DRAFT RECOMMENDATION– January 2015 Version

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

Dear Ms. Bassi:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its recommendation for an instream flow water right on Pruden Creek, located in Water Division 1.

Location and Land Status. Pruden Creek originates on the north flank of Thirtynine Mile Mountain, approximately eight miles south of Elevenmile Canyon Reservoir. This reach begins at the headwaters and extends downstream to the headgate of the Pruden Ditch, a distance of approximately 5.4 miles. The BLM manages approximately 0.4 miles of this reach, the U.S. Forest Service manages 3.5 miles, and 1.5 miles are in private ownership.

Biological Summary. Pruden Creek is a cold-water, high gradient stream. The reach flows through a shallow, rolling valley approximately one-fourth mile in width. The stream is confined by bedrock in some locations and travels through alluvium in other locations. The stream generally has medium-sized substrate, ranging from gravels to small boulders. The stream has a good mix of pools, small riffles, and runs.

Fisheries surveys have revealed a self-sustaining population of brook trout. Intensive macro-invertebrate surveys have not been conducted, but spot samples have revealed various species of mayfly, caddisfly, and stonefly.

The riparian community is generally comprised of various willow species, alder, river birch, and potentilla. The riparian community is in fair to good condition. The structure of the riparian community provides only limited shading and cover for fish habitat.

R2Cross Analysis. The BLM collected the following R2Cross data from Pruden Creek:

Cross Section Date	Discharge Rate	Top Width	Winter Flow Recommendation (meets 2 of 3 hydraulic criteria)	Summer Flow Recommendation (meets 3 of 3 hydraulic criteria)
08/17/2009 #1	0.27 cfs	5.70 feet	0.70 cfs	Out of range
08/17/2009 #2	0.24 cfs	2.70 feet	0.27 cfs	Out of range
05/19/2014 #1	0.45 cfs	6.43 feet	0.55 cfs	1.1 cfs *See note.*
		Averages:	0.51 cfs	1.10 cfs

Note: The flow that meets all three instream flow criteria – 1.16 cfs – is outside of the confidence interval for this data set. 1.1 cfs is within the confidence interval and provides 47% wetted perimeter and meets the instream flow criteria for average depth and average velocity.

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

> 1.1 cubic feet per second is recommended during the warm weather period from May 1 to August 31. This recommendation is driven by the wetted perimeter criteria. This creek is very small and steep and has limited physical habitat, so it is important to protect a flow rate that provides usable habitat in riffles when fish are completing critical life history functions during the warm weather months.
>
> 0.4 cubic feet per second is recommended during the fall period, from September 1 to November 30. This recommendation is driven by limited water availability. This flow rate meets two of three instream flow criteria in some, but not all, of the surveyed cross sections.
>
> 0.3 cfs is recommended during the winter period from December 1 through March 31. This flow rate should prevent pools from freezing, allowing the fish population to successfully overwinter. Even though the base flow in this creek is small, it is extremely consistent, allowing the fishery to persist.
>
> 0.4 cfs is recommended during the early portion of the snowmelt runoff period, from the April 1 to April 30. This flow rate meets two of three instream flow criteria in some, but not all, of the surveyed cross sections , but reflects the fact that snowmelt runoff is not yet sufficient during April to meet all three instream flow criteria.

Water Availability. The BLM recommends relying upon two sources of data for water availability analysis. Streamstats appears to be the only reliable source of information for this watershed. The BLM does not recommend usage of gage data from this region because all of the gage data either has very short periods of record, or is heavily influenced by water diversion and storage operations. Unfortunately, Pruden Ditch has been abandoned, so recent diversion records are not available.

The BLM is not aware of any water rights within or upstream from the proposed instream flow reach.

Relationship to Land Management Plans. BLM's land use plan calls for Pruden Creek to be managed to maintain, restore, or improve riparian conditions, such that proper functioning conditions are achieved. It also specifies that instream flow appropriations will pursued on fishery streams to ensure sufficient flows rates for fisheries protection. Appropriation of an instream flow water right would assist BLM in long-term management of outstanding riparian values and important fishery values.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section were included with BLM's draft recommendation in February 2015. We thank both Colorado

Parks and Wildlife and the Colorado 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,

Brian St. George
Deputy State Director
Resources and Fire

Cc: David Gilbert, Royal Gorge FO
Keith Berger, Royal Gorge FO

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

LOCATION INFORMATION

STREAM NAME:	Pruden Creek
XS LOCATION:	At BLM-USFS boundary
XS NUMBER:	2
DATE:	17-Aug-09
OBSERVERS:	R. Smith, D. Gilbert, J. Backstrand
1/4 SEC:	SW
SECTION:	28
TWP:	13S
RANGE:	73W
PM:	Sixth
COUNTY:	Park
WATERSHED:	South Platte
DIVISION:	1
DOW CODE:	30572
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:	0.043

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

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

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 2

DATA POINTS= 14

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	LS	2.00	4.80			0.00		0.00	0.00	0.0%
1	G	4.50	5.60			0.00		0.00	0.00	0.0%
	W	4.90	5.99	0.00		0.00		0.00	0.00	0.0%
		5.00	6.15	0.15	0.36	0.19	0.15	0.03	0.01	4.5%
		5.30	6.20	0.20	0.45	0.30	0.20	0.06	0.03	11.3%
		5.60	6.20	0.20	0.80	0.30	0.20	0.06	0.05	20.1%
		5.90	6.15	0.15	0.95	0.30	0.15	0.05	0.04	17.9%
		6.20	6.25	0.25	0.45	0.32	0.25	0.08	0.03	14.2%
		6.50	6.25	0.25	0.89	0.30	0.25	0.08	0.07	28.0%
		6.80	6.25	0.25	0.15	0.30	0.25	0.06	0.01	3.9%
		7.00	6.05	0.05	0.00	0.28	0.05	0.01	0.00	0.0%
	W	7.10	5.99	0.00		0.12		0.00	0.00	0.0%
1	G	7.20	5.58			0.00		0.00	0.00	0.0%
	RS	10.10	4.55			0.00		0.00	0.00	0.0%
	TOTALS ----------					2.41	0.25 (Max.)	0.42	0.24	100.0%

Manning's n = 0.1659
Hydraulic Radius= 0.17201036

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.42	0.44	5.1%
5.74	0.42	1.03	147.2%
5.76	0.42	0.98	135.1%
5.78	0.42	0.93	123.1%
5.80	0.42	0.88	111.3%
5.82	0.42	0.83	99.6%
5.84	0.42	0.78	88.0%
5.86	0.42	0.73	76.6%
5.88	0.42	0.69	65.2%
5.90	0.42	0.64	54.0%
5.92	0.42	0.59	42.9%
5.94	0.42	0.55	31.9%
5.95	0.42	0.53	26.5%
5.96	0.42	0.50	21.1%
5.97	0.42	0.48	15.7%
5.98	0.42	0.46	10.4%
5.99	0.42	0.44	5.1%
6.00	0.42	0.41	-0.2%
6.01	0.42	0.39	-5.4%
6.02	0.42	0.37	-10.6%
6.03	0.42	0.35	-15.7%
6.04	0.42	0.33	-20.8%
6.06	0.42	0.29	-30.7%
6.08	0.42	0.25	-40.5%
6.10	0.42	0.21	-50.1%
6.12	0.42	0.17	-59.6%
6.14	0.42	0.13	-68.9%
6.16	0.42	0.09	-77.9%
6.18	0.42	0.06	-85.5%
6.20	0.42	0.04	-91.6%
6.22	0.42	0.02	-95.2%
6.24	0.42	0.01	-98.5%

WATERLINE AT ZERO
AREA ERROR = 6.000

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS 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	5.60	2.70	0.52	0.65	1.39	3.37	100.0%	0.41	1.43	1.03
	5.65	2.63	0.48	0.60	1.26	3.25	96.4%	0.39	1.24	0.99
	5.70	2.57	0.44	0.55	1.13	3.13	92.7%	0.36	1.06	0.94
	5.75	2.51	0.40	0.50	1.00	3.00	89.1%	0.33	0.89	0.89
	5.80	2.44	0.36	0.45	0.88	2.88	85.4%	0.30	0.74	0.84
	5.85	2.38	0.32	0.40	0.76	2.76	81.8%	0.27	0.59	0.78
	5.90	2.31	0.28	0.35	0.64	2.64	78.1%	0.24	0.46	0.72
	5.95	2.25	0.23	0.30	0.53	2.51	74.5%	0.21	0.34	0.65
WL	6.00	2.18	0.19	0.25	0.41	2.38	70.6%	0.17	0.24	0.58
	6.05	2.06	0.15	0.20	0.31	2.23	66.0%	0.14	0.15	0.50
	6.10	1.98	0.10	0.15	0.21	2.10	62.2%	0.10	0.08	0.40
	6.15	1.91	0.06	0.10	0.11	1.97	58.5%	0.06	0.03	0.27
	6.20	0.80	0.04	0.05	0.04	0.83	24.6%	0.04	0.01	0.23
	6.25	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.24	cfs
CALCULATED FLOW (Qc)=	0.24	cfs
(Qm-Qc)/Qm * 100 =	-0.8	%
MEASURED WATERLINE (WLm)=	5.99	ft
CALCULATED WATERLINE (WLc)=	6.00	ft
(WLm-WLc)/WLm * 100 =	-0.2	%
MAX MEASURED DEPTH (Dm)=	0.25	ft
MAX CALCULATED DEPTH (Dc)=	0.25	ft
(Dm-Dc)/Dm * 100	-0.2	%
MEAN VELOCITY=	0.58	ft/sec
MANNING'S N=	0.166	
SLOPE=	0.043	ft/ft
.4 * Qm =	0.1	cfs
2.5 * Qm=	0.6	cfs

RECOMMENDED INSTREAM FLOW:
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FLOW (CFS)	PERIOD
___________	________

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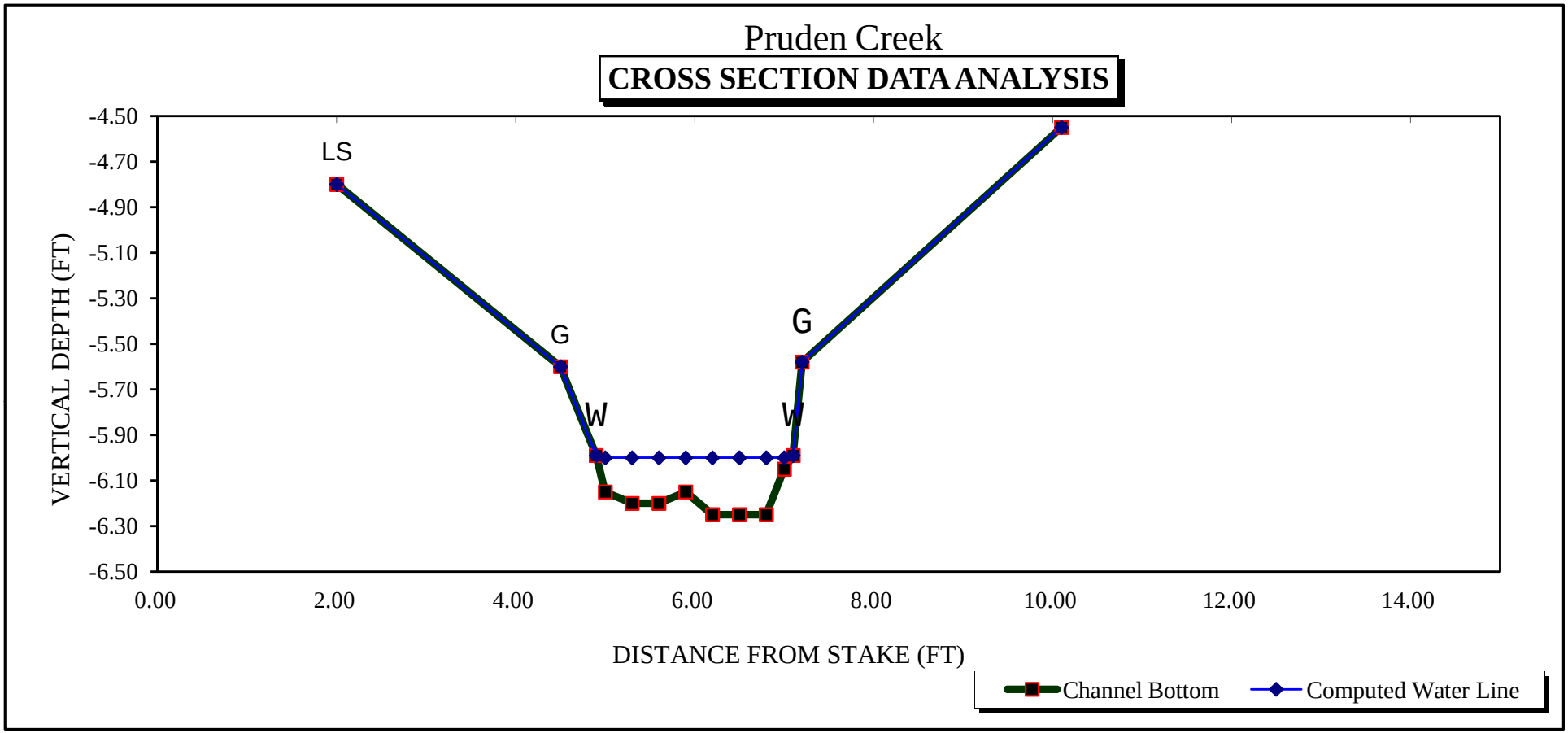
RECOMMENDATION BY: ………………….………..……............................ AGENCY..…………………….....…….....…...…....... DATE:......…...…......……………

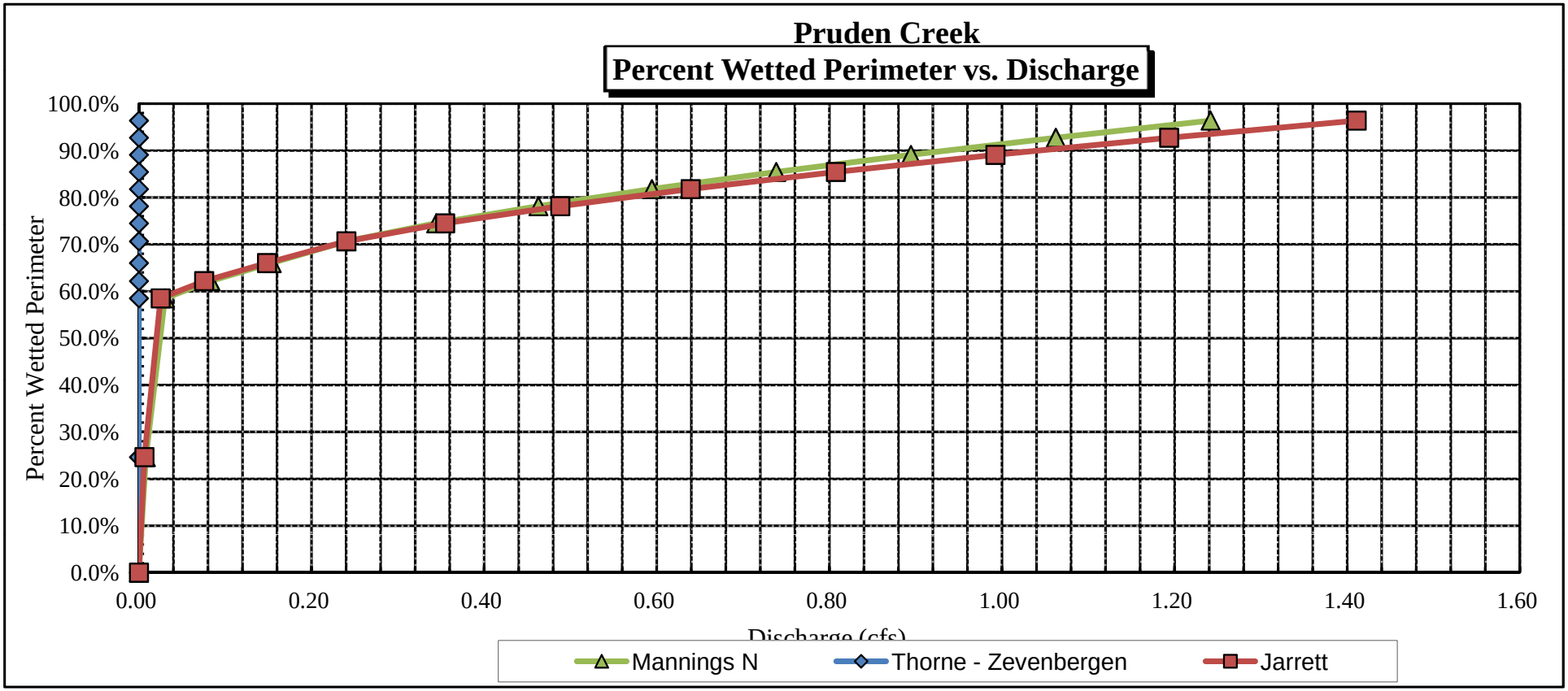
CWCB REVIEW BY: ..……………………….....……………………………………………….......................................…............. DATE:................…………….….

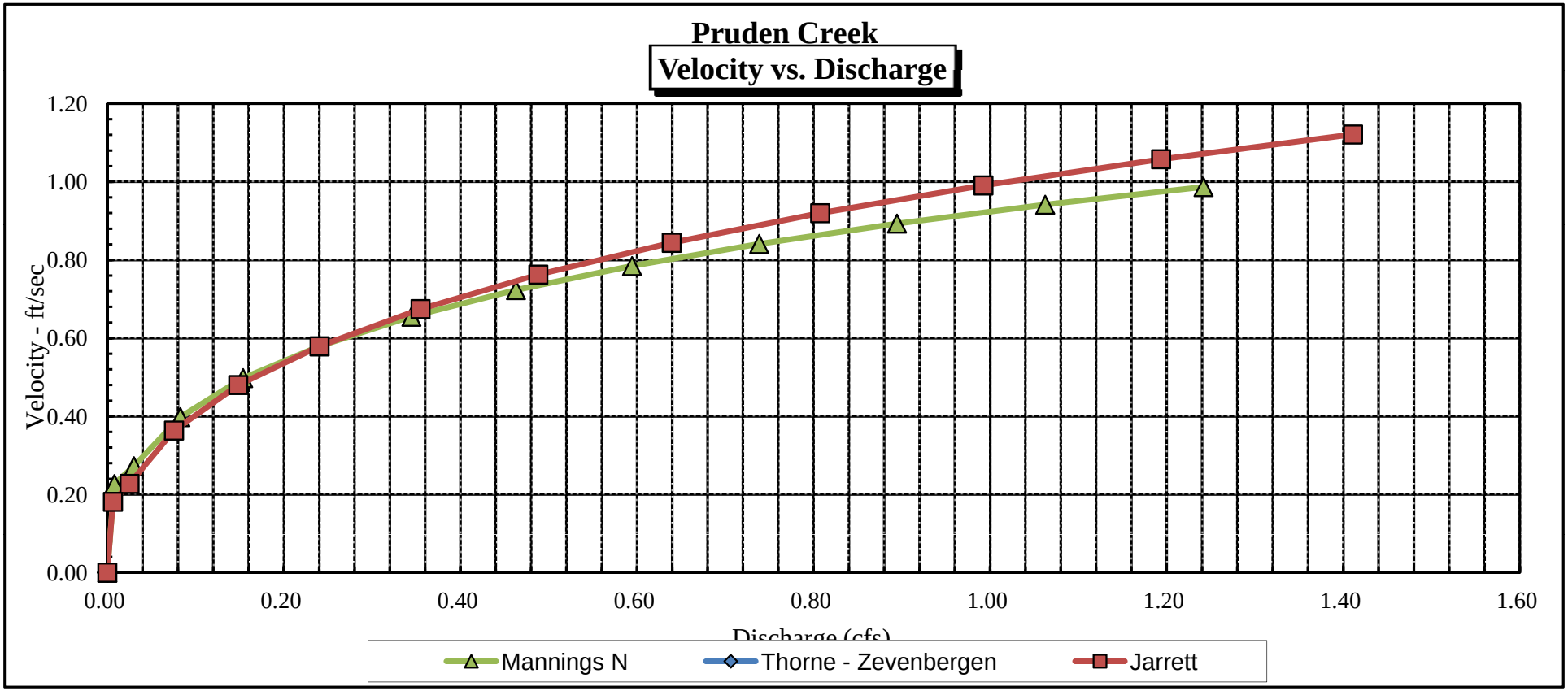
STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 2 Jarrett Variable Manning's n Correction Applied

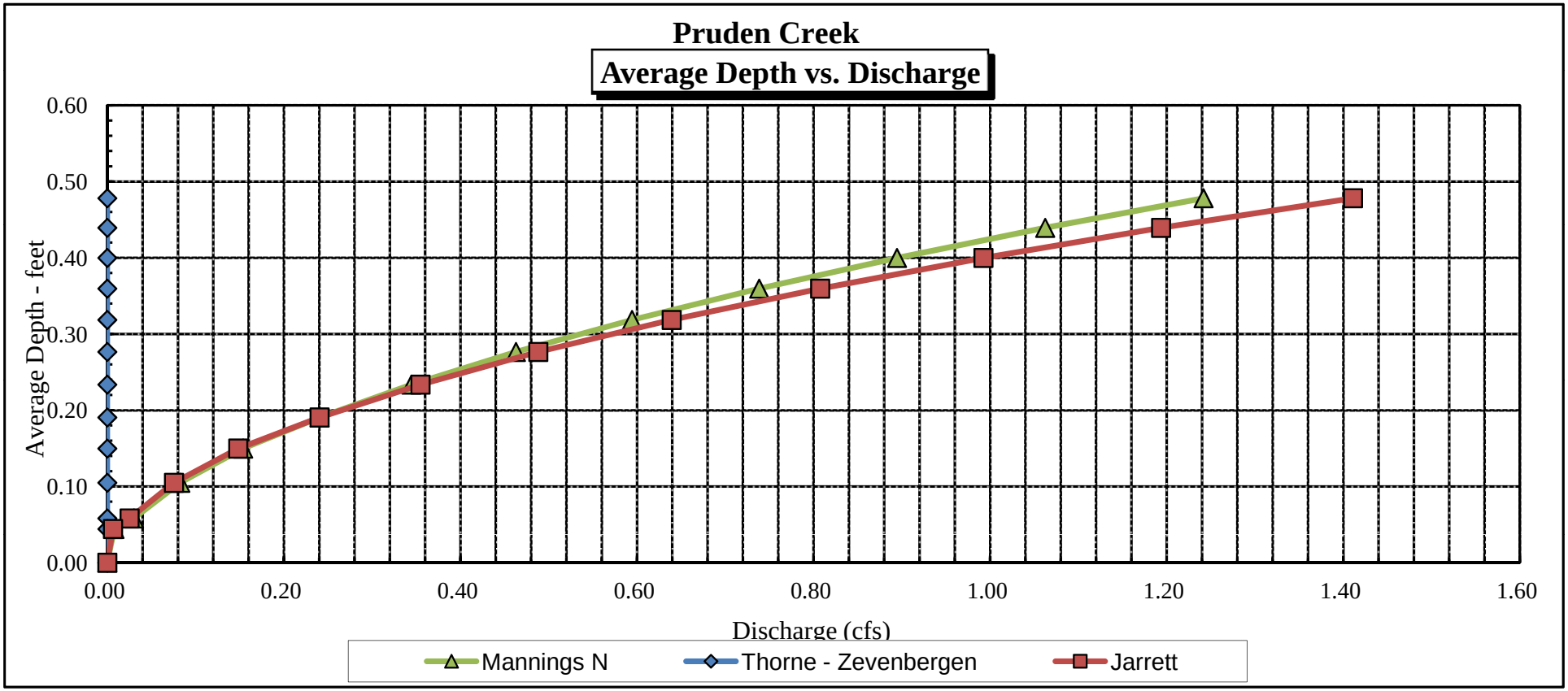
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

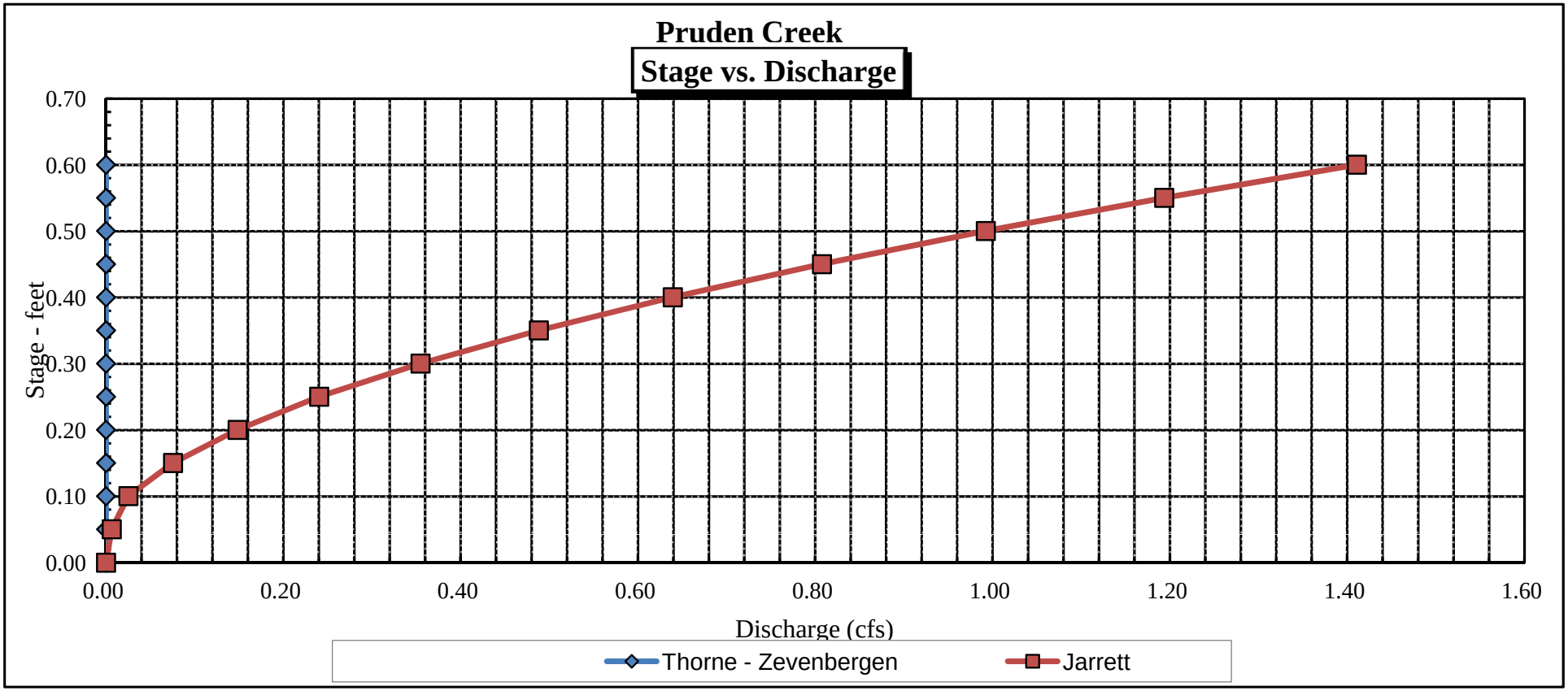
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.60	2.70	0.52	0.65	1.39	3.37	100.0%	0.41	1.64	1.18
	5.65	2.63	0.48	0.60	1.26	3.25	96.4%	0.39	1.41	1.12
	5.70	2.57	0.44	0.55	1.13	3.13	92.7%	0.36	1.19	1.06
	5.75	2.51	0.40	0.50	1.00	3.00	89.1%	0.33	0.99	0.99
	5.80	2.44	0.36	0.45	0.88	2.88	85.4%	0.30	0.81	0.92
	5.85	2.38	0.32	0.40	0.76	2.76	81.8%	0.27	0.64	0.84
	5.90	2.31	0.28	0.35	0.64	2.64	78.1%	0.24	0.49	0.76
	5.95	2.25	0.23	0.30	0.53	2.51	74.5%	0.21	0.35	0.67
WL	6.00	2.18	0.19	0.25	0.41	2.38	70.6%	0.17	0.24	0.58
	6.05	2.06	0.15	0.20	0.31	2.23	66.0%	0.14	0.15	0.48
	6.10	1.98	0.10	0.15	0.21	2.10	62.2%	0.10	0.08	0.36
	6.15	1.91	0.06	0.10	0.11	1.97	58.5%	0.06	0.03	0.23
	6.20	0.80	0.04	0.05	0.04	0.83	24.6%	0.04	0.01	0.18
	6.25	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!


Pruden Creek
CROSS SECTION DATA ANALYSIS
VERTICAL DEPTH (FT)
-4.50
-4.70
-4.90
-5.10
-5.30
-5.50
-5.70
-5.90
-6.10
-6.30
-6.50
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
LS
G
W
W
G
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Pruden Creek
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Pruden Creek
Velocity vs. Discharge
Velocity - ft/sec
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
Mannings N
Thorne - Zevenbergen
Jarrett


Pruden Creek
Average Depth vs. Discharge
Average Depth - feet
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Pruden Creek
Stage vs. Discharge
Stage - feet
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

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

LOCATION INFORMATION

STREAM NAME:	Pruden Creek
XS LOCATION:	At BLM-USFS boundary
XS NUMBER:	1
DATE:	17-Aug-09
OBSERVERS:	R. Smith, D. Gilbert, J. Backstrand
1/4 SEC:	SW
SECTION:	28
TWP:	13S
RANGE:	73W
PM:	Sixth
COUNTY:	Park
WATERSHED:	South Platte
DIVISION:	1
DOW CODE:	30572
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

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

TAPE WT:	0.0106
TENSION:	99999

CHANNEL PROFILE DATA

SLOPE:	0.05

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

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

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 1

DATA POINTS= 14

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	LS	2.00	2.38			0.00		0.00	0.00	0.0%
1	G	7.30	3.82			0.00		0.00	0.00	0.0%
		8.60	4.08			0.00		0.00	0.00	0.0%
	W	9.30	4.22	0.00		0.00		0.00	0.00	0.0%
		9.60	4.30	0.10	0.30	0.31	0.10	0.03	0.01	3.3%
		9.90	4.40	0.20	0.74	0.32	0.20	0.05	0.04	13.5%
		10.10	4.40	0.20	0.82	0.20	0.20	0.06	0.05	17.9%
		10.50	4.45	0.25	0.86	0.40	0.25	0.09	0.08	27.4%
		10.80	4.40	0.20	0.98	0.30	0.20	0.06	0.06	21.4%
		11.10	4.45	0.25	0.73	0.30	0.25	0.06	0.05	16.6%
	W	11.30	4.19	0.00		0.33		0.00	0.00	0.0%
		12.30	4.08			0.00		0.00	0.00	0.0%
1	G	13.20	3.86			0.00		0.00	0.00	0.0%
	RS	17.40	2.82			0.00		0.00	0.00	0.0%
	TOTALS ----------					2.17	0.25	0.35	0.27	100.0%
							(Max.)			

Manning's n = 0.1255
Hydraulic Radius= 0.16157887

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.35	0.34	-2.1%
3.96	0.35	1.23	251.3%
3.98	0.35	1.13	224.2%
4.00	0.35	1.04	198.1%
4.02	0.35	0.96	173.1%
4.04	0.35	0.87	149.1%
4.06	0.35	0.79	126.1%
4.08	0.35	0.71	104.2%
4.10	0.35	0.64	83.5%
4.12	0.35	0.58	64.3%
4.14	0.35	0.51	46.8%
4.16	0.35	0.46	30.9%
4.17	0.35	0.43	23.5%
4.18	0.35	0.41	16.6%
4.19	0.35	0.39	10.1%
4.20	0.35	0.36	3.9%
4.21	0.35	0.34	-2.1%
4.22	0.35	0.32	-7.9%
4.23	0.35	0.30	-13.6%
4.24	0.35	0.28	-19.1%
4.25	0.35	0.26	-24.5%
4.26	0.35	0.25	-29.7%
4.28	0.35	0.21	-39.9%
4.30	0.35	0.18	-49.5%
4.32	0.35	0.14	-58.6%
4.34	0.35	0.11	-67.3%
4.36	0.35	0.09	-75.6%
4.38	0.35	0.06	-83.4%
4.40	0.35	0.03	-90.8%
4.42	0.35	0.01	-96.4%
4.44	0.35	0.00	-99.3%
4.46	0.35	0.00	-100.0%

WATERLINE AT ZERO
AREA ERROR = 4.201

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 1 Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	3.86	5.70	0.30	0.59	1.73	5.93	100.0%	0.29	2.01	1.16
	3.90	5.32	0.28	0.55	1.50	5.55	93.5%	0.27	1.66	1.11
	3.95	4.87	0.26	0.50	1.25	5.08	85.6%	0.25	1.29	1.04
	4.00	4.41	0.23	0.45	1.01	4.62	77.8%	0.22	0.98	0.96
	4.05	3.96	0.20	0.40	0.81	4.15	70.0%	0.19	0.71	0.89
	4.10	3.40	0.18	0.35	0.62	3.58	60.3%	0.17	0.51	0.82
	4.15	2.69	0.17	0.30	0.47	2.87	48.3%	0.16	0.37	0.79
WL	4.20	2.08	0.17	0.25	0.35	2.25	37.8%	0.16	0.27	0.77
	4.25	1.83	0.14	0.20	0.25	1.97	33.1%	0.13	0.17	0.67
	4.30	1.61	0.10	0.15	0.17	1.71	28.8%	0.10	0.09	0.56
	4.35	1.42	0.06	0.10	0.09	1.49	25.1%	0.06	0.04	0.41
	4.40	1.01	0.02	0.05	0.02	1.04	17.6%	0.02	0.01	0.22

STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.27	cfs
CALCULATED FLOW (Qc)=	0.27	cfs
(Qm-Qc)/Qm * 100 =	2.4	%
MEASURED WATERLINE (WLm)=	4.21	ft
CALCULATED WATERLINE (WLc)=	4.20	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	0.6	%
MEAN VELOCITY=	0.77	ft/sec
MANNING'S N=	0.126	
SLOPE=	0.05	ft/ft
.4 * Qm =	0.1	cfs
2.5 * Qm=	0.7	cfs

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

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

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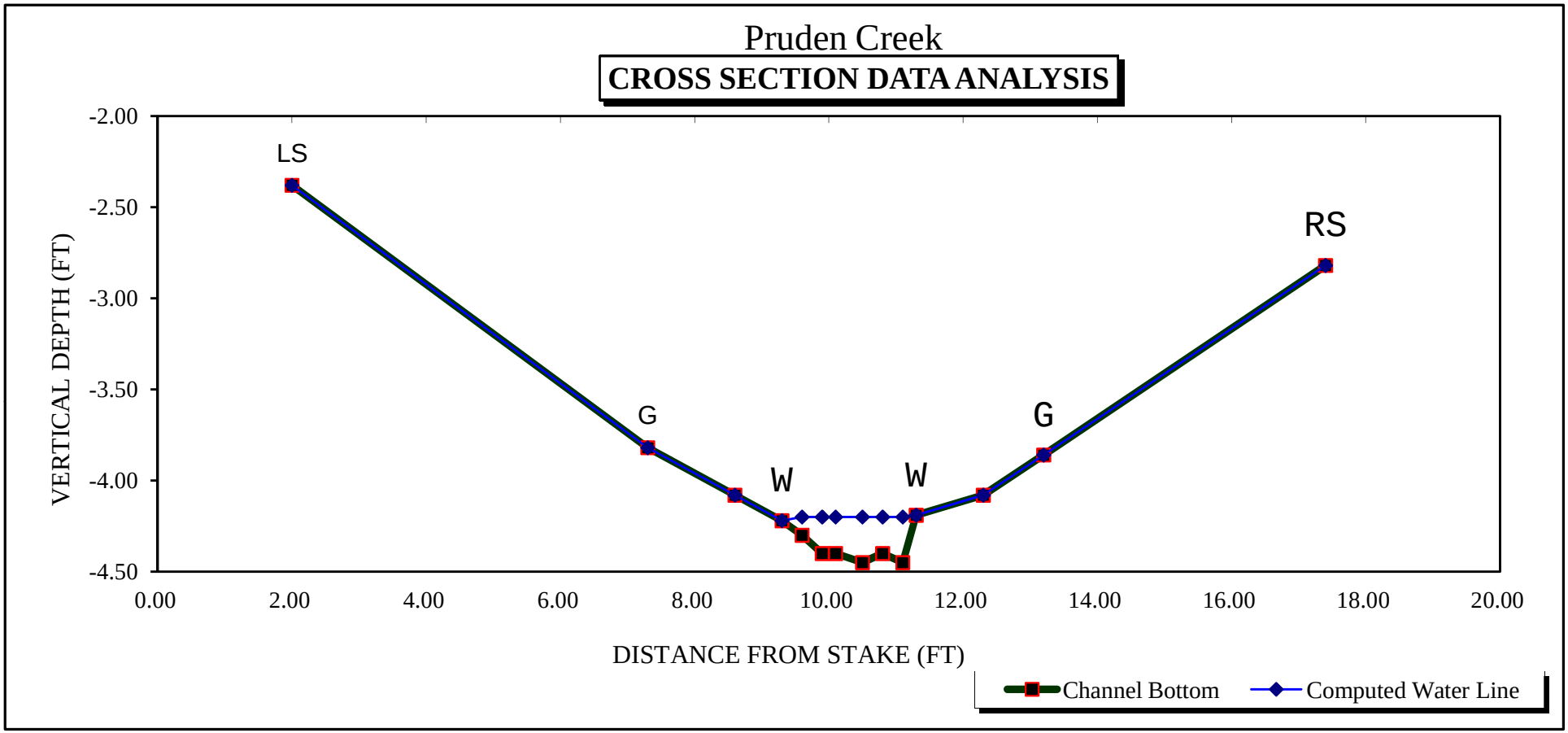
RECOMMENDATION BY: ………………...………..…................................ AGENCY...……………………......…....…....……...... DATE:......…....….......……………

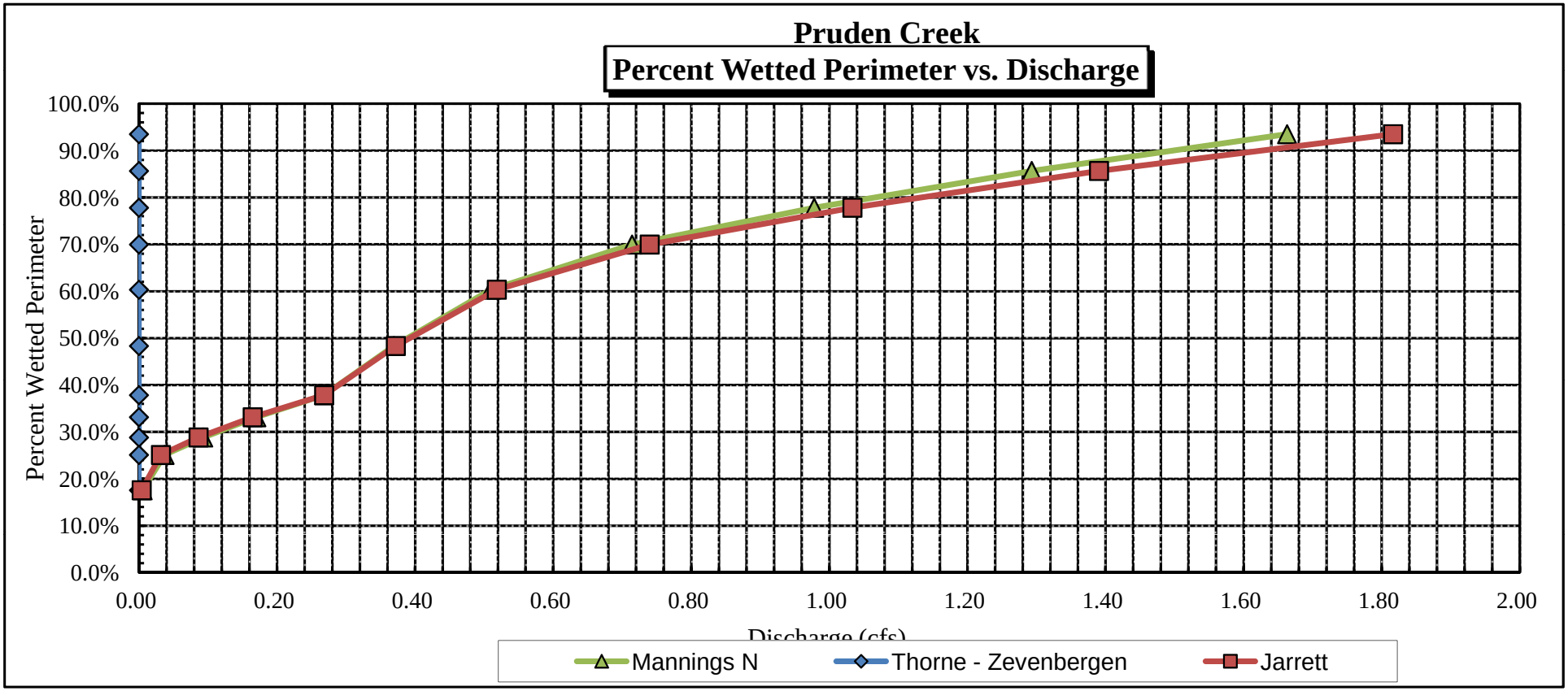
CWCB REVIEW BY: ...……………………….....……………………………………………...…............. DATE:..................……………...…

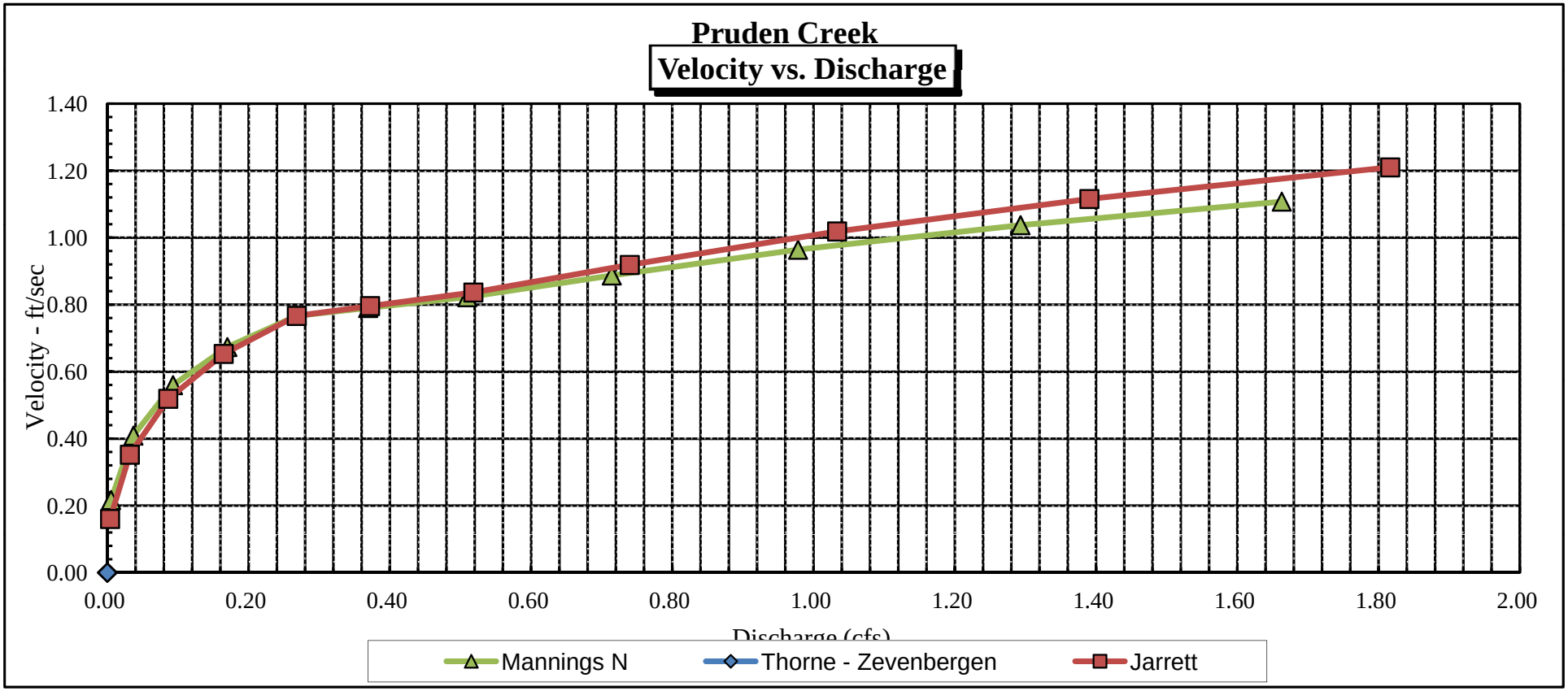
STREAM NAME: Pruden Creek
XS LOCATION: At BLM-USFS boundary
XS NUMBER: 1 Jarrett Variable Manning's n Correction Applied

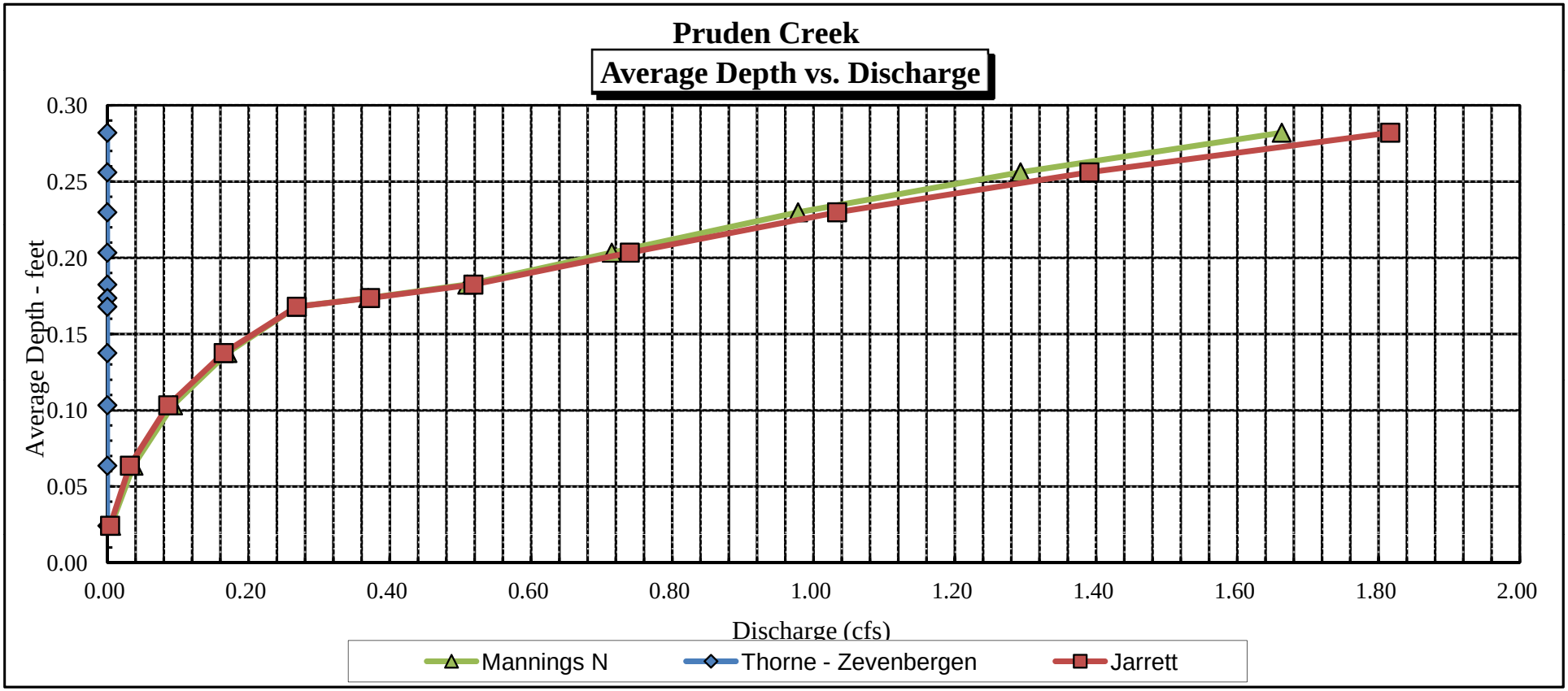
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

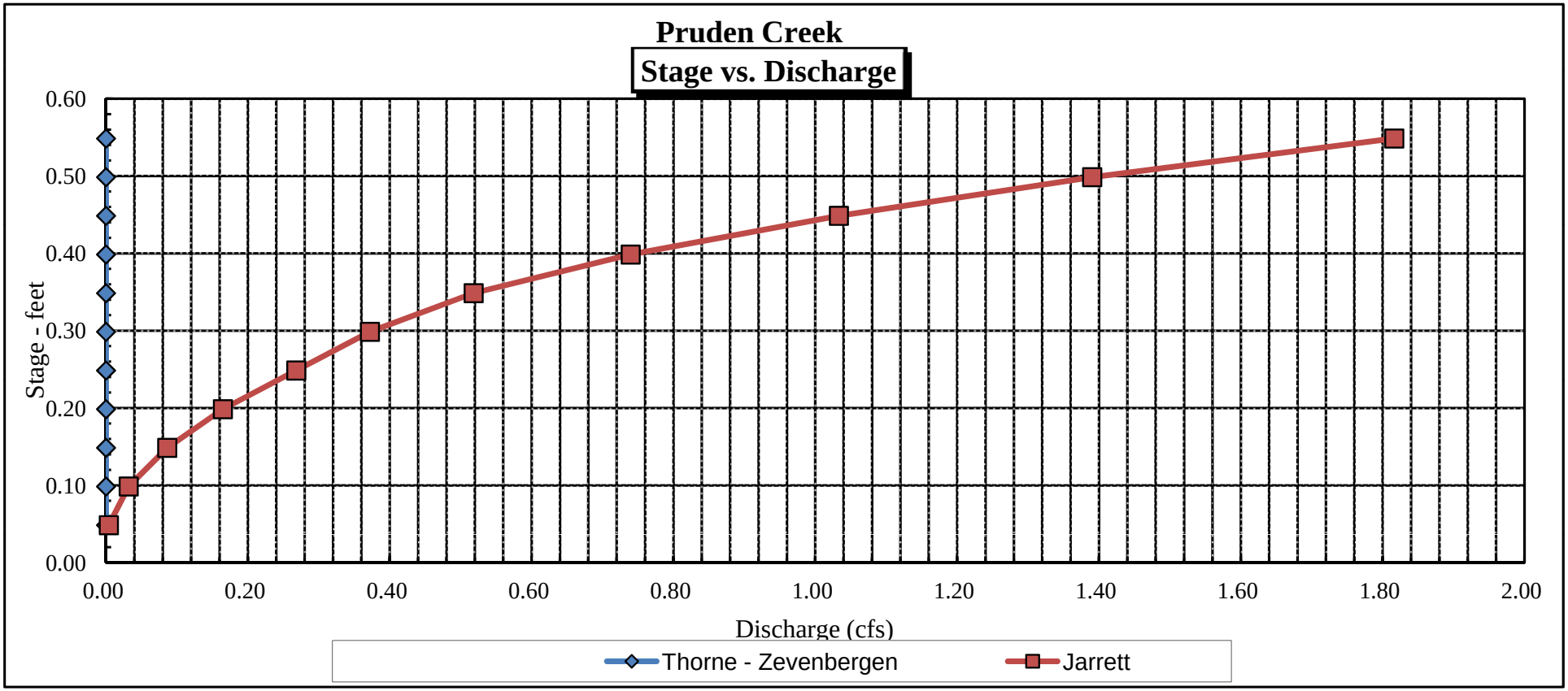
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	3.86	5.70	0.30	0.59	1.73	5.93	100.0%	0.29	2.23	1.29
	3.90	5.32	0.28	0.55	1.50	5.55	93.5%	0.27	1.82	1.21
	3.95	4.87	0.26	0.50	1.25	5.08	85.6%	0.25	1.39	1.12
	4.00	4.41	0.23	0.45	1.01	4.62	77.8%	0.22	1.03	1.02
	4.05	3.96	0.20	0.40	0.81	4.15	70.0%	0.19	0.74	0.92
	4.10	3.40	0.18	0.35	0.62	3.58	60.3%	0.17	0.52	0.84
	4.15	2.69	0.17	0.30	0.47	2.87	48.3%	0.16	0.37	0.80
WL	4.20	2.08	0.17	0.25	0.35	2.25	37.8%	0.16	0.27	0.77
	4.25	1.83	0.14	0.20	0.25	1.97	33.1%	0.13	0.16	0.65
	4.30	1.61	0.10	0.15	0.17	1.71	28.8%	0.10	0.09	0.52
	4.35	1.42	0.06	0.10	0.09	1.49	25.1%	0.06	0.03	0.35
	4.40	1.01	0.02	0.05	0.02	1.04	17.6%	0.02	0.00	0.16


Pruden Creek
CROSS SECTION DATA ANALYSIS
-2.00
-2.50
-3.00
-3.50
-4.00
-4.50
VERTICAL DEPTH (FT)
LS
G
W
W
G
RS
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line


Pruden Creek
Percent Wetted Perimeter vs. Discharge
Percent Wetted Perimeter
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Pruden Creek
Velocity vs. Discharge
Velocity - ft/sec
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Pruden Creek
Average Depth vs. Discharge
Average Depth - feet
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
Discharge (cfs)
Mannings N
Thorne - Zevenbergen
Jarrett


Pruden Creek
Stage vs. Discharge
Stage - feet
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
Discharge (cfs)
Thorne - Zevenbergen
Jarrett

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

LOCATION INFORMATION

STREAM NAME:	Pruden Creek
XS LOCATION:	0.25 mile d/s from USFS-BLM border
XS NUMBER:	1
DATE:	19-May-14
OBSERVERS:	R. Smith, D. Gilbert
1/4 SEC:	SW
SECTION:	28
TWP:	13S
RANGE:	73W
PM:	Sixth
COUNTY:	Park
WATERSHED:	South Platte
DIVISION:	1
DOW CODE:	30572
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:	0.041

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

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

STREAM NAME: Pruden Creek
XS LOCATION: 0.25 mile d/s from USFS-BLM border
XS NUMBER: 1

DATA POINTS= 17

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	1.10	8.50			0.00		0.00	0.00	0.0%
	W	1.50	8.88	0.00	0.00	0.00		0.00	0.00	0.0%
		1.80	8.98	0.10	0.49	0.32	0.10	0.03	0.01	3.2%
		2.10	9.04	0.16	0.57	0.31	0.16	0.05	0.03	6.0%
		2.40	9.04	0.16	1.25	0.30	0.16	0.05	0.06	13.3%
		2.70	9.01	0.13	1.07	0.30	0.13	0.04	0.04	9.2%
		3.00	9.06	0.18	1.09	0.30	0.18	0.05	0.06	13.0%
		3.30	9.10	0.22	0.99	0.30	0.22	0.07	0.07	14.4%
		3.60	9.20	0.32	1.37	0.32	0.32	0.10	0.13	29.1%
		3.90	9.16	0.28	0.61	0.30	0.28	0.06	0.03	7.6%
		4.00	9.16	0.28	0.67	0.10	0.28	0.03	0.02	4.1%
	W	4.10	8.91	0.00	0.00	0.27		0.00	0.00	0.0%
		4.20	8.71			0.00		0.00	0.00	0.0%
		5.00	8.54			0.00		0.00	0.00	0.0%
		6.00	8.74			0.00		0.00	0.00	0.0%
		7.00	8.66			0.00		0.00	0.00	0.0%
1	LS & G	8.00	8.58			0.00		0.00	0.00	0.0%
	TOTALS ----------					2.82	0.32 (Max.)	0.47	0.45	100.0%

Manning's n = 0.0930
Hydraulic Radius= 0.16497557

STREAM NAME: Pruden Creek
XS LOCATION: 0.25 mile d/s from USFS-BLM border
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.47	0.43	-8.0%
8.65	0.47	1.21	160.6%
8.67	0.47	1.12	140.5%
8.69	0.47	1.03	122.4%
8.71	0.47	0.96	106.2%
8.73	0.47	0.89	92.0%
8.75	0.47	0.83	79.3%
8.77	0.47	0.78	67.3%
8.79	0.47	0.72	55.3%
8.81	0.47	0.67	43.5%
8.83	0.47	0.61	31.8%
8.85	0.47	0.56	20.3%
8.86	0.47	0.53	14.5%
8.87	0.47	0.51	8.8%
8.88	0.47	0.48	3.2%
8.89	0.47	0.45	-2.4%
8.90	0.47	0.43	-8.0%
8.91	0.47	0.40	-13.5%
8.92	0.47	0.38	-18.9%
8.93	0.47	0.35	-24.2%
8.94	0.47	0.33	-29.4%
8.95	0.47	0.30	-34.6%
8.97	0.47	0.26	-44.7%
8.99	0.47	0.21	-54.6%
9.01	0.47	0.17	-64.0%
9.03	0.47	0.13	-72.6%
9.05	0.47	0.10	-79.1%
9.07	0.47	0.08	-83.7%
9.09	0.47	0.06	-87.6%
9.11	0.47	0.04	-90.9%
9.13	0.47	0.03	-93.8%
9.15	0.47	0.02	-96.4%

WATERLINE AT ZERO
AREA ERROR = 8.881

STREAM NAME: Pruden Creek
XS LOCATION: 0.25 mile d/s from USFS-BLM border
XS NUMBER: 1 Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	8.58	6.43	0.25	0.62	1.58	6.93	100.0%	0.23	1.91	1.21
	8.58	6.41	0.25	0.62	1.58	6.91	99.8%	0.23	1.90	1.21
	8.63	5.25	0.24	0.57	1.28	5.71	82.5%	0.22	1.54	1.20
	8.68	4.09	0.26	0.52	1.05	4.52	65.3%	0.23	1.29	1.22
	8.73	3.01	0.29	0.47	0.88	3.40	49.1%	0.26	1.15	1.31
	8.78	2.77	0.27	0.42	0.73	3.11	44.9%	0.24	0.91	1.24
	8.83	2.69	0.22	0.37	0.60	2.98	43.0%	0.20	0.66	1.11
WL	8.88	2.61	0.18	0.32	0.46	2.85	41.1%	0.16	0.45	0.97
	8.93	2.44	0.14	0.27	0.34	2.64	38.1%	0.13	0.28	0.82
	8.98	2.27	0.10	0.22	0.22	2.42	35.0%	0.09	0.14	0.66
	9.03	1.67	0.07	0.17	0.12	1.78	25.7%	0.07	0.06	0.53
	9.08	0.88	0.07	0.12	0.06	0.95	13.7%	0.06	0.03	0.52
	9.13	0.62	0.04	0.07	0.03	0.65	9.4%	0.04	0.01	0.37
	9.18	0.20	0.01	0.02	0.00	0.21	3.0%	0.01	0.00	0.14

STREAM NAME: Pruden Creek
XS LOCATION: 0.25 mile d/s from USFS-BLM border
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.45	cfs
CALCULATED FLOW (Qc)=	0.45	cfs
(Qm-Qc)/Qm * 100 =	0.7	%
MEASURED WATERLINE (WLm)=	8.90	ft
CALCULATED WATERLINE (WLc)=	8.88	ft
(WLm-WLc)/WLm * 100 =	0.2	%
MAX MEASURED DEPTH (Dm)=	0.32	ft
MAX CALCULATED DEPTH (Dc)=	0.32	ft
(Dm-Dc)/Dm * 100	0.2	%
MEAN VELOCITY=	0.97	ft/sec
MANNING'S N=	0.093	
SLOPE=	0.041	ft/ft
.4 * Qm =	0.2	cfs
2.5 * Qm=	1.1	cfs

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

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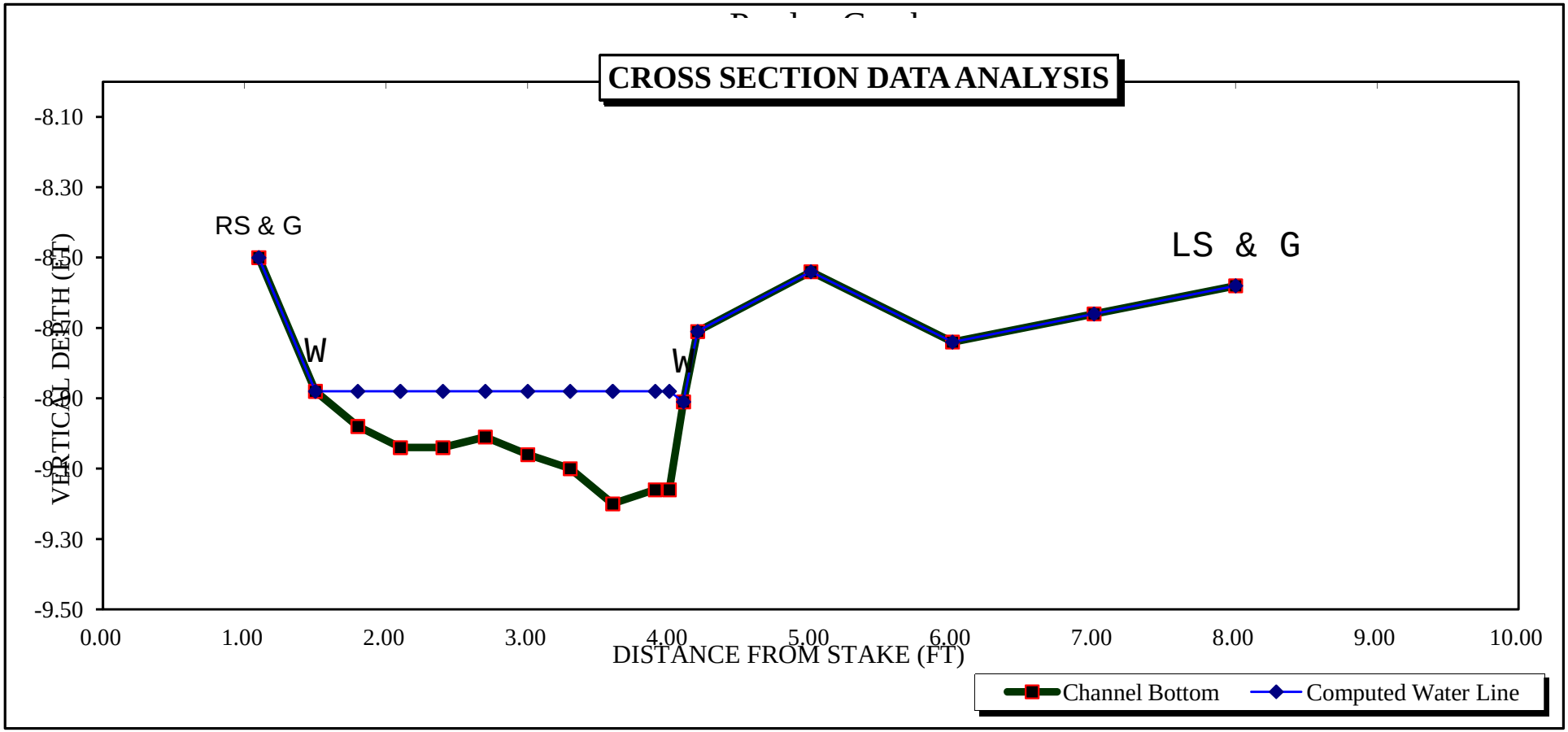
RECOMMENDATION BY: ………………...……..…….............................. AGENCY...……………………......…....…...…....... DATE:......…...…......……………

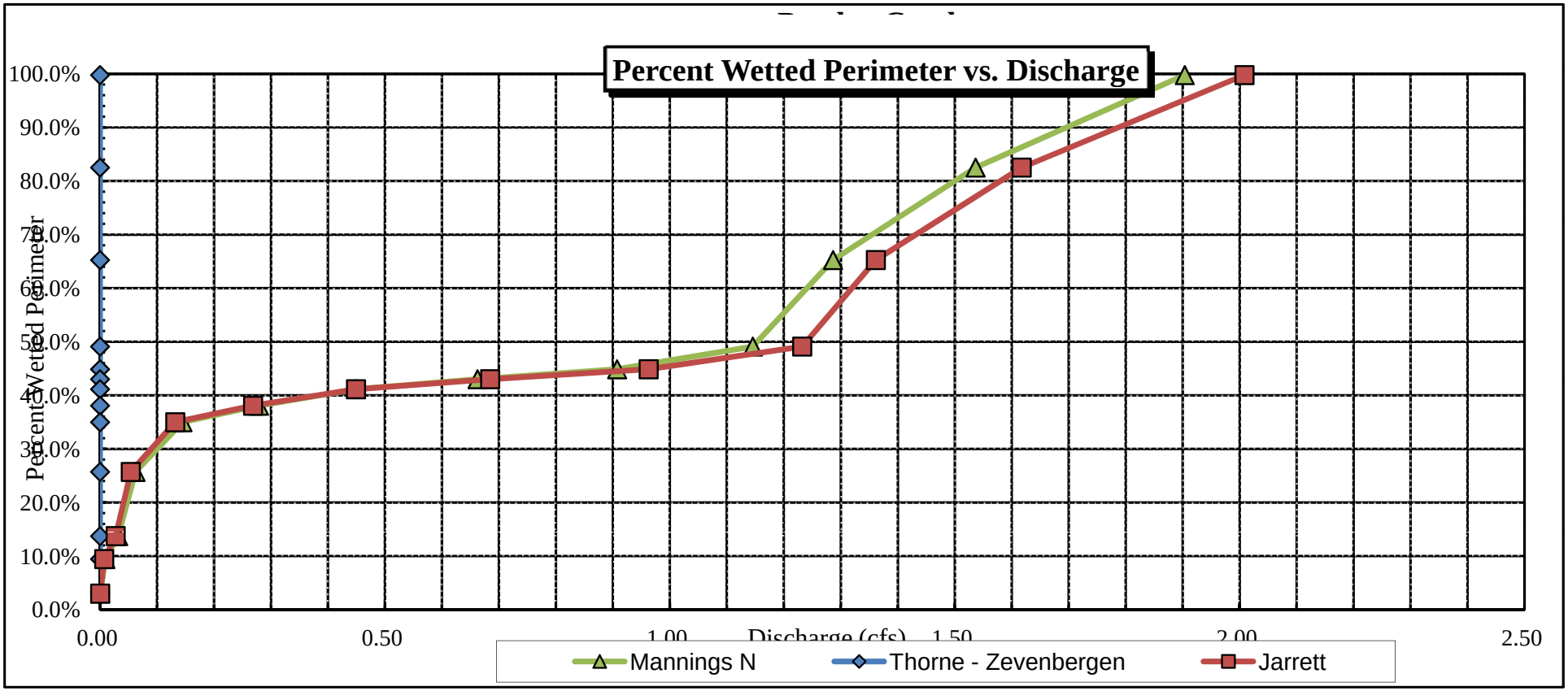
CWCB REVIEW BY: ..……………………….....………………………………………………..…............. DATE:.................…………….....

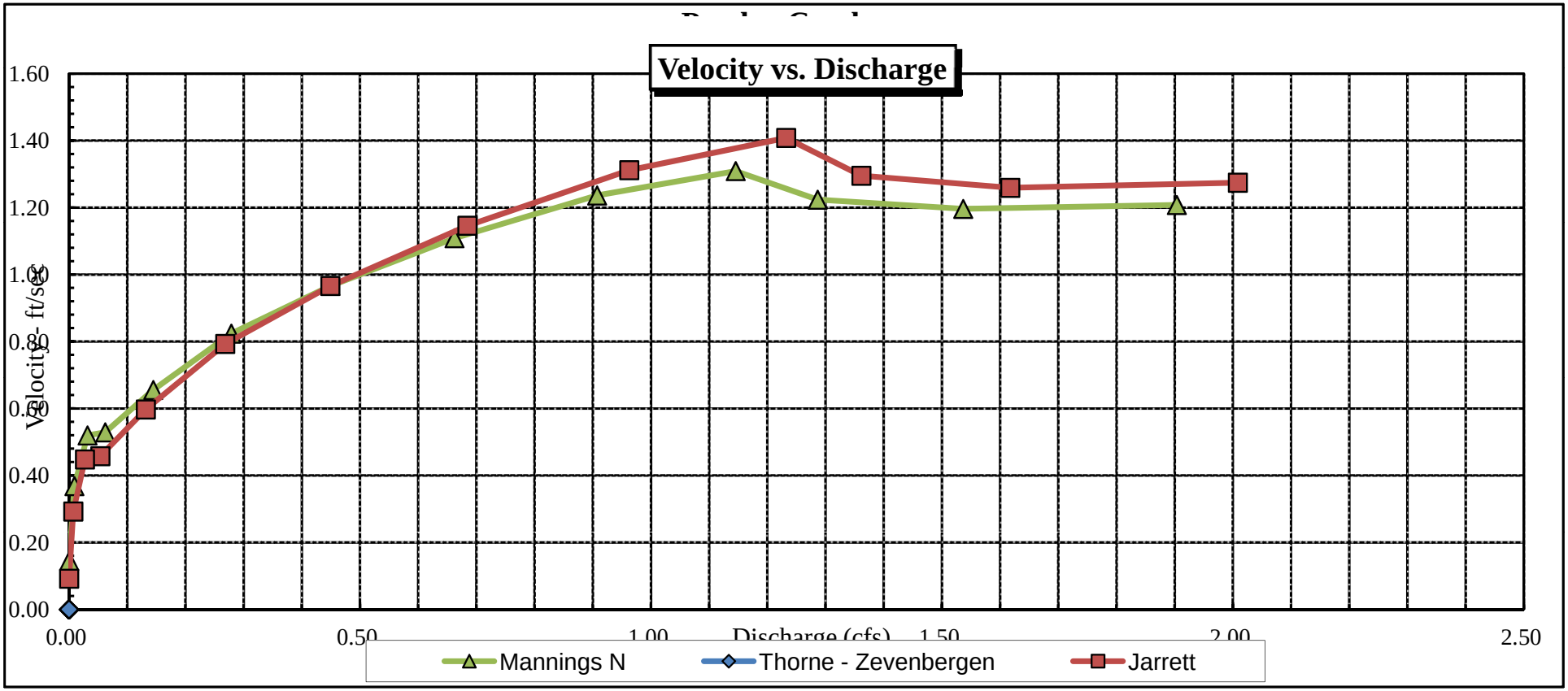
STREAM NAME: Pruden Creek
XS LOCATION: 0.25 mile d/s from USFS-BLM border
XS NUMBER: 1 Jarrett Variable Manning's n Correction Applied

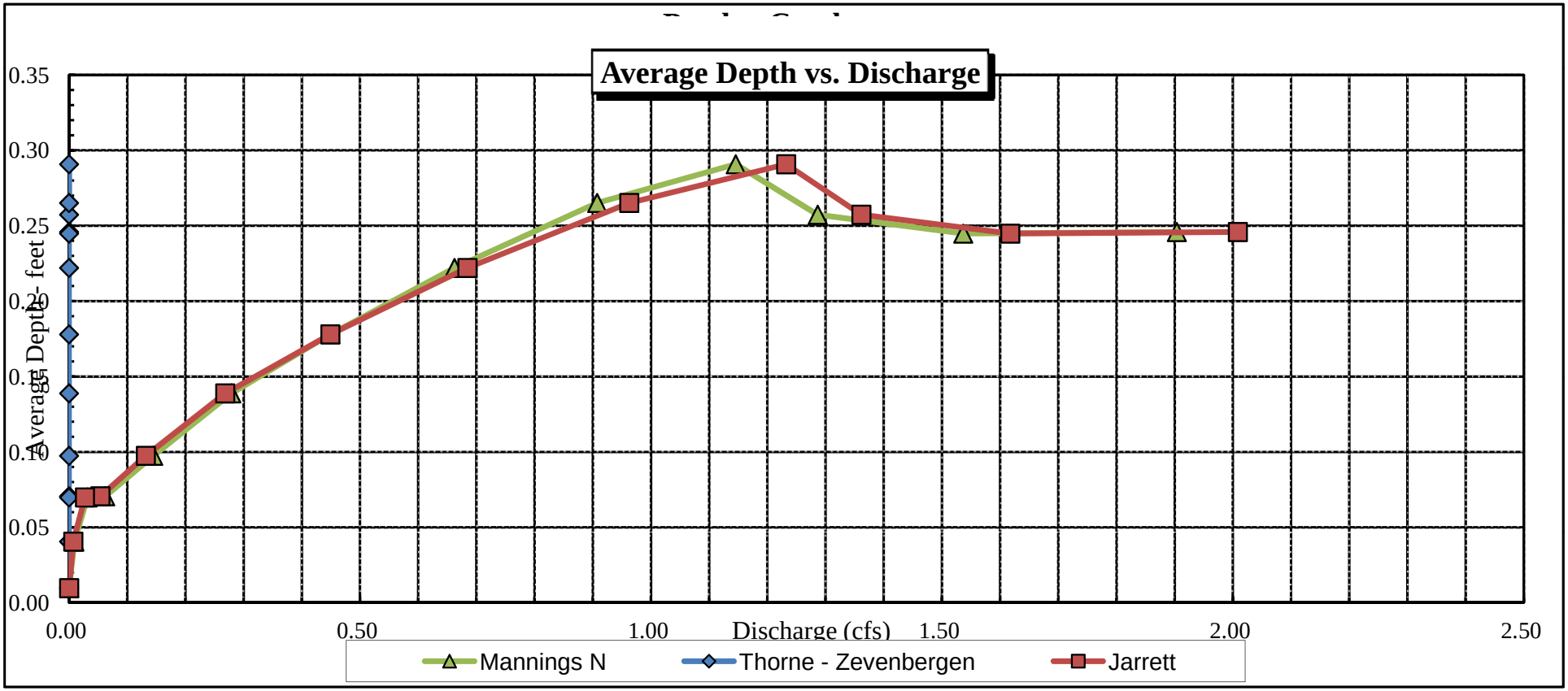
GL = lowest Grassline elevation corrected for sag
STAGING TABLE *WL* = Waterline corrected for variations in field measured water surface elevations and sag

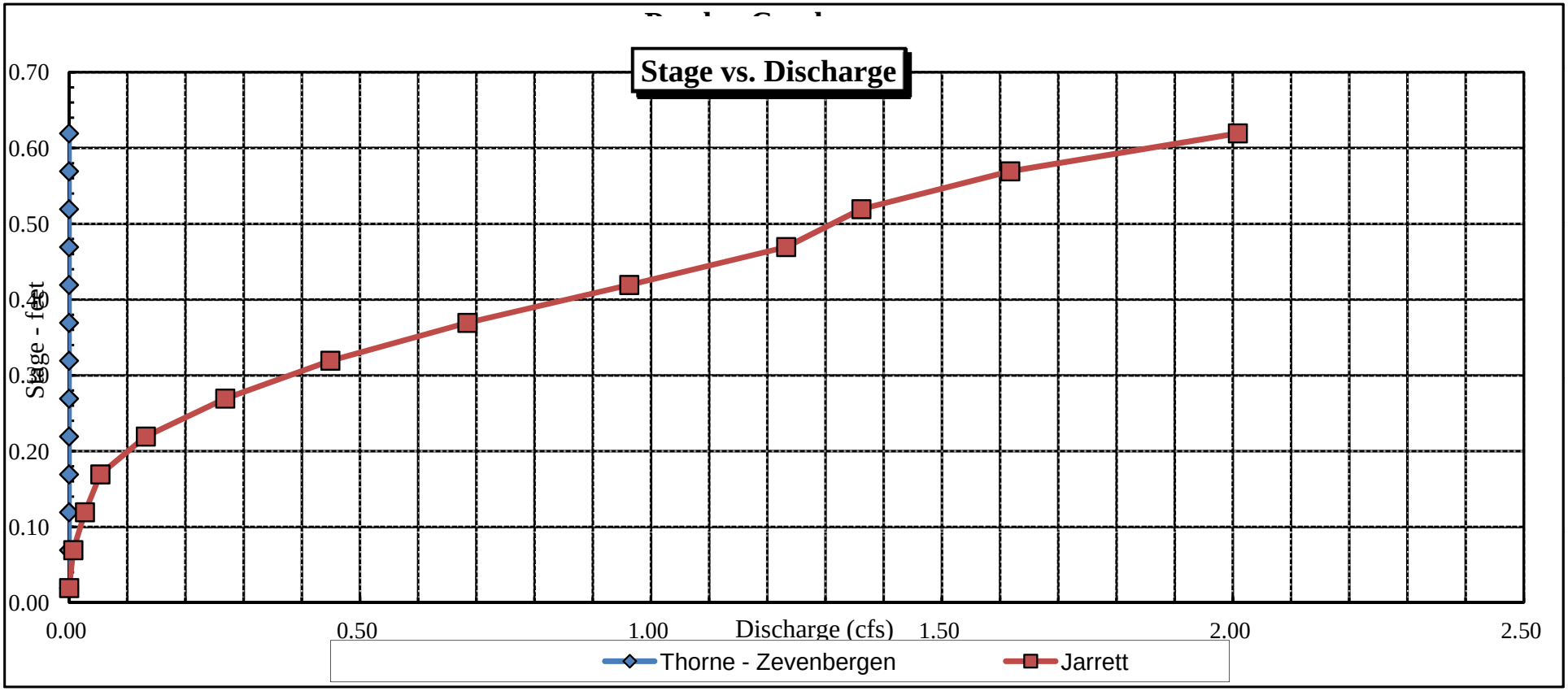
	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	8.58	6.43	0.25	0.62	1.58	6.93	100.0%	0.23	2.01	1.27
	8.58	6.41	0.25	0.62	1.58	6.91	99.8%	0.23	2.01	1.27
	8.63	5.25	0.24	0.57	1.28	5.71	82.5%	0.22	1.62	1.26
	8.68	4.09	0.26	0.52	1.05	4.52	65.3%	0.23	1.36	1.30
	8.73	3.01	0.29	0.47	0.88	3.40	49.1%	0.26	1.23	1.41
	8.78	2.77	0.27	0.42	0.73	3.11	44.9%	0.24	0.96	1.31
	8.83	2.69	0.22	0.37	0.60	2.98	43.0%	0.20	0.68	1.15
WL	8.88	2.61	0.18	0.32	0.46	2.85	41.1%	0.16	0.45	0.97
	8.93	2.44	0.14	0.27	0.34	2.64	38.1%	0.13	0.27	0.79
	8.98	2.27	0.10	0.22	0.22	2.42	35.0%	0.09	0.13	0.60
	9.03	1.67	0.07	0.17	0.12	1.78	25.7%	0.07	0.05	0.46
	9.08	0.88	0.07	0.12	0.06	0.95	13.7%	0.06	0.03	0.45
	9.13	0.62	0.04	0.07	0.03	0.65	9.4%	0.04	0.01	0.29
	9.18	0.20	0.01	0.02	0.00	0.21	3.0%	0.01	0.00	0.09


CROSS SECTION DATA ANALYSIS
-8.10
-8.30
-8.50
-8.70
-8.90
-9.10
-9.30
-9.50
VERTICAL DEPTH (FT)
RS & G
W
W
LS & G
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
0.50
1.00
Discharge (cfs)
1.50
2.00
2.50
Mannings N
Thorne - Zevenbergen
Jarrett


Velocity vs. Discharge
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Velocity - ft/sec
0.00
0.50
1.00
Discharge (cfs)
1.50
2.00
2.50
Mannings N
Thorne - Zevenbergen
Jarrett


Average Depth vs. Discharge
Average Depth - feet
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.50
1.00
Discharge (cfs)
1.50
2.00
2.50
Mannings N
Thorne - Zevenbergen
Jarrett


Stage vs. Discharge
Stage - feet
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.50
1.00
Discharge (cfs)
1.50
2.00
2.50
Thorne - Zevenbergen
Jarrett

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Pruden Creek					CROSS-SECTION NO.: 2	
CROSS-SECTION LOCATION: At BLM-USFS boundary						
DATE: 8-17-09	OBSERVERS: R. Smith, D. Gilbert, J. Backstrand					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 28	TOWNSHIP: 13 N/S	RANGE: 73 E/W	PM: Sixth	
COUNTY: Park	WATERSHED: South Platte	WATER DIVISION: 1	DOW WATER CODE: 30572			
MAP(S): USGS:						
USFS:						

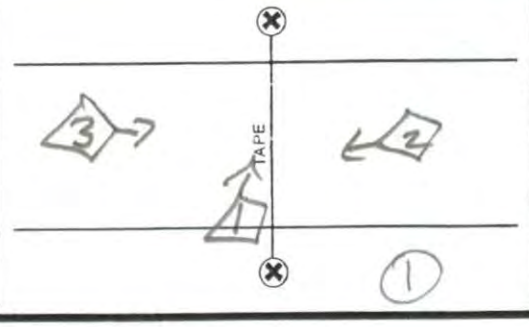
SUPPLEMENTAL DATA

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: 2" cobbles do 1' boulders	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS: 3		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	5.99 / 5.99
② WS Upstream	4.0	5.87'
③ WS Downstream	11.0	6.51
SLOPE	0.64 / 15.0 = .043	

SKETCH



LEGEND:
Stake ⊗
Station ①
Photo ◇
Direction of Flow

AQUATIC SAMPLING SUMMARY

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

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

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

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

COMMENTS

TDS = 170
Ph = 8.4
Temp = 15°

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Pruden Creek | CROSS-SECTION NO: 2 | DATE: 8-17-09 | SHEET ___ OF ___

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: 2:15 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec): At Point	Velocity (ft/sec): Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	2.0		4.80								
G	4.5		5.60								
W	4.9		5.99								
	5.0		6.15	0.15				0.36			
	5.3		6.20	0.20				0.45			
	5.6		6.20	0.20				0.80			
	5.9		6.15	0.15				0.95			
	6.2		6.25	0.25				0.45			
	6.5		6.25	0.25				0.89			
	6.8		6.25	0.25				0.15			
	7.0		6.05	0.05				0.00			
W	7.1		5.99								
G	7.2		5.58								
RS	10.1		4.55								
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: Pruden Creek						CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: At BLM - USFS boundary						
DATE: 8-17-09	OBSERVERS: R Smith, J. Backstrand, D Gilbert					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 28	TOWNSHIP: 13 N/S	RANGE: 73 E/W	PM: Sixth	
COUNTY: Park	WATERSHED: South Platte	WATER DIVISION: 1	DOW WATER CODE: 30572			
MAP(S): USGS:	13 S 450563					
USFS:	4304272					

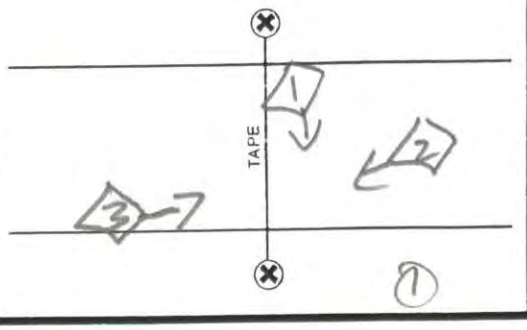
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: M-M			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE: 2" cobble to 1' boulders	PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS: 3		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	4.22 / 4.19
② WS Upstream	7.0'	4.08
③ WS Downstream	8.0	4.82
SLOPE	0.74/15.0' = 0.05	

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 = 170
Ph = 8.4
Temp = 15°

Riparian community: alder - willow (4 species)
river birch
potentilla

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Pruden Creek	CROSS-SECTION NO.: 1	DATE: 8-17-09	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME: 1:20 pm

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	2.0		2.38								
G	7.3		3.82								
	8.6		4.08								
W	9.3		4.22								
	9.6		4.30	0.1				0.30			
	9.9		4.40	0.2				0.74			
	10.1		4.40	0.2				0.82			
	10.5		4.45	0.25				0.86			
	10.8		4.40	0.2				0.98			
	11.1		4.45	0.25				0.73			
W	11.3		4.19								
	12.3		4.08								
G	13.2		3.86								
RS	17.4		2.82								
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: Pruden Creek						CROSS-SECTION NO.:
CROSS-SECTION LOCATION: 1/4 mile downstream from BLM-USFS boundary						
DATE: 5-19-14	OBSERVERS: R. Smith, D. Gilbert					
LEGAL DESCRIPTION	¼ SECTION: SW	SECTION: 28	TOWNSHIP: 13 N/S	RANGE: 73 E/W	PM: 6th	
COUNTY: Park	WATERSHED: S. Platte	WATER DIVISION: 1	DOW WATER CODE: 30572			
MAP(S): USGS:	GPS Zone 13S 450752					
USFS:	4304441					

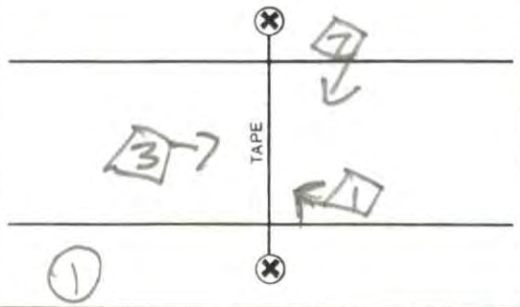
SUPPLEMENTAL DATA

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	surveyed
② WS Upstream	25.0'	8.04
③ WS Downstream	19.8'	9.86
SLOPE	1.82 / 44.8' = .041	

SKETCH



LEGEND: Stake ⊗ Station ① Photo ◇ Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED: ____ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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

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

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

May Fly black fly stone fly caddis fly

COMMENTS

Several fish sighted. PH = 8.13
Temp = 10.2° C
Cond = 185.8
Salinity = 0.1 ppt

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Pruden Creek	CROSS-SECTION NO: 1	DATE: 5-19-14	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 Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
G+RS	1.7		8.50								
W	1.5		8.88	0							
	1.8		8.98	.10				0.49			
	2.1		9.04	.16				0.57			
	2.4		9.04	.16				1.25			
	2.7		9.01	.13				1.07			
	3.0		9.06	.18				1.09			
	3.3		9.10	.22				0.99			
	3.6		9.20	.32				1.37			
	3.9		9.16	.28				0.61			
	4.0		9.16	.28				0.67			
W	4.1		8.91	0							
	4.2		8.71								
	5.0		8.54								
	6.0		8.74								
	7.0		8.66								
G+LS	8.0		8.58								
TOTALS:											

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