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

In Reply Refer To:
7250 (CO-932)

DEC 0 5 2016

Ms. Linda Bassi
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 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 Dry Fork Roan Creek, located in Water Division 5.

Location and Land Status. Dry Fork Roan Creek originates on the south side of Cow Ridge, approximately 23 miles north of Grand Junction. Dry Fork Roan Creek flows into Roan Creek approximately 3.5 miles northwest of DeBeque. This recommendation covers the stream reach beginning at the confluence of the South Dry Fork and North Dry Fork and extends downstream to the headgate of Omundson and Frost Ditch. This stream reach covers a distance of approximately 2.25 miles. BLM manages 1.00 miles of this stream reach, while 1.25 miles are in private ownership.

Biological Summary. Dry Fork Roan Creek is a cool-water, moderate gradient stream in a stream valley that is approximately 0.5 mile wide. The stream is typically narrow, has a good width-depth ratio, and generally has small substrate. Portions of the stream that have recovered from historic overgrazing typically have good cover and a good mix of riffle and run habitat. In areas that have not fully recovered from historic overgrazing, the stream is wider, has less cover, and exhibits less bank stability.

The riparian community along Dry Fork Roan Creek is robust and recovering from historic grazing practices, providing improving cover and shading for the stream. The riparian community is comprised mainly of willow and Fremont cottonwood. BLM wildlife data collected in 2012 identified native northern leopard frogs (a State species of concern) utilizing the riparian habitats associated with Dry Fork Roan Creek. In addition, BLM spot surveys have revealed a macroinvertebrate community that includes mayflies and caddisflies.

R2Cross Analysis. BLM collected the following R2Cross data from Dry Fork Roan 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)
05/15/2012 #1	0.78 cfs	8.3 feet	0.92 cfs	1.05 cfs
05/15/2012 #2	0.94 cfs	6.9 feet	1.22 cfs	1.78 cfs
		Averages:	1.07 cfs	1.41 cfs

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

> 0.5 cubic feet per second is recommended for the high temperature period from May 1 through August 15. This recommendation is driven by limited water availability. 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. This flow rate should also help maintain water in the rooting zone for the extensive riparian community associated with this creek.
>
> 0.20 cubic feet per second is recommended for the base flow period between August 16 and April 30. This flow rate doesn't meet any of the instream flow criteria, but it does reflect limited water availability, as influenced by base season flows and occasional diversions. This flow rate should provide sufficient flow to prevent pools from freezing during the winter. It should also provide for connectivity between the limited physical habitat that is available during the low flow period.

Water Availability. There are several sources of water availability information that could be used for this creek. BLM recommends using United States Geological Survey (USGS) Gage 09095400 (Dry Fork Fork near Debeque, CO) because it is located at the bottom of the proposed instream flow reach, and as such, it incorporates all of the water uses that occur upstream from the gage. Despite the short period of record, it provides valuable data. BLM also recommends consulting the StreamStats package developed jointly between the USGS and the Colorado Water Conservation Board (CWCB).

BLM is aware of the following ditches located upstream from the proposed instream flow reach:

Smith Ditch – 1.0 cfs, 1912 priority
Rothschild Ditch – 2.0 cfs, 1887 priority
DeLaMatyr Ditch – 3.0 cfs, 1887 priority
Anderson and Hayes Ditch – 1.7 cfs, 1886 and 1887 priorities
Hayes Ditch – 1.5 cfs, 1887 priority

BLM's understanding is that return flows from all of the ditches listed above accrue to the creek. In addition, BLM understands there are water rights on lower Roan Creek that are senior in priority to all of the ditches on the Dry Fork, so the ditches on the Dry Fork may be precluded from diverting during dry periods.

The BLM notes that water availability analysis on this creek had to be determined from an extremely limited data set, and because of water availability, the recommended flow rates are substantially below the flow rates recommended by R2Cross analysis. For these reasons, the BLM recommends that protected flow rates be increased if new data demonstrates that additional water is available, or if diversions from the creek are permanently decreased.

Relationship to Land Management Plans. Common goals and objectives focused on management of water resource values identified in the Grand Junction Field Office Resource Management Plan include:

1. Protection, preservation, and enhancement of watershed functions in the capture, retention, and release of water in quantity, quality, and time to meet ecosystem and human needs. (goal)
2. Provide sufficient water quantity on BLM lands for multiple use management and functioning, healthy riparian, wetland, aquatic, and upland systems. (objective)
3. Ensure streams on BLM lands are in geomorphic balance (e.g. stream channel size, sinuosity, slope, and substrate are appropriate for its landscape setting and geology) with the water and sediment being supplied by the watershed (e.g., no accelerated erosion, deposition, or head-cutting) and ensure that the land used does not impeded the natural hydrograph(e.g., allows timing, magnitude and duration of peak, high and low flow events by minimizing surface disturbance, erosion, and sedimentation of streams). (objective)

Appropriation of an instream flow water right would assist BLM in long-term management of riparian values, aquatic habitat, and amphibian and 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 at (303) 239-3940.

Sincerely,

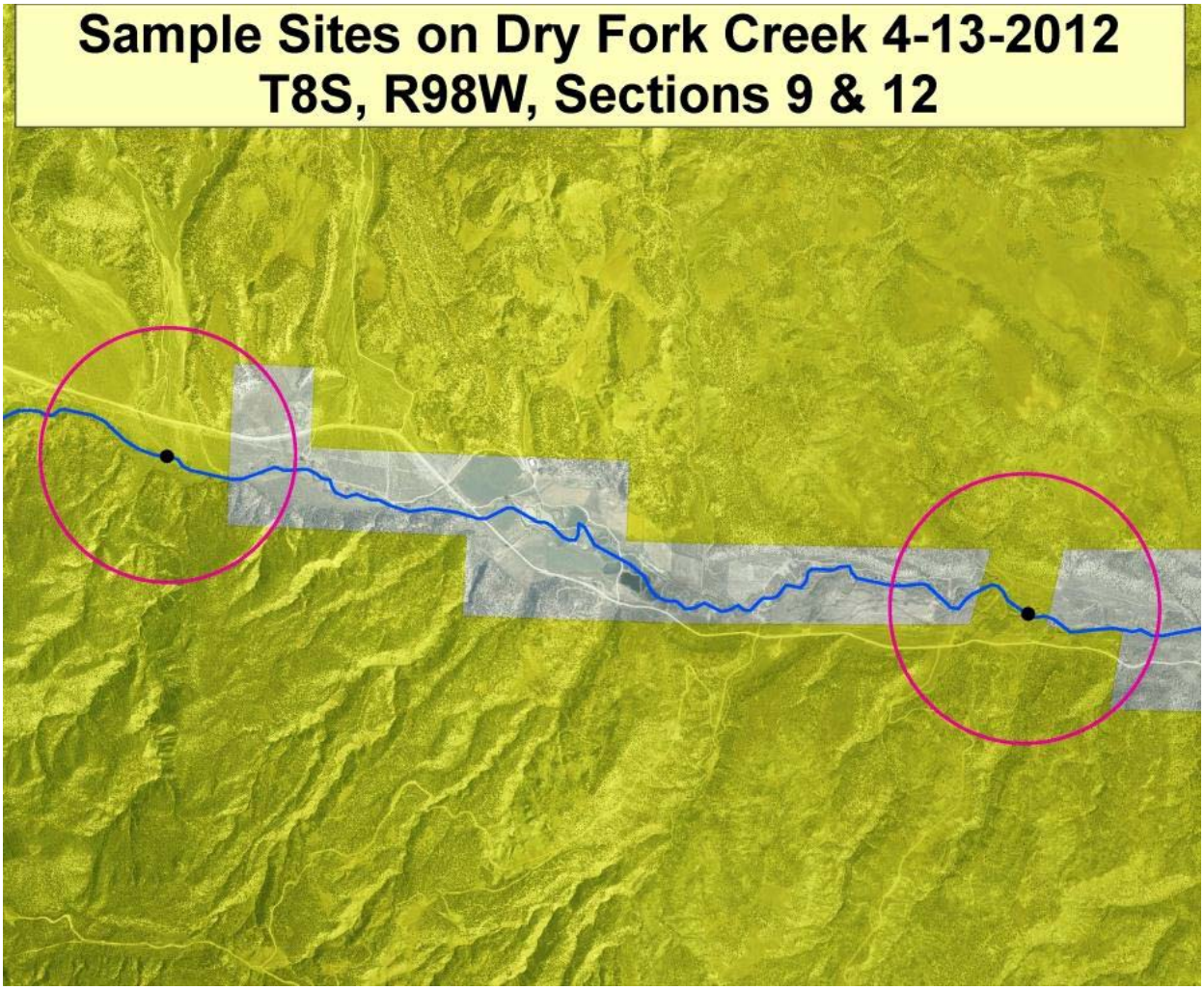
Brian St. George
Deputy State Director
Resources and Fire

Cc: Katie Stevens, Grand Junction Field Office
Kevin Hyatt, Grand Junction Field Office

Grand Junction Field Office Stream Surveys
April 2012

Dry Fork Creek - Water Code #23898

Dry Fork Creek, located northwest of DeBeque, Colorado on lands managed by the BLM's Grand Junction Field Office, was sampled on April 13, 2012. Dry Fork Creek is tributary to Roan Creek and then the Colorado River. Two sites were sampled using 1 backpack electroshocker. A two-pass removal population estimate was conducted at the lower of the two sites. No fish were collected or seen at the upper site. Sampling was conducted to determine fish species composition and to look specifically for spring spawning use of the creek by select native fish (flannelmouth suckers, bluehead suckers, and roundtail chubs). Personnel present included Tom Fresques, and Faith Dziedzic BLM, and Jenn Logan, Kevin Thompson, and their crew, Colorado Parks and Wildlife.



Lower Site

Brook stickleback

Fathead minnow

Speckled dace

Bullfrog

Upper sample site

Upper Sample Site

Discussion:

Two sites on Dry Fork Creek were sampled. Native speckled dace and nonnative fathead minnow and brook stickleback were collected at the lower site as were native northern leopard frogs and nonnative bullfrogs. No fish were seen or captured at the upper site despite better flow and habitat. Water diversions appear to effect flow regimes in select stream segments. This was a very dry year and flow was limited. It could be that on good flow years the stream is used seasonally by other native fishes.

Riparian vegetation at the lower site consisted of tamarisk, cottonwoods, willow, and limited sedges. Stream habitat was fair with limited shallow pools and mostly small run and riffle habitats. Substrate was primarily cobble covered with silt and sands.

Riparian vegetation at the upper site consisted of canary reedgrass, scattered willows, and some sedge and rush. Stream habitat was mostly longer runs with some deeper pools and limited riffles. Fine sediments were abundant. Flows were better here but no fish were collected or seen. It is possible that a barrier to upstream fish movement exists between the lower and upper site on private lands but no obvious barriers were observed and it could just be diversion structures and/or low flows.

Recommendations:

- Consider sampling at other times of year and on a good water year to see if there is increased use by select native fishes

- Determine the extent of the northern leopard frog/bullfrog populations

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Dry Fork Roan Creek						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: 1.25 miles downstream from conf. w/ South Dry Fk.						
DATE: 5-15-12	OBSERVERS: R. Smith, N. Diederich					
LEGAL DESCRIPTION	¼ SECTION: SE NW	SECTION: 9	TOWNSHIP: 8 N/S	RANGE: 98 E/W	PM: 6th	
COUNTY: Garfield	WATERSHED: Roan Ck.	WATER DIVISION: 5	DOW WATER CODE: 21701			
MAP(S): USGS:			NAD 83	0729723		
USFS:			Zone 12S	4361901		

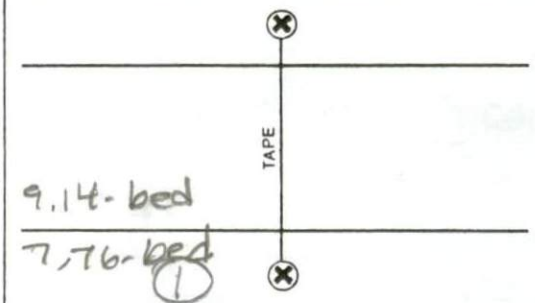
SUPPLEMENTAL DATA

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 4" cobbles	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	8.42/8.42
② WS Upstream	40.0	8.85
③ WS Downstream	73.0	7.50
SLOPE	1.35/113.0 =	

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
(N)			(Y)

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

COMMENTS

pH = 8.46
Temp = 15.3° C
Cond = 2714 µS
Salinity = 1.5 ppt

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Dry Fork Roan Creek | CROSS-SECTION NO.: 1 | DATE: 5-15-12 | SHEET ___ OF ___

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

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~~		6.76								
	1.0		7.17								
	2.0		7.88								
	2.5		8.33								
W	2.9		8.42								
	3.2		8.52	.1				0.58			
	3.5		8.62	.2				0.95			
	3.8		8.67	.25				1.08			
	4.1		8.67	.25				1.27			
	4.4		8.67	.25				1.25			
	4.7		8.67	.25				1.14			
	5.0		8.62	.20				1.10			
	5.3		8.57	.15				1.03			
	5.6		8.62	.20				1.23			
	5.9		8.67	.25				1.21			
	6.2		8.57	.15				1.08			
	6.5		8.52	.10				0.63			
	6.8		8.57	.15				Ø			
	7.1		8.52	.10				Ø			
	7.4		8.52	.10				Ø			
W	7.6		8.42								
	8.0		8.29								
	8.4		7.2								
G	9		6.73								
	10.0		6.56								
RS	11.3		5.99								
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:	Dry Fork Roan Creek
XS LOCATION:	1.25 mi fs fr conf w/ S. Dry Fork
XS NUMBER:	1
DATE:	15-May-12
OBSERVERS:	R. Smith, N. Dieterich
1/4 SEC:	SE NW
SECTION:	9
TWP:	8S
RANGE:	98W
PM:	Sixth
COUNTY:	Garfield
WATERSHED:	Roan Creek
DIVISION:	4
DOW CODE:	21701
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:	0.0119

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

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

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi fs fr conf w/ S. Dry Fork
XS NUMBER: 1

DATA POINTS= 26

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	0.70	6.76			0.00		0.00	0.00	0.0%
		1.00	7.17			0.00		0.00	0.00	0.0%
		2.00	7.88			0.00		0.00	0.00	0.0%
		2.50	8.33			0.00		0.00	0.00	0.0%
	W	2.90	8.42	0.00	0.00	0.00		0.00	0.00	0.0%
		3.20	8.52	0.10	0.58	0.32	0.10	0.03	0.02	2.2%
		3.50	8.62	0.20	0.95	0.32	0.20	0.06	0.06	7.3%
		3.80	8.67	0.25	1.08	0.30	0.25	0.08	0.08	10.4%
		4.10	8.67	0.25	1.27	0.30	0.25	0.08	0.10	12.3%
		4.40	8.67	0.25	1.25	0.30	0.25	0.08	0.09	12.1%
		4.70	8.67	0.25	1.17	0.30	0.25	0.08	0.09	11.3%
		5.00	8.62	0.20	1.10	0.30	0.20	0.06	0.07	8.5%
		5.30	8.57	0.15	1.03	0.30	0.15	0.05	0.05	6.0%
		5.60	8.62	0.20	1.23	0.30	0.20	0.06	0.07	9.5%
		5.90	8.67	0.25	1.21	0.30	0.25	0.08	0.09	11.7%
		6.20	8.57	0.15	1.08	0.32	0.15	0.05	0.05	6.3%
		6.50	8.52	0.10	0.63	0.30	0.10	0.03	0.02	2.4%
		6.80	8.57	0.15	0.00	0.30	0.15	0.05	0.00	0.0%
		7.10	8.52	0.10	0.00	0.30	0.10	0.03	0.00	0.0%
		7.40	8.52	0.10	0.00	0.30	0.10	0.03	0.00	0.0%
	W	7.60	8.42	0.00	0.00	0.22		0.00	0.00	0.0%
		8.00	8.29			0.00		0.00	0.00	0.0%
		8.40	7.20			0.00		0.00	0.00	0.0%
1	G	9.00	6.73			0.00		0.00	0.00	0.0%
		10.00	6.56			0.00		0.00	0.00	0.0%
	RS	11.30	5.99			0.00		0.00	0.00	0.0%
	TOTALS ----------					4.81	0.25 (Max.)	0.81	0.78	100.0%

Manning's n = 0.0511
Hydraulic Radius= 0.16752004

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi fs fr conf w/ S. Dry Fork
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.81	0.81	0.0%
8.17	0.81	2.15	167.4%
8.19	0.81	2.04	153.3%
8.21	0.81	1.93	139.2%
8.23	0.81	1.81	125.1%
8.25	0.81	1.70	111.2%
8.27	0.81	1.59	97.3%
8.29	0.81	1.48	83.5%
8.31	0.81	1.37	69.8%
8.33	0.81	1.26	56.3%
8.35	0.81	1.15	43.2%
8.37	0.81	1.05	30.4%
8.38	0.81	1.00	24.1%
8.39	0.81	0.95	17.9%
8.40	0.81	0.90	11.9%
8.41	0.81	0.85	5.9%
8.42	0.81	0.81	0.0%
8.43	0.81	0.76	-5.8%
8.44	0.81	0.71	-11.6%
8.45	0.81	0.67	-17.2%
8.46	0.81	0.62	-22.9%
8.47	0.81	0.58	-28.4%
8.49	0.81	0.49	-39.3%
8.51	0.81	0.40	-50.0%
8.53	0.81	0.32	-60.0%
8.55	0.81	0.25	-68.6%
8.57	0.81	0.19	-76.2%
8.59	0.81	0.14	-82.9%
8.61	0.81	0.09	-88.6%
8.63	0.81	0.05	-93.4%
8.65	0.81	0.02	-97.2%
8.67	0.81	0.00	-100.0%

WATERLINE AT ZERO
AREA ERROR = 8.420

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi fs fr conf w/ S. Dry Fork
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	6.76	8.26	1.44	1.91	11.91	9.92	100.0%	1.20	42.70	3.59
	7.42	6.97	0.99	1.25	6.89	8.03	81.0%	0.86	19.76	2.87
	7.47	6.88	0.95	1.20	6.55	7.89	79.6%	0.83	18.34	2.80
	7.52	6.79	0.91	1.15	6.20	7.75	78.2%	0.80	16.98	2.74
	7.57	6.70	0.88	1.10	5.87	7.61	76.7%	0.77	15.66	2.67
	7.62	6.61	0.84	1.05	5.53	7.47	75.3%	0.74	14.38	2.60
	7.67	6.52	0.80	1.00	5.21	7.33	73.9%	0.71	13.15	2.53
	7.72	6.43	0.76	0.95	4.88	7.19	72.5%	0.68	11.97	2.45
	7.77	6.35	0.72	0.90	4.56	7.05	71.1%	0.65	10.83	2.37
	7.82	6.26	0.68	0.85	4.25	6.91	69.7%	0.61	9.74	2.29
	7.87	6.17	0.64	0.80	3.94	6.77	68.3%	0.58	8.70	2.21
	7.92	6.09	0.60	0.75	3.63	6.64	67.0%	0.55	7.70	2.12
	7.97	6.02	0.55	0.70	3.33	6.52	65.7%	0.51	6.75	2.03
	8.02	5.94	0.51	0.65	3.03	6.39	64.4%	0.47	5.84	1.93
	8.07	5.87	0.47	0.60	2.73	6.26	63.1%	0.44	4.99	1.83
	8.12	5.80	0.42	0.55	2.44	6.13	61.8%	0.40	4.19	1.72
	8.17	5.72	0.38	0.50	2.15	6.00	60.5%	0.36	3.45	1.60
	8.22	5.65	0.33	0.45	1.87	5.87	59.2%	0.32	2.76	1.48
	8.27	5.57	0.28	0.40	1.59	5.75	57.9%	0.28	2.14	1.35
	8.32	5.42	0.24	0.35	1.31	5.55	56.0%	0.24	1.59	1.21
	8.37	5.08	0.21	0.30	1.05	5.19	52.4%	0.20	1.15	1.09
WL	8.42	4.70	0.17	0.25	0.80	4.81	48.5%	0.17	0.78	0.96
	8.47	4.45	0.13	0.20	0.58	4.54	45.7%	0.13	0.46	0.80
	8.52	3.90	0.09	0.15	0.36	3.97	40.0%	0.09	0.23	0.64
	8.57	2.85	0.07	0.10	0.19	2.90	29.2%	0.07	0.10	0.52
	8.62	1.95	0.04	0.05	0.07	1.97	19.9%	0.04	0.02	0.35
	8.67	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi fs fr conf w/ S. Dry Fork
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.78	cfs
CALCULATED FLOW (Qc)=	0.78	cfs
(Qm-Qc)/Qm * 100 =	0.0	%
MEASURED WATERLINE (WLm)=	8.42	ft
CALCULATED WATERLINE (WLc)=	8.42	ft
(WLm-WLc)/WLm * 100 =	0.0	%
MAX MEASURED DEPTH (Dm)=	0.25	ft
MAX CALCULATED DEPTH (Dc)=	0.25	ft
(Dm-Dc)/Dm * 100	0.0	%
MEAN VELOCITY=	0.96	ft/sec
MANNING'S N=	0.051	
SLOPE=	0.0119	ft/ft
.4 * Qm =	0.3	cfs
2.5 * Qm=	1.9	cfs

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

FLOW (CFS)	PERIOD
___________	________

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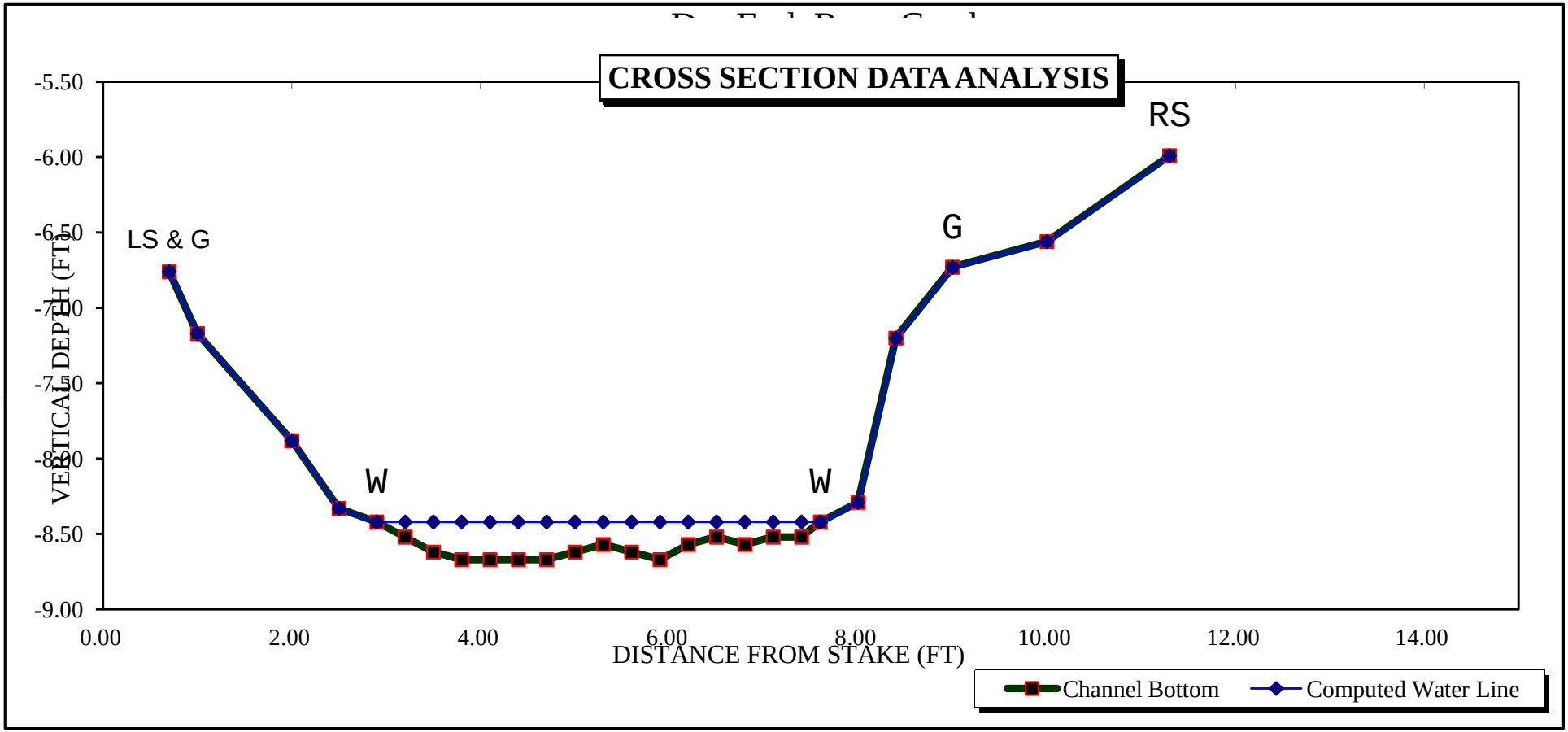
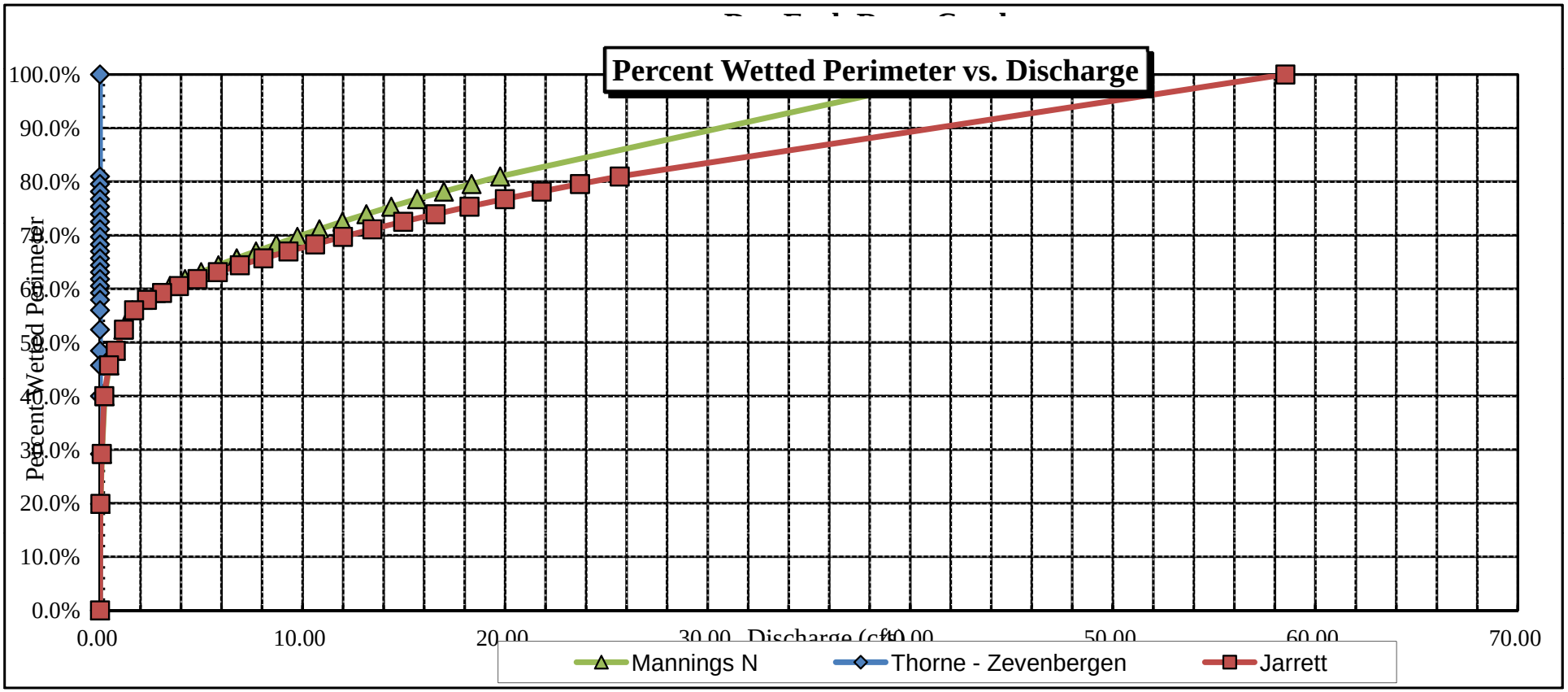
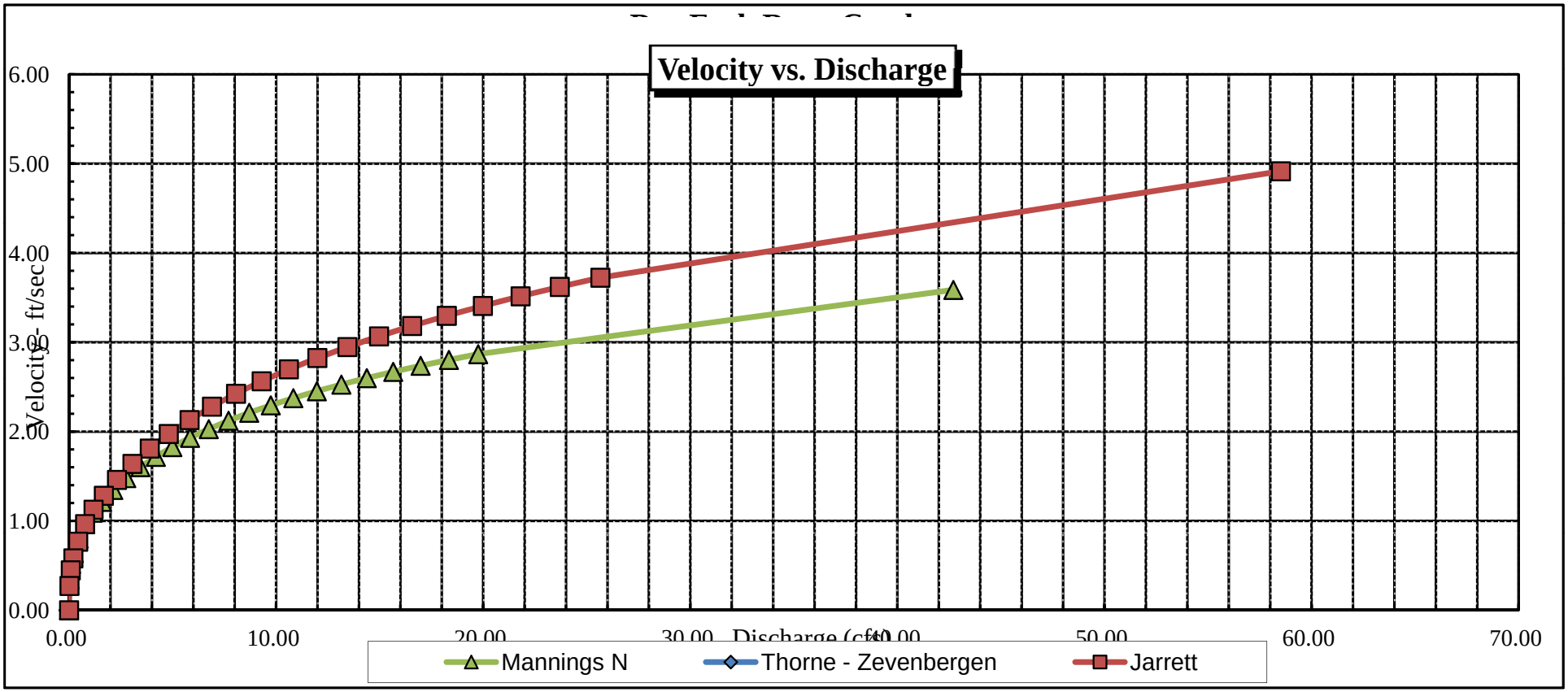
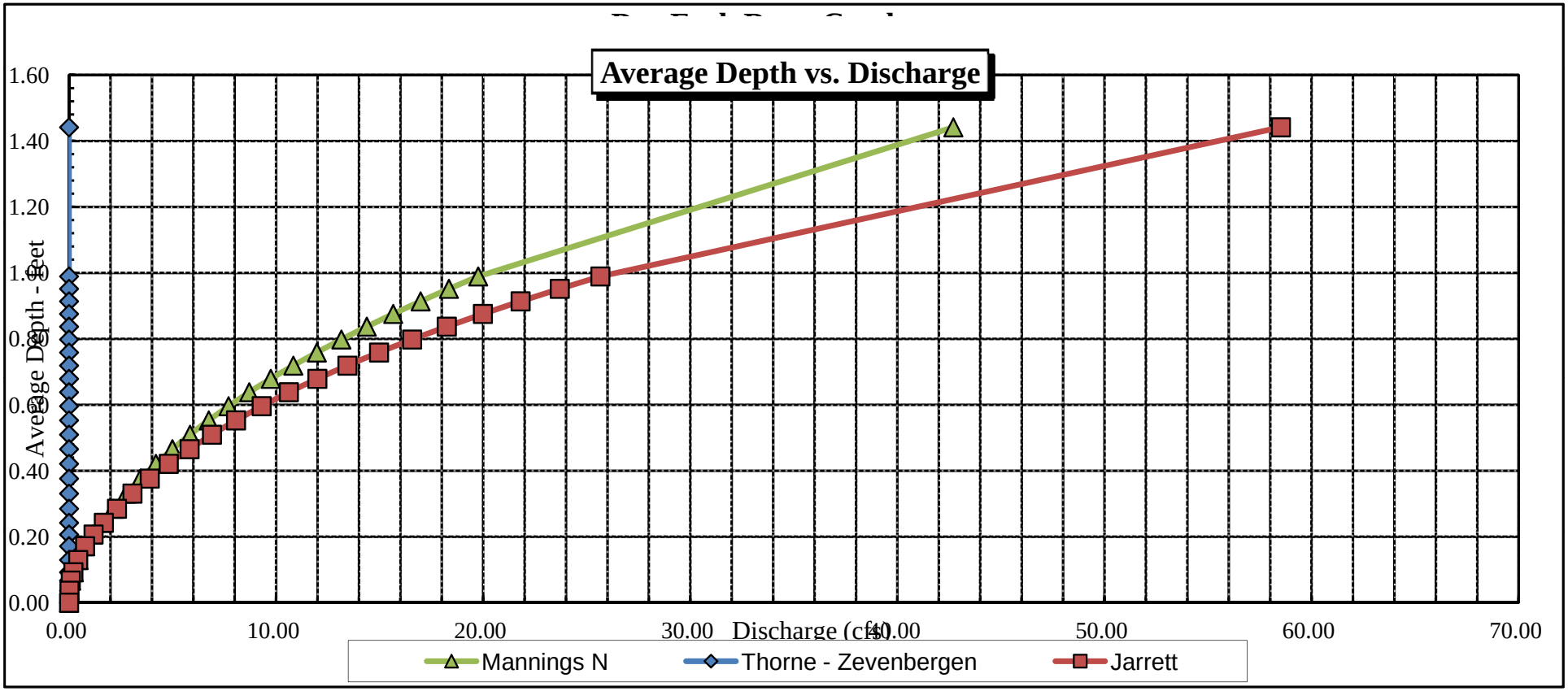
RECOMMENDATION BY: ………………...………..……............................... AGENCY...……………………......…....…...…....... DATE:......…...…......……………

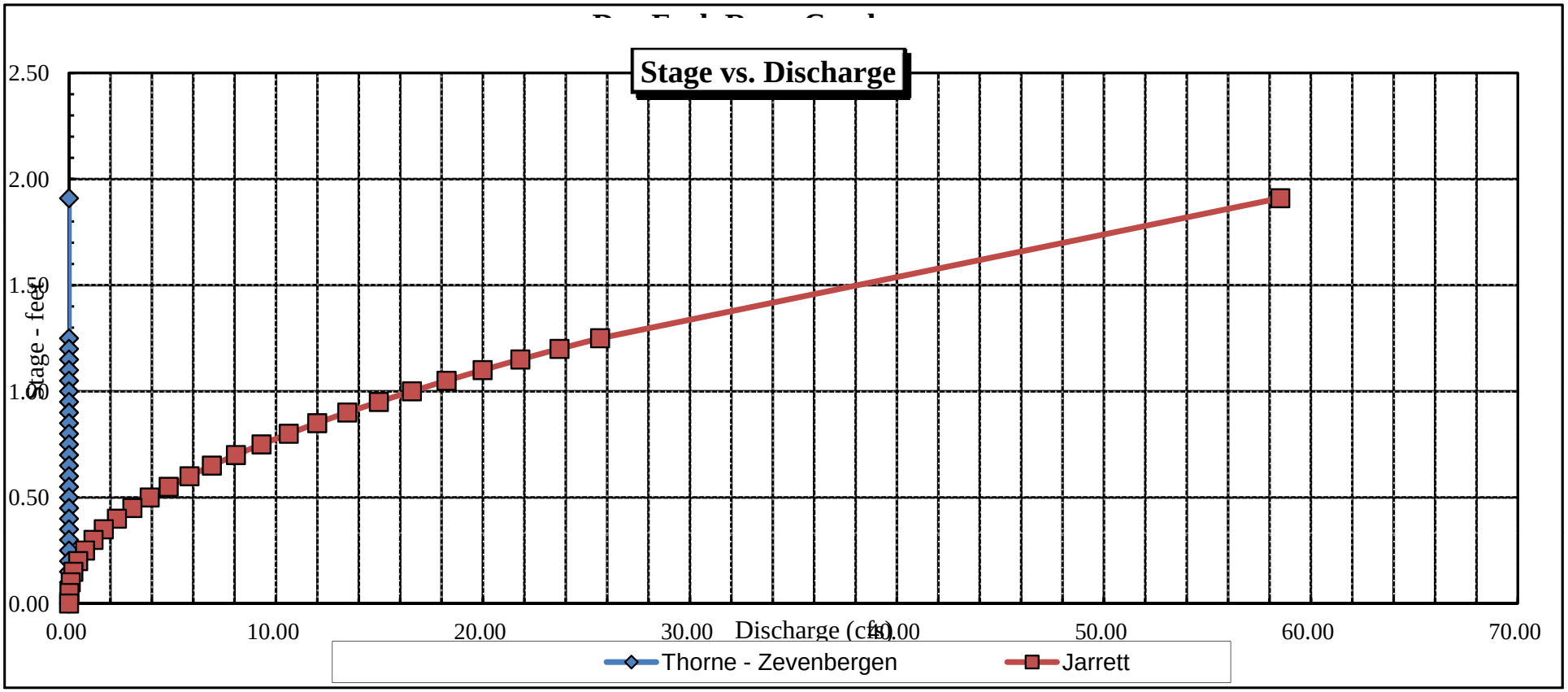
CWCB REVIEW BY: ..………………………......……………………………………………...…............ DATE:.................………………...…


CROSS SECTION DATA ANALYSIS
-5.50
-6.00
-6.50
-7.00
-7.50
-8.00
-8.50
-9.00
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
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
10.00
20.00
30.00
50.00
60.00
70.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Velocity - ft/sec
0.00
10.00
20.00
30.00
Discharge (cfs)
50.00
60.00
70.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - Feet
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
10.00
20.00
30.00
Discharge (cfs)
40.00
50.00
60.00
70.00
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
2.50
2.00
1.50
1.00
0.50
0.00
Stage - feet
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Dry Fork Roan Creek						CROSS-SECTION NO.: 2
CROSS-SECTION LOCATION: 1.25 miles downstream from confluence with South Dry Fork						
DATE: 5-15-12	OBSERVERS: R. Smith, N. Dieterich					
LEGAL DESCRIPTION	¼ SECTION: SE NW	SECTION: 9	TOWNSHIP: 8 (N/S)	RANGE: 98 (E/W)	PM: 6th	
COUNTY: Garfield	WATERSHED: Roan Ck.	WATER DIVISION: 5	DOW WATER CODE: 21701			
MAP(S): USGS:						
USFS:						

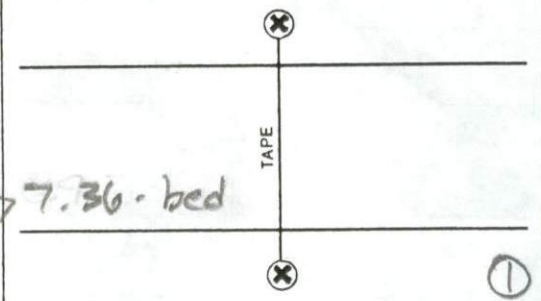
SUPPLEMENTAL DATA

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 4" cobbles	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	7.97/7.98
(2) WS Upstream	36	6.99 → 7.36 - bed
(3) WS Downstream	46	8.42
SLOPE	1.43 / 82.0 = .0174	

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

COMMENTS

pH = 8.46
Temp = 15.3° C
Cond = 2714 µS
Salinity = 1.5 ppt

Willow - Cottonwood riparian.

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Dry Fork Roan Ck. | CROSS-SECTION NO.: 2 | DATE: 5-15-12 | SHEET ___ OF ___

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: 12:30 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	0.0		5.56								
G	1.1		6.32								
	1.5		6.95								
W	1.8		7.97								
	2.1		8.12	.15				.26			
	2.4		8.12	.15				1.16			
	2.7		8.07	.10				.68			
	3.0		8.22	.25				1.38			
	3.3		8.22	.25				1.87			
	3.6		8.22	.25				1.29			
	3.9		8.22	.25				2.04			
	4.2		8.17	.20				1.67			
	4.5		8.17	.20				1.83			
	4.8		8.12	.15				1.68			
	5.1		8.07	.10				.89			
	5.4		8.07	.10				.91			
	5.7		8.12	.15				.61			
W	5.8		7.98								
	6.0		7.53								
	7.0		6.82								
G	8.0		6.39								
	8.2		5.29								
RS	8.9		4.91								
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:	Dry Fork Roan Creek
XS LOCATION:	1.25 mi ds fr conf w S. Dry Fork
XS NUMBER:	2
DATE:	15-May-12
OBSERVERS:	R. Smith, N. Dieterich
1/4 SEC:	SE NW
SECTION:	9
TWP:	8S
RANGE:	98W
PM:	Sixth
COUNTY:	Garfield
WATERSHED:	Roan Creek
DIVISION:	5
DOW CODE:	21701
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:	0.0174

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

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

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi ds fr conf w S. Dry Fork
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
	LS	0.00	5.56			0.00		0.00	0.00	0.0%
1	G	1.10	6.32			0.00		0.00	0.00	0.0%
		1.50	6.95			0.00		0.00	0.00	0.0%
	W	1.80	7.97	0.00	0.00	0.00		0.00	0.00	0.0%
		2.10	8.12	0.15	0.26	0.34	0.15	0.05	0.01	1.3%
		2.40	8.12	0.15	1.16	0.30	0.15	0.05	0.05	5.6%
		2.70	8.07	0.10	0.68	0.30	0.10	0.03	0.02	2.2%
		3.00	8.22	0.25	1.38	0.34	0.25	0.08	0.10	11.1%
		3.30	8.22	0.25	1.87	0.30	0.25	0.08	0.14	15.0%
		3.60	8.22	0.25	1.29	0.30	0.25	0.08	0.10	10.3%
		3.90	8.22	0.25	2.04	0.30	0.25	0.08	0.15	16.4%
		4.20	8.17	0.20	1.67	0.30	0.20	0.06	0.10	10.7%
		4.50	8.17	0.20	1.83	0.30	0.20	0.06	0.11	11.7%
		4.80	8.12	0.15	1.68	0.30	0.15	0.05	0.08	8.1%
		5.10	8.07	0.10	0.89	0.30	0.10	0.03	0.03	2.9%
		5.40	8.07	0.10	0.91	0.30	0.10	0.03	0.03	2.9%
		5.70	8.12	0.15	0.61	0.30	0.15	0.03	0.02	2.0%
	W	5.80	7.98	0.00	0.00	0.17		0.00	0.00	0.0%
		6.00	7.53			0.00		0.00	0.00	0.0%
		7.00	6.82			0.00		0.00	0.00	0.0%
1	G	8.00	6.39			0.00		0.00	0.00	0.0%
		8.20	5.29			0.00		0.00	0.00	0.0%
	RS	8.90	4.91			0.00		0.00	0.00	0.0%
	TOTALS ----------					4.16	0.25 (Max.)	0.68	0.94	100.0%

Manning's n = 0.0420
Hydraulic Radius= 0.16212097

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi ds fr conf w S. Dry Fork
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.68	0.66	-2.9%
7.73	0.68	1.68	148.7%
7.75	0.68	1.60	136.3%
7.77	0.68	1.51	124.0%
7.79	0.68	1.43	111.7%
7.81	0.68	1.35	99.5%
7.83	0.68	1.26	87.2%
7.85	0.68	1.18	75.1%
7.87	0.68	1.10	63.0%
7.89	0.68	1.02	50.9%
7.91	0.68	0.94	38.9%
7.93	0.68	0.86	26.9%
7.94	0.68	0.82	20.9%
7.95	0.68	0.78	14.9%
7.96	0.68	0.74	9.0%
7.97	0.68	0.70	3.0%
7.98	0.68	0.66	-2.9%
7.99	0.68	0.62	-8.8%
8.00	0.68	0.58	-14.6%
8.01	0.68	0.54	-20.5%
8.02	0.68	0.50	-26.2%
8.03	0.68	0.46	-32.0%
8.05	0.68	0.38	-43.3%
8.07	0.68	0.31	-54.5%
8.09	0.68	0.24	-64.5%
8.11	0.68	0.18	-73.0%
8.13	0.68	0.14	-80.0%
8.15	0.68	0.10	-85.6%
8.17	0.68	0.06	-90.7%
8.19	0.68	0.04	-94.6%
8.21	0.68	0.01	-97.9%
8.23	0.68	0.00	-100.0%

WATERLINE AT ZERO
AREA ERROR = 7.970

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi ds fr conf w S. Dry Fork
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	6.39	6.86	1.27	1.83	8.69	8.70	100.0%	1.00	40.49	4.66
	6.97	5.28	0.98	1.25	5.20	6.67	76.6%	0.78	20.55	3.95
	7.02	5.20	0.95	1.20	4.94	6.53	75.0%	0.76	19.11	3.87
	7.07	5.11	0.92	1.15	4.68	6.39	73.5%	0.73	17.73	3.79
	7.12	5.03	0.88	1.10	4.43	6.25	71.9%	0.71	16.40	3.70
	7.17	4.94	0.85	1.05	4.18	6.11	70.3%	0.68	15.11	3.62
	7.22	4.86	0.81	1.00	3.93	5.97	68.7%	0.66	13.88	3.53
	7.27	4.77	0.77	0.95	3.69	5.83	67.1%	0.63	12.69	3.44
	7.32	4.69	0.74	0.90	3.46	5.70	65.5%	0.61	11.54	3.34
	7.37	4.60	0.70	0.85	3.22	5.56	63.9%	0.58	10.45	3.24
	7.42	4.52	0.66	0.80	2.99	5.42	62.3%	0.55	9.40	3.14
	7.47	4.43	0.63	0.75	2.77	5.28	60.7%	0.52	8.41	3.03
	7.52	4.35	0.59	0.70	2.55	5.14	59.1%	0.50	7.46	2.92
	7.57	4.30	0.54	0.65	2.34	5.03	57.8%	0.46	6.53	2.80
	7.62	4.26	0.50	0.60	2.12	4.92	56.6%	0.43	5.65	2.66
	7.67	4.23	0.45	0.55	1.91	4.82	55.4%	0.40	4.81	2.52
	7.72	4.19	0.41	0.50	1.70	4.71	54.1%	0.36	4.02	2.36
	7.77	4.15	0.36	0.45	1.49	4.60	52.9%	0.32	3.28	2.20
	7.82	4.12	0.31	0.40	1.28	4.49	51.7%	0.29	2.60	2.02
	7.87	4.08	0.26	0.35	1.08	4.39	50.4%	0.25	1.97	1.83
	7.92	4.04	0.22	0.30	0.88	4.28	49.2%	0.20	1.42	1.62
WL	7.97	4.00	0.17	0.25	0.67	4.17	48.0%	0.16	0.93	1.38
	8.02	3.87	0.12	0.20	0.48	4.00	46.0%	0.12	0.54	1.13
	8.07	3.43	0.08	0.15	0.29	3.53	40.5%	0.08	0.25	0.88
	8.12	2.00	0.07	0.10	0.14	2.03	23.3%	0.07	0.12	0.80
	8.17	1.30	0.04	0.05	0.05	1.31	15.1%	0.04	0.03	0.56

STREAM NAME: Dry Fork Roan Creek
XS LOCATION: 1.25 mi ds fr conf w S. Dry Fork
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.94	cfs
CALCULATED FLOW (Qc)=	0.93	cfs
(Qm-Qc)/Qm * 100 =	0.2	%
MEASURED WATERLINE (WLm)=	7.98	ft
CALCULATED WATERLINE (WLc)=	7.97	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	0.1	%
MEAN VELOCITY=	1.38	ft/sec
MANNING'S N=	0.042	
SLOPE=	0.0174	ft/ft
.4 * Qm =	0.4	cfs
2.5 * Qm=	2.3	cfs

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

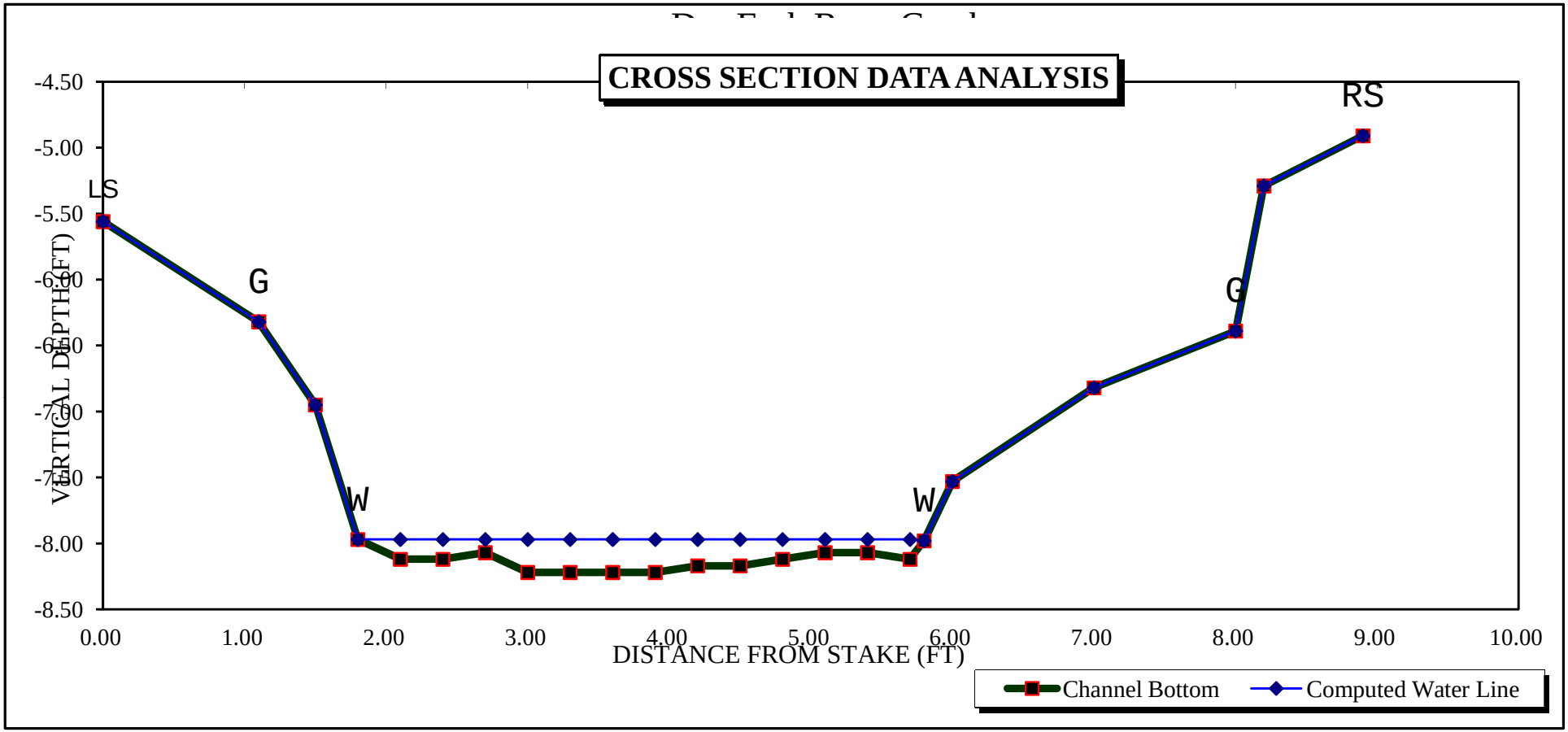
FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

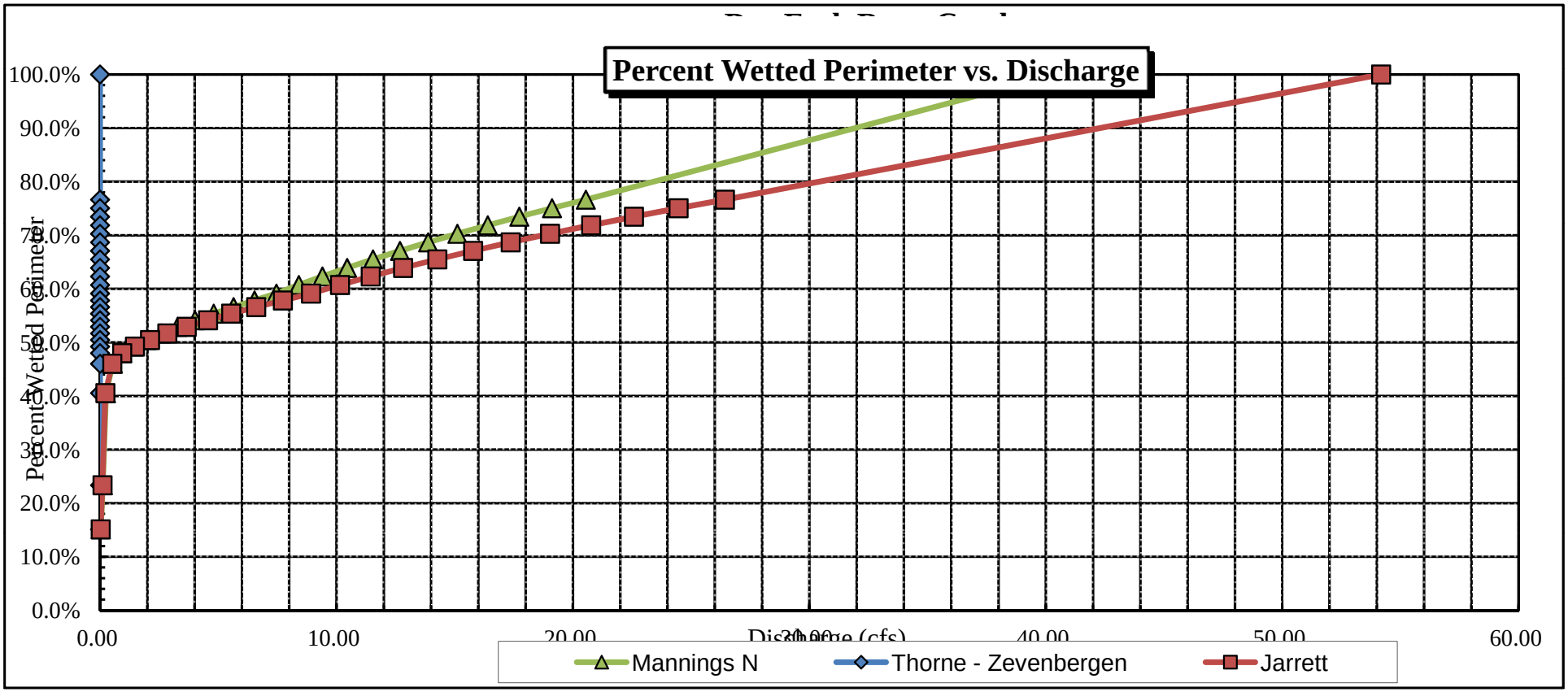
RATIONALE FOR RECOMMENDATION:
============================

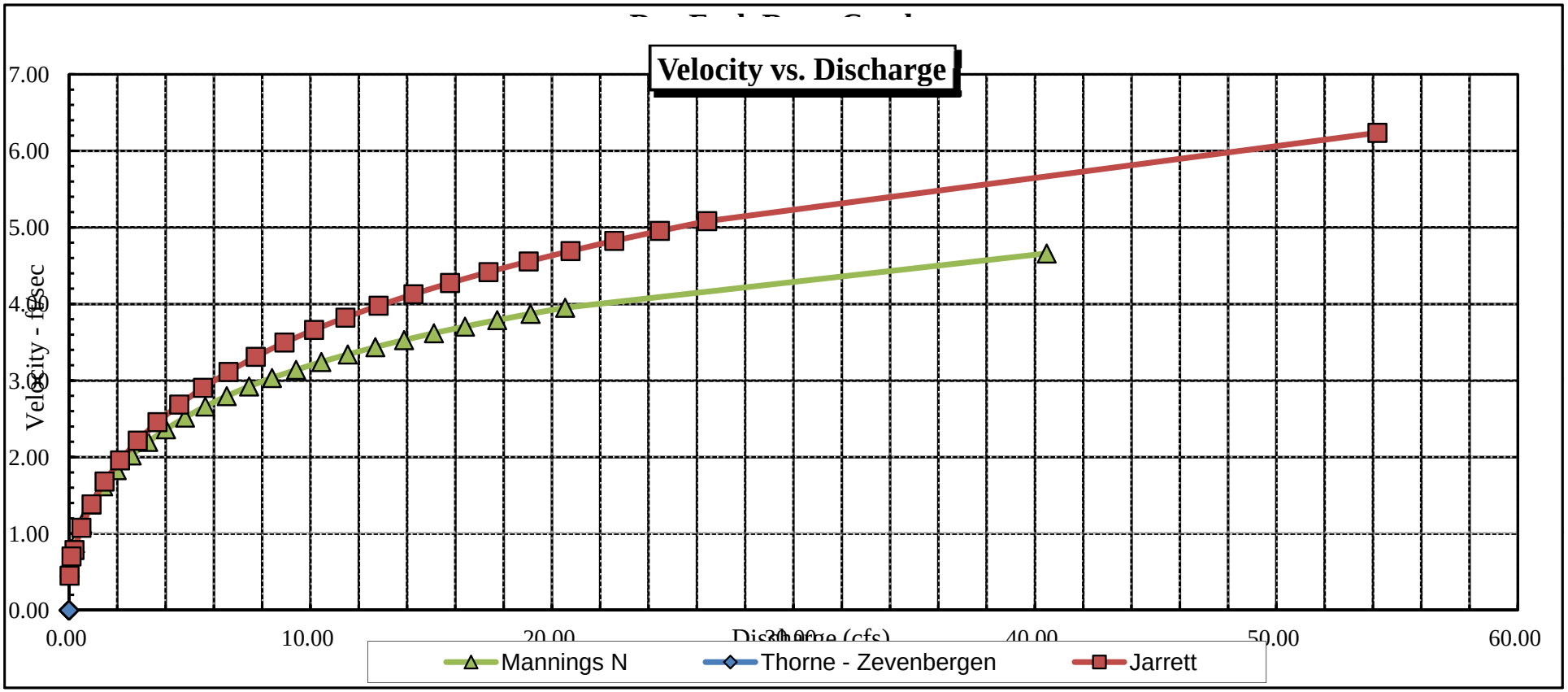
____
____
____
____
____
____
____
____
____
____
____
____
____
____
____

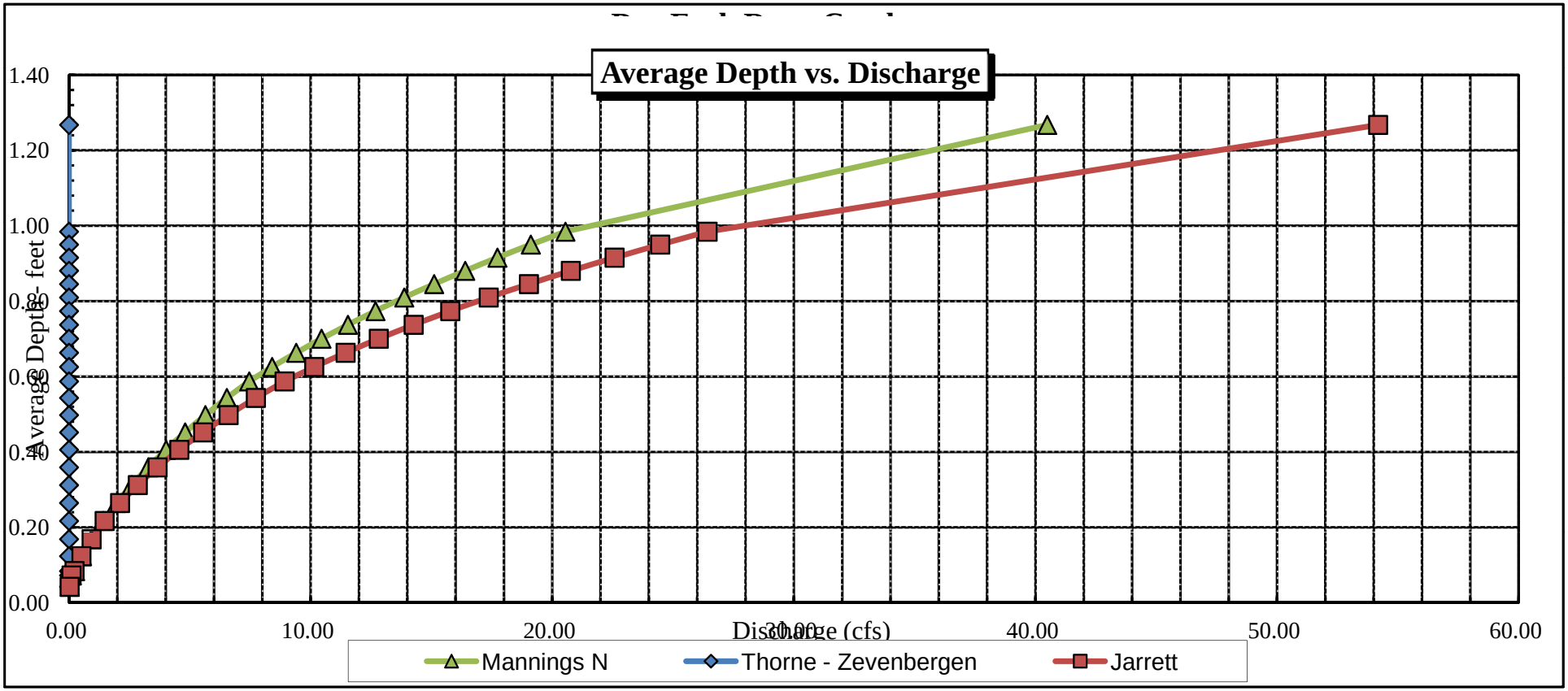
RECOMMENDATION BY: ……………………...………..….…............................... AGENCY...…………………….......…......…...…....... DATE:.......….....…......……………

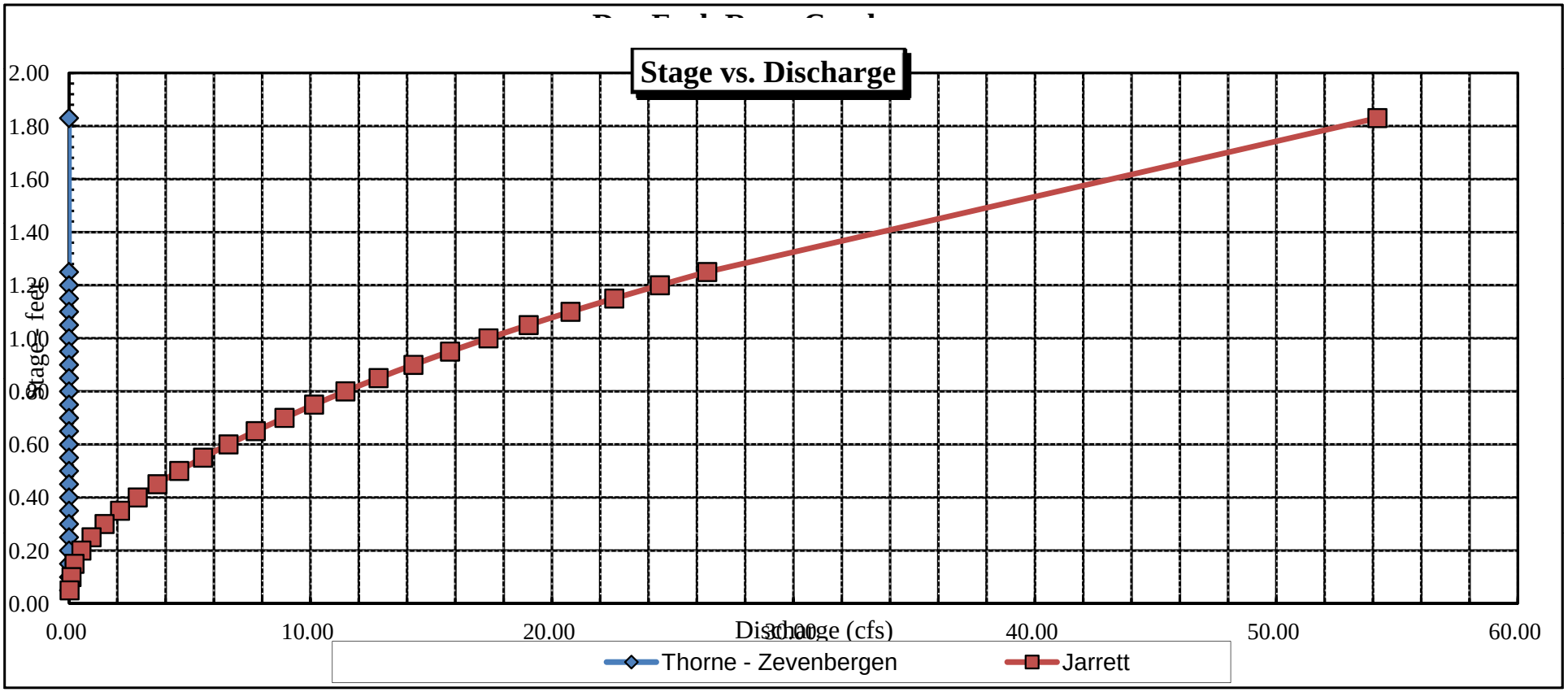
CWCB REVIEW BY: ..……………………………....……………………………………………………...….............. DATE:.................…………….....…


CROSS SECTION DATA ANALYSIS
LS
G
W
W
G
RS
-4.50
-5.00
-5.50
-6.00
-6.50
-7.00
-7.50
-8.00
-8.50
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


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
10.00
20.00
40.00
50.00
60.00
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
10.00
20.00
40.00
50.00
60.00
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - feet
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Stage, feet
0.00
10.00
20.00
30.00
40.00
50.00
60.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

Discharge Measurement Summary

Date Generated: Tue Jul 15 2014

File Information

File Name	DFRC1MBC.001.WAD
Start Date and Time	2014/05/20 17:04:42

Site Details

Site Name	DRY FRK ROAN CR 1MBC
Operator(s)	BJE

System Information

Sensor Type	FlowTracker
Serial #	P2355
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units (English Units)

Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.7%	2.9%
Velocity	1.3%	4.8%
Width	0.2%	0.2%
Method	3.3%	-
# Stations	6.6%	-
Overall	**7.6%**	**5.6%**

Summary

Averaging Int.	40	# Stations	8
Start Edge	REW	Total Width	3.500
Mean SNR	25.1 dB	Total Area	1.219
Mean Temp	70.67 °F	Mean Depth	0.348
Disch. Equation	Mid-Section	Mean Velocity	0.2887
		Total Discharge	**0.3521**

Measurement Results

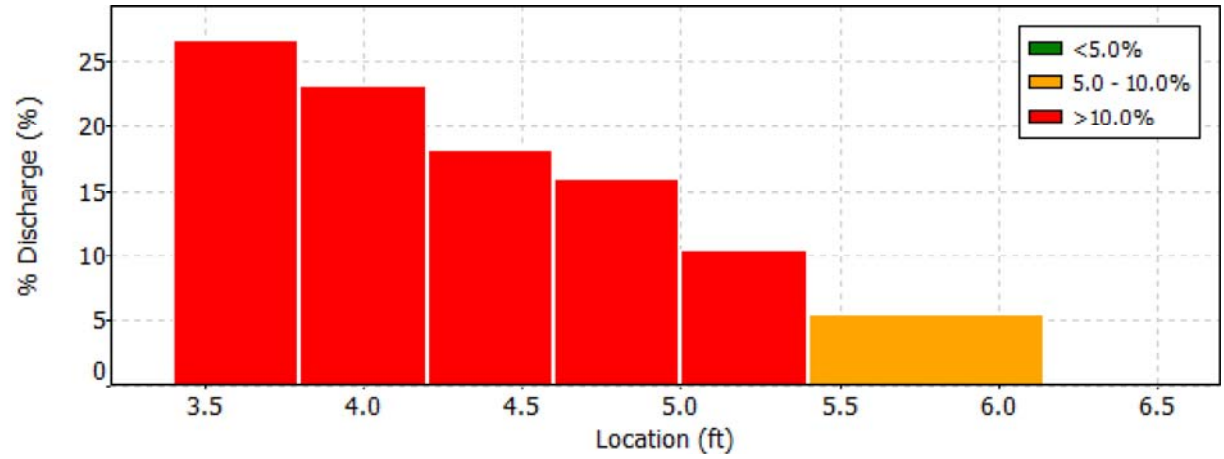
St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	17:04	3.20	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	17:04	3.60	0.6	0.550	0.6	0.220	0.4278	1.00	0.4278	0.220	0.0941	26.7
2	17:07	4.00	0.6	0.600	0.6	0.240	0.3402	1.00	0.3402	0.240	0.0816	23.2
3	17:09	4.40	0.6	0.500	0.6	0.200	0.3212	1.00	0.3212	0.200	0.0642	18.2
4	17:11	4.80	0.6	0.410	0.6	0.164	0.3445	1.00	0.3445	0.164	0.0565	16.0
5	17:14	5.20	0.6	0.370	0.6	0.148	0.2467	1.00	0.2467	0.148	0.0365	10.4
6	17:19	5.60	0.6	0.330	0.6	0.132	0.0771	1.00	0.0771	0.248	0.0191	5.4
7	17:19	6.70	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

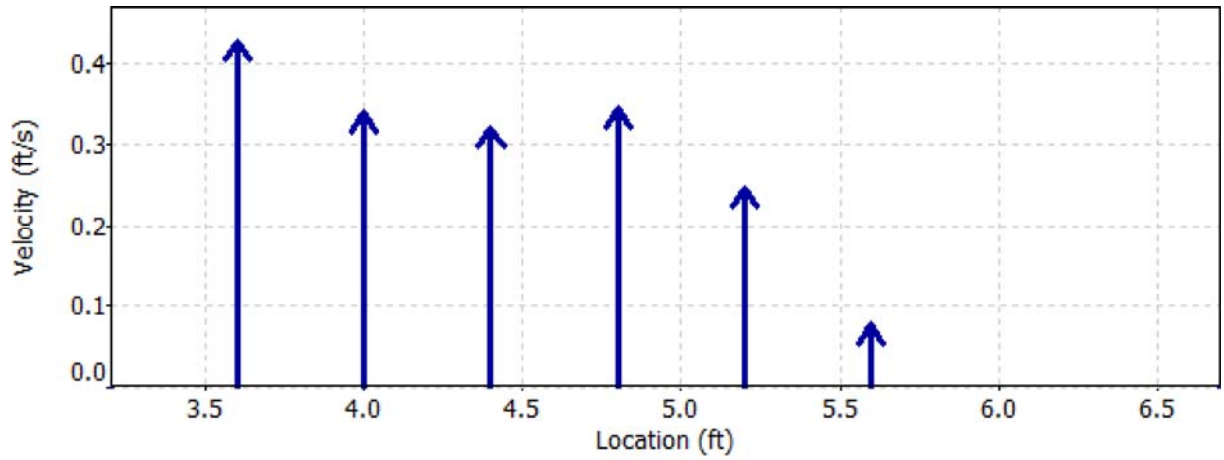
Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

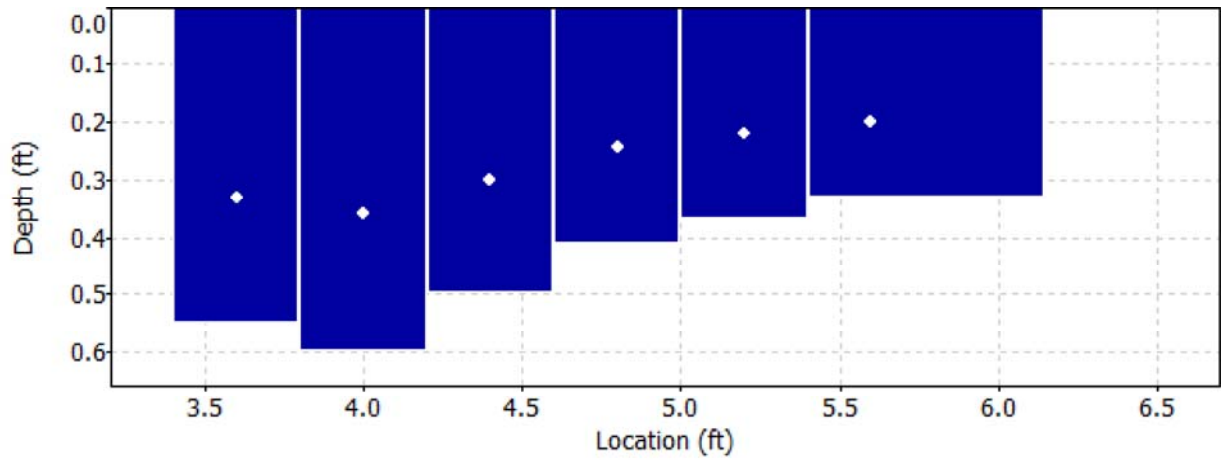
Discharge Measurement Summary

Date Generated: Tue Jul 15 2014

File Information		Site Details	
File Name	DFRC1MBC.001.WAD	Site Name	DRY FRK ROAN CR 1MBC
Start Date and Time	2014/05/20 17:04:42	Operator(s)	BJE







Discharge Measurement Summary

Date Generated: Tue Jul 15 2014

File Information		Site Details	
File Name	DFRC1MBC.001.WAD	Site Name	DRY FRK ROAN CR 1MBC
Start Date and Time	2014/05/20 17:04:42	Operator(s)	BJE

Quality Control

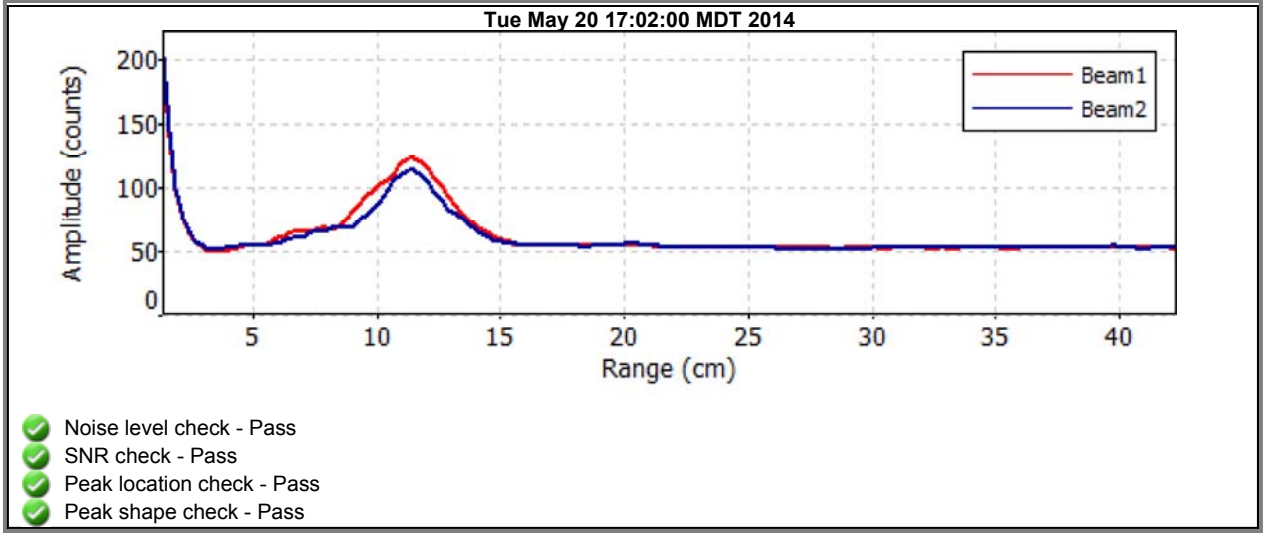
No Quality Control warnings

Discharge Measurement Summary

Date Generated: Tue Jul 15 2014

File Information		Site Details	
File Name	DFRC1MBC.001.WAD	Site Name	DRY FRK ROAN CR 1MBC
Start Date and Time	2014/05/20 17:04:42	Operator(s)	BJE

Automatic Quality Control Test (BeamCheck)



- Noise level check - Pass
- SNR check - Pass
- Peak location check - Pass
- Peak shape check - Pass

Page 1 of 2	State of Colorado	Meas. No.: 001
YYYY: 2014	**Colorado Water Conservation Board**	Division: 5
MM-DD: 05-20	ADV Discharge Measurement Notes	District: 70

Station Name: Dry Fork Roan River, (Creek) Canal, Ditch

At, Near, Above, (Below) ~1 mile Confluence of South & North

Latitude: N 39° 22' 42.79" Longitude: W 108° 20' 23.81" NAD83

Party: Brian Epstein

Conditions

Weather: 80°F Sunny

Wind Spd / Dir: less than 2mph variable Water Temp:

X-Sec Desc: muddy bed

Flow Conds: laminar

Control Desc.: N/A

Measurement Rated: Excelent (2%) / Good (5%) / Fair (8%) / (Poor (>8%)) [based on the above conditions]

Water Level Reading

Time	Staff Gage	Pressure Trans.	Time	Staff Gage	Pressure Trans.
N/A					

Pressure Transducer Download

File Name: N/A

Time:

Weighted MGH

GH Corr.

Correct MGH

Discharge Measurement

Manufacturer:	SonTek	Model:	FlowTracker	S/N:	P2354 / (P2365)
Firmware:	3.7	Software:	2.20		
Diag Test File:	(Yes) or No	Raw Data File:	DFRC1MBC.001		
Meas Type:	(Wading) / Boat / Bridge / Cableway			Method:	0.6
	N/A	ft. or mi / upstream or downstream of gage			
Start Edge:	REW 3.2	End Edge:	LEW 6.7	Total Width:	3.5
Start Time:	17:01	End Time:	17:22		
Discharge:	0.352	Unsertainty:	7.6%	# Stations:	8
Mean v:	0.299	Width	3.5	Mean d:	0.35
Max v:	0.429	Area:	1.219	Max d:	0.60
Mean SNR:	25	σv:	0.009	Mean Temp:	70.7°F

Meas. By: BJE Notes By: BJE

Processed By: Reviewed By:

Remarks:

16:48 187 Dry Fork Rican Creek X-section from upstream / looking downstream

16:48 188 DFRC X-section from left bank
- notice line of lighter mud 0.3' above current water level
- high water line 1.2' above current water level

- At cross section grasses and other water intense plants surround creek by about ten feet
- this ribbon follows the creek giving way to sage and other less water intense species after 10-20 feet.

State of Colorado

Colorado Water Conservation Board

Field Notes

Dry Fork Roan Creek
Party: Brian Epstein & Craig Tysse

Chevron Property from lower BLM Parcel to confluence w/ Roan Creek

09:25 GPS: DryFkRoanPic001
Pic 389 - looking upstream
Pic 390 - looking down w/ GPS for scale, top pic upstream
- classic riffle pool
- ripe with surface insects

09:34 GPS: DryFkRoanPic002
- Concrete weir
- Pic 391 concrete weir, looking LEW
  - shovel at gage pool
  - good access
  - man made control
  - nice rapid
- 09:41 Pic 392 Concrete weir, from downstream looking upstream

09:47 GPS DryFkRoanPic003
- pipeline right of way
- 09:46 393 from REW bank looking at right of way perpendicular to creek
  - Craig says project will happen soon if goes

10:09 GPS DryFkRoanPic004
- 10:09 Pic 394 Dry section, looking upstream

10:14 GPS DryFkRoanPic005
- 10:16 395 Draw comes down dry from photo top, into Dry Fork, current standing pool

Notes By: Brian Epstein YYYY-MM-DD: 2014-07-29 Page 1 of 2

- dry above and below standing pool

10:31 GPS DryFkRoanPic006
- Dry Fork begins picking up water
- Pic 396 looking downstream at area of accreation

10:41 GPS DryFkRoanPic007
- stream accreations continue
- Pic 397 looking upstream
  398 video looking upstream

11:15 GPS DryFkRoanPic009
- Confluence w/ Roan Creek
- 11:16 Pic 399 Dry Fork pic left, Roan Cr picture right
- healthy willow community at confluence

State of Colorado

Colorado Water Conservation Board

Field Notes

Dry Fork Roan Creek

15:21 synchronize camera time to GPS

GPS Waypoint: DryFrkRoanCrPic001

15:21 179 From above waypoint, looking upstream, Dry Fork Roan Creek Discharge = Ø

15:21 180 From above waypoint, looking downstream Dry Fork Roan Creek, Discharge = Ø

- hiked down to creek and ~1000 feet upstream, dry the intire trip

15:37 181 From waypoint but 35 feet below, looking upstream, Discharge Ø

- land upstream of lower BLM 1/16 section parcel on Dry Fork Roan Creek, lower pond full
  - two other ponds on property observed full

GPS Waypoint: DryFrkRoanCrPic002

16:24 182 From above waypoint ... Pic002, looking upstream at Dry Fork Roan Creek

16:24 183 same as above pic but looking downstream

16:24 184 video same as above panning from upstream to downstream

16:30 185 At waypoint... Pic002 observed dead

16:30 186 " " " " " "

→ took measurement of discharge, see ANV field note sheet "Dry Fork Roan Creek below ~1 mile from confluence of South & North"
- GPS Waypoint: DFRC1MBL-001

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4X4
V8