United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7210
www.co.blm.gov

DEC 18 2013

In Reply Refer To:
7250 (CO-930)

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 BLM-private land boundary, a distance of approximately 1.3 miles. The BLM manages the entire 1.3 miles of this stream reach.

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. The 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

The 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.

> 5.0 cubic feet per second is recommended for the snowmelt runoff and high temperature period from April 15 through June 30. This recommendation is driven by the average velocity criteria, and represents the highest flow rate that is within the confidence interval for the data sets that were collected. Even though this flow doesn't provide 1.0 foot per second average velocity, it does provide an average velocity of 0.8 feet per second, which the BLM believes is sufficient in this step-pool stream environment. 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.
>
> 0.65 cubic feet per second is recommended for the summer through winter period from July 1 to April 14. This recommendation is driven by limited water availability, and the 0.65 cfs recommendation is outside of the confidence interval for three of the six cross sections that were collected. However, the BLM notes that 0.65 cfs will meet the wetted perimeter and depth criteria in three 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. The U.S. Geological Survey (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. The 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. The 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. The 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.

The BLM also recommends consulting the StreamStats package developed jointly between the USGS and the Colorado Water Conservation Board (CWCB).

The 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. The BLM's plan for the Roan Plateau strongly emphasizes maintenance of aquatic and riparian resource while allowing limited oil and gas development. This is 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 the 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 CWCB for their cooperation in this effort.

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

Sincerely,

Leigh D. Espy
Deputy State Director, Resources and Fire

cc: Jim Cagney, NW District
Steve Bennett, Colorado River Valley Field Office
Pauline Adams, Colorado River Valley Field Office

DRAFT INSTREAM FLOW RECOMMENDATION

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

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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.

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		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.

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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: 21460

Crew: "Martin, Talley, Krizman"

Notes:

"The purpose of the sample was to determine fish species presence and composition, specifically related to cutthroat 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

Species	# Caught	% Catch	Min Size	Capture P	#/Mile	95% CI	#/Acre	95% CI	Lbs/Acre	95% CI
BRK	4	8	150	1.00	108	0	73	0	8	0
LOC	46	92	150	0.91	1254	42	841	28	165	6

LENGTH FREQUENCY RECORD (cm)

Species	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-22	22-24	24-26	26-28	28-30	30-32	32-34	34-36	36-38	38-40	40-42	42-44	44-46	46-48	48-50	50-52	52-54	54-56	56-58	58-60	>60
BRK				1					4																						
LOC			16	15			7	18	10	8	1	8	4	2	1		1														

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: East Fork Parachute Creek						CROSS-SECTION NO.: 2	
CROSS-SECTION LOCATION: 80 yds. upstream from BLM-private boundary							
DATE: 8-15-11	OBSERVERS: R. Smith, P. Adams						
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 35	TOWNSHIP: 5 N/S	RANGE: 95 E/W	PM: 6th		
COUNTY: Garfield	WATERSHED: Parachute Creek	WATER DIVISION: 5	DOW WATER CODE: 21460				
MAP(S):	USGS:						
	USFS:						

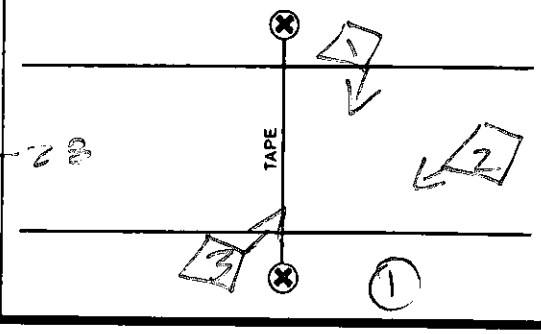
SUPPLEMENTAL DATA

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 1 ft. boulders	PHOTOGRAPHS TAKEN: (YES/NO)	NUMBER OF PHOTOGRAPHS: 8		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
Tape @ Stake LB	0.0	surveyed
Tape @ Stake RB	0.0	surveyed
1 WS @ Tape LB/RB	0.0 7.9	8.25 / 8.30
2 WS Upstream	93.0	4.84
3 WS Downstream	4.0	8.80
SLOPE	3.96/97.0 = .041	

SKETCH



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:
stonefly, caddisfly, black fly

COMMENTS

pH: 8.52
Cond: 464
Temp: 14.4°C
Salinity: 0.2 ppt

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: East Fk. Parachute Ck.	CROSS-SECTION NO.: 2	DATE: 8-15-11	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: ____ ft	TIME: 1:30 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
RS	1.0		6.50								
G	1.3		7.30								
	2.3		7.48								
W	2.8		8.30								
	3.1		8.3	.2				0			
	3.4		8.5	.2				0			
	3.7		8.4	.1				.01			
	4.0		8.4	.1				.08			
	4.3		8.45	.15				.05			
	4.6		8.45	.15				.37			
	4.9		8.45	.15				.62			
	5.2		8.4	.10				.52			
	5.5		8.4	.10				.74			
	5.8		8.4	.10				1.50			
	6.1		8.55	.30				.26			
	6.4		8.55	.30				.39			
	6.7		8.45	.20				.55			
	7.0		8.50	.25				1.47			
	7.3		8.40	.15				0.92			
	7.6		8.40	.15				1.16			
W	7.9		8.25								
	8.5		7.80								
G	9.7		7.30								
LS	13.2		6.68								
TOTALS:											

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

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

LOCATION INFORMATION

STREAM NAME:	East Fork 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

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:	0.041

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	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	RS	1.00	6.50			0.00		0.00	0.00	0.0%
1	G	1.30	7.30			0.00		0.00	0.00	0.0%
		2.30	7.48			0.00		0.00	0.00	0.0%
	W	2.80	8.30	0.00	0.00	0.00		0.00	0.00	0.0%
		3.10	8.50	0.20	0.00	0.36	0.20	0.06	0.00	0.0%
		3.40	8.50	0.20	0.00	0.30	0.20	0.06	0.00	0.0%
		3.70	8.40	0.10	0.01	0.32	0.10	0.03	0.00	0.1%
		4.00	8.40	0.10	0.08	0.30	0.10	0.03	0.00	0.6%
		4.30	8.45	0.15	0.05	0.30	0.15	0.05	0.00	0.5%
		4.60	8.45	0.15	0.37	0.30	0.15	0.05	0.02	3.9%
		4.90	8.45	0.15	0.62	0.30	0.15	0.05	0.03	6.5%
		5.20	8.40	0.10	0.52	0.30	0.10	0.03	0.02	3.6%
		5.50	8.40	0.10	0.74	0.30	0.10	0.03	0.02	5.2%
		5.80	8.40	0.10	1.56	0.30	0.10	0.03	0.05	10.9%
		6.10	8.55	0.30	0.26	0.34	0.30	0.09	0.02	5.4%
		6.40	8.55	0.30	0.39	0.30	0.30	0.09	0.04	8.2%
		6.70	8.45	0.20	0.55	0.32	0.20	0.06	0.03	7.7%
		7.00	8.50	0.25	1.47	0.30	0.25	0.08	0.11	25.7%
		7.30	8.40	0.15	0.92	0.32	0.15	0.05	0.04	9.6%
		7.60	8.40	0.15	1.16	0.30	0.15	0.05	0.05	12.2%
	W	7.90	8.25	0.00	0.00	0.34		0.00	0.00	0.0%
		8.50	7.80			0.00		0.00	0.00	0.0%
1	G	9.70	7.30			0.00		0.00	0.00	0.0%
	RS	13.20	6.68			0.00		0.00	0.00	0.0%
	TOTALS ----------					5.29	0.3 (Max.)	0.81	0.43	100.0%

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:
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FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

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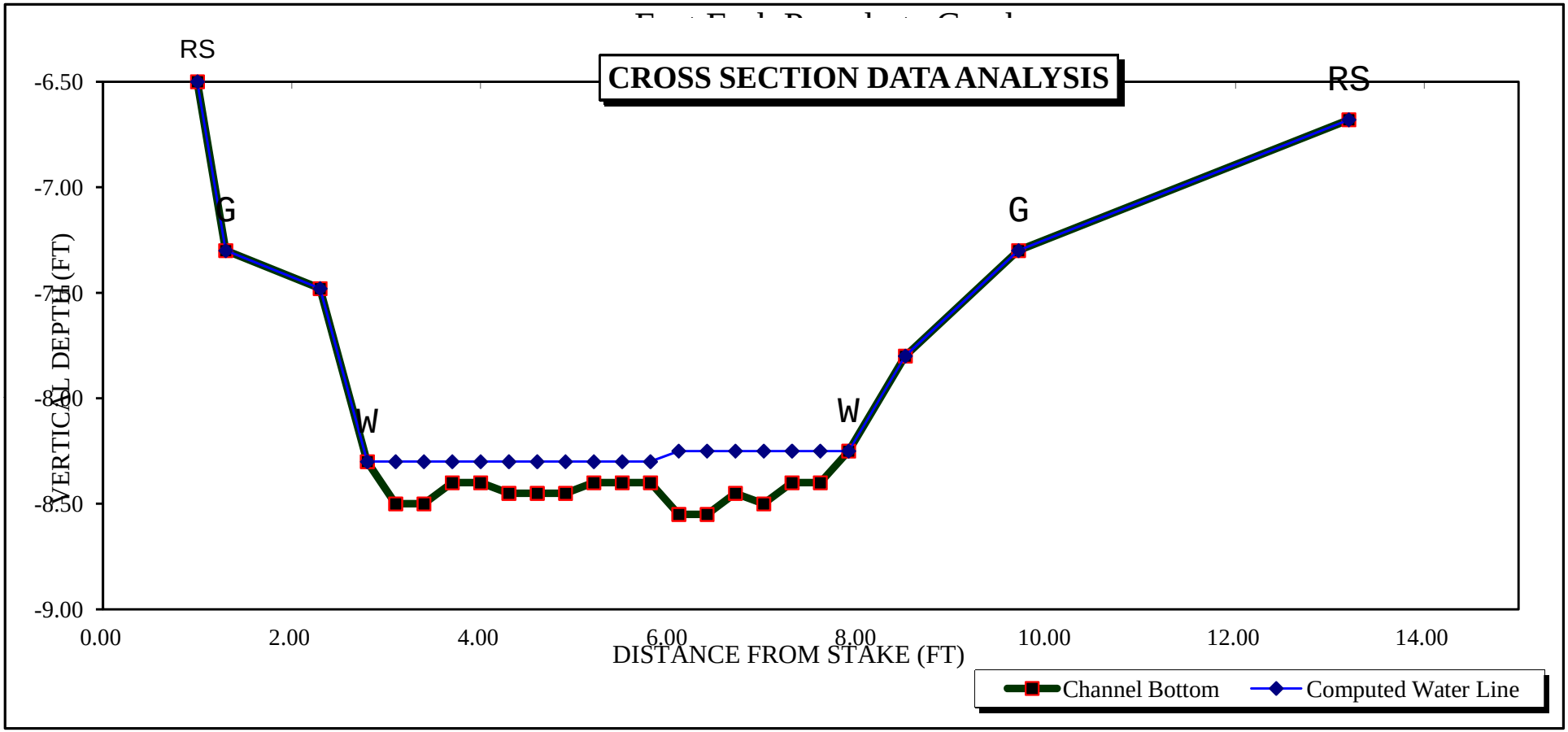
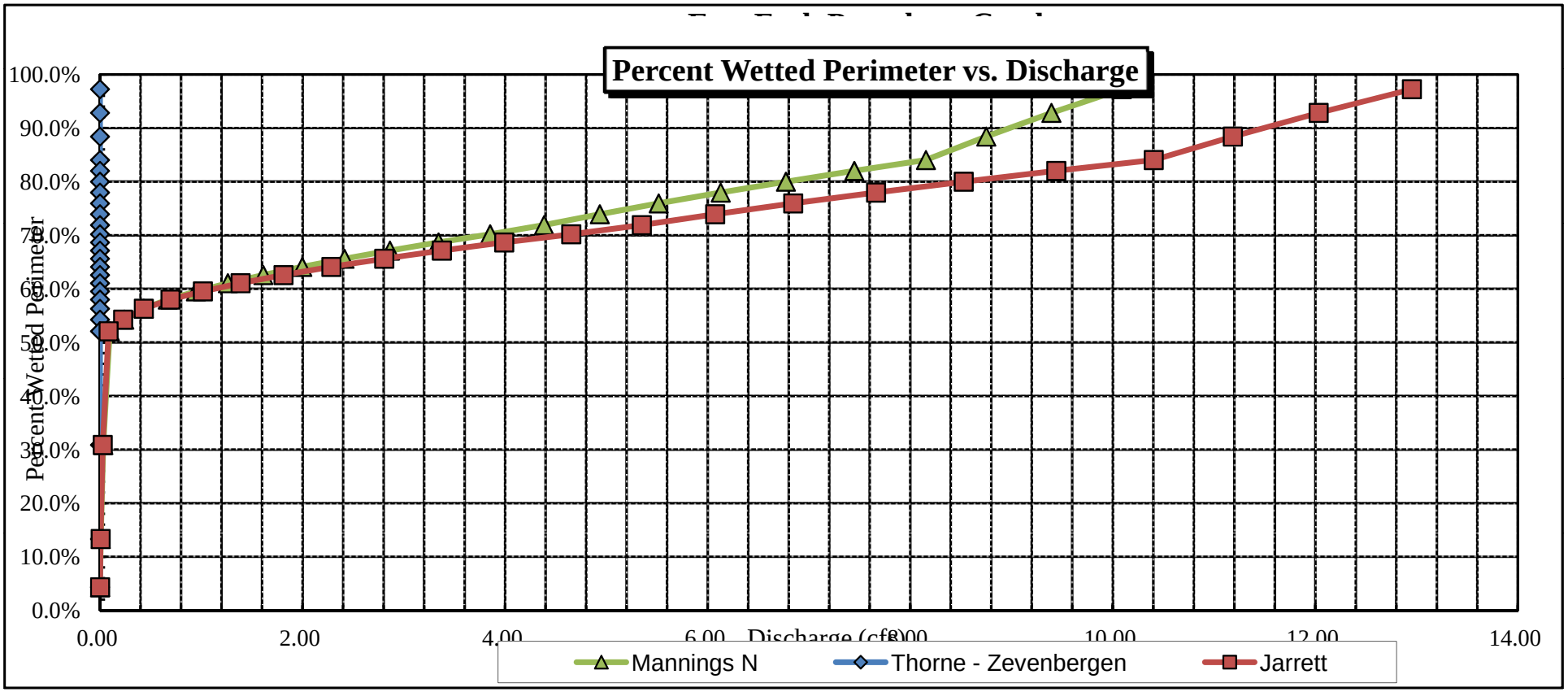
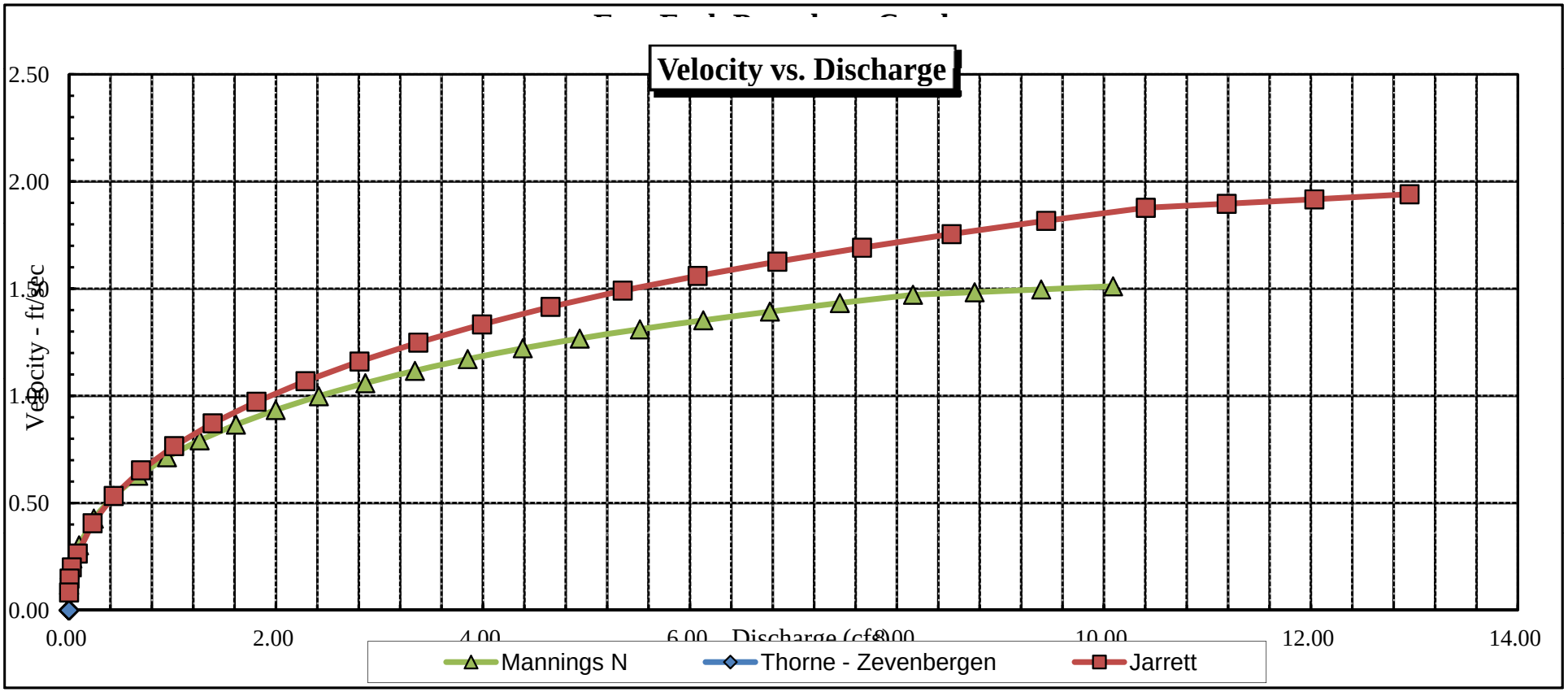
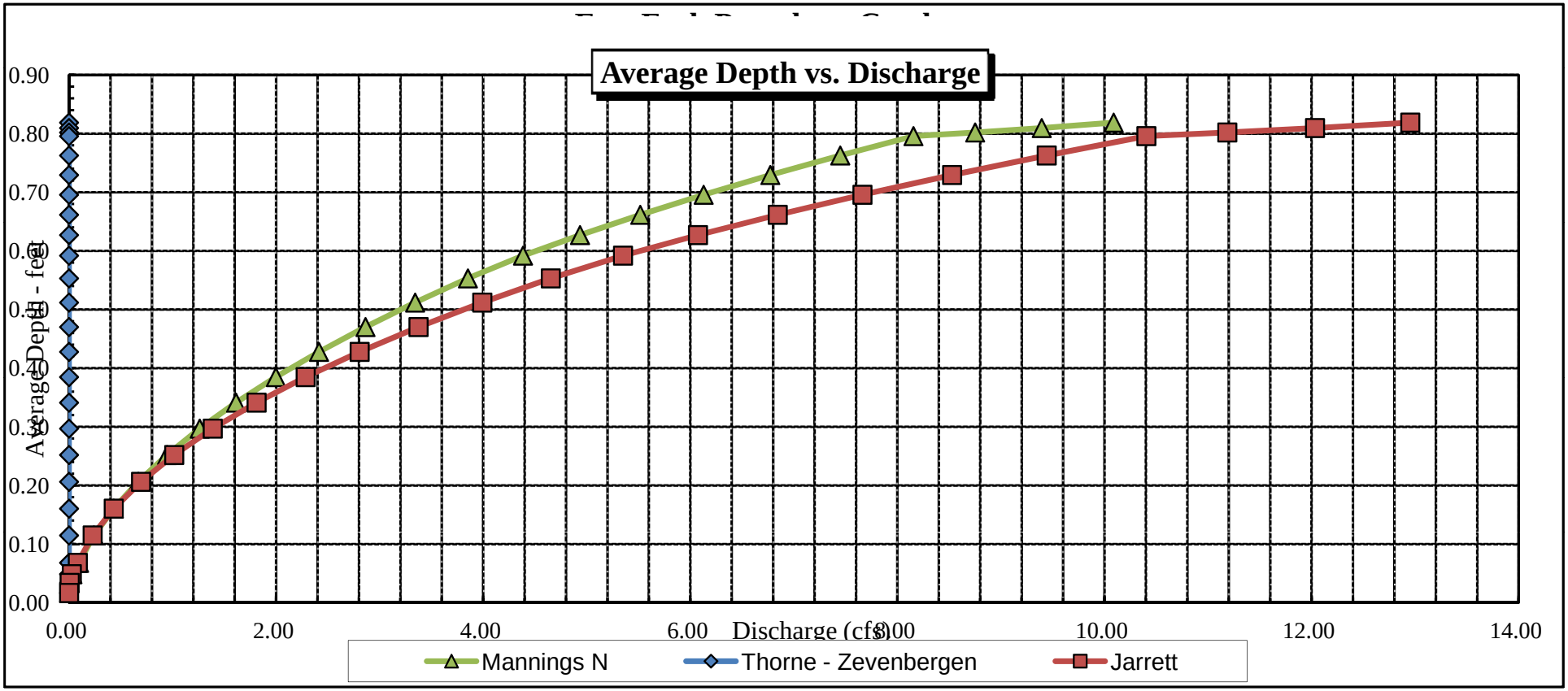
RECOMMENDATION BY: ……………….……….……............................. AGENCY.…………………….....……...…...…....... DATE:......…...…......……………

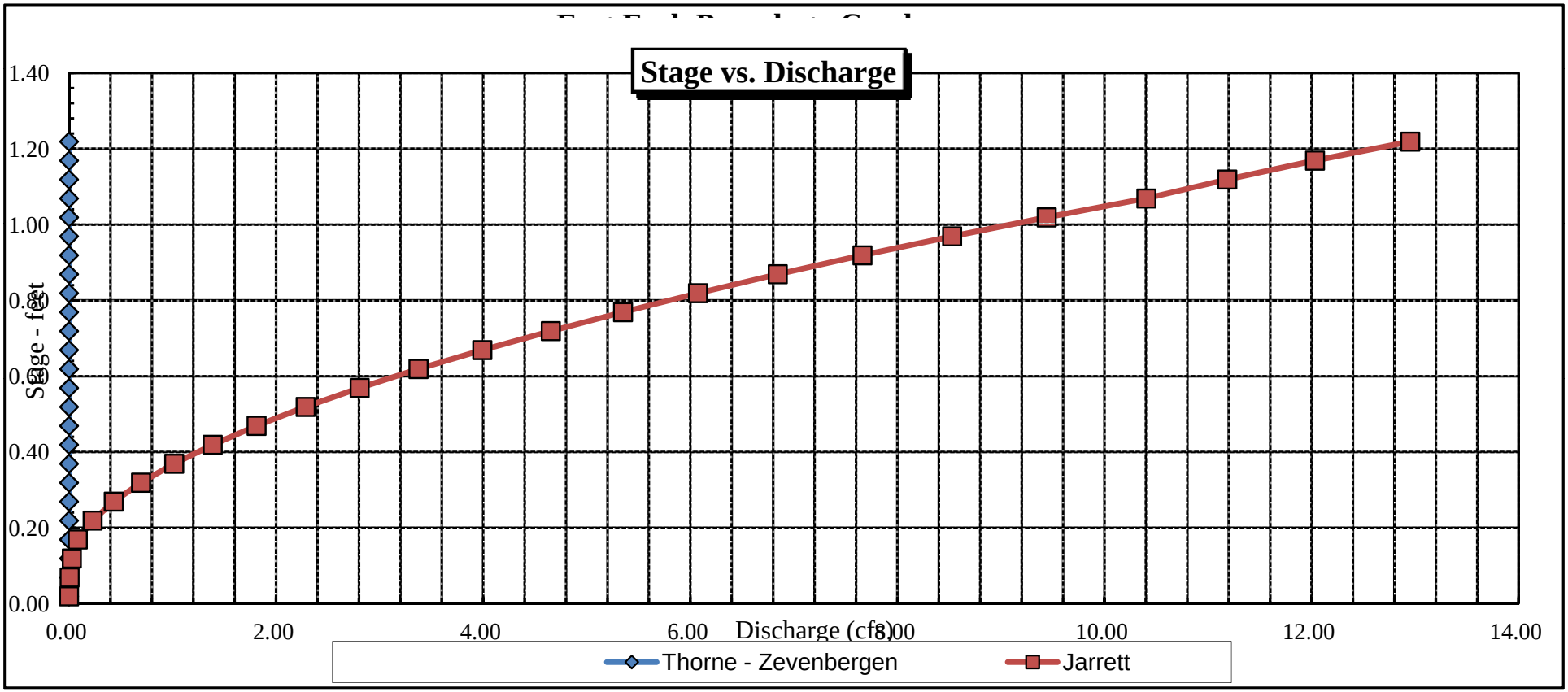
CWCB REVIEW BY: ..…………………………...…………………………………………………...…............. DATE:.................…………….....


CROSS SECTION DATA ANALYSIS
RS
RS
G
G
W
W
-6.50
-7.00
-7.50
-8.00
-8.50
-9.00
VERTICAL DEPTH (FT)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
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
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
Velocity - ft/sec
2.50
2.00
1.50
1.00
0.50
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - feet
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Stage - feet
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

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 | ¼ 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: 6[illegible]: 12S 750264 E 4385505 N | USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO | METER TYPE: Marsh McBirney

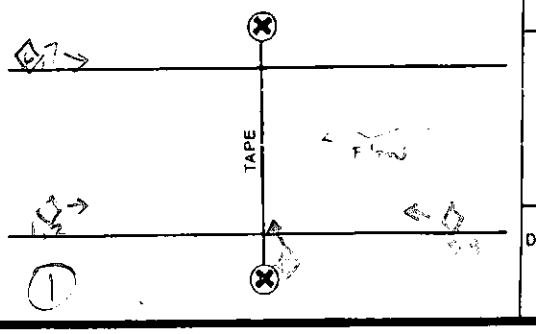
METER NUMBER: | DATE RATED: | CALIB/SPIN: _____ sec | TAPE WEIGHT: _____ lbs/foot | TAPE TENSION: _____ lbs

CHANNEL BED MATERIAL SIZE RANGE: gravel to 1.0 boulders | PHOTOGRAPHS TAKEN: YES/NO | NUMBER OF PHOTOGRAPHS: 8

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	6.78 / 6.82
② WS Upstream	54.0	4.84
③ WS Downstream	43.0	8.80
SLOPE	3.96 / 97.0 = .041	

SKETCH



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:

Stonefly, caddisfly, blackfly, water striders

COMMENTS

Conductivity: 1440 us, Temp: 14.3°C, pH: 8.52, Salinity: 0.2 ppt

Box Elder - Maple Riparian Community

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: East Fork Parachute Ck.	CROSS-SECTION NO: 1	DATE: 8-15-11	SHEET __ OF __
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: ____ ft	TIME: 12:40

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 (ft²)	Discharge (cfs)
G+RS	0.5		4.91								
G?	2.0		5.76								
	2.6		6.55								
W	2.8		6.80								
	3.1		6.85	0.05				0			
	3.4		7.05	0.25				0.19			
	3.7		7.10	0.30				0.27			
	4.0		7.10	0.30				0.50			
	4.3		7.00	0.2				0.46			
	4.6		7.00	0.2				0.34			
	4.9		6.95	0.15				0.30			
	5.2		7.00	0.20				0.34			
	5.5		6.95	0.15				0.52			
	5.8		6.95	0.15				0.46			
	6.1		6.95	0.15				0.28			
	6.4		7.00	0.20				0.15			
	6.7		6.95	0.15				0.29			
	7.0		6.95	0.15				0.52			
	7.3		6.90	0.10				0.53			
	7.6		6.90	0.10				0.52			
	7.9		6.90	0.10				0.40			
	8.2		6.90	0.10				0.51			
	8.5		7.00	0.20				0.28			
	8.8		6.90	0.10				0.28			
	9.1		6.70	0.10				0.16			
	9.4		6.85	0.05				0			
	9.7		6.80	0.0				0			
	10.0		6.80	0.0				0			
	10.3		6.80	0.0				0			
W	10.5	6.80	→								
	11.6	6.34									
~~G? 16.0~~	13.7	6.13	< 5.76								
	18.0	5.46									
LSFG	21.0	4.90									
TOTALS:											

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

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

LOCATION INFORMATION

STREAM NAME:	East Fork 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

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:	0.041

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

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

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

DATA POINTS= 35

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
RS	0.50	4.91			0.00		0.00	0.00	0.0%
1 G	2.00	5.76			0.00		0.00	0.00	0.0%
	2.60	6.55			0.00		0.00	0.00	0.0%
W	2.80	6.80	0.00	0.00	0.00		0.00	0.00	0.0%
	3.10	6.85	0.05	0.00	0.30	0.05	0.02	0.00	0.0%
	3.40	7.05	0.25	0.19	0.36	0.25	0.08	0.01	4.0%
	3.70	7.10	0.30	0.27	0.30	0.30	0.09	0.02	6.8%
	4.00	7.10	0.30	0.50	0.30	0.30	0.09	0.05	12.6%
	4.30	7.00	0.20	0.46	0.32	0.20	0.06	0.03	7.7%
	4.60	7.00	0.20	0.34	0.30	0.20	0.06	0.02	5.7%
	4.90	6.95	0.15	0.30	0.30	0.15	0.05	0.01	3.8%
	5.20	7.00	0.20	0.34	0.30	0.20	0.06	0.02	5.7%
	5.50	6.95	0.15	0.52	0.30	0.15	0.05	0.02	6.6%
	5.80	6.95	0.15	0.46	0.30	0.15	0.05	0.02	5.8%
	6.10	6.95	0.15	0.28	0.30	0.15	0.05	0.01	3.5%
	6.40	7.00	0.20	0.15	0.30	0.20	0.06	0.01	2.5%
	6.70	6.95	0.15	0.29	0.30	0.15	0.05	0.01	3.7%
	7.00	6.95	0.15	0.52	0.30	0.15	0.05	0.02	6.6%
	7.30	6.90	0.10	0.53	0.30	0.10	0.03	0.02	4.5%
	7.60	6.90	0.10	0.52	0.30	0.10	0.03	0.02	4.4%
	7.90	6.90	0.10	0.40	0.30	0.10	0.03	0.01	3.4%
	8.20	6.90	0.10	0.51	0.30	0.10	0.03	0.02	4.3%
	8.50	7.00	0.20	0.28	0.32	0.20	0.06	0.02	4.7%
	8.80	6.90	0.10	0.28	0.32	0.10	0.03	0.01	2.4%
	9.10	6.90	0.10	0.16	0.30	0.10	0.03	0.00	1.3%
	9.40	6.85	0.05	0.00	0.30	0.05	0.02	0.00	0.0%
	9.70	6.80	0.00	0.00	0.30		0.00	0.00	0.0%
	10.00	6.80	0.00	0.00	0.00		0.00	0.00	0.0%
	10.30	6.80	0.00	0.00	0.00		0.00	0.00	0.0%
W	10.50	6.80			0.00		0.00	0.00	0.0%
	11.60	6.34			0.00		0.00	0.00	0.0%
	13.70	6.13			0.00		0.00	0.00	0.0%
1 G	16.00	5.76			0.00		0.00	0.00	0.0%
	18.00	5.46			0.00		0.00	0.00	0.0%
LS	21.00	4.90			0.00		0.00	0.00	0.0%
TOTALS ----------					7.05	0.3 (Max.)	1.04	0.36	100.0%

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:
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FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

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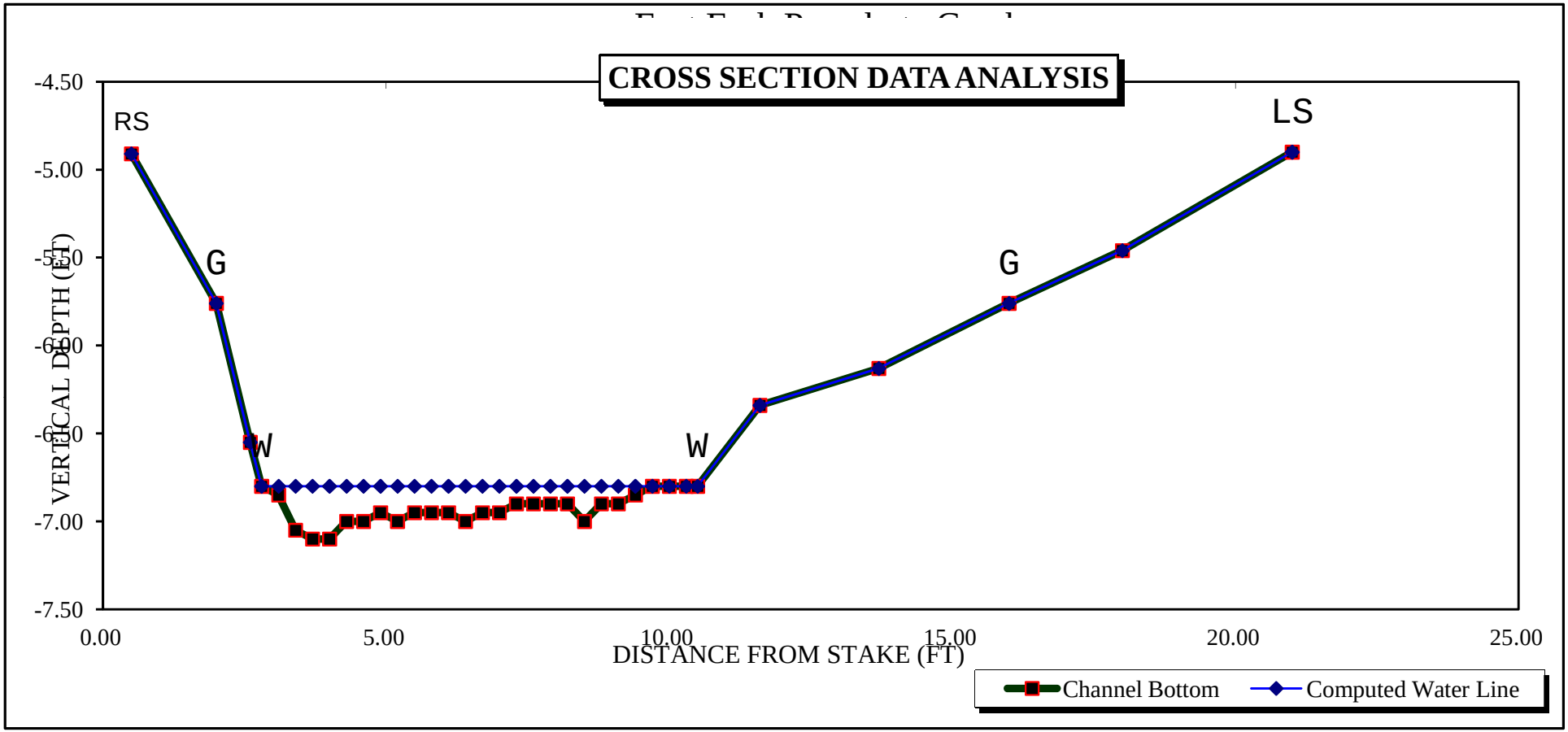
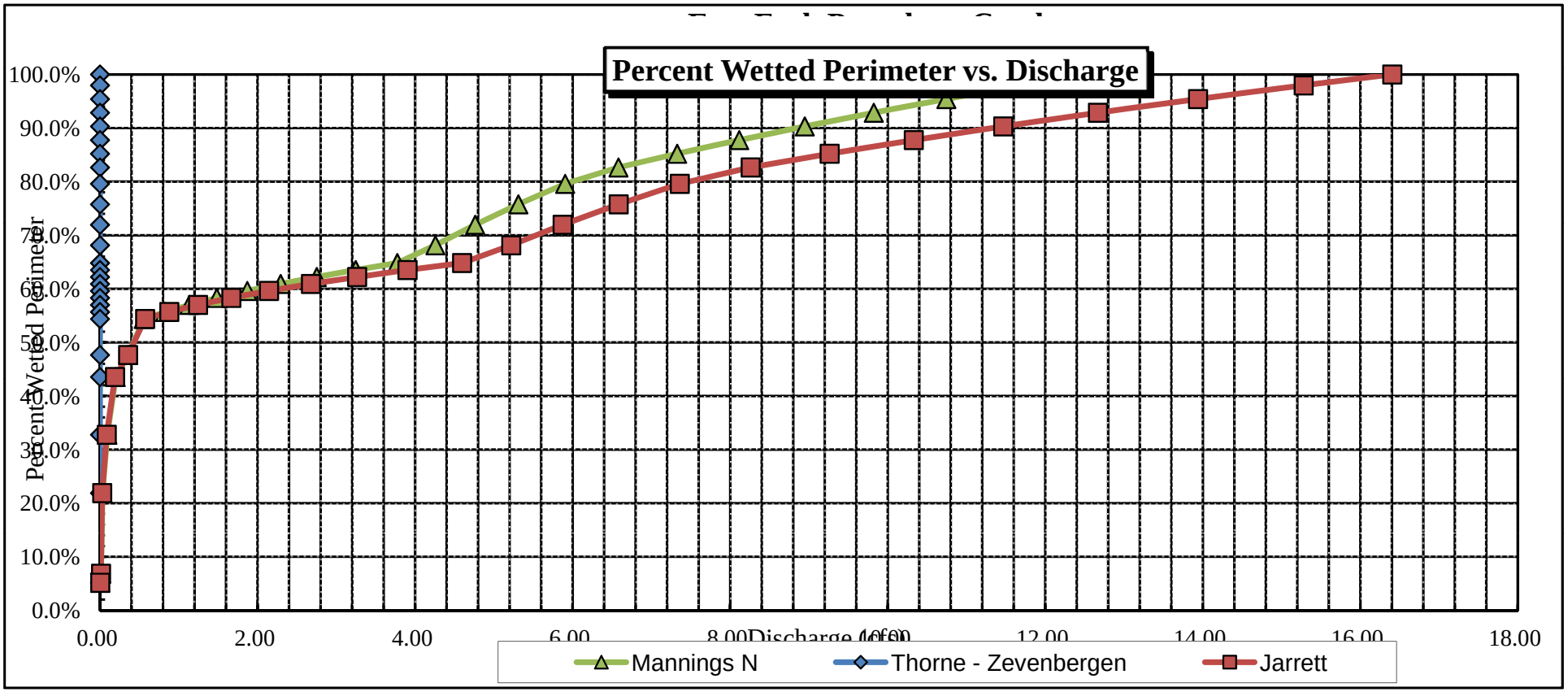
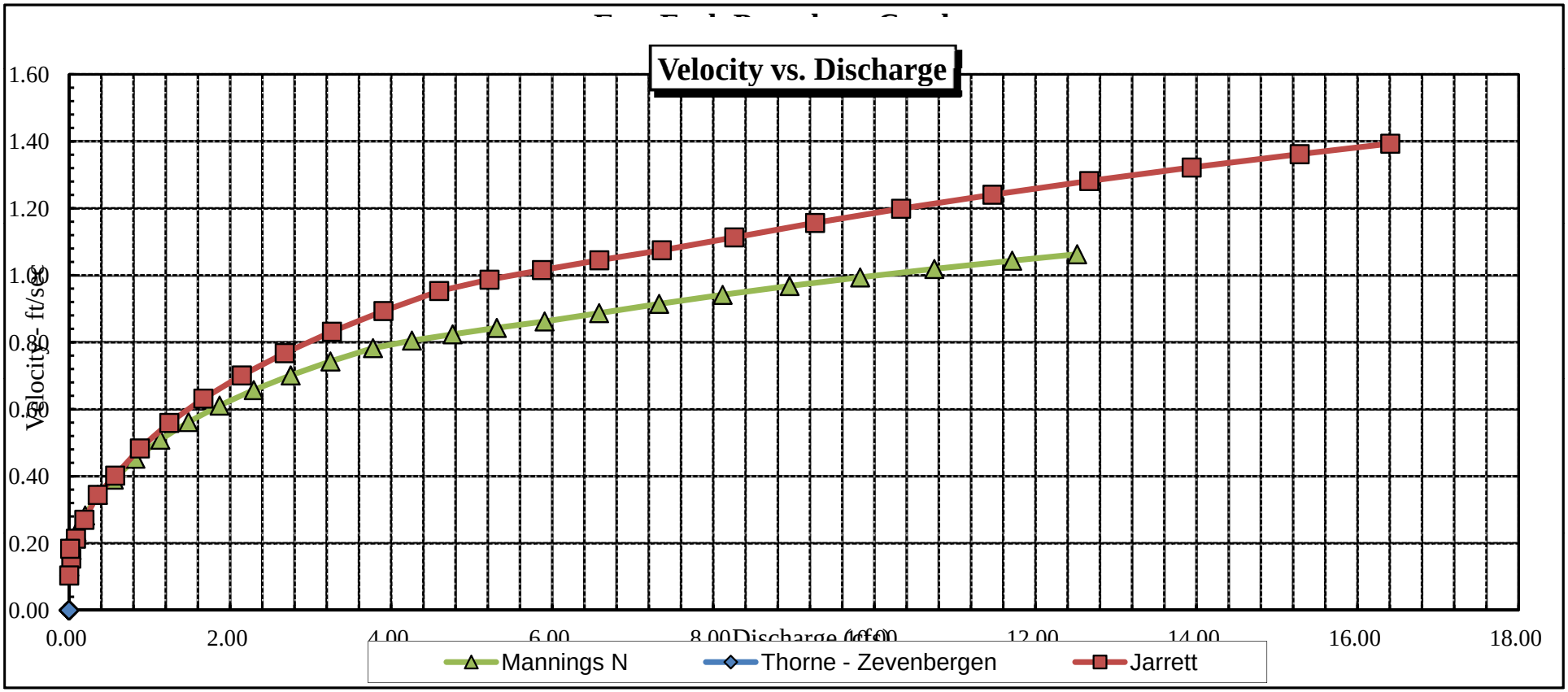
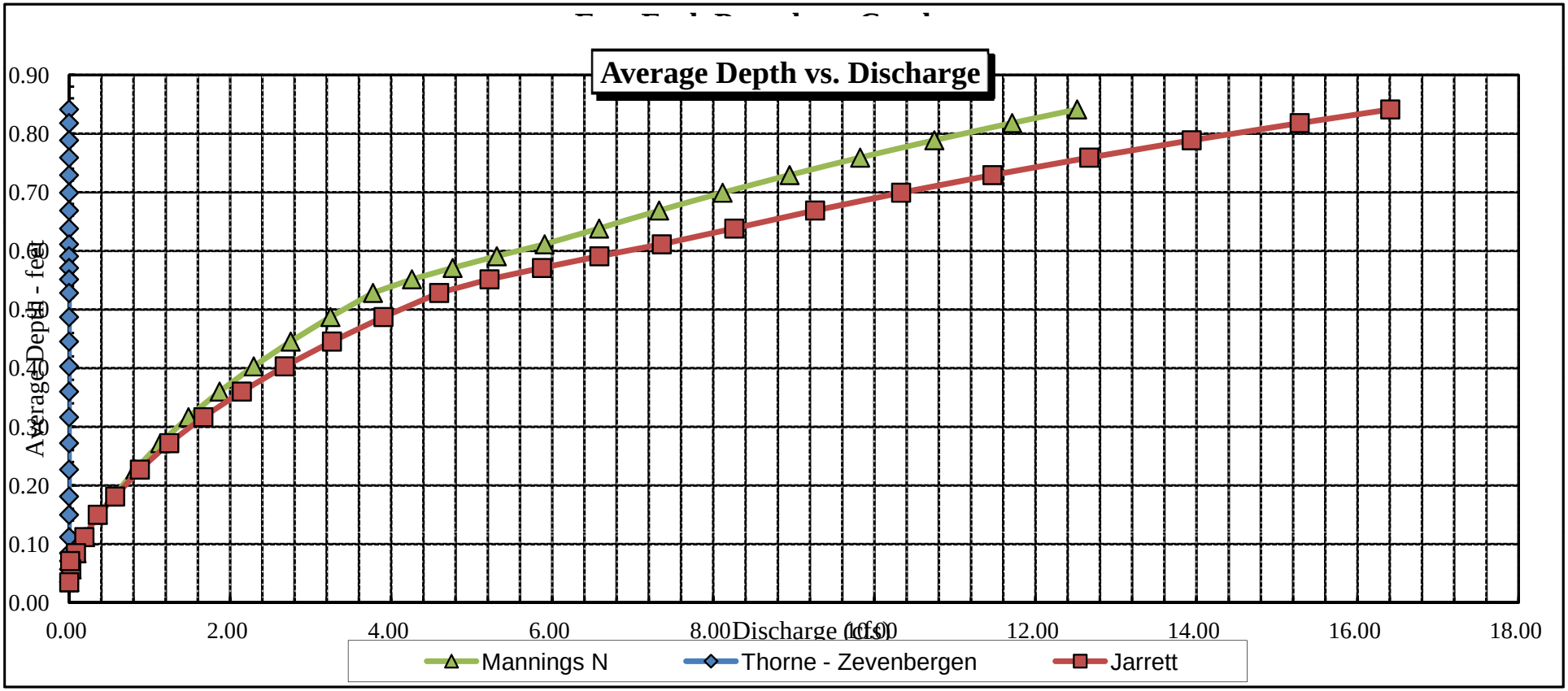
RECOMMENDATION BY: ……………………..………..…….............................. AGENCY..……………………….....…….....…...……....... DATE:.......…...…......……………

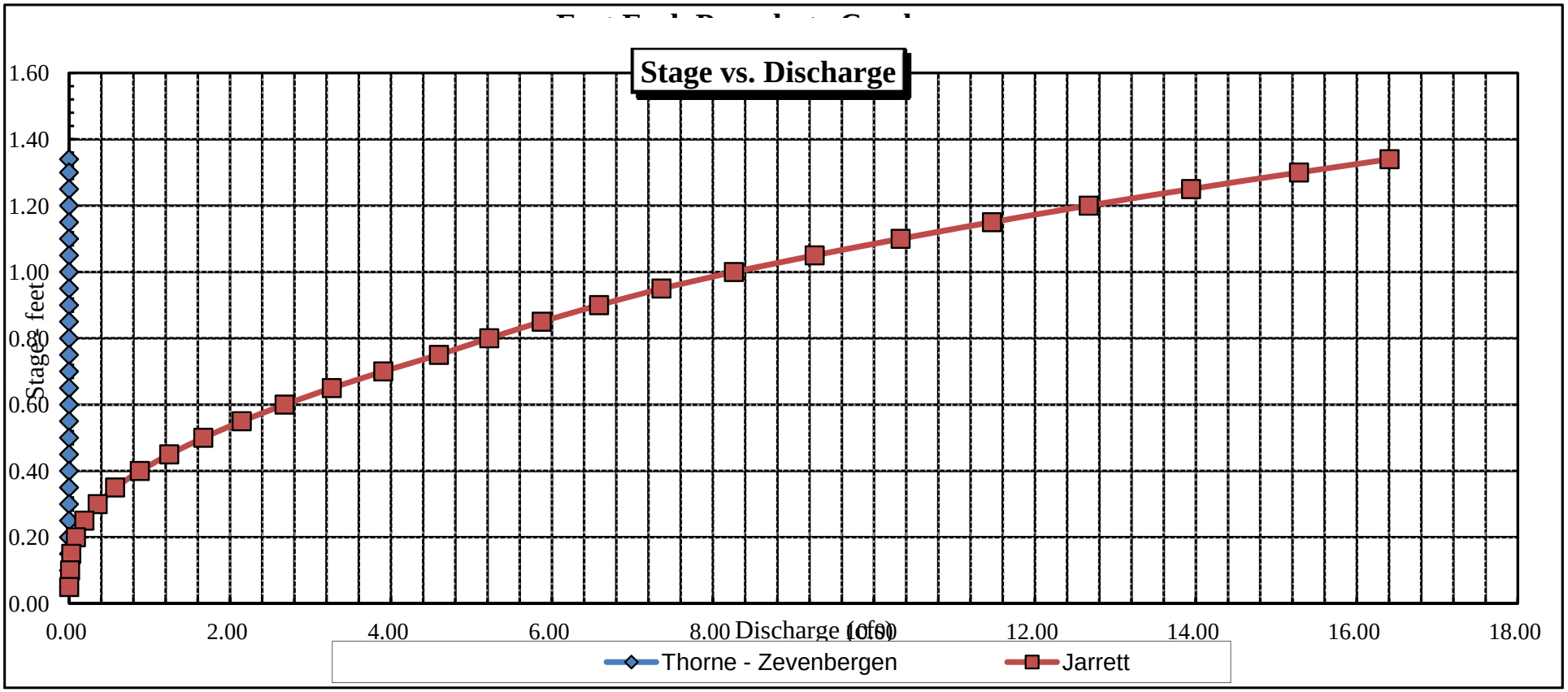
CWCB REVIEW BY: ..……………………………....…………………………………………………...…............. DATE:.................…………….....


CROSS SECTION DATA ANALYSIS
RS
G
W
W
G
LS
-4.50
-5.00
-7.00
-7.50
0.00
5.00
10.00
15.00
20.00
25.00
VERTICAL DEPTH (FT)
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
2.00
4.00
6.00
8.00
Discharge (cfs)
12.00
14.00
16.00
18.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
Velocity - ft/sec
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
2.00
4.00
6.00
8.00
12.00
14.00
16.00
18.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - feet
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Stage, feet
0.00
2.00
4.00
6.00
8.00
12.00
14.00
16.00
18.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: East Fork Parachute Creek						CROSS-SECTION NO.: 3
CROSS-SECTION LOCATION: Approx. 0.5 miles below East Fork Falls						
DATE: 5-17-12	OBSERVERS: R. Smith, P. Adams					
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 35	TOWNSHIP: 5 (N/S)	RANGE: 95 (E/W)	PM: 6th	
COUNTY: Garfield	WATERSHED: Parachute Creek	WATER DIVISION: 5	DOW WATER CODE: 2146D			
MAP(S): USGS:						
USFS:						

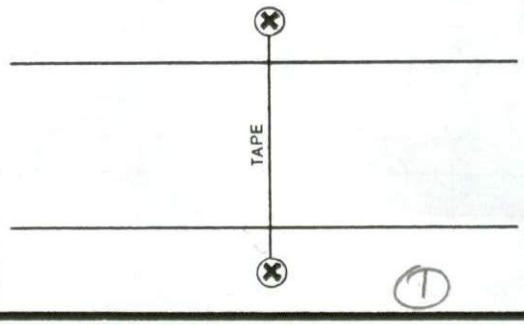
SUPPLEMENTAL DATA

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: 4" cobbles to 2-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 1.6	4.80/4.77
(2) WS Upstream	32.3	3.50
(3) WS Downstream	39.8	6.19
SLOPE	2.69/72.1 = .037	

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:
mayfly, caddisfly, stonefly, black fly

COMMENTS

Ph: 8.81
Temp = 6.5° C
Cond = 292
Salinity = 0.2 ppt

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) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
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				Ø			
	3.6		5.10	.30				Ø			
	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	Ø				Ø			
	12.4		4.85	.10				Ø			
	12.8		4.80	.05				Ø			
W	13.3		4.76								
	13.6		4.40								
	15.0		4.56								
	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 ft | CALCULATIONS PERFORMED BY | CALCULATIONS CHECKED BY

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

LOCATION INFORMATION

STREAM NAME:	East Fork 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

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:	0.037

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 (Max.)	3.80	2.43	100.0%

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:
=============================

FLOW (CFS)	PERIOD
___________	___________
___________	___________
___________	___________
___________	___________

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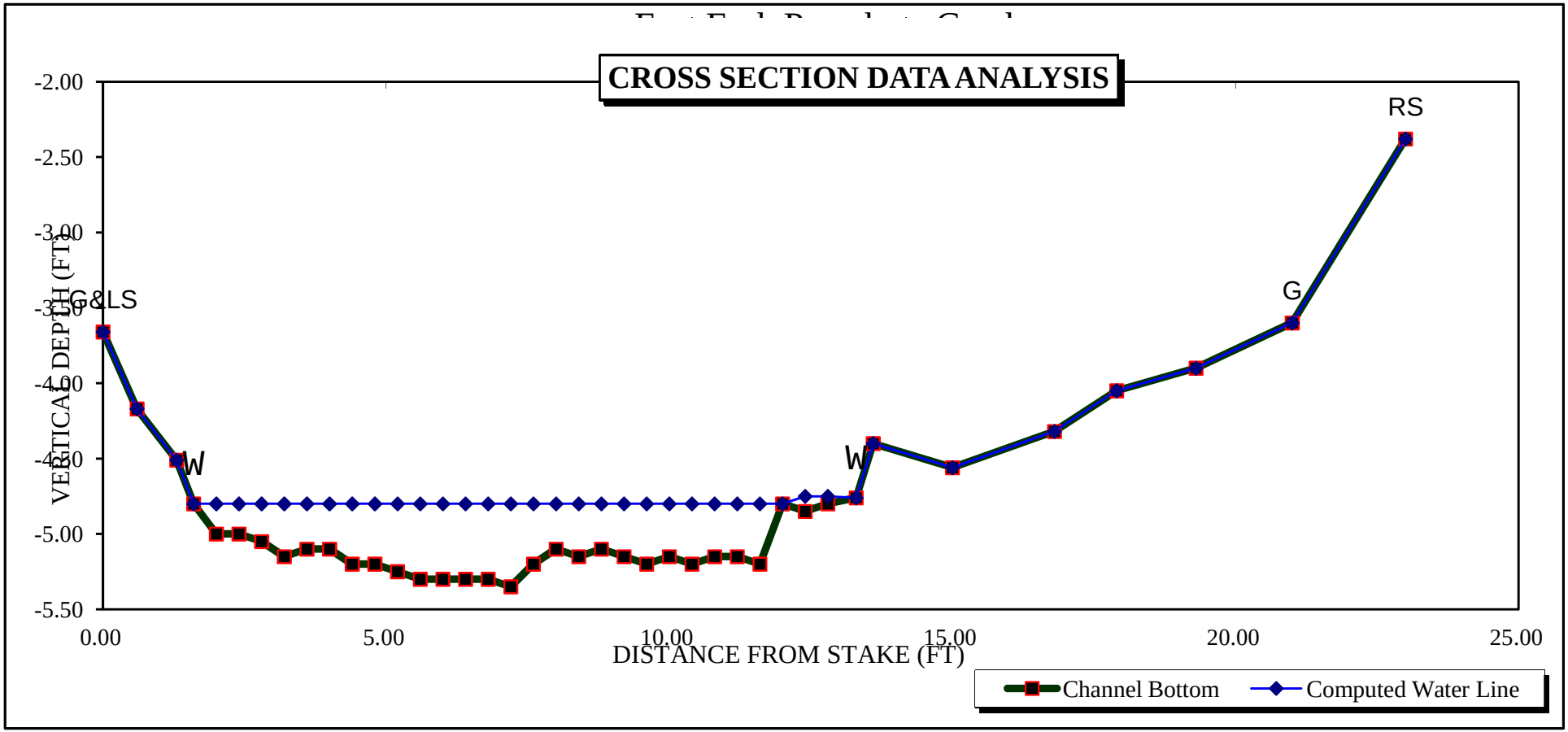
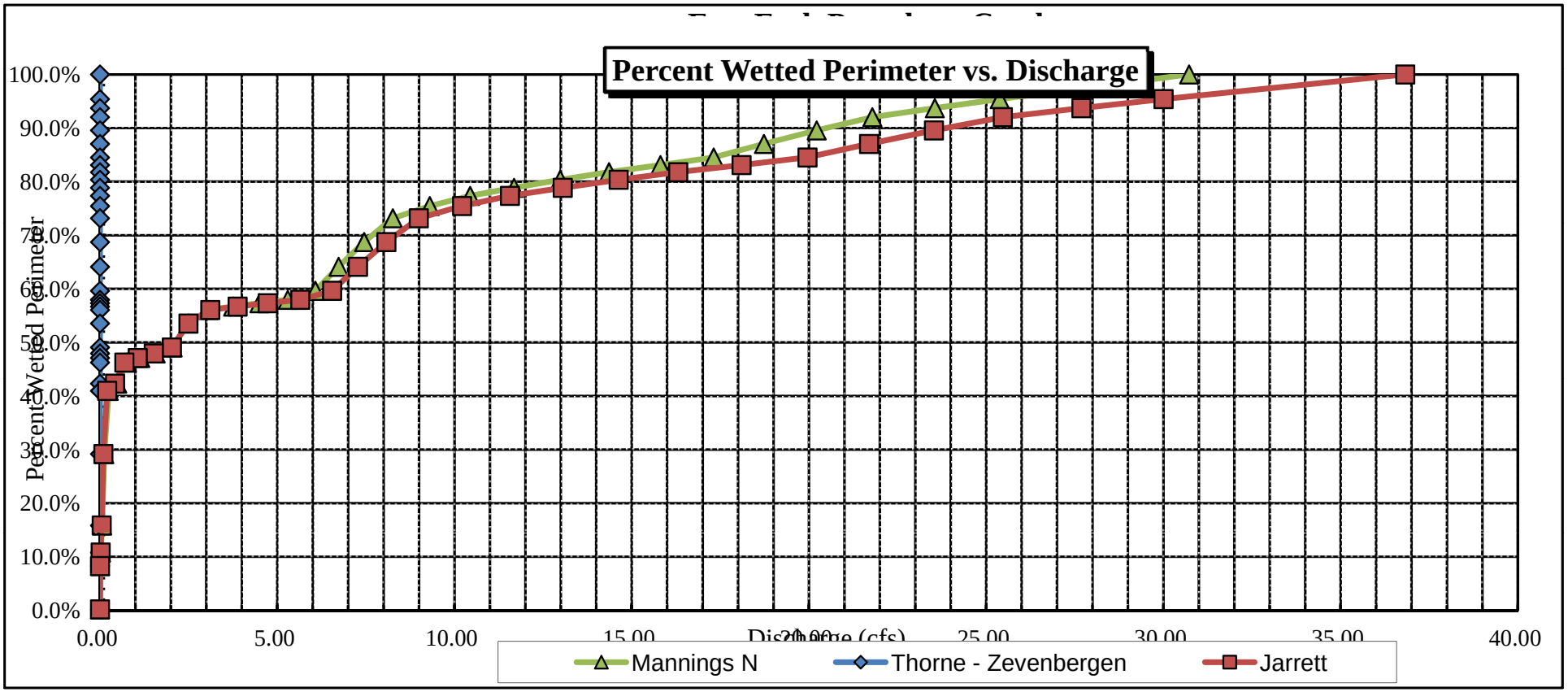
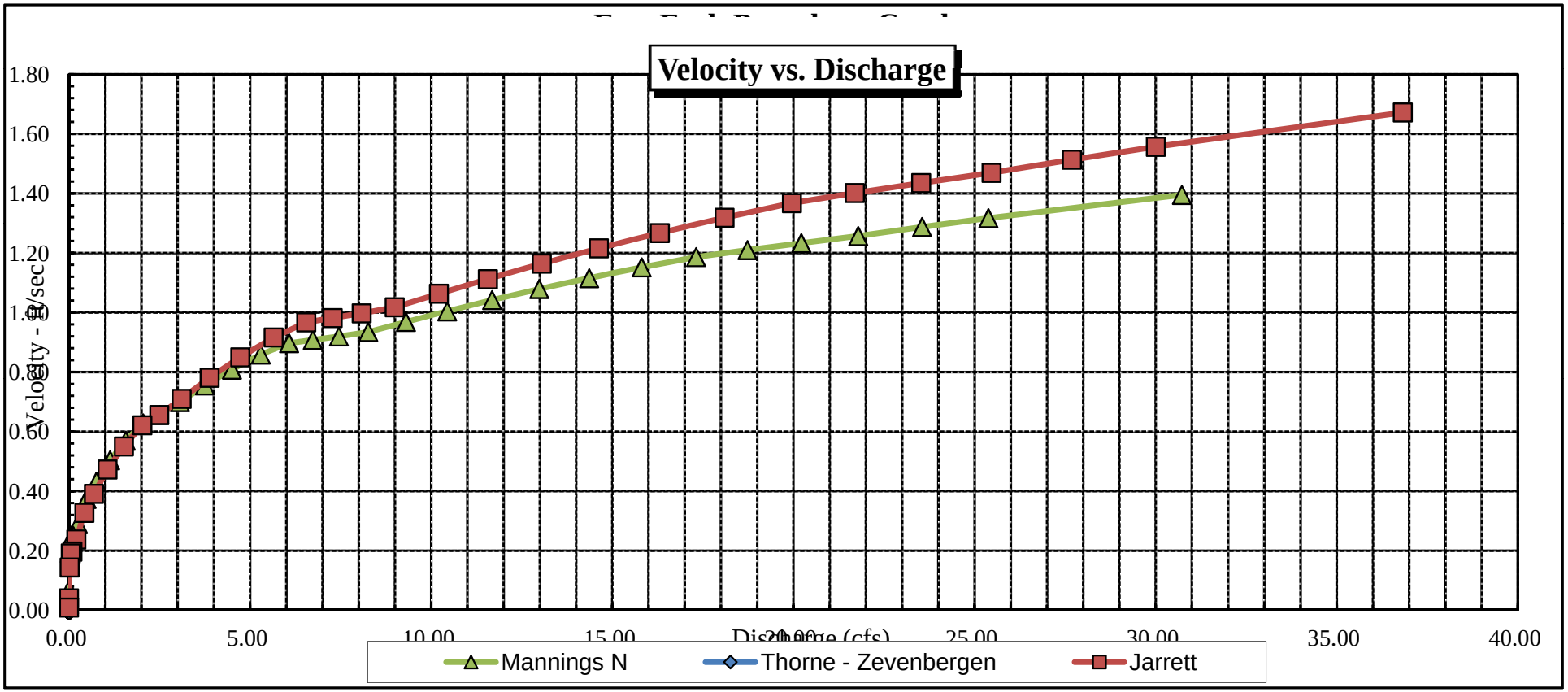
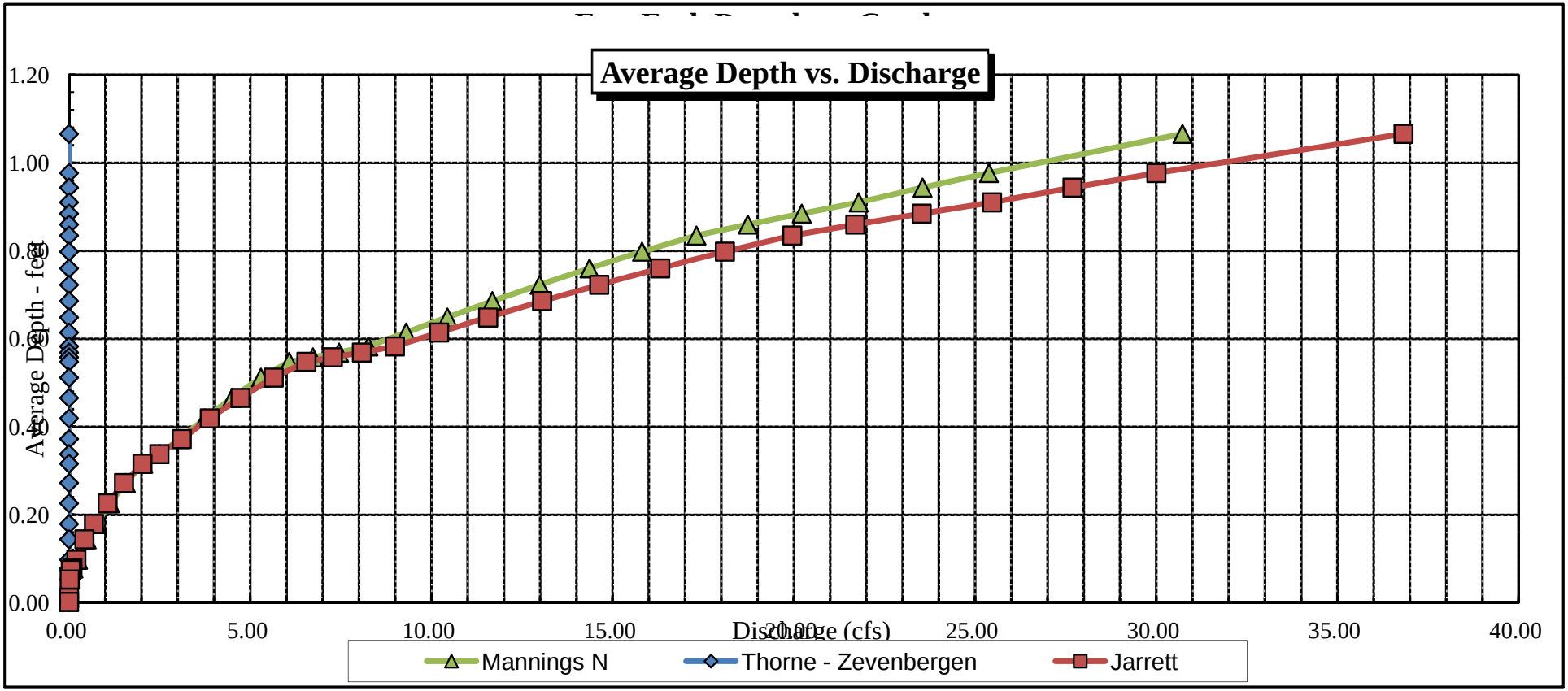
RECOMMENDATION BY: ………………………………………… AGENCY………………………………………… DATE:……………………

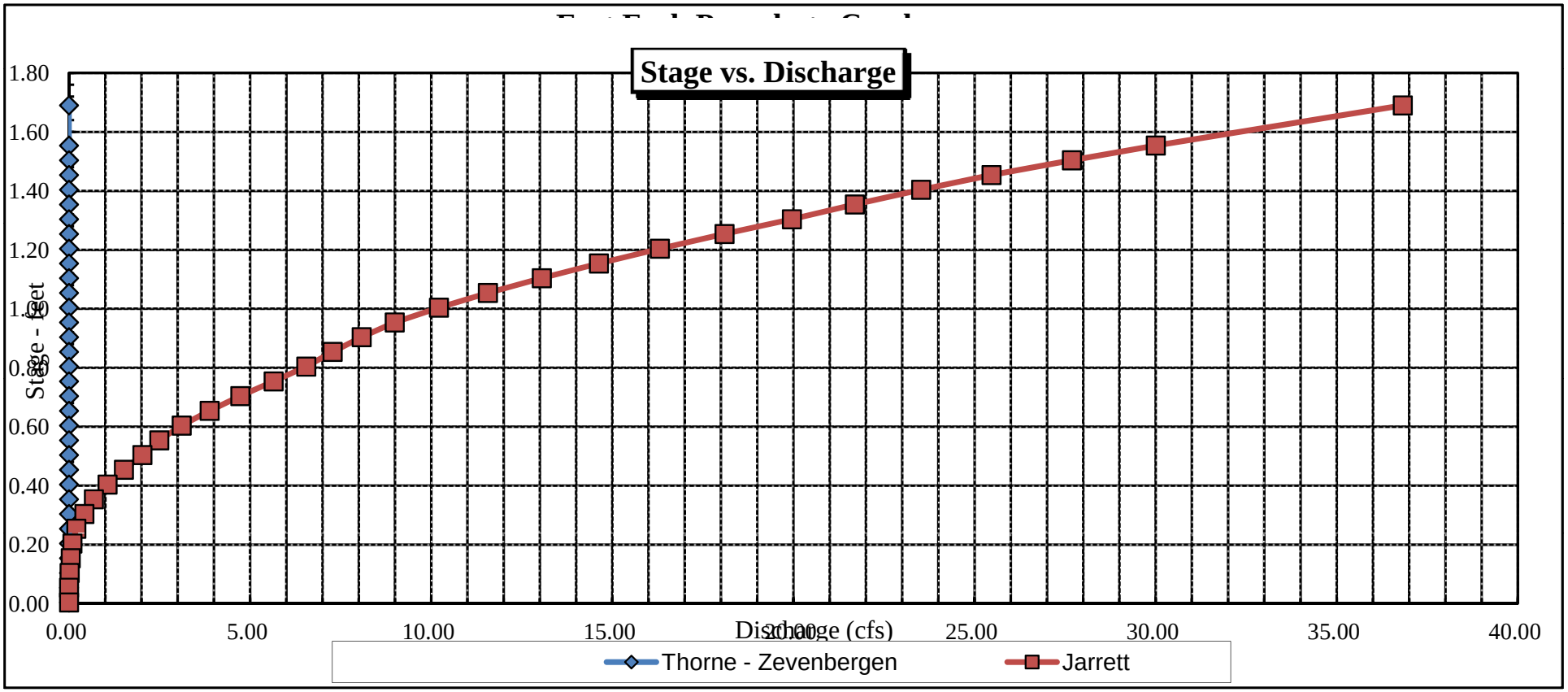
CWCB REVIEW BY: ………………………………………………………………………………………… DATE:……………………


CROSS SECTION DATA ANALYSIS
-2.00
-2.50
-3.00
-3.50
-4.00
-4.50
-5.00
-5.50
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
DISTANCE FROM STAKE (FT)
G&LS
W
W
G
RS
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
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - feet
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Stage - feet
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: East Fork Parachute Creek						CROSS-SECTION NO.: 2	
CROSS-SECTION LOCATION: Approx. 0.5 mile below East Fork Falls							
DATE: 5-17-12	OBSERVERS: R. Smith, P. Adams						
LEGAL DESCRIPTION	¼ 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:						
	USFS:						

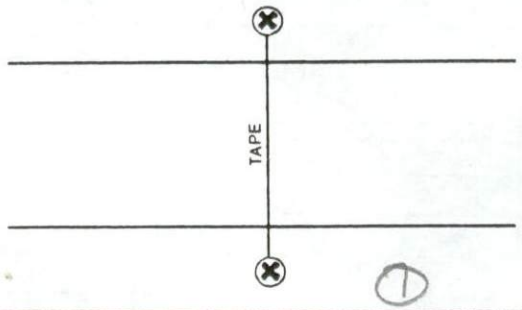
SUPPLEMENTAL DATA

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 2 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	4.75 / 4.75
② WS Upstream	28.8	3.62
③ WS Downstream	36.1	5.25
SLOPE	1.63 / 64.9 =	

SKETCH



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:

mayfly, caddisfly, stonefly, black fly - abundant

COMMENTS

pH = 8.81
Temp = 6.50 C
Cond = 292
Salinity = 0.2 ppt

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: East Fork Parachute Ck. | CROSS-SECTION NO: 2 | 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

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+G	0.0		3.62								
	0.6		4.22								
	1.1		4.64								
W	1.6		4.75								
	2.0		5.0	.25				.51			
	2.4		5.15	.40				.12			
	2.8		5.15	.40				.10			
	3.2		5.15	.40				1.45			
	3.6		5.25	.50				.36			
	4.0		5.30	.55				0			
	4.4		5.35	.60				0			
	4.8		5.25	.50				0			
	5.2		5.20	.45				.93			
	5.6		5.00	.25				.98			
	6.0		5.05	.30				1.94			
	6.4		5.15	.40				.85			
	6.8		5.15	.40				1.09			
	7.2		5.05	.30				1.65			
	7.6		5.25	.50				2.21			
	8.0		5.25	.50				.78			
	8.4		5.15	.40				.72			
	8.8		5.10	.35				.05			
	9.2		5.05	.30				0			
	9.6		4.90	.15				0			
	10		4.80	.05				0			
W	10.5		4.75								
	11.0		4.52								
	12.3		4.08								
	13.6		3.88								
G	17.0		3.86								
RS	17.7		3.42								
TOTALS											

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

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

LOCATION INFORMATION

STREAM NAME:	East Fork 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

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:	0.025

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 PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q 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%
		1.10	4.64			0.00		0.00	0.00	0.0%
	W	1.60	4.75	0.00	0.51	0.00		0.00	0.00	0.0%
		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%
		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%
		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%
		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%
		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%
		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%
		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%
		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%
		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%
		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%
		10.00	4.80	0.05	0.00	0.41	0.05	0.02	0.00	0.0%
	W	10.50	4.75	0.00		0.50		0.00	0.00	0.0%
		11.00	4.52			0.00		0.00	0.00	0.0%
		12.30	4.08			0.00		0.00	0.00	0.0%
		13.60	3.88			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 (Max.)	3.18	1.99	100.0%

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

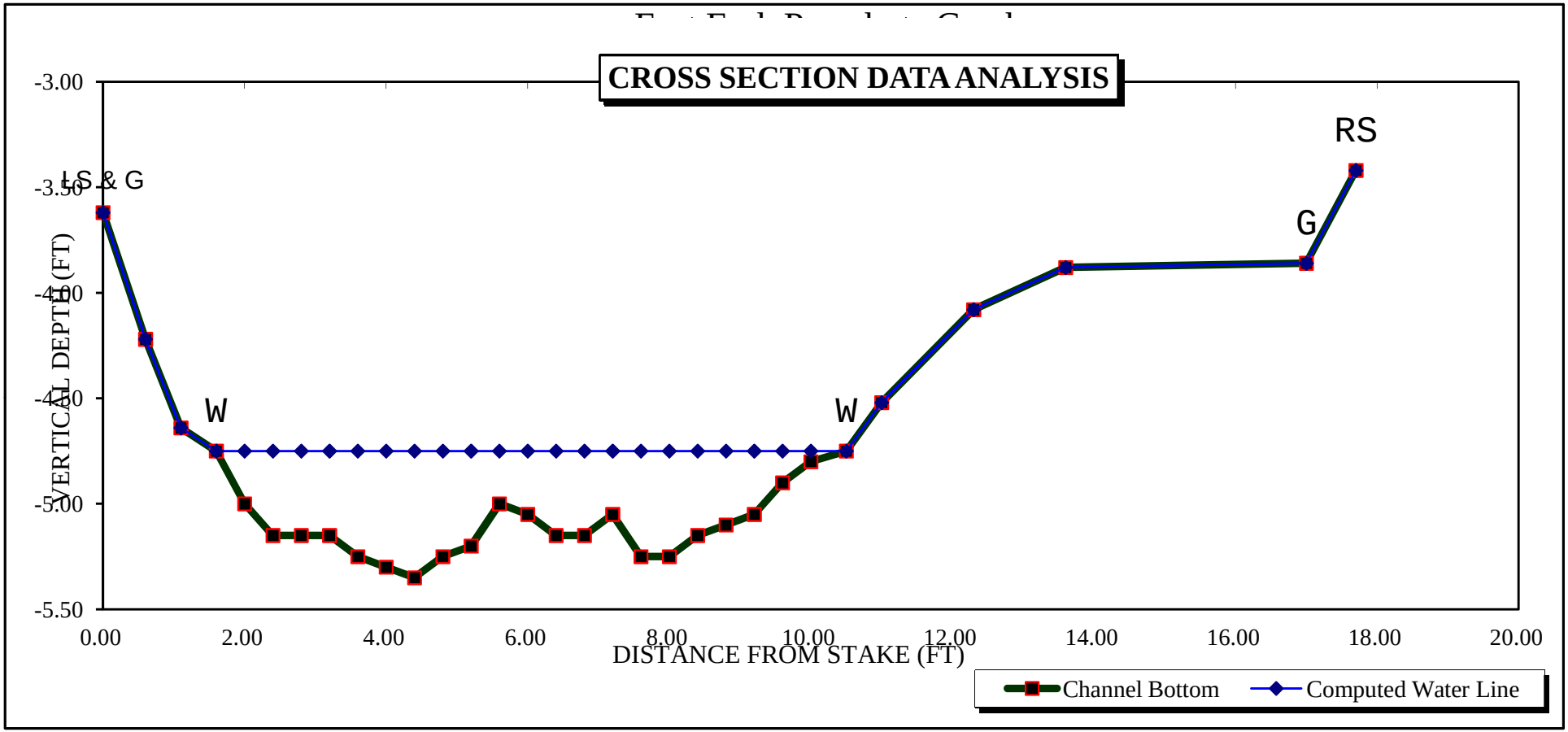
RECOMMENDED INSTREAM FLOW:
=============================

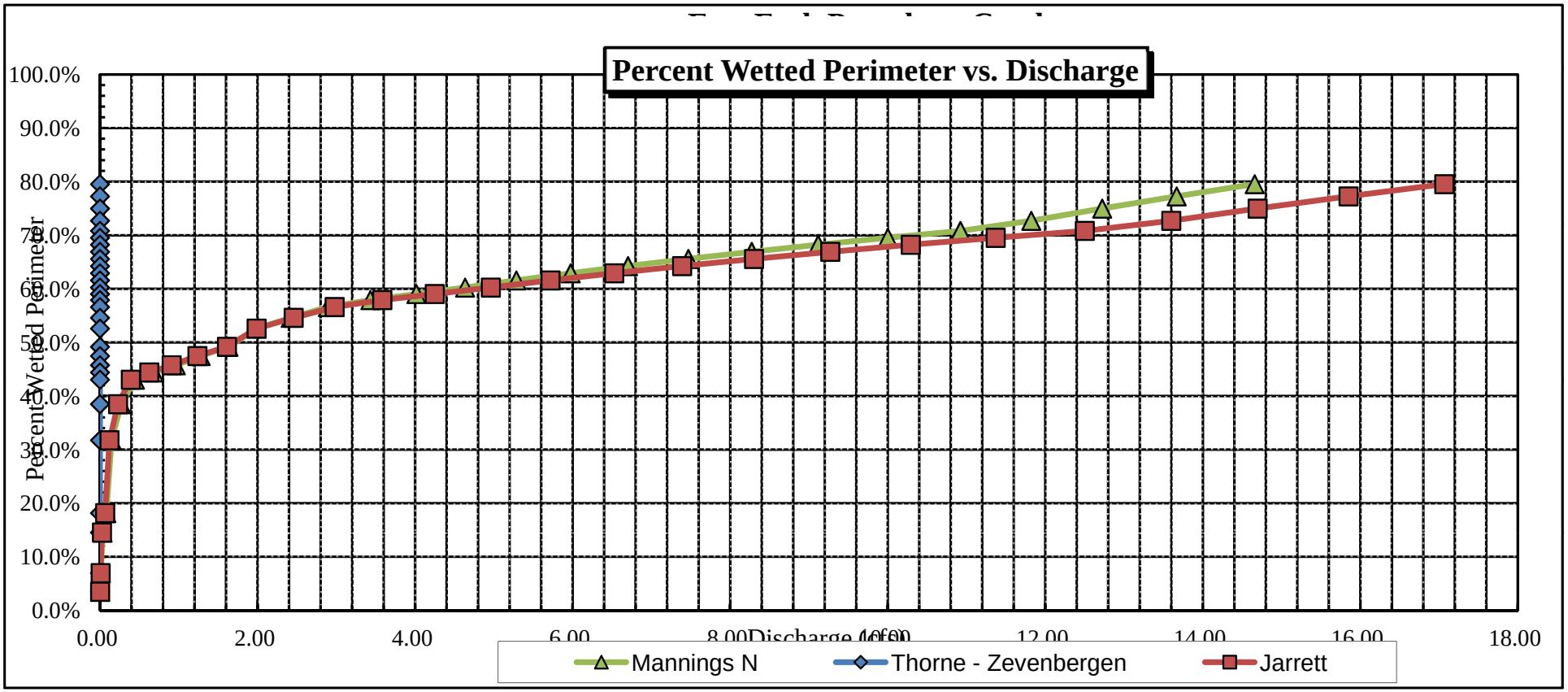
FLOW (CFS)	PERIOD

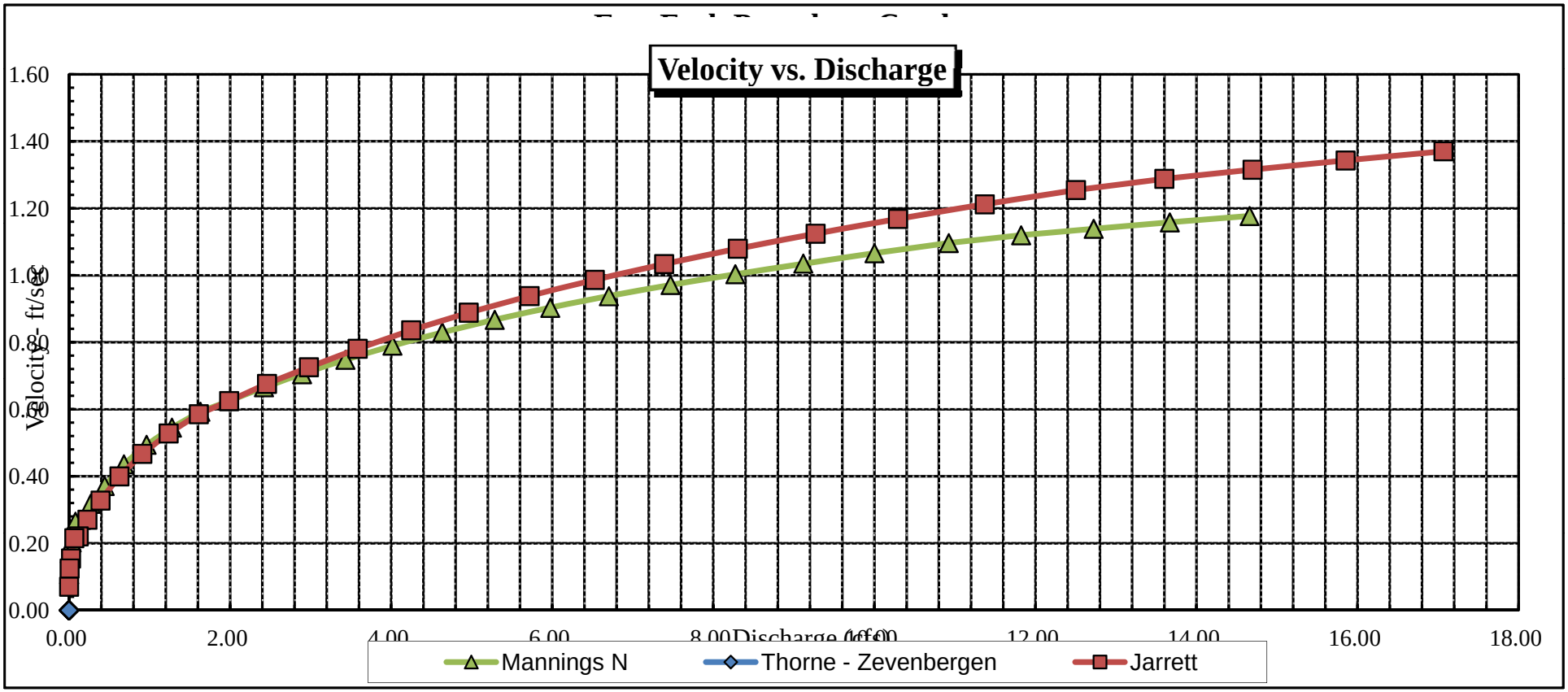
RATIONALE FOR RECOMMENDATION:
=============================

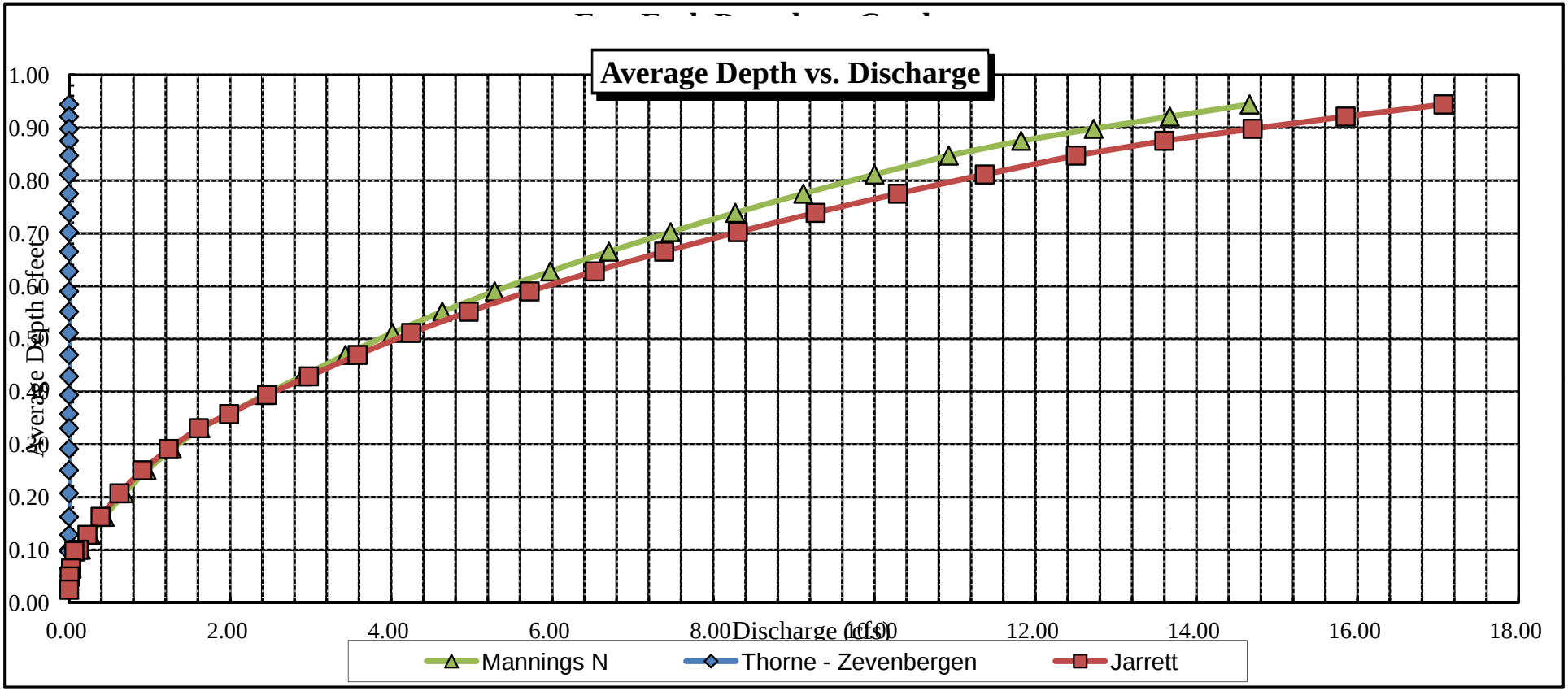
RECOMMENDATION BY: ……………………...………..……............................... AGENCY...……………………......……...…...…….....…...... DATE:.......…...…......……………

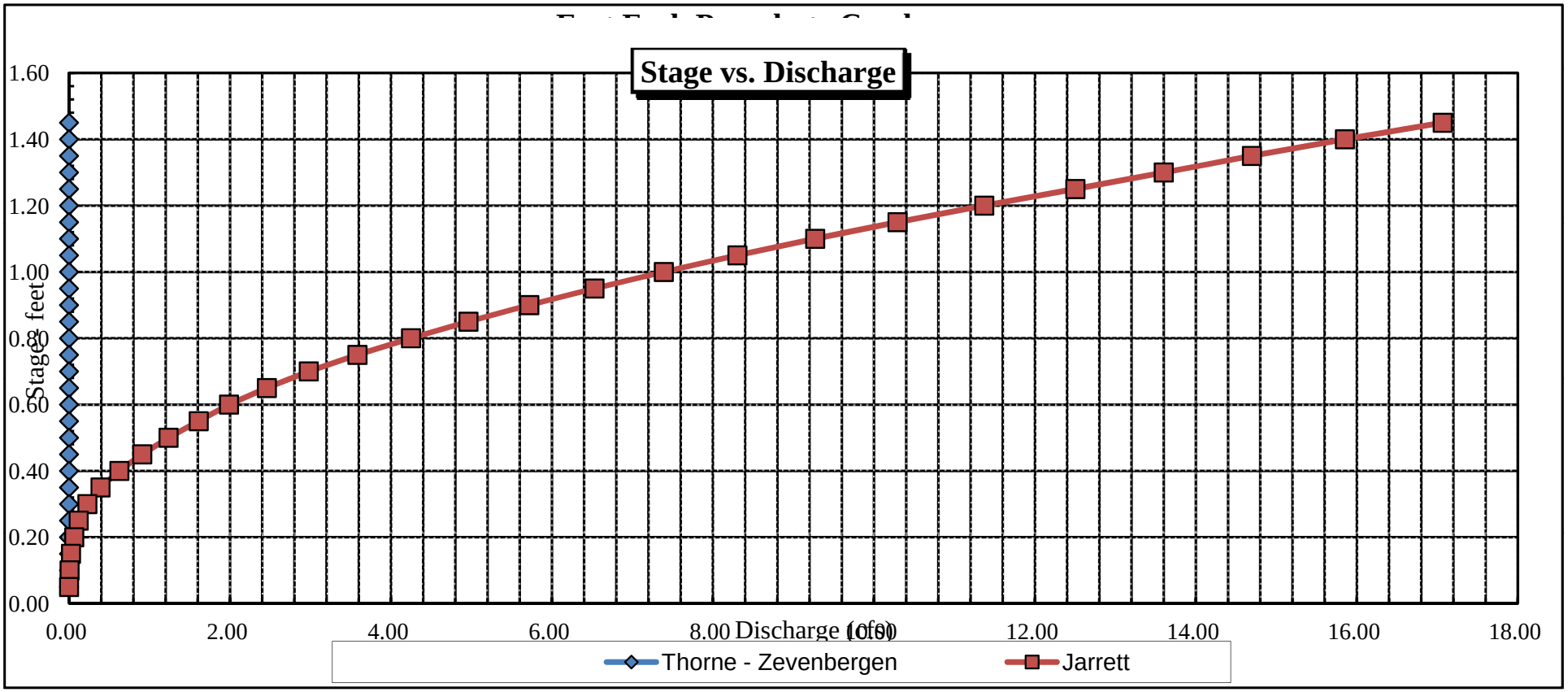
CWCB REVIEW BY: ..…………………………....………………………………………………..…............. DATE:..................……………...….


CROSS SECTION DATA ANALYSIS
-3.00
-3.50
-4.00
-4.50
-5.00
-5.50
VERTICAL DEPTH (FT)
LS & G
W
W
G
RS
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
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
2.00
4.00
6.00
8.00
Discharge (cfs)
12.00
14.00
16.00
18.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
Velocity - ft/sec
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
2.00
4.00
6.00
8.00
12.00
14.00
16.00
18.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth (feet)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
Stage - feet
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

STREAM NAME: East Fork Parachute Creek						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: Approx 0.5 miles below East Fork Falls						
DATE: 5-17-12	OBSERVERS: R. Smith, P. Adams					
LEGAL DESCRIPTION	¼ 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:	GPS Zone 125	755749	4381438			
USFS:						

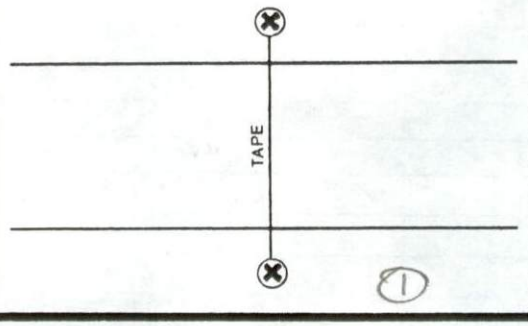
SUPPLEMENTAL DATA

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 2-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	4.68 / 4.64
② WS Upstream	36.5	4.25
③ WS Downstream	40.3	5.20
SLOPE	0.95 / 76.8 = .0124	

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:
mayfly, caddisfly, stonefly, black fly

COMMENTS

Ph= 8.81
Temp= 6.5°C
Cond= 292
Salinity= 0.2 ppt

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: East Fork Parachute Creek	CROSS-SECTION NO.: 1	DATE: 5-17-12	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: ____ ft	TIME: 9:45 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 Obser-vation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
1.5 + G	6.0		3.32								
	7.5		4.04								
	8.5		4.50								
N	9.0		4.66								
	9.5		4.85	.2				Ø			
	10		4.85	.2				.08			
	10.5		4.85	.2				.48			
	11		5.05	.4				1.31			
	11.5		4.95	.3				1.02	←		
	12		5.05	.4				1.16	←		
	12.5		5.05	.4				.56			
	13		4.85	.2				1.32			
	13.5		5.05	.4				1.09			
	14		4.95	.3				1.09	←		
	14.5		5.15	.5				.49			
	15		5.15	.5				.21			
	15.5		5.20	.55				.10			
	16		5.05	.40				.33			
	16.5		5.10	.45				.53			
	17		5.05	.40				.38			
	17.5		5.05	.40				.14			
	18		4.95	.30				.41			
	18.5		4.95	.30				.60			
	19		5.05	.40				.63			
	19.5		4.95	.30				.31			
	20		4.65	Ø				Ø			
W	20.6		4.64								
	23.4		4.30								
	29.0		3.92								
G	30.7		3.48								
RS	36.9		3.20								
TOTALS:											

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

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

LOCATION INFORMATION

STREAM NAME:	East Fork 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

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:	0.0124

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 PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q 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%
		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%
	W	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%
		29.00	3.92			0.00		0.00	0.00	0.0%
1	G	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 (Max.)	3.75	2.14	100.0%

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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_____
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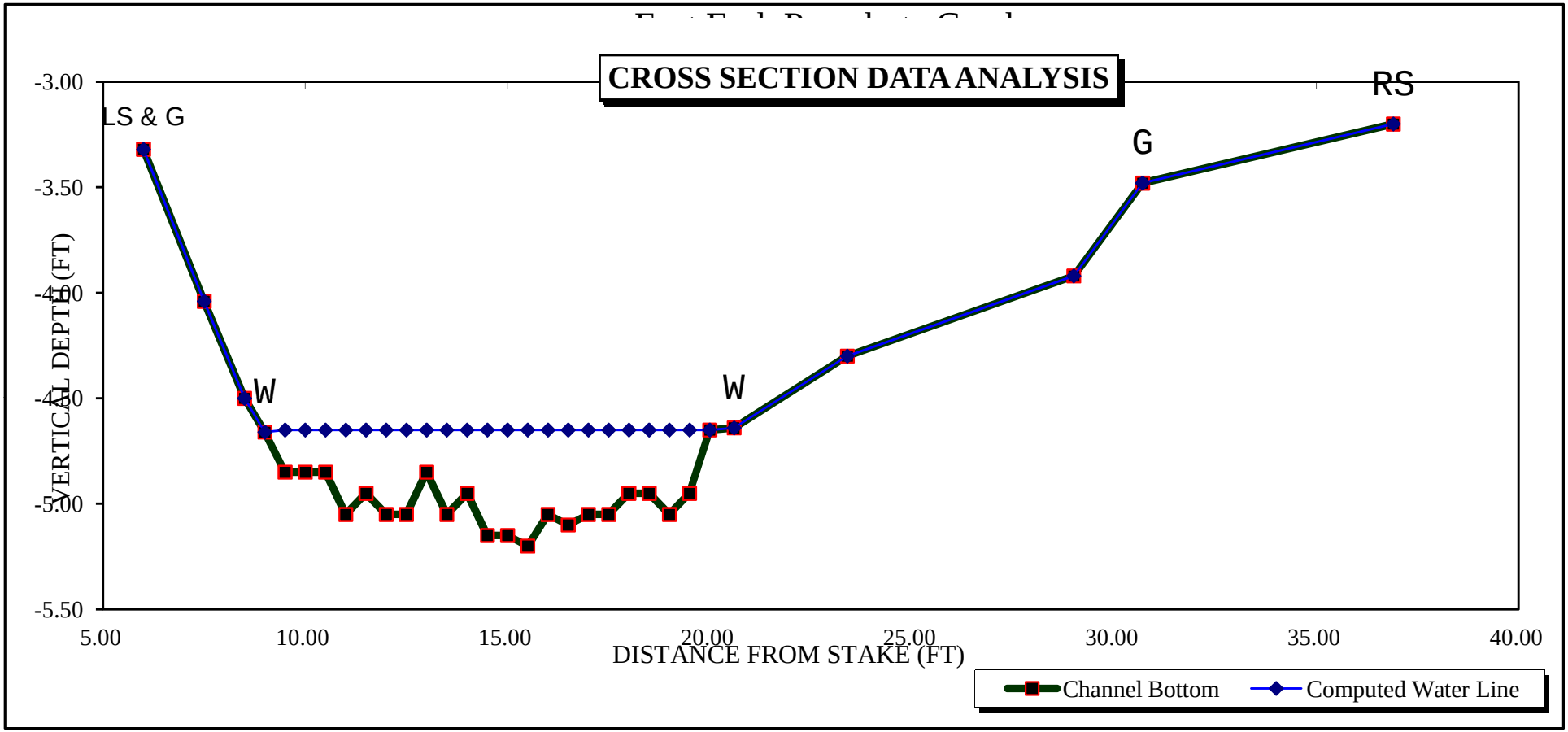
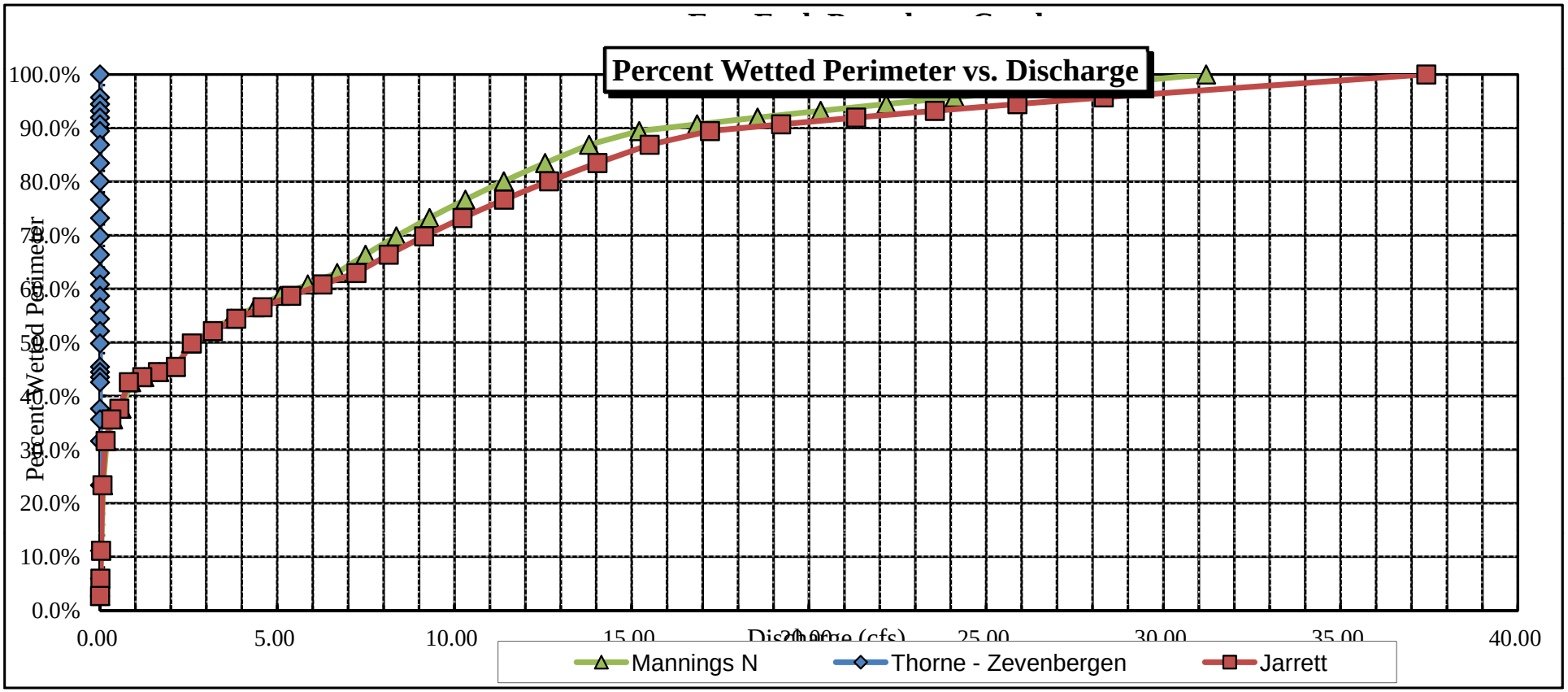
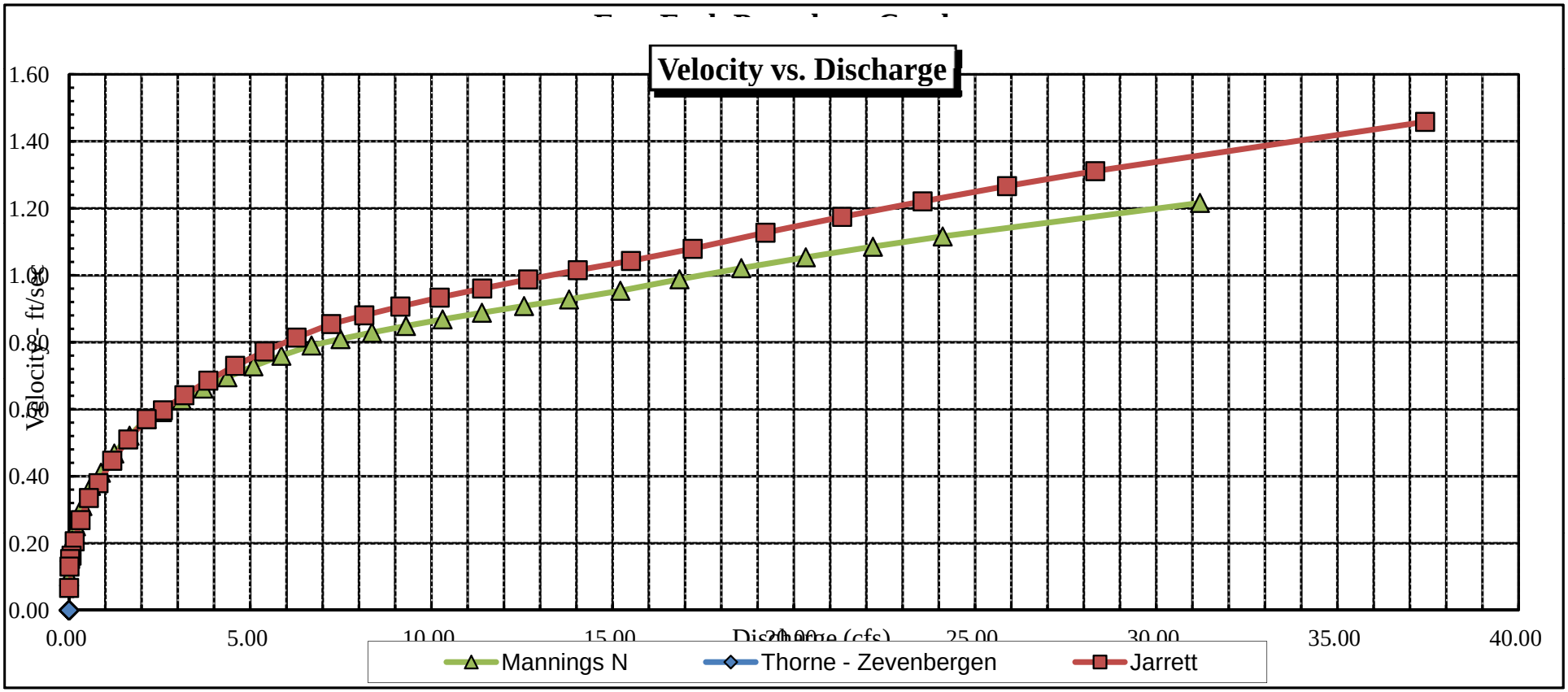
_____
_____
_____
_____

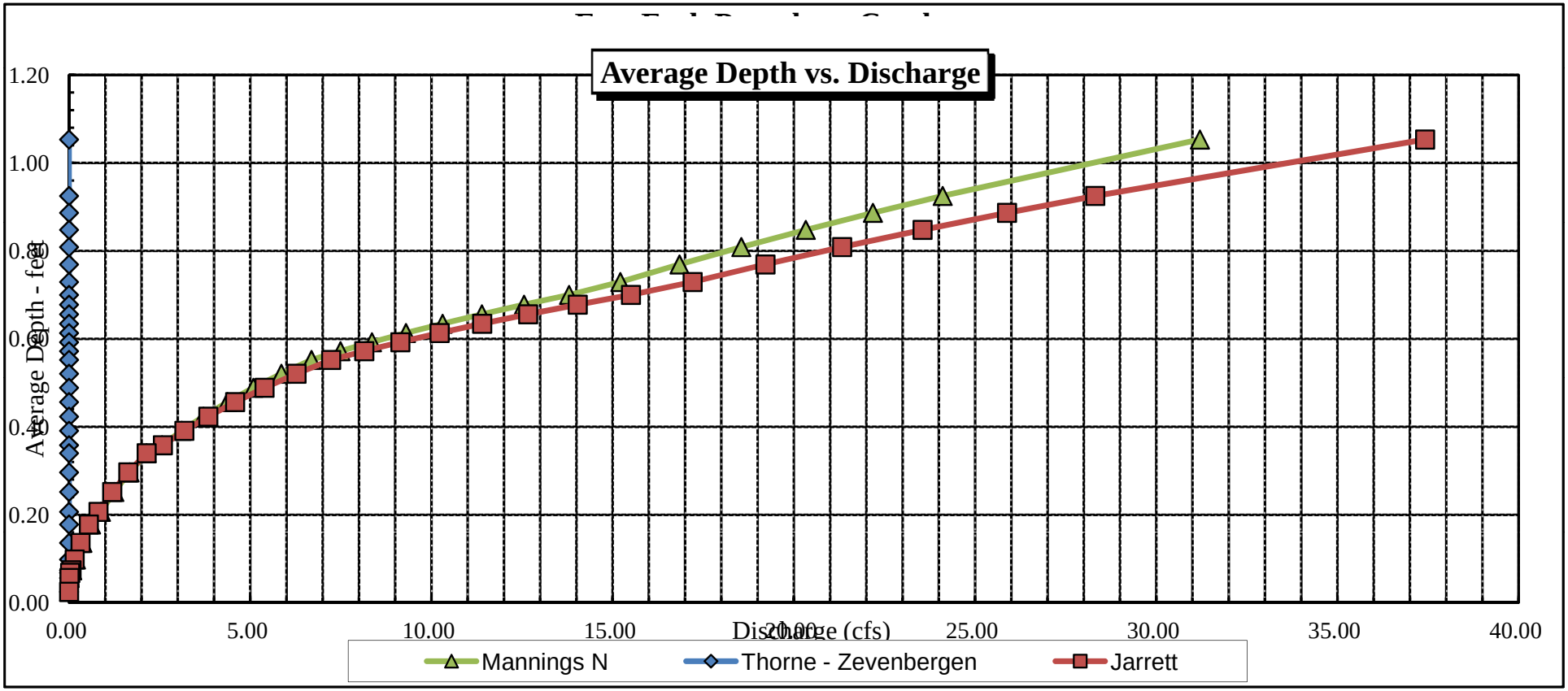
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

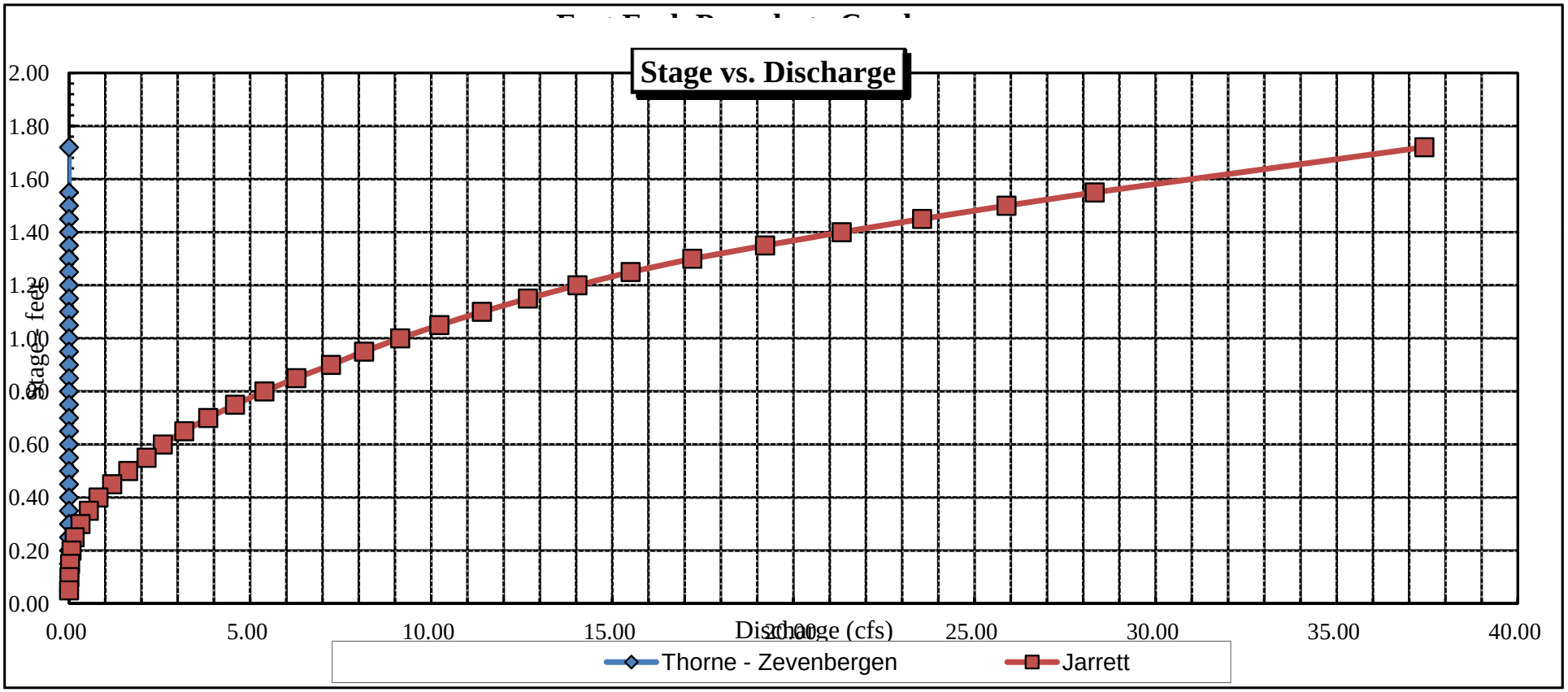
CWCB REVIEW BY: ..... DATE:.....


CROSS SECTION DATA ANALYSIS
-3.00
-3.50
-4.00
-4.50
-5.00
-5.50
VERTICAL DEPTH (FT)
LS & G
W
W
G
RS
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
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
5.00
10.00
15.00
25.00
30.00
35.00
40.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
Velocity - ft/sec
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - feet
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
Stage (feet)
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: East Fork Parachute - below falls | CROSS-SECTION NO: 1

CROSS-SECTION LOCATION: 50 ft. downstream from decommissioned USGS gage

DATE: 8-24-01 | OBSERVERS: R. Smith, M. McGuire

LEGAL DESCRIPTION: ¼ SECTION: SE | SECTION: 35 | TOWNSHIP: 5 (N/S) | RANGE: 95 (E/W) | PM:

COUNTY: Garfield | WATERSHED: Colorado | WATER DIVISION: 5 | DOW WATER CODE: 21460

MAP(S): USGS: Forked Gulch 7.5' | UTM 12 S 0756174 4583498

USFS: 7,020 ft.

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES/NO) | METER TYPE: Marsh-McBirney

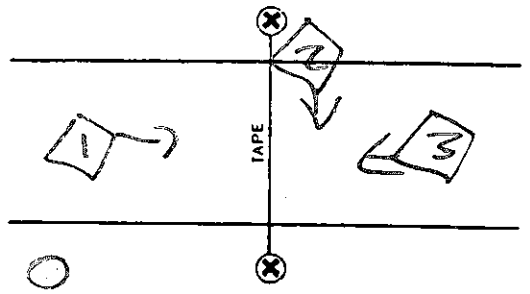
METER NUMBER: | DATE RATED: | CALIB/SPIN _____ sec | TAPE WEIGHT surveyed lbs/100' | TAPE TENSION surveyed lbs

CHANNEL BED MATERIAL SIZE RANGE: gravel to 5-foot boulders | PHOTOGRAPHS TAKEN: (YES/NO) | NUMBER OF PHOTOGRAPHS: 4

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	3.24 / 3.26
② WS Upstream	25.0'	2.88
③ WS Downstream	18.0'	3.94
SLOPE	1.06 / 43.0'	= 0.024

SKETCH



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
see attached survey																	

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME: caddisfly, mayfly, stonefly

COMMENTS

TDS: 350 PH: 8.8 Temp: 11°C

Very steep stream.

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: E Fork Parachute Ck. below falls | CROSS-SECTION NO: 1 | DATE: 8-24-04 | SHEET __ OF __

BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading: 0.2 ft | TIME: 3:40 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec): At Point	Velocity (ft/sec): Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS+G	0.0		2.88								
	1.0		2.84								
	2.0		3.00								
	3.0		3.06								
W	3.3		3.24	Ø				Ø			
	3.6		3.45	0.2				0.10			
	3.9		3.49	0.25				0.46			
	4.2		3.46	0.20				0.57			
	4.5		3.50	0.25				0.51			
	4.8		3.48	0.25				0.50			
	5.1		3.49	0.25				0.30			
	5.4		3.43	0.20				0.22			
	5.7		3.43	0.20				0.57			
	6.0		3.40	0.15				0.84			
	6.3		3.40	0.15				0.35			
	6.6		3.44	0.20				0.19			
	6.9		3.52	0.25				0.29			
W	7.0		3.26	Ø				Ø			
	8.0		3.03								
	9.0		2.90								
	10.0		2.92								
RS	11.2		2.90								
TOTALS											

End of Measurement | Time: 4:00 p | Gage Reading: 0.2 ft | CALCULATIONS PERFORMED BY: | CALCULATIONS CHECKED BY:

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

LOCATION INFORMATION

STREAM NAME:	East Fork 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
TAPE WT:	0.0106	with a survey level and rod
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	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1 LS & G	0.00	2.88			0.00		0.00	0.00	0.0%
	1.00	2.84			0.00		0.00	0.00	0.0%
	2.00	3.00			0.00		0.00	0.00	0.0%
	3.00	3.06			0.00		0.00	0.00	0.0%
W	3.30	3.24	0.00	0.00	0.00		0.00	0.00	0.0%
	3.60	3.45	0.20	0.10	0.37	0.20	0.06	0.01	2.1%
	3.90	3.49	0.25	0.46	0.30	0.25	0.08	0.03	12.1%
	4.20	3.46	0.20	0.57	0.30	0.20	0.06	0.03	12.0%
	4.50	3.50	0.25	0.51	0.30	0.25	0.08	0.04	13.4%
	4.80	3.48	0.25	0.30	0.30	0.25	0.08	0.02	7.9%
	5.10	3.49	0.25	0.30	0.30	0.25	0.08	0.02	7.9%
	5.40	3.43	0.20	0.22	0.31	0.20	0.06	0.01	4.6%
	5.70	3.43	0.20	0.57	0.30	0.20	0.06	0.03	12.0%
	6.00	3.40	0.15	0.84	0.30	0.15	0.05	0.04	13.3%
	6.30	3.40	0.15	0.35	0.30	0.15	0.05	0.02	5.5%
	6.60	3.44	0.20	0.19	0.30	0.20	0.06	0.01	4.0%
	6.90	3.52	0.25	0.29	0.31	0.25	0.05	0.01	5.1%
W	7.00	3.26	0.00	0.00	0.28		0.00	0.00	0.0%
	8.00	3.03			0.00		0.00	0.00	0.0%
	9.00	2.90			0.00		0.00	0.00	0.0%
	10.00	2.92			0.00		0.00	0.00	0.0%
1 RS & G	11.20	2.90			0.00		0.00	0.00	0.0%
TOTALS ----------					3.97	0.25 (Max.)	0.74	0.28	100.0%

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

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	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:
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FLOW (CFS)	PERIOD
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____________________	____________________
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RATIONALE FOR RECOMMENDATION:
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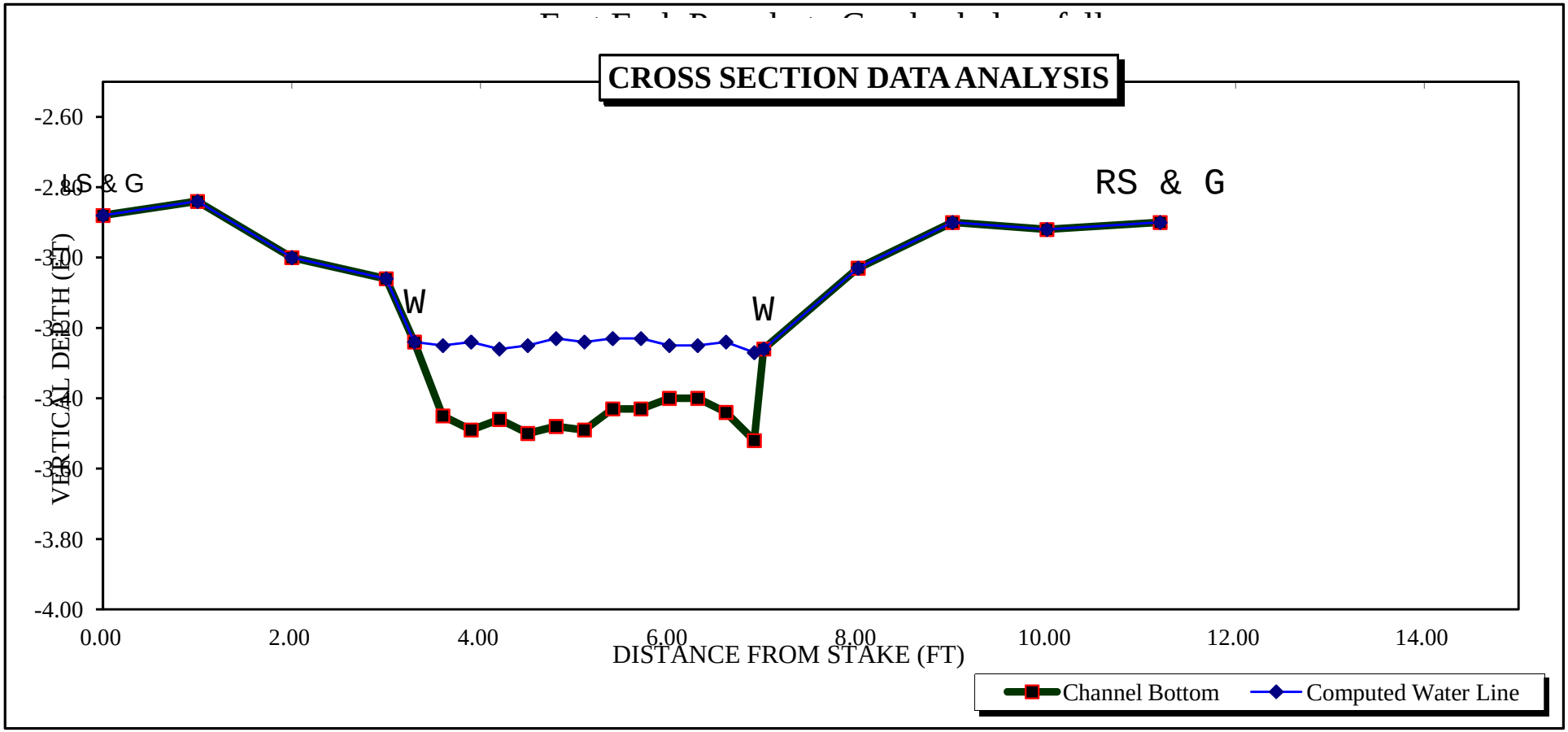
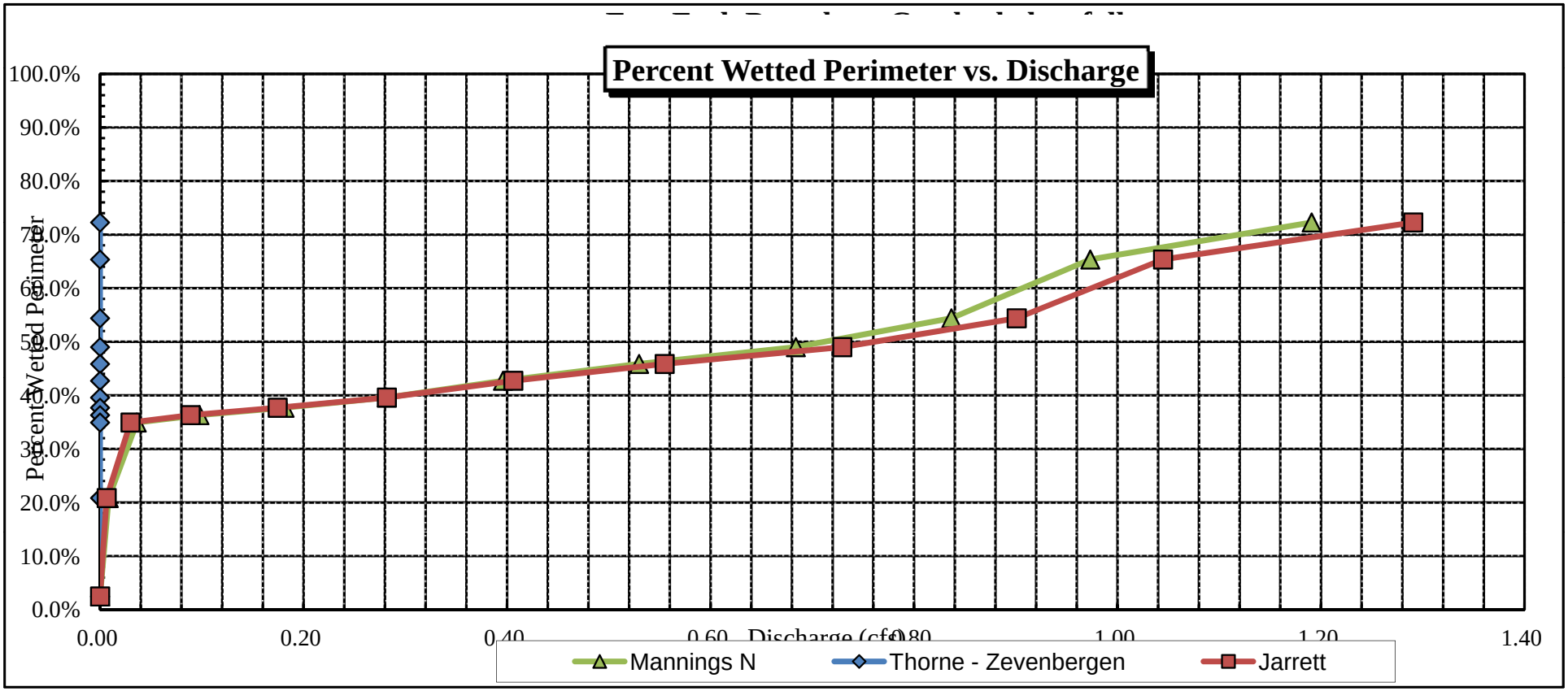
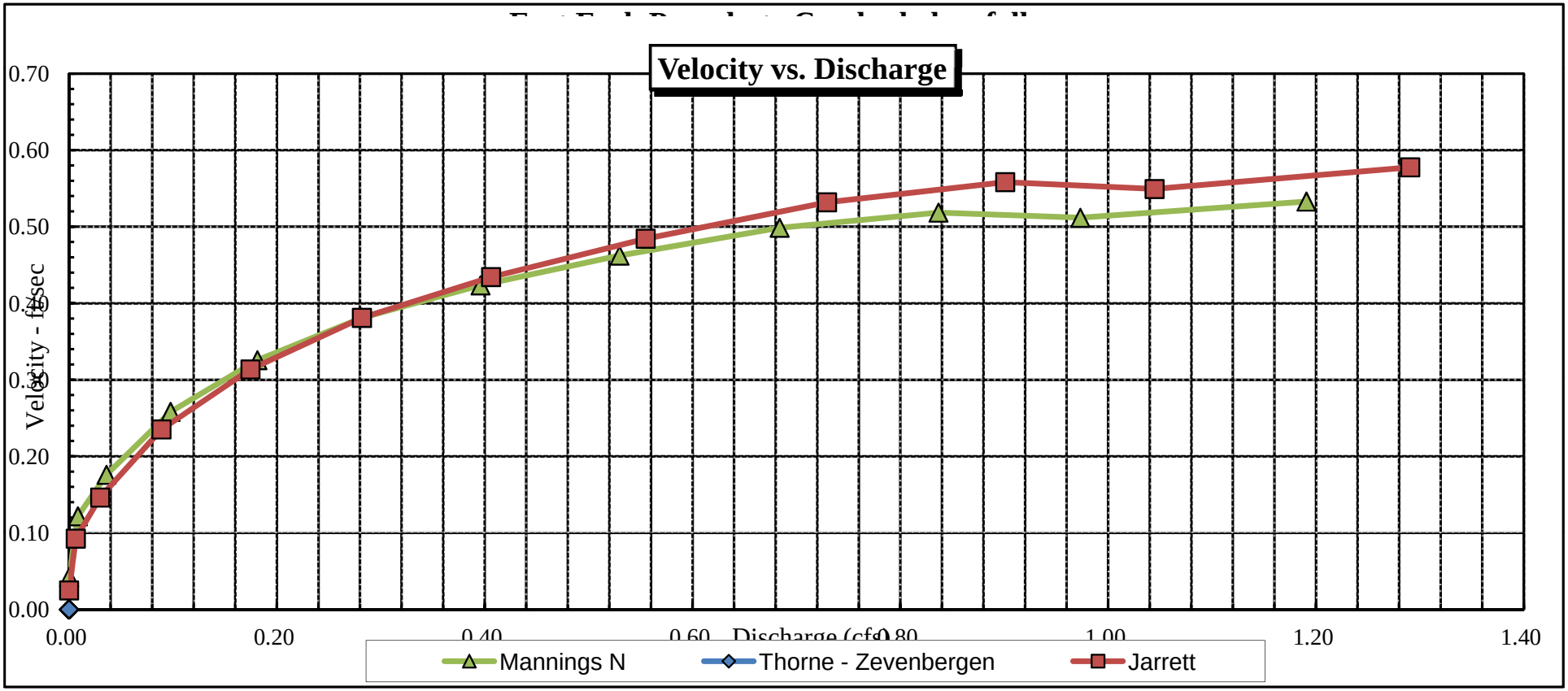
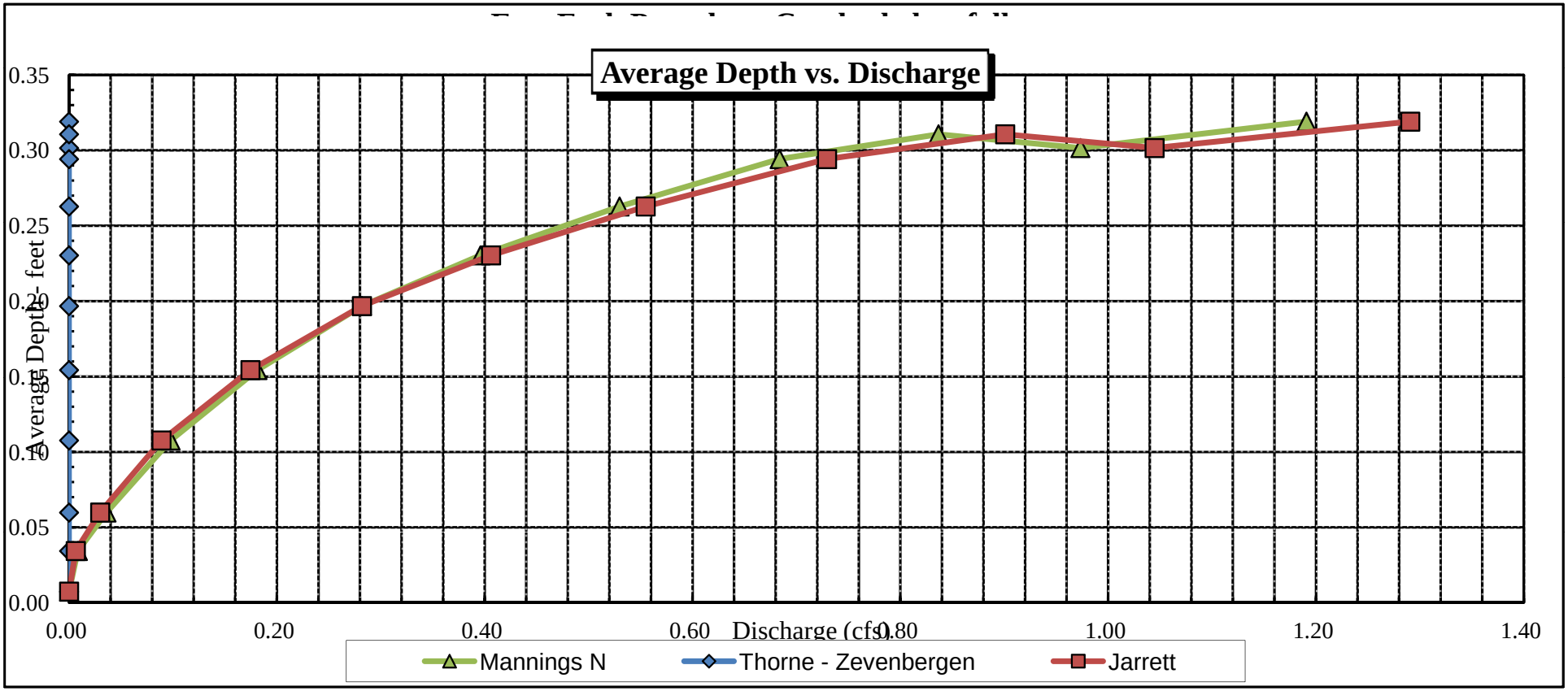
RECOMMENDATION BY: …………………...………..……............................... AGENCY...……………………......……....…...……...... DATE:.......…...…......……………

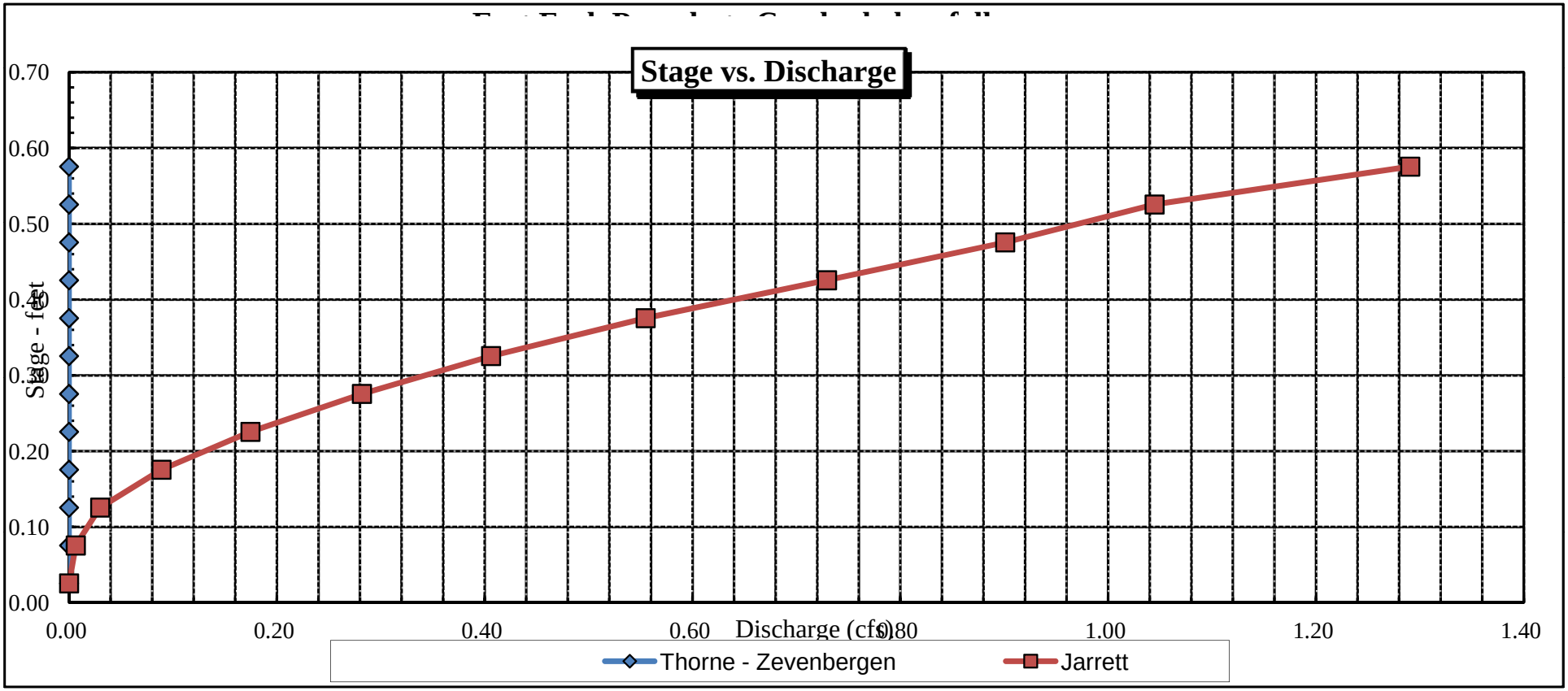
CWCB REVIEW BY: ..…………………………....…………………………………………………..…............. DATE:.................…………….....


CROSS SECTION DATA ANALYSIS
LS & G
RS & G
W
W
-2.60
-2.80
-3.00
-3.20
-3.40
-3.60
-3.80
-4.00
VERTICAL DEPTH (FT)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
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
0.20
0.40
0.60
Discharge (cfs)
1.00
1.20
1.40
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
Velocity - ft/sec
0.70
0.60
0.50
0.20
0.10
0.00
0.00
0.20
0.40
0.60
1.00
1.20
1.40
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - feet
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
Stage - feet
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
Discharge (cfs)
Thorne - Zevenbergen
Jarrett


OHAUS
On/Off Zero
Unit/Cal
13