United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7093
www.blm.gov/co

TAKE PRIDE IN AMERICA

RECEIVED
DEC 22 2009
Colorado Water Conservation Board

In Reply Refer To:
7250 (CO-932)

DEC 16 2009

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 instream flow recommendation for upper Cochetopa Creek, located in Water Division 4.

Location and Land Status. Cochetopa Creek is a tributary to Tomichi Creek approximately eight miles southeast of Gunnison, Colorado. The creek is located within the upper Gunnison River watershed. This recommendation covers a reach located in the upper portions of the watershed, beginning at the confluence with Nutras Creek and extending downstream to the Mesa Ditch.

One hundred percent of this reach is located on federal lands. Approximately 80% of the federal lands are managed by the U.S. Forest Service, and 20% are managed by the BLM.

Biological Summary. This segment of Cochetopa Creek is a moderate to high gradient stream, with moderate substrate size, punctuated by occasional boulders. The lower portion of the proposed reach is confined by a narrow canyon, but the upper portion of the reach meanders through a broader valley, supporting extensive wetland communities on the valley floor. The riparian community is in good condition and is composed primarily of willow communities in the upper part of the reach and spruce-willow communities in the lower part of the reach. The upper part of the reach provides good pools and overhanging banks for overwintering, while the lower part of the reach confined to a canyon is comprised mainly of riffle and run habitat. Fishery surveys indicate that the creek supports a self-sustaining population of brown, brook, and rainbow trout. The survey revealed a variety of age classes and individual specimens up to 12 inches in length.

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

Party	Date	Discharge	250%-40%	Summer (3/3)	Winter (2/3)
BLM	10/07/2005	19.14	7.7-47.9	9.66	Out of range
BLM	09/26/2006	15.81	6.3-39.5	11.27	Out of range
BLM	10/07/2008	11.48	4.6-28.7	10.11	6.36
BLM	10/07/2008	11.51	4.6-28.8	14.32	Out of range

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

> 11.3 cubic feet per second is recommended during the high temperature period from May 16 through August 15. This recommendation was derived by averaging the results of the data sets. The recommendation is driven by the depth criteria. Given the wide creek channel in riffle habitats, 11.3 cfs is required to meet the depth criteria and provide sufficient physical habitat that is usable by the fish population.
>
> 7.5 cubic feet per second is recommended for the period from August 16 through September 30. This recommendation meets two of the three instream flow criteria. It is important to provide as much protection as possible during this period, because the fish population is feeding and gaining weight in preparation for the winter period.
>
> 4.5 cubic feet per second is recommended for the period from October 1 to November 15. It is important to protect a constant flow rate during this period to prevent dessication of brown trout eggs before the creek ices over for the winter. This recommendation is driven by water availability criteria. In most cross sections that were surveyed, this flow rate meets the wetted perimeter criteria and provides an average velocity of 0.9 feet per second.
>
> 2.75 cubic feet second is recommended for the period from November 16 to March 15. This recommendation is driven by water availability. This flow should provide adequate flow through pools and prevent complete icing of riffles during winter to insure successful overwintering by the fish population.
>
> 5.0 cubic feet per second is recommended from March 16 to May 15. This is the period when fish are starting to become active again after overwintering. In most cross sections that were surveyed, this flow rate meets the wetted perimeter criteria and provides an average velocity of 0.9 feet per second.

Water Availability. In 1982, the CWCB appropriated instream flow water rights on Cochetopa Creek, above and below the segments recommended in this letter:

- Confluence with Pauline Creek to confluence with Tomichi Creek – 8.5 cfs, year round

BLM has identified the following water right within the proposed reach:

- Mesa Ditch – priorities ranging from 1877 to 1961 – 78 cfs

In addition, BLM has identified what appears to be a transmountain diversion to Water Division 3, a significant distance above the proposed reach:

- Tarbell Ditch – 1914 priority – 25 cfs

It appears as if the timing and volume of diversions by this ditch may be limited by the high altitude location of the diversion.

The BLM recommends using the Cochetopa Creek Gage Below Rock Creek (USGS 09118450), which has operated from 1981 to the present, to calculate water availability. A basin apportionment analytical approach would be required to apply this data to the upper reach, along with an analysis to add back in irrigation depletions between the Mesa Ditch and the gage.

Relationship to Management Plans. Under the current resource management plan, Cochetopa Creek is managed to maintain and improve riparian habitat conditions. The BLM has made significant changes to grazing management to improve aquatic and riparian conditions. This portion of the creek can be accessed only be rough trails and roads, so it is managed for dispersed recreation. The BLM management plan specifically calls for instream flow recommendations on creeks within this management unit that support fisheries.

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

Linda Anania
Deputy State Director, Resources and Fire

cc: Andrew Breibart, Gunnison Field Office
Brian St. George, Gunnison Field Office
Valori Armstrong, Southwest District

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 instream flow recommendation for upper Cochetopa Creek, located in Water Division 4.

Location and Land Status. Cochetopa Creek is tributary to Tomichi Creek approximately eight miles southeast of Gunnison, Colorado. The creek is located within the upper Gunnison River watershed. This recommendation covers a reach located in the upper portions of the watershed, beginning at the confluence with Nutras Creek and extending downstream to the confluence with Pauline Creek.

Approximately 80 percent of the 8.0-mile reach is located on federal lands, while the remaining 20 percent is located on private lands. Approximately 90% of the federal lands are managed by the U.S. Forest Service, and 10% are managed by the BLM.

Biological Summary. This segment of Cochetopa Creek is a moderate to high gradient stream, with moderate substrate size, punctuated by occasional boulders. The lower portion of the proposed reach is confined by a narrow canyon, but the upper portion of the reach meanders through a broader valley, supporting extensive wetland communities on the valley floor. The riparian community is in good condition and is composed primarily of willow communities in the upper part of the reach and spruce-willow communities in the lower part of the reach. The upper part of the reach provides good pools and overhanging banks for overwintering, while the lower part of the reach confined to a canyon is comprised mainly of riffle and run habitat. Fishery surveys indicate that the creek supports a self-sustaining population of brown, brook, and rainbow trout. The survey revealed a variety of age classes and individual specimens up to 12 inches in length.

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

Party	Date	Discharge	250%-40%	Summer (3/3)	Winter (2/3)
BLM	10/07/2005	19.14	7.7-47.9	9.66	Out of range
BLM	09/26/2006	15.81	6.3-39.5	11.27	Out of range
BLM	10/07/2008	11.48	4.6-28.7	10.11	6.36
BLM	10/07/2008	11.51	4.6-28.8	14.32	Out of range

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.

11.3 cubic feet per second is recommended during the high temperature period from May 1 through November 15. This recommendation was derived by averaging the results of the data sets. The recommendation is driven by the depth criteria. Given the wide creek channel in riffle habitats, 11.3 cfs is required to meet the depth criteria and provide sufficient physical habitat that is usable by the fish population. If possible, it is important to protect a constant flow rate for the brown trout spawning period, which can extend through November 15.

6.3 cubic feet second is recommended for the period from November 16 to April 30. This recommendation is driven by the wetted perimeter criteria. This flow should provide adequate flow through pools and prevent complete icing of riffles during winter to insure successful overwintering by the fish population.

Water Availability. In 1982, the CWCB appropriated instream flow water rights on Cochetopa Creek, above and below the segments recommended in this letter:

- Headwaters to confluence with Nutras Creek – 4.0 cfs, year round
- Confluence with Pauline Creek to confluence with Tomichi Creek – 8.5 cfs, year round

BLM has identified two water rights within the proposed reach:

- Mesa Ditch – priorities ranging from 1877 to 1961 – 78 cfs
- Big Rock Ditch – 1970 priority – 17.5 cfs

The operational practices of these ditches need to be analyzed, especially relative to the priority of other downstream water rights. There are at least 17.2 cfs of downstream water rights that are senior to the Mesa Ditch, so the ditch may not be able to sweep the creek, despite its large water right.

In addition, BLM has identified what appears to be a transmountain diversion to Water Division 3, a significant distance above the proposed reach:

- Tarbell Ditch – 1914 priority – 25 cfs

It appears as if the timing and volume of diversions by this ditch may be limited by the high altitude location of the diversion.

BLM recommends using the Cochetopa Creek Gage Below Rock Creek (USGS 09118450), which has operated from 1981 to the present, to calculate water availability. A basin apportionment analytical approach would be required to apply this data to the upper reach, along with an analysis to add back in irrigation depletions between the Mesa Ditch and the gage.

Relationship to Management Plans. Under the current resource management plan, Cochetopa Creek is managed to maintain and improve riparian habitat conditions. BLM has made significant changes to grazing management to improve aquatic and riparian conditions. This

portion of the creek can be accessed only be rough trails and roads, so it is managed for dispersed recreation. The BLM management plan specifically calls for instream flow recommendations on creeks within this management unit that support fisheries.

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: Art Hayes, Gunnison Field Office
Field Office Manager, Gunnison Field Office

Gunnison Field Office Stream Surveys
October 2008

Cochetopa Creek - Water Code #39188

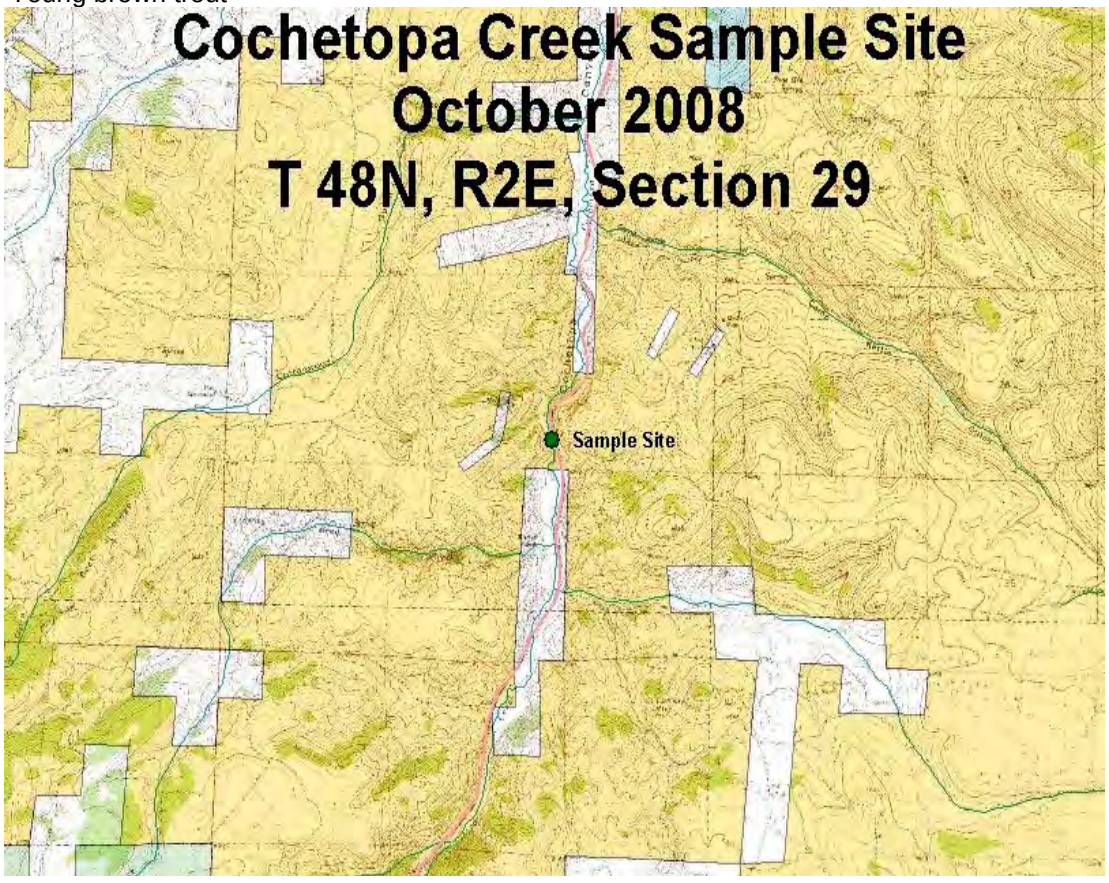
Cochetopa creek, located east of Gunnison, CO on BLM lands managed by the Gunnison Field Office, was sampled on October 7, 2008, to determine fishery status and species composition. Presence/absence sampling was done in support of the Colorado BLM in-stream flow program. A one-pass effort was completed. Sampling was conducted via backpack electro-shocker and approximately 125 feet of stream was sampled at the lowest BLM segment. Personnel present were Tom Fresques and Gregor Dekleva, GSFO. A population estimate was not conducted due to lack of personnel and the width of the stream. Cochetopa creek is tributary to Tomichi creek and then the Gunnison River.

Cochetopa creek

Brown trout *(Salmo trutta)*

Brown trout

Young brown trout



STREAM SURVEY FISH SAMPLING FORM

WATER Cochetopa Creek H2O CODE 39188 DATE 10/7/2008

GEAR BPE EFFORT 125 feet STATION # 1 PASS # 1

CREW Fresques, Dekleva DRAINAGE Gunnison River LOCATION See map

Pass	species	length	weight		Pass	species	length	weight
1	LOC	298			1	LOC	204	
1	LOC	325			1	LOC	183	
1	LOC	267			1	LOC	208	
1	LOC	260			1	LOC	210	
1	LOC	245			1	LOC	75	

GPS Location: See Map

Notes: Stream Width 18 ft. Sample Reach 125 ft.

Conductivity: Electro shocker settings

Other Brown trout noted of various age classes including fish up to eighteen plus inches.

Discussion:

Cochetopa creek is in overall good condition with a healthy riparian area. Plant species include alder, birch, sedge, current, rose, and Red Osier dogwood. However, Canada thistle is also present and common along the stream. The stream itself is in good condition with flow estimated at around 15 CFS. An excellent mix of pools, riffles, and runs provides good habitat. Midges, stone, caddis, and mayflies are present and abundant. Brown trout were the only species collected or seen and all fish collected appeared healthy and robust. Old and new beaver activity was present at the sample site.

Recommendations:

- Pursue instream-flow recommendations for these reaches
- Continue periodic habitat monitoring to ensure stream and riparian habitat remain healthy
- Look into weed spraying in this area to reduce/eliminate Canada thistle.

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Cochetopa Creek - upper						CROSS-SECTION NO.: 1	
CROSS-SECTION LOCATION: where Colorado Trail joins creek from the east							
DATE: 10-7-08	OBSERVERS: R. Smith, A. Hayes						
LEGAL DESCRIPTION	¼ SECTION: SE	SECTION: 5	TOWNSHIP: 44 (N) S	RANGE: 2 (E) W	PM: NM		
COUNTY: Saguache	WATERSHED: Gunnison	WATER DIVISION: 4	DOW WATER CODE: 59205				
MAP(S): USGS:	343931						
USFS:	421855						

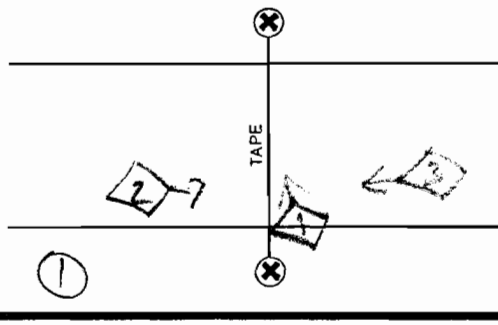
SUPPLEMENTAL DATA

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 5" 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	6.20 / 6.20
(2) WS Upstream	7.0	6.14
(3) WS Downstream	14.0	6.44
SLOPE	0.3 / 22.0 = .014	

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:
caddisfly, mayfly, stonefly

COMMENTS

Ph = 8.6 TDS: 50
Temp: 38°

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cochetopa Ck.	CROSS-SECTION NO.:	DATE:	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ft	TIME:

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Obser-vation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
12526	20		5.40								
	4.5		5.50								
	7.9		5.85								
W	9.0		6.20								
	10.0		6.30	.1				.56			
	11		6.25	.05				0			
	12		6.25	.05				.39			
	13		6.30	.1				.81			
	14		6.35	.15				.80			
	15		6.35	.15				.76			
	16		6.40	.20				1.59			
	17		6.50	.30				1.87			
	18		6.55	.35				2.66			
	19		6.50	.30				2.29			
	19.5		6.60	.40				2.96			
	20		6.65	.45				2.67			
	20.5		6.65	.5				2.60			
	21		6.65	.5				2.36			
	21.5		6.85	.65				2.35			
	22		6.80	.60				2.40			
	22.5		6.75	.55				2.30			
	23		6.80	.60				2.18			
	23.5		6.90	.70				2.07			
	24		6.75	.55				2.23			
	24.5		6.75	.60				2.36			
	25		6.65	.50				2.26			
	25.5		6.60	.40				2.14			
	26		6.50	.30				2.02			
	26.5		6.50	.30				1.30			
	27		6.30	.10				0.45			
	27.5		6.25	.05				0			
W	28.2		6.20								
G	29.7		5.44								
	32.6		4.94								
	36.0		4.95								
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: Cochetopa Creek						CROSS-SECTION NO.: 2 of 2
CROSS-SECTION LOCATION: near private - public boundary						
DATE: 10-7-05	OBSERVERS: K. Smith, A. Hayes					
LEGAL DESCRIPTION	¼ SECTION:	SECTION: 28	TOWNSHIP: 45 (N)/S	RANGE: 2 (E)/W	PM: N.M.	
COUNTY: Saguache	WATERSHED: Gunnison	WATER DIVISION: 4	DOW WATER CODE: 39203			
MAP(S): USGS: Cold Spring Park 7.5'	Zone 13	0345264				
USFS:		4221829				

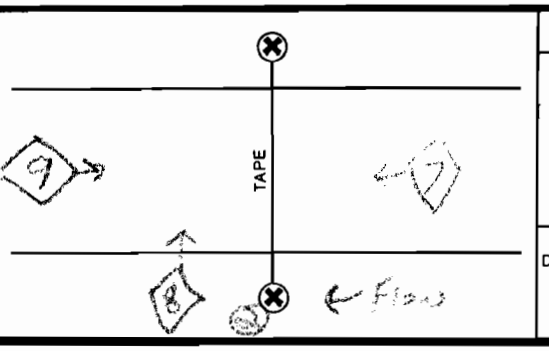
SUPPLEMENTAL DATA Elv 9610

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: Sand to 8" 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	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	5.98 / 5.92
② WS Upstream	20.0 ft	5.79
③ WS Downstream	20.0 ft	6.51
SLOPE	0.72/40.0 = 0.018	

SKETCH



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

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/(NO)	DISTANCE ELECTROFISHED: _____ ft	FISH CAUGHT: YES/(NO)	WATER CHEMISTRY SAMPLED: (YES)/NO

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL

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

COMMENTS

TDS = 40
Ph = 8.1
Temp: 6.0° C

FORM #ISF FD 1-85 5 9 K

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cochadoya Creek	CROSS-SECTION NO.: 2	DATE: 10-7-05	SHEET 1 OF 1
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: 0.3 ft	TIME: 1:05 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 G	0.0		4.48								
	2.0		5.52								
W	6.4		5.96	ϕ							
	8.0		6.21	0.30					0.59		
	9.5		6.27	0.40					1.23		
	11.0		6.10	.20					1.41		
	12.5		6.74	.90					1.86		
	14.0		6.78	.90					2.54		
	15.5		6.44	.55					2.01		
	17.0		6.55	.55					1.05		
	18.5		6.75	.85					1.99		
	20.0		6.74	.85					1.81		
	21.5		6.64	.70					1.31		
	23.0		6.37	.45					0.94		
	24.5		6.29	.35					0.99		
	26.0		6.45	.40					0.76		
	27.5		6.40	.40					1.19		
	29.0		6.30	.30					0.78		
	30.5		6.16	.10					0.26		
	32.0		6.56	.50					0.60		
W	33.0		6.02	ϕ							
LS G	36.0		4.43								
TOTALS:											

End of Measurement	Time: 1:30	Gage Reading: 0.3 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: Cochetopa Creek						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: Mar private - BLM boundary						
DATE: 9/26/06	OBSERVERS: Hayes/Fresques/Smith/Thompson					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 28	TOWNSHIP: 45 (N)/S	RANGE: 2 E/(W)	PM: N.M.	
COUNTY: Saguache	WATERSHED: Gunnison	WATER DIVISION: 4	DOW WATER CODE: 39205			
MAP(S): USGS: Cold Park Spring 7.5'						
USFS:						

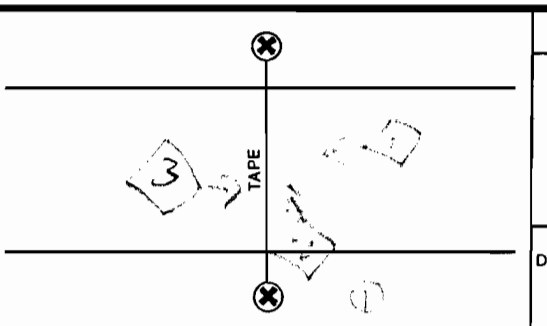
SUPPLEMENTAL DATA

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 → 8" cobble	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	
(X) Tape @ Stake RB	0.0	
(1) WS @ Tape LB/RB	0.0	5.55/5.55
(2) WS Upstream	63	4.76
(3) WS Downstream	65	6.38
SLOPE	1.62'/129.0' = 0.0[illegible]	

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, stonefly, mayfly

COMMENTS

Temp: 38.0 TDS: 50
PH: 8.2

FORM #ISF FD 1-85

T 38.0
pH 8.2

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cachatopa Creek	CROSS-SECTION NO.:	DATE: 7/26/04	SHEET ___ OF ___

BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: 0.4 ft	TIME: 10:20

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		3.54								
G	3.0		4.38								
W	7.0		5.55								
	8.0		5.66	.10				0.00			
	9.0		5.51	0.0				0.00			
	10.0		5.69	.15				0.37			
	11.0		5.82	.25				1.16			
	12.0		6.05	.50				1.76			
	13.0		5.81	.25				2.53			
	14.0		5.85	.30				1.80			
	15.0		6.30	.75				1.74			
	16.0		6.27	.70				1.73			
	17.0		6.26	.70				2.35			
	18.0		6.29	.75				1.58			
	19.0		6.21	.65				1.46			
	20.0		6.08	.55				1.71			
	21.0		5.79	.45				1.89			
	22.0		6.07	.55				0.22			
	23.0		6.00	.45				1.09			
	24.0		5.94	.40				1.35			
	25.0		5.95	.40				1.55			
	26.0		5.95	.40				1.64			
	27.0		5.82	.25				1.86			
	28.0		5.96	.40				1.02			
	29.0		5.96	.40				1.27			
	30.0		5.94	.40				1.23			
	31.0		5.98	.40				0.96			
	32.0		5.79	.25				1.55			
	33.0		5.80	.25				1.01			
	34.0		5.76	.20				0.00			
W	35		5.55								
St G	37		4.42								
TOTALS:											

End of Measurement	Time: 10:50	Gage Reading: 0.4 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: Cochetopa Creek - upper | CROSS-SECTION NO.: 2

CROSS-SECTION LOCATION: where Colorado Trail joins the creek from east

DATE: 10-7-08 | OBSERVERS: R. Smith, A Hayes

LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP:	RANGE:	PM:
	SE	5	44 N/S	2 E/W	NM

COUNTY:	WATERSHED:	WATER DIVISION:	DOW WATER CODE:
Saguache	Gunnison	4	37203

MAP(S): USGS: 3438819 | USFS: 11218419

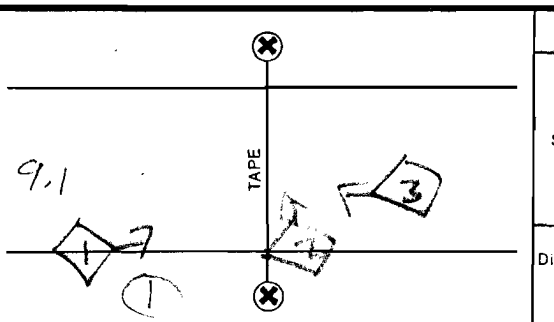
SUPPLEMENTAL DATA

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 3" 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 30.4	6.15 / 6.17
② WS Upstream	12.0	6.10
③ WS Downstream	15.0	6.38
SLOPE	0.28 / 27.0 = .01	

SKETCH



LEGEND: Stake ⊗ | Station ① | Photo ① | Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO | DISTANCE ELECTROFISHED: ____ ft | FISH CAUGHT: YES/NO | WATER CHEMISTRY SAMPLED: YES/NO

LENGTH - FREQUENCY DISTRIBUTION BY ONE-INCH SIZE GROUPS (1.0-1.9, 2.0-2.9, ETC.)

SPECIES (FILL IN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL

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

caddisfly, mayfly, stonefly

COMMENTS

pH: 8.6
Temp: 33°
TDS: 50

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cochetopa Creek - upper	CROSS-SECTION NO.:	DATE: 10-7-08	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME: 11:15 am

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
RS/G	2.0		5.45								
W	8.1		6.17								
	10		6.40		.25			0.60			
	11		6.55		.40			0.67			
	12		6.60		.45			1.64			
	13		6.55		.40			1.94			
	14		6.55		.40			1.99			
	15		6.65		.50			1.94			
	16		6.50		.35			2.39			
	17		6.55		.40			2.07			
	18		6.55		.40			2.34			
	19		6.50		.40			2.11			
	20		6.50		.40			2.23			
	21		6.50		.35			2.19			
	22		6.45		.30			2.04			
	23		6.40		.25			1.72			
	24		6.40		.30			1.69			
	25		6.35		.20			1.07			
	26		6.35		.20			1.20			
	27		6.35		.20			1.11			
	28		6.40		.25			0.95			
	29		6.45		.30			0.31			
W	30.4		6.15								
	32.5		6.00								
G	36.9		5.35								
LS	37.2		4.50								
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:	Cochetopa Creek - upper
XS LOCATION:	junction w/ Colo. Trail from east
XS NUMBER:	1
DATE:	7-Oct-08
OBSERVERS:	R. Smith, A. Hayes
1/4 SEC:	SE
SECTION:	5
TWP:	44N
RANGE:	2E
PM:	New Mexico
COUNTY:	Saguache
WATERSHED:	Gunnison
DIVISION:	4
DOW CODE:	39203
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:	0.014

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

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

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: junction w/ Colo. Trail from east
XS NUMBER: 1

DATA POINTS= 35

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1	RS & G	2.00	5.40			0.00		0.00	0.00	0.0%
		4.50	5.50			0.00		0.00	0.00	0.0%
		4.90	5.88			0.00		0.00	0.00	0.0%
	W	9.00	6.20			0.00		0.00	0.00	0.0%
		10.00	6.30	0.10	0.56	1.00	0.10	0.10	0.06	0.5%
		11.00	6.25	0.05	0.00	1.00	0.05	0.05	0.00	0.0%
		12.00	6.25	0.05	0.39	1.00	0.05	0.05	0.02	0.2%
		13.00	6.30	0.10	0.81	1.00	0.10	0.10	0.08	0.7%
		14.00	6.35	0.15	0.80	1.00	0.15	0.15	0.12	1.0%
		15.00	6.35	0.15	0.76	1.00	0.15	0.15	0.11	1.0%
		16.00	6.40	0.20	1.59	1.00	0.20	0.20	0.32	2.8%
		17.00	6.50	0.30	1.89	1.00	0.30	0.30	0.57	4.9%
		18.00	6.55	0.35	2.66	1.00	0.35	0.35	0.93	8.1%
		19.00	6.50	0.30	2.29	1.00	0.30	0.23	0.52	4.5%
		19.50	6.60	0.40	2.96	0.51	0.40	0.20	0.59	5.2%
		20.00	6.65	0.45	2.67	0.50	0.45	0.23	0.60	5.2%
		20.50	6.65	0.50	2.60	0.50	0.50	0.25	0.65	5.7%
		21.00	6.65	0.50	2.36	0.50	0.50	0.25	0.59	5.1%
		21.50	6.85	0.65	2.35	0.54	0.65	0.33	0.76	6.7%
		22.00	6.80	0.60	2.40	0.50	0.60	0.30	0.72	6.3%
		22.50	6.75	0.55	2.30	0.50	0.55	0.28	0.63	5.5%
		23.00	6.80	0.60	2.18	0.50	0.60	0.30	0.65	5.7%
		23.50	6.90	0.70	2.07	0.51	0.70	0.35	0.72	6.3%
		24.00	6.75	0.55	2.23	0.52	0.55	0.28	0.61	5.3%
		24.50	6.75	0.60	2.36	0.50	0.60	0.30	0.71	6.2%
		25.00	6.65	0.50	2.26	0.51	0.50	0.25	0.57	4.9%
		25.50	6.60	0.40	2.14	0.50	0.40	0.20	0.43	3.7%
		26.00	6.50	0.30	2.02	0.51	0.30	0.15	0.30	2.6%
		26.50	6.50	0.30	1.30	0.50	0.30	0.15	0.20	1.7%
		27.00	6.30	0.10	0.45	0.54	0.10	0.05	0.02	0.2%
		27.50	6.25	0.05	0.00	0.50	0.05	0.03	0.00	0.0%
	W	28.20	6.20			0.70		0.00	0.00	0.0%
1	G	29.70	5.44			0.00		0.00	0.00	0.0%
		32.60	4.99			0.00		0.00	0.00	0.0%
	LS	36.00	4.95			0.00		0.00	0.00	0.0%
	TOTALS ----------					19.37	0.7 (Max.)	5.56	11.48	100.0%

Manning's n = 0.0370
Hydraulic Radius= 0.28674116

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: junction w/ Colo. Trail from east
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	5.56	5.46	-1.8%
5.95	5.56	10.72	92.9%
5.97	5.56	10.26	84.7%
5.99	5.56	9.81	76.7%
6.01	5.56	9.37	68.7%
6.03	5.56	8.93	60.8%
6.05	5.56	8.50	53.0%
6.07	5.56	8.08	45.4%
6.09	5.56	7.66	37.8%
6.11	5.56	7.24	30.4%
6.13	5.56	6.84	23.0%
6.15	5.56	6.43	15.8%
6.16	5.56	6.23	12.2%
6.17	5.56	6.04	8.7%
6.18	5.56	5.84	5.2%
6.19	5.56	5.65	1.7%
6.20	5.56	5.46	-1.8%
6.21	5.56	5.26	-5.2%
6.22	5.56	5.08	-8.6%
6.23	5.56	4.89	-12.0%
6.24	5.56	4.71	-15.3%
6.25	5.56	4.53	-18.5%
6.27	5.56	4.20	-24.4%
6.29	5.56	3.89	-29.9%
6.31	5.56	3.61	-35.0%
6.33	5.56	3.34	-39.9%
6.35	5.56	3.08	-44.6%
6.37	5.56	2.85	-48.8%
6.39	5.56	2.62	-52.8%
6.41	5.56	2.41	-56.7%
6.43	5.56	2.20	-60.5%
6.45	5.56	1.99	-64.2%

WATERLINE AT ZERO
AREA ERROR = 6.195

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: junction w/ Colo. Trail from east
XS NUMBER: 1 Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.44	26.70	0.87	1.46	23.22	27.22	100.0%	0.85	99.31	4.28
	5.44	26.57	0.87	1.46	23.09	27.09	99.5%	0.85	98.72	4.27
	5.49	25.22	0.86	1.41	21.80	25.73	94.5%	0.85	92.80	4.26
	5.54	24.95	0.82	1.36	20.55	25.42	93.4%	0.81	84.77	4.13
	5.59	24.79	0.78	1.31	19.30	25.24	92.7%	0.76	76.76	3.98
	5.64	24.64	0.73	1.26	18.07	25.06	92.0%	0.72	69.08	3.82
	5.69	24.49	0.69	1.21	16.84	24.87	91.4%	0.68	61.73	3.67
	5.74	24.34	0.64	1.16	15.62	24.69	90.7%	0.63	54.72	3.50
	5.79	24.19	0.60	1.11	14.41	24.51	90.0%	0.59	48.06	3.34
	5.84	24.04	0.55	1.06	13.20	24.32	89.4%	0.54	41.76	3.16
	5.89	23.71	0.51	1.01	12.00	23.97	88.1%	0.50	35.99	3.00
	5.94	22.97	0.47	0.96	10.84	23.22	85.3%	0.47	31.00	2.86
	5.99	22.23	0.44	0.91	9.71	22.46	82.5%	0.43	26.37	2.72
	6.04	21.49	0.40	0.86	8.61	21.71	79.8%	0.40	22.11	2.57
	6.09	20.76	0.36	0.81	7.56	20.96	77.0%	0.36	18.20	2.41
	6.14	20.02	0.33	0.76	6.54	20.20	74.2%	0.32	14.65	2.24
WL	6.19	19.28	0.29	0.71	5.55	19.45	71.5%	0.29	11.45	2.06
	6.24	18.12	0.25	0.66	4.62	18.29	67.2%	0.25	8.77	1.90
	6.29	14.31	0.27	0.61	3.82	14.47	53.2%	0.26	7.48	1.96
	6.34	12.99	0.24	0.56	3.15	13.14	48.3%	0.24	5.76	1.83
	6.39	10.87	0.24	0.51	2.57	11.01	40.4%	0.23	4.63	1.80
	6.44	10.19	0.20	0.46	2.04	10.32	37.9%	0.20	3.30	1.62
	6.49	9.56	0.16	0.41	1.55	9.68	35.6%	0.16	2.17	1.40
	6.54	6.76	0.17	0.36	1.15	6.86	25.2%	0.17	1.65	1.44
	6.59	6.05	0.14	0.31	0.83	6.15	22.6%	0.14	1.04	1.25
	6.64	5.10	0.11	0.26	0.55	5.19	19.1%	0.11	0.59	1.07
	6.69	3.66	0.10	0.21	0.35	3.74	13.7%	0.09	0.35	0.99
	6.74	3.29	0.05	0.16	0.18	3.35	12.3%	0.05	0.12	0.68
	6.79	1.59	0.04	0.11	0.07	1.63	6.0%	0.04	0.04	0.56
	6.84	0.52	0.02	0.06	0.01	0.54	2.0%	0.02	0.01	0.39
	6.89	0.04	0.00	0.01	0.00	0.04	0.2%	0.00	0.00	0.09

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: junction w/ Colo. Trail from east
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	11.48	cfs
CALCULATED FLOW (Qc)=	11.45	cfs
(Qm-Qc)/Qm * 100 =	0.3	%
MEASURED WATERLINE (WLm)=	6.20	ft
CALCULATED WATERLINE (WLc)=	6.19	ft
(WLm-WLc)/WLm * 100 =	0.1	%
MAX MEASURED DEPTH (Dm)=	0.70	ft
MAX CALCULATED DEPTH (Dc)=	0.71	ft
(Dm-Dc)/Dm * 100	-0.7	%
MEAN VELOCITY=	2.06	ft/sec
MANNING'S N=	0.037	
SLOPE=	0.014	ft/ft
.4 * Qm =	4.6	cfs
2.5 * Qm=	28.7	cfs

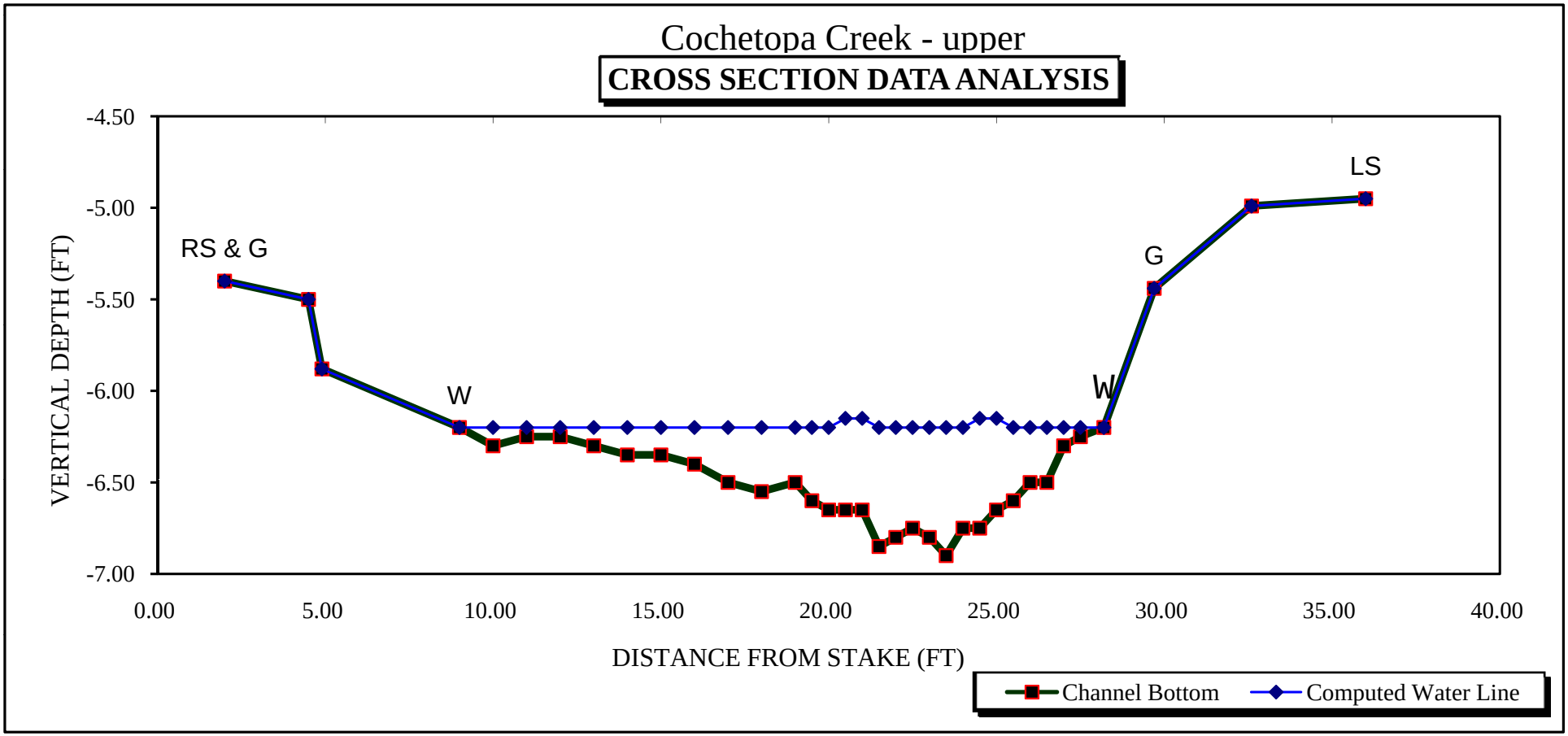
RECOMMENDED INSTREAM FLOW:
=============================

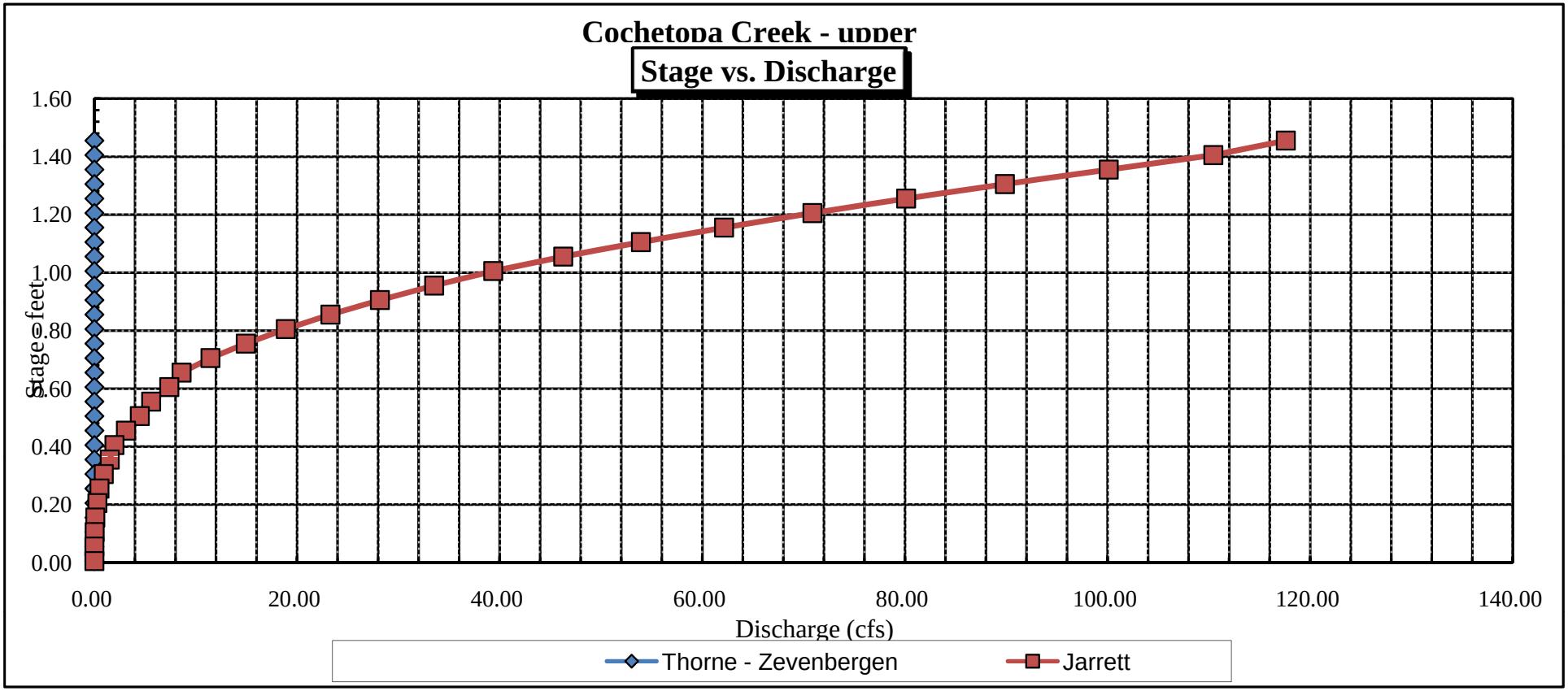
FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

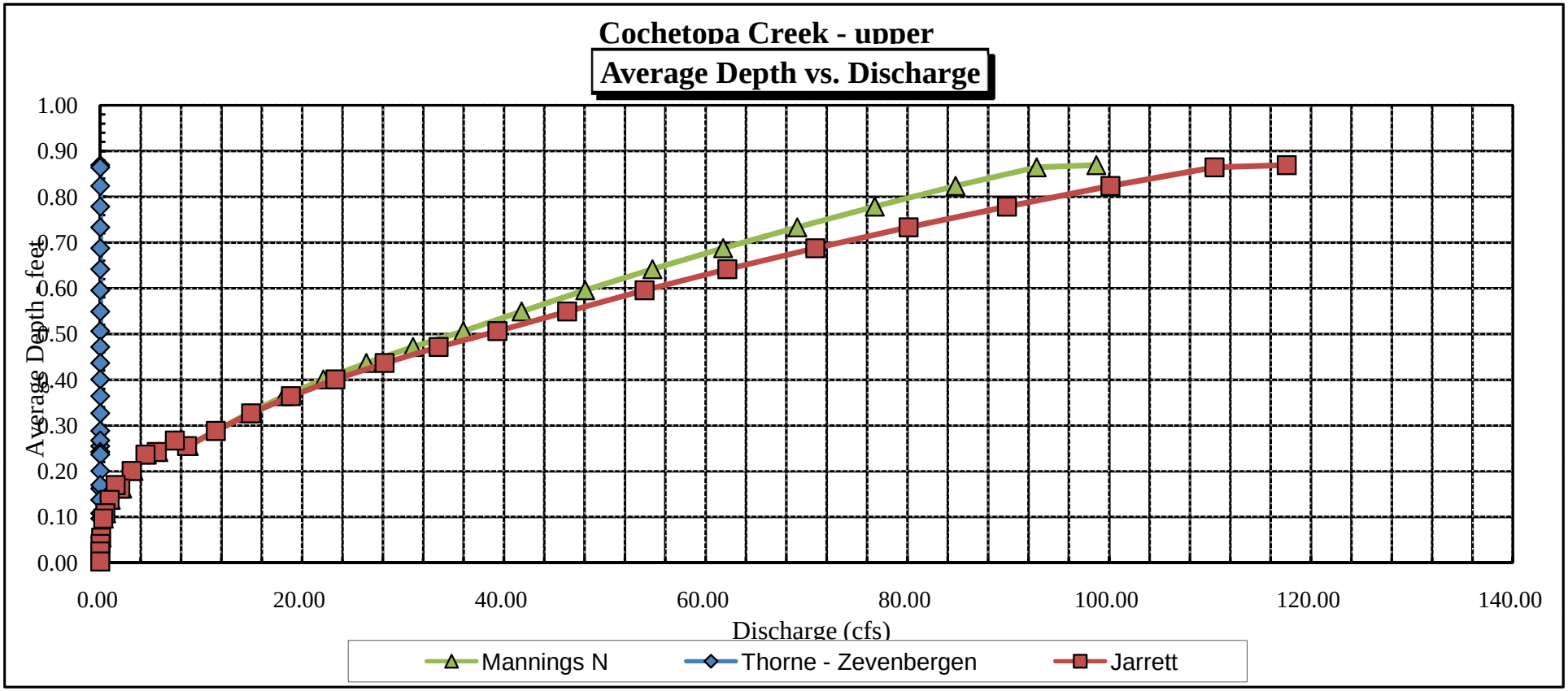
RATIONALE FOR RECOMMENDATION:
=============================

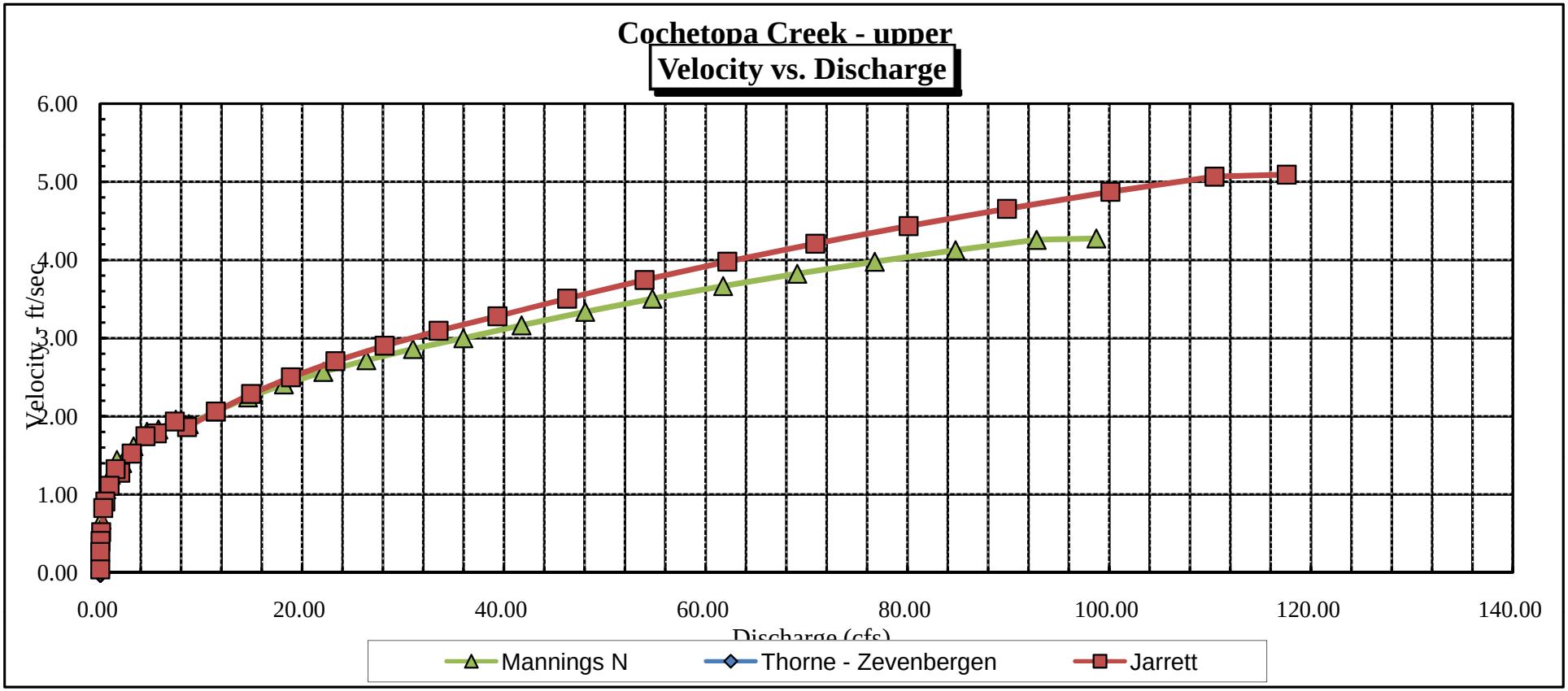
RECOMMENDATION BY: ……………………..……….……............................... AGENCY..…………………………......……....….....…….......... DATE:......…....…......……………

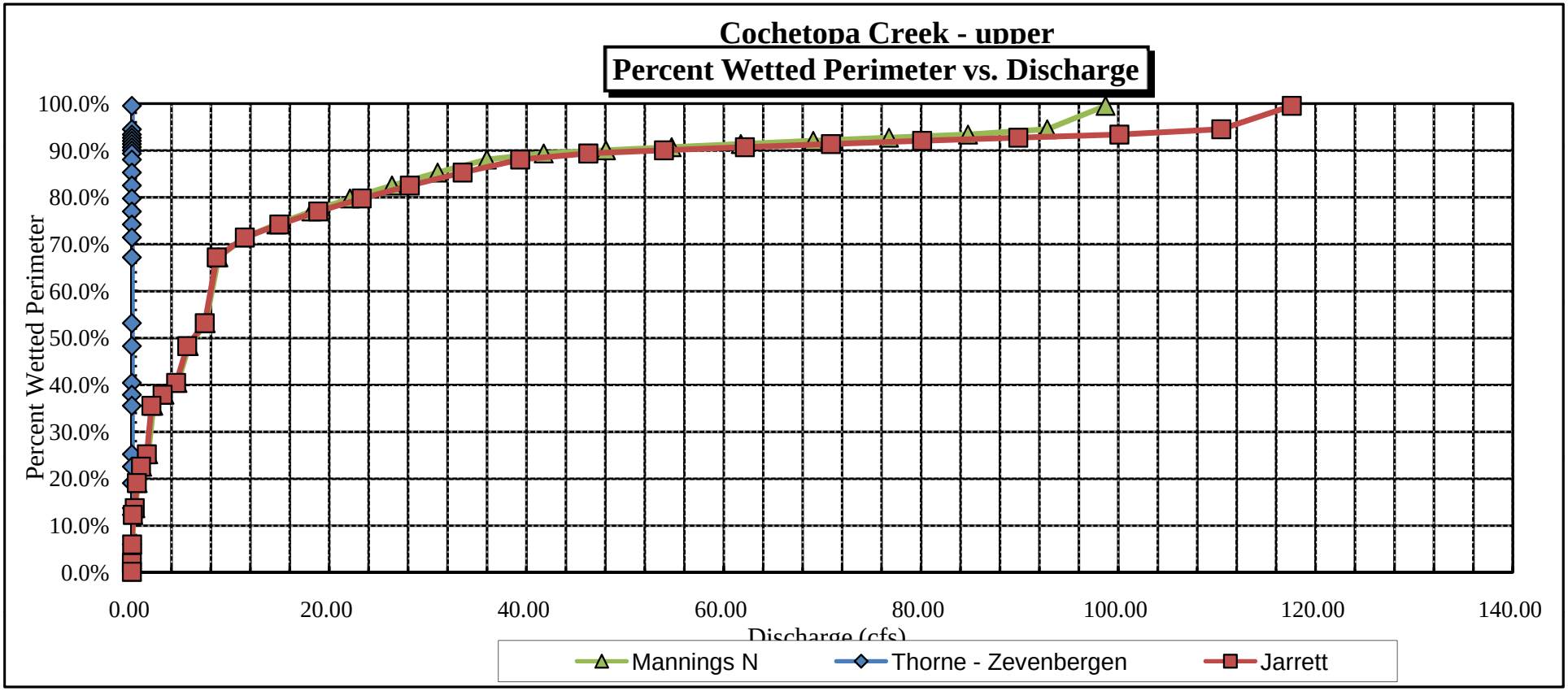
CWCB REVIEW BY: ..……………………………....……………………………………………………….....................................…............. DATE:..................…………….....


Cochetopa Creek - upper
CROSS SECTION DATA ANALYSIS
-4.50
-5.00
-5.50
-6.00
-6.50
-7.00
VERTICAL DEPTH (FT)
RS & G
W
W
G
LS
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Cochetopa Creek - upper
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
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett


Cochetopa Creek - upper
Average Depth vs. Discharge
Average Depth - feet
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Cochetopa Creek - upper
Velocity vs. Discharge
Velocity, ft/sec
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Cochetopa Creek - upper
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
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett

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

LOCATION INFORMATION

STREAM NAME:	Cochetopa Creek
XS LOCATION:	near private - BLM boundary
XS NUMBER:	1
DATE:	26-Sep-06
OBSERVERS:	Hayes, Fresques, Smith, Thompson
1/4 SEC:	SW
SECTION:	28
TWP:	45N
RANGE:	2W
PM:	N.M.
COUNTY:	Saguache
WATERSHED:	Gunnison
DIVISION:	4
DOW CODE:	39203
USGS MAP:	Cold Park Spring 7.5'
USFS MAP:	0

SUPPLEMENTAL DATA

		*** NOTE ***
		Leave TAPE WT and TENSION
		at defaults for data collected
TAPE WT:	0.0106	with a survey level and rod
TENSION:	99999	

CHANNEL PROFILE DATA

SLOPE:	0.01265625

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

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

STREAM NAME: Cochetopa Creek
XS LOCATION: near private - BLM boundary
XS NUMBER: 1

DATA POINTS= 33

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	S	0.00	3.54			0.00		0.00	0.00	0.0%
1	G	3.00	4.38			0.00		0.00	0.00	0.0%
	W	7.00	5.55			0.00		0.00	0.00	0.0%
		8.00	5.66	0.10	0.00	1.01	0.10	0.10	0.00	0.0%
		9.00	5.57	0.00	0.00	1.00		0.00	0.00	0.0%
		10.00	5.69	0.15	0.37	1.01	0.15	0.15	0.06	0.4%
		11.00	5.82	0.25	1.16	1.01	0.25	0.25	0.29	1.8%
		12.00	6.05	0.50	1.76	1.03	0.50	0.50	0.88	5.6%
		13.00	5.81	0.25	2.53	1.03	0.25	0.25	0.63	4.0%
		14.00	5.85	0.30	1.80	1.00	0.30	0.30	0.54	3.4%
		15.00	6.30	0.75	1.74	1.10	0.75	0.75	1.31	8.3%
		16.00	6.27	0.70	1.73	1.00	0.70	0.70	1.21	7.7%
		17.00	6.26	0.70	2.35	1.00	0.70	0.70	1.65	10.4%
		18.00	6.29	0.75	1.58	1.00	0.75	0.75	1.19	7.5%
		19.00	6.21	0.65	1.46	1.00	0.65	0.65	0.95	6.0%
		20.00	6.08	0.55	1.71	1.01	0.55	0.55	0.94	5.9%
		21.00	5.99	0.45	1.89	1.00	0.45	0.45	0.85	5.4%
		22.00	6.07	0.55	0.22	1.00	0.55	0.55	0.12	0.8%
		23.00	6.00	0.45	1.09	1.00	0.45	0.45	0.49	3.1%
		24.00	5.94	0.40	1.35	1.00	0.40	0.40	0.54	3.4%
		25.00	5.95	0.40	1.55	1.00	0.40	0.40	0.62	3.9%
		26.00	5.95	0.40	1.64	1.00	0.40	0.40	0.66	4.1%
		27.00	5.82	0.25	1.86	1.01	0.25	0.25	0.47	2.9%
		28.00	5.96	0.40	1.02	1.01	0.40	0.40	0.41	2.6%
		29.00	5.96	0.40	1.27	1.00	0.40	0.40	0.51	3.2%
		30.00	5.94	0.40	1.23	1.00	0.40	0.40	0.49	3.1%
		31.00	5.98	0.40	0.96	1.00	0.40	0.40	0.38	2.4%
		32.00	5.79	0.25	1.55	1.02	0.25	0.25	0.39	2.5%
		33.00	5.80	0.25	1.01	1.00	0.25	0.25	0.25	1.6%
		34.00	5.76	0.20	0.00	1.00	0.20	0.20	0.00	0.0%
	W	35.00	5.55			1.02		0.00	0.00	0.0%
1	G	37.00	4.42			0.00		0.00	0.00	0.0%
	S	37.00	4.42			0.00		0.00	0.00	0.0%
	TOTALS ----------					28.26	0.75 (Max.)	10.85	15.81	100.0%

Manning's n = 0.0606
Hydraulic Radius= 0.38391637

STREAM NAME: Cochetopa Creek
XS LOCATION: near private - BLM boundary
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	10.85	10.36	-4.5%
5.32	10.85	17.50	61.3%
5.34	10.85	16.91	55.9%
5.36	10.85	16.33	50.5%
5.38	10.85	15.75	45.2%
5.40	10.85	15.18	39.9%
5.42	10.85	14.60	34.6%
5.44	10.85	14.03	29.3%
5.46	10.85	13.46	24.1%
5.48	10.85	12.89	18.8%
5.50	10.85	12.33	13.6%
5.52	10.85	11.76	8.4%
5.53	10.85	11.48	5.8%
5.54	10.85	11.20	3.2%
5.55	10.85	10.92	0.6%
5.56	10.85	10.64	-1.9%
5.57	10.85	10.36	-4.5%
5.58	10.85	10.09	-7.0%
5.59	10.85	9.82	-9.5%
5.60	10.85	9.55	-12.0%
5.61	10.85	9.28	-14.5%
5.62	10.85	9.02	-16.9%
5.64	10.85	8.50	-21.6%
5.66	10.85	8.00	-26.2%
5.68	10.85	7.51	-30.8%
5.70	10.85	7.02	-35.3%
5.72	10.85	6.54	-39.7%
5.74	10.85	6.07	-44.1%
5.76	10.85	5.59	-48.4%
5.78	10.85	5.13	-52.7%
5.80	10.85	4.69	-56.8%
5.82	10.85	4.27	-60.7%

WATERLINE AT ZERO
AREA ERROR = 5.553

STREAM NAME: Cochetopa Creek
XS LOCATION: near private - BLM boundary
XS NUMBER: 1

Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	4.42	33.86	1.35	1.88	45.87	34.58	100.0%	1.33	152.76	3.33
	4.55	33.18	1.25	1.75	41.43	33.84	97.9%	1.22	130.79	3.16
	4.60	32.92	1.21	1.70	39.78	33.56	97.0%	1.19	122.89	3.09
	4.65	32.66	1.17	1.65	38.14	33.28	96.2%	1.15	115.20	3.02
	4.70	32.40	1.13	1.60	36.51	33.00	95.4%	1.11	107.74	2.95
	4.75	32.14	1.09	1.55	34.90	32.72	94.6%	1.07	100.49	2.88
	4.80	31.88	1.04	1.50	33.30	32.44	93.8%	1.03	93.46	2.81
	4.85	31.62	1.00	1.45	31.71	32.16	93.0%	0.99	86.65	2.73
	4.90	31.36	0.96	1.40	30.14	31.88	92.2%	0.95	80.07	2.66
	4.95	31.10	0.92	1.35	28.58	31.60	91.4%	0.90	73.70	2.58
	5.00	30.84	0.88	1.30	27.03	31.32	90.6%	0.86	67.57	2.50
	5.05	30.58	0.83	1.25	25.49	31.04	89.8%	0.82	61.66	2.42
	5.10	30.32	0.79	1.20	23.97	30.77	89.0%	0.78	55.98	2.34
	5.15	30.06	0.75	1.15	22.46	30.49	88.1%	0.74	50.54	2.25
	5.20	29.80	0.70	1.10	20.96	30.21	87.3%	0.69	45.33	2.16
	5.25	29.54	0.66	1.05	19.48	29.93	86.5%	0.65	40.36	2.07
	5.30	29.28	0.61	1.00	18.01	29.65	85.7%	0.61	35.63	1.98
	5.35	29.02	0.57	0.95	16.55	29.37	84.9%	0.56	31.15	1.88
	5.40	28.77	0.53	0.90	15.11	29.09	84.1%	0.52	26.92	1.78
	5.45	28.51	0.48	0.85	13.67	28.81	83.3%	0.47	22.95	1.68
	5.50	28.25	0.43	0.80	12.26	28.53	82.5%	0.43	19.25	1.57
WL	5.55	27.97	0.39	0.75	10.85	28.23	81.6%	0.38	15.82	1.46
	5.60	26.64	0.36	0.70	9.48	26.89	77.8%	0.35	13.05	1.38
	5.65	24.98	0.33	0.65	8.19	25.21	72.9%	0.32	10.67	1.30
	5.70	24.18	0.29	0.60	6.96	24.40	70.6%	0.29	8.32	1.20
	5.75	23.55	0.24	0.55	5.77	23.77	68.7%	0.24	6.19	1.07
	5.80	21.07	0.22	0.50	4.63	21.28	61.5%	0.22	4.63	1.00
	5.85	18.86	0.19	0.45	3.63	19.06	55.1%	0.19	3.31	0.91
	5.90	17.32	0.16	0.40	2.72	17.48	50.5%	0.16	2.18	0.80
	5.95	12.65	0.15	0.35	1.91	12.78	36.9%	0.15	1.49	0.78
	6.00	8.73	0.16	0.30	1.41	8.83	25.5%	0.16	1.14	0.81
	6.05	6.32	0.16	0.25	1.03	6.39	18.5%	0.16	0.85	0.82
	6.10	5.27	0.14	0.20	0.75	5.32	15.4%	0.14	0.56	0.75
	6.15	4.77	0.11	0.15	0.50	4.81	13.9%	0.10	0.31	0.61
	6.20	4.27	0.06	0.10	0.28	4.30	12.4%	0.06	0.12	0.44
	6.25	3.57	0.02	0.05	0.08	3.59	10.4%	0.02	0.02	0.22

STREAM NAME: Cochetopa Creek
XS LOCATION: near private - BLM boundary
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	15.81	cfs
CALCULATED FLOW (Qc)=	15.82	cfs
(Qm-Qc)/Qm * 100 =	-0.1	%
MEASURED WATERLINE (WLm)=	5.57	ft
CALCULATED WATERLINE (WLc)=	5.55	ft
(WLm-WLc)/WLm * 100 =	0.3	%
MAX MEASURED DEPTH (Dm)=	0.75	ft
MAX CALCULATED DEPTH (Dc)=	0.75	ft
(Dm-Dc)/Dm * 100	0.3	%
MEAN VELOCITY=	1.46	ft/sec
MANNING'S N=	0.061	
SLOPE=	0.01265625	ft/ft
.4 * Qm =	6.3	cfs
2.5 * Qm=	39.5	cfs

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

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

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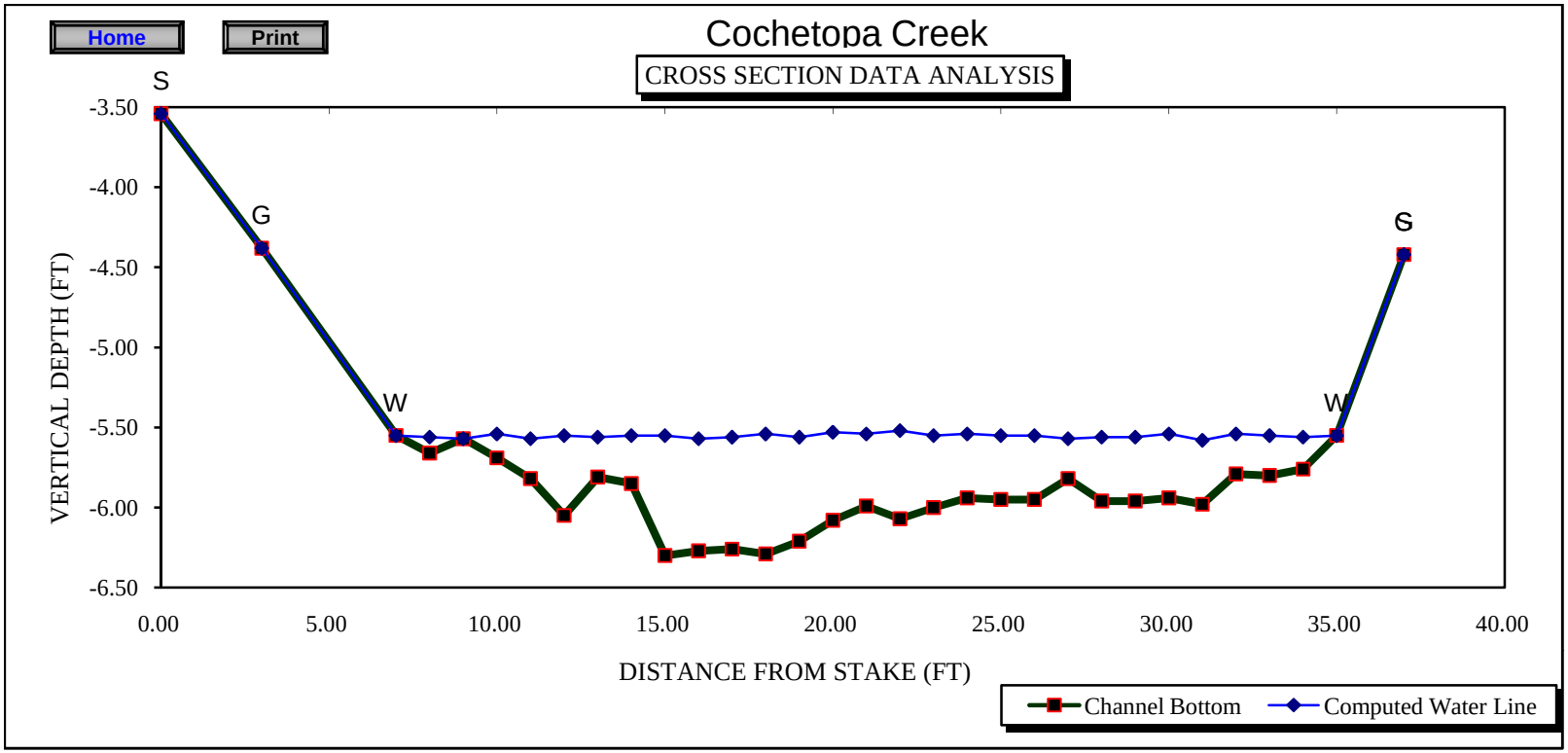
RECOMMENDATION BY: ..... AGENCY..... DATE:.....

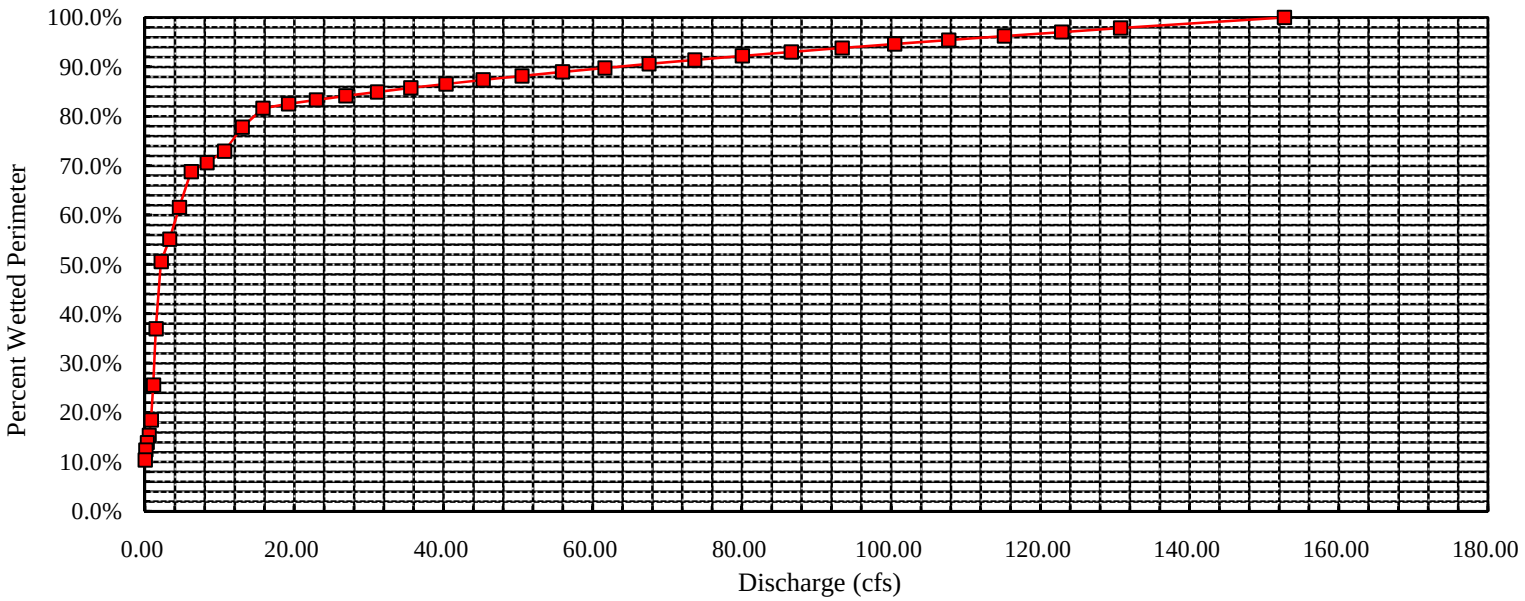
CWCB REVIEW BY: ..... DATE:.....



ChartMin	0	ChartMinY	-6.5
ChartMax	40	ChartMaxY	-3.5

Home Print

Percent Wetted Perimeter vs. Discharge



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

LOCATION INFORMATION

STREAM NAME:	Cochetopa Creek
XS LOCATION:	Near private/public boundary
XS NUMBER:	2
DATE:	7-Oct-05
OBSERVERS:	R. Smith, A. Hayes
1/4 SEC:	SW
SECTION:	28
TWP:	45 N
RANGE:	2 E
PM:	N.M.
COUNTY:	Saguache
WATERSHED:	Gunnison
DIVISION:	4
DOW CODE:	39203
USGS MAP:	Cold Spring Park
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:	0.018

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

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

STREAM NAME: Cochetopa Creek
XS LOCATION: Near private/public boundary
XS NUMBER: 2

DATA POINTS= 21

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
1	RS/GL	0.00	4.48			0.00		0.00	0.00	0.0%
		2.00	5.52			0.00		0.00	0.00	0.0%
	W	6.40	5.96	0.00		0.00		0.00	0.00	0.0%
		8.00	6.21	0.30	0.59	1.62	0.30	0.47	0.27	1.4%
		9.50	6.27	0.40	1.23	1.50	0.40	0.60	0.74	3.9%
		11.00	6.10	0.20	1.41	1.51	0.20	0.30	0.42	2.2%
		12.50	6.74	0.90	1.86	1.63	0.90	1.35	2.51	13.1%
		14.00	6.78	0.90	2.54	1.50	0.90	1.35	3.43	17.9%
		15.50	6.44	0.55	2.01	1.54	0.55	0.83	1.66	8.7%
		17.00	6.55	0.55	1.05	1.50	0.55	0.83	0.87	4.5%
		18.50	6.75	0.85	1.99	1.51	0.85	1.28	2.54	13.3%
		20.00	6.74	0.85	1.81	1.50	0.85	1.28	2.31	12.1%
		21.50	6.64	0.70	1.31	1.50	0.70	1.05	1.38	7.2%
		23.00	6.37	0.45	0.84	1.52	0.45	0.68	0.57	3.0%
		24.50	6.29	0.35	0.99	1.50	0.35	0.53	0.52	2.7%
		26.00	6.45	0.40	0.76	1.51	0.40	0.60	0.46	2.4%
		27.50	6.40	0.40	1.19	1.50	0.40	0.60	0.71	3.7%
		29.00	6.30	0.30	0.78	1.50	0.30	0.45	0.35	1.8%
		30.50	6.16	0.10	0.26	1.51	0.10	0.15	0.04	0.2%
		32.00	6.56	0.50	0.60	1.55	0.50	0.63	0.38	2.0%
	W	33.00	6.02	0.00		1.14		0.00	0.00	0.0%
	TOTALS ----------					27.05	0.9 (Max.)	12.94	19.14	100.0%

Manning's n = 0.0824
Hydraulic Radius= 0.47829159

STREAM NAME: Cochetopa Creek
XS LOCATION: Near private/public boundary
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	12.94	11.74	-9.3%
5.74	12.94	18.63	44.0%
5.76	12.94	18.06	39.5%
5.78	12.94	17.49	35.1%
5.80	12.94	16.92	30.8%
5.82	12.94	16.36	26.4%
5.84	12.94	15.80	22.1%
5.86	12.94	15.25	17.8%
5.88	12.94	14.70	13.6%
5.90	12.94	14.15	9.4%
5.92	12.94	13.61	5.2%
5.94	12.94	13.07	1.0%
5.95	12.94	12.80	-1.0%
5.96	12.94	12.54	-3.1%
5.97	12.94	12.27	-5.2%
5.98	12.94	12.01	-7.2%
5.99	12.94	11.74	-9.3%
6.00	12.94	11.48	-11.3%
6.01	12.94	11.22	-13.3%
6.02	12.94	10.95	-15.4%
6.03	12.94	10.69	-17.4%
6.04	12.94	10.43	-19.4%
6.06	12.94	9.91	-23.4%
6.08	12.94	9.40	-27.4%
6.10	12.94	8.88	-31.4%
6.12	12.94	8.38	-35.3%
6.14	12.94	7.88	-39.1%
6.16	12.94	7.38	-42.9%
6.18	12.94	6.90	-46.7%
6.20	12.94	6.44	-50.3%
6.22	12.94	5.98	-53.8%
6.24	12.94	5.55	-57.1%

WATERLINE AT ZERO
AREA ERROR = 5.945

STREAM NAME: Cochetopa Creek
XS LOCATION: Near private/public boundary
XS NUMBER: 2

Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	4.48	33.00	1.77	2.30	58.49	33.73	100.0%	1.73	204.20	3.49
	4.94	32.11	1.35	1.84	43.36	32.72	97.0%	1.32	126.50	2.92
	4.99	32.01	1.30	1.79	41.75	32.61	96.7%	1.28	119.07	2.85
	5.04	31.91	1.26	1.74	40.15	32.51	96.4%	1.24	111.82	2.78
	5.09	31.82	1.21	1.69	38.56	32.40	96.0%	1.19	104.75	2.72
	5.14	31.72	1.17	1.64	36.97	32.29	95.7%	1.15	97.88	2.65
	5.19	31.63	1.12	1.59	35.39	32.18	95.4%	1.10	91.20	2.58
	5.24	31.53	1.07	1.54	33.81	32.07	95.1%	1.05	84.71	2.51
	5.29	31.43	1.03	1.49	32.24	31.96	94.8%	1.01	78.41	2.43
	5.34	31.34	0.98	1.44	30.67	31.86	94.4%	0.96	72.32	2.36
	5.39	31.24	0.93	1.39	29.10	31.75	94.1%	0.92	66.43	2.28
	5.44	31.14	0.88	1.34	27.54	31.64	93.8%	0.87	60.74	2.21
	5.49	31.05	0.84	1.29	25.99	31.53	93.5%	0.82	55.26	2.13
	5.54	30.75	0.79	1.24	24.44	31.23	92.6%	0.78	50.21	2.05
	5.59	30.25	0.76	1.19	22.92	30.72	91.1%	0.75	45.59	1.99
	5.64	29.75	0.72	1.14	21.42	30.22	89.6%	0.71	41.17	1.92
	5.69	29.25	0.68	1.09	19.94	29.72	88.1%	0.67	36.96	1.85
	5.74	28.75	0.64	1.04	18.49	29.22	86.6%	0.63	32.97	1.78
	5.79	28.25	0.60	0.99	17.06	28.71	85.1%	0.59	29.18	1.71
	5.84	27.75	0.56	0.94	15.66	28.21	83.6%	0.56	25.60	1.63
	5.89	27.25	0.52	0.89	14.29	27.71	82.1%	0.52	22.23	1.56
WL	5.94	26.75	0.48	0.84	12.94	27.21	80.7%	0.48	19.07	1.47
	5.99	26.38	0.44	0.79	11.61	26.83	79.5%	0.43	16.07	1.38
	6.04	26.01	0.40	0.74	10.30	26.45	78.4%	0.39	13.29	1.29
	6.09	25.60	0.35	0.69	9.01	26.02	77.1%	0.35	10.75	1.19
	6.14	24.68	0.31	0.64	7.75	25.08	74.4%	0.31	8.57	1.11
	6.19	23.21	0.28	0.59	6.55	23.57	69.9%	0.28	6.75	1.03
	6.24	20.86	0.26	0.54	5.45	21.19	62.8%	0.26	5.33	0.98
	6.29	18.94	0.24	0.49	4.46	19.23	57.0%	0.23	4.07	0.91
	6.34	16.41	0.22	0.44	3.57	16.67	49.4%	0.21	3.10	0.87
	6.39	14.19	0.20	0.39	2.81	14.41	42.7%	0.20	2.29	0.81
	6.44	11.53	0.19	0.34	2.17	11.71	34.7%	0.18	1.70	0.79
	6.49	9.75	0.17	0.29	1.64	9.89	29.3%	0.17	1.20	0.73
	6.54	8.18	0.15	0.24	1.19	8.27	24.5%	0.14	0.79	0.66
	6.59	7.07	0.11	0.19	0.81	7.14	21.2%	0.11	0.46	0.57
	6.64	6.03	0.08	0.14	0.48	6.08	18.0%	0.08	0.22	0.45
	6.69	4.57	0.05	0.09	0.22	4.59	13.6%	0.05	0.07	0.32
	6.74	2.27	0.01	0.04	0.03	2.28	6.7%	0.01	0.00	0.13

STREAM NAME: Cochetopa Creek
XS LOCATION: Near private/public boundary
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	19.14	cfs
CALCULATED FLOW (Qc)=	19.07	cfs
(Qm-Qc)/Qm * 100 =	0.4	%
MEASURED WATERLINE (WLm)=	5.99	ft
CALCULATED WATERLINE (WLc)=	5.94	ft
(WLm-WLc)/WLm * 100 =	0.8	%
MAX MEASURED DEPTH (Dm)=	0.90	ft
MAX CALCULATED DEPTH (Dc)=	0.84	ft
(Dm-Dc)/Dm * 100	7.2	%
MEAN VELOCITY=	1.47	ft/sec
MANNING'S N=	0.082	
SLOPE=	0.018	ft/ft
.4 * Qm =	7.7	cfs
2.5 * Qm=	47.9	cfs

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

FLOW (CFS)	PERIOD
___________________	__________________
___________________	__________________
___________________	__________________
___________________	__________________

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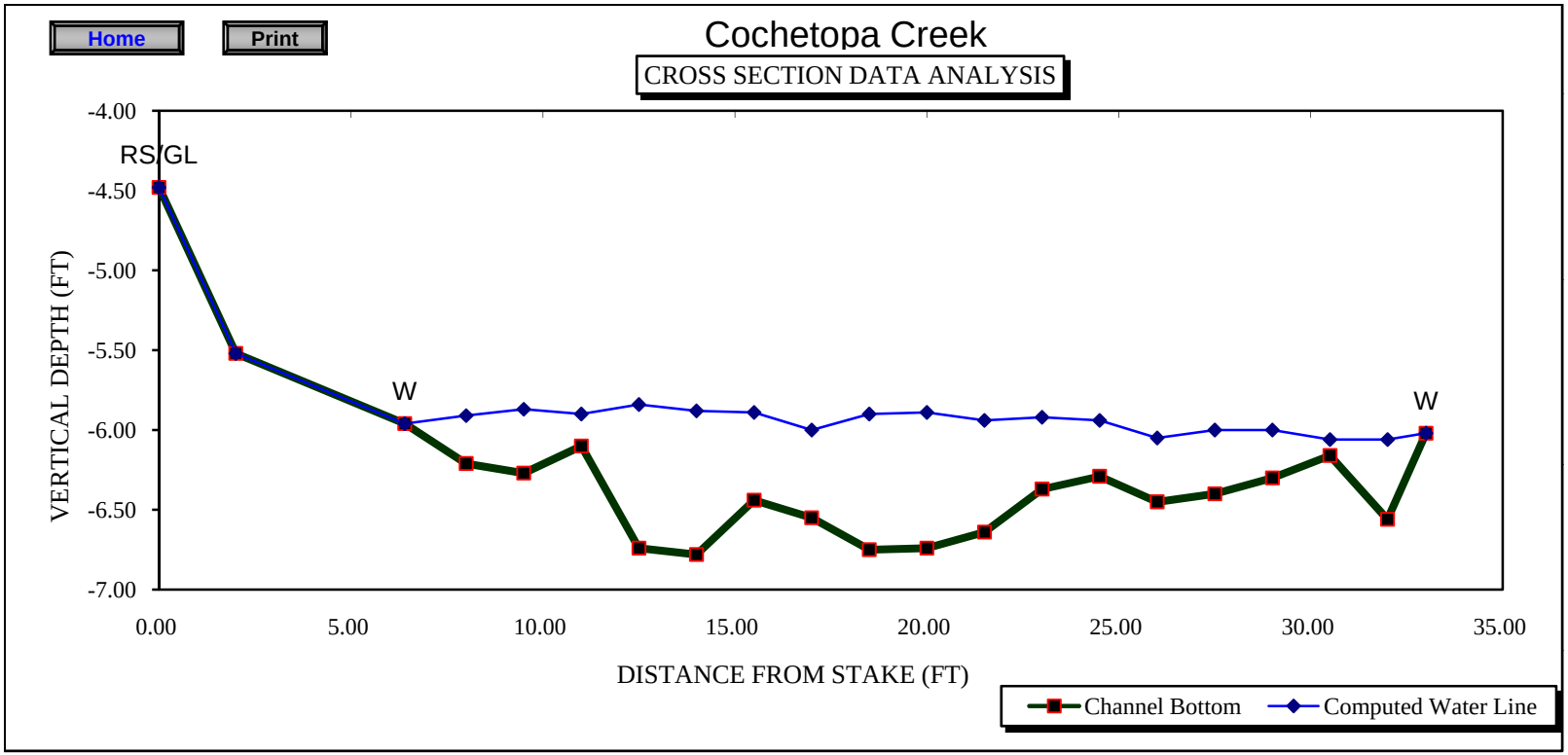
RECOMMENDATION BY: ………………...………..……............................... AGENCY...……………………......……...…...……...... DATE:......…...…......……………

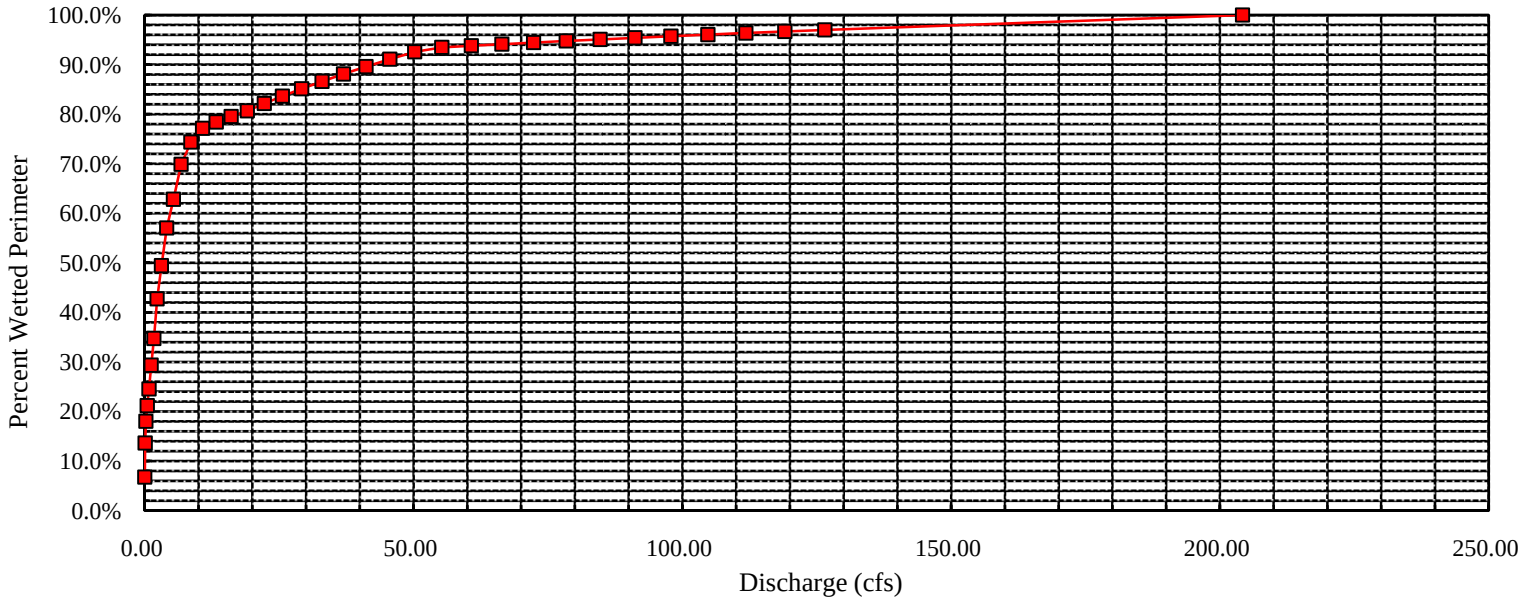
CWCB REVIEW BY: ..……………………….....……………………………………………………...…............. DATE:.................…………….....



ChartMin	0	ChartMinY	-7
ChartMax	35	ChartMaxY	-4

Home Print

Percent Wetted Perimeter vs. Discharge



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

LOCATION INFORMATION

STREAM NAME:	Cochetopa Creek - upper
XS LOCATION:	Junction w/ Colo. Trail from east
XS NUMBER:	2
DATE:	7-Oct-08
OBSERVERS:	R. Smith, A. Hayes
1/4 SEC:	SE
SECTION:	5
TWP:	44N
RANGE:	2E
PM:	New Mexico
COUNTY:	Saguache
WATERSHED:	Gunnison
DIVISION:	4
DOW CODE:	39203
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:	0.01

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

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

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: Junction w/ Colo. Trail from east
XS NUMBER: 2

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	RS & G	2.00	5.45			0.00		0.00	0.00	0.0%
	W	8.10	6.17			0.00		0.00	0.00	0.0%
		10.00	6.40	0.25	0.60	1.91	0.25	0.36	0.22	1.9%
		11.00	6.55	0.40	0.67	1.01	0.40	0.40	0.27	2.3%
		12.00	6.60	0.45	1.64	1.00	0.45	0.45	0.74	6.4%
		13.00	6.55	0.40	1.94	1.00	0.40	0.40	0.78	6.7%
		14.00	6.55	0.40	1.99	1.00	0.40	0.40	0.80	6.9%
		15.00	6.65	0.50	1.94	1.00	0.50	0.50	0.97	8.4%
		16.00	6.50	0.35	2.39	1.01	0.35	0.35	0.84	7.3%
		17.00	6.55	0.40	2.07	1.00	0.40	0.40	0.83	7.2%
		18.00	6.55	0.40	2.34	1.00	0.40	0.40	0.94	8.1%
		19.00	6.50	0.40	2.11	1.00	0.40	0.40	0.84	7.3%
		20.00	6.50	0.40	2.23	1.00	0.40	0.40	0.89	7.8%
		21.00	6.50	0.35	2.19	1.00	0.35	0.35	0.77	6.7%
		22.00	6.45	0.30	1.84	1.00	0.30	0.30	0.55	4.8%
		23.00	6.40	0.25	1.72	1.00	0.25	0.25	0.43	3.7%
		24.00	6.40	0.30	1.69	1.00	0.30	0.30	0.51	4.4%
		25.00	6.35	0.20	1.67	1.00	0.20	0.20	0.33	2.9%
		26.00	6.35	0.20	1.20	1.00	0.20	0.20	0.24	2.1%
		27.00	6.35	0.20	1.14	1.00	0.20	0.20	0.23	2.0%
		28.00	6.40	0.25	0.95	1.00	0.25	0.25	0.24	2.1%
		29.00	6.45	0.30	0.31	1.00	0.30	0.36	0.11	1.0%
	W	30.40	6.15			1.43		0.00	0.00	0.0%
		32.50	6.00			0.00		0.00	0.00	0.0%
1	G	36.90	5.35			0.00		0.00	0.00	0.0%
	LS	37.20	4.50			0.00		0.00	0.00	0.0%
	TOTALS ----------					22.38	0.5 (Max.)	6.87	11.51	100.0%

Manning's n = 0.0404
Hydraulic Radius= 0.3070238

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: Junction w/ Colo. Trail from east
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	6.87	6.52	-5.1%
5.91	6.87	12.75	85.6%
5.93	6.87	12.21	77.7%
5.95	6.87	11.68	69.9%
5.97	6.87	11.15	62.2%
5.99	6.87	10.63	54.6%
6.01	6.87	10.11	47.1%
6.03	6.87	9.60	39.7%
6.05	6.87	9.10	32.4%
6.07	6.87	8.61	25.3%
6.09	6.87	8.13	18.3%
6.11	6.87	7.66	11.5%
6.12	6.87	7.43	8.1%
6.13	6.87	7.20	4.7%
6.14	6.87	6.97	1.4%
6.15	6.87	6.74	-1.9%
6.16	6.87	6.52	-5.1%
6.17	6.87	6.30	-8.4%
6.18	6.87	6.08	-11.6%
6.19	6.87	5.85	-14.8%
6.20	6.87	5.64	-18.0%
6.21	6.87	5.42	-21.2%
6.23	6.87	4.99	-27.4%
6.25	6.87	4.56	-33.6%
6.27	6.87	4.14	-39.8%
6.29	6.87	3.72	-45.8%
6.31	6.87	3.31	-51.8%
6.33	6.87	2.91	-57.7%
6.35	6.87	2.51	-63.5%
6.37	6.87	2.16	-68.5%
6.39	6.87	1.84	-73.3%
6.41	6.87	1.54	-77.6%

WATERLINE AT ZERO
AREA ERROR = 6.144

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: Junction w/ Colo. Trail from east
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	5.45	34.22	0.79	1.20	26.88	34.40	100.0%	0.78	83.94	3.12
	5.49	33.55	0.76	1.16	25.38	33.71	98.0%	0.75	77.30	3.05
	5.54	32.79	0.72	1.11	23.73	32.95	95.8%	0.72	70.14	2.96
	5.59	32.02	0.69	1.06	22.10	32.18	93.6%	0.69	63.33	2.86
	5.64	31.26	0.66	1.01	20.52	31.41	91.3%	0.65	56.86	2.77
	5.69	30.50	0.62	0.96	18.98	30.64	89.1%	0.62	50.74	2.67
	5.74	29.74	0.59	0.91	17.47	29.87	86.8%	0.58	44.97	2.57
	5.79	28.98	0.55	0.86	16.00	29.10	84.6%	0.55	39.53	2.47
	5.84	28.21	0.52	0.81	14.58	28.33	82.4%	0.51	34.43	2.36
	5.89	27.45	0.48	0.76	13.18	27.57	80.1%	0.48	29.67	2.25
	5.94	26.69	0.44	0.71	11.83	26.80	77.9%	0.44	25.24	2.13
	5.99	25.93	0.41	0.66	10.51	26.03	75.7%	0.40	21.14	2.01
	6.04	24.85	0.37	0.61	9.24	24.94	72.5%	0.37	17.55	1.90
	6.09	23.72	0.34	0.56	8.03	23.81	69.2%	0.34	14.32	1.78
WL	6.14	22.60	0.30	0.51	6.87	22.68	66.0%	0.30	11.41	1.66
	6.19	21.89	0.26	0.46	5.76	21.97	63.9%	0.26	8.68	1.51
	6.24	21.25	0.22	0.41	4.68	21.32	62.0%	0.22	6.27	1.34
	6.29	20.60	0.18	0.36	3.64	20.66	60.1%	0.18	4.20	1.16
	6.34	19.95	0.13	0.31	2.62	20.01	58.2%	0.13	2.49	0.95
	6.39	15.54	0.11	0.26	1.77	15.58	45.3%	0.11	1.53	0.86
	6.44	11.96	0.09	0.21	1.10	11.99	34.9%	0.09	0.82	0.75
	6.49	10.49	0.05	0.16	0.54	10.51	30.6%	0.05	0.28	0.51
	6.54	5.97	0.03	0.11	0.17	5.99	17.4%	0.03	0.06	0.34
	6.59	1.16	0.02	0.06	0.03	1.17	3.4%	0.02	0.01	0.30
	6.64	0.10	0.00	0.01	0.00	0.10	0.3%	0.00	0.00	0.07

STREAM NAME: Cochetopa Creek - upper
XS LOCATION: Junction w/ Colo. Trail from east
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	11.51	cfs
CALCULATED FLOW (Qc)=	11.41	cfs
(Qm-Qc)/Qm * 100 =	0.9	%
MEASURED WATERLINE (WLm)=	6.16	ft
CALCULATED WATERLINE (WLc)=	6.14	ft
(WLm-WLc)/WLm * 100 =	0.3	%
MAX MEASURED DEPTH (Dm)=	0.50	ft
MAX CALCULATED DEPTH (Dc)=	0.51	ft
(Dm-Dc)/Dm * 100	-1.1	%
MEAN VELOCITY=	1.66	ft/sec
MANNING'S N=	0.040	
SLOPE=	0.01	ft/ft
.4 * Qm =	4.6	cfs
2.5 * Qm=	28.8	cfs

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

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

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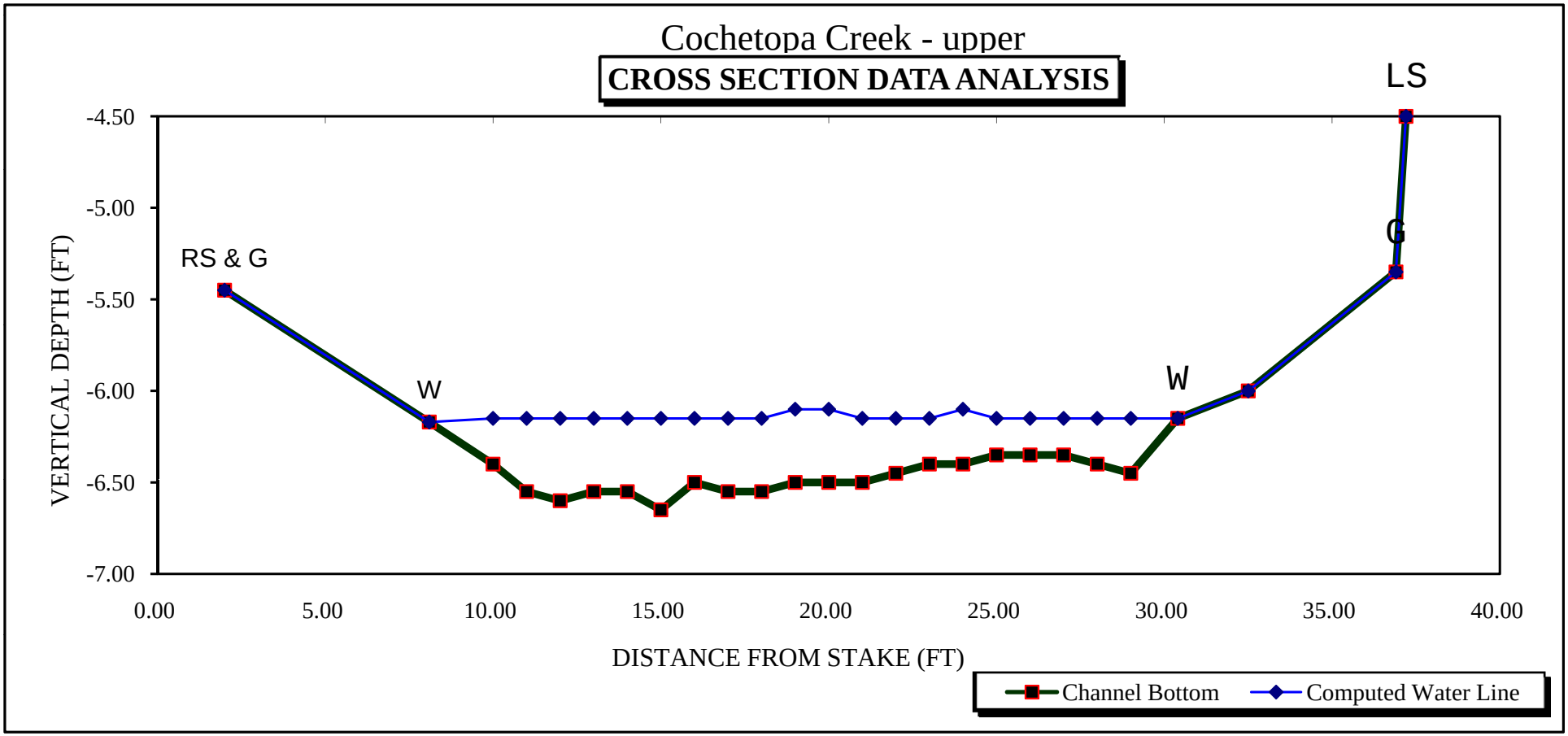
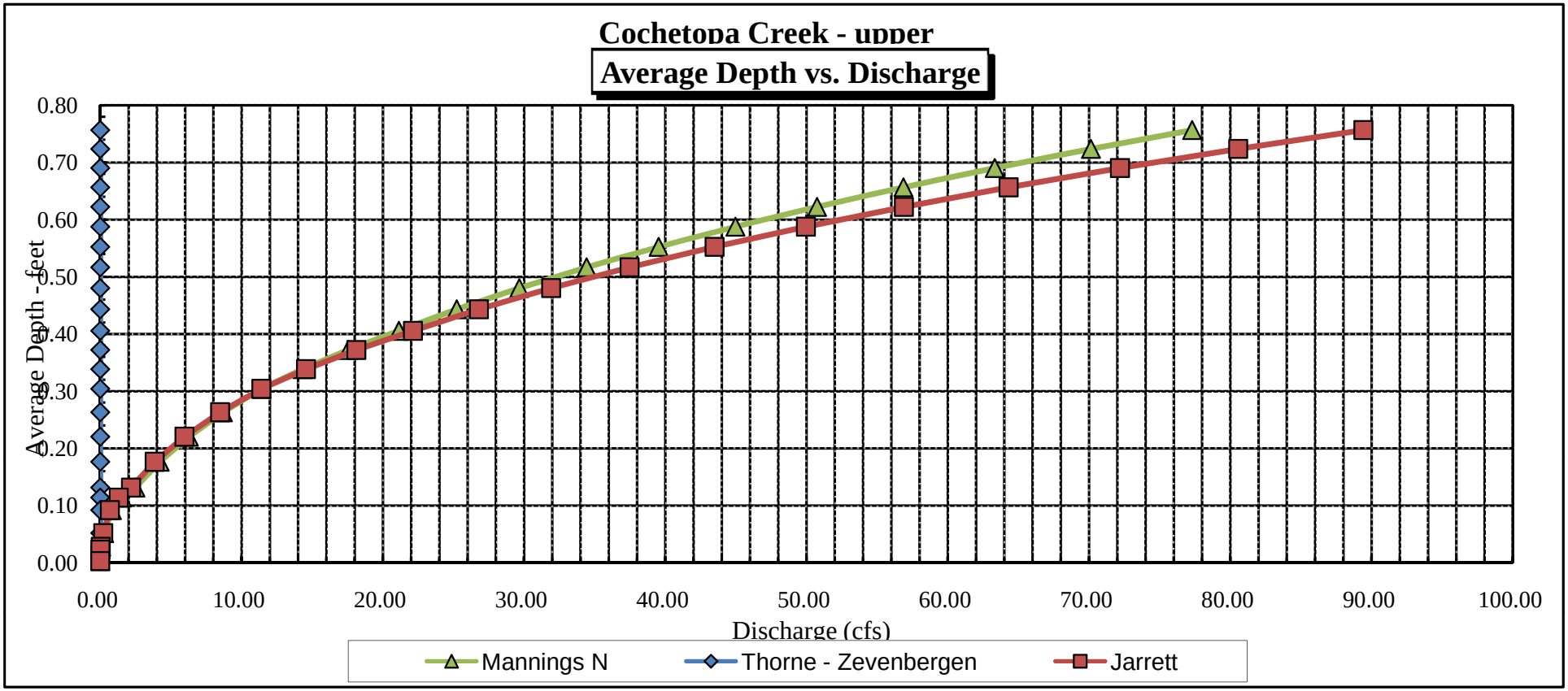
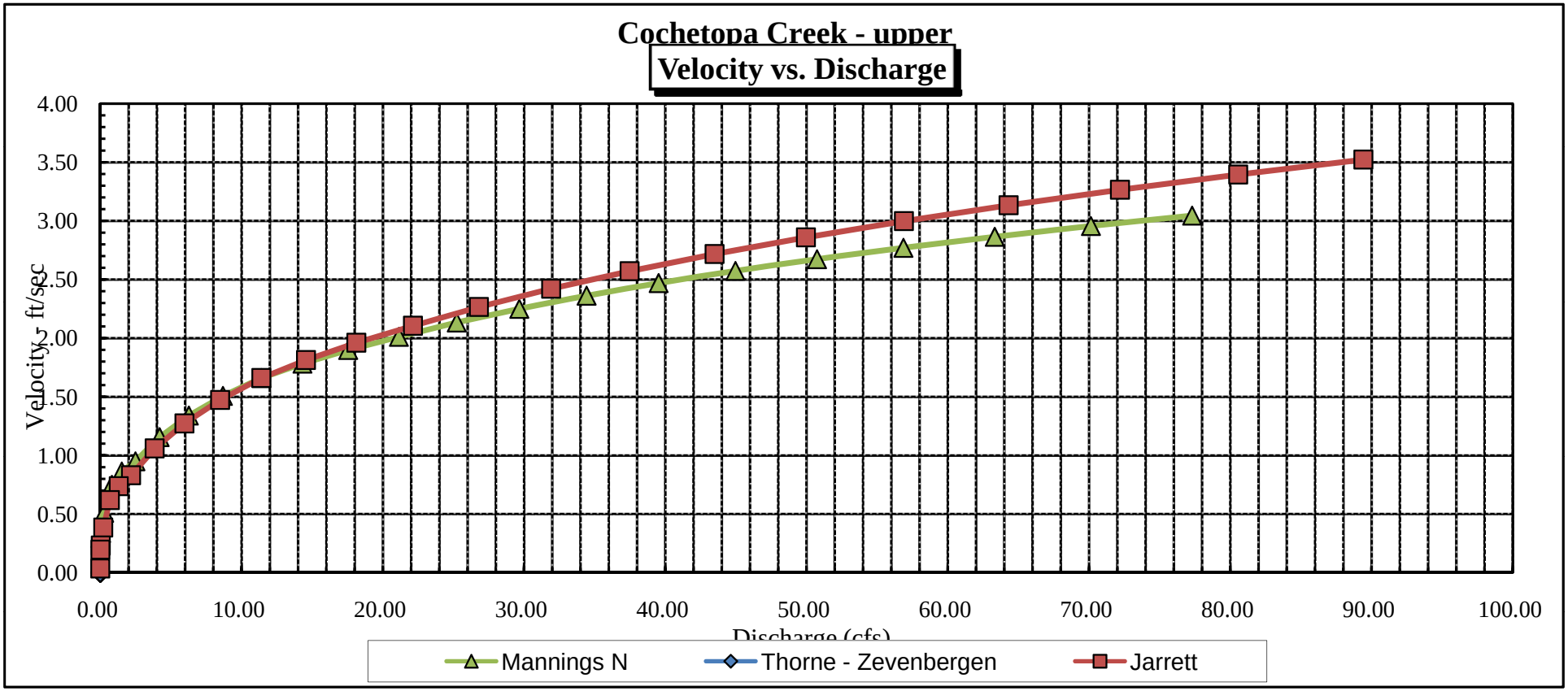
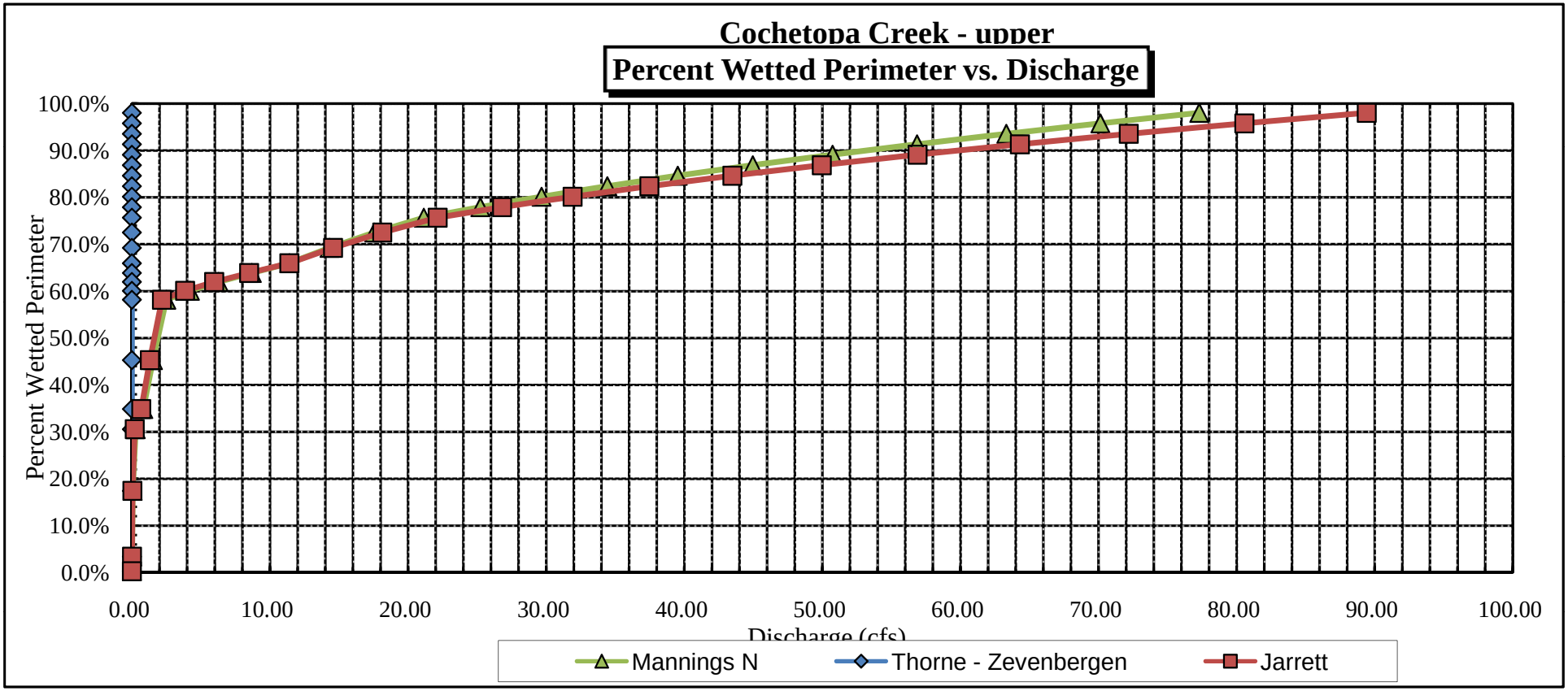
RECOMMENDATION BY: ………………...……...……............................... AGENCY...……………………......…....…...…….…...... DATE:......…...…......……………

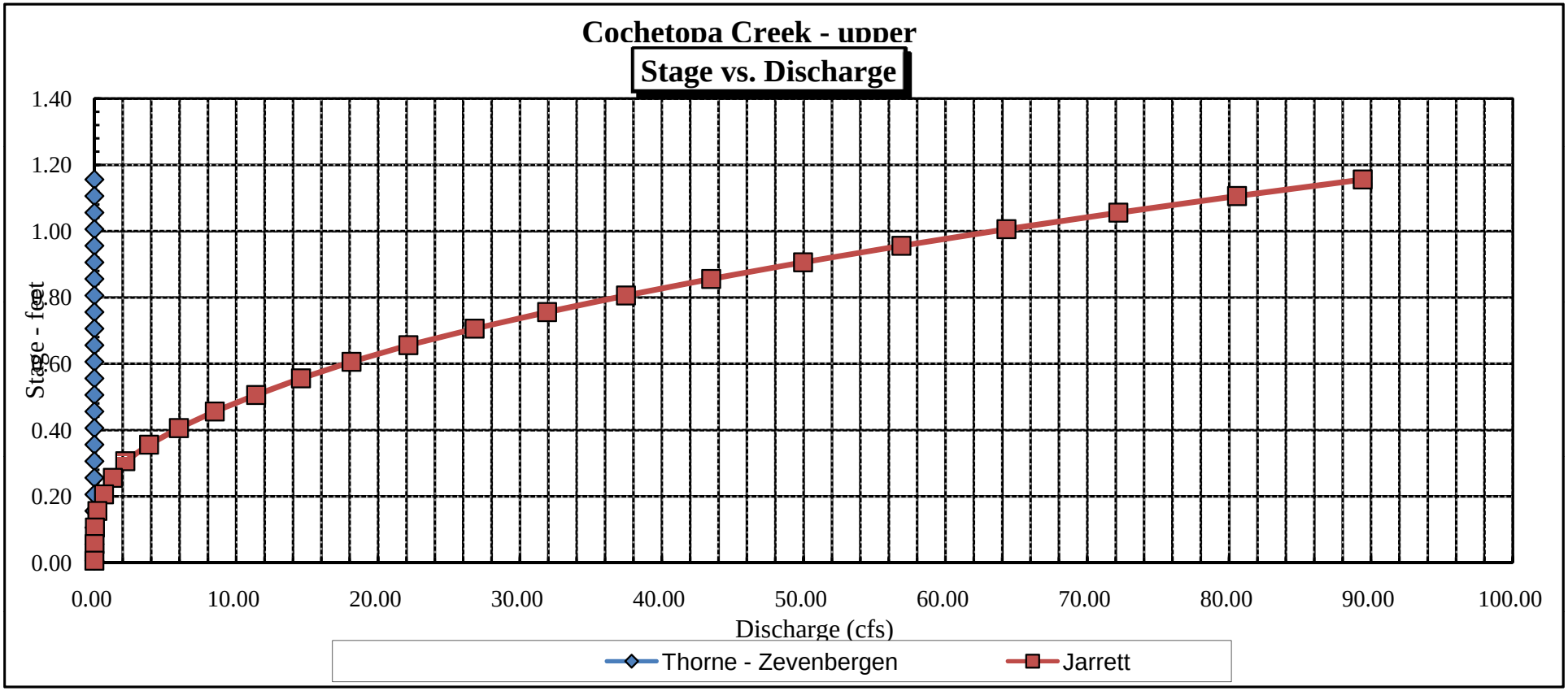
CWCB REVIEW BY: ..……………………….....………………………………………………...…............. DATE:.................….…………...…


Cochetopa Creek - upper
CROSS SECTION DATA ANALYSIS
LS
G
RS & G
W
W
-4.50
-5.00
-5.50
-6.00
-6.50
-7.00
VERTICAL DEPTH (FT)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Cochetopa Creek - upper
Average Depth vs. Discharge
Average Depth - feet
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Cochetopa Creek - upper
Velocity vs. Discharge
Velocity - ft/sec
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Cochetopa Creek - upper
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
40.00
50.00
60.00
70.00
80.00
90.00
100.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Cochetopa Creek - upper
Stage vs. Discharge
Stage - 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
70.00
80.00
90.00
100.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett