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 an instream flow water right for Mill Creek located in Water Division 3.

Location and Land Status. Mill Creek is tributary to Saguache Creek approximately 11 miles northwest of Saguache. This recommendation covers the reach from the Forest Service boundary to the headgate of the Harence Ditch, a distance of approximately 0.75 miles. The reach is located downstream of the Forest Service quantification point QP51C for its reserved water right on Mill Creek.

Biological Summary. Mill Gulch is a moderate gradient stream with large substrate size. The riparian community consists primarily of sedges and rushes, and has been steadily improving in condition since 2002. The creek presently does not support a fishery, but BLM believes that the flow regime and aquatic insect community will support a fishery. BLM also believes that multiple watershed improvement measures, including closure of duplicate roads, improved maintenance of existing roads, and improvement in grazing practices on lands located upstream on the National Forest, will further increase the amount of reliability of stream flows. The creek has a good width-depth ratio, overhanging bank habitat, good and good shading. BLM has observed perennial flow in the stream upstream of the Harence Ditch headgates, and there are many other creeks of this size within the Saguache Creek watershed that support fisheries. In addition, BLM has consistently observed mayfly and caddisfly in the creek. BLM will complete an updated macroinvertebrate survey during the 2009 field season. BLM's intention is to reintroduce Rio Grande Cutthroat Trout to the creek.

R2Cross Analysis. BLM collected the following R2Cross data from the creek:

Party	Date	Discharge	250%-40%	Summer (3/3)	Winter (2/3)
BLM	10/20/2008	0.12	0.0-1.3	Out of range	0.3
BLM	10/20/2008	0.10	0.0 – 0.2	Out of range	0.18

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

> 0.8 cfs is recommended for the higher temperature period, from May 1 through September 30. This recommendation is driven by the average velocity criteria. This flow rate should create a high percentage of usable physical habitat in the small channel. This estimate is based on R2Cross results that were outside the

confidence interval of the data set, but BLM intends to collect additional data during 2009 to verify this number.

0.25 cfs is recommended for the remainder of the year, from October 1 through April 30. This recommendation is driven by the average depth criteria. This flow should provide sufficient water circulation to prevent total icing in pools that are critical for overwintering fish. This recommendation will be verified with additional data collection during the 2009 field season.

Water Availability. For water availability analysis, BLM recommends employing a paired basin analytical approach, using the La Garita Creek gage (USGS 08231000). Mill Creek and La Garita Creek both drain portions of the La Garita Mountains, so snowpack and precipitation should be similar. The Mill Creek watershed faces north, while the La Garita Creek watershed faces east, so the Mill Creek watershed may retain slightly more snowpack. BLM does not recommend using the Saguache Creek near Saguache (USGS 8227000) because this gage is heavily influenced by agricultural irrigation operations in the Saguache Creek watershed. However, the gage could be used to give a rough approximation of the timing of snowmelt runoff.

BLM is not aware of any decreed or historic stream diversions in this stream reach other than the Harence Ditches located at the lower terminus of the recommended stream reach.

Relationship to Management Plans. BLM and Forest Service resource management plan for this area specifically identifies Mill Creek as a priority for projects and changes in management to improve watershed and riparian conditions. Conditions have improved significantly on the creek since the adoption of the plan, and BLM is ready to move to the next management step, which is to attempt to reintroduce a fishery to the creek. A protected flow rate would provide BLM with assurance that its investment in fisheries projects will be supported by adequate flow rates.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2009. We thank both the Division of Wildlife and the 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,

Linda Anania
Deputy State Director
Resources and Fire

cc: Andrew Archuleta, Saguache FO
Steve Sanchez, Saguache FO

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Mill Creek						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: 200 ft. downstream from BLM-USFS boundary						
DATE: 10-20-05	OBSERVERS: R. Smith, S. Sanchez					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 32	TOWNSHIP: 45 (N) S	RANGE: 6 (E) W	PM: NM	
COUNTY: Saguache	WATERSHED: Closed Basin	WATER DIVISION: 3	DOW WATER CODE: 38253			
MAP(S): USGS:			13S 0382652			
USFS:		8,371 ft.	4218153			

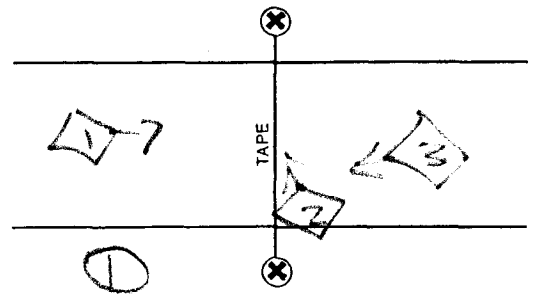
SUPPLEMENTAL DATA

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: 1" to 12"	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	5.25/5.25
(2) WS Upstream	7.1	5.16
(3) WS Downstream	6.2	5.40
SLOPE	0.24/13.3 = 0.018	

SKETCH



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:

caddisfly

COMMENTS

TDS = 120
Temp = 6°C
PH = 8.2

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Mill Creek	CROSS-SECTION NO.: 1	DATE: 10-29-08	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME: 3:30 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)
LS/G	3.0		4.88								
	3.4		4.98								
W	3.6		5.26								
	3.8		5.40	.15				.16			
	4.0		5.55	.30				.14			
	4.2		5.55	.30				.38			
	4.4		5.55	.30				.38			
	4.6		5.55	.30				.09			
	4.8		5.55	.30				.08			
	5.0		5.55	.30				.30			
	5.2		5.50	.25				.21			
	5.4		5.50	.25				.26			
	5.6		5.40	.15				.32			
	5.8		5.35	.10				.19			
W	6.0		5.25								
	6.4		5.06								
	7.2		5.04								
RS/G	9.5		4.87								
TOTALS:											

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

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Mill Creek						CROSS-SECTION NO.: 2
CROSS-SECTION LOCATION: 250 ft downstream from BLM - USFS boundary						
DATE: 10-20-08	OBSERVERS: R. Smith, S. Sanchez					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 32	TOWNSHIP: 45 (N)/S	RANGE: 6 (E)/W	PM: NM	
COUNTY: Saguache	WATERSHED: Closed Basin	WATER DIVISION: 3	DOW WATER CODE: 38253			
MAP(S): USGS:						
USFS:						

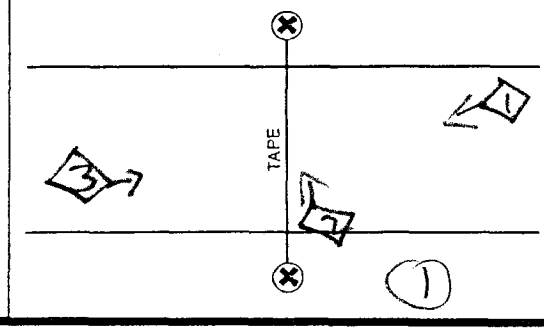
SUPPLEMENTAL DATA

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" to 12"	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	5.80 / 5.81
② WS Upstream	6.3	5.72
③ WS Downstream	7.3	5.55
SLOPE	0.13 / 13.6 = .009	

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:

caddisfly

COMMENTS

TDS = 120
Temp = 6°C
PH = 8.2

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Mill Creek | CROSS-SECTION NO.: 2 | DATE: 10-20-08 | SHEET ___ OF ___

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: 4 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	3.0		5.55								
	6.4		5.50								
	8.5		5.40								
W	8.9		5.81								
	9.1		5.90	.1				0			
	9.3		5.95	.15				.17			
	9.5		6.05	.25				1.00			
	9.7		6.05	.25				0.49			
	9.9		6.05	.25				0.12			
	10.1		6.00	.20				0.10			
	10.3		6.00	.20				0.20			
W	10.5		5.80								
	10.7		5.45								
	12.6		5.54								
RS/G	14.2		5.57								
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:	Mill Creek
XS LOCATION:	200' downstr from BLM-USFS boundary
XS NUMBER:	1
DATE:	20-Oct-08
OBSERVERS:	R. Smith, S. Sanchez
1/4 SEC:	SW
SECTION:	32
TWP:	45N
RANGE:	6E
PM:	N.M.
COUNTY:	Saguache
WATERSHED:	Closed Basin
DIVISION:	3
DOW CODE:	38253
USGS MAP:	0
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:	0.018

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

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

STREAM NAME: Mill Creek
XS LOCATION: 200' downstr from BLM-USFS boundary
XS NUMBER: 1

DATA POINTS= 18

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	3.00	4.88			0.00		0.00	0.00	0.0%
		3.40	4.98			0.00		0.00	0.00	0.0%
	W	3.60	5.26			0.00		0.00	0.00	0.0%
		3.80	5.40	0.15	0.16	0.24	0.15	0.03	0.00	3.9%
		4.00	5.55	0.30	0.14	0.25	0.30	0.06	0.01	6.8%
		4.20	5.55	0.30	0.38	0.20	0.30	0.06	0.02	18.4%
		4.40	5.55	0.30	0.38	0.20	0.30	0.06	0.02	18.4%
		4.60	5.55	0.30	0.09	0.20	0.30	0.06	0.01	4.4%
		4.80	5.55	0.30	0.08	0.20	0.30	0.06	0.00	3.9%
		5.00	5.55	0.30	0.30	0.20	0.30	0.06	0.02	14.5%
		5.20	5.50	0.25	0.21	0.21	0.25	0.05	0.01	8.5%
		5.40	5.50	0.25	0.26	0.20	0.25	0.05	0.01	10.5%
		5.60	5.40	0.15	0.32	0.22	0.15	0.03	0.01	7.7%
		5.80	5.35	0.10	0.19	0.21	0.10	0.02	0.00	3.1%
	W	6.00	5.25			0.22		0.00	0.00	0.0%
		6.40	5.06			0.00		0.00	0.00	0.0%
		7.20	5.04			0.00		0.00	0.00	0.0%
1	RS & G	9.50	4.87			0.00		0.00	0.00	0.0%
	TOTALS ----------					2.55	0.3 (Max.)	0.54	0.12	100.0%

Manning's n = 0.3084
Hydraulic Radius= 0.21146159

STREAM NAME: Mill Creek
XS LOCATION: 200' downstr from BLM-USFS boundary
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.54	0.53	-2.0%
5.01	0.54	1.26	132.7%
5.03	0.54	1.17	117.5%
5.05	0.54	1.10	103.3%
5.07	0.54	1.03	91.6%
5.09	0.54	0.98	80.9%
5.11	0.54	0.92	70.3%
5.13	0.54	0.86	60.0%
5.15	0.54	0.81	49.9%
5.17	0.54	0.76	40.0%
5.19	0.54	0.70	30.3%
5.21	0.54	0.65	20.8%
5.22	0.54	0.63	16.1%
5.23	0.54	0.60	11.5%
5.24	0.54	0.58	6.9%
5.25	0.54	0.55	2.4%
5.26	0.54	0.53	-2.0%
5.27	0.54	0.51	-6.4%
5.28	0.54	0.48	-10.8%
5.29	0.54	0.46	-15.1%
5.30	0.54	0.44	-19.3%
5.31	0.54	0.41	-23.4%
5.33	0.54	0.37	-31.5%
5.35	0.54	0.33	-39.4%
5.37	0.54	0.29	-47.0%
5.39	0.54	0.25	-54.1%
5.41	0.54	0.21	-60.9%
5.43	0.54	0.18	-67.4%
5.45	0.54	0.14	-73.6%
5.47	0.54	0.11	-79.6%
5.49	0.54	0.08	-85.4%
5.51	0.54	0.05	-90.7%

WATERLINE AT ZERO
AREA ERROR = 5.250

STREAM NAME: Mill Creek
XS LOCATION: 200' downstr from BLM-USFS boundary
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	4.88	6.36	0.30	0.67	1.92	6.72	100.0%	0.28	0.54	0.28
	4.90	6.01	0.30	0.65	1.79	6.36	94.6%	0.28	0.50	0.28
	4.95	5.13	0.29	0.60	1.51	5.48	81.5%	0.28	0.41	0.27
	5.00	4.32	0.30	0.55	1.28	4.65	69.2%	0.27	0.35	0.27
	5.05	3.33	0.32	0.50	1.08	3.64	54.1%	0.30	0.31	0.29
	5.10	2.83	0.33	0.45	0.93	3.10	46.1%	0.30	0.27	0.29
	5.15	2.69	0.30	0.40	0.79	2.92	43.4%	0.27	0.22	0.27
	5.20	2.55	0.26	0.35	0.66	2.74	40.8%	0.24	0.17	0.25
WL	5.25	2.41	0.22	0.30	0.54	2.56	38.1%	0.21	0.12	0.23
	5.30	2.24	0.19	0.25	0.42	2.37	35.3%	0.18	0.09	0.21
	5.35	2.07	0.15	0.20	0.32	2.17	32.3%	0.15	0.06	0.18
	5.40	1.80	0.12	0.15	0.22	1.88	27.9%	0.12	0.03	0.15
	5.45	1.63	0.08	0.10	0.13	1.68	25.0%	0.08	0.02	0.12
	5.50	1.26	0.04	0.05	0.06	1.29	19.1%	0.04	0.00	0.08

STREAM NAME: Mill Creek
XS LOCATION: 200' downstr from BLM-USFS boundary
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.12	cfs
CALCULATED FLOW (Qc)=	0.12	cfs
(Qm-Qc)/Qm * 100 =	0.3	%
MEASURED WATERLINE (WLm)=	5.26	ft
CALCULATED WATERLINE (WLc)=	5.25	ft
(WLm-WLc)/WLm * 100 =	0.1	%
MAX MEASURED DEPTH (Dm)=	0.30	ft
MAX CALCULATED DEPTH (Dc)=	0.30	ft
(Dm-Dc)/Dm * 100	0.1	%
MEAN VELOCITY=	0.23	ft/sec
MANNING'S N=	0.308	
SLOPE=	0.018	ft/ft
.4 * Qm =	0.0	cfs
2.5 * Qm=	0.3	cfs

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

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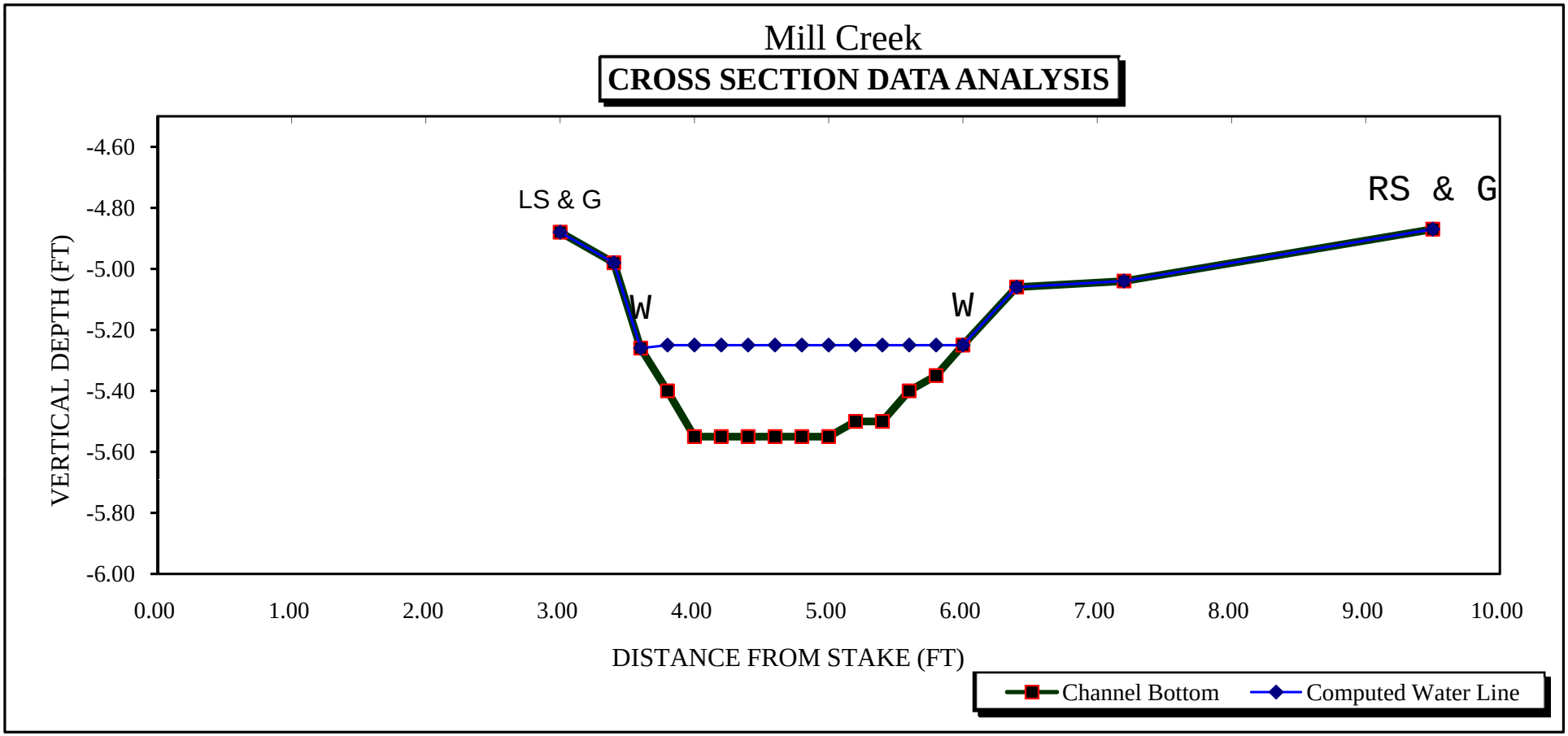
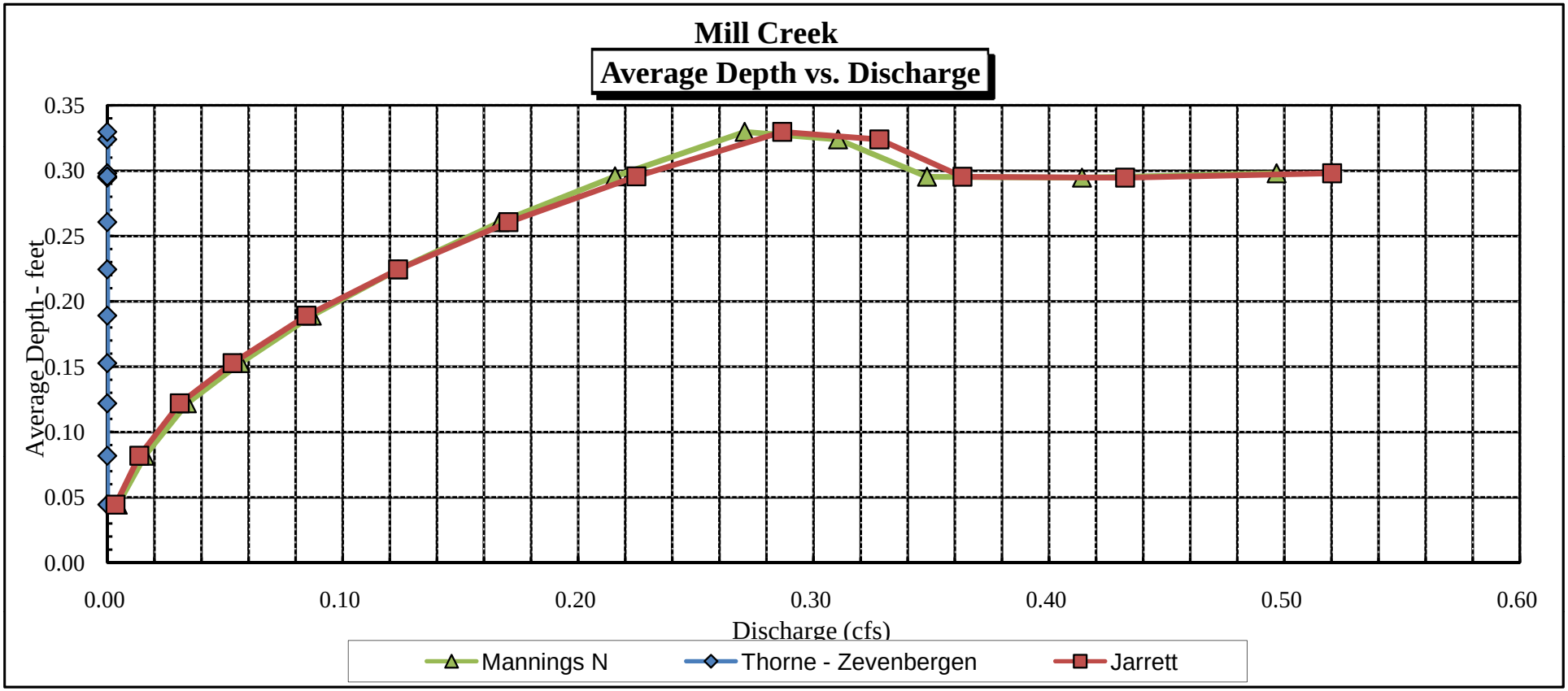
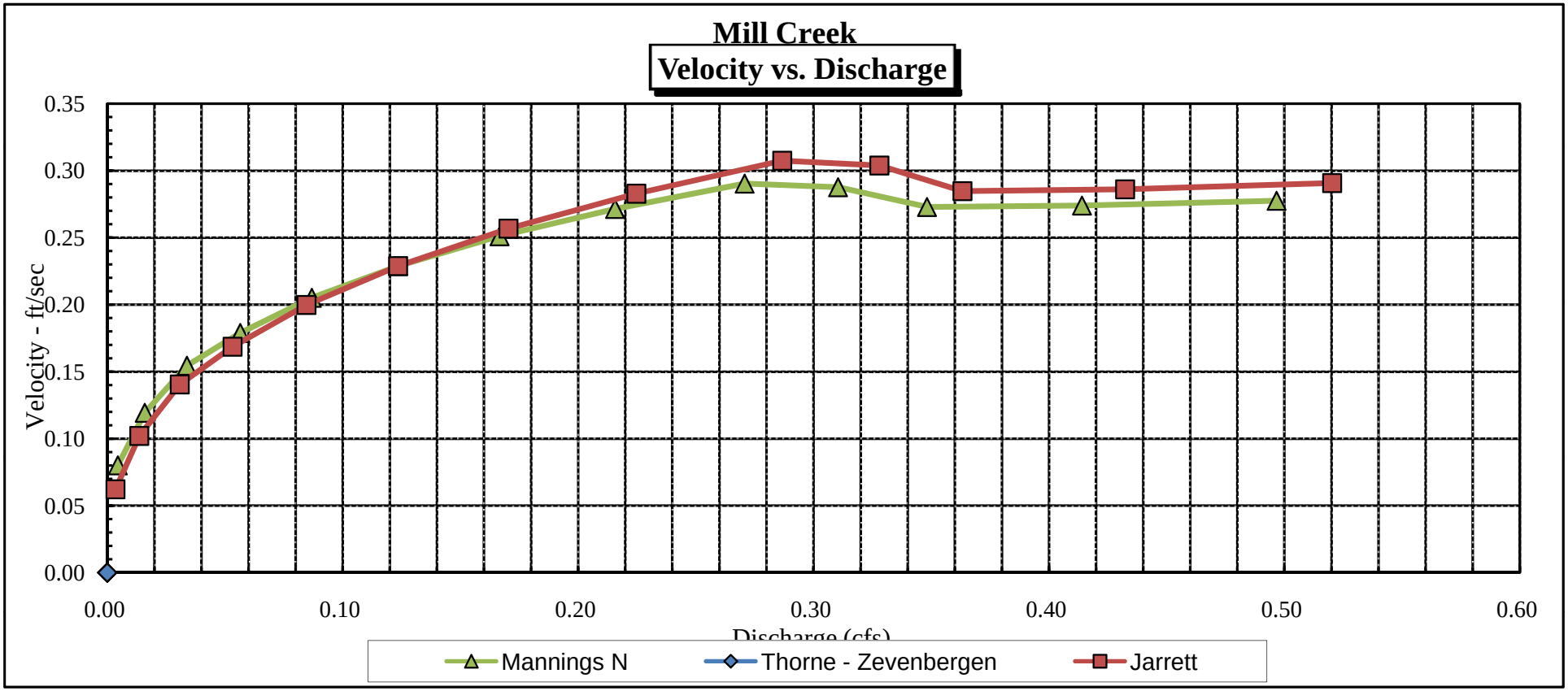
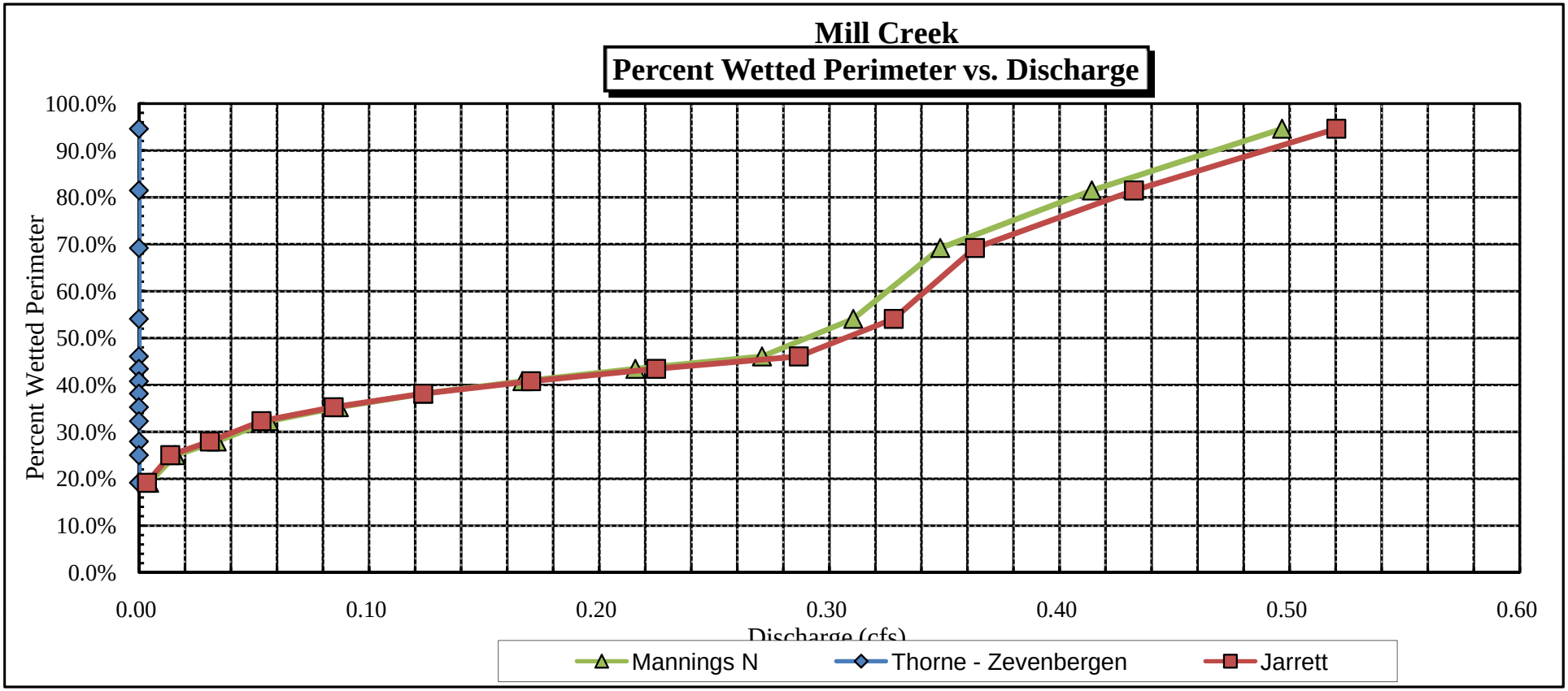
RECOMMENDATION BY: ………………...………..…….............................. AGENCY...……………………......…....…...…….…...... DATE:......…...…......……………

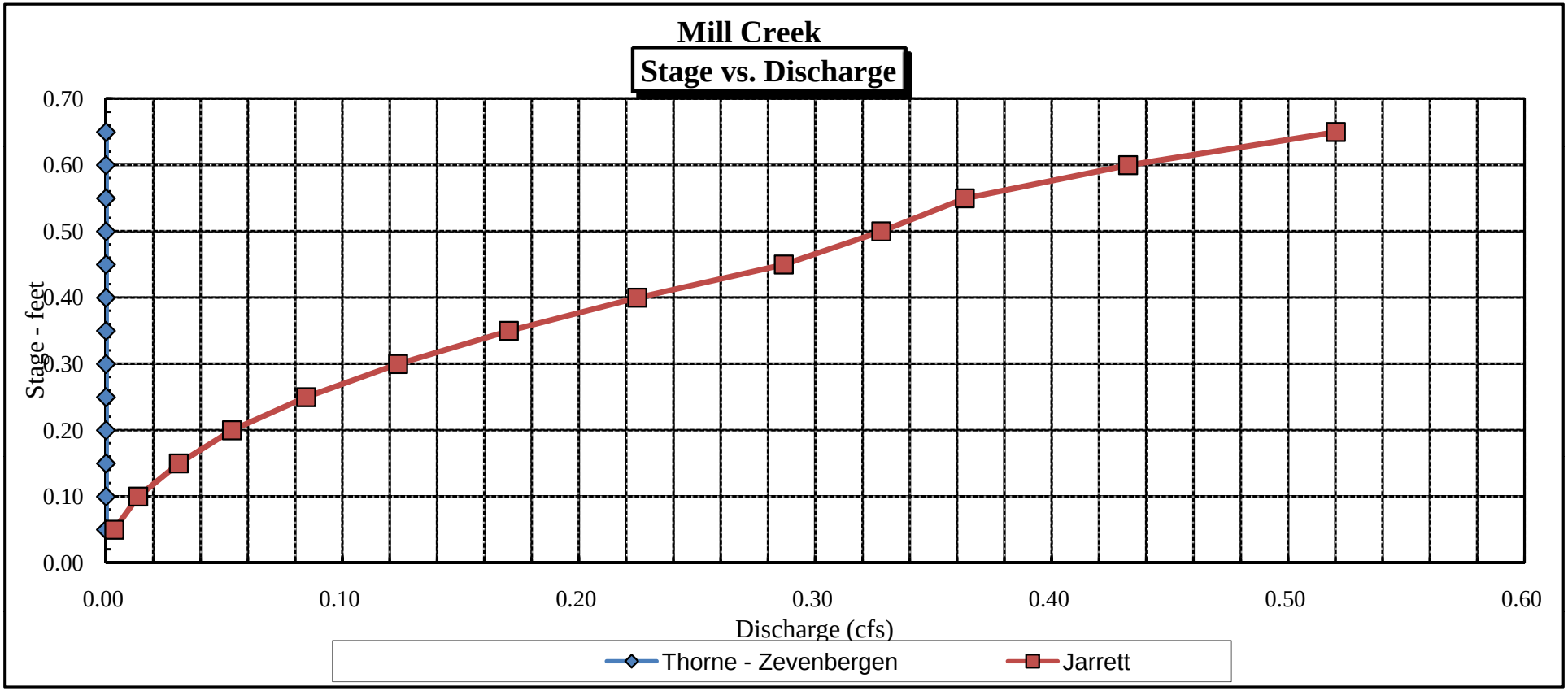
CWCB REVIEW BY: ..…………………………...……………………………………………………...…............. DATE:.................…………….…


Mill Creek
CROSS SECTION DATA ANALYSIS
LS & G
W
W
RS & G
-4.60
-4.80
-5.00
-5.20
-5.40
-5.60
-5.80
-6.00
VERTICAL DEPTH (FT)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Mill Creek
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
0.10
0.20
0.30
0.40
0.50
0.60
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Mill Creek
Velocity vs. Discharge
Velocity - ft/sec
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.10
0.20
0.30
0.40
0.50
0.60
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Mill Creek
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
0.10
0.20
0.30
0.40
0.50
0.60
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Mill Creek
Stage vs. Discharge
Stage - feet
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.10
0.20
0.30
0.40
0.50
0.60
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

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

LOCATION INFORMATION

STREAM NAME:	Mill Creek
XS LOCATION:	250' downst. From BLM-USFS boundary
XS NUMBER:	2
DATE:	20-Oct-08
OBSERVERS:	R. Smith, S. Sanchez
1/4 SEC:	SW
SECTION:	32
TWP:	45N
RANGE:	6E
PM:	NM
COUNTY:	Saguache
WATERSHED:	Closed Basin
DIVISION:	3
DOW CODE:	38253
USGS MAP:	0
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:	0.009

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

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

STREAM NAME: Mill Creek
XS LOCATION: 250' downst. From BLM-USFS boundary
XS NUMBER: 2

DATA POINTS= 15

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	3.00	5.55			0.00		0.00	0.00	0.0%
		6.40	5.50			0.00		0.00	0.00	0.0%
		8.50	5.40			0.00		0.00	0.00	0.0%
	W	8.90	5.81			0.00		0.00	0.00	0.0%
		9.10	5.90	0.10	0.00	0.22	0.10	0.02	0.00	0.0%
		9.30	5.95	0.15	0.19	0.21	0.15	0.03	0.01	5.8%
		9.50	6.05	0.25	1.00	0.22	0.25	0.05	0.05	50.9%
		9.70	6.05	0.25	0.49	0.20	0.25	0.05	0.02	24.9%
		9.90	6.05	0.25	0.12	0.20	0.25	0.05	0.01	6.1%
		10.10	6.00	0.20	0.10	0.21	0.20	0.04	0.00	4.1%
		10.30	6.00	0.20	0.20	0.20	0.20	0.04	0.01	8.1%
	W	10.50	5.80			0.28		0.00	0.00	0.0%
		10.70	5.45			0.00		0.00	0.00	0.0%
		12.60	5.54			0.00		0.00	0.00	0.0%
1	RS & G	14.20	5.57			0.00		0.00	0.00	0.0%
	TOTALS ----------					1.74	0.25 (Max.)	0.28	0.10	100.0%

Manning's n = 0.1190
Hydraulic Radius= 0.16109756

STREAM NAME: Mill Creek
XS LOCATION: 250' downst. From BLM-USFS boundary
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.28	0.27	-2.5%
5.56	0.28	0.73	160.0%
5.58	0.28	0.68	143.7%
5.60	0.28	0.64	129.8%
5.62	0.28	0.61	116.2%
5.64	0.28	0.57	102.8%
5.66	0.28	0.53	89.5%
5.68	0.28	0.49	76.6%
5.70	0.28	0.46	63.8%
5.72	0.28	0.42	51.2%
5.74	0.28	0.39	38.9%
5.76	0.28	0.36	26.8%
5.77	0.28	0.34	20.8%
5.78	0.28	0.32	14.9%
5.79	0.28	0.31	9.1%
5.80	0.28	0.29	3.3%
5.81	0.28	0.27	-2.5%
5.82	0.28	0.26	-8.2%
5.83	0.28	0.24	-13.7%
5.84	0.28	0.23	-19.2%
5.85	0.28	0.21	-24.5%
5.86	0.28	0.20	-29.7%
5.88	0.28	0.17	-39.8%
5.90	0.28	0.14	-49.4%
5.92	0.28	0.12	-58.5%
5.94	0.28	0.09	-66.9%
5.96	0.28	0.07	-74.6%
5.98	0.28	0.05	-81.8%
6.00	0.28	0.03	-88.6%
6.02	0.28	0.02	-93.7%
6.04	0.28	0.01	-97.6%
6.06	0.28	0.00	-100.0%

WATERLINE AT ZERO
AREA ERROR = 5.801

STREAM NAME: Mill Creek
XS LOCATION: 250' downst. From BLM-USFS boundary
XS NUMBER: 2 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	5.57	1.97	0.35	0.48	0.69	2.34	100.0%	0.30	0.36	0.53
	5.60	1.92	0.33	0.45	0.63	2.26	96.7%	0.28	0.32	0.51
	5.65	1.84	0.29	0.40	0.54	2.13	91.2%	0.25	0.25	0.47
	5.70	1.76	0.25	0.35	0.45	2.01	85.8%	0.22	0.20	0.44
	5.75	1.69	0.21	0.30	0.36	1.88	80.3%	0.19	0.14	0.40
WL	5.80	1.61	0.17	0.25	0.28	1.75	74.8%	0.16	0.10	0.35
	5.85	1.46	0.14	0.20	0.20	1.57	67.0%	0.13	0.06	0.30
	5.90	1.30	0.10	0.15	0.13	1.37	58.7%	0.10	0.03	0.25
	5.95	1.05	0.07	0.10	0.08	1.10	47.0%	0.07	0.02	0.20
	6.00	0.70	0.04	0.05	0.03	0.71	30.5%	0.04	0.00	0.13

STREAM NAME: Mill Creek
XS LOCATION: 250' downst. From BLM-USFS boundary
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.10	cfs
CALCULATED FLOW (Qc)=	0.10	cfs
(Qm-Qc)/Qm * 100 =	0.5	%
MEASURED WATERLINE (WLm)=	5.81	ft
CALCULATED WATERLINE (WLc)=	5.80	ft
(WLm-WLc)/WLm * 100 =	0.1	%
MAX MEASURED DEPTH (Dm)=	0.25	ft
MAX CALCULATED DEPTH (Dc)=	0.25	ft
(Dm-Dc)/Dm * 100	0.3	%
MEAN VELOCITY=	0.35	ft/sec
MANNING'S N=	0.119	
SLOPE=	0.009	ft/ft
.4 * Qm =	0.0	cfs
2.5 * Qm=	0.2	cfs

RECOMMENDED INSTREAM FLOW:
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FLOW (CFS)	PERIOD
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____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

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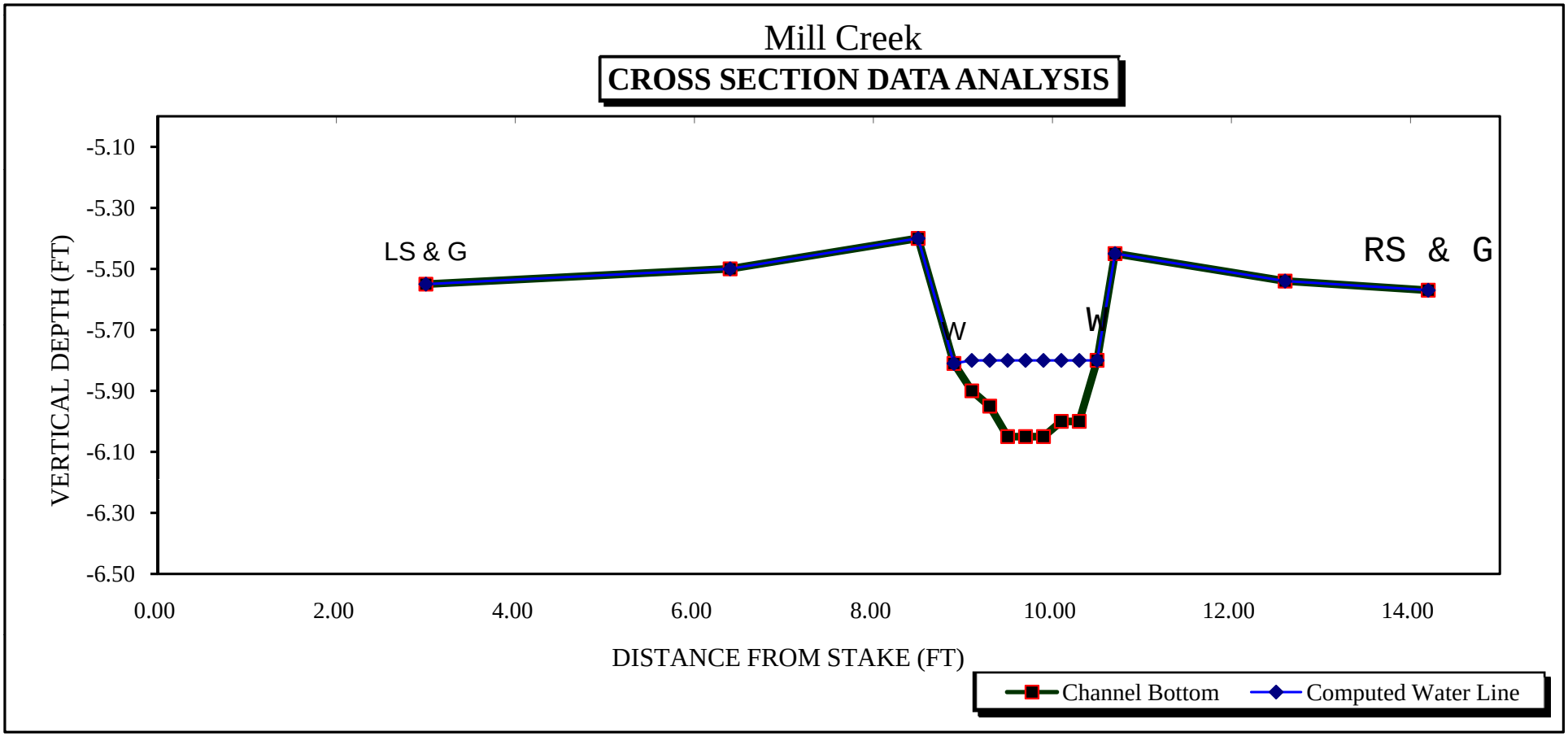
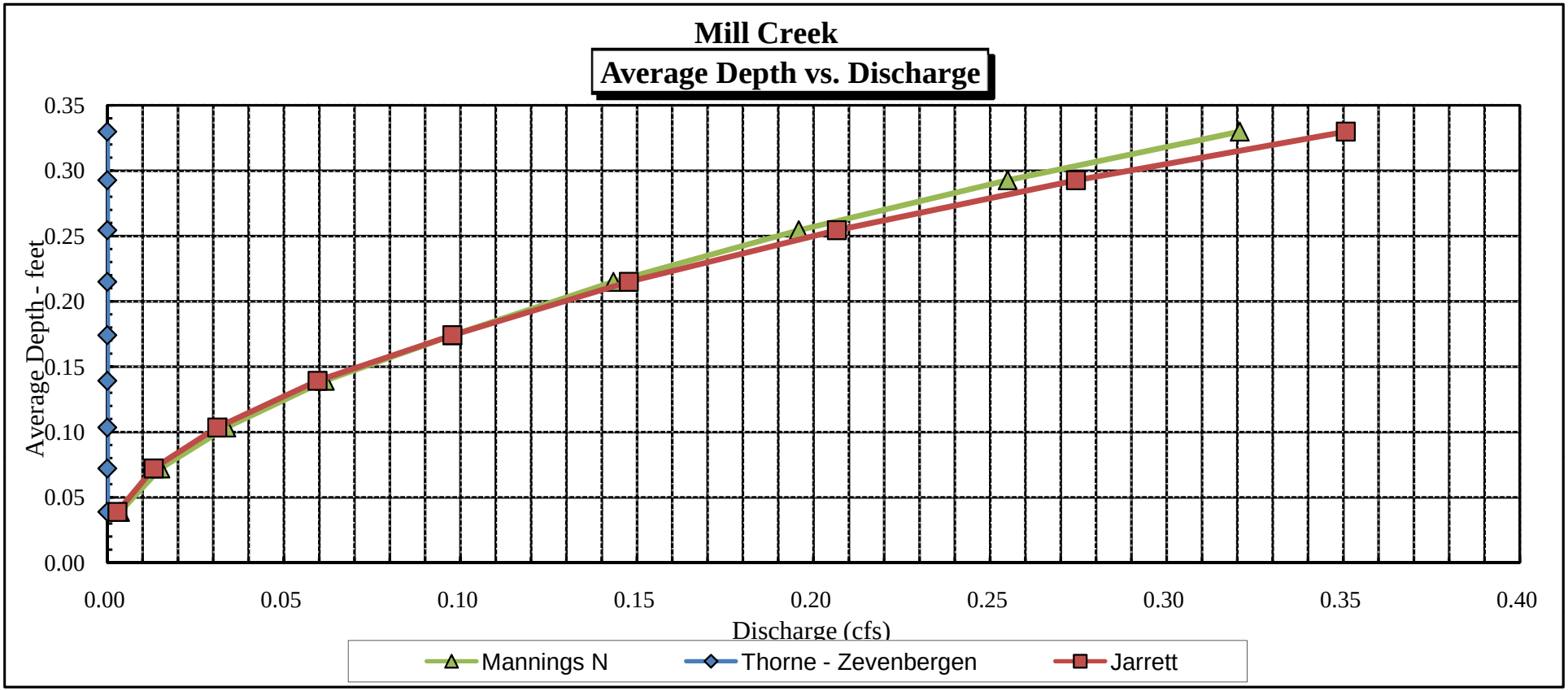
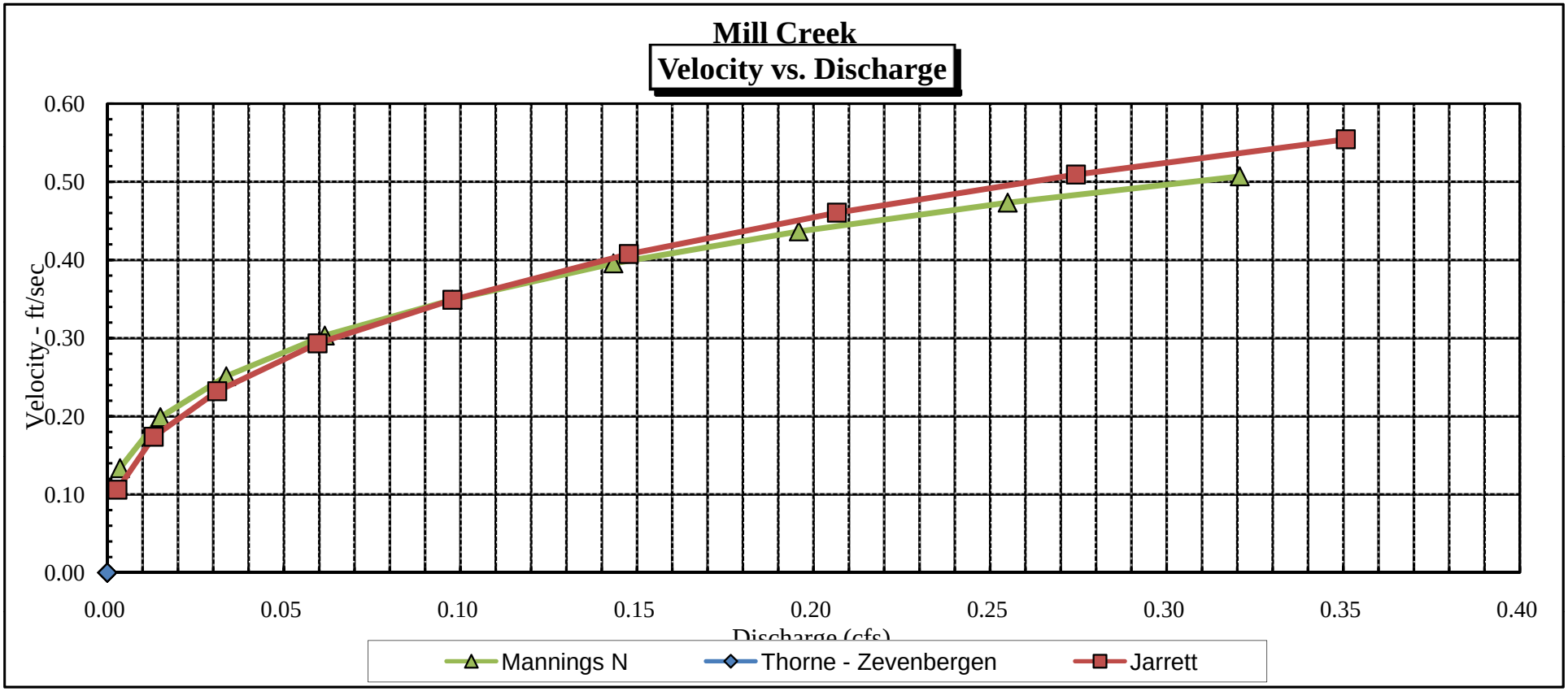
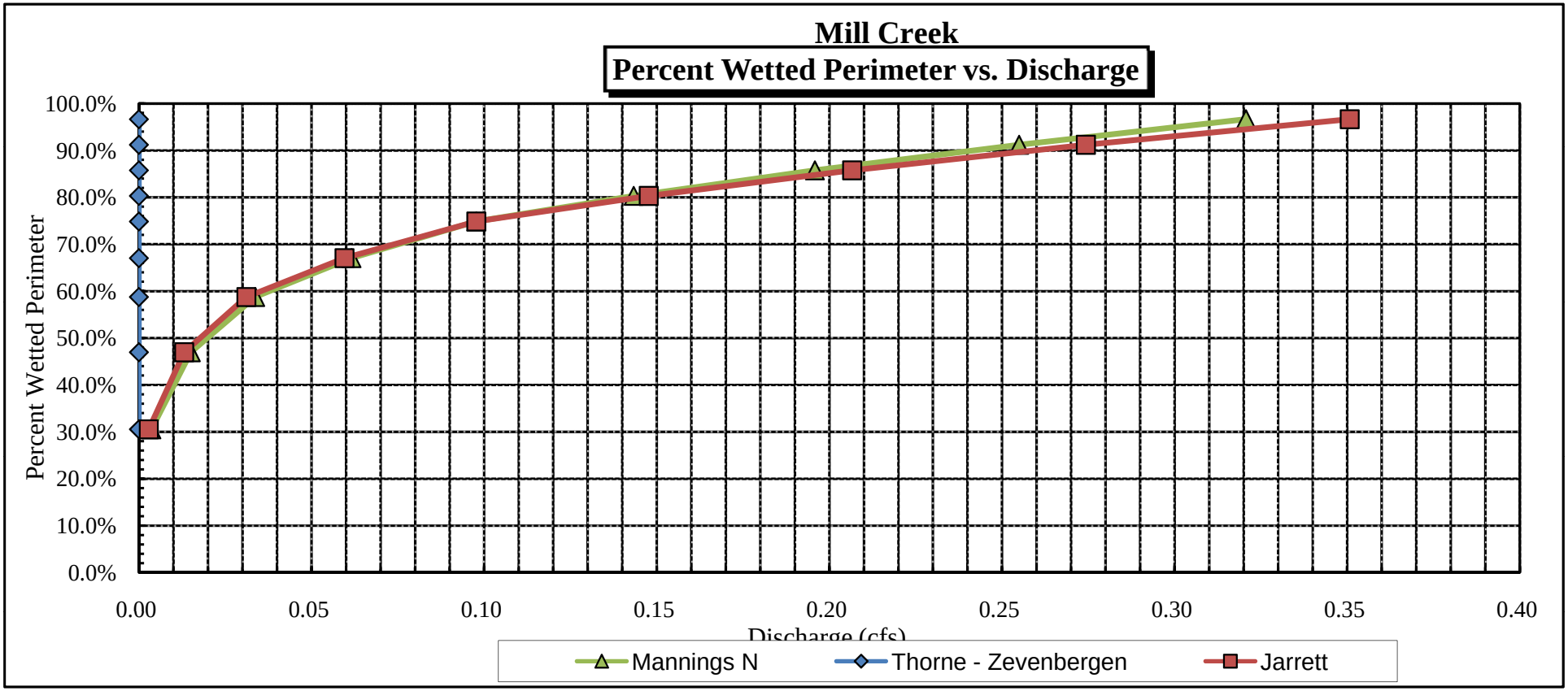
RECOMMENDATION BY: …………………...………..……............................... AGENCY..……………………….....……...…...……...... DATE:......…...…......……………

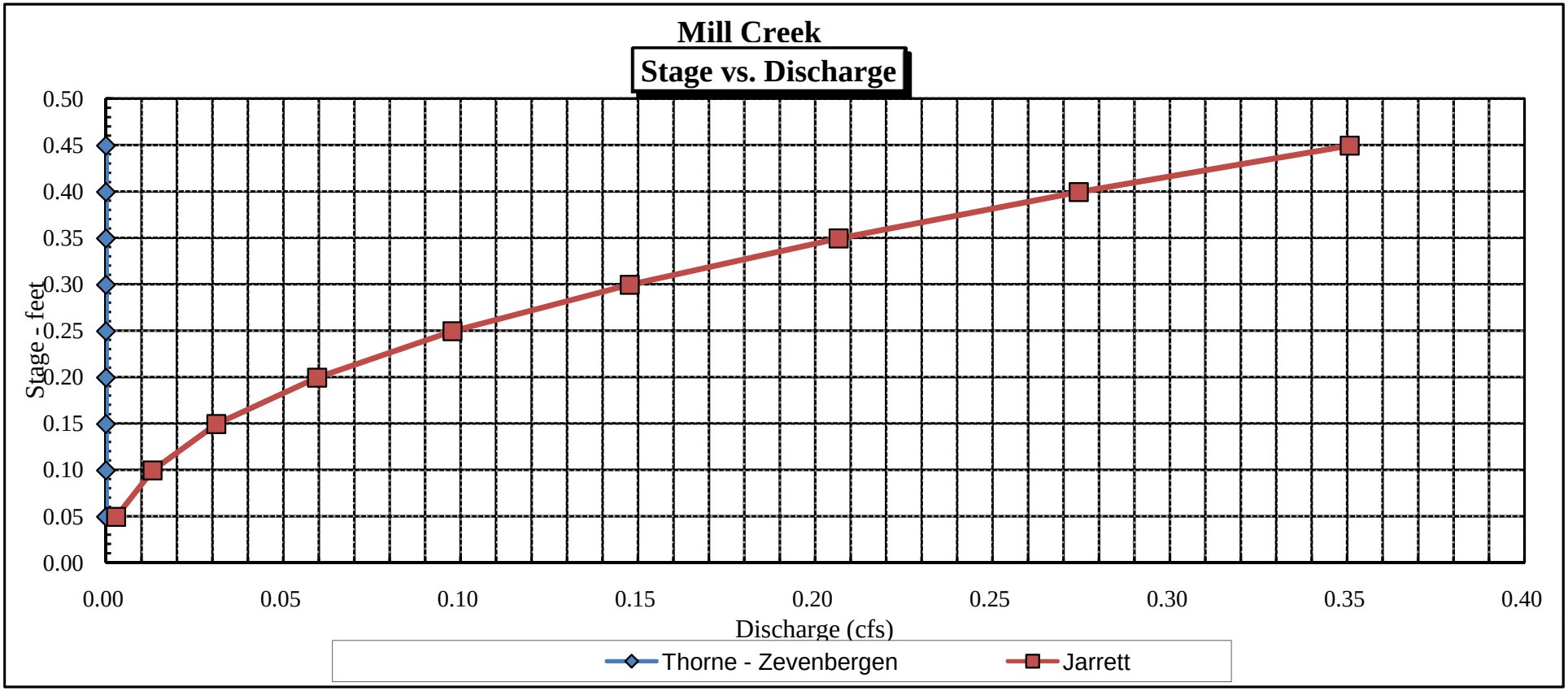
CWCB REVIEW BY: ..……………………………...……………………………………………………...…............. DATE:.................…………….....


Mill Creek
CROSS SECTION DATA ANALYSIS
VERTICAL DEPTH (FT)
-5.10
-5.30
-5.50
-5.70
-5.90
-6.10
-6.30
-6.50
LS & G
W
W
RS & G
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


Mill Creek
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
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Mill Creek
Velocity vs. Discharge
Velocity - ft/sec
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Mill Creek
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
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Mill Creek
Stage vs. Discharge
Stage - feet
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
Discharge (cfs)
Thorne - Zevenbergen
Jarrett