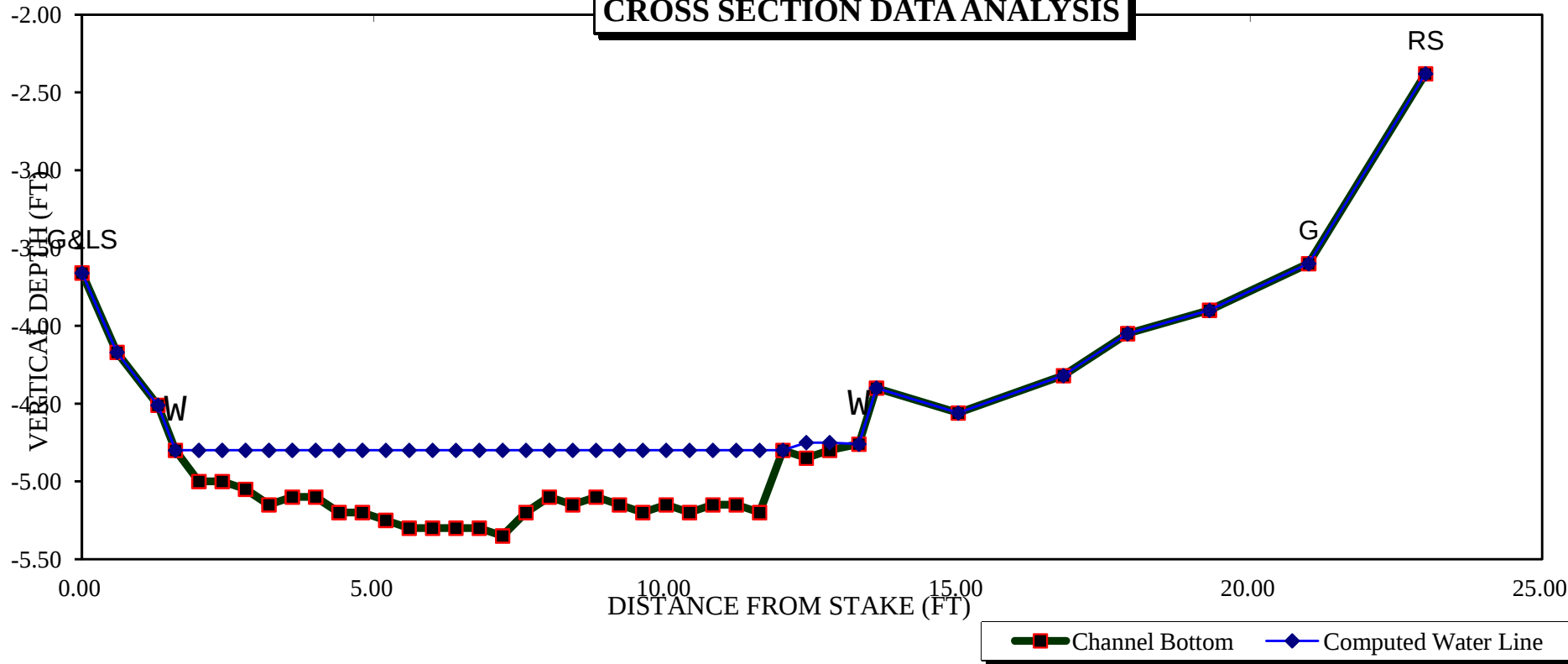
RECOMMENDED INSTREAM FLOW:
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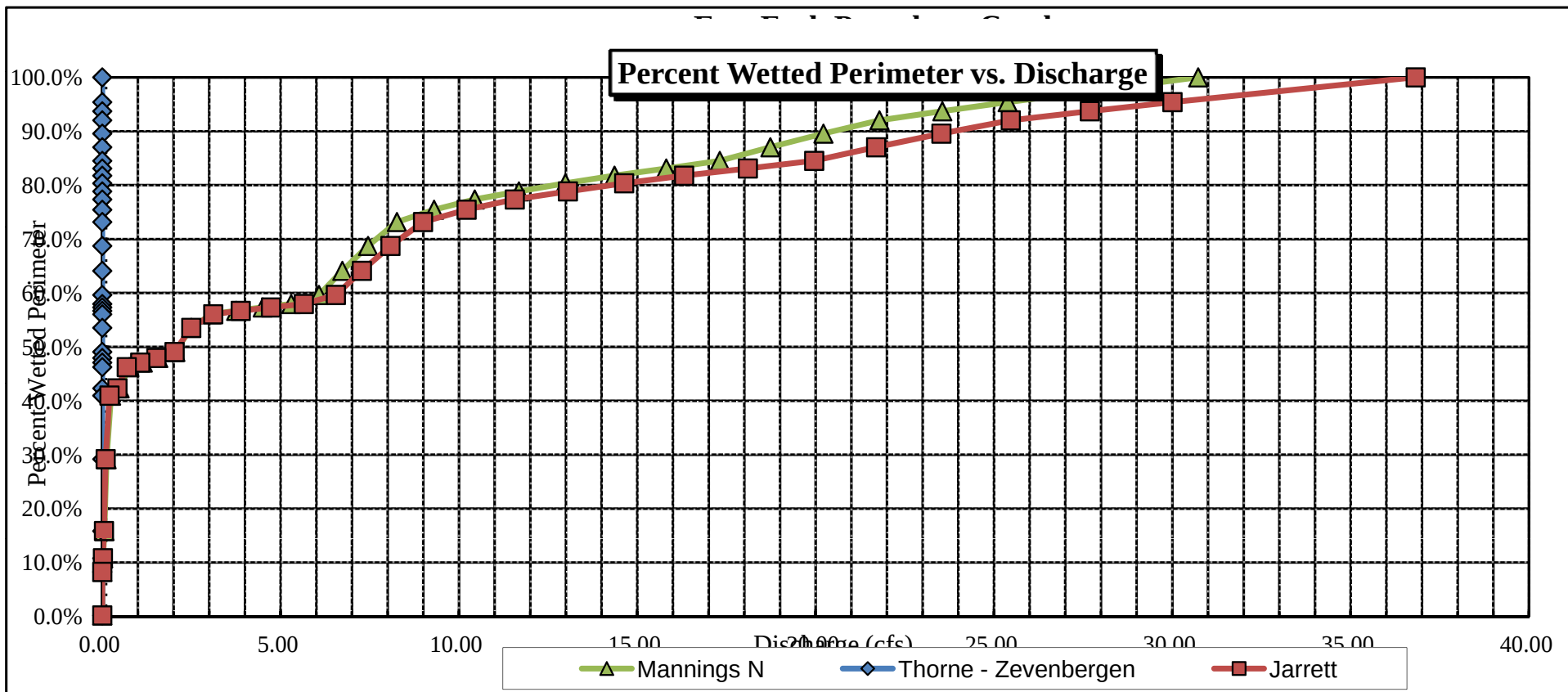
FLOW (CFS)	PERIOD
=====	=====
_____	_____
_____	_____
_____	_____
_____	_____

RATIONALE FOR RECOMMENDATION:
=====

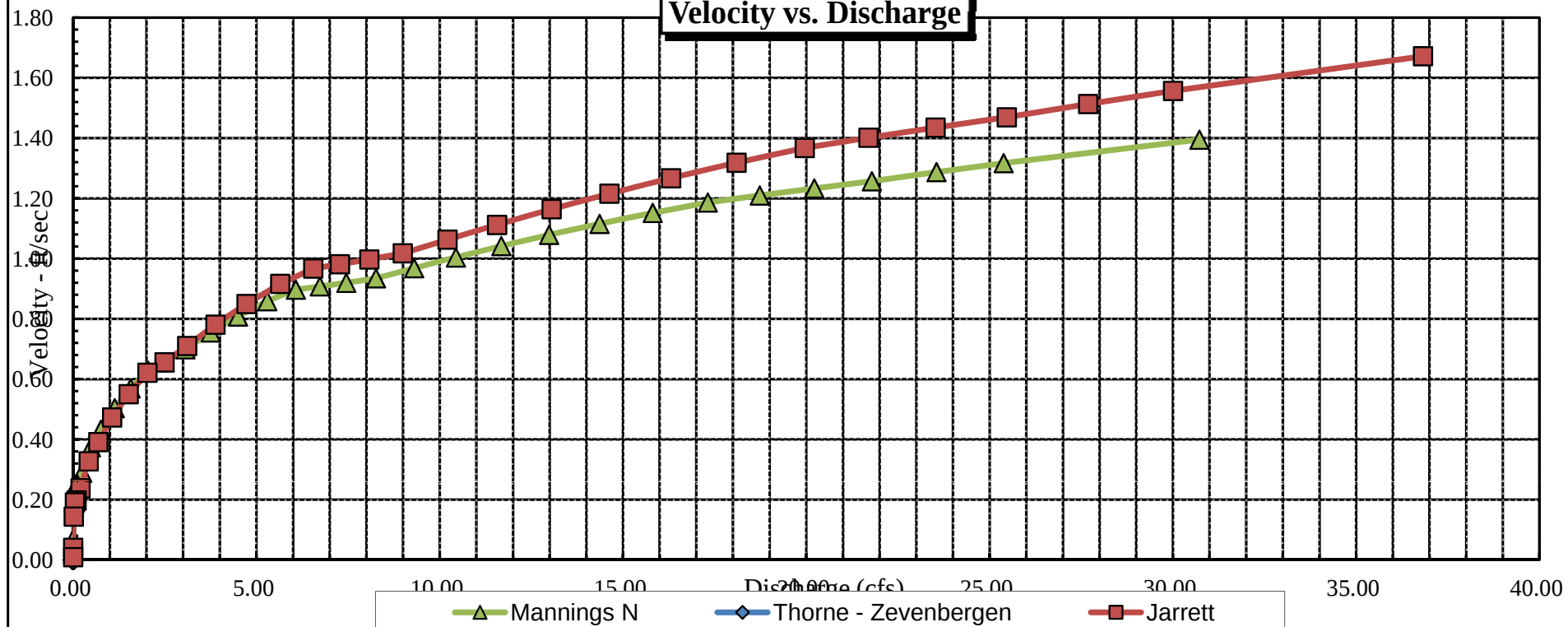
RECOMMENDATION BY: AGENCY..... DATE:.....
CWCB REVIEW BY: DATE:.....

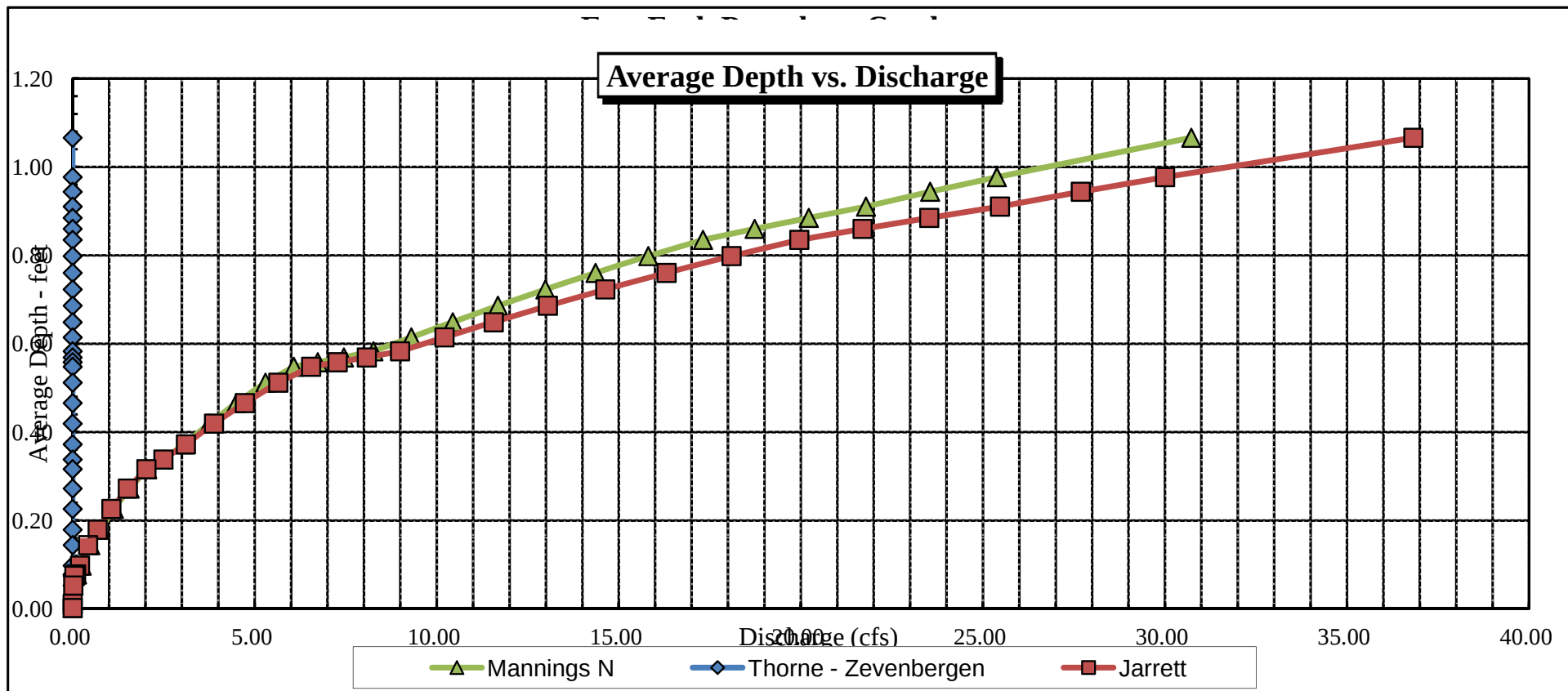
CROSS SECTION DATA ANALYSIS



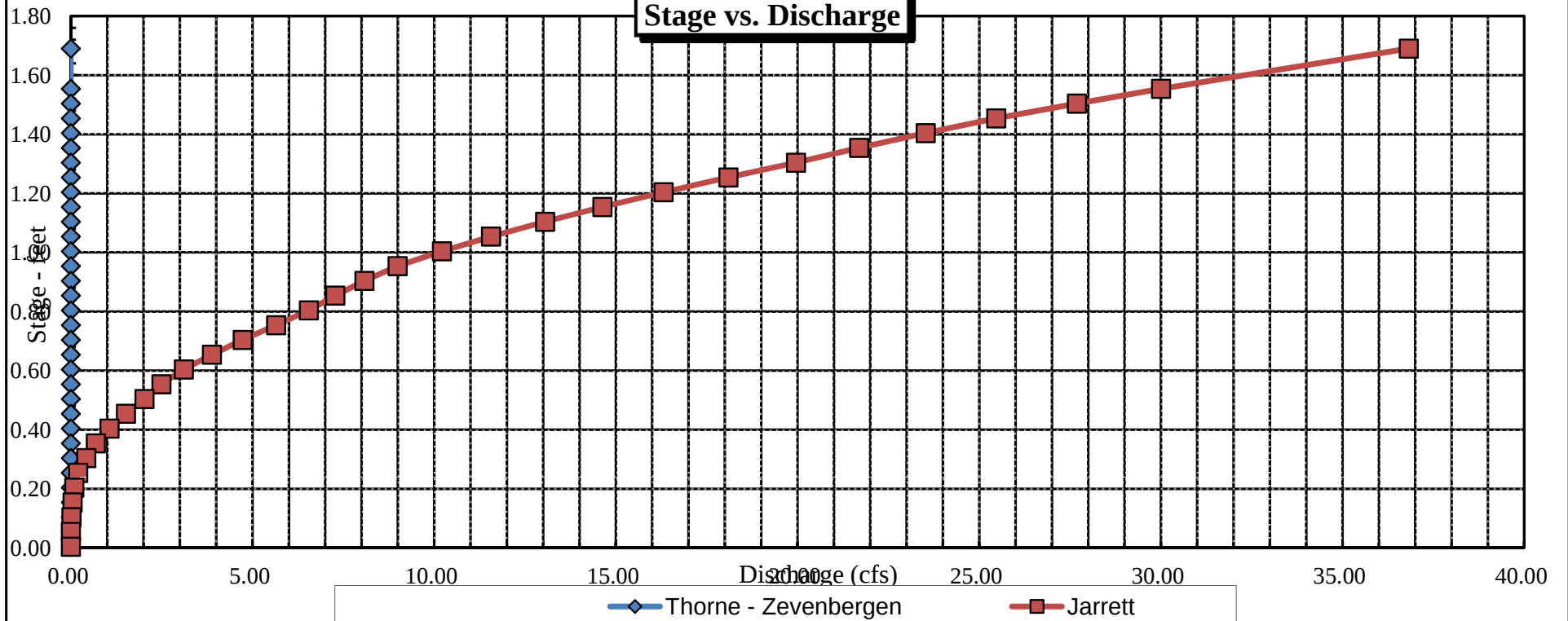


Velocity vs. Discharge





Stage vs. Discharge





COLORADO WATER
CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



LOCATION INFORMATION

STREAM NAME: <u>East Fork Parachute Creek</u>		CROSS-SECTION NO.: <u>2</u>
CROSS-SECTION LOCATION: <u>Approx. 0.5 mile below East Fork Falls</u>		
DATE: <u>5-17-12</u>	OBSERVERS: <u>R. Smith, P. Adams</u>	
LEGAL DESCRIPTION:	1/4 SECTION: <u>NW</u>	SECTION: <u>35</u>
	TOWNSHIP: <u>5 N/S</u>	RANGE: <u>95 E/W</u>
COUNTY: <u>Garfield</u>	WATERSHED: <u>Parachute Ck.</u>	WATER DIVISION: <u>5</u>
		DOW WATER CODE: <u>21460</u>
MAP(S):	USGS:	
	USFS:	

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: ☒ YES ☐ NO	METER TYPE: <u>M-M</u>		
METER NUMBER:	DATE RATED:	CALIB/SPIN: <u>sec</u>	TAPE WEIGHT: <u>suveyed</u> lbs/foot
			TAPE TENSION: <u>suveyed</u> lbs
CHANNEL BED MATERIAL SIZE RANGE: <u>gravel to 2 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>suveyed</u>
⊗ Tape @ Stake RB	0.0	<u>suveyed</u>
① WS @ Tape LB/RB	0.0	<u>4.75/4.75</u>
② WS Upstream	<u>28.8</u>	<u>3.62</u>
③ WS Downstream	<u>36.1</u>	<u>5.25</u>
SLOPE	<u>1.63 / 64.9 =</u>	

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:																	
<u>mayfly, caddisfly, stonefly, black fly - abundant</u>																	

COMMENTS

<u>pH = 8.81</u>
<u>Temp = 6.50 C</u>
<u>Cond = 292</u>
<u>Salinity = 0.2 ppt</u>

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: East Fork Parachute Ck.

CROSS-SECTION NO.: 7

DATE: 5-17-12

SHEET ____ OF ____

BEGINNING OF MEASUREMENT

EDGE OF WATER LOOKING DOWNSTREAM:
(0.0 AT STAKE)

LEFT / RIGHT

Gage Reading: _____ ft

TIME: 10:30 am

[illegible]

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

LOCATION INFORMATION

STREAM NAME: East Fork Parachute Creek
XS LOCATION: Approx. 0.5 mile below E Fk Falls
XS NUMBER: 2

DATE: 17-May-12
OBSERVERS: R. Smith, P. Adams

1/4 SEC: NW
SECTION: 35
TWP: 5S
RANGE: 95W
PM: Sixth

COUNTY: Garfield
WATERSHED: Parachute Creek
DIVISION: 5
DOW CODE: 21460

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: 0.025

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 mile below E Fk Falls
 XS NUMBER: 2

DATA POINTS= 31

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED	WATER	AREA	Q	% Q
					PERIM.	DEPTH	(Am)	(Qm)	CELL
1 LS & G	0.00	3.62			0.00		0.00	0.00	0.0%
	0.60	4.22			0.00		0.00	0.00	0.0%
W	1.10	4.64			0.00		0.00	0.00	0.0%
	1.60	4.75	0.00	0.51	0.00		0.00	0.00	0.0%
W	2.00	5.00	0.25	0.12	0.47	0.25	0.10	0.01	0.6%
	2.40	5.15	0.40	0.10	0.43	0.40	0.16	0.02	0.8%
W	2.80	5.15	0.40	1.45	0.40	0.40	0.16	0.23	11.7%
	3.20	5.15	0.40	0.36	0.40	0.40	0.16	0.06	2.9%
W	3.60	5.25	0.50	0.00	0.41	0.50	0.20	0.00	0.0%
	4.00	5.30	0.55	0.00	0.40	0.55	0.22	0.00	0.0%
W	4.40	5.35	0.60	0.00	0.40	0.60	0.24	0.00	0.0%
	4.80	5.25	0.50	0.93	0.41	0.50	0.20	0.19	9.4%
W	5.20	5.20	0.45	0.98	0.40	0.45	0.18	0.18	8.9%
	5.60	5.00	0.25	1.94	0.45	0.25	0.10	0.19	9.8%
W	6.00	5.05	0.30	0.85	0.40	0.30	0.12	0.10	5.1%
	6.40	5.15	0.40	1.09	0.41	0.40	0.16	0.17	8.8%
W	6.80	5.15	0.40	1.65	0.40	0.40	0.16	0.26	13.3%
	7.20	5.05	0.30	2.21	0.41	0.30	0.12	0.27	13.3%
W	7.60	5.25	0.50	0.78	0.45	0.50	0.20	0.16	7.8%
	8.00	5.25	0.50	0.72	0.40	0.50	0.20	0.14	7.2%
W	8.40	5.15	0.40	0.05	0.41	0.40	0.16	0.01	0.4%
	8.80	5.10	0.35	0.00	0.40	0.35	0.14	0.00	0.0%
W	9.20	5.05	0.30	0.00	0.40	0.30	0.12	0.00	0.0%
	9.60	4.90	0.15	0.00	0.43	0.15	0.06	0.00	0.0%
W	10.00	4.80	0.05	0.00	0.41	0.05	0.02	0.00	0.0%
	10.50	4.75	0.00		0.50		0.00	0.00	0.0%
W	11.00	4.52			0.00		0.00	0.00	0.0%
	12.30	4.08			0.00		0.00	0.00	0.0%
W	13.60	3.88			0.00		0.00	0.00	0.0%
	17.00	3.86			0.00		0.00	0.00	0.0%
1 G	17.00	3.86			0.00		0.00	0.00	0.0%
RS	17.70	3.42			0.00		0.00	0.00	0.0%

TOTALS -----

9.22 0.6 3.18 1.99 100.0%
 (Max.)

Manning's n = 0.1852
 Hydraulic Radius= 0.3453398

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 mile below E Fk Falls
 XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	3.18	3.18	0.0%
4.50	3.18	5.58	75.5%
4.52	3.18	5.38	69.1%
4.54	3.18	5.18	62.9%
4.56	3.18	4.98	56.6%
4.58	3.18	4.79	50.4%
4.60	3.18	4.59	44.2%
4.62	3.18	4.40	38.1%
4.64	3.18	4.20	32.0%
4.66	3.18	4.01	26.0%
4.68	3.18	3.82	20.1%
4.70	3.18	3.64	14.2%
4.71	3.18	3.54	11.4%
4.72	3.18	3.45	8.5%
4.73	3.18	3.36	5.6%
4.74	3.18	3.27	2.8%
4.75	3.18	3.18	0.0%
4.76	3.18	3.09	-2.8%
4.77	3.18	3.01	-5.5%
4.78	3.18	2.92	-8.2%
4.79	3.18	2.84	-10.9%
4.80	3.18	2.75	-13.5%
4.82	3.18	2.59	-18.7%
4.84	3.18	2.42	-23.8%
4.86	3.18	2.26	-28.9%
4.88	3.18	2.10	-33.9%
4.90	3.18	1.95	-38.8%
4.92	3.18	1.79	-43.6%
4.94	3.18	1.64	-48.4%
4.96	3.18	1.49	-53.2%
4.98	3.18	1.34	-57.9%
5.00	3.18	1.19	-62.5%

WATERLINE AT ZERO

AREA ERROR = 4.750

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 mile below E Fk Falls
 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	3.86	16.76	0.78	1.49	13.02	17.53	100.0%	0.74	13.55	1.04
	3.90	13.19	0.94	1.45	12.45	13.94	79.5%	0.89	14.66	1.18
	3.95	12.81	0.92	1.40	11.80	13.54	77.2%	0.87	13.67	1.16
	4.00	12.44	0.90	1.35	11.17	13.14	75.0%	0.85	12.72	1.14
	4.05	12.06	0.88	1.30	10.56	12.74	72.7%	0.83	11.82	1.12
	4.10	11.76	0.85	1.25	9.97	12.41	70.8%	0.80	10.92	1.10
	4.15	11.56	0.81	1.20	9.38	12.18	69.5%	0.77	10.00	1.07
	4.20	11.37	0.78	1.15	8.81	11.96	68.2%	0.74	9.12	1.03
	4.25	11.16	0.74	1.10	8.25	11.73	66.9%	0.70	8.27	1.00
	4.30	10.95	0.70	1.05	7.69	11.49	65.6%	0.67	7.47	0.97
	4.35	10.75	0.67	1.00	7.15	11.26	64.2%	0.64	6.70	0.94
	4.40	10.54	0.63	0.95	6.62	11.03	62.9%	0.60	5.98	0.90
	4.45	10.33	0.59	0.90	6.10	10.79	61.6%	0.56	5.29	0.87
	4.50	10.13	0.55	0.85	5.58	10.56	60.2%	0.53	4.63	0.83
	4.55	9.94	0.51	0.80	5.08	10.35	59.0%	0.49	4.02	0.79
	4.60	9.77	0.47	0.75	4.59	10.15	57.9%	0.45	3.43	0.75
	4.65	9.57	0.43	0.70	4.11	9.92	56.6%	0.41	2.89	0.70
	4.70	9.24	0.39	0.65	3.64	9.57	54.6%	0.38	2.42	0.67
WL	4.75	8.90	0.36	0.60	3.18	9.22	52.6%	0.35	1.99	0.62
	4.80	8.32	0.33	0.55	2.75	8.62	49.2%	0.32	1.63	0.59
	4.85	8.04	0.29	0.50	2.34	8.32	47.5%	0.28	1.28	0.55
	4.90	7.76	0.25	0.45	1.95	8.02	45.7%	0.24	0.96	0.49
	4.95	7.55	0.21	0.40	1.57	7.78	44.4%	0.20	0.68	0.44
	5.00	7.33	0.16	0.35	1.19	7.54	43.0%	0.16	0.44	0.37
	5.05	6.57	0.13	0.30	0.85	6.74	38.5%	0.13	0.27	0.32
	5.10	5.43	0.10	0.25	0.55	5.56	31.7%	0.10	0.15	0.27
	5.15	3.10	0.10	0.20	0.30	3.18	18.2%	0.10	0.08	0.26
	5.20	2.50	0.06	0.15	0.16	2.55	14.5%	0.06	0.03	0.20
	5.25	1.20	0.05	0.10	0.06	1.22	7.0%	0.05	0.01	0.17
	5.30	0.60	0.02	0.05	0.01	0.61	3.5%	0.02	0.00	0.11

STREAM NAME: East Fork Parachute Creek
XS LOCATION: Approx. 0.5 mile below E Fk Falls
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)= 1.99 cfs
CALCULATED FLOW (Qc)= 1.99 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)= 0.60 ft
MAX CALCULATED DEPTH (Dc)= 0.60 ft
(Dm-Dc)/Dm * 100 = 0.0 %

MEAN VELOCITY= 0.62 ft/sec
MANNING'S N= 0.185
SLOPE= 0.025 ft/ft

.4 * Qm = 0.8 cfs
2.5 * Qm= 5.0 cfs

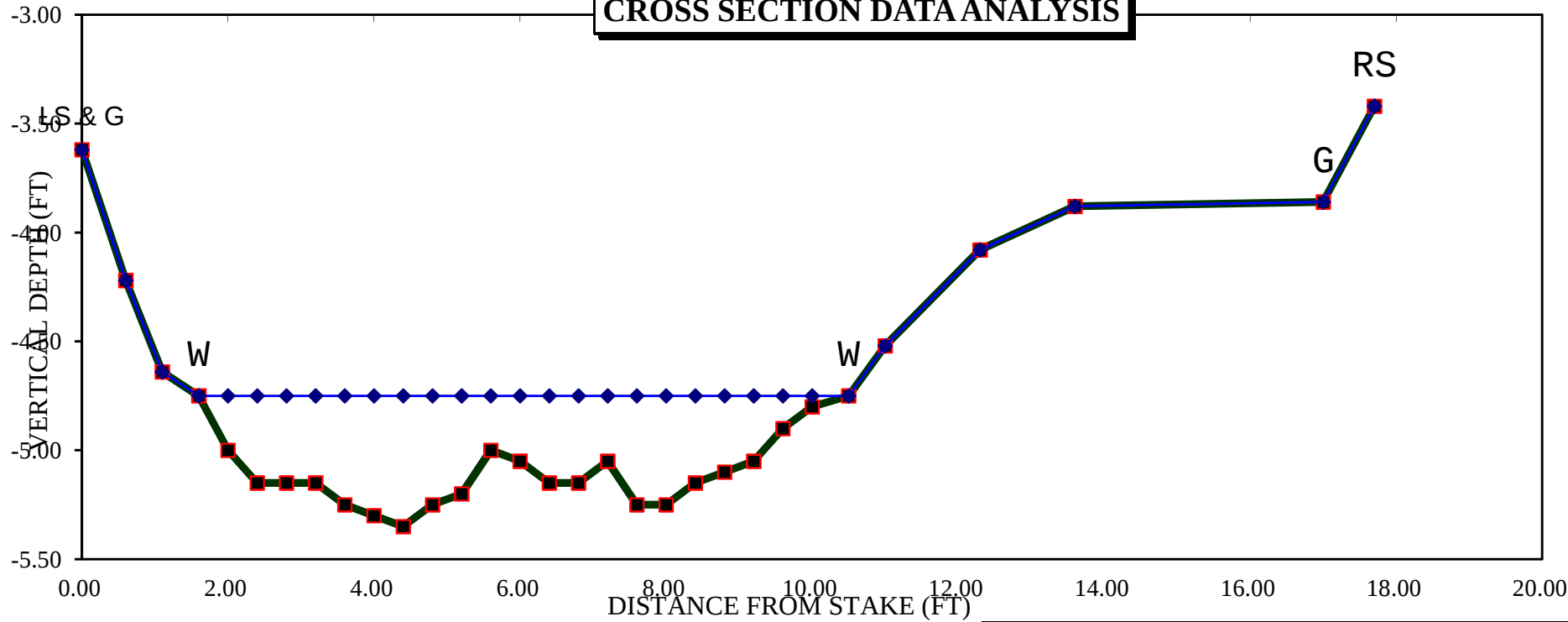
RECOMMENDED INSTREAM FLOW:
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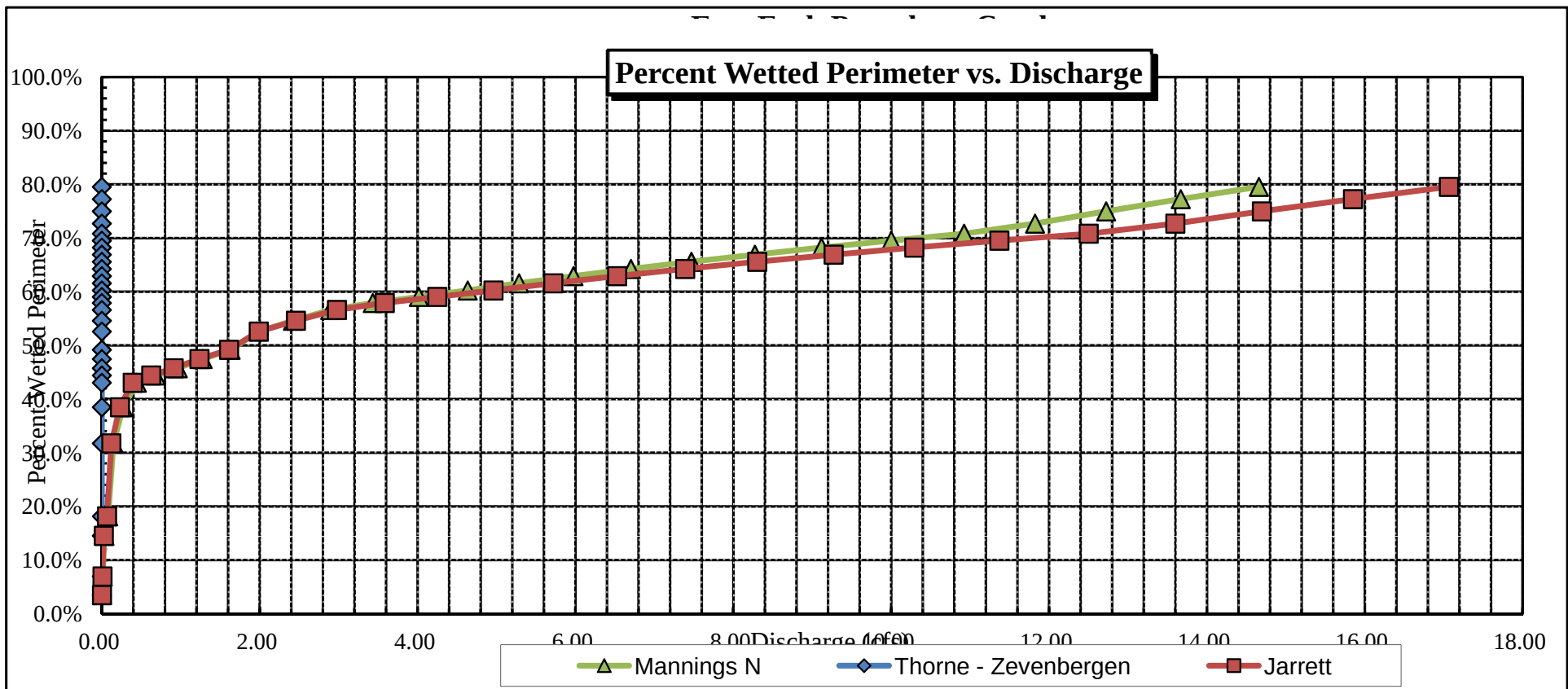
FLOW (CFS)	PERIOD
=====	=====
_____	_____
_____	_____
_____	_____
_____	_____

RATIONALE FOR RECOMMENDATION:
=====

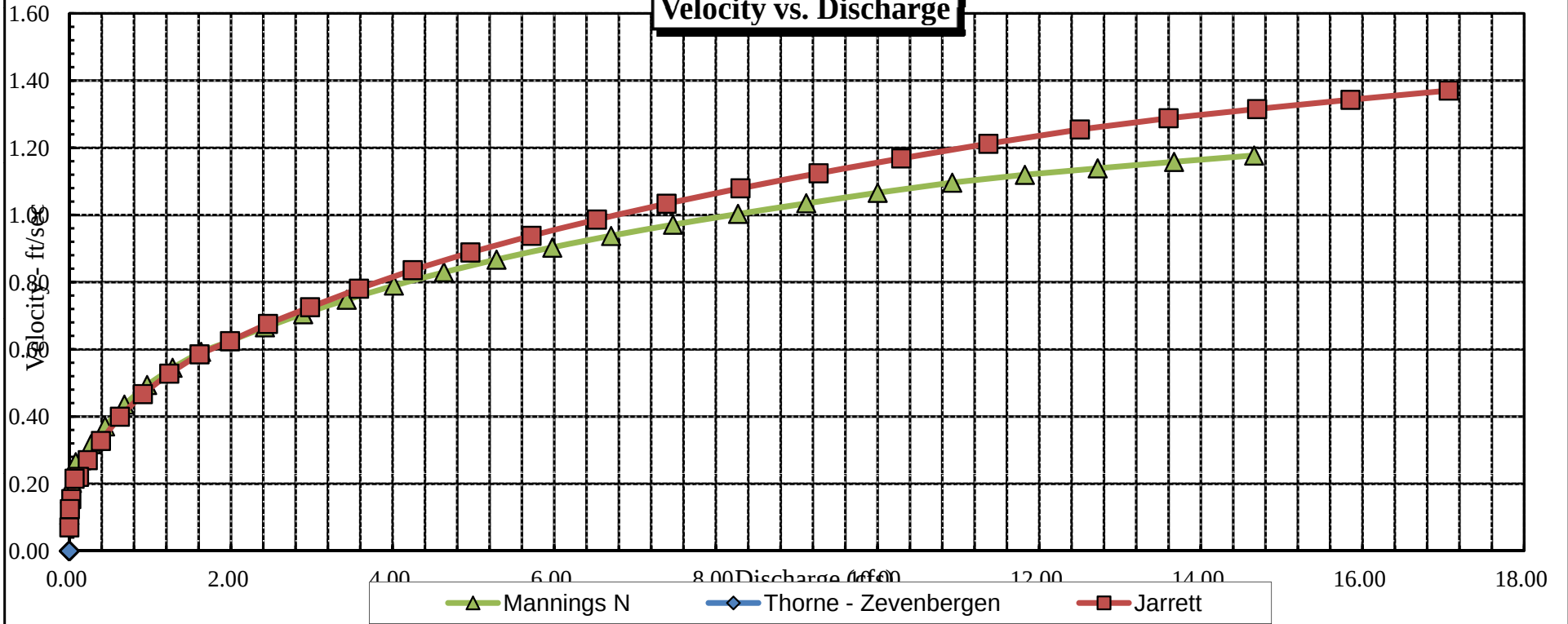
RECOMMENDATION BY: AGENCY..... DATE:.....
CWCB REVIEW BY: DATE:.....

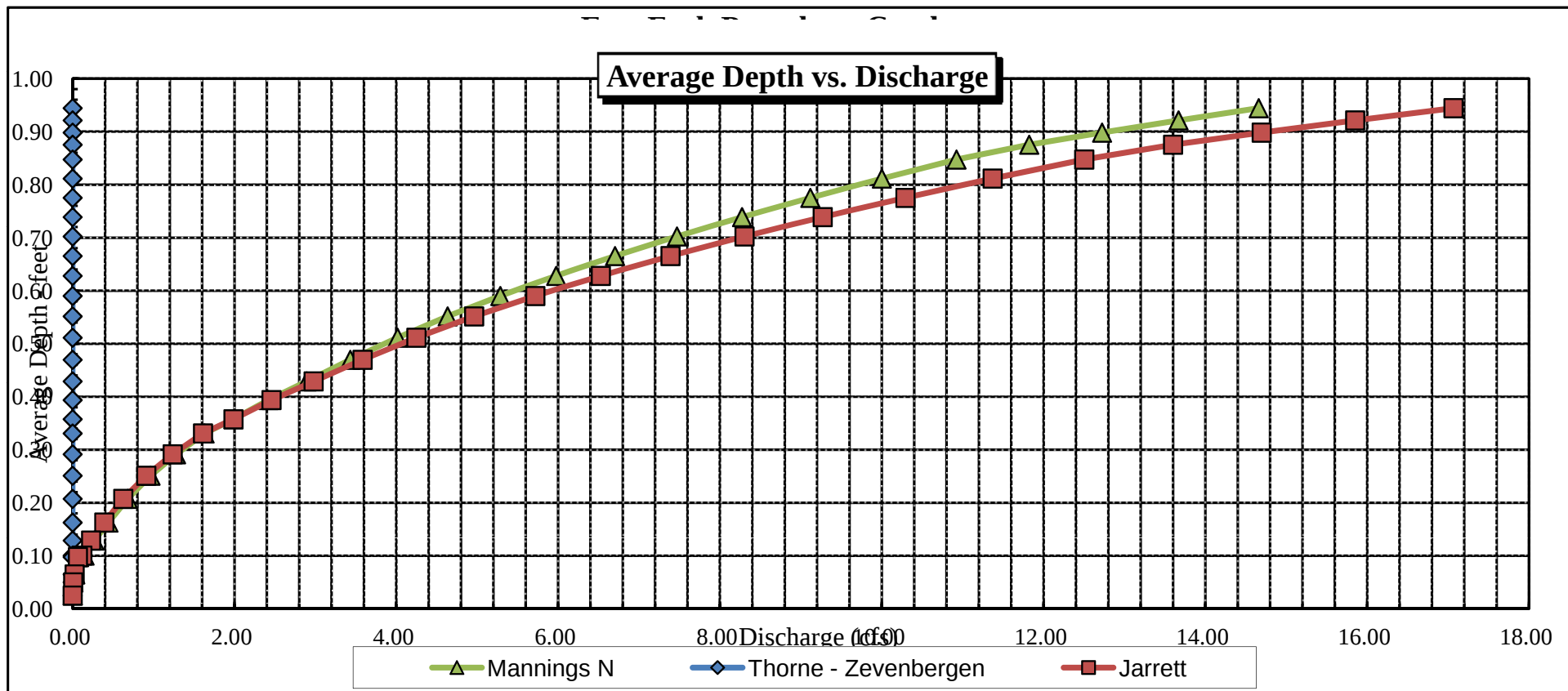
CROSS SECTION DATA ANALYSIS



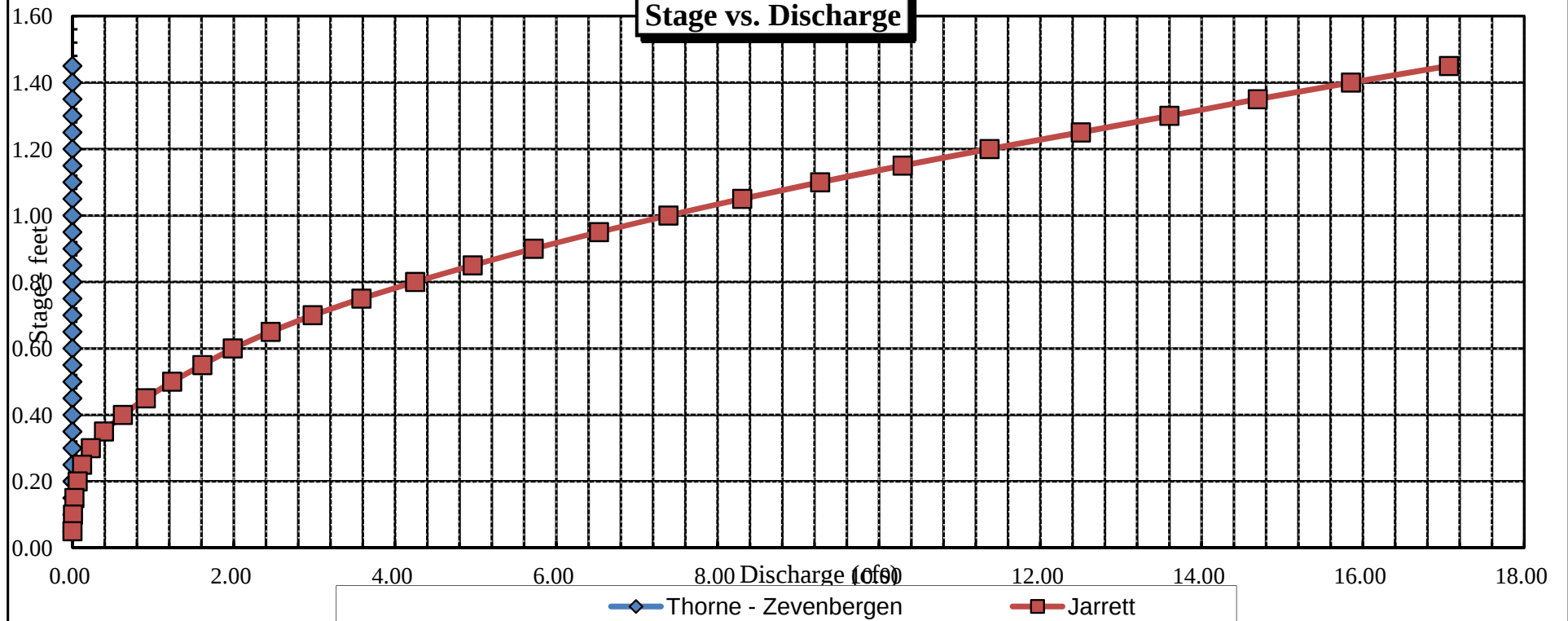


Velocity vs. Discharge





Stage vs. Discharge





COLORADO WATER
CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



LOCATION INFORMATION

STREAM NAME: <u>East Fork Parachute Creek</u>		CROSS-SECTION NO.: <u>1</u>
CROSS-SECTION LOCATION: <u>Approx 0.5 miles below East Fork Falls</u>		
DATE: <u>5-17-12</u>	OBSERVERS: <u>R. Smith, P. Adams</u>	
LEGAL DESCRIPTION	1/4 SECTION: <u>NW</u>	SECTION: <u>35</u>
	TOWNSHIP: <u>5 N/S</u>	RANGE: <u>95 E/W</u>
COUNTY: <u>Garfield</u>	WATERSHED: <u>Parachute Ck.</u>	WATER DIVISION: <u>5</u>
		DOW WATER CODE: <u>21460</u>
MAP(S):	USGS:	<u>GPS Zone 755749</u>
	USFS:	<u>125 4381438</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 2-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>4.68 / 4.64</u>
② WS Upstream	<u>36.5</u>	<u>4.25</u>
③ WS Downstream	<u>40.3</u>	<u>5.20</u>
SLOPE	<u>0.95 / 76.8 = .0124</u>	

SKETCH

TAPE

LEGEND:

Stake ⊗

Station ①

Photo ◇

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:																	
<u>mayfly, caddisfly, stonefly, black fly</u>																	

COMMENTS

<u>Ph = 8.81</u>
<u>Temp = 6.5°C</u>
<u>Cond = 292</u>
<u>Salinity = 0.2 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 Parachute Creek
XS LOCATION: Approx. 0.5 miles below E Fk Falls
XS NUMBER: 1

DATE: 17-May-12
OBSERVERS: R. Smith, P. Adams

1/4 SEC: NW
SECTION: 35
TWP: 5S
RANGE: 95W
PM: Sixth

COUNTY: Garfield
WATERSHED: Parachute Creek
DIVISION: 5
DOW CODE: 21460

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: 0.0124

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 miles below E Fk Falls
 XS NUMBER: 1

DATA POINTS= 31

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED	WATER	AREA	Q	% Q
					PERIM.	DEPTH	(Am)	(Qm)	CELL
1 LS & G	6.00	3.32			0.00		0.00	0.00	0.0%
	7.50	4.04			0.00		0.00	0.00	0.0%
	8.50	4.50			0.00		0.00	0.00	0.0%
W	9.00	4.66	0.00	0.00	0.00		0.00	0.00	0.0%
	9.50	4.85	0.20	0.00	0.53	0.20	0.10	0.00	0.0%
	10.00	4.85	0.20	0.08	0.50	0.20	0.10	0.01	0.4%
	10.50	4.85	0.20	0.48	0.50	0.20	0.10	0.05	2.2%
	11.00	5.05	0.40	1.31	0.54	0.40	0.20	0.26	12.2%
	11.50	4.95	0.30	1.02	0.51	0.30	0.15	0.15	7.1%
	12.00	5.05	0.40	1.16	0.51	0.40	0.20	0.23	10.8%
	12.50	5.05	0.40	0.56	0.50	0.40	0.20	0.11	5.2%
	13.00	4.85	0.20	1.32	0.54	0.20	0.10	0.13	6.2%
	13.50	5.05	0.40	1.09	0.54	0.40	0.20	0.22	10.2%
	14.00	4.95	0.30	1.09	0.51	0.30	0.15	0.16	7.6%
	14.50	5.15	0.50	0.49	0.54	0.50	0.25	0.12	5.7%
	15.00	5.15	0.50	0.21	0.50	0.50	0.25	0.05	2.4%
	15.50	5.20	0.55	0.10	0.50	0.55	0.28	0.03	1.3%
	16.00	5.05	0.40	0.33	0.52	0.40	0.20	0.07	3.1%
	16.50	5.10	0.45	0.53	0.50	0.45	0.23	0.12	5.6%
	17.00	5.05	0.40	0.38	0.50	0.40	0.20	0.08	3.5%
	17.50	5.05	0.40	0.14	0.50	0.40	0.20	0.03	1.3%
	18.00	4.95	0.30	0.41	0.51	0.30	0.15	0.06	2.9%
	18.50	4.95	0.30	0.60	0.50	0.30	0.15	0.09	4.2%
W	19.00	5.05	0.40	0.63	0.51	0.40	0.20	0.13	5.9%
	19.50	4.95	0.30	0.31	0.51	0.30	0.15	0.05	2.2%
	20.00	4.65	0.00	0.00	0.58		0.00	0.00	0.0%
	20.60	4.64	0.00	0.00	0.00		0.00	0.00	0.0%
	23.40	4.30			0.00		0.00	0.00	0.0%
1 G	29.00	3.92			0.00		0.00	0.00	0.0%
	30.70	3.48			0.00		0.00	0.00	0.0%
RS	36.90	3.20			0.00		0.00	0.00	0.0%

TOTALS -----

11.36 0.55 3.75 2.14 100.0%
 (Max.)

Manning's n = 0.1382
 Hydraulic Radius= 0.33007795

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 miles below E Fk Falls
 XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	3.75	3.70	-1.4%
4.41	3.75	6.92	84.4%
4.43	3.75	6.63	76.9%
4.45	3.75	6.35	69.5%
4.47	3.75	6.08	62.1%
4.49	3.75	5.81	54.9%
4.51	3.75	5.54	47.8%
4.53	3.75	5.28	40.9%
4.55	3.75	5.03	34.0%
4.57	3.75	4.77	27.3%
4.59	3.75	4.52	20.7%
4.61	3.75	4.28	14.2%
4.62	3.75	4.16	11.0%
4.63	3.75	4.04	7.8%
4.64	3.75	3.92	4.7%
4.65	3.75	3.81	1.6%
4.66	3.75	3.70	-1.4%
4.67	3.75	3.59	-4.3%
4.68	3.75	3.48	-7.2%
4.69	3.75	3.37	-10.2%
4.70	3.75	3.26	-13.0%
4.71	3.75	3.15	-15.9%
4.73	3.75	2.94	-21.7%
4.75	3.75	2.72	-27.3%
4.77	3.75	2.51	-33.0%
4.79	3.75	2.30	-38.6%
4.81	3.75	2.10	-44.1%
4.83	3.75	1.89	-49.6%
4.85	3.75	1.68	-55.1%
4.87	3.75	1.50	-60.1%
4.89	3.75	1.32	-64.8%
4.91	3.75	1.14	-69.5%

WATERLINE AT ZERO

AREA ERROR = 4.650

STREAM NAME: East Fork Parachute Creek
 XS LOCATION: Approx. 0.5 miles below E Fk Falls
 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	3.48	24.37	1.05	1.72	25.66	25.07	100.0%	1.02	31.21	1.22
	3.65	23.35	0.92	1.55	21.60	24.00	95.7%	0.90	24.11	1.12
	3.70	23.06	0.89	1.50	20.44	23.68	94.5%	0.86	22.18	1.09
	3.75	22.76	0.85	1.45	19.29	23.37	93.2%	0.83	20.33	1.05
	3.80	22.46	0.81	1.40	18.16	23.05	91.9%	0.79	18.55	1.02
	3.85	22.16	0.77	1.35	17.05	22.74	90.7%	0.75	16.84	0.99
	3.90	21.87	0.73	1.30	15.95	22.42	89.4%	0.71	15.21	0.95
	3.95	21.24	0.70	1.25	14.87	21.78	86.9%	0.68	13.80	0.93
	4.00	20.40	0.68	1.20	13.82	20.93	83.5%	0.66	12.55	0.91
	4.05	19.56	0.66	1.15	12.83	20.07	80.1%	0.64	11.39	0.89
	4.10	18.71	0.63	1.10	11.87	19.21	76.6%	0.62	10.31	0.87
	4.15	17.87	0.61	1.05	10.95	18.35	73.2%	0.60	9.30	0.85
	4.20	17.02	0.59	1.00	10.08	17.50	69.8%	0.58	8.36	0.83
	4.25	16.18	0.57	0.95	9.25	16.64	66.4%	0.56	7.49	0.81
	4.30	15.33	0.55	0.90	8.46	15.78	63.0%	0.54	6.69	0.79
	4.35	14.81	0.52	0.85	7.71	15.25	60.8%	0.51	5.86	0.76
	4.40	14.29	0.49	0.80	6.98	14.71	58.7%	0.47	5.09	0.73
	4.45	13.77	0.46	0.75	6.28	14.18	56.6%	0.44	4.37	0.70
	4.50	13.25	0.42	0.70	5.61	13.64	54.4%	0.41	3.71	0.66
	4.55	12.68	0.39	0.65	4.96	13.07	52.1%	0.38	3.11	0.63
	4.60	12.11	0.36	0.60	4.34	12.49	49.8%	0.35	2.57	0.59
WL	4.65	11.03	0.34	0.55	3.75	11.39	45.4%	0.33	2.14	0.57
	4.70	10.81	0.30	0.50	3.20	11.15	44.5%	0.29	1.67	0.52
	4.75	10.60	0.25	0.45	2.67	10.91	43.5%	0.24	1.25	0.47
	4.80	10.38	0.21	0.40	2.14	10.67	42.6%	0.20	0.88	0.41
	4.85	9.16	0.18	0.35	1.63	9.43	37.6%	0.17	0.61	0.37
	4.90	8.71	0.14	0.30	1.18	8.93	35.6%	0.13	0.37	0.31
	4.95	7.74	0.10	0.25	0.76	7.92	31.6%	0.10	0.19	0.25
	5.00	5.74	0.07	0.20	0.42	5.86	23.4%	0.07	0.09	0.21
	5.05	2.74	0.07	0.15	0.19	2.79	11.1%	0.07	0.04	0.20
	5.10	1.46	0.06	0.10	0.08	1.48	5.9%	0.06	0.01	0.17
	5.15	0.66	0.02	0.05	0.02	0.67	2.7%	0.02	0.00	0.10

STREAM NAME: East Fork Parachute Creek
XS LOCATION: Approx. 0.5 miles below E Fk Falls
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	2.14 cfs
CALCULATED FLOW (Qc)=	2.14 cfs
(Qm-Qc)/Qm * 100 =	0.2 %
MEASURED WATERLINE (WLm)=	4.66 ft
CALCULATED WATERLINE (WLc)=	4.65 ft
(WLm-WLc)/WLm * 100 =	0.1 %
MAX MEASURED DEPTH (Dm)=	0.55 ft
MAX CALCULATED DEPTH (Dc)=	0.55 ft
(Dm-Dc)/Dm * 100	0.1 %
MEAN VELOCITY=	0.57 ft/sec
MANNING'S N=	0.138
SLOPE=	0.0124 ft/ft
.4 * Qm =	0.9 cfs
2.5 * Qm=	5.4 cfs

RECOMMENDED INSTREAM FLOW:

=====

FLOW (CFS)

PERIOD

=====

=====

RATIONALE FOR RECOMMENDATION:

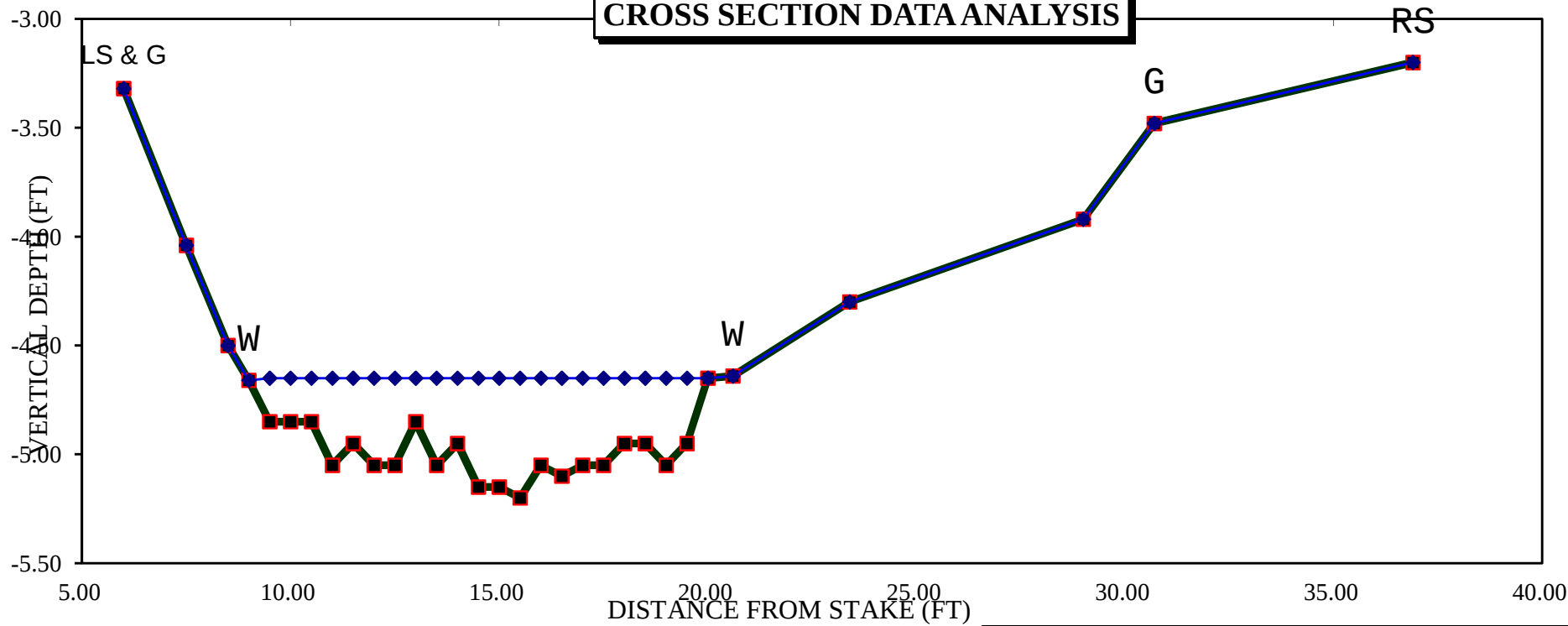
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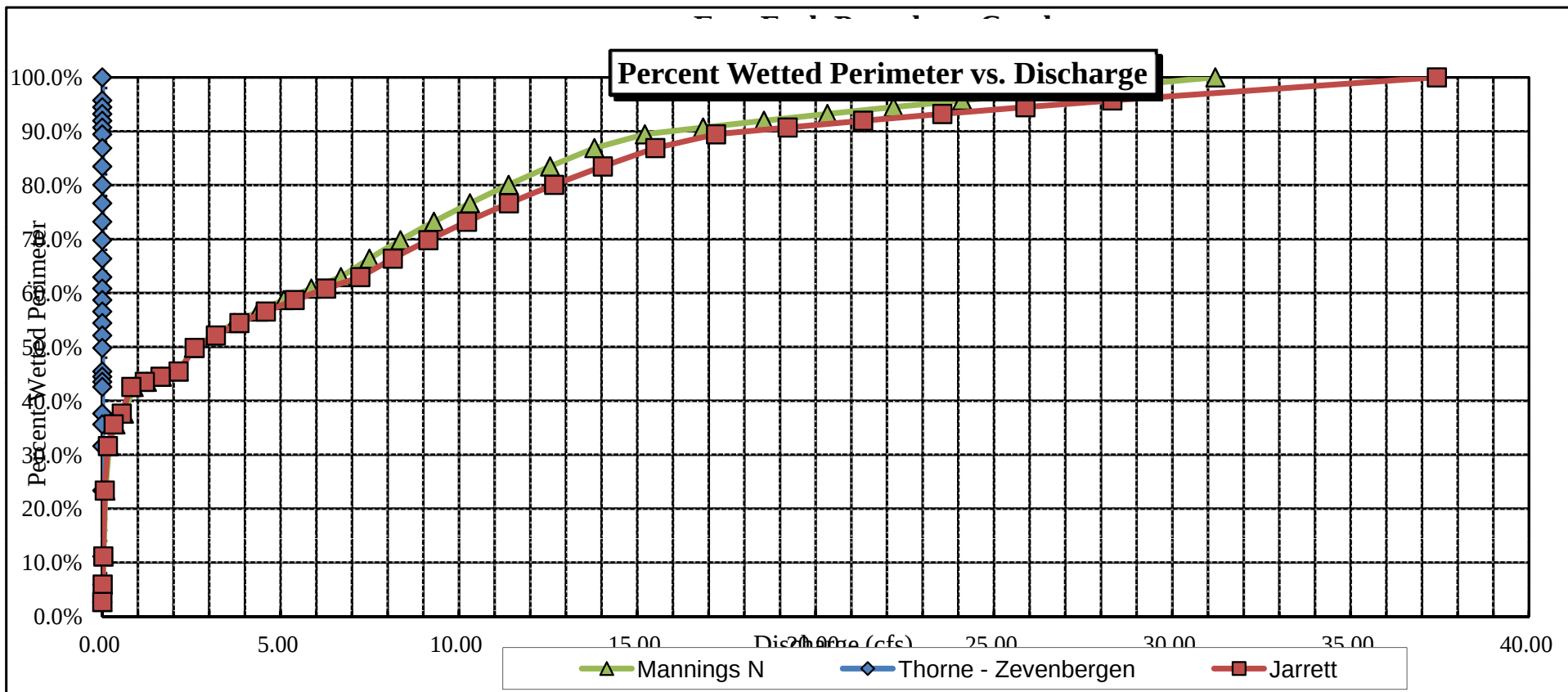
[illegible]

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

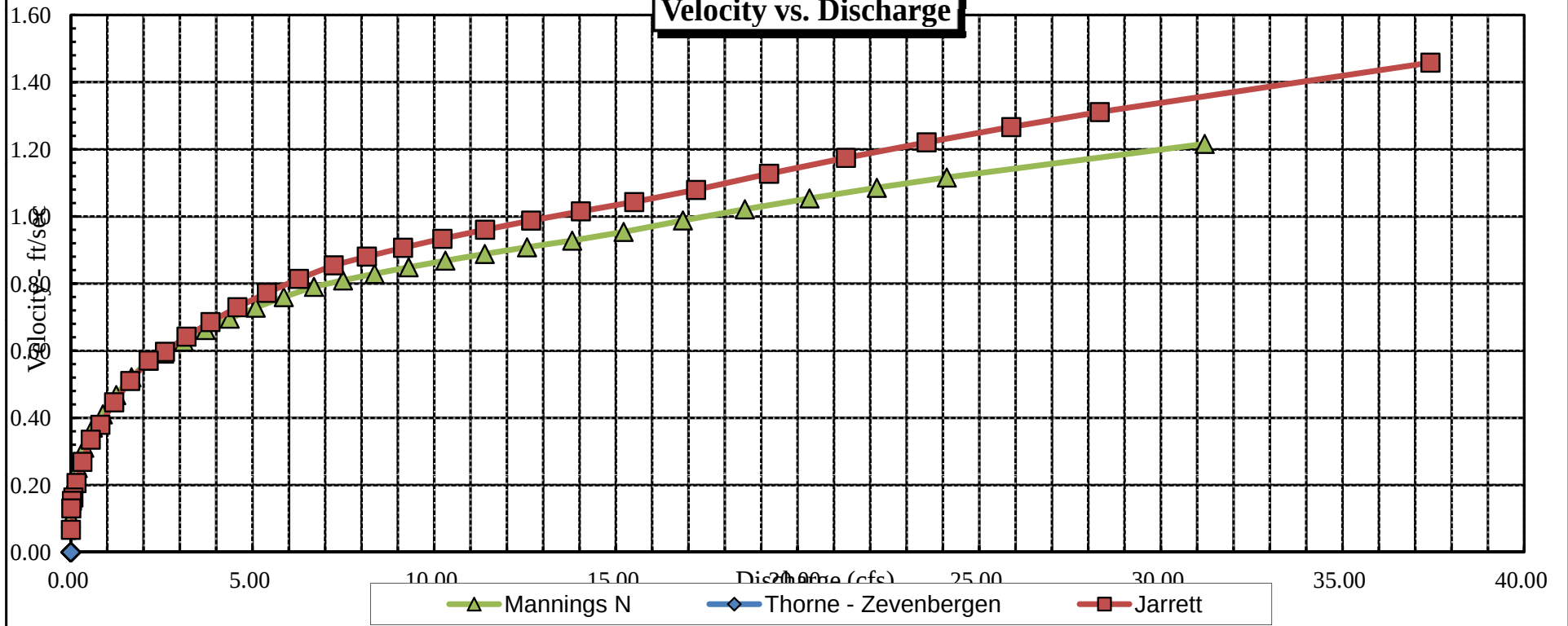
CWCB REVIEW BY: DATE:

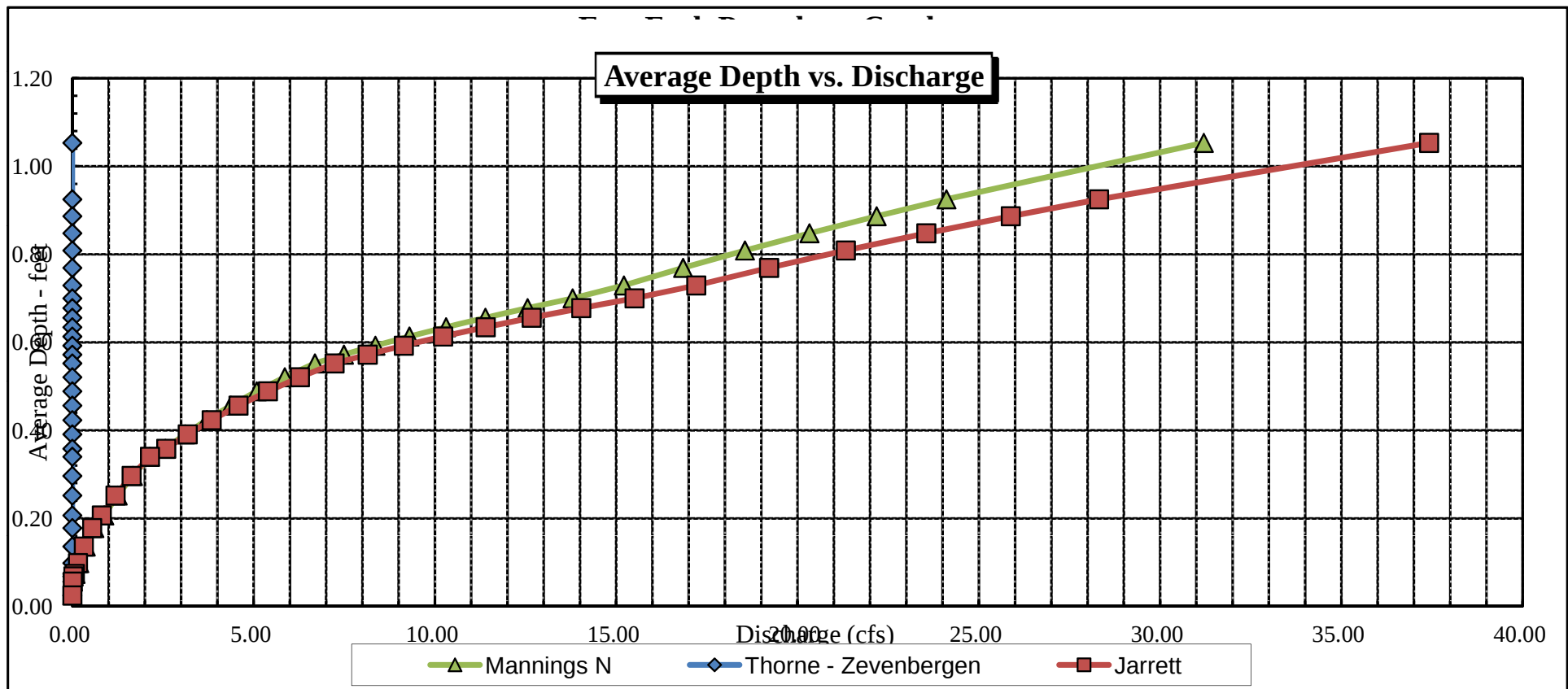
CROSS SECTION DATA ANALYSIS



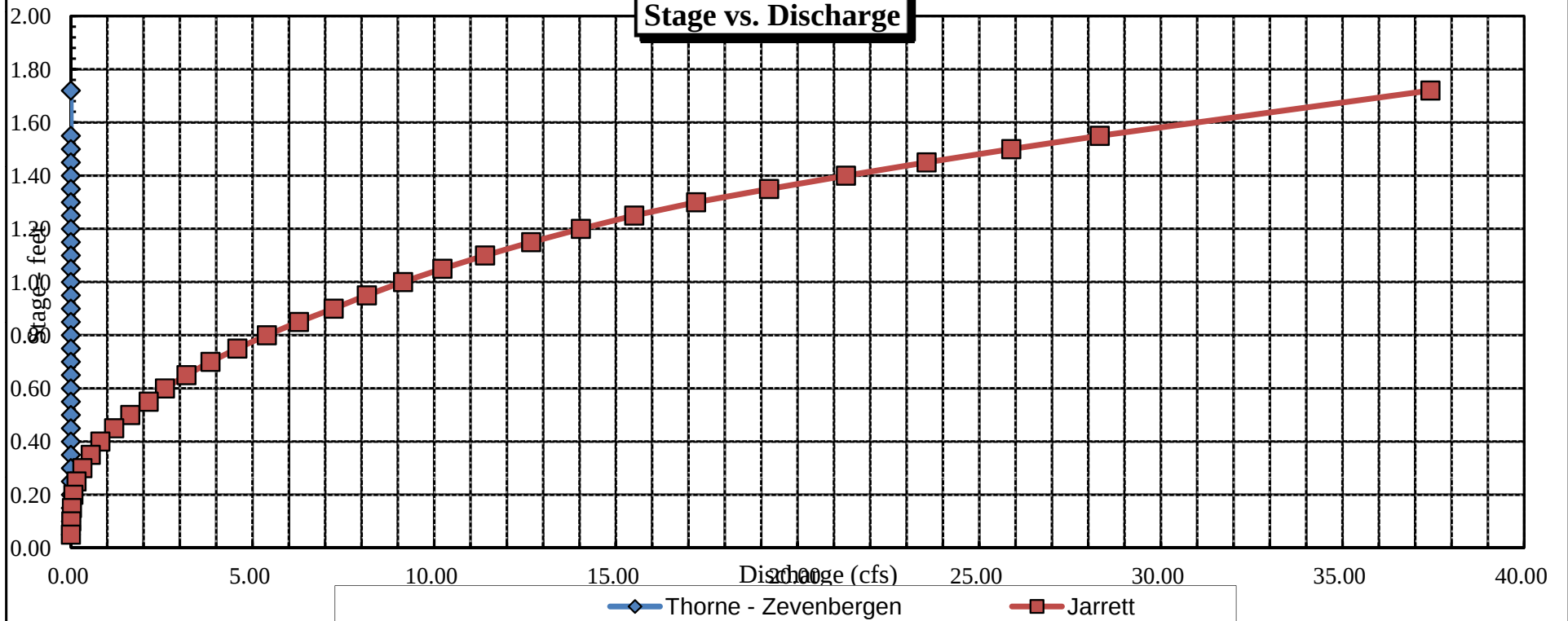


Velocity vs. Discharge





Stage vs. Discharge





FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME <i>East Fork Parachute - below falls</i>		CROSS-SECTION NO <i>1</i>	
CROSS SECTION LOCATION <i>50 ft. downstream from decommissioned USGS gage</i>			
DATE <i>8-24-01</i>	OBSERVERS <i>R. Smith, M. McGuire</i>		
LEGAL DESCRIPTION	1/4 SECTION <i>SE</i>	SECTION <i>35</i>	TOWNSHIP <i>S N/S</i>
COUNTY <i>Gardfield</i>	WATERSHED <i>Colorado</i>	WATER DIVISION <i>5</i>	DOW WATER CODE <i>21460</i>
USGS: <i>Forked Gulch 7.5'</i>	UTM <i>12 S 0756174</i>		
USFS: <i>7,020 ft.</i>	<i>4383498</i>		

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION	☒ YES ☐ NO	METER TYPE <i>Marsh-McBirney</i>		
METER NUMBER	DATE RATED	CALIB/SPIN	SEC	TAPE WEIGHT
				<i>surveyed</i>
CHANNEL BED MATERIAL SIZE RANGE <i>gravel to 3-foot boulders</i>				<i>surveyed</i>
		PHOTOGRAPHS TAKEN	☒ YES ☐ NO	NUMBER OF PHOTOGRAPHS <i>4</i>

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)	SECTION 1 2 3	LEGEND Stake (X) Station (O) Photo (diamond) Direction of flow (arrow)
(X) Tape & Stake LB	0.0	<i>surveyed</i>		
(X) Tape & Stake RB	0.0	<i>surveyed</i>		
(1) WS & Tape LB/RB	0.0	<i>3.24 / 3.26</i>		
(2) WS Upstream	<i>25.0'</i>	<i>2.88</i>		
(3) WS Downstream	<i>18.0'</i>	<i>3.94</i>		
SLOPE	<i>1.06 / 43.0' = 0.024</i>			

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	
<i>see attached survey</i>																		
AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME																		
<i>caddisfly, mayfly, stonefly</i>																		

COMMENTS

*TDS: 350 PPM 8.8 Temp: 11°C
Very steep stream.*

DISCHARGE/CROSS SECTION N

E Fork Parachute Ck. ^{below} falls

Comment

DATE: 8-24-04

SHEET ____ OF ____

EDGE OF WATER LOOKING DOWNSTREAM
(GOAT STAKE)

Gage Reading:

02

TIME 3:40 PM

[illegible]

TOTALS.

Time: 4:00

Gage Reading.

67

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 Parachute Creek - below falls
XS LOCATION: 50' d/s fr old USGS gage
XS NUMBER: 1

DATE: 24-Aug-01
OBSERVERS: R. Smith, M. McGuire

1/4 SEC: SE
SECTION: 35
TWP: 5S
RANGE: 95W
PM: Sixth

COUNTY: Garfield
WATERSHED: Parachute Creek
DIVISION: 5
DOW CODE: 21460

USGS MAP: Forked Gulch 7.5'
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: 0.024

INPUT DATA CHECKED BY:DATE.....

ASSIGNED TO:DATE.....

STREAM NAME: East Fork Parachute Creek - below falls
 XS LOCATION: 50' d/s fr old USGS gage
 XS NUMBER: 1

DATA POINTS= 22

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
1 LS & G	0.00	2.88		
	1.00	2.84		
	2.00	3.00		
	3.00	3.06		
W	3.30	3.24	0.00	0.00
	3.60	3.45	0.20	0.10
	3.90	3.49	0.25	0.46
	4.20	3.46	0.20	0.57
	4.50	3.50	0.25	0.51
	4.80	3.48	0.25	0.30
	5.10	3.49	0.25	0.30
	5.40	3.43	0.20	0.22
	5.70	3.43	0.20	0.57
	6.00	3.40	0.15	0.84
	6.30	3.40	0.15	0.35
	6.60	3.44	0.20	0.19
	6.90	3.52	0.25	0.29
W	7.00	3.26	0.00	0.00
	8.00	3.03		
	9.00	2.90		
	10.00	2.92		
1 RS & G	11.20	2.90		

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%
0.37	0.20	0.06	0.01	2.1%
0.30	0.25	0.08	0.03	12.1%
0.30	0.20	0.06	0.03	12.0%
0.30	0.25	0.08	0.04	13.4%
0.30	0.25	0.08	0.02	7.9%
0.30	0.25	0.08	0.02	7.9%
0.31	0.20	0.06	0.01	4.6%
0.30	0.20	0.06	0.03	12.0%
0.30	0.15	0.05	0.04	13.3%
0.30	0.15	0.05	0.02	5.5%
0.30	0.20	0.06	0.01	4.0%
0.31	0.25	0.05	0.01	5.1%
0.28		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%

3.97 0.25 0.74 0.28 100.0%
 (Max.)

Manning's n = 0.1951
 Hydraulic Radius= 0.18625822

STREAM NAME: East Fork Parachute Creek - below falls
 XS LOCATION: 50' d/s fr old USGS gage
 XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.74	0.72	-2.8%
3.00	0.74	1.87	152.4%
3.02	0.74	1.75	136.2%
3.04	0.74	1.64	121.3%
3.06	0.74	1.54	107.6%
3.08	0.74	1.44	94.6%
3.10	0.74	1.35	81.9%
3.12	0.74	1.25	69.5%
3.14	0.74	1.17	57.5%
3.16	0.74	1.08	45.8%
3.18	0.74	0.99	34.4%
3.20	0.74	0.91	23.4%
3.21	0.74	0.87	18.0%
3.22	0.74	0.83	12.7%
3.23	0.74	0.80	7.4%
3.24	0.74	0.76	2.3%
3.25	0.74	0.72	-2.8%
3.26	0.74	0.68	-7.8%
3.27	0.74	0.65	-12.7%
3.28	0.74	0.61	-17.7%
3.29	0.74	0.57	-22.6%
3.30	0.74	0.54	-27.4%
3.32	0.74	0.47	-37.1%
3.34	0.74	0.39	-46.7%
3.36	0.74	0.32	-56.2%
3.38	0.74	0.25	-65.6%
3.40	0.74	0.19	-74.9%
3.42	0.74	0.13	-82.8%
3.44	0.74	0.08	-89.2%
3.46	0.74	0.04	-94.6%
3.48	0.74	0.01	-98.6%
3.50	0.74	0.00	-99.9%

WATERLINE AT ZERO

AREA ERROR = 3.244

STREAM NAME: East Fork Parachute Creek - below falls
 XS LOCATION: 50' d/s fr old USGS gage
 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	2.90	9.83	0.26	0.62	2.58	10.19	100.0%	0.25	1.22	0.47
	2.94	7.00	0.32	0.58	2.23	7.37	72.3%	0.30	1.19	0.53
	2.99	6.31	0.30	0.53	1.90	6.66	65.4%	0.29	0.97	0.51
	3.04	5.20	0.31	0.48	1.61	5.54	54.4%	0.29	0.84	0.52
	3.09	4.66	0.29	0.43	1.37	4.99	49.0%	0.27	0.68	0.50
	3.14	4.36	0.26	0.38	1.15	4.67	45.9%	0.25	0.53	0.46
	3.19	4.06	0.23	0.33	0.94	4.35	42.7%	0.21	0.40	0.42
WL	3.24	3.76	0.20	0.28	0.74	4.03	39.6%	0.18	0.28	0.38
	3.29	3.61	0.15	0.23	0.56	3.84	37.7%	0.14	0.18	0.33
	3.34	3.52	0.11	0.18	0.38	3.70	36.3%	0.10	0.10	0.26
	3.39	3.43	0.06	0.13	0.20	3.56	34.9%	0.06	0.04	0.18
	3.44	2.05	0.03	0.08	0.07	2.12	20.8%	0.03	0.01	0.12
	3.49	0.23	0.01	0.03	0.00	0.25	2.5%	0.01	0.00	0.04

STREAM NAME: East Fork Parachute Creek - below falls
XS LOCATION: 50' d/s fr old USGS gage
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.28 cfs
CALCULATED FLOW (Qc)=	0.28 cfs
(Qm-Qc)/Qm * 100 =	1.0 %
MEASURED WATERLINE (WLm)=	3.25 ft
CALCULATED WATERLINE (WLc)=	3.24 ft
(WLm-WLc)/WLm * 100 =	0.2 %
MAX MEASURED DEPTH (Dm)=	0.25 ft
MAX CALCULATED DEPTH (Dc)=	0.28 ft
(Dm-Dc)/Dm * 100	-10.2 %
MEAN VELOCITY=	0.38 ft/sec
MANNING'S N=	0.195
SLOPE=	0.024 ft/ft
.4 * Qm =	0.1 cfs
2.5 * Qm=	0.7 cfs

RECOMMENDED INSTREAM FLOW:
=====

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

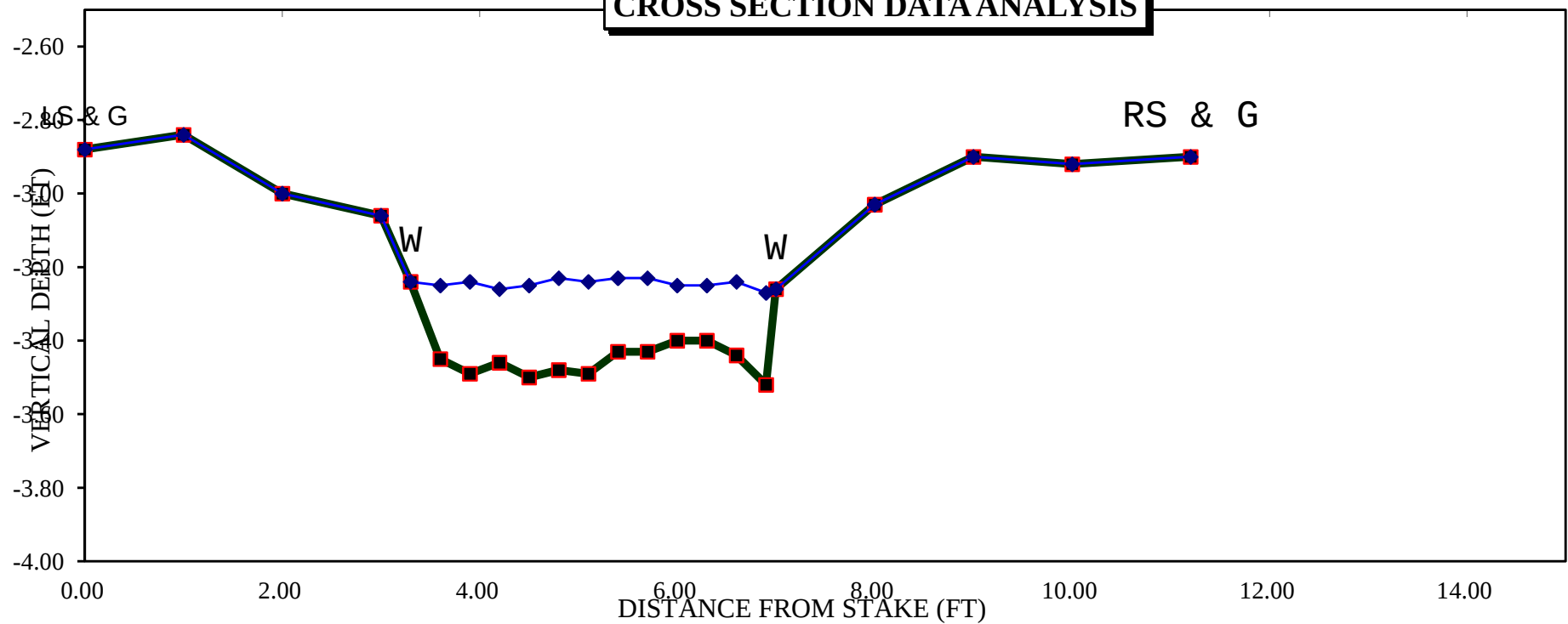
RATIONALE FOR RECOMMENDATION:
=====

[illegible]

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

CWCB REVIEW BY: DATE:

CROSS SECTION DATA ANALYSIS



Channel Bottom Computed Water Line

