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 Granite Creek, located in Water Division 4.

Location and Land Status. Granite Creek originates in the Glade Park area southwest of Grand Junction and flows into Utah, where it is tributary to the Dolores River. This recommendation covers the stream reach beginning at the confluence of two unnamed tributaries located within the SE ¼, Section 12, T14S R104W, Sixth P.M. (Latitude 38,50,58 Longitude 108,57,43) and extending downstream to the Utah-Colorado border, a distance of approximately 5.6 miles. The BLM manages 5.3 miles of this stream reach, while 0.3 miles are in private ownership.

Biological Summary. Granite 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 riffle, run, and deep pool habitats to support a salmonid fishery.

Fishery surveys revealed an abundant and self-sustaining brook trout fishery. Even though Granite Creek is a small stream, the fish population survived the 2002-2003 drought, indicating that base flows are sufficient to support the trout fishery through all types of climate conditions. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

The riparian community along Granite Creek is very robust, providing dense cover and shading for the stream. The riparian community is comprised mainly of alder and willow species.

R2Cross Analysis. The BLM collected the following R2Cross data from Granite 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)
06/15/2005 #1	2.93 cfs	8.93 feet	Out of confidence interval	3.51 cfs
06/15/2005 #2	3.18 cfs	10.38 feet	Out of confidence interval	2.22 cfs
07/07/2011 #1	1.08 cfs	10.18 feet	1.64 cfs	2.45 cfs
		Averages:	1.64 cfs	2.73 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.

> 2.7 cubic feet per second is recommended for the snowmelt runoff period, from April 1 through June 30. This recommendation is driven by the average velocity and wetted perimeter 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 limited time when snowmelt runoff flows are available.
>
> 0.5 cubic feet per second is recommended for the fall and winter period from July1 to March 31. This recommendation is driven by limited water availability. This flow rate comes very close to meeting the wetted perimeter and average depth criteria. It should provide sufficient flow to prevent pools from freezing and protect overwintering fish.

Water Availability. There is no readily available gage data for this creek or for any of the adjacent watersheds. The BLM recommends using the StreamStats package developed jointly between the U.S. Geological Survey and the Colorado Water Conservation Board (CWCB). The BLM's experience is that for applications in the area, this package is very reliable in terms of estimating average monthly flow rates that can be expected during the snowmelt runoff period. However, the BLM believes that the Streamstats program tends to overestimate flow rates during late fall through winter, because the program is not capable of considering the local geology through which stream channels are routed.

The BLM is aware of the following decreed water rights on private land located upstream from the proposed instream flow reach.

- Gordon Granite Creek Ditch was decreed in case W-550 and W-551 for 2 cfs for stockwatering use.

- There are also nine small reservoirs, 1.25 acre feet or less in size, located within the Granite Creek watershed. These reservoirs were decreed case number 2006 CW 29, Water Division 4, for stockwatering, wildlife and domestic purposes. These reservoirs store water from runoff and springs.

- In case number W-580, Water Division 4, Granite Creek Spring, Pipeline, and Pond was decreed for 1.0 cfs for non-consumptive fish culture, livestock watering, and domestic purposes.

- More than 10 water rights have been decreed on springs for livestock watering and domestic purposes.

Relationship to Land Management Plans. The BLM's inventories of conditions in the Granite Creek watershed indicate that it is in largely natural condition, with very little surface disturbance and very little development other than trails, two-track roads and limited livestock grazing infrastructure. The BLM intends to continue management of the watershed for natural conditions and processes. 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 the BLM's draft recommendation in February 2012. 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
Katie Stevens, Grand Junction FO
Nate Dieterich, Grand Junction FO

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. Ute 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 riffle, run, and deep pool habitats to support a salmonid fishery.

Fishery surveys revealed an abundant and self-sustaining brook trout fishery. Even though Granite Creek is a small stream, the fish population survived the 2002-2003 drought, indicating that base flows are sufficient to support the trout fishery through all types of climate conditions. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

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> 2.7 cubic feet per second is recommended for the snowmelt runoff period, from April 1 through June 30. This recommendation is driven by the average velocity and wetted perimeter 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 limited time when snowmelt runoff flows are available.
>
> 1.6 cubic feet per second is recommended for the mid-summer period, from July 1 to August 31. This recommendation is driven by the average velocity criteria. This flow rate is capable of maintaining pool habitat in the creek and preventing excessively water high temperatures.
>
> 0.6 cubic feet per second is recommended for the fall and winter period from September 1 to March 31. This recommendation is driven by limited water availability. This flow rate comes very close to meeting the wetted perimeter and average depth criteria. It should provide sufficient flow to prevent pools from freezing and protect overwintering fish.

Water Availability. There is no readily available gage data for this creek or for any of the adjacent watersheds. BLM recommends using the StreamStats package developed jointly between the U.S. Geological Survey and the CWCB. BLM's experience is that for applications in the area, this package is very reliable in terms of estimating average monthly flow rates that can be expected during the snowmelt runoff period. However, BLM believes that the Streamstats program tends to overestimate flow rates during late from fall through winter, because the program is not capable of considering the local geology through which stream channels are routed.

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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: Catherine Robertson, Grand Junction FO
Nate Dieterich, Grand Junction FO

Grand Junction Field Office Stream Surveys
July 2007

Granite Creek - Water Code #21979

Granite Creek, located north of Glade Park, CO and located near the Utah/Colorado border on BLM lands managed by the Grand Junction Field Office was sampled on July 5, 2007. Granite Creek is tributary to the Dolores River. Presence/absence sampling was done in support of the Colorado BLM in-stream flow program and to determine species composition and distribution of resident fish. Portions of the stream are being considered for restoration and stocking of Colorado River cutthroat trout. Sampling was conducted via backpack electro-shocker and approximately 300 feet of stream was sampled at the upper reach, and 50 feet was sampled at a lower reach. Personnel present were Lori Martin, CDOW Aquatic Bioligist, Ty Smith CDOW DWM, Aaron Rice, CDOW Tech, Tom Fresques, and Malia Boyum BLM.

A total of 27 fish were collected. All fish collected were brook trout (**see attached data sheet for age class distribution**).

Upper Stream segment at road crossing

Upper Stream segment – dense riparian vegetation

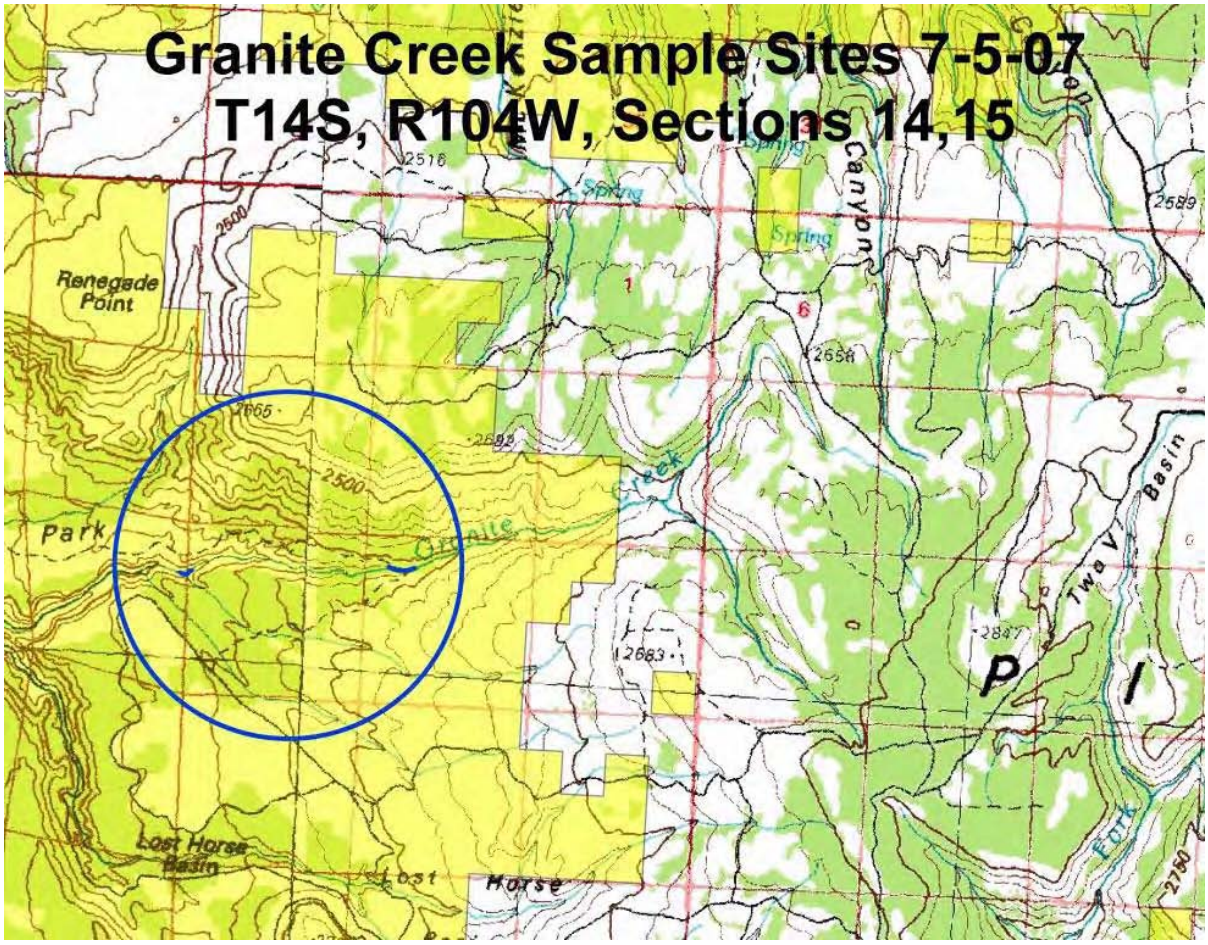
Brook trout - adult

Brook trout – young-of-year


Lower Stream segment

Fish

Brook trout – adult



Map of sample areas

STREAM SURVEY FISH SAMPLING FORM

WATER Granite Creek H2O CODE 21979 DATE 7/5/2007

GEAR Backpack Electroshocker EFFORT 150 feet STATION # 1 PASS # 1

CREW Fresques, Boyum, DRAINAGE Dolores River LOCATION See Map

species	length	weight	Pass		species	length	weight	Pass
BRK	64				BRK	185		
BRK	55				BRK	56		
BRK	148							
BRK	185							
BRK	120							
BRK	142							
BRK	155							
BRK	148							
BRK	**118**							
BRK	122							
BRK	187							
BRK	138							
BRK	168							
BRK	172							
BRK	144							
BRK	200							
BRK	168							
BRK	152							
BRK	224							
BRK	254							
BRK	145							
BRK	128							
BRK	57							
BRK	170							
BRK	51							

GPS Location: See Map

Notes: Stream Width Averaged 4 ft. Sample Reach 150 ft.

Conductivity: Electroshocker settings

Discussion:

Granite Creek was sampled to determine fish species composition and to help determine distribution of brook trout. The stream is small with flow estimated at less than 1 cfs. Riparian condition is excellent with dense woody cover comprised mainly of alder and willow. Pools were small but common and brook trout were abundant at and within all sample sites. Several age classes of fish were present and fish appeared healthy.

The CDOW is considering the placement of Colorado River cutthroat trout into the upper reaches of the stream on private lands as a natural barrier is in place to keep brook trout and cutthroat trout separate. It is possible that BLM portions of the stream could be reclaimed and converted from a brook trout to cutthroat fishery in the future. An instream flow recommendation on this creek would be valuable in helping protect this fishery.

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Granite Creek						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: Approx. 1/4 mile downstream from confluence w/ Lost Horse Basin						
DATE: 6-15-05	OBSERVERS: R. Smith, D. Smith					
LEGAL DESCRIPTION	% SECTION: SE	SECTION: 17	TOWNSHIP: 14 N/S	RANGE: 104 E/W	PM: 6th	
COUNTY: Mesa	WATERSHED: Dolores	WATER DIVISION: 4	DOW WATER CODE: 21979			
MAP(S): USGS: Steamboat Mesa 7.5'	GPS: 0670089					
USFS:	Zone 12 4300119					

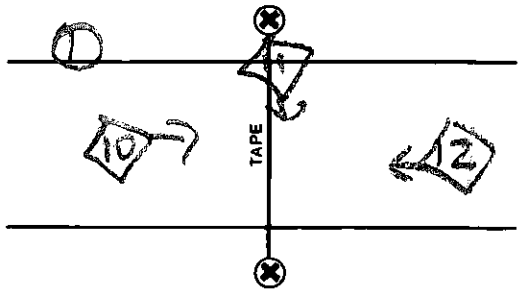
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES/NO)	METER TYPE: Marsh - McBirney			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: surveyed ____ lbs/foot	TAPE TENSION: surveyed ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: gravel to 6" 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	4.12/4.07
② WS Upstream	15.0'	3.99
③ WS Downstream	5.0'	4.21
SLOPE	0.22/20.0 = 0.011	

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

Ph: 8.4 Temp: 56.5°
Extremely healthy riparian: river birch, skunk brush, willow. Excellent stream cover.

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Granite Creek	CROSS-SECTION NO.: 1	DATE: 6-15-05	SHEET 1 OF 1
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: 0.3 ft	TIME: 1:10 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			2.54								
G	1.5		3.43								
W	2.5		4.12								
	3.0		4.38	0.25				0.16			
	3.5		4.72	0.60				0.73			
	4.0		4.66	0.55				0.75			
	4.5		4.70	0.60				0.91			
	5.0		4.16	0.05				1.09			
	5.5		4.72	0.60				1.13			
	6.0		4.62	0.50				1.16			
6.75 >	6.5	4.63 >	4.68	0.55	< 0.50			1.32	< 1.32		
	7.0		4.60	0.45				1.36			
	7.5		4.66	0.50				1.07			
	8.0		4.50	0.40				1.21			
	8.5		4.50	0.40				0.94			
	9.0		4.46	0.40				0.58			
	9.5		4.39	0.35				0.42			
W	10.1		4.07								
G	10.5		3.48								
RS	11.0		2.97								
TOTALS:											

End of Measurement	Time: 1:35	Gage Reading: 0.3 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:	Granite Creek
XS LOCATION:	Approx. 1/4 mile downstream from confluence
XS NUMBER:	1
DATE:	15-Jun-05
OBSERVERS:	R.Smith, D. Smith
1/4 SEC:	SE
SECTION:	17
TWP:	14S
RANGE:	104W
PM:	Sixth
COUNTY:	Mesa
WATERSHED:	Dolores
DIVISION:	4
DOW CODE:	21979
USGS MAP:	Steamboat Mesa 7.5'
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:	0.011

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

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

STREAM NAME: Granite Creek
XS LOCATION: Approx. 1/4 mile downstream from confluence
XS NUMBER: 1

DATA POINTS= 20

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
LS	0.00	2.54			0.00		0.00	0.00	0.0%
1 G	1.50	3.43			0.00		0.00	0.00	0.0%
W	2.50	4.12			0.00		0.00	0.00	0.0%
	3.00	4.38	0.25	0.16	0.56	0.25	0.13	0.02	0.7%
	3.50	4.72	0.60	0.73	0.60	0.60	0.30	0.22	7.5%
	4.00	4.66	0.55	0.75	0.50	0.55	0.28	0.21	7.1%
	4.50	4.70	0.60	0.91	0.50	0.60	0.30	0.27	9.3%
	5.00	4.16	0.05	1.09	0.74	0.05	0.03	0.03	0.9%
	5.50	4.72	0.60	1.13	0.75	0.60	0.30	0.34	11.6%
	6.00	4.62	0.50	1.16	0.51	0.50	0.25	0.29	9.9%
	6.50	4.68	0.55	1.32	0.50	0.55	0.21	0.27	9.3%
	6.75	4.63	0.50	1.32	0.25	0.50	0.13	0.17	5.6%
	7.00	4.60	0.45	1.30	0.25	0.45	0.17	0.22	7.5%
	7.50	4.66	0.50	1.07	0.50	0.50	0.25	0.27	9.1%
	8.00	4.50	0.40	1.21	0.52	0.40	0.20	0.24	8.3%
	8.50	4.50	0.40	0.94	0.50	0.40	0.20	0.19	6.4%
	9.00	4.46	0.40	0.58	0.50	0.40	0.20	0.12	4.0%
	9.50	4.39	0.35	0.42	0.50	0.35	0.19	0.08	2.8%
W	10.10	4.07			0.68		0.00	0.00	0.0%
1 G	10.50	3.48			0.00		0.00	0.00	0.0%
TOTALS ----------					8.40	0.6 (Max.)	3.12	2.93	100.0%

Manning's n = 0.0858
Hydraulic Radius= 0.37133732

STREAM NAME: Granite Creek
XS LOCATION: Approx. 1/4 mile downstream from confluence
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	3.12	3.22	3.4%
3.85	3.12	5.19	66.6%
3.87	3.12	5.03	61.4%
3.89	3.12	4.87	56.2%
3.91	3.12	4.71	51.0%
3.93	3.12	4.55	45.9%
3.95	3.12	4.39	40.8%
3.97	3.12	4.23	35.7%
3.99	3.12	4.07	30.6%
4.01	3.12	3.92	25.6%
4.03	3.12	3.76	20.6%
4.05	3.12	3.61	15.6%
4.06	3.12	3.53	13.2%
4.07	3.12	3.45	10.7%
4.08	3.12	3.37	8.2%
4.09	3.12	3.30	5.8%
4.10	3.12	3.22	3.4%
4.11	3.12	3.15	0.9%
4.12	3.12	3.07	-1.5%
4.13	3.12	3.00	-3.9%
4.14	3.12	2.92	-6.3%
4.15	3.12	2.85	-8.7%
4.17	3.12	2.70	-13.4%
4.19	3.12	2.55	-18.1%
4.21	3.12	2.41	-22.7%
4.23	3.12	2.27	-27.2%
4.25	3.12	2.13	-31.6%
4.27	3.12	1.99	-36.0%
4.29	3.12	1.86	-40.3%
4.31	3.12	1.73	-44.5%
4.33	3.12	1.60	-48.7%
4.35	3.12	1.47	-52.8%

WATERLINE AT ZERO
AREA ERROR = 4.109

STREAM NAME: Granite Creek
XS LOCATION: Approx. 1/4 mile downstream from confluence
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	8.93	0.93	1.24	8.31	10.24	100.0%	0.81	13.14	1.58
	3.51	8.87	0.91	1.21	8.05	10.15	99.2%	0.79	12.54	1.56
	3.56	8.76	0.87	1.16	7.61	10.00	97.7%	0.76	11.53	1.51
	3.61	8.65	0.83	1.11	7.18	9.85	96.3%	0.73	10.56	1.47
	3.66	8.55	0.79	1.06	6.75	9.70	94.8%	0.70	9.62	1.43
	3.71	8.44	0.75	1.01	6.32	9.56	93.4%	0.66	8.72	1.38
	3.76	8.33	0.71	0.96	5.90	9.41	91.9%	0.63	7.86	1.33
	3.81	8.23	0.67	0.91	5.49	9.26	90.5%	0.59	7.04	1.28
	3.86	8.12	0.63	0.86	5.08	9.11	89.0%	0.56	6.25	1.23
	3.91	8.02	0.58	0.81	4.68	8.96	87.6%	0.52	5.51	1.18
	3.96	7.91	0.54	0.76	4.28	8.81	86.1%	0.49	4.80	1.12
	4.01	7.80	0.50	0.71	3.89	8.67	84.7%	0.45	4.14	1.06
	4.06	7.70	0.45	0.66	3.50	8.52	83.2%	0.41	3.51	1.00
WL	4.11	7.54	0.41	0.61	3.12	8.33	81.4%	0.37	2.94	0.94
	4.16	7.36	0.37	0.56	2.74	8.12	79.4%	0.34	2.42	0.88
	4.21	7.08	0.34	0.51	2.38	7.78	76.0%	0.31	1.97	0.83
	4.26	6.80	0.30	0.46	2.04	7.43	72.6%	0.27	1.56	0.77
	4.31	6.52	0.26	0.41	1.70	7.08	69.1%	0.24	1.20	0.70
	4.36	6.24	0.22	0.36	1.38	6.73	65.7%	0.21	0.88	0.63
	4.41	5.87	0.18	0.31	1.08	6.29	61.5%	0.17	0.61	0.56
	4.46	5.35	0.15	0.26	0.80	5.71	55.8%	0.14	0.39	0.49
	4.51	4.15	0.13	0.21	0.56	4.44	43.4%	0.13	0.25	0.45
	4.56	3.83	0.09	0.16	0.36	4.06	39.6%	0.09	0.13	0.36
	4.61	3.36	0.05	0.11	0.17	3.52	34.4%	0.05	0.04	0.24
	4.66	1.78	0.02	0.06	0.04	1.86	18.2%	0.02	0.01	0.15
	4.71	0.18	0.01	0.01	0.00	0.19	1.8%	0.01	0.00	0.06

STREAM NAME: Granite Creek
XS LOCATION: Approx. 1/4 mile downstream from confluence
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	2.93	cfs
CALCULATED FLOW (Qc)=	2.94	cfs
(Qm-Qc)/Qm * 100 =	-0.5	%
MEASURED WATERLINE (WLm)=	4.10	ft
CALCULATED WATERLINE (WLc)=	4.11	ft
(WLm-WLc)/WLm * 100 =	-0.3	%
MAX MEASURED DEPTH (Dm)=	0.60	ft
MAX CALCULATED DEPTH (Dc)=	0.61	ft
(Dm-Dc)/Dm * 100	-1.9	%
MEAN VELOCITY=	0.94	ft/sec
MANNING'S N=	0.086	
SLOPE=	0.011	ft/ft
.4 * Qm =	1.2	cfs
2.5 * Qm=	7.3	cfs

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

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

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

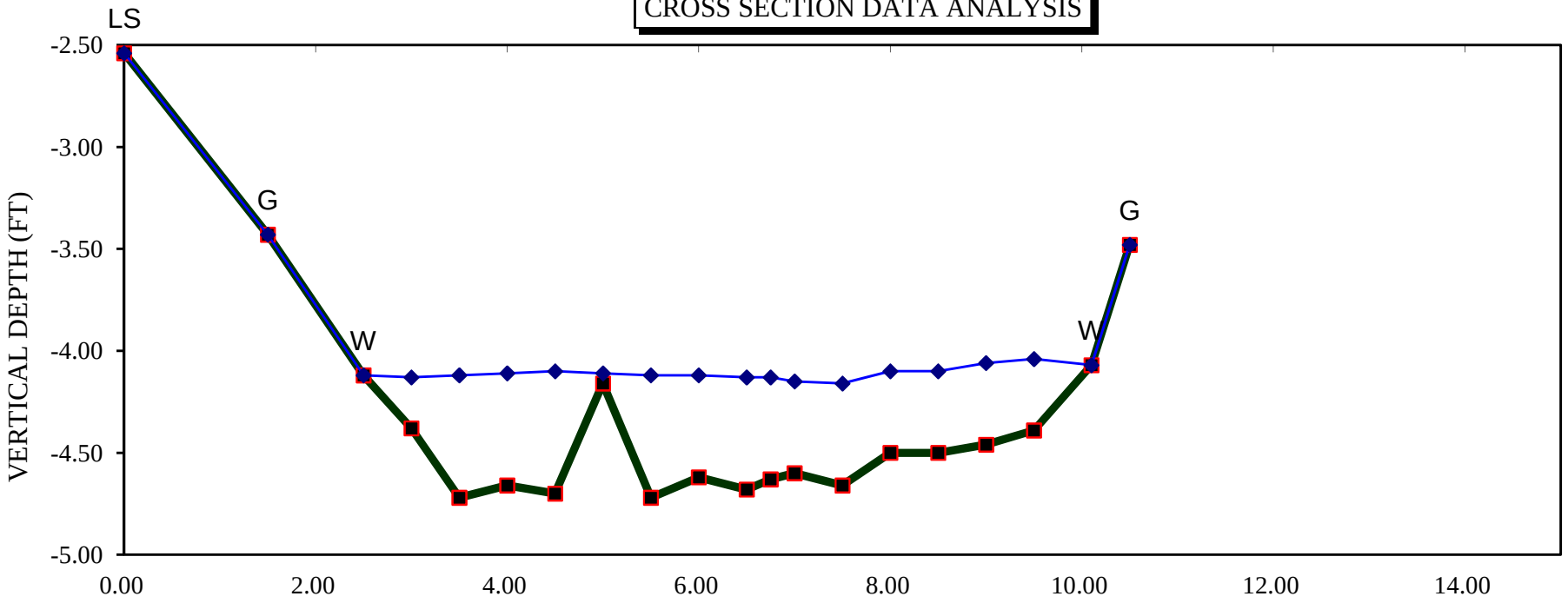
RECOMMENDATION BY: ………………....………..…….............................. AGENCY..……………………......……...…....…….…..... DATE:......…...….......……………

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

Home Print

Granite Creek

CROSS SECTION DATA ANALYSIS



COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

STREAM NAME: Granite Creek						CROSS-SECTION NO.: 2
CROSS-SECTION LOCATION: Approx. 1/4 mile downstream from confluence w/ Lost Horse Basin						
DATE: 6-15-05	OBSERVERS: R. Smith, D. Smith					
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 17	TOWNSHIP: 14 N/S	RANGE: 104 E/W	PM: 6th	
COUNTY: Mesa	WATERSHED: Dolores	WATER DIVISION: 4	DOW WATER CODE: 21979			
MAP(S): USGS: Steamboat Mesa 7.5'	GPS = 0670087 4300119					
USFS:						

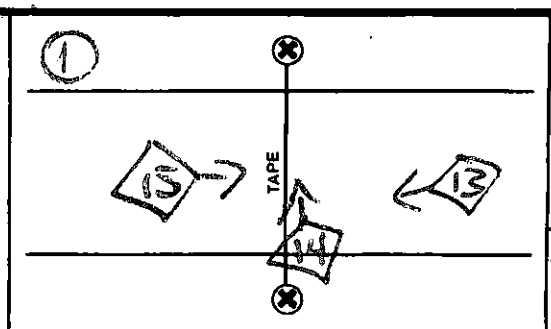
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) NO	METER TYPE: Marsh-McBirney			
METER NUMBER:	DATE RATED:	CALIB/SPIN: ____ sec	TAPE WEIGHT: surveyed ____ lbs/foot	TAPE TENSION: surveyed ____ lbs
CHANNEL BED MATERIAL SIZE RANGE: gravel to 6" 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	4.45 / 4.35
② WS Upstream	12.0	4.74
③ WS Downstream	50.0	3.92
SLOPE	0.82 / 80.0 = 0.0273	

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																	

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

COMMENTS

Ph: 8.4 Temp: 50.5°

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Granite Creek	CROSS-SECTION NO.: 2	DATE: 6-15-05	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: 0.4 ft	TIME: 2 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	0.0		2.64								
G	0.9		3.44								
	2.0		4.20								
W	3.4		4.38	Ø				Ø			
	4.0		4.64	0.25				1.43			
	4.5		4.95	0.55				1.09			
	5.0		4.90	0.50				1.55			
5.75 >	5.5	4.88 >	4.88	0.50	< 0.50		5.75 <	1.83	1.54		
	6.0		4.88	0.50	< 0.50			1.23			
6.25 /	6.5	4.87 >	4.86	0.50			6.25 <	0.89	1.61		
	7.0		4.96	0.60				0.45			
	7.5		4.92	0.55				0.99			
	8.0		4.90	0.50				1.05			
	8.5		4.82	0.40				0.75			
	9.0		4.74	0.30				1.79			
	9.5		4.52	0.20				1.51			
	10.0		4.70	0.75				Ø			
W	10.5		4.45	Ø				Ø			
	11.0		4.39								
G	11.5		3.59								
LS	13.5		2.55								
TOTALS:											

End of Measurement	Time: 2:40	Gage Reading: 0.4 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:	Granite Creek
XS LOCATION:	.25 m d/s from conf. w/ Lost Horse Basin
XS NUMBER:	2
DATE:	15-Jun-05
OBSERVERS:	R. Smith, D. Smith
1/4 SEC:	SE
SECTION:	17
TWP:	14S
RANGE:	104W
PM:	Sixth
COUNTY:	Mesa
WATERSHED:	Dolores River
DIVISION:	4
DOW CODE:	21979
USGS MAP:	Steamboat Mesa
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:	0.0273

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

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

STREAM NAME: Granite Creek
XS LOCATION: .25 m d/s from conf. w/ Lost Horse Basin
XS NUMBER: 2

DATA POINTS= 23

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	RS	0.00	2.64			0.00		0.00	0.00	0.0%
1	G	0.90	3.44			0.00		0.00	0.00	0.0%
		2.00	4.20			0.00		0.00	0.00	0.0%
	W	3.40	4.38	0.00	0.00	0.00		0.00	0.00	0.0%
		4.00	4.64	0.25	1.43	0.65	0.25	0.14	0.20	6.2%
		4.50	4.95	0.55	1.09	0.59	0.55	0.28	0.30	9.4%
		5.00	4.90	0.50	1.55	0.50	0.50	0.25	0.39	12.2%
		5.50	4.88	0.50	1.83	0.50	0.50	0.19	0.34	10.8%
		5.75	4.88	0.50	1.54	0.25	0.50	0.13	0.19	6.1%
		6.00	4.88	0.50	1.23	0.25	0.50	0.13	0.15	4.8%
		6.25	4.87	0.50	1.61	0.25	0.50	0.13	0.20	6.3%
		6.50	4.86	0.50	0.89	0.25	0.50	0.19	0.17	5.2%
		7.00	4.98	0.60	0.45	0.51	0.60	0.30	0.14	4.2%
		7.50	4.92	0.55	0.99	0.50	0.55	0.28	0.27	8.6%
		8.00	4.90	0.50	1.05	0.50	0.50	0.25	0.26	8.3%
		8.50	4.82	0.40	0.75	0.51	0.40	0.20	0.15	4.7%
		9.00	4.74	0.30	1.79	0.51	0.30	0.15	0.27	8.4%
		9.50	4.52	0.20	1.51	0.55	0.20	0.10	0.15	4.7%
		10.00	4.70	0.25	0.00	0.53	0.25	0.13	0.00	0.0%
	W	10.50	4.45	0.00	0.00	0.56		0.00	0.00	0.0%
		11.00	4.39			0.00		0.00	0.00	0.0%
1	G	11.50	3.59			0.00		0.00	0.00	0.0%
	LS	13.50	2.55			0.00		0.00	0.00	0.0%
	TOTALS ----------					7.41	0.6 (Max.)	2.81	3.18	100.0%

Manning's n = 0.1138
Hydraulic Radius= 0.37939583

STREAM NAME: Granite Creek
XS LOCATION: .25 m d/s from conf. w/ Lost Horse Basin
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	2.81	2.66	-5.3%
4.17	2.81	4.75	68.9%
4.19	2.81	4.57	62.4%
4.21	2.81	4.39	55.9%
4.23	2.81	4.21	49.5%
4.25	2.81	4.03	43.3%
4.27	2.81	3.86	37.1%
4.29	2.81	3.69	31.1%
4.31	2.81	3.52	25.1%
4.33	2.81	3.36	19.3%
4.35	2.81	3.20	13.7%
4.37	2.81	3.04	8.1%
4.38	2.81	2.96	5.4%
4.39	2.81	2.89	2.7%
4.40	2.81	2.81	0.0%
4.41	2.81	2.74	-2.7%
4.42	2.81	2.66	-5.3%
4.43	2.81	2.59	-7.9%
4.44	2.81	2.52	-10.4%
4.45	2.81	2.45	-12.9%
4.46	2.81	2.38	-15.4%
4.47	2.81	2.31	-17.8%
4.49	2.81	2.17	-22.7%
4.51	2.81	2.04	-27.5%
4.53	2.81	1.91	-32.2%
4.55	2.81	1.78	-36.9%
4.57	2.81	1.65	-41.3%
4.59	2.81	1.53	-45.7%
4.61	2.81	1.41	-49.9%
4.63	2.81	1.29	-54.0%
4.65	2.81	1.18	-58.0%
4.67	2.81	1.07	-61.8%

WATERLINE AT ZERO
AREA ERROR = 4.395

STREAM NAME: Granite Creek
XS LOCATION: .25 m d/s from conf. w/ Lost Horse Basin
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	3.59	10.38	1.00	1.39	10.38	11.34	100.0%	0.91	21.11	2.03
	3.59	10.37	1.00	1.39	10.33	11.33	99.9%	0.91	20.95	2.03
	3.64	10.27	0.96	1.34	9.81	11.18	98.6%	0.88	19.40	1.98
	3.69	10.17	0.91	1.29	9.30	11.04	97.3%	0.84	17.91	1.93
	3.74	10.06	0.87	1.24	8.80	10.89	96.0%	0.81	16.46	1.87
	3.79	9.96	0.83	1.19	8.29	10.74	94.7%	0.77	15.06	1.82
	3.84	9.85	0.79	1.14	7.80	10.60	93.4%	0.74	13.72	1.76
	3.89	9.75	0.75	1.09	7.31	10.45	92.1%	0.70	12.43	1.70
	3.94	9.65	0.71	1.04	6.82	10.30	90.8%	0.66	11.19	1.64
	3.99	9.54	0.66	0.99	6.34	10.15	89.5%	0.62	10.01	1.58
	4.04	9.44	0.62	0.94	5.87	10.01	88.2%	0.59	8.88	1.51
	4.09	9.34	0.58	0.89	5.40	9.86	86.9%	0.55	7.80	1.44
	4.14	9.23	0.53	0.84	4.94	9.71	85.6%	0.51	6.78	1.37
	4.19	9.13	0.49	0.79	4.48	9.57	84.3%	0.47	5.82	1.30
	4.24	8.74	0.46	0.74	4.03	9.15	80.6%	0.44	5.03	1.25
	4.29	8.32	0.43	0.69	3.60	8.70	76.7%	0.41	4.32	1.20
	4.34	7.90	0.40	0.64	3.20	8.24	72.7%	0.39	3.67	1.15
WL	4.39	7.52	0.37	0.59	2.81	7.84	69.1%	0.36	3.06	1.09
	4.44	6.99	0.35	0.54	2.45	7.29	64.3%	0.34	2.55	1.04
	4.49	6.74	0.31	0.49	2.11	7.02	61.9%	0.30	2.04	0.97
	4.54	6.40	0.28	0.44	1.78	6.65	58.6%	0.27	1.59	0.90
	4.59	5.94	0.25	0.39	1.47	6.14	54.1%	0.24	1.22	0.83
	4.64	5.47	0.22	0.34	1.18	5.64	49.7%	0.21	0.90	0.76
	4.69	5.04	0.18	0.29	0.92	5.16	45.5%	0.18	0.63	0.68
	4.74	4.80	0.14	0.24	0.67	4.89	43.1%	0.14	0.39	0.58
	4.79	4.41	0.10	0.19	0.44	4.48	39.5%	0.10	0.21	0.46
	4.84	4.01	0.06	0.14	0.23	4.07	35.9%	0.06	0.08	0.32
	4.89	2.10	0.03	0.09	0.07	2.13	18.8%	0.03	0.01	0.22
	4.94	0.50	0.02	0.04	0.01	0.51	4.5%	0.02	0.00	0.13

STREAM NAME: Granite Creek
XS LOCATION: .25 m d/s from conf. w/ Lost Horse Basin
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	3.18	cfs
CALCULATED FLOW (Qc)=	3.06	cfs
(Qm-Qc)/Qm * 100 =	3.6	%
MEASURED WATERLINE (WLm)=	4.42	ft
CALCULATED WATERLINE (WLc)=	4.39	ft
(WLm-WLc)/WLm * 100 =	0.5	%
MAX MEASURED DEPTH (Dm)=	0.60	ft
MAX CALCULATED DEPTH (Dc)=	0.59	ft
(Dm-Dc)/Dm * 100	2.5	%
MEAN VELOCITY=	1.09	ft/sec
MANNING'S N=	0.114	
SLOPE=	0.0273	ft/ft
.4 * Qm =	1.3	cfs
2.5 * Qm=	8.0	cfs

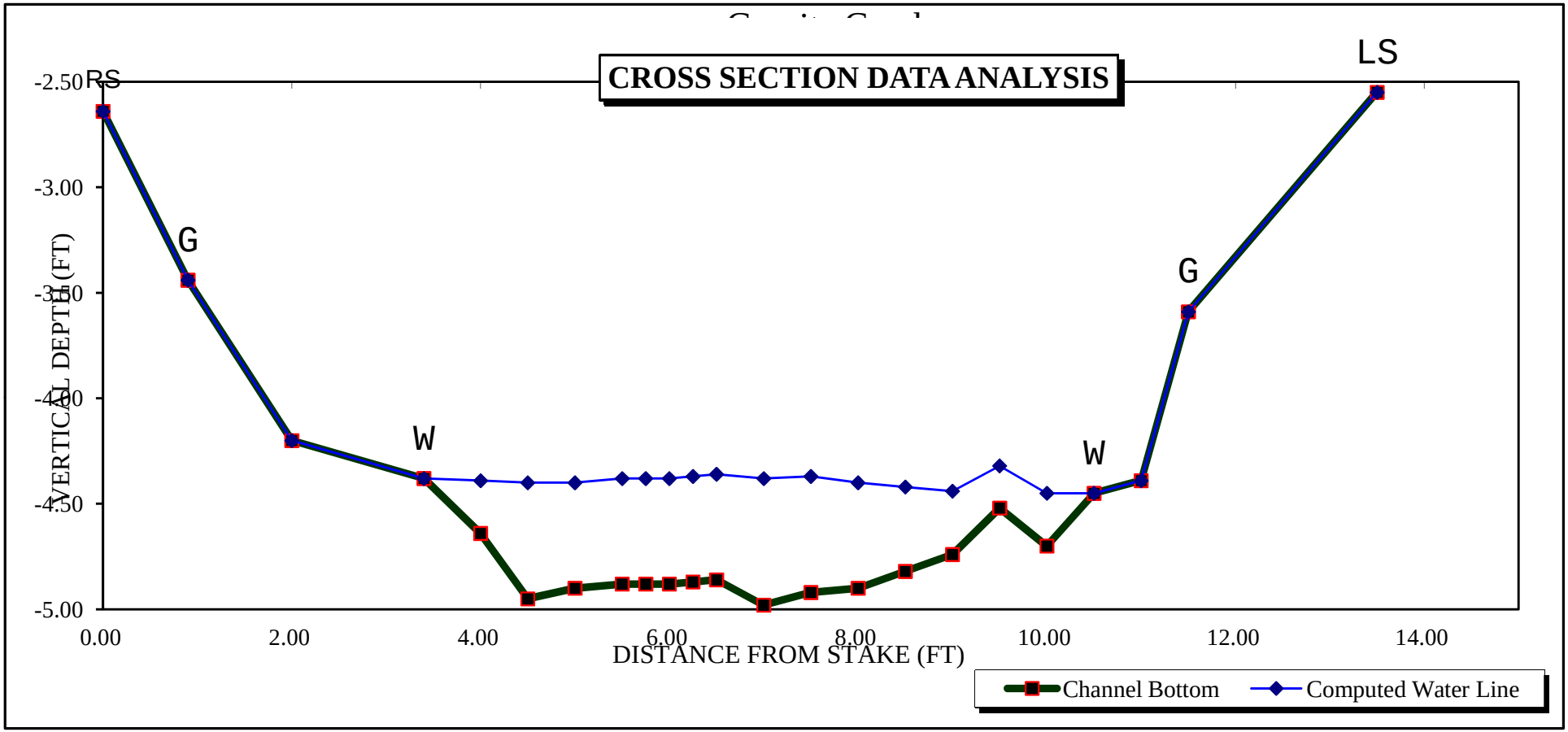
RECOMMENDED INSTREAM FLOW:
=============================

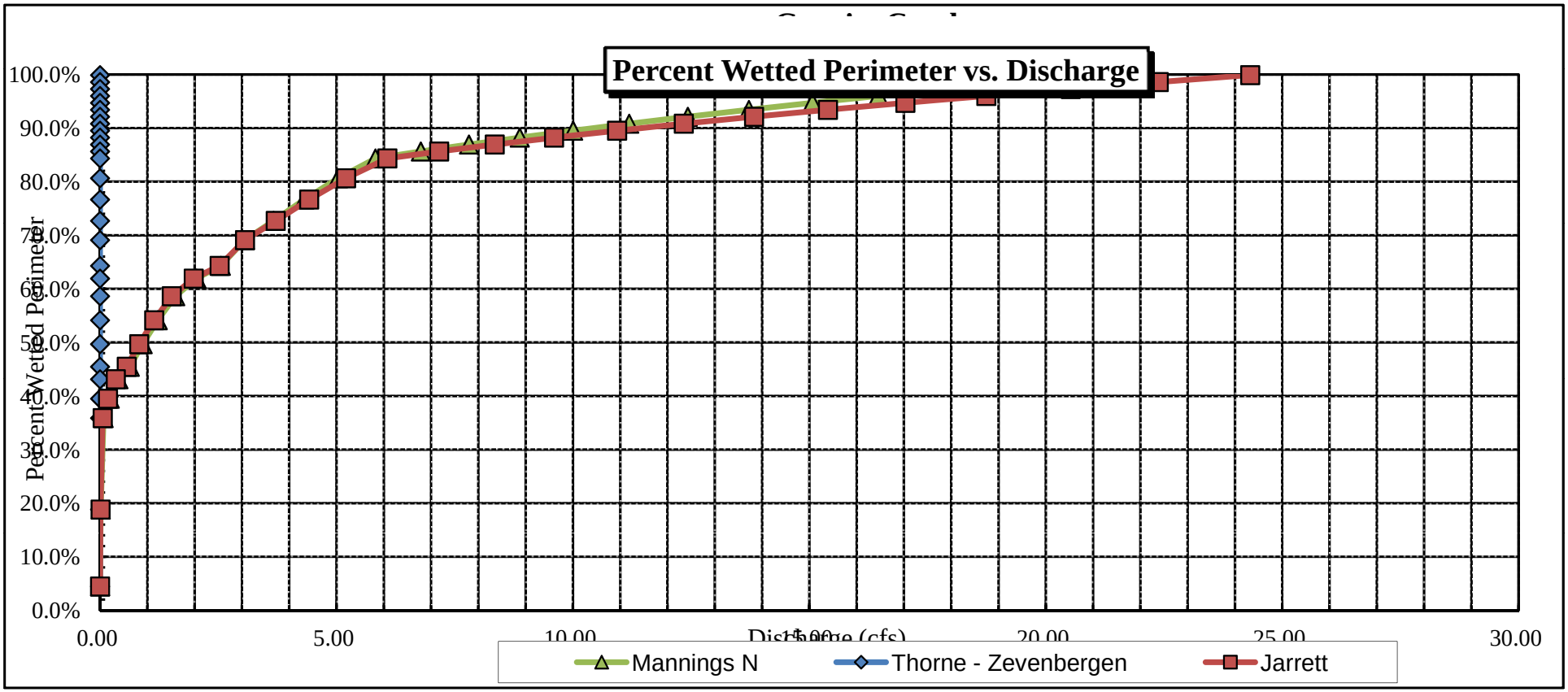
FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

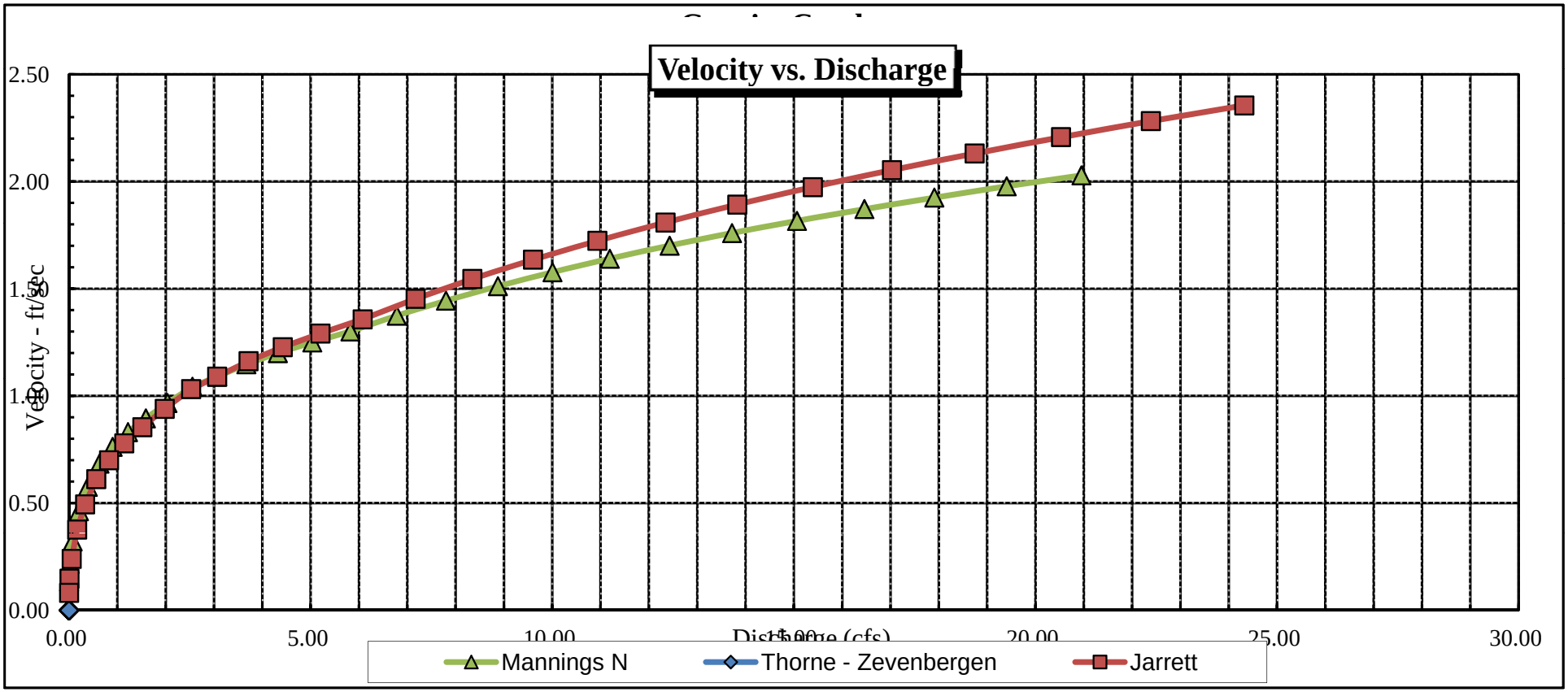
RATIONALE FOR RECOMMENDATION:
=============================

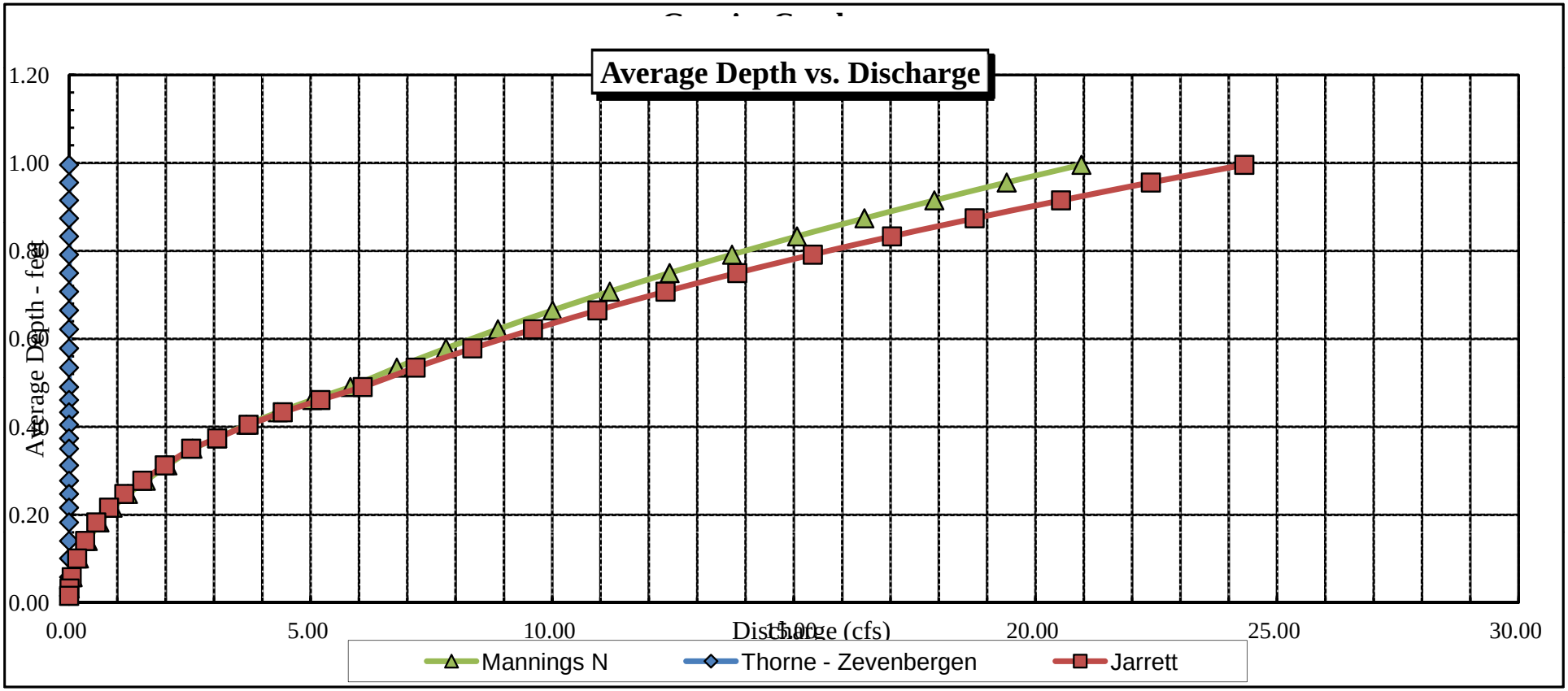
RECOMMENDATION BY: ……………………...………..……............................... AGENCY...……………………….....……...…...……...... DATE:......…...…......……………

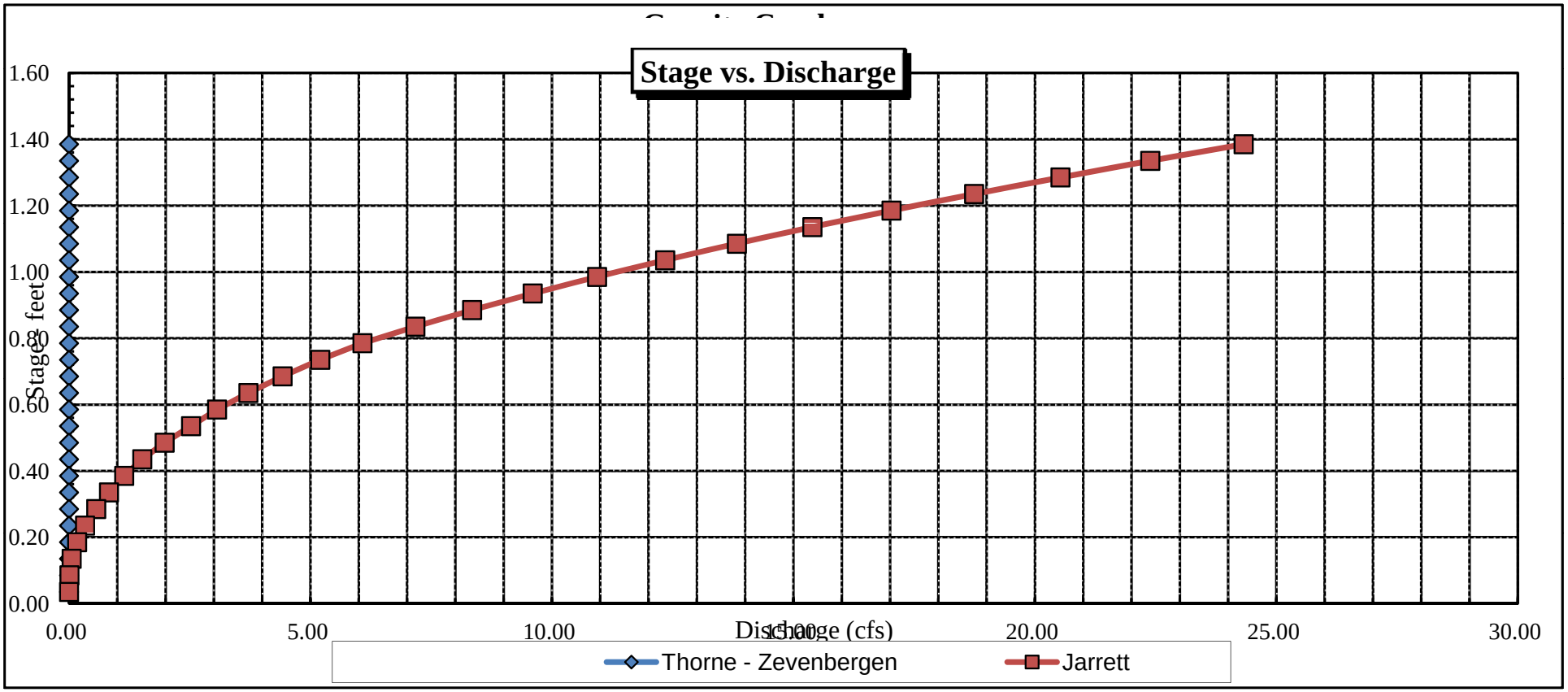
CWCB REVIEW BY: ..………………………….....………………………………………………..…............. DATE:.................…………….....


CROSS SECTION DATA ANALYSIS
RS
G
W
W
G
LS
-2.50
-3.00
-4.00
-4.50
-5.00
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
5.00
10.00
15.00
20.00
25.00
30.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
2.50
2.00
1.50
1.00
0.50
0.00
Velocity - ft/sec
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


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

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Granite Creek @ State line				CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: NAD 1983 Zone 12S 0668745 4299728				
DATE: 7/7/2011	OBSERVERS: N. Dietrich / Z. Havers / T.S.			
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 19	TOWNSHIP: 14 N/(S)	RANGE: 104 E/(W) PM: 6th
COUNTY: Mesa	WATERSHED: Lower Dolores	WATER DIVISION: 4	DOW WATER CODE:	
MAP(S): USGS: Steamboat Mesa				
MAP(S): USFS:				

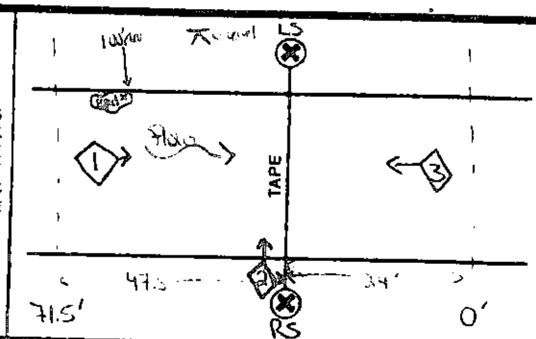
SUPPLEMENTAL DATA

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 / Cobble		PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	
② WS Upstream	47.5	8.14
③ WS Downstream	24.0	9.61
SLOPE	2.1%	~B3/4 type Stream @ section

SKETCH



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

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/(NO)	DISTANCE ELECTROFISHED: N/A ft	FISH ~~CAUGHT~~ observed: (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
Brook trout				|—|												1

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

COMMENTS

~4-5" brook trout observed

Pressure transducer Stage = 1.03 ft.

pH = 8.43

SC = 360 μS

Temp = 15.7°C

Datum: arbitrary datum i. BM=100' Stage reading = 98.17 (to ...)

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Granite Creek @ Stateline | CROSS SECTION NO 2 | DATE 7/7/11 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT (circled: RIGHT) | Gage Reading: 1.03 ft | TIME 0945

Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total FS Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	~~Revolutions~~ Channel points elevation relative to BM=100'	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft²)	Discharge (cfs)
RS	0	—	6.01			101.99					
	1	1	6.26			101.74					
	2		6.69			101.31					
	3		7.46			100.54					
RG	4		8.17			99.83					
	6	2	8.53			99.47					
	8	2	8.89			99.11				0	0
RW	8.7	0.7	9.16	—	0.6d	98.84	20sec	0			
	9	0.3	9.34	0.18		98.66		0.21		0.054	0.01
	9.3		9.42	0.26		98.58		0.90		0.078	0.07
	9.6		9.48	0.32		98.52		0.83		0.096	0.08
	9.9		9.5	0.34		98.5		1.01		0.102	0.1
	10.2		9.52	0.36		98.48		1.20		0.108	0.13
	10.5		9.55	0.39		98.45		1.12		0.117	0.13
	10.8		9.55	0.39		98.45		0.94		0.117	0.11
	11.1		9.55	0.39		98.45		0.89		0.117	0.1
	[illegible]		9.47	0.31		98.53		1.06		0.093	0.1
	[illegible]		[illegible]	0.36		98.48		1.37		0.108	0.15
	[illegible]		[illegible]	0.33		98.51		0.84		0.099	0.08
	12.3		9.40	0.24		98.6		0.15		0.072	0.01
	12.6		9.33	0.17		98.67		0		0.051	0
	12.9		9.25	0.09		98.75		0		0.027	0
LW	13.2		9.16	—		98.84		0		0	0
LG top of cutbank	14.4	1.2	7.95			100.05					1.08 cfs
	15.5	1.1	7.59			100.41					
	17.0	1.5	6.95			101.05					
	17.7	0.7	6.69			101.31					
LS	19.5	0.8	5.87			102.13					
TOTALS:											

BM=100' top of rock on LB US of X-section

BS @ 1 = 8.0

HI = 108.0

BS @ 1 ✓ @ completion

End of Measurement | Time: 1000 | Staff Gage Reading: 1.03 ft | CALCULATIONS PERFORMED BY: N. Dieterich | CALCULATIONS CHECKED BY:

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

LOCATION INFORMATION

STREAM NAME:	Granite Creek
XS LOCATION:	Just upstream of CO-UT border
XS NUMBER:	1
DATE:	7-Jul-11
OBSERVERS:	0
1/4 SEC:	NW
SECTION:	19
TWP:	14S
RANGE:	104W
PM:	6th
COUNTY:	Mesa
WATERSHED:	Dolores River
DIVISION:	4
DOW CODE:	21979
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:	0.021

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

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

STREAM NAME: Granite Creek
XS LOCATION: Just upstream of CO-UT border
XS NUMBER: 1

DATA POINTS= 28

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
RS	0.00	6.01			0.00		0.00	0.00	0.0%
	1.00	6.26			0.00		0.00	0.00	0.0%
	2.00	6.69			0.00		0.00	0.00	0.0%
	3.00	7.46			0.00		0.00	0.00	0.0%
1 G	4.00	8.17			0.00		0.00	0.00	0.0%
	6.00	8.53			0.00		0.00	0.00	0.0%
	8.00	8.89			0.00		0.00	0.00	0.0%
W	8.70	9.16	0.00	0.00	0.00		0.00	0.00	0.0%
	9.00	9.34	0.18	0.21	0.35	0.18	0.05	0.01	1.1%
	9.30	9.42	0.26	0.90	0.31	0.26	0.08	0.07	6.5%
	9.60	9.48	0.32	0.83	0.31	0.32	0.10	0.08	7.4%
	9.90	9.50	0.34	1.01	0.30	0.34	0.10	0.10	9.5%
	10.20	9.52	0.36	1.20	0.30	0.36	0.11	0.13	12.0%
	10.50	9.55	0.39	1.12	0.30	0.39	0.12	0.13	12.1%
	10.80	9.55	0.39	0.94	0.30	0.39	0.12	0.11	10.2%
	11.10	9.55	0.39	0.89	0.30	0.39	0.12	0.10	9.6%
	11.40	9.47	0.31	1.06	0.31	0.31	0.09	0.10	9.1%
	11.70	9.52	0.36	1.37	0.30	0.36	0.11	0.15	13.7%
	12.00	9.49	0.33	0.84	0.30	0.33	0.10	0.08	7.7%
	12.30	9.40	0.24	0.15	0.31	0.24	0.07	0.01	1.0%
	12.60	9.33	0.17	0.00	0.31	0.17	0.05	0.00	0.0%
	12.90	9.25	0.09	0.00	0.31	0.09	0.03	0.00	0.0%
W	13.20	9.16	0.00	0.00	0.31		0.00	0.00	0.0%
1 G	14.40	7.95			0.00		0.00	0.00	0.0%
	15.50	7.59			0.00		0.00	0.00	0.0%
	17.00	6.95			0.00		0.00	0.00	0.0%
	17.70	6.69			0.00		0.00	0.00	0.0%
LS	19.50	5.87			0.00		0.00	0.00	0.0%
TOTALS ----------					4.63	0.39 (Max.)	1.24	1.08	100.0%

Manning's n = 0.1026
Hydraulic Radius= 0.26759172

STREAM NAME: Granite Creek
XS LOCATION: Just upstream of CO-UT border
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.24	1.24	0.0%
8.91	1.24	2.48	99.8%
8.93	1.24	2.37	91.2%
8.95	1.24	2.26	82.7%
8.97	1.24	2.16	74.2%
8.99	1.24	2.06	65.9%
9.01	1.24	1.95	57.7%
9.03	1.24	1.85	49.7%
9.05	1.24	1.76	41.7%
9.07	1.24	1.66	33.9%
9.09	1.24	1.56	26.1%
9.11	1.24	1.47	18.5%
9.12	1.24	1.42	14.8%
9.13	1.24	1.38	11.0%
9.14	1.24	1.33	7.3%
9.15	1.24	1.28	3.6%
9.16	1.24	1.24	0.0%
9.17	1.24	1.19	-3.6%
9.18	1.24	1.15	-7.2%
9.19	1.24	1.11	-10.7%
9.20	1.24	1.06	-14.2%
9.21	1.24	1.02	-17.7%
9.23	1.24	0.94	-24.4%
9.25	1.24	0.85	-31.1%
9.27	1.24	0.77	-37.5%
9.29	1.24	0.70	-43.8%
9.31	1.24	0.62	-49.9%
9.33	1.24	0.55	-55.8%
9.35	1.24	0.48	-61.5%
9.37	1.24	0.41	-67.0%
9.39	1.24	0.34	-72.2%
9.41	1.24	0.28	-77.2%

WATERLINE AT ZERO
AREA ERROR = 9.160

STREAM NAME: Granite Creek
XS LOCATION: Just upstream of CO-UT border
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	8.17	10.18	0.81	1.38	8.22	10.84	100.0%	0.76	14.34	1.74
	8.21	9.92	0.79	1.34	7.82	10.56	97.4%	0.74	13.42	1.72
	8.26	9.59	0.76	1.29	7.33	10.20	94.1%	0.72	12.33	1.68
	8.31	9.27	0.74	1.24	6.86	9.85	90.9%	0.70	11.30	1.65
	8.36	8.94	0.72	1.19	6.40	9.50	87.6%	0.67	10.33	1.61
	8.41	8.61	0.69	1.14	5.96	9.15	84.4%	0.65	9.41	1.58
	8.46	8.28	0.67	1.09	5.54	8.79	81.1%	0.63	8.55	1.54
	8.51	7.96	0.65	1.04	5.14	8.44	77.9%	0.61	7.74	1.51
	8.56	7.63	0.62	0.99	4.75	8.09	74.6%	0.59	6.98	1.47
	8.61	7.30	0.60	0.94	4.37	7.74	71.4%	0.57	6.27	1.43
	8.66	6.97	0.58	0.89	4.02	7.38	68.1%	0.54	5.61	1.40
	8.71	6.65	0.55	0.84	3.67	7.03	64.9%	0.52	5.00	1.36
	8.76	6.32	0.53	0.79	3.35	6.68	61.6%	0.50	4.44	1.32
	8.81	5.99	0.51	0.74	3.04	6.32	58.4%	0.48	3.92	1.29
	8.86	5.66	0.49	0.69	2.75	5.97	55.1%	0.46	3.44	1.25
	8.91	5.40	0.46	0.64	2.48	5.68	52.4%	0.44	2.99	1.21
	8.96	5.22	0.42	0.59	2.21	5.47	50.4%	0.40	2.54	1.15
	9.01	5.04	0.39	0.54	1.95	5.26	48.5%	0.37	2.12	1.08
	9.06	4.86	0.35	0.49	1.71	5.05	46.6%	0.34	1.74	1.02
	9.11	4.68	0.31	0.44	1.47	4.84	44.6%	0.30	1.39	0.95
WL	9.16	4.50	0.28	0.39	1.24	4.63	42.7%	0.27	1.08	0.87
	9.21	4.25	0.24	0.34	1.02	4.36	40.2%	0.23	0.81	0.80
	9.26	4.00	0.20	0.29	0.81	4.08	37.7%	0.20	0.58	0.72
	9.31	3.72	0.17	0.24	0.62	3.79	35.0%	0.16	0.39	0.63
	9.36	3.40	0.13	0.19	0.44	3.45	31.8%	0.13	0.24	0.53
	9.41	3.00	0.09	0.14	0.28	3.04	28.1%	0.09	0.12	0.43
	9.46	2.60	0.05	0.09	0.14	2.63	24.2%	0.05	0.04	0.30
	9.51	1.36	0.03	0.04	0.04	1.37	12.6%	0.03	0.01	0.19

STREAM NAME: Granite Creek
XS LOCATION: Just upstream of CO-UT border
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.08	cfs
CALCULATED FLOW (Qc)=	1.08	cfs
(Qm-Qc)/Qm * 100 =	0.0	%
MEASURED WATERLINE (WLm)=	9.16	ft
CALCULATED WATERLINE (WLc)=	9.16	ft
(WLm-WLc)/WLm * 100 =	0.0	%
MAX MEASURED DEPTH (Dm)=	0.39	ft
MAX CALCULATED DEPTH (Dc)=	0.39	ft
(Dm-Dc)/Dm * 100	0.0	%
MEAN VELOCITY=	0.87	ft/sec
MANNING'S N=	0.103	
SLOPE=	0.021	ft/ft
.4 * Qm =	0.4	cfs
2.5 * Qm=	2.7	cfs

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

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

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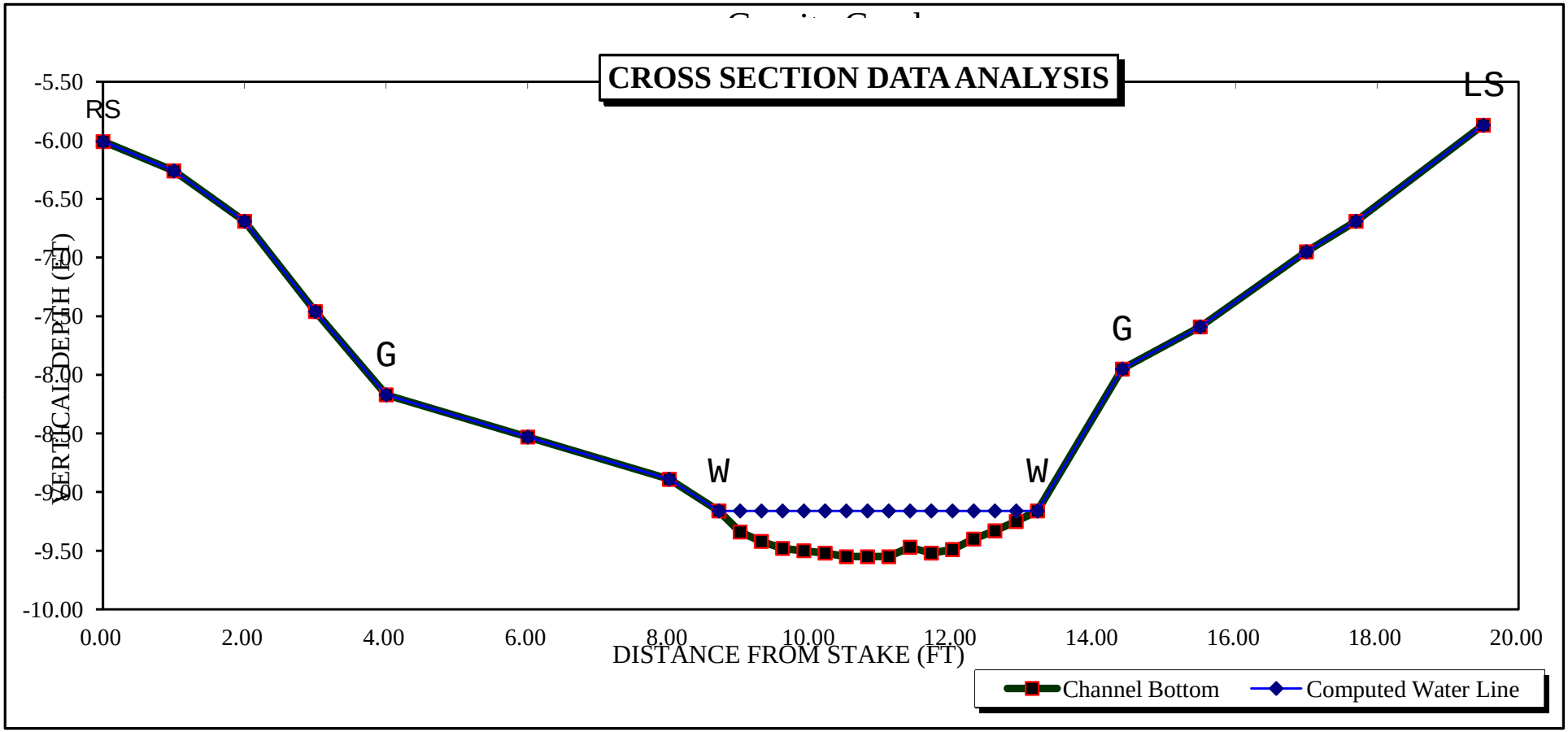
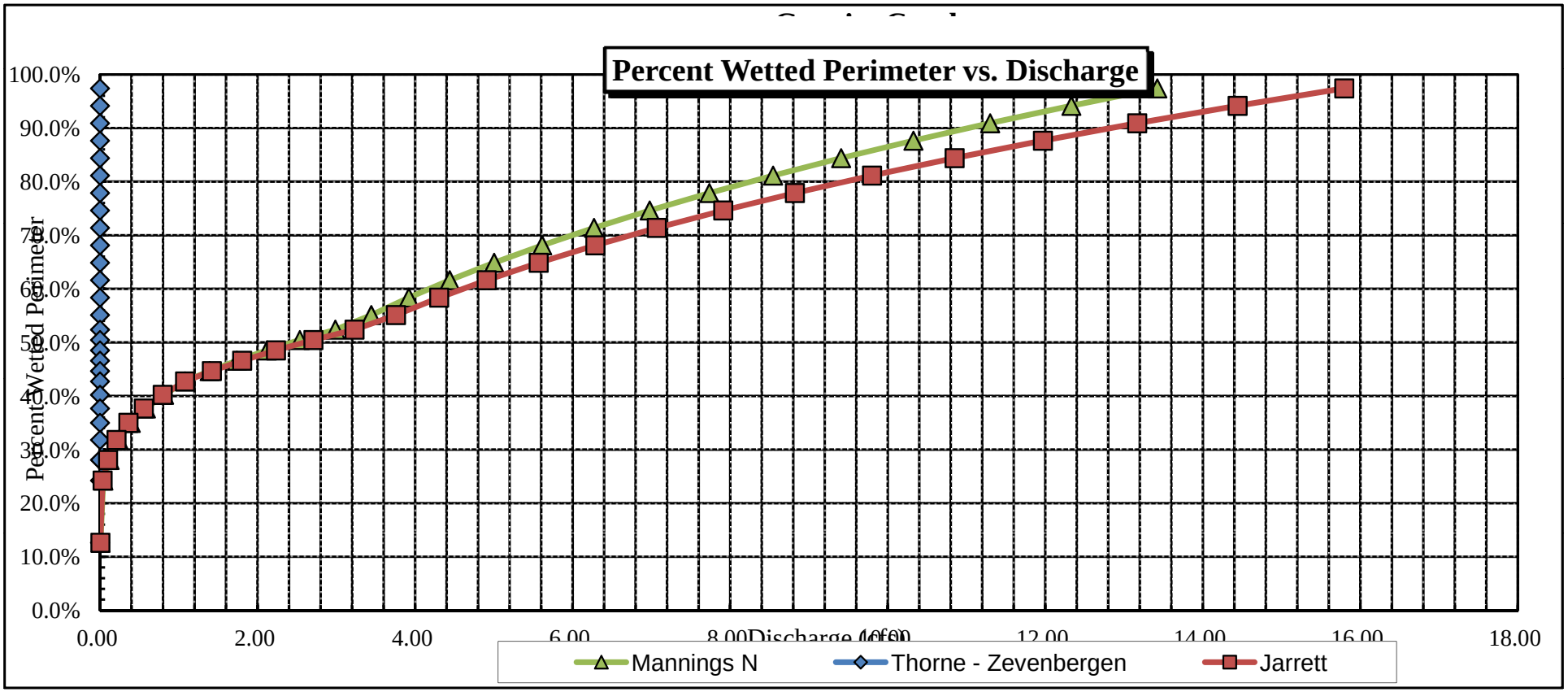
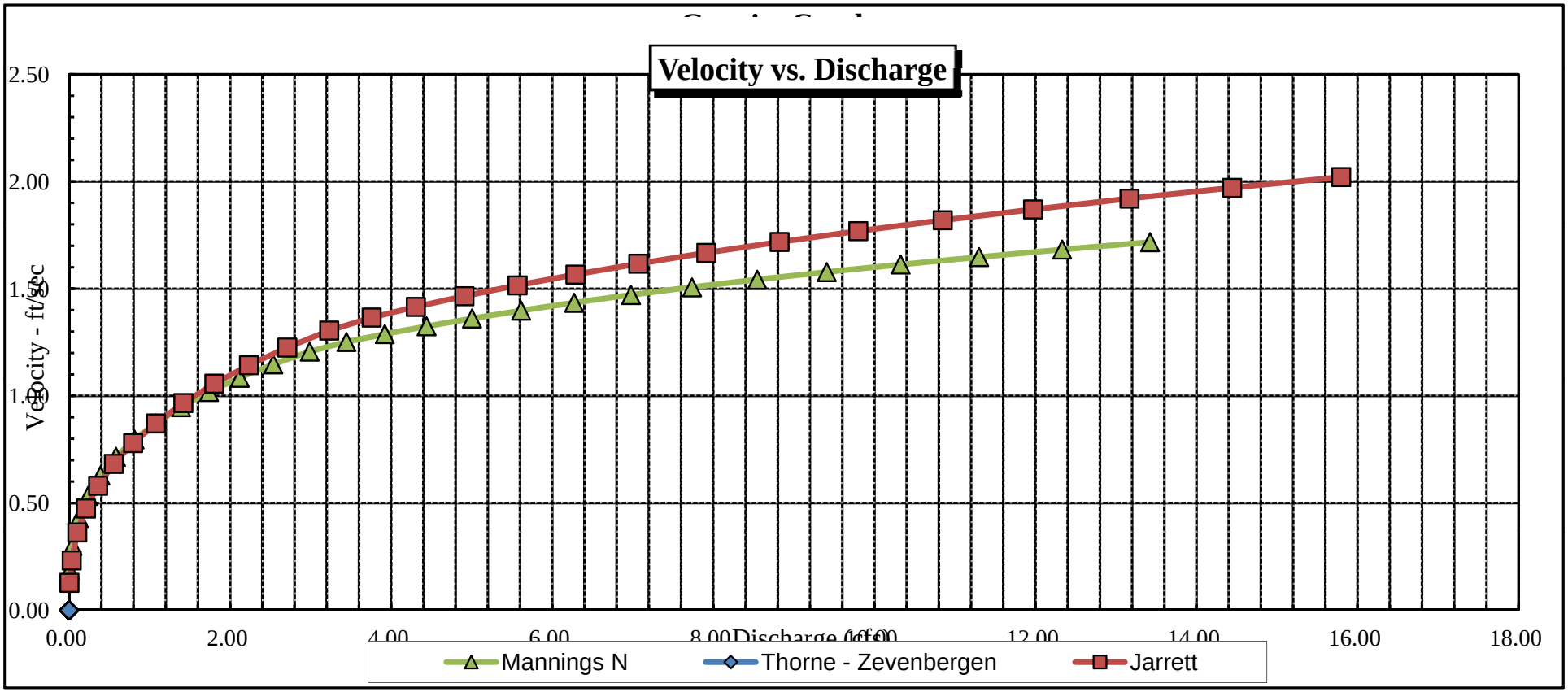
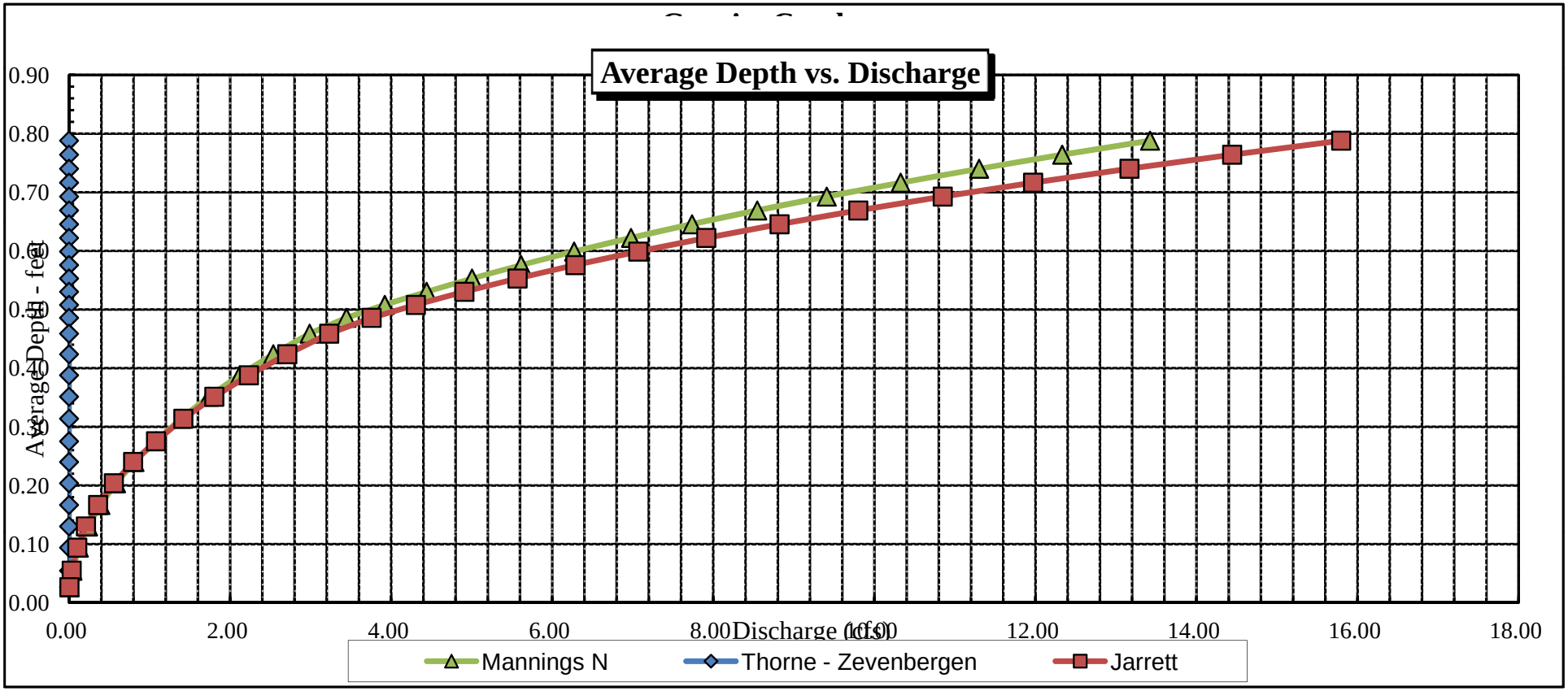
RECOMMENDATION BY: ………………...………..……............................... AGENCY...……………………......……...…...……....... DATE:.......…...…......……………

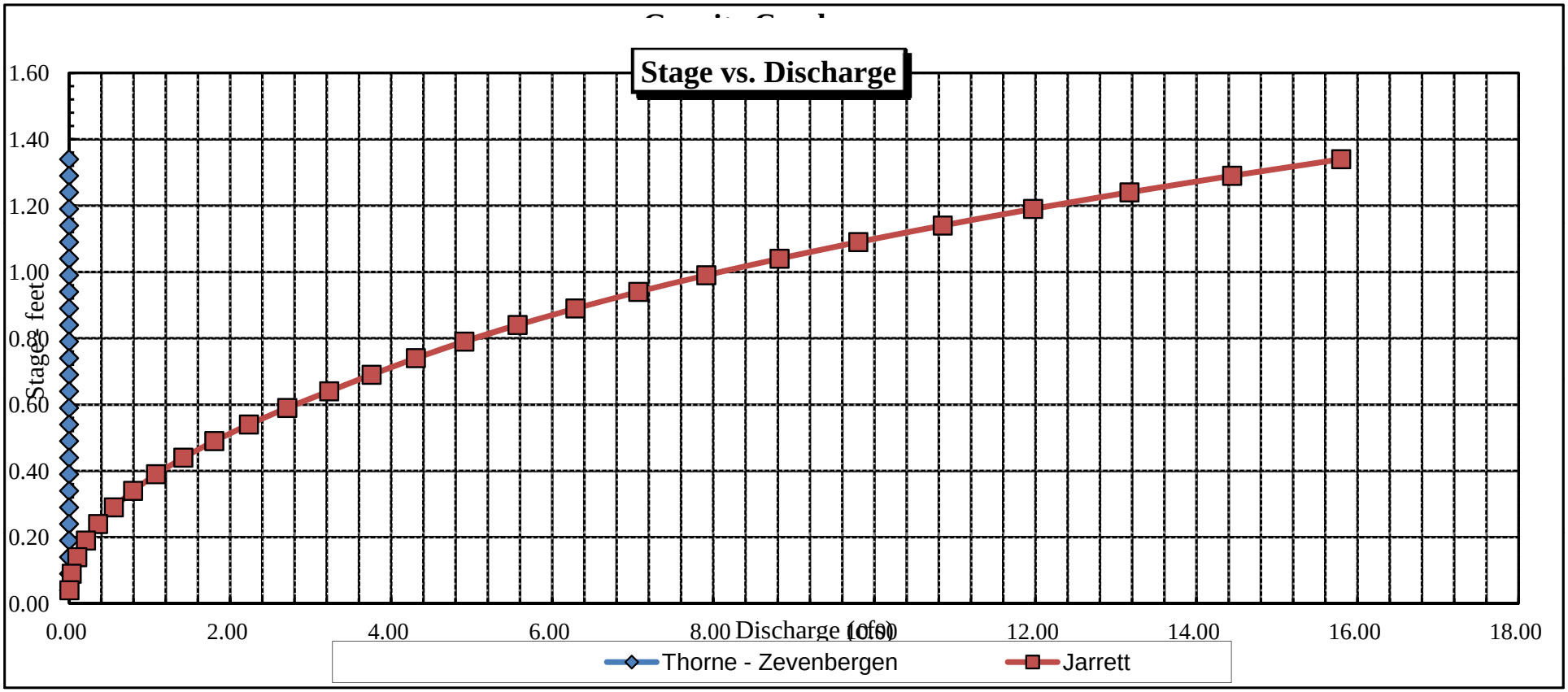
CWCB REVIEW BY: ...…………………………....………………………………………………...…............. DATE:..................……………...…


CROSS SECTION DATA ANALYSIS
RS
G
W
W
G
LS
-5.50
-6.00
-6.50
-7.00
-7.50
-8.00
-8.50
-9.00
-9.50
-10.00
VERTICAL DEPTH (FT)
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
12.00
14.00
16.00
18.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
2.50
2.00
1.50
1.00
0.50
0.00
Velocity - ft/sec
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
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