Stream: Cucharas River

Executive Summary

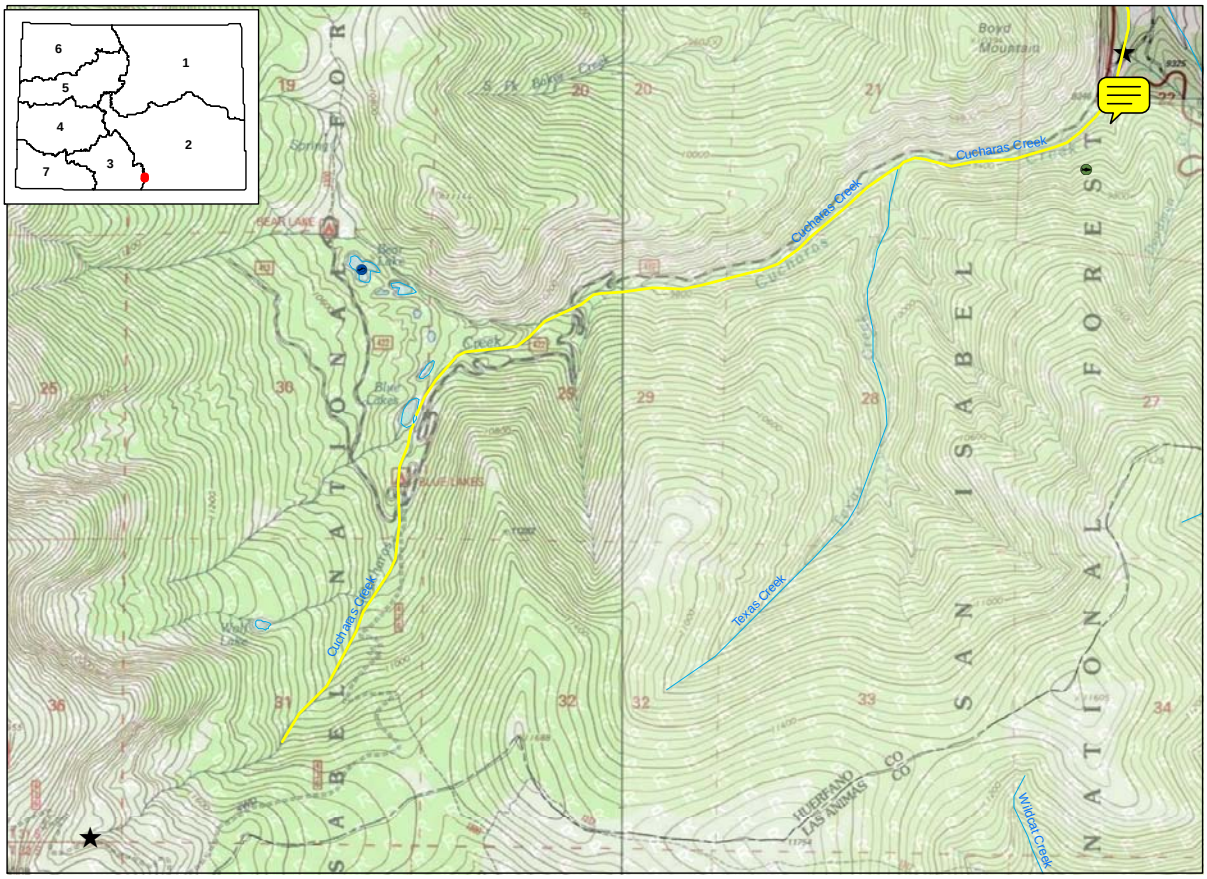
Water Division: 2
Water District: 16
CDOW#: 29606

Segment: Headwaters to State Highway 12

Upper Terminus: Headwaters
Latitude: 37º 17’ 47.2”N Longitude: 105º 09’ 27.7"W
UTM North: 4127771 UTM East: 130486024

Lower Terminus: State Highway 12
Latitude: 37º 19’ 54.4”N Longitude: 105º 05’ 48.5"W
UTM North: UTM East:

Counties: Huerfano
Length: 5.3 miles
USGS Quad(s): Trinchera Peak, Cucharas Pass
ISF Appropriation: 3.0 cfs (04/15 – 05/14)
4.9 cfs (05/15 – 06/30)
2.5 cfs (07/01 – 08/14)
1.6 cfs (08/15 – 09/15)
1.2 cfs (09/16 – 04/14)



Cucharas River - Huerfano County

The information contained in this report and the associated instream flow file folder forms the basis for the instream flow recommendation to be considered by the Colorado Water Conservation Board (Board). It is the Colorado Division of Wildlife (CDOW) staff's opinion that the information contained in this report is sufficient for the Board's staff to begin the investigations required to support the findings required in Rule 5(i) of the Instream Flow Rules.

The State of Colorado's Instream Flow Program (ISFP) was created in 1973 when the Colorado State Legislature recognized "the need to correlate the activities of mankind with some reasonable preservation of the natural environment" (see 37-92-102 (3) C.R.S.). The statute vests the Board with the exclusive authority to appropriate and acquire instream flow and natural lake level water rights. In order to encourage other entities to participate in Colorado's ISFP, the statute directs the Board to request instream flow recommendations from other state and federal agencies. The CDOW is recommending this segment of the Cucharas River to the Board for inclusion into the ISFP. The Cucharas River should be considered for inclusion into the ISFP because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

The CDOW is forwarding this stream flow recommendation to the Board to meet Colorado's policy "… that the wildlife and their environment are to be protected, preserved, enhanced, and

managed for the use, benefit, and enjoyment of the people of this state and its visitors … and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilities for wildlife-related opportunities" (See §33-1-101 (1) C.R.S.). The CDOW Strategic Plan states "[h]ealthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The [CDOW] desires to protect and enhance the quality and quantity of aquatic habitats."

The Cucharas River is approximately 70 miles long. It begins on the northeast side of Trinchera Peak at an elevation of approximately 12,000 feet and terminates at the confluence with Huerfano Creek at an elevation of approximately 5,100 feet. Of the 5.3 mile segment addressed by this report, approximately 95% of the segment, or 5.3 miles, is located on public lands. The Cucharas River is located within Huerfano County. The Cucharas River generally flows in a northeasterly direction.

The subject of this report is a segment of the Cucharas River beginning at its headwaters and extending downstream to State Highway 12. The proposed segment is located southwest of the Town of Cuchara. The recommendation for this segment is discussed below.

Instream Flow Recommendation(s)

The CDOW is recommending 4.90 cfs, summer, and 1.60 cfs, winter, based on their data collection efforts. This recommendation is based on the physical and biological data collected to date and does not incorporate any water availability constraints.

- 4.90 cubic feet per second is recommended is required to maintain the three principal hydraulic criteria of average depth, average velocity and percent wetted perimeter;
- 1.60 cubic feet per second is required to maintain two of the three principal hydraulic criteria.

The modeling results from this survey effort are within the confidence interval produced by the R2CROSS model (see Table 1).

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Headwaters	State Highway 12	5.3	5%	95%

95% of the public lands are managed by the USFS.

Biological and Field Survey Data

The CDOW, in April of 1997 and May and July of 2006, collected stream cross section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of the Cucharas River. The Cucharas River is classified as a small stream (between 10 to 19 feet wide) and fishery surveys indicate the stream environment of the Cucharas River supports rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*) and brook trout (*Salvelinus fontinalis*) (See CDOW Fish Survey in Appendix B).

Field Survey Data

CDOW staff used the R2CROSS methodology to quantify the amount of water required to preserve the natural environment to a reasonable degree. The R2CROSS method requires that stream discharge and channel profile data be collected in a riffle stream habitat type. Riffles are most easily visualized, as the stream habitat types that would dry up first should streamflow cease. This type of hydraulic data collection consists of setting up a transect, surveying the stream channel geometry, and measuring the stream discharge. Appendix B contains copies of field data collected for this proposed segment.

Biological Flow Recommendation

The Board staff relies upon the biological expertise of the cooperating agencies to interpret output from the R2CROSS data collected to develop the initial, biologic instream flow recommendation. This initial recommendation is designed to address the unique biologic requirements of each stream without regard to water availability. Three instream flow hydraulic parameters, average depth, percent wetted perimeter, and average velocity are used to develop biologic instream flow recommendations. The CDOW has determined that maintaining these three hydraulic parameters at adequate levels across riffle habitat types, aquatic habitat in pools and runs will also be maintained for most life stages of fish and aquatic invertebrates (Nehring 1979; Espegren 1996).

For this segment of stream, three data sets were collected with the results shown in Table 1 below. Table 1 shows who collected the data (Party), the date the data was collected, the measured discharge at the time of the survey (Q), the accuracy range of the predicted flows based on Manning's Equation (240% and 40% of Q), the summer flow recommendation based on meeting 3 of 3 hydraulic criteria and the winter flow recommendation based upon 2 of 3 hydraulic criteria.

Table 1: Data

Party	Date	Q	250%-40%	Summer (3/3)	Winter (2/3)
DOW	4/23/97	3.5	8.8 – 1.4	4.9	2.0
DOW	5/10/06	2.2	5.5 – 0.9	$7.9^{(R)}$	1.3
DOW	7/19/06	2.7	6.8 – 1.1	$7.8^{(R)}$	1.4

DOW = Division of Wildlife R = Outside of R2X Accuracy Range

Biologic Flow Recommendation

The summer flow recommendation, which met 3 of 3 criteria and is within the accuracy range of the R2CROSS model, ranged is 4.9 cfs (See Table 1). The winter flow recommendations, which met 2 of 3 criteria and were within the accuracy range of the R2CROSS model, ranged from 2.0 cfs to 1.3 cfs. Averaging the winter values within range, results in a 1.6 cfs winter recommendation (See Table 1).

Hydrologic Data

After incorporating the above water availability constraints, the original instream flow recommendation was modified to the following:

- 4.90 cubic feet per second is recommended from May 15 through June 30;
- 2.5 cubic feet per second is recommended from July 1 through August 15
- 1.60 cubic feet per second is recommended from August 16 through September 15;
- 1.20 cubic feet per second is recommended from September 16 through April 14;
- 3.00 cubic feet per second is recommended from April 15 through May 14.

However, if additional water is determined to be available in further investigations, the CDOW would recommend appropriating the additional water up to the recommended flow amounts to preserve the natural environment to a reasonable degree.

Stream: Cucharas River

Executive Summary

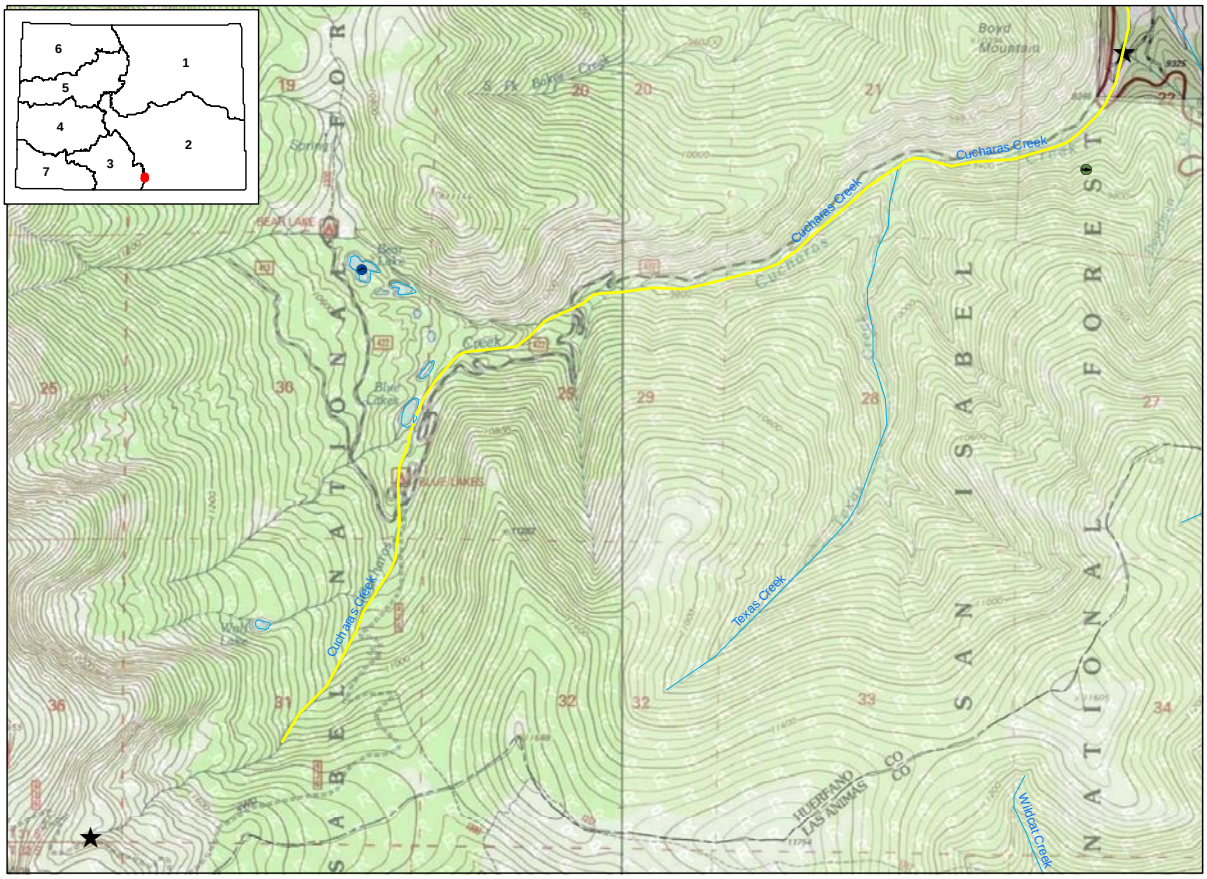
Water Division: 2
Water District: 16
CDOW#: 29606

Segment: Headwaters to Deadman Creek

Upper Terminus: Headwaters
Latitude: 37º 17’ 47.2”N Longitude: 105º 09’ 27.7"W
UTM North: 4127771 UTM East: 130486024

Lower Terminus: Deadman Creek
Latitude: 37º 20’ 04.2”N Longitude: 105º 05’ 43.1"W
UTM North: 4131985 UTM East: 130491558

Counties: Huerfano
Length: 5.3 miles
USGS Quad(s): Trinchera Peak, Cucharas Pass
ISF Appropriation: 4.9 cfs (05/15 – 06/30)
1.6 cfs (07/01 – 09/15)
1.2 cfs (09/16 – 03/31)
1.6 cfs (04/01 – 05/14)



Cucharas River - Huerfano County

The information contained in this report and the associated instream flow file folder forms the basis for the instream flow recommendation to be considered by the Colorado Water Conservation Board (Board). It is the Colorado Division of Wildlife (CDOW) staff's opinion that the information contained in this report is sufficient for the Board's staff to begin the investigations required to support the findings required in Rule 5(i) of the Instream Flow Rules.

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Hydrologic Data

The CDOW staff conducted a preliminary evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. The hydrograph below was derived from data collected by the USGS stream gage for Cucharas River at Boyd Ranch, near

La Veta, CO (#07114000), which has a drainage area of 56 square miles (See Gage Summary in Appendix C). The total drainage area upstream of this ISF segment of the Cucharas River is 9.4 square miles. The period of record for the Cucharas River gage was 1934 to 1981, the period of record used by staff in their analysis was 1934 to 1981, or 47 years of record. Table 2 below displays the estimated flow of Cucharas River at the lower terminus of the instream flow reach in terms of a percentage of exceedence.

Table 2: Estimated Stream Flow for Cucharas River

Exceedences	January	February	March	April	May	June	July	August	September	October	November	December
1%	2.1	2.7	3.7	20.1	47.0	44.5	18.9	8.1	4.5	3.9	3.4	2.5
5%	1.8	1.8	2.7	11.2	34.7	31.2	10.9	5.7	3.4	2.9	2.5	2.0
10%	1.6	1.6	2.2	7.6	28.6	24.8	9.1	4.7	2.7	2.2	2.0	1.8
20%	1.4	1.4	1.8	4.9	19.0	18.1	6.7	3.9	2.4	1.8	1.7	1.5
50%	1.2	1.2	1.3	2.7	8.1	9.2	3.9	2.4	1.6	1.5	1.4	1.2
80%	0.9	0.9	1.1	1.5	3.4	3.9	2.2	1.5	1.2	1.0	1.1	1.0
90%	0.8	0.9	0.9	1.3	2.0	2.9	1.7	1.2	0.9	0.9	0.9	0.8
95%	0.7	0.8	0.9	1.1	1.4	2.2	1.3	0.9	0.7	0.8	0.8	0.7
99%	0.6	0.6	0.7	0.9	1.2	1.2	0.6	0.6	0.5	0.6	0.6	0.5

Table 2 shows that the summer flow recommendation of 4.9 cfs is available at least 50% of the time for the months of May and June. The winter flow recommendation of 1.6 cfs is available at least 50% of the time from July through mid September and the month of April. Based on this water availability analysis, the winter recommendation was further reduced to 1.2 cfs for the time period of September 16 through March 31. After incorporating the above water availability constraints, the original instream flow recommendation was modified to the following:

- 4.90 cubic feet per second is recommended from May 15 through June 30;
- 1.60 cubic feet per second is recommended from July 1 through September 15;
- 1.20 cubic feet per second is recommended from September 16 through March 31;
- 1.60 cubic feet per second is recommended from April 1 through May 14.

However, if additional water is determined to be available in further investigations, the CDOW would recommend appropriating the additional water up to the recommended flow amounts to preserve the natural environment to a reasonable degree.

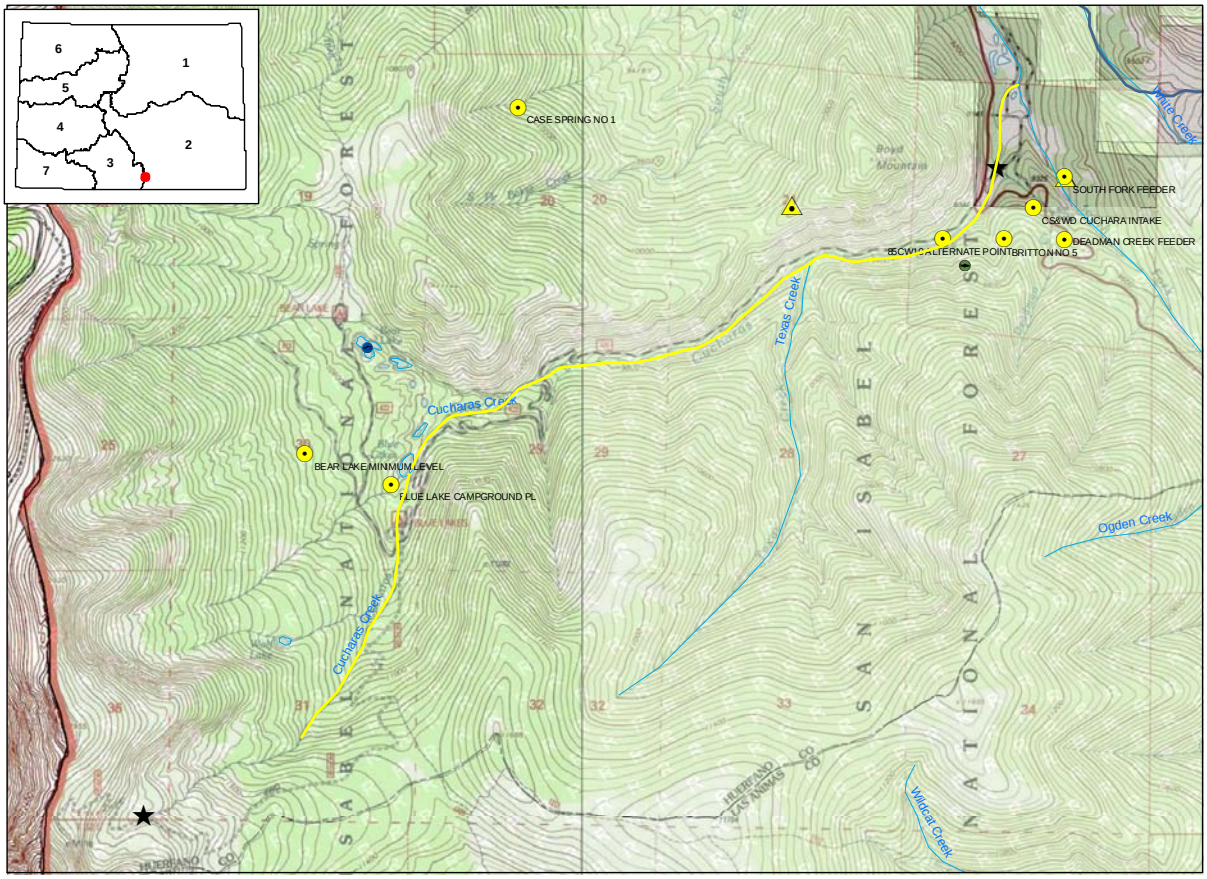
Precipitation Data

CDOW staff identified 4 local precipitation data sets located near the Cucharas River Drainage: La Veta, La Veta Pass, North Lake and Aguilar 18 WSW (see Precipitation Data in Appendix C).

Existing Water Right Information

CDOW staff has analyzed the water rights tabulation and will consult with the Division Engineer's Office (DEO) to identify any potential water availability problems due to existing diversions. Records indicate that there are 4 surface water diversions that are located within this reach of Cucharas River. In addition, there are several existing water rights downstream of the proposed instream flow reach (see below).

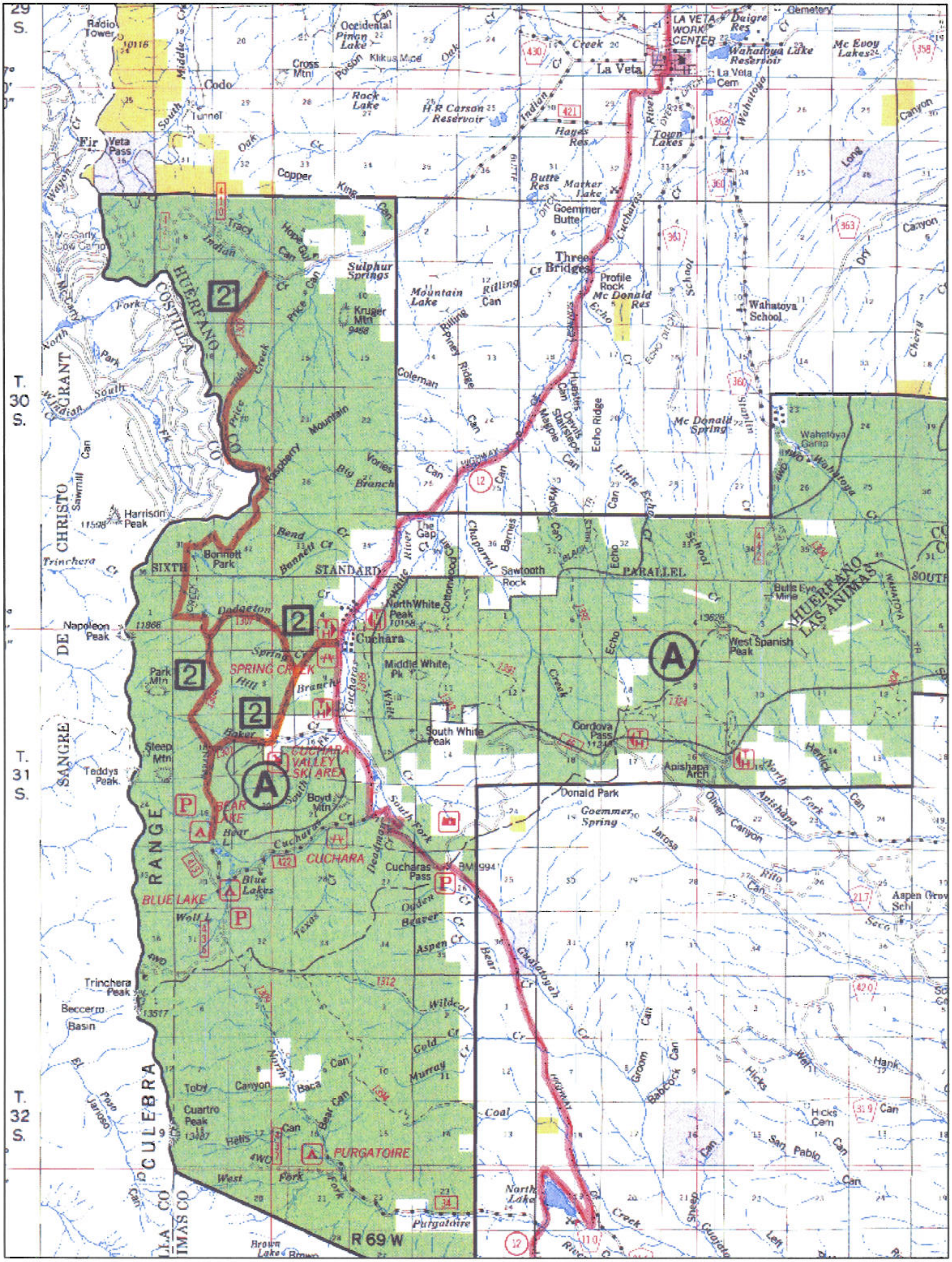
WD	ID	NAME	WATER_SRC
16	825	CS&WD CUCHARA INTAKE	CUCHARAS RIVER
16	2123	CASE SPRING NO 1	UNAMED SPRINGS
16	586	BRITTON NO 5	CUCHARAS RIVER
16	2226	BLUE LAKE CAMPGROUND PL	UNAMED SPRINGS
16	985	DEADMAN CREEK FEEDER	CUCHARAS RIVER
16	986	SOUTH FORK FEEDER	CUCHARAS RIVER
16	988	85CW10 ALTERNATE POINT	CUCHARAS RIVER
16	3516	BEAR LAKE MINIMUM LEVEL	CUCHARAS RIVER
16	3859	BRITTON RESERVOIR NO 1	CUCHARAS RIVER
16	3860	BRITTON RESERVOIR NO 2	CUCHARAS RIVER
16	3861	BRITTON RESERVOIR NO 3	CUCHARAS RIVER



Cucharas River - Huerfano County

Appendix - B

Field Data


T. 30 S.
T. 31 S.
T. 32 S.
29 S.
R 69 W
LA VETA WORK CENTER
La Veta
Daigre Res
Cemetery
Wahatoya Lake Reservoir
Mc Evoy Lakes
La Veta Cem
Occidental Pinon Lake
Cross Mtn
Rock Lake
H R Carson Reservoir
Hayes Res
Town Lakes
Butte Res
Marker Lake
Goemmer Butte
Three Bridges
Profile Rock
Mc Donald Res
Wahatoya School
Radio Tower
Codo
Tunnel
Veta Pass
Copper
Sulphur Springs
Kruger Mtn 9488
Mountain Lake
Coleman
Piney Ridge
Echo Ridge
Mc Donald Spring
Wahatoya Camp
HUERFANO
COSTILLA
GRANT
SANGRE DE CHRISTO RANGE
CULEBRA
Harrison Peak
Napoleon Peak
Park Mtn
Sleep Mtn
Teddys Peak
Bonnett Park
SIXTH STANDARD PARALLEL
Dodgeton
Spring Cr
SPRING CREEK
North White Peak
Cuchara
Middle White Pk
South White Peak
Cordova Pass
West Spanish Peak
HUERFANO
LAS ANIMAS
Bulls Eye Mine
Apishapa Arch
Sawtooth Rock
The Gap
CUCHARA VALLEY SKI AREA
Boyd Mtn
BEAR LAKE
CUCHARA
Cucharas Pass
BLUE LAKE
Blue Lakes
Wolf L
Donald Park
Goemmer Spring
Trinchera Peak 13517
Beccerro Basin
Toby Canyon
Cuartro Peak 13487
PURGATOIRE
Purgatoire
North Lake
Hicks Cem
San Pablo
Aspen Grove Sch
Brown Lake
HIGHWAY
A
2

Pike & San Isabel National Forests
Cimarron & Comanche National Grasslands

U.S.D.A. Forest Service Go

Recreation – San Carlos Ranger District

Spanish Peaks Day/Overnight use areas

Spanish Peaks Day/Overnight use areas: These areas are usually open April to October, depending on snow conditions.

Location: From La Veta, travel north on Hwy 12. Map shows location of each area.

Weather: Weather in the summer is generally mild with warm days and cool nights; highs in the 80's and lows in the 40's. Afternoon thunderstorms a common occurrence. Spring and fall weather is usually dry and sunny with highs in the 60's and lows in the 30's.

Attractions: Picnicking, hiking & fishing.

Special User Fee: Fee stations are located near the entrance of the areas. During the summer, the sites receives heavy use on the weekends and holida

Area	Fee	Facilities	Trail Access
Cordova Pass Parking Area	4.00/day	3 picnic sites, restroom and trash receptacle	Access to Levy-Krier(1392), West Peak (1390) and Salazar(1390a) trails
Cordova Pass Overnight RV Parking	4.00/night	3 overnight campsites, restroom and trash receptacle	Access to Levy-Krier(1392), West Peak (1390) and Salazar(1390a) trails
Cuchara Day Use Picnic Area	5.00/day	13 picnic sites, restroom and trash receptacle	No trails, just a picnic area
Spring Creek Trailhead	4.00/day	3 picnic sites, restroom and trash receptacle	Access to Dodgeton trail

Other Important Information: Be Bear Aware. It is prohibited to Possess or leave unattended any food, refuse or other bear attractants unless it is; A stored in a bear resistant method or, B. being eaten, prepared for eating or being transported. 36 CFR 261.58(cc).

PSICC Special Orders

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

LOCATION INFORMATION

STREAM NAME:	Cucharas Creek
XS LOCATION:	USFS Picnic Area
XS NUMBER:	051006-01
DATE:	10-May-06
OBSERVERS:	Uppendahl
1/4 SEC:	NE
SECTION:	29
TWP:	31 S
RANGE:	69 W
PM:	6
COUNTY:	Huerfano
WATERSHED:	Cucharas Creek
DIVISION:	2
DOW CODE:	0
USGS MAP:	Cucharas Pass
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:	0.05875

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

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

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 051006-01

DATA POINTS= 46

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	PIN TOP	0.00	8.50			0.00		0.00	0.00	0.0%
		1.00	8.35			0.00		0.00	0.00	0.0%
		2.00	8.75			0.00		0.00	0.00	0.0%
		3.00	9.15			0.00		0.00	0.00	0.0%
1	GL	3.50	9.20			0.00		0.00	0.00	0.0%
		4.00	9.45			0.00		0.00	0.00	0.0%
	WL	4.50	10.20	0.00	0.00	0.00		0.00	0.00	0.0%
		5.00	10.30	0.10	0.01	0.51	0.10	0.05	0.00	0.0%
		5.50	10.40	0.20	0.41	0.51	0.20	0.10	0.04	1.9%
		6.00	10.45	0.25	0.61	0.50	0.25	0.13	0.08	3.5%
		6.50	10.40	0.20	0.73	0.50	0.20	0.10	0.07	3.3%
		7.00	10.40	0.20	1.09	0.50	0.20	0.10	0.11	5.0%
		7.50	10.55	0.35	0.39	0.52	0.35	0.18	0.07	3.1%
		8.00	10.55	0.35	0.16	0.50	0.35	0.18	0.03	1.3%
	BR	8.50	10.40	0.20	0.00	0.52	0.20	0.10	0.00	0.0%
	BR	9.00	10.45	0.25	0.00	0.50	0.25	0.13	0.00	0.0%
	BR	9.50	10.55	0.35	0.12	0.51	0.35	0.18	0.02	1.0%
		10.00	10.30	0.10	1.86	0.56	0.10	0.04	0.07	3.4%
		10.30	10.50	0.30	0.53	0.36	0.30	0.09	0.05	2.2%
		10.60	10.60	0.40	0.34	0.32	0.40	0.12	0.04	1.9%
		10.90	10.60	0.40	0.73	0.30	0.40	0.12	0.09	4.0%
		11.20	10.60	0.40	1.80	0.30	0.40	0.12	0.22	9.9%
		11.50	10.65	0.45	1.80	0.30	0.45	0.14	0.24	11.1%
		11.80	10.60	0.40	0.34	0.30	0.40	0.12	0.04	1.9%
		12.10	10.45	0.20	0.88	0.34	0.20	0.06	0.05	2.4%
		12.40	10.40	0.20	1.16	0.30	0.20	0.06	0.07	3.2%
		12.70	10.60	0.40	1.71	0.36	0.40	0.12	0.21	9.4%
		13.00	10.60	0.40	1.62	0.30	0.40	0.12	0.19	8.9%
		13.30	10.70	0.50	0.84	0.32	0.50	0.15	0.13	5.8%
		13.60	10.60	0.40	0.83	0.32	0.40	0.12	0.10	4.6%
		13.90	10.60	0.40	0.70	0.30	0.40	0.12	0.08	3.8%
	BR	14.20	10.60	0.40	0.04	0.30	0.40	0.12	0.00	0.2%
	TR	14.50	10.21	0.01	0.00	0.49	0.01	0.00	0.00	0.0%
		15.00	10.51	0.31	0.14	0.58	0.31	0.16	0.02	1.0%
	TR	15.50	10.25	0.05	0.00	0.56	0.05	0.03	0.00	0.0%
		16.00	10.40	0.20	0.21	0.52	0.20	0.10	0.02	1.0%
		16.50	10.50	0.30	0.37	0.51	0.30	0.15	0.06	2.5%
		17.00	10.45	0.25	0.51	0.50	0.25	0.13	0.06	2.9%
		17.50	10.45	0.25	0.15	0.50	0.25	0.13	0.02	0.9%
	WL	18.00	10.20	0.00	0.00	0.56		0.00	0.00	0.0%
		19.00	9.90			0.00		0.00	0.00	0.0%
1		19.50	8.85			0.00		0.00	0.00	0.0%
		20.00	8.40			0.00		0.00	0.00	0.0%
		21.00	8.05			0.00		0.00	0.00	0.0%
	S	22.00	7.90			0.00		0.00	0.00	0.0%
	TOP ROCK	22.50	7.15			0.00		0.00	0.00	0.0%
	TOTALS ----------					14.29	0.5 (Max.)	3.52	2.18	100.0%

Manning's n = 0.2285
Hydraulic Radius= 0.246606486

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 051006-01

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	3.52	3.54	0.4%
9.95	3.52	7.04	99.7%
9.97	3.52	6.75	91.5%
9.99	3.52	6.46	83.4%
10.01	3.52	6.18	75.3%
10.03	3.52	5.89	67.2%
10.05	3.52	5.61	59.2%
10.07	3.52	5.33	51.2%
10.09	3.52	5.05	43.3%
10.11	3.52	4.77	35.4%
10.13	3.52	4.49	27.5%
10.15	3.52	4.22	19.7%
10.16	3.52	4.08	15.8%
10.17	3.52	3.95	12.0%
10.18	3.52	3.81	8.1%
10.19	3.52	3.67	4.3%
10.20	3.52	3.54	0.4%
10.21	3.52	3.40	-3.4%
10.22	3.52	3.27	-7.2%
10.23	3.52	3.14	-11.0%
10.24	3.52	3.01	-14.7%
10.25	3.52	2.87	-18.4%
10.27	3.52	2.62	-25.7%
10.29	3.52	2.36	-32.9%
10.31	3.52	2.12	-39.9%
10.33	3.52	1.88	-46.7%
10.35	3.52	1.65	-53.3%
10.37	3.52	1.42	-59.6%
10.39	3.52	1.21	-65.8%
10.41	3.52	1.00	-71.5%
10.43	3.52	0.83	-76.6%
10.45	3.52	0.67	-80.9%

WATERLINE AT ZERO
AREA ERROR = 10.201

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 051006-01

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	9.20	15.83	1.16	1.50	18.38	17.57	100.0%	1.05	29.86	1.62
	9.20	15.83	1.16	1.50	18.36	17.57	100.0%	1.05	29.82	1.62
	9.25	15.71	1.12	1.45	17.57	17.40	99.0%	1.01	27.89	1.59
	9.30	15.58	1.08	1.40	16.79	17.23	98.1%	0.97	26.02	1.55
	9.35	15.46	1.04	1.35	16.02	17.06	97.1%	0.94	24.20	1.51
	9.40	15.34	0.99	1.30	15.25	16.90	96.2%	0.90	22.44	1.47
	9.45	15.21	0.95	1.25	14.48	16.73	95.2%	0.87	20.74	1.43
	9.50	15.16	0.91	1.20	13.72	16.62	94.6%	0.83	19.04	1.39
	9.55	15.10	0.86	1.15	12.97	16.50	93.9%	0.79	17.41	1.34
	9.60	15.04	0.81	1.10	12.21	16.38	93.3%	0.75	15.83	1.30
	9.65	14.98	0.76	1.05	11.46	16.27	92.6%	0.70	14.31	1.25
	9.70	14.93	0.72	1.00	10.72	16.15	91.9%	0.66	12.85	1.20
	9.75	14.87	0.67	0.95	9.97	16.04	91.3%	0.62	11.45	1.15
	9.80	14.81	0.62	0.90	9.23	15.92	90.6%	0.58	10.11	1.10
	9.85	14.76	0.58	0.85	8.49	15.81	90.0%	0.54	8.84	1.04
	9.90	14.70	0.53	0.80	7.75	15.69	89.3%	0.49	7.64	0.99
	9.95	14.50	0.48	0.75	7.02	15.46	88.0%	0.45	6.54	0.93
	10.00	14.30	0.44	0.70	6.30	15.22	86.6%	0.41	5.52	0.88
	10.05	14.10	0.40	0.65	5.59	14.99	85.3%	0.37	4.57	0.82
	10.10	13.90	0.35	0.60	4.89	14.75	84.0%	0.33	3.70	0.76
	10.15	13.70	0.31	0.55	4.20	14.52	82.6%	0.29	2.90	0.69
WL	10.20	13.49	0.26	0.50	3.52	14.28	81.3%	0.25	2.19	0.62
	10.25	13.04	0.22	0.45	2.86	13.78	78.4%	0.21	1.58	0.55
	10.30	12.30	0.18	0.40	2.23	12.96	73.8%	0.17	1.08	0.49
	10.35	11.39	0.14	0.35	1.63	11.95	68.0%	0.14	0.68	0.42
	10.40	9.93	0.11	0.30	1.09	10.39	59.2%	0.10	0.38	0.35
	10.45	6.51	0.10	0.25	0.67	6.83	38.9%	0.10	0.22	0.33
	10.50	4.62	0.08	0.20	0.39	4.81	27.4%	0.08	0.11	0.29
	10.55	3.06	0.06	0.15	0.19	3.15	18.0%	0.06	0.04	0.24
	10.60	1.18	0.04	0.10	0.04	1.22	6.9%	0.04	0.01	0.17
	10.65	0.29	0.02	0.05	0.01	0.31	1.8%	0.02	0.00	0.13

D = 1.33
%WP = 0.31
V = 7.88

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 051006-01

SUMMARY SHEET

MEASURED FLOW (Qm)=	2.18	cfs
CALCULATED FLOW (Qc)=	2.19	cfs
(Qm-Qc)/Qm * 100 =	0.0	%
MEASURED WATERLINE (WLm)=	10.20	ft
CALCULATED WATERLINE (WLc)=	10.20	ft
(WLm-WLc)/WLm * 100 =	0.0	%
MAX MEASURED DEPTH (Dm)=	0.50	ft
MAX CALCULATED DEPTH (Dc)=	0.50	ft
(Dm-Dc)/Dm * 100	0.2	%
MEAN VELOCITY=	0.62	ft/sec
MANNING'S N=	0.228	
SLOPE=	0.05875	ft/ft
.4 * Qm =	0.9	cfs
2.5 * Qm=	5.5	cfs

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

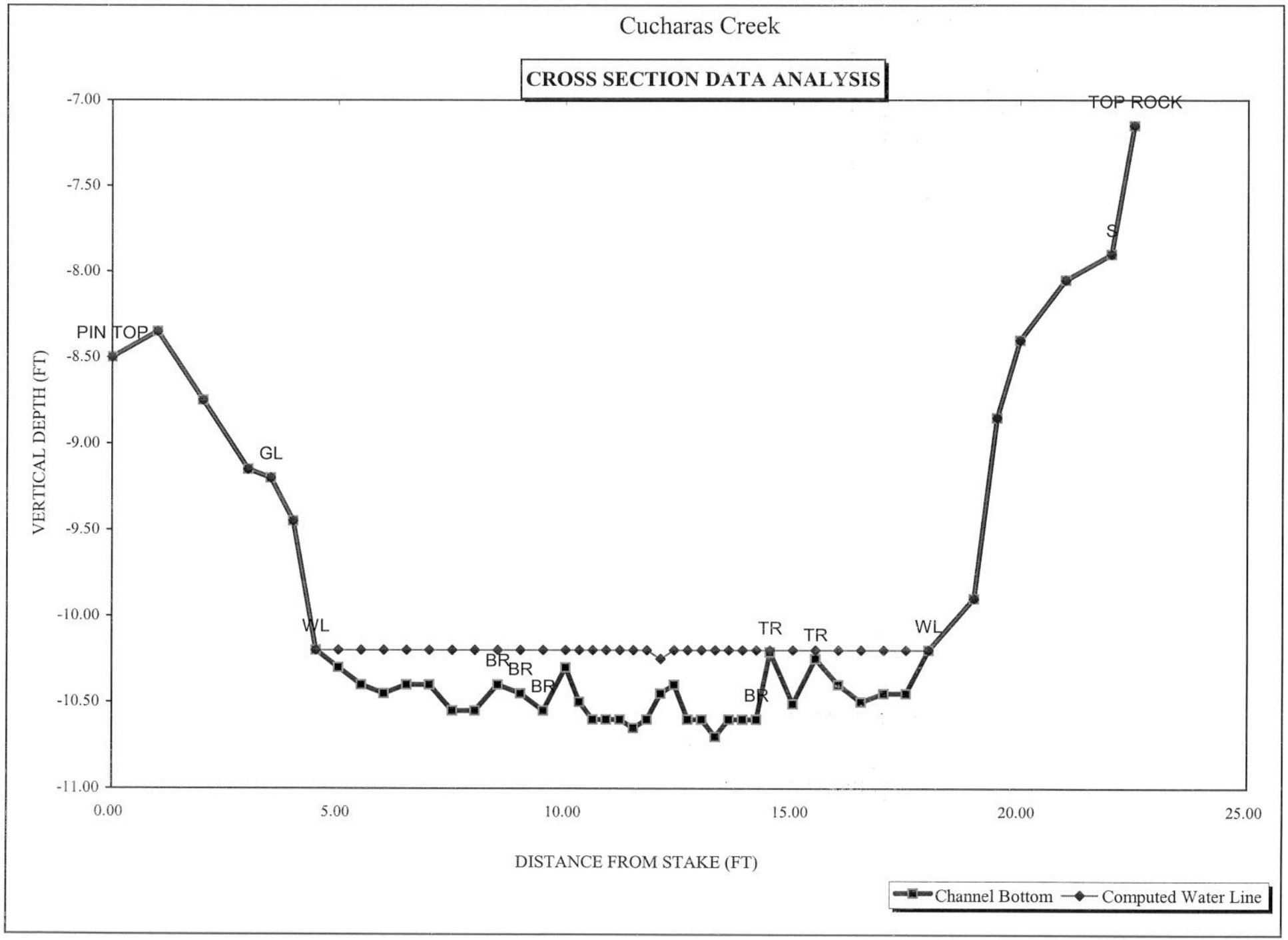
FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

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

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

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

Cucharas Creek



Data Input & Proofing

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 051006-01
DATE: 5/10/2006
OBSERVERS: Uppendahl

1/4 SEC: NE
SECTION: 29
TWP: 31 S
RANGE: 69 W
PM: 6

COUNTY: Huerfano
WATERSHED: Cucharas Creek
DIVISION: 2
DOW CODE:
USGS MAP: Cucharas Pass
USFS MAP:

Level and Rod Survey

TAPE WT: 0.0106 lbs / ft
TENSION: 99999 lbs

SLOPE: 0.05875 ft / ft

CHECKED BY:.....DATE.....

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

Total Data Points = 46

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	PIN TOP	0.00	8.50			0.00	0.00	0.00
		1.00	8.35			0.00	0.00	0.00
		2.00	8.75			0.00	0.00	0.00
		3.00	9.15			0.00	0.00	0.00
1	GL	3.50	9.20			0.00	0.00	0.00
		4.00	9.45			0.00	0.00	0.00
	WL	4.50	10.20	0.00	0.00	0.00	0.00	0.00
		5.00	10.30	0.10	0.01	0.05	0.00	10.20
		5.50	10.40	0.20	0.41	0.10	0.04	10.20
		6.00	10.45	0.25	0.61	0.13	0.08	10.20
		6.50	10.40	0.20	0.73	0.10	0.07	10.20
		7.00	10.40	0.20	1.09	0.10	0.11	10.20
		7.50	10.55	0.35	0.39	0.18	0.07	10.20
		8.00	10.55	0.35	0.16	0.18	0.03	10.20
	BR	8.50	10.40	0.20	0.00	0.10	0.00	10.20
	BR	9.00	10.45	0.25	0.00	0.13	0.00	10.20
	BR	9.50	10.55	0.35	0.12	0.18	0.02	10.20
		10.00	10.30	0.10	1.86	0.04	0.07	10.20
		10.30	10.50	0.30	0.53	0.09	0.05	10.20
		10.60	10.60	0.40	0.34	0.12	0.04	10.20
		10.90	10.60	0.40	0.73	0.12	0.09	10.20
		11.20	10.60	0.40	1.80	0.12	0.22	10.20
		11.50	10.65	0.45	1.80	0.14	0.24	10.20
		11.80	10.60	0.40	0.34	0.12	0.04	10.20
		12.10	10.45	0.20	0.88	0.06	0.05	10.25
		12.40	10.40	0.20	1.16	0.06	0.07	10.20
		12.70	10.60	0.40	1.71	0.12	0.21	10.20
		13.00	10.60	0.40	1.62	0.12	0.19	10.20
		13.30	10.70	0.50	0.84	0.15	0.13	10.20
		13.60	10.60	0.40	0.83	0.12	0.10	10.20
		13.90	10.60	0.40	0.70	0.12	0.08	10.20
	BR	14.20	10.60	0.40	0.04	0.12	0.00	10.20
	TR	14.50	10.21	0.01	0.00	0.00	0.00	10.20
		15.00	10.51	0.31	0.14	0.16	0.02	10.20
	TR	15.50	10.25	0.05	0.00	0.03	0.00	10.20
		16.00	10.40	0.20	0.21	0.10	0.02	10.20
		16.50	10.50	0.30	0.37	0.15	0.06	10.20
		17.00	10.45	0.25	0.51	0.13	0.06	10.20
		17.50	10.45	0.25	0.15	0.13	0.02	10.20
	WL	18.00	10.20	0.00	0.00	0.00	0.00	0.00
		19.00	9.90			0.00	0.00	0.00
1		19.50	8.85			0.00	0.00	0.00
		20.00	8.40			0.00	0.00	0.00
		21.00	8.05			0.00	0.00	0.00
	S	22.00	7.90			0.00	0.00	0.00
	TOP ROCK	22.50	7.15			0.00	0.00	0.00
					Totals	3.52	2.18	

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 051006-01

Thorne-Zevenbergen D84 Correction Applied
Estimated D84 = 1.72

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

Velocity based on test of R/D84>1

	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	9.20	15.83	1.16	1.50	18.38	17.57	100.0%	1.05	68.70	3.74
	9.20	15.83	1.16	1.50	18.36	17.57	100.0%	1.05	68.54	3.73
	9.25	15.71	1.12	1.45	17.57	17.40	99.0%	1.01	61.69	3.51
	9.30	15.58	1.08	1.40	16.79	17.23	98.1%	0.97	55.34	3.30
	9.35	15.46	1.04	1.35	16.02	17.06	97.1%	0.94	49.45	3.09
	9.40	15.34	0.99	1.30	15.25	16.90	96.2%	0.90	44.00	2.89
	9.45	15.21	0.95	1.25	14.48	16.73	95.2%	0.87	38.98	2.69
	9.50	15.16	0.91	1.20	13.72	16.62	94.6%	0.83	34.19	2.49
	9.55	15.10	0.86	1.15	12.97	16.50	93.9%	0.79	29.83	2.30
	9.60	15.04	0.81	1.10	12.21	16.38	93.3%	0.75	25.87	2.12
	9.65	14.98	0.76	1.05	11.46	16.27	92.6%	0.70	22.29	1.94
	9.70	14.93	0.72	1.00	10.72	16.15	91.9%	0.66	19.07	1.78
	9.75	14.87	0.67	0.95	9.97	16.04	91.3%	0.62	16.19	1.62
	9.80	14.81	0.62	0.90	9.23	15.92	90.6%	0.58	13.62	1.48
	9.85	14.76	0.58	0.85	8.49	15.81	90.0%	0.54	11.35	1.34
	9.90	14.70	0.53	0.80	7.75	15.69	89.3%	0.49	9.36	1.21
	9.95	14.50	0.48	0.75	7.02	15.46	88.0%	0.45	7.67	1.09
	10.00	14.30	0.44	0.70	6.30	15.22	86.6%	0.41	6.20	0.98
	10.05	14.10	0.40	0.65	5.59	14.99	85.3%	0.37	4.93	0.88
	10.10	13.90	0.35	0.60	4.89	14.75	84.0%	0.33	3.85	0.79
	10.15	13.70	0.31	0.55	4.20	14.52	82.6%	0.29	2.94	0.70
WL	10.20	13.49	0.26	0.50	3.52	14.28	81.3%	0.25	2.19	0.62
	10.25	13.04	0.22	0.45	2.86	13.78	78.4%	0.21	1.58	0.55
	10.30	12.30	0.18	0.40	2.23	12.96	73.8%	0.17	1.09	0.49
	10.35	11.39	0.14	0.35	1.63	11.95	68.0%	0.14	0.71	0.43
	10.40	9.93	0.11	0.30	1.09	10.39	59.2%	0.10	0.41	0.38
	10.45	6.51	0.10	0.25	0.67	6.83	38.9%	0.10	0.17	0.25
	10.50	4.62	0.08	0.20	0.39	4.81	27.4%	0.08	0.07	0.18
	10.55	3.06	0.06	0.15	0.19	3.15	18.0%	0.06	0.02	0.11
	10.60	1.18	0.04	0.10	0.04	1.22	6.9%	0.04	0.00	0.03
	10.65	0.29	0.02	0.05	0.01	0.31	1.8%	0.02	0.00	0.00

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Cuchara Creek | CROSS-SECTION NO.: 1

CROSS-SECTION LOCATION: USFS Picnic Area

WP# 16 37° 19 23.7 105 07 20.6.

DATE: 5/10/06 | OBSERVERS: UPPENDAHL

LEGAL DESCRIPTION | ¼ SECTION: NE | SECTION: 29 | TOWNSHIP: 31 N/S | RANGE: 69 E/W | PM: 6

COUNTY: Huerfano | WATERSHED: Cucharas River | WATER DIVISION: 2 | DOW WATER CODE:

MAP(S): USGS: Cucharas Pass | USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO | METER TYPE: FLO-MATE

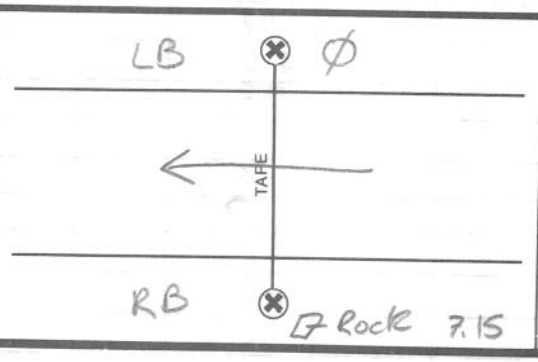
METER NUMBER: | DATE RATED: | CALIB/SPIN: _____ sec | TAPE WEIGHT: _____ lbs/foot | TAPE TENSION: _____ lbs

CHANNEL BED MATERIAL SIZE RANGE: | PHOTOGRAPHS TAKEN: YES/NO | NUMBER OF PHOTOGRAPHS:

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	7.80
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	10.20 / 10.20
② WS Upstream	20	8.85
③ WS Downstream	20	11.20
SLOPE	2.35/40 = .05875	

SKETCH



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

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO | DISTANCE ELECTROFISHED: 0 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:

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cucharas RIVER | CROSS-SECTION NO.: 05100601 | DATE: 09/06/06 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT | Gage Reading: _____ ft | TIME: 16:35

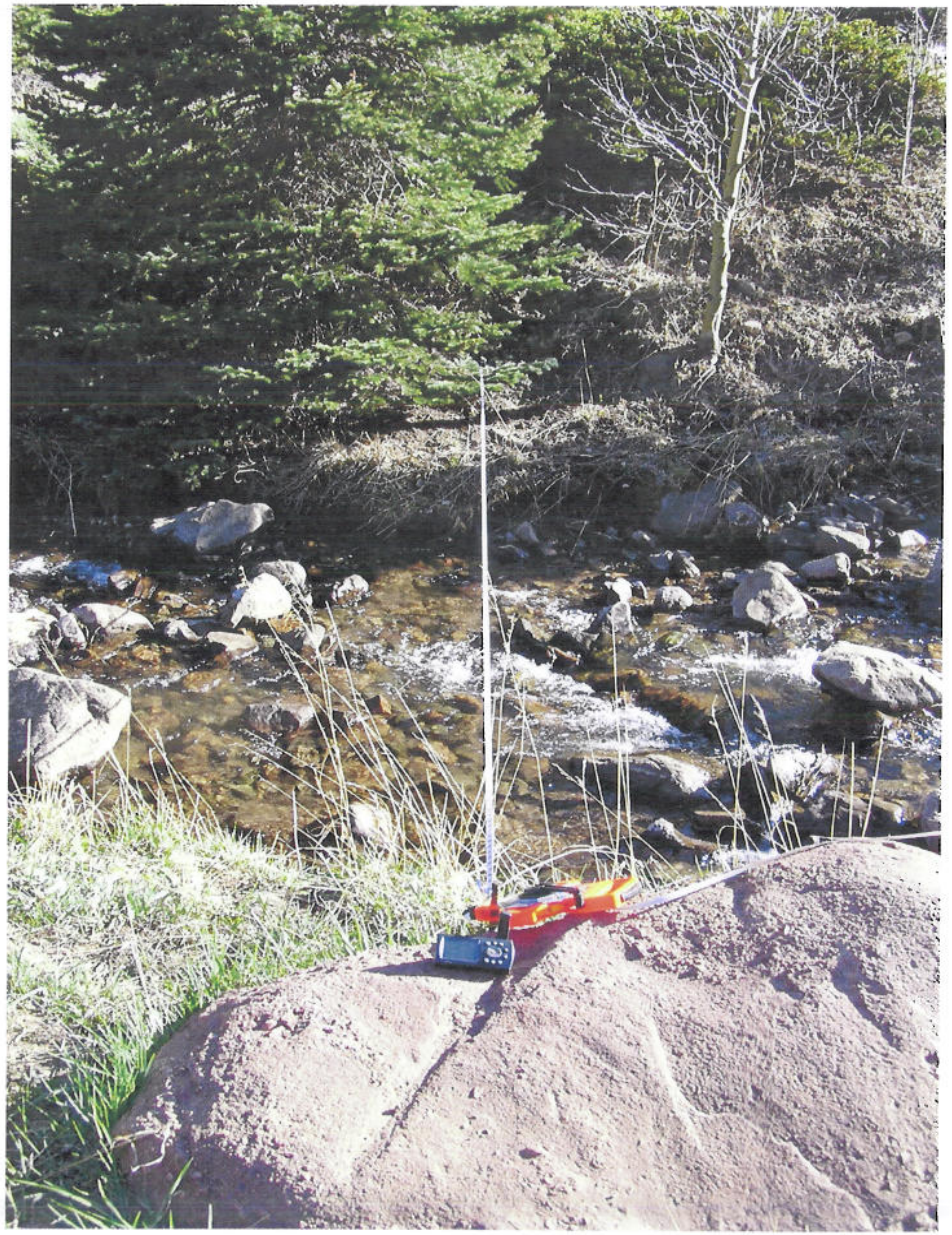
Features (Stake (S) Grassline (G) Waterline (W) Rock (R))	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Obser-vation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S	0		7.88								
	1.0		8.35								
	2.0		8.75								
	3		9.15								
GL	3.5		9.20								
	4		9.45								
WL	4.5		10.20	0				0			
	5			.10				.01			
	5.5			.20				.41			
	6			.25				.61			
	6.5			.20				.73			
	7			.20				1.09			
	7.5			.35				.39			
	8		10.55	.35				.16			
BR	8.5			.20				0			
BR	9.0			.25				0			
BR	9.5			.35				.12			
	10.0			.10				1.86			
	10.3			.30				.53			
	10.6			.40				.34			
	10.9			.40				.73			
	11.2			.40				1.80			
	11.5			.45				1.80			
	11.8			.40				.34			
	12.1		10.45	.20				.88			
	12.4			.20				1.16			
	12.7			.40				1.71			
	13.0			.40				1.62			
	13.3			.50				.84			
	13.6			.40				.83			
	13.9			.40				.70			
BR	14.2			.40				.04			
TR	14.5			.01				0			
	15.0			.31				.14			
TR	15.5			.05				0			
	16.0			.20				.21			
	16.5			.30				.37			
	17.0			.25				.51			
	17.5			.25				.15			
WL	18.0		10.20	0				0			
	19		9.90								
GL	19.5		8.85								
TOTALS:	20.0		8.40								2.18

End of Measurement | Time: 17:45 | Gage Reading: _____ ft | CALCULATIONS PERFORMED BY: | CALCULATIONS CHECKED BY:

21. 8.05
S 22 7.90

Cuchara Creek

USFS Picnic Area



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

LOCATION INFORMATION

STREAM NAME:	Cucharas Creek
XS LOCATION:	USFS Picnic Area
XS NUMBER:	071906-x3
DATE:	19-Jul-06
OBSERVERS:	Uppendahl & Molloy
1/4 SEC:	NE
SECTION:	29
TWP:	31 S
RANGE:	69 W
PM:	6
COUNTY:	Huerfano
WATERSHED:	Cucharas Creek
DIVISION:	2
DOW CODE:	0
USGS MAP:	Cucharas Pass
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:	0.05875

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

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

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 071906-x3

DATA POINTS= 39

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
PIN TOP	0.00	6.07		
B PIN	0.01	6.28		
	1.00	6.54		
	2.00	6.94		
	3.00	7.34		
1 GL	3.50	7.35		
WL	4.50	8.36	0.00	0.00
	5.00	8.56	0.20	0.19
	5.50	8.71	0.35	0.25
	6.00	8.61	0.25	0.83
TR	6.50	8.41	0.05	0.63
	7.00	8.56	0.20	1.02
	7.50	8.76	0.40	0.35
	8.00	8.76	0.40	0.33
BR	8.50	8.66	0.30	0.09
BR	9.00	8.66	0.30	0.00
	9.50	8.76	0.40	0.69
	10.00	8.56	0.20	0.51
	10.50	8.91	0.55	0.29
	11.00	8.96	0.60	1.93
	11.50	8.56	0.20	1.83
	12.00	8.66	0.30	0.82
	12.50	8.61	0.25	1.87
	13.00	8.71	0.35	1.57
	13.50	8.66	0.30	0.85
BR	14.00	8.86	0.50	0.04
BR	14.50	8.56	0.20	0.00
	15.00	8.66	0.30	0.11
	15.50	8.51	0.15	0.19
	16.00	8.71	0.35	0.45
	16.50	8.66	0.30	0.72
	17.00	8.71	0.35	1.29
	17.50	8.66	0.30	0.20
	18.00	8.41	0.05	0.00
WL	18.80	8.35	0.00	0.00
1 GL	19.50	7.04		
	20.00	6.59		
	21.00	6.24		
	22.00	6.09		

VALUES COMPUTED FROM RAW FIELD DATA

WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.54	0.20	0.10	0.02	0.7%
0.52	0.35	0.18	0.04	1.6%
0.51	0.25	0.13	0.10	3.8%
0.54	0.05	0.03	0.02	0.6%
0.52	0.20	0.10	0.10	3.8%
0.54	0.40	0.20	0.07	2.6%
0.50	0.40	0.20	0.07	2.4%
0.51	0.30	0.15	0.01	0.5%
0.50	0.30	0.15	0.00	0.0%
0.51	0.40	0.20	0.14	5.1%
0.54	0.20	0.10	0.05	1.9%
0.61	0.55	0.28	0.08	2.9%
0.50	0.60	0.30	0.58	21.4%
0.64	0.20	0.10	0.18	6.8%
0.51	0.30	0.15	0.12	4.5%
0.50	0.25	0.13	0.23	8.6%
0.51	0.35	0.18	0.27	10.2%
0.50	0.30	0.15	0.13	4.7%
0.54	0.50	0.25	0.01	0.4%
0.58	0.20	0.10	0.00	0.0%
0.51	0.30	0.15	0.02	0.6%
0.52	0.15	0.08	0.01	0.5%
0.54	0.35	0.18	0.08	2.9%
0.50	0.30	0.15	0.11	4.0%
0.50	0.35	0.18	0.23	8.3%
0.50	0.30	0.15	0.03	1.1%
0.56	0.05	0.03	0.00	0.0%
0.80		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
0.00		0.00	0.00	0.0%
15.07	0.6 (Max.)	4.06	2.71	100.0%

TOTALS ----------

Manning's n = 0.2252
Hydraulic Radius= 0.269305746

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 071906-x3

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	4.06	4.13	1.7%
8.11	4.06	7.75	91.0%
8.13	4.06	7.45	83.7%
8.15	4.06	7.16	76.5%
8.17	4.06	6.87	69.3%
8.19	4.06	6.58	62.1%
8.21	4.06	6.29	55.0%
8.23	4.06	6.00	47.8%
8.25	4.06	5.71	40.7%
8.27	4.06	5.42	33.5%
8.29	4.06	5.13	26.4%
8.31	4.06	4.84	19.3%
8.32	4.06	4.70	15.8%
8.33	4.06	4.55	12.3%
8.34	4.06	4.41	8.7%
8.35	4.06	4.27	5.2%
8.36	4.06	4.13	1.7%
8.37	4.06	3.98	-1.8%
8.38	4.06	3.84	-5.3%
8.39	4.06	3.70	-8.7%
8.40	4.06	3.57	-12.1%
8.41	4.06	3.43	-15.4%
8.43	4.06	3.17	-22.0%
8.45	4.06	2.90	-28.4%
8.47	4.06	2.65	-34.8%
8.49	4.06	2.39	-41.1%
8.51	4.06	2.14	-47.2%
8.53	4.06	1.90	-53.3%
8.55	4.06	1.66	-59.1%
8.57	4.06	1.43	-64.9%
8.59	4.06	1.20	-70.3%
8.61	4.06	1.00	-75.4%

WATERLINE AT ZERO
AREA ERROR = 8.360

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 071906-x3

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	7.35	15.83	1.22	1.61	19.27	17.62	100.0%	1.09	32.72	1.70
	7.36	15.82	1.21	1.60	19.11	17.60	99.9%	1.09	32.31	1.69
	7.41	15.74	1.16	1.55	18.32	17.47	99.1%	1.05	30.26	1.65
	7.46	15.67	1.12	1.50	17.54	17.34	98.4%	1.01	28.27	1.61
	7.51	15.59	1.07	1.45	16.76	17.22	97.7%	0.97	26.33	1.57
	7.56	15.51	1.03	1.40	15.98	17.09	97.0%	0.94	24.45	1.53
	7.61	15.44	0.98	1.35	15.21	16.96	96.3%	0.90	22.62	1.49
	7.66	15.36	0.94	1.30	14.44	16.83	95.5%	0.86	20.85	1.44
	7.71	15.29	0.89	1.25	13.67	16.71	94.8%	0.82	19.13	1.40
	7.76	15.21	0.85	1.20	12.91	16.58	94.1%	0.78	17.47	1.35
	7.81	15.13	0.80	1.15	12.15	16.45	93.4%	0.74	15.88	1.31
	7.86	15.06	0.76	1.10	11.39	16.33	92.6%	0.70	14.34	1.26
	7.91	14.98	0.71	1.05	10.64	16.20	91.9%	0.66	12.87	1.21
	7.96	14.90	0.66	1.00	9.90	16.07	91.2%	0.62	11.46	1.16
	8.01	14.83	0.62	0.95	9.15	15.95	90.5%	0.57	10.11	1.10
	8.06	14.75	0.57	0.90	8.41	15.82	89.8%	0.53	8.84	1.05
	8.11	14.68	0.52	0.85	7.68	15.69	89.0%	0.49	7.63	0.99
	8.16	14.60	0.48	0.80	6.95	15.56	88.3%	0.45	6.49	0.93
	8.21	14.52	0.43	0.75	6.22	15.44	87.6%	0.40	5.43	0.87
	8.26	14.45	0.38	0.70	5.49	15.31	86.9%	0.36	4.44	0.81
	8.31	14.37	0.33	0.65	4.77	15.18	86.2%	0.31	3.53	0.74
WL	8.36	14.17	0.29	0.60	4.06	14.94	84.8%	0.27	2.72	0.67
	8.41	13.38	0.25	0.55	3.37	14.13	80.2%	0.24	2.07	0.61
	8.46	12.86	0.21	0.50	2.71	13.58	77.0%	0.20	1.48	0.55
	8.51	12.35	0.17	0.45	2.08	13.02	73.9%	0.16	0.98	0.47
	8.56	11.54	0.13	0.40	1.49	12.16	69.0%	0.12	0.58	0.39
	8.61	9.89	0.10	0.35	0.95	10.39	59.0%	0.09	0.31	0.32
	8.66	6.87	0.08	0.30	0.52	7.25	41.1%	0.07	0.14	0.28
	8.71	2.98	0.09	0.25	0.27	3.23	18.3%	0.08	0.08	0.31
	8.76	1.38	0.11	0.20	0.15	1.55	8.8%	0.10	0.05	0.34
	8.81	1.04	0.09	0.15	0.09	1.15	6.5%	0.08	0.03	0.29
	8.86	0.70	0.07	0.10	0.05	0.75	4.3%	0.06	0.01	0.25
	8.91	0.57	0.03	0.05	0.01	0.59	3.3%	0.02	0.00	0.13
	8.96	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

3/3 = 7.8 cfs
2/3 = 1.4

STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 071906-x3

SUMMARY SHEET

MEASURED FLOW (Qm)=	2.71	cfs
CALCULATED FLOW (Qc)=	2.72	cfs
(Qm-Qc)/Qm * 100 =	-0.6	%
MEASURED WATERLINE (WLm)=	8.36	ft
CALCULATED WATERLINE (WLc)=	8.36	ft
(WLm-WLc)/WLm * 100 =	-0.1	%
MAX MEASURED DEPTH (Dm)=	0.60	ft
MAX CALCULATED DEPTH (Dc)=	0.60	ft
(Dm-Dc)/Dm * 100	0.0	%
MEAN VELOCITY=	0.67	ft/sec
MANNING'S N=	0.225	
SLOPE=	0.05875	ft/ft
.4 * Qm =	1.1	cfs
2.5 * Qm=	6.8	cfs

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

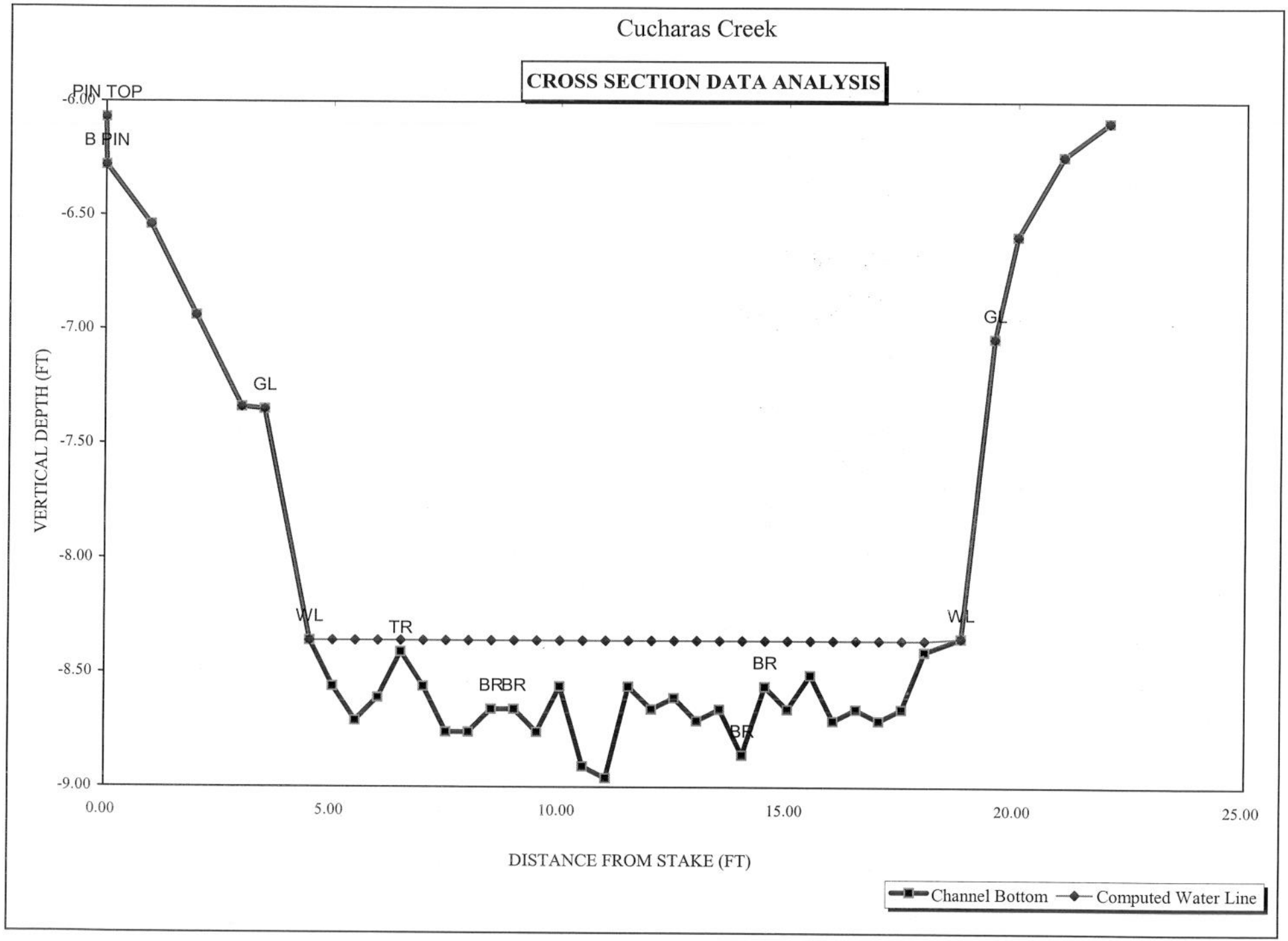
FLOW (CFS)	PERIOD
==========	========
_____	_____
_____	_____
_____	_____
_____	_____

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

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

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

Cucharas Creek



STREAM NAME: Cucharas Creek
XS LOCATION: USFS Picnic Area
XS NUMBER: 071906-x3

Thorne-Zevenbergen D84 Correction Applied
Estimated D84 = 1.81

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

STAGING TABLE

Velocity based on test of R/D84>1

	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	7.35	15.83	1.22	1.61	19.27	17.62	100.0%	1.09	75.08	3.90
	7.36	15.82	1.21	1.60	19.11	17.60	99.9%	1.09	73.58	3.85
	7.41	15.74	1.16	1.55	18.32	17.47	99.1%	1.05	66.23	3.61
	7.46	15.67	1.12	1.50	17.54	17.34	98.4%	1.01	59.41	3.39
	7.51	15.59	1.07	1.45	16.76	17.22	97.7%	0.97	53.09	3.17
	7.56	15.51	1.03	1.40	15.98	17.09	97.0%	0.94	47.26	2.96
	7.61	15.44	0.98	1.35	15.21	16.96	96.3%	0.90	41.88	2.75
	7.66	15.36	0.94	1.30	14.44	16.83	95.5%	0.86	36.95	2.56
	7.71	15.29	0.89	1.25	13.67	16.71	94.8%	0.82	32.43	2.37
	7.76	15.21	0.85	1.20	12.91	16.58	94.1%	0.78	28.32	2.19
	7.81	15.13	0.80	1.15	12.15	16.45	93.4%	0.74	24.58	2.02
	7.86	15.06	0.76	1.10	11.39	16.33	92.6%	0.70	21.19	1.86
	7.91	14.98	0.71	1.05	10.64	16.20	91.9%	0.66	18.15	1.70
	7.96	14.90	0.66	1.00	9.90	16.07	91.2%	0.62	15.42	1.56
	8.01	14.83	0.62	0.95	9.15	15.95	90.5%	0.57	12.99	1.42
	8.06	14.75	0.57	0.90	8.41	15.82	89.8%	0.53	10.83	1.29
	8.11	14.68	0.52	0.85	7.68	15.69	89.0%	0.49	8.94	1.16
	8.16	14.60	0.48	0.80	6.95	15.56	88.3%	0.45	7.28	1.05
	8.21	14.52	0.43	0.75	6.22	15.44	87.6%	0.40	5.85	0.94
	8.26	14.45	0.38	0.70	5.49	15.31	86.9%	0.36	4.63	0.84
	8.31	14.37	0.33	0.65	4.77	15.18	86.2%	0.31	3.59	0.75
WL	8.36	14.17	0.29	0.60	4.06	14.94	84.8%	0.27	2.72	0.67
	8.41	13.38	0.25	0.55	3.37	14.13	80.2%	0.24	2.01	0.60
	8.46	12.86	0.21	0.50	2.71	13.58	77.0%	0.20	1.44	0.53
	8.51	12.35	0.17	0.45	2.08	13.02	73.9%	0.16	0.99	0.48
	8.56	11.54	0.13	0.40	1.49	12.16	69.0%	0.12	0.64	0.43
	8.61	9.89	0.10	0.35	0.95	10.39	59.0%	0.09	0.36	0.37
	8.66	6.87	0.08	0.30	0.52	7.25	41.1%	0.07	0.14	0.26
	8.71	2.98	0.09	0.25	0.27	3.23	18.3%	0.08	0.03	0.11
	8.76	1.38	0.11	0.20	0.15	1.55	8.8%	0.10	0.01	0.05
	8.81	1.04	0.09	0.15	0.09	1.15	6.5%	0.08	0.00	0.03
	8.86	0.70	0.07	0.10	0.05	0.75	4.3%	0.06	0.00	0.02
	8.91	0.57	0.03	0.05	0.01	0.59	3.3%	0.02	0.00	0.01
	8.96	0.00	#DIV/0!	0.00	0.00	0.00	0.0%	#DIV/0!	#DIV/0!	#DIV/0!

Data Input & Proofing

STREAM NAME:	Cucharas Creek
XS LOCATION:	USFS Picnic Area
XS NUMBER:	071906-x3
DATE:	7/19/2006
OBSERVERS:	Uppendahl & Molloy
1/4 SEC:	NE
SECTION:	29
TWP:	31 S
RANGE:	69 W
PM:	6
COUNTY:	Huerfano
WATERSHED:	Cucharas Creek
DIVISION:	2
DOW CODE:	
USGS MAP:	Cucharas Pass
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.05875 ft / ft

CHECKED BY:.....DATE.....

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

Total Data Points = 39

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	PIN TOP	0.00	6.07			0.00	0.00	0.00
	B PIN	0.01	6.28			0.00	0.00	0.00
		1.00	6.54			0.00	0.00	0.00
		2.00	6.94			0.00	0.00	0.00
		3.00	7.34			0.00	0.00	0.00
1	GL	3.50	7.35			0.00	0.00	0.00
	WL	4.50	8.36	0.00	0.00	0.00	0.00	0.00
		5.00	8.56	0.20	0.19	0.10	0.02	8.36
		5.50	8.71	0.35	0.25	0.18	0.04	8.36
		6.00	8.61	0.25	0.83	0.13	0.10	8.36
	TR	6.50	8.41	0.05	0.63	0.03	0.02	8.36
		7.00	8.56	0.20	1.02	0.10	0.10	8.36
		7.50	8.76	0.40	0.35	0.20	0.07	8.36
		8.00	8.76	0.40	0.33	0.20	0.07	8.36
	BR	8.50	8.66	0.30	0.09	0.15	0.01	8.36
	BR	9.00	8.66	0.30	0.00	0.15	0.00	8.36
		9.50	8.76	0.40	0.69	0.20	0.14	8.36
		10.00	8.56	0.20	0.51	0.10	0.05	8.36
		10.50	8.91	0.55	0.29	0.28	0.08	8.36
		11.00	8.96	0.60	1.93	0.30	0.58	8.36
		11.50	8.56	0.20	1.83	0.10	0.18	8.36
		12.00	8.66	0.30	0.82	0.15	0.12	8.36
		12.50	8.61	0.25	1.87	0.13	0.23	8.36
		13.00	8.71	0.35	1.57	0.18	0.27	8.36
		13.50	8.66	0.30	0.85	0.15	0.13	8.36
	BR	14.00	8.86	0.50	0.04	0.25	0.01	8.36
	BR	14.50	8.56	0.20	0.00	0.10	0.00	8.36
		15.00	8.66	0.30	0.11	0.15	0.02	8.36
		15.50	8.51	0.15	0.19	0.08	0.01	8.36
		16.00	8.71	0.35	0.45	0.18	0.08	8.36
		16.50	8.66	0.30	0.72	0.15	0.11	8.36
		17.00	8.71	0.35	1.29	0.18	0.23	8.36
		17.50	8.66	0.30	0.20	0.15	0.03	8.36
		18.00	8.41	0.05	0.00	0.03	0.00	8.36
	WL	18.80	8.35	0.00	0.00	0.00	0.00	0.00
1	GL	19.50	7.04			0.00	0.00	0.00
		20.00	6.59			0.00	0.00	0.00
		21.00	6.24			0.00	0.00	0.00
		22.00	6.09			0.00	0.00	0.00
					Totals	4.06	2.71	

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Cucharas RIVER						CROSS-SECTION NO.: 3	
CROSS-SECTION LOCATION: USFS Picnic Area							
DATE: 7/19/07	OBSERVERS: Uppendahl + Mullay						
LEGAL DESCRIPTION	¼ SECTION: NE	SECTION: 29	TOWNSHIP: 3 N/S	RANGE: 69 E/W	PM: 6		
COUNTY: Huerfano	WATERSHED: Cucharas	WATER DIVISION:	DOW WATER CODE:				
MAP(S): USGS: Cucharas Pass							
USFS:							

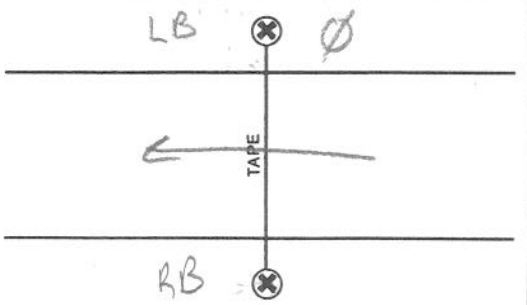
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) NO	METER TYPE: FLO MATE			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE:	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS:		

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	
② WS Upstream		
③ WS Downstream		
SLOPE	.05875	

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:

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cucharas River	CROSS-SECTION NO.: 07190603 3	DATE: 7/19/06	SHEET ___ OF ___
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) LEFT / RIGHT	Gage Reading: _____ ft	TIME: 19:00

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)
Top S	0		6.07								
B Stake	0		6.28								
	3.0		7.34								
	3.5		7.35								
WL	4.5		8.36	0				0			
	5			.20				.19			
	5.5			.35				.25			
	6			.25				.83			
TR	6.5			.05				.63			
	7			.20				1.02			
	7.5			.40				.35			
	8			.40				.33			
BR	8.5			.30				.09			
BR	9			.30				0			
	9.5			.40				.69			
	10			.20				.51			
	10.5			.55				.29			
	11.0			.60				1.93			
	11.5			.20				1.83			
	12			.30				.82			
	12.5			.25				1.87			
	13			.35				1.57			
	13.5			.30				.85			
BR	14			.50				.04			
BR	14.5			.20				0			
	15			.30				.11			
	15.5			.15				.19			
	16			.35				.45			
	16.5			.30				.72			
	17.			.35				1.29			
	17.5			.30				.20			
	18.0			.05				0			
WL	18.8		8.35	0				0			
GL	19.5		7.04								
WL	18.8		8.35	0							
TOTALS:											

End of Measurement	Time: 19:15	Gage Reading: _____ ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

7/19/06

CUCHARAS CREEK

@ USFS PICNIC AREA

E

Surveyed by: Rodosevich, Cavalieri, Boyer

		CODE		C
Code No.	29606 A	1	Region Southeast	
Date	August 8, 1975	2	Beaver dams	X
Section No.	1	3	Number (count or estimate)	
Stream Name	Cucharas Creek	4	Estimated acreage	
Primary Drainage	Cucharas River	5	Physical stream damage	X
			(% of section affected)	XX
Major Drainage	Arkansas River	6	Bank degredation	
Lower terminus	FISHERY		Channelization	
Location:	Confluence with Cucharas R.	7	Dredging	
	Below Hwy 12		Mine tailing encroachment	
			Road encroachment	
			Accessibility (miles)	X
T.	31S	8	Surfaced	
R.	69W	9	Non-surfaced car 5 miles	
S.	22	10	4-wheel	
Width	19 ft.	11	Established trail	
Elevation	9080 ft.	12	No established trail	
Flow (c.f.s.)	9.4	13	Boat only	
pH	8.8	14	No access	
phth	0	15	Land status and mileage	X
MO	102.6 ppm	16	USFS 4.5 miles	
EDTA	85.5 ppm	17	BLM	
Conductivity	100 umho	18	Municipal	
X if stream profile obtained		19	Div. of Wildlife	
Upper terminus		XXX	Private, no public access	
Location:	1.7 miles SW of Blue Lake	20	Private, open to public 0.5 mile	
			State Land Board	
			County	
T.	13S	21	Mixed small tracts, open	
R.	69W	22	Mixed small tracts, closed	
S.	31	23	Stocking	X
Width	14.5 ft.	24	Miles creel size 2.5 miles	
Elevation	11,600 Ft.	25	Miles fingerling	
Flow (c.f.s.)		26	Miles fry	
pH	8.8	27	Miles not stocked 1.5 miles	
phth	0	28	Aquatic Vegetation	X
MO	102.6 ppm	29	Filamentous algae (x one)	X
EDTA	85.5 ppm	30	Absent	
Conductivity	75 umho	31	Rare X	
X if stream profile obtained		32	Common	
Section Summary		XXX	Abundant	
Meander factor	1.1	33	Watercress	X
Length in Miles	5.0	34	X if present	
Width in feet	16.5 ft.	35	Stream size classification (x one)	X
Acreage	10.8	36	Large river 100' +	
Observed flow		37	River 60-99'	
X if inundated by reservoir		38	Large stream 36-59'	
Mileage unsectioned	1	39	Medium 20-35'	
Counties where section is located		XXX	Small 10-19' X	
County	Huerfano	40	Minor 4-9'	
Miles	5	41	Very small stream 4'	
County		42	Gradient (computer, elev. & miles)	X
Miles		43	Percent per mile 9.5	
County		44		
		45		

Fishery Value (X one)	XXX	Upper Station	XX
None	88	Elevation	11
Poor	89	Describe or map station location	11
Below average	90		
Average X	91		
Above average	92		
Excellent	93		
Fishery value - limiting factors	XXX		
Lack of Pools	94		
	95		
	96		
FISH SAMPLING	XXX		
Lower or only station	XXX		
Elevation	97		
Describe or map station location	98		
		Sampling method	11
		Length - feet	11
		Sampling adequate	11
		Sampling inadequate	11
		X if scales collected	11
		Estimated % of fish biomass	XX
		Rough fish	12
		Game fish	12
		Estimated % of rough fish biomass	XX
		Bullheads	12
		Carp	12
		Cottids	12
		Dace	12
Sampling method	99	Minnows	12
Length - feet	100	Suckers	12
Sampling adequate	101	Sunfish	12
Sampling inadequate	102	Combined stations	X
X if scales collected	103	Estimated % of fish biomass	XX
Estimated % of fish biomass	XXX	Rough fish	13
Rough fish	104	Game fish	13
Game fish	105	Estimate % of rough fish biomass	XX
Estimated % of rough fish biomass	XXX	Bullheads	13
Bullheads	106	Carp	13
Carp	107	Cottids	13
Cottids	108	Dace	13
Dace	109	Minnows	13
Minnows	110	Suckers	13
Suckers	111	Sunfish	13
Sunfish	112	No. of game fish 6.0" per mile	13

'72-'73 FISHERIES INVENTORY /
1041 RELATED DATA

Stream Code _ _ _ _ _ _

'72-'73 Inventory S - _ _ _ _

Stream Name _____

Percent Open to Public _____,
('72 Inventory)

1041 Form

Quality of Water _____,
Pool-riffle Ratio _____,
Temperature of Water _____,
Clarity of Water _____,
Fish Food Supply _____,
Condition of Fish _____,
Legal Access _____,
Physical Access* _____,
Aesthetic Value _____,
Meanders Value _____,
Improvement Potential _____,

No Data

'72 Inventory

Stocking Status —, (regularly, occasionally, rarely or never)
Population Status —, (normal, over-populated, under-populated)

☐ MINIMUM STREAM FLOW DATA

SB-97 Computer run Step. A

Maximum Channel Width _____,
Maximum Wetted Perimeter _____,
Maximum Depth _____,

"Filed on" Blue book

Decreed Flow _____,

Initial Month _____,
Initial Day _____,
Initial Year _____*

STOCKING AND FISH SAMPLING DATA

STREAM CODE 29606

STOCKING

STOCK 79-83 5 YRS

STOCKYRS Y Y Y Y Y

SPECIES-SIZE STOCKED:

N..1 B..3 R..4 ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

FISH SAMPLING

SAMPLE DATE: ___ / ___ / ___

METHODS: ~~RONE~~ CCEN ___ ___ ___

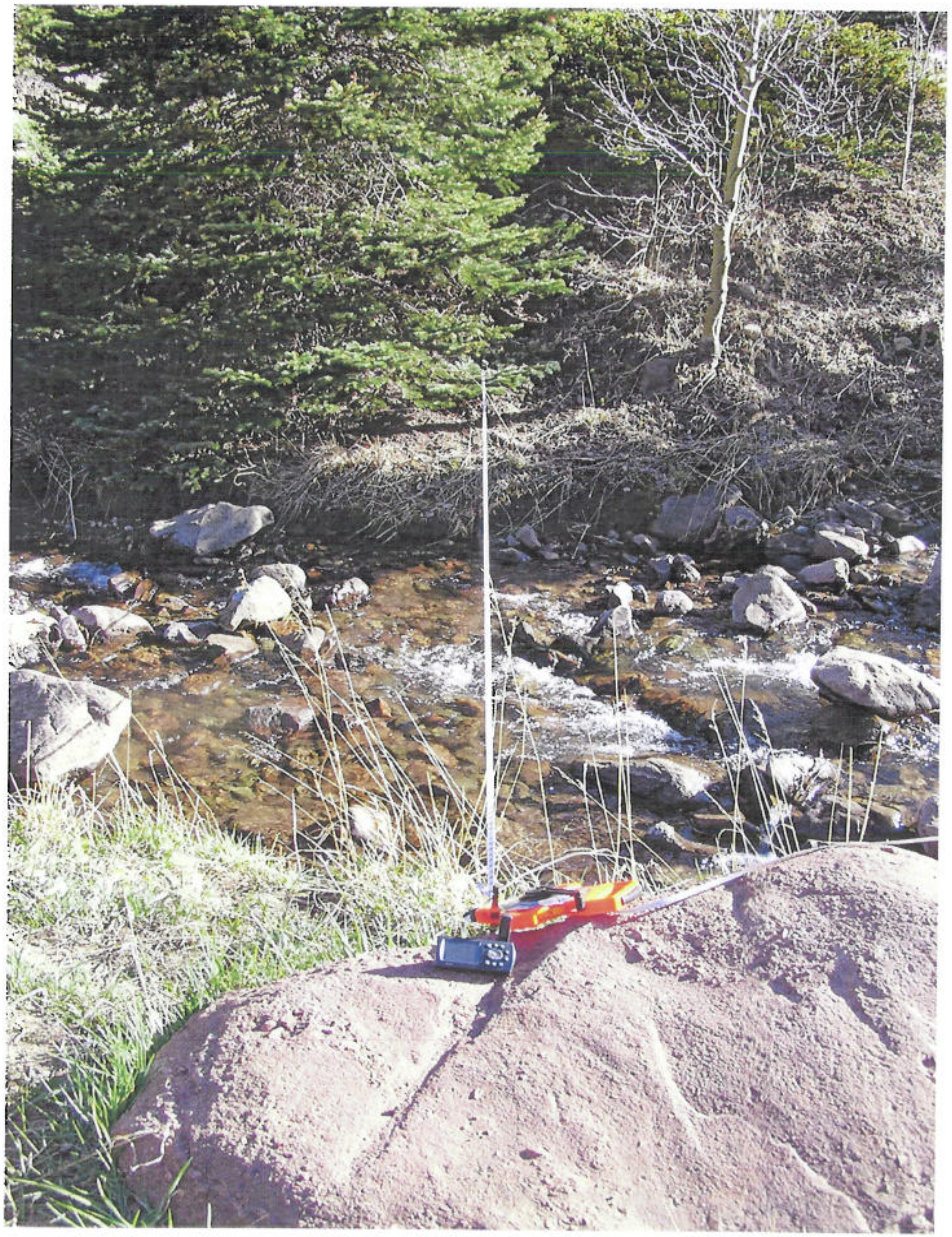
	SPECIES	#TAKEN	AVG. LENGTH (cm)	RANGE (cm)	AVG. WT (g)	RANGE (g)	%TOTAL CATCH
1.	R..	15	21.5				
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

R

5/10/06

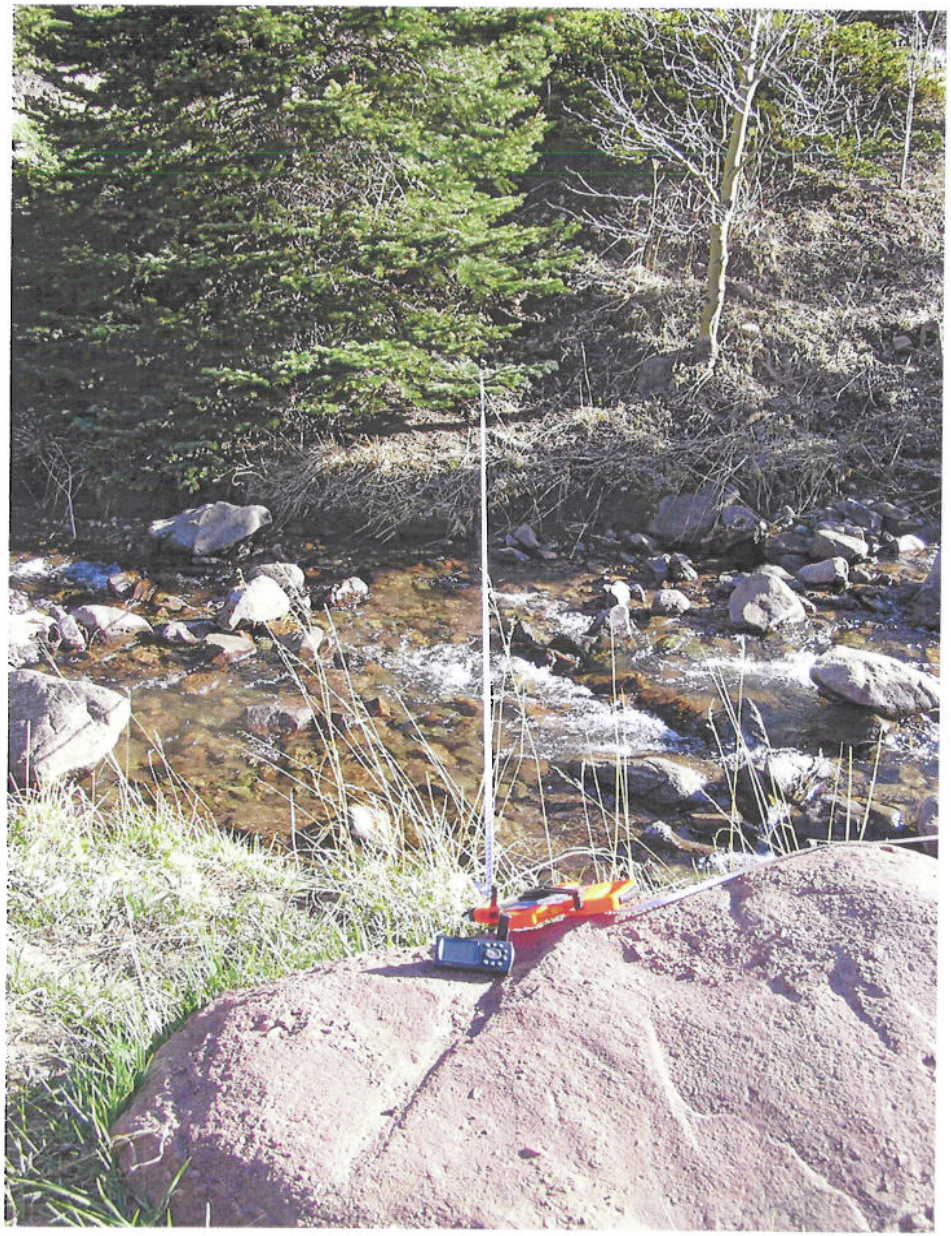
Cuchara Creek

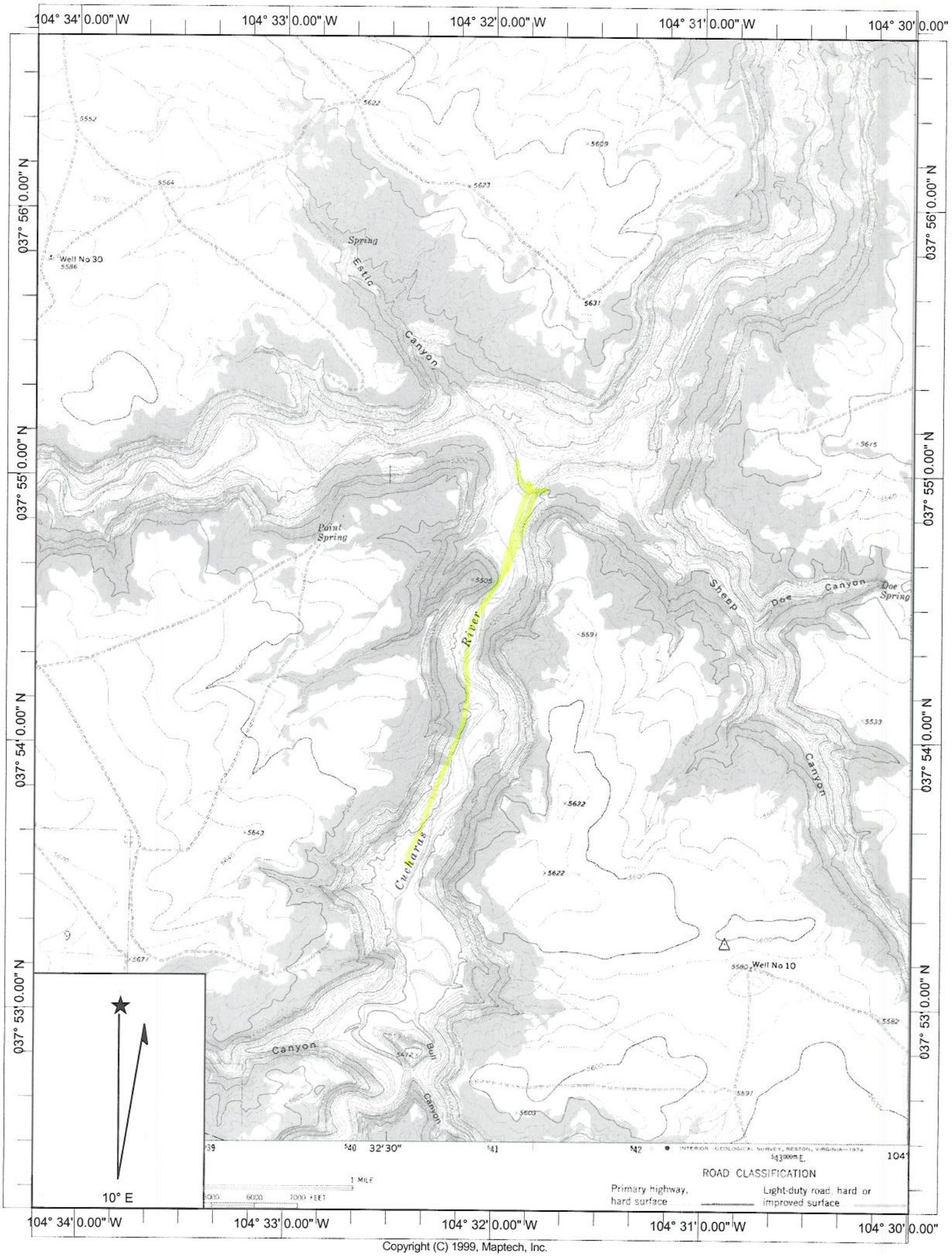
USFS Picnic Area



Cuchara Creek

USFS Picnic Area





COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION P83 A6 32 D2

STREAM NAME: Cucharas River 93K					CROSS-SECTION NO.:
CROSS-SECTION LOCATION:					
DATE: 4-23-97	OBSERVERS: Lee Chavez, Pete Gallagher, Darryl Murphy				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: 25S N/S	RANGE: E/W	PM:
COUNTY: PUE/HUE	WATERSHED: ARKansas	WATER DIVISION: Arkansas R. WD2	DOW WATER CODE: 29581/33673		
MAP(S): USGS:					
USFS: San Isabel National Forest					

SUPPLEMENTAL DATA

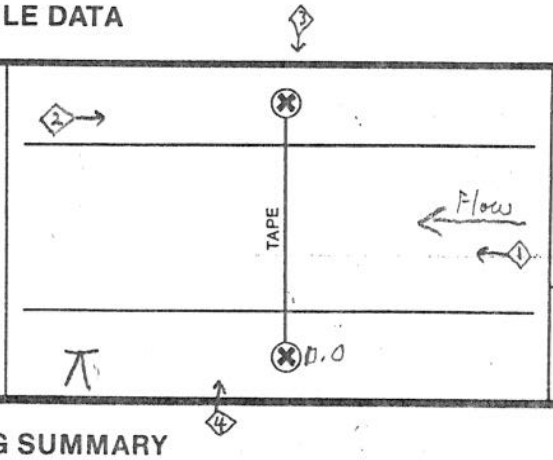
SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Marsh Mc Birney			
METER NUMBER: Model 201 D	DATE RATED:	CALIB/SPIN: 10.02 sec	TAPE WEIGHT: NA lbs/foot	Rod & level Survey TAPE TENSION: NA lbs
CHANNEL BED MATERIAL SIZE RANGE:		PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS:	

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
(X) Tape @ Stake LB	0.0	2.79
Tape @ Stake RB	0.0	3.25
(1) WS @ Tape LB/RB	0.0	6.36 / 6.57
(2) WS Upstream	15.0	6.02
(3) WS Downstream	4.0	6.7
SLOPE	TOS 11.0	6.99

.97/26 = .0373

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:

COMMENTS

Staff gage Elev. = 0.58 feet

(41)

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cucharas River | CROSS-SECTION NO.: | DATE: 4-23-96 | SHEET 1 OF 1

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 Rod Reading (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)
Monument	BM		2.38								
Left S	0.0		3.59								
	~~2.0~~										
	2.7		4.2								
	3.2		4.63								
LBE	5.0		5.4								
LSW	5.3	.25	6.42	~~0.8~~	.6				0	.0025	0
	5.8	.50	6.49	.1	.6				.03	.05	.0015
	6.3	.45	6.75	.15	.6				.98	.07	.07
	6.7	.45	6.7	.3	.6				.96	.14	.13
	7.2	.50	6.72	.2	.6				.83	.10	.08
	7.7	.55	6.74	.3	.6				1.15	.17	.19
	8.3	.50	6.69	.3	.6				0.4	.15	.06
behind rock	8.7	.50	6.66	.3	.6				0.0	.15	0
	9.3	.50	6.59	.2	.6				0.41	.10	.04
	9.7	.45	6.75	.35	.6				2.1	.16	.33
	10.2	.50	6.68	.35	.6				0.9	.18	.16
	10.7	.50	6.72	.40	.6				0.5	.20	.10
	11.2	.50	6.75	.45	.6				1.25	.23	.28
	11.7	.50	6.82	.3	.6				1.8	.15	.27
in rock	12.2	.55	6.48	.1	.6				0.5	.06	.03
	12.8	.50	6.79	.25	.6				1.2	.13	.15
	13.2	.45	6.86	.4	.6				0.9	.18	.16
rock	13.7	.50	6.64	.1	.6				0.6	.05	.03
	14.2	.50	6.71	.25	.6				0.6	.13	.08
	14.7	.50	6.84	.35	.6				1.15	.18	.20
	15.2	.50	6.76	.3	.6				0.8	.15	.12
On rock	15.7	.50	6.54	.3	.6				0.45	.15	.07
rock	16.2	.50	6.45	0	.6				0.0	0	0
"	16.7	.45	6.51	0	.6				0.0	0	0
	17.1	.50	6.67	.1	.6				.85	.05	.04
	17.7	.55	7.02	.5	.6				1.25	.28	.34
	18.2	.50	7.09	.5	.6				0.25	.25	.06
	18.7	.50	6.98	.45	.6				1.15	.23	.26
	19.2	.55	6.76	.25	.6				1.43	.14	.20
	19.8	.50	6.78	.2	.6				0.65	.10	.07
	20.2	.45	6.61	.05	.6				0.21	.02	.0047
RSW	20.7	.25	6.63	~~.10~~	.6				0.0	.03	0
	21.7		5.82								
RBE	24.0		5.38								
	24.7		5.7								
~~TOTALS~~:	25.1	15.4	4.6							3.98	3.53

End of Measurement | Time: | Gage Reading: .58 ft | CALCULATIONS PERFORMED BY: LEE CHAVEZ | CALCULATIONS CHECKED BY:

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

LOCATION INFORMATION
====================

STREAM NAME: Cucharas Creek (93K) USFS-DATA
XS LOCATION:
XS NUMBER:

DATE: 5/30/95
OBSERVERS: Murphy, Pfsoch

1/4 SEC:
SECTION:
TWP:
RANGE:
PM:

COUNTY: Huerfano
WATERSHED: Cucharas River
DIVISION: 2
DOW CODE: 29606

USGS MAP:
USFS MAP: San Isabel

SUPPLEMENTAL DATA
=================

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

TAPE WT: 0.0001
TENSION: 99999

CHANNEL PROFILE DATA
====================
SLOPE: 0.039

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

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

STREAM NAME: Cucharas Creek (93K) USFS-DATA
XS LOCATION:
XS NUMBER:

INPUT DATA # DATA POINTS= 34

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL
	S	0.00	1.74	0.00	0.00
		5.00	2.46	0.00	0.00
1	G	8.40	3.29	0.00	0.00
	W	11.50	4.40	0.00	0.00
		11.60	5.15	0.70	1.40
		12.00	5.05	0.60	0.70
		12.60	5.19	0.80	1.00
		13.00	5.20	0.80	0.30
		13.50	5.16	0.70	1.50
		14.00	5.25	0.90	3.30
		14.50	5.19	0.70	1.60
		15.00	5.05	0.60	4.30
		15.50	4.93	0.60	4.00
		16.00	5.10	0.70	2.10
		16.50	4.95	0.50	3.90
		17.00	5.00	0.60	2.30
		17.50	5.05	0.60	2.20
		18.00	4.95	0.50	1.40
		18.50	4.96	0.50	0.90
		19.00	5.00	0.60	2.20
		19.50	4.94	0.50	2.50
		20.00	5.00	0.60	0.70
		20.50	5.08	0.70	1.40
		21.00	5.23	0.60	1.70
		22.00	4.99	0.60	0.30
		23.00	4.84	0.40	0.60
		24.00	4.76	0.40	1.30
		25.40	4.73	0.40	0.00
	W	25.60	3.75	0.00	0.00
		26.40	3.94	0.00	0.00
1	G	27.30	3.89	0.00	0.00
		28.20	3.28	0.00	0.00
		29.10	2.92	0.00	0.00
	S	31.70	0.20	0.00	0.00
	TOTALS				

VALUES COMPUTED FROM RAW FIELD DATA

WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
0.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
0.76	0.70	0.18	0.25	1.8%
0.41	0.60	0.30	0.21	1.6%
0.62	0.80	0.40	0.40	3.0%
0.40	0.80	0.36	0.11	0.8%
0.50	0.70	0.35	0.53	3.9%
0.51	0.90	0.45	1.49	11.0%
0.50	0.70	0.35	0.56	4.2%
0.52	0.60	0.30	1.29	9.6%
0.51	0.60	0.30	1.20	8.9%
0.53	0.70	0.35	0.74	5.5%
0.52	0.50	0.25	0.98	7.2%
0.50	0.60	0.30	0.69	5.1%
0.50	0.60	0.30	0.66	4.9%
0.51	0.50	0.25	0.35	2.6%
0.50	0.50	0.25	0.23	1.7%
0.50	0.60	0.30	0.66	4.9%
0.50	0.50	0.25	0.63	4.6%
0.50	0.60	0.30	0.21	1.6%
0.51	0.70	0.35	0.49	3.6%
0.52	0.60	0.45	0.77	5.7%
1.03	0.60	0.60	0.18	1.3%
1.01	0.40	0.40	0.24	1.8%
1.00	0.40	0.48	0.62	4.6%
1.40	0.40	0.32	0.00	0.0%
1.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
0.00	0.00	0.00	0.00	0.0%
15.78	0.9 (Max.)	8.14	13.45	100.0%

Manning's n = 0.1141

STREAM NAME: Cucharas Creek (93K) USFS-DATA
XS LOCATION:
XS NUMBER:

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
3.83	8.14	17.04	109.4%
3.85	8.14	16.70	105.2%
3.87	8.14	16.36	101.1%
3.89	8.14	16.02	97.0%
3.91	8.14	15.69	92.9%
3.93	8.14	15.37	89.0%
3.95	8.14	15.06	85.2%
3.97	8.14	14.76	81.4%
3.99	8.14	14.45	77.7%
4.01	8.14	14.15	73.9%
4.03	8.14	13.85	70.2%
4.04	8.14	13.70	68.4%
4.05	8.14	13.55	66.5%
4.06	8.14	13.40	64.7%
4.07	8.14	13.25	62.8%
4.08	8.14	13.10	61.0%
4.09	8.14	12.95	59.2%
4.10	8.14	12.80	57.3%
4.11	8.14	12.65	55.5%
4.12	8.14	12.50	53.7%
4.13	8.14	12.35	51.9%
4.15	8.14	12.06	48.2%
4.17	8.14	11.76	44.6%
4.19	8.14	11.47	41.0%
4.21	8.14	11.18	37.4%
4.23	8.14	10.89	33.9%
4.25	8.14	10.60	30.3%
4.27	8.14	10.31	26.8%
4.29	8.14	10.03	23.2%
4.31	8.14	9.74	19.7%
4.33	8.14	9.46	16.2%

WATERLINE AT ZERO
AREA ERROR = 3.825

STREAM NAME: Cucharas Creek (93K) USFS-DATA
XS LOCATION:
XS NUMBER:

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 PER (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	3.89	16.61	0.96	1.36	15.94	18.27	100.0%	0.87	37.44	2.35
WL	3.83	17.17	0.99	1.43	17.04	18.92	103.6%	0.90	40.86	2.40
	3.88	16.74	0.97	1.38	16.19	18.42	100.8%	0.88	38.21	2.36
	3.93	15.72	0.98	1.33	15.37	17.34	95.0%	0.89	36.49	2.37
	3.98	15.24	0.96	1.28	14.61	16.81	92.0%	0.87	34.20	2.34
	4.03	15.09	0.92	1.23	13.85	16.61	90.9%	0.83	31.55	2.28
	4.08	14.94	0.88	1.18	13.10	16.41	89.8%	0.80	28.98	2.21
	4.13	14.79	0.84	1.13	12.35	16.21	88.8%	0.76	26.51	2.15
	4.18	14.64	0.79	1.08	11.62	16.01	87.7%	0.73	24.13	2.08
	4.23	14.49	0.75	1.03	10.89	15.81	86.6%	0.69	21.84	2.01
	4.28	14.34	0.71	0.98	10.17	15.61	85.5%	0.65	19.65	1.93
	4.33	14.19	0.67	0.93	9.46	15.41	84.4%	0.61	17.56	1.86
	4.38	14.04	0.62	0.88	8.75	15.21	83.3%	0.58	15.56	1.78
	4.43	13.96	0.58	0.83	8.05	15.06	82.5%	0.53	13.63	1.69
	4.48	13.94	0.53	0.78	7.35	14.96	81.9%	0.49	11.77	1.60
	4.53	13.93	0.48	0.73	6.66	14.86	81.4%	0.45	10.02	1.51
	4.58	13.91	0.43	0.68	5.96	14.76	80.8%	0.40	8.37	1.40
	4.63	13.89	0.38	0.63	5.27	14.66	80.2%	0.36	6.84	1.30
	4.68	13.87	0.33	0.58	4.57	14.56	79.7%	0.31	5.43	1.19
	4.73	13.86	0.28	0.53	3.88	14.45	79.1%	0.27	4.15	1.07
	4.78	12.26	0.26	0.48	3.23	12.81	70.1%	0.25	3.31	1.03
	4.83	11.63	0.23	0.43	2.63	12.13	66.4%	0.22	2.44	0.93
	4.88	11.20	0.18	0.38	2.06	11.66	63.8%	0.18	1.67	0.81
	4.93	10.86	0.14	0.33	1.51	11.27	61.7%	0.13	1.02	0.67
	4.98	8.47	0.12	0.28	1.01	8.81	48.2%	0.11	0.61	0.61
	5.03	6.06	0.11	0.23	0.65	6.32	34.6%	0.10	0.37	0.57
	5.08	4.45	0.09	0.18	0.39	4.61	25.3%	0.09	0.20	0.50
	5.13	3.30	0.06	0.13	0.20	3.38	18.5%	0.06	0.08	0.39
	5.18	2.16	0.03	0.08	0.06	2.19	12.0%	0.03	0.01	0.24
	5.23	0.38	0.01	0.03	0.00	0.39	2.1%	0.01	0.00	0.13

Return

D = 1.98
V = 3.05
%WP = 0.66

STREAM NAME: Cucharas Creek (93K) USFS-DATA
XS LOCATION:
XS NUMBER:

SUMMARY SHEET

MEASURED FLOW (Qm)=	13.45 cfs
CALCULATED FLOW (Qc)=	40.86 cfs
(Qm-Qc)/Qm * 100 =	-203.7 %
MEASURED WATERLINE (WLm)=	4.08 ft
CALCULATED WATERLINE (WLc)=	3.83 ft
(WLm-WLc)/WLm * 100 =	6.1 %
MAX MEASURED DEPTH (Dm)=	0.90 ft
MAX CALCULATED DEPTH (Dc)=	1.43 ft
(Dm-Dc)/Dm * 100	-58.3 %
MEAN VELOCITY=	2.40 ft/sec
MANNING'S N=	0.114
SLOPE=	0.039 ft/ft
.4 * Qm =	5.4 cfs
2.5 * Qm=	33.6 cfs

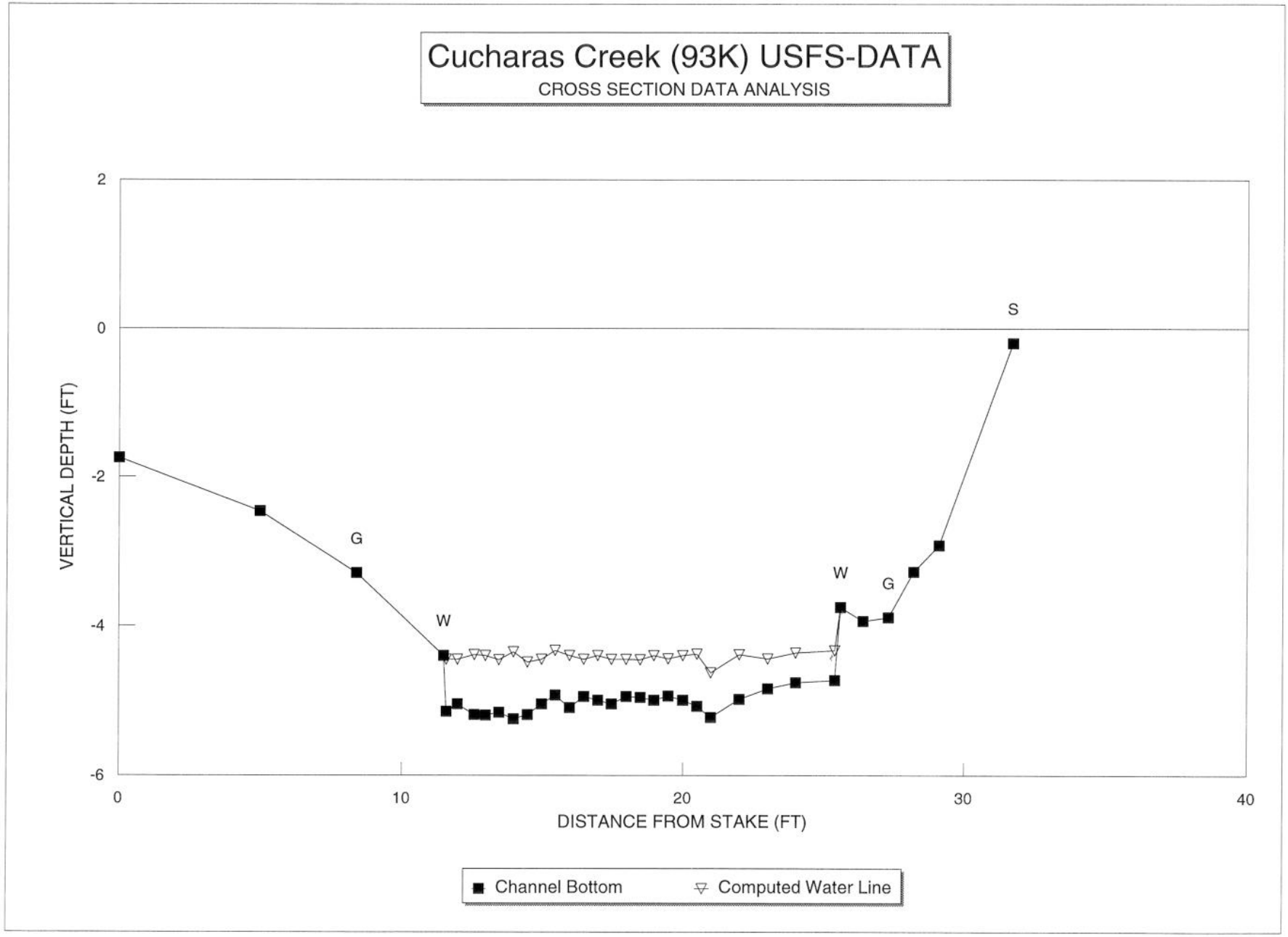
RECOMMENDED INSTREAM FLOW:
==========

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

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

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

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


Cucharas Creek (93K) USFS-DATA
CROSS SECTION DATA ANALYSIS
VERTICAL DEPTH (FT)
2
0
-2
-4
-6
0
10
20
30
40
DISTANCE FROM STAKE (FT)
S
G
W
W
G
Channel Bottom
Computed Water Line

PROOF SHEET

LOCATION INFORMATION

STREAM NAME: Cucharas Creek (93K) USFS-DATA
XS LOCATION:
XS NUMBER:

DATE: 5/30/95
OBSERVERS: Murphy, Pfsoch

1/4 SEC:
SECTION:
TWP:
RANGE:
PM:

COUNTY: Huerfano
WATERSHED: Cucharas River
DIVISION: 2
DOW CODE: 29606

USGS MAP:
USFS MAP: San Isabel

SUPPLEMENTAL DATA

TAPE WT: 0.0001
TENSION: 99999

CHANNEL PROFILE DATA

SLOPE: 0.039

CHECKED BY:.....DATE.....

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

INPUT DATA # DATA POINTS= 34

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	TAPE TO WATER
S	0.00	1.74	0.00	0.00	0.00	0.00	0.00
	5.00	2.46	0.00	0.00	0.00	0.00	0.00
1 G	8.40	3.29	0.00	0.00	0.00	0.00	0.00
W	11.50	4.40	0.00	0.00	0.00	0.00	0.00
	11.60	5.15	0.70	1.40	0.18	0.25	4.45
	12.00	5.05	0.60	0.70	0.30	0.21	4.45
	12.60	5.19	0.80	1.00	0.40	0.40	4.39
	13.00	5.20	0.80	0.30	0.36	0.11	4.40
	13.50	5.16	0.70	1.50	0.35	0.53	4.46
	14.00	5.25	0.90	3.30	0.45	1.49	4.35
	14.50	5.19	0.70	1.60	0.35	0.56	4.49
	15.00	5.05	0.60	4.30	0.30	1.29	4.45
	15.50	4.93	0.60	4.00	0.30	1.20	4.33
	16.00	5.10	0.70	2.10	0.35	0.74	4.40
	16.50	4.95	0.50	3.90	0.25	0.98	4.45
	17.00	5.00	0.60	2.30	0.30	0.69	4.40
	17.50	5.05	0.60	2.20	0.30	0.66	4.45
	18.00	4.95	0.50	1.40	0.25	0.35	4.45
	18.50	4.96	0.50	0.90	0.25	0.23	4.46
	19.00	5.00	0.60	2.20	0.30	0.66	4.40
	19.50	4.94	0.50	2.50	0.25	0.63	4.44
	20.00	5.00	0.60	0.70	0.30	0.21	4.40
	20.50	5.08	0.70	1.40	0.35	0.49	4.38
	21.00	5.23	0.60	1.70	0.45	0.77	4.63
	22.00	4.99	0.60	0.30	0.60	0.18	4.39
	23.00	4.84	0.40	0.60	0.40	0.24	4.44
	24.00	4.76	0.40	1.30	0.48	0.62	4.36
	25.40	4.73	0.40	0.00	0.32	0.00	4.33
W	25.60	3.75	0.00	0.00	0.00	0.00	0.00
	26.40	3.94	0.00	0.00	0.00	0.00	0.00
1 G	27.30	3.89	0.00	0.00	0.00	0.00	0.00
	28.20	3.28	0.00	0.00	0.00	0.00	0.00
	29.10	2.92	0.00	0.00	0.00	0.00	0.00
S	31.70	0.20	0.00	0.00	0.00	0.00	0.00
TOTALS					8.14	13.45	

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

P92 B2

LOCATION INFORMATION

STREAM NAME: Cucharas Creek (93K) USFS Data					CROSS-SECTION NO.:
CROSS-SECTION LOCATION:					
DATE: 5/30/95	OBSERVERS: Murphy, PFosch				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY: Huerfano	WATERSHED: AR ~~Cucharas~~ River		WATER DIVISION: 2	DOW WATER CODE: 29606	
MAP(S):	USGS:				
	USFS: San Isabel				

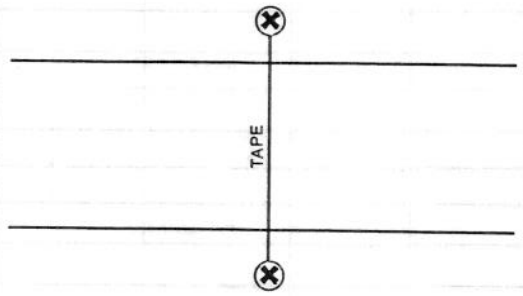
SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: YES / NO	METER TYPE: Pygmy.			
METER NUMBER:	DATE RATED:	CALIB/SPIN: _____ sec	TAPE WEIGHT: _____ lbs/foot	TAPE TENSION: _____ lbs
CHANNEL BED MATERIAL SIZE RANGE:		PHOTOGRAPHS TAKEN: YES/NO	NUMBER OF PHOTOGRAPHS:	

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	
② WS Upstream	20'	6.26
③ WS Downstream	47.8	8.89
SLOPE	2.63/67.8 = 0.039	

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:

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Cucharas Creek	CROSS-SECTION NO.:	DATE: 5/30/95	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)
S	0		1.74								
	5		2.46								
G	8.4		3.29								
W	11.5		4.40	0	0						
	11.6	.2	5.15	0.7				1.4			.20
	12	.5	5.05	.6				0.7			.21
	12.6	.5	5.19	.8				1.0			.40
	13	.45	5.20	.8				0.3			.11
	13.5	.5	5.16	.7				1.5			.53
	14	1	5.25	.9				3.3			1.49
	14.5		5.19	.7				1.6			.56
	15		5.05	.6				4.3			1.29
	15.5		4.93	.6				4.0			1.20
	16		5.1	.7				2.1			.74
	16.5		4.95	.5				3.9			.98
	17		5	.6				2.3			.69
	17.5		5.05	.6				2.2			.66
	18		4.95	.5				1.4			.35
	18.5		4.96	.5				0.9			.23
	19		5.0	.6				2.2			.66
	19.5		4.94	.5				2.5			.63
	20		5.00	.6				.7			.21
	20.5	.5	5.08	.7				1.4			.49
	21	.75	5.23	.6				1.7			.77
	22	1	4.99	.6				0.3			.18
	23	1	4.84	.4				0.6			.24
	24	1.3	4.76	.4				1.3			.68
	25.4	.8	4.73	.4				0			0
W	25.6		3.75	0							
	26.4		3.94								
=	27.3		3.89								
G	28.2		3.28								
	29.1		2.92								
	31.7		0.2								
TOTALS:		14.0								8.14	13.5

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

Banfull Width (ft) Width (ft)	Cross-Sectional Area (Sq.ft) Sectional Area (Sq.ft)	Mean Depth (ft) Depth (ft)	Maximum Depth (ft) Depth (ft)	Wetted Perimeter (ft) Perimeter (ft)	Hydraulic Radius (ft) Radius (ft)
19.80	26.72	1.35	1.94	22.00	1.21

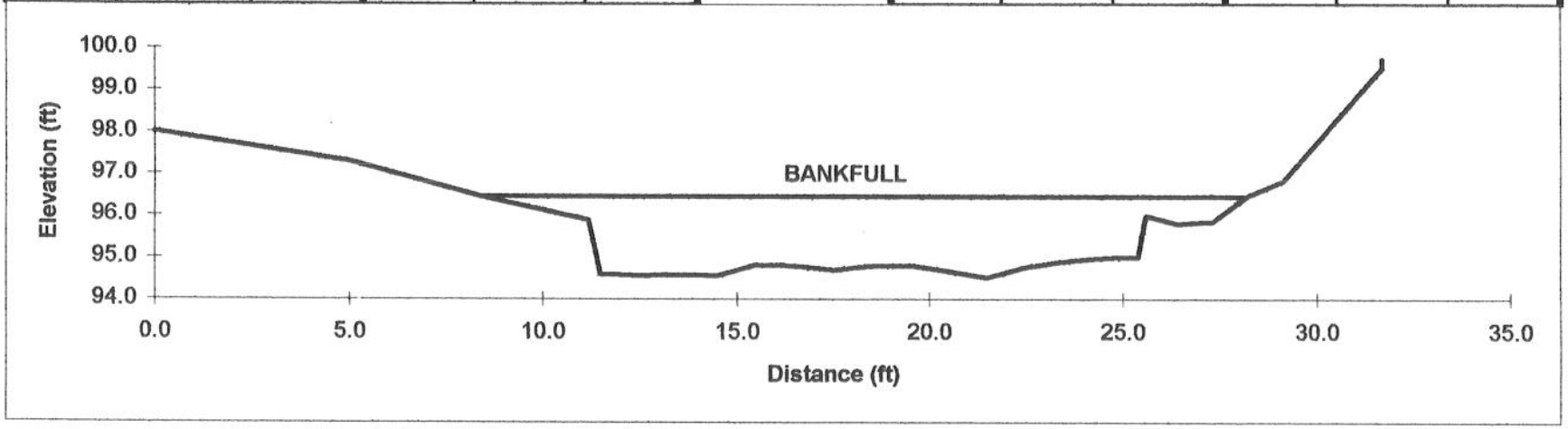
STREAM NAME: Cucharas Ck

ID NUMBER: 93K

DATE 5/30/95

CREW: Murphy, Pfosch

Identifier	Distance (ft)	Elevation (ft)	Identifier	Distance (ft)	Elevation (ft)
BEGIN	1.74 0.0	97.99	4.99	22.5	94.74
	2.46 5.0	97.27	4.89	23.5	94.89
LBF	3.29 8.4	96.44	4.76	24.5	94.97
TofBank	3.86 11.2	95.87	RedgeBa 3.3	25.4	95.00
	5.15 11.5	94.58	RTB 3.75	25.6	95.98
	5.19 12.5	94.54	3.94	26.4	95.79
	5.16 13.5	94.57	3.89	27.3	95.84
	5.19 14.5	94.54	RBF 3.28	28.2	96.45
	4.93 15.5	94.80	2.92	29.1	96.81
	4.95 16.5	94.78	.2	31.7	99.53
	5.05 17.5	94.68	END 0	31.7	99.73
	4.96 18.5	94.77			
	4.94 19.5	94.79			
	5.08 20.5	94.65			
	5.23 21.5	94.50			



FILENAME: 93K.XL ENTERED: 11/1/96

Station	Ft width	Ft Depth	Ft Area	FPS Vel.	CFS q
LEW 11.6	.2	.7	.14	1.4	.2
12	.5	.6	.3	.7	.21
12.6	.5	.8	.4	1.0	.40
13	.45	.8	.36	.3	.11
13.5	.5	.7	.35	1.5	.53
14	.5	.9	.45	3.3	1.49
14.5	.5	.7	.35	1.6	.56 .51
15	.5	.6	.30	4.3	1.29
15.5	.5	.6	.3	4.0	1.20
16	.5	.7	.35	2.1	.74
16.5	.5	.5	.25	3.9	.98
17	.5	.6	.30	2.3	.69
17.5	.5	.6	.30	2.2	.66
18	.5	.5	.25	1.4	.35
18.5	.5	.5	.25	.9	.23
19	.5	.6	.30	2.2	.66
19.5	.5	.5	.25	2.5	.63
20	.5	.6	.3	.7	.21
20.5	.5	.7	.35	1.4	.49
21	.75	.6	.45	1.7	.77
22	1	.6	.6	.3	.18
23	1	.4	.4	.6	.24
24	1.3	.4	.52	1.3	.68
25.6	.8	.4	.32	—	0
14.0	14.0		8.14	0.60	13.5

Σq

.2
.41
.81
.92
1.45
2.94
3.5
4.79
5.99
6.92
7.71
8.40
9.06
9.41
9.64
10.3
10.93
11.14
11.63
12.4
12.58
12.82
13.5
13.5

Cuchara Creek
May 30, 1995

Staff gage = 1.85'

L.Z Oswald - Current Meter
Lee Chavez - Notes

Price AA
Spin Test before 2 min +
Spin Test after 2 min +

13.5 ÷ 4 = 3.38 ÷ 2 = 1.69

Suspended Sed.

Sample	CFS	Station
#1	1.69	13.7
#2	5.07	15.2
#3	8.45	17.1
#4	11.83	20.7

Bedload Sediment Sample
Helly Smith
10 verticles @ 2 min. each

checked by DN 6/8/95

STA	WIDTH ft	DEPTH ft	Area ft²	Velocity ft/sec	Q ft³/sec	ΣQ
LEW 9.0	.25	0	0	0	0	0
9.5	.5	.2	.1	1.1	.11	.11
10.0	.5	.2	.1	2.2	.22	.33
10.5	.5	.2	.1	3.9	.39	.72
11.0	.5	.2	.1	3.6	.36	1.08
11.5	.5	.7	.35	5.8	2.03	3.11
12.0	.5	1.3	.65	5.1	3.32	6.43
12.5	.5	1.4	.7	5.4	3.78	10.21
13.0	.5	1.5	.75	4.9	3.68	13.89
13.5	.5	1.2	.6	4.2	2.52	16.41
14.0	.5	1.3	.65	5.4	3.51	19.92
14.5	.5	1.2	.6	5.4	3.24	23.16
15.0	.5	1.2	.6	6.8	4.08	27.24
15.5	.5	1.3	.65	4.8	3.12	30.36
16.0	.5	1.3	.65	7.0	4.55	34.91
16.5	.5	1.2	.6	6.8	4.08	38.99
17.0	.5	1.4	.7	5.8	4.06	43.05
17.5	.5	1.4	.7	1.4	.98	44.03
18.0	.5	1.3	.65	2.8	1.82	45.85
18.5	.5	1.4	.7	5.8	4.06	49.91
19.0	.5	1.4	.7	3.2	2.24	52.15
19.5	.5	1.3	.65	5.4	3.51	55.66
20.0	.5	0.8	.4	6.4	2.56	58.22
20.5	.5	1.0	.5	6.2	3.1	61.32

Discharge

6/21/95

Darryl Murphy notes

Liz Oswald meter ↑

Darryl Bresson ⊙, Bedload + suspended

Staff gauge Before: 1.3' at 1:20PM

Staff gauge after: 1.31 at 3:45PM

#1

Crest gauge = 0.5

Staff gauge @ Boyd Road Cucharas Creek 1.66 at 4:05PM

#2

Spin Test before: 2 min. t

Spin Test After: 1 min 50 sec

#3

Weather: sunny, hot, some afternoon clouding.

checked

X-Section — Cucharas Creek

STA	BS+	HI	FS−	ELEV	Remarks
	2.37	102.37		100.00	BM
8.6		96.37	6.0		L.E.W
27.7		95.85	6.52		R.E.W
	2.38	99.99			BM

Checked By D Bresson ✓ HIP 6/21/95

Cucharas Creek — 6/21/95 — 24

SLOPE

#1 Downstream	FS	ΔELEV.	DISTANCE
BED	9.56	1.43	
H^2O Surface	8.35	1.55	
			22'

Slope BED = .065 = 6.5

Slope H^2O Surface = .070 = 7.0

#2 MIDDLE			
BED	8.13	1.77	
H^2O Surface	6.8	1.68	
			43'

Slope BED = .041 = 4.1

Slope H^2O Surface = ~~.070 = 2.1~~ .039 = 3.9

6 5'

#3 UPSTREAM		
BED	6.36	3.20
H^2O Surface	5.12	3.23

TOTAL Slope BED = .049 = 4.9

TOTAL Slope H^2O Surface = .050 = 5.0

✓ By DB ↓HIP 6/21/95

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

STREAM NAME: CUCHARAS RIVER
XS LOCATION: 93K
XS NUMBER: 1

DATE: 4/23/97
OBSERVERS: CHAVEZ GALLAGER MURPHY

1/4 SEC:
SECTION:
TWP:
RANGE:
PM:

COUNTY:
WATERSHED: ARKANSAS
DIVISION: 2
DOW CODE:

USGS MAP:
USFS MAP: SAN IS

SUPPLEMENTAL DATA
==========

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

TAPE WT: 0.0001
TENSION: 99999

CHANNEL PROFILE DATA
==========
SLOPE: 0.0373

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

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

STREAM NAME: CUCHARAS RIVER
XS LOCATION: 93K
XS NUMBER: 1

INPUT DATA # DATA POINTS= 41

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	3.59	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	2.70	4.20	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	3.20	4.63	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
1 BF	5.00	5.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
WL	5.30	6.42	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	5.80	6.49	0.10	0.03	0.50	0.10	0.05	0.00	0.0%
	6.30	6.75	0.15	0.98	0.56	0.15	0.07	0.07	1.9%
	6.70	6.70	0.30	0.96	0.40	0.30	0.13	0.13	3.7%
	7.20	6.72	0.20	0.83	0.50	0.20	0.10	0.08	2.4%
	7.70	6.74	0.30	1.15	0.50	0.30	0.17	0.19	5.4%
	8.30	6.69	0.30	0.40	0.60	0.30	0.15	0.06	1.7%
	8.70	6.66	0.30	0.00	0.40	0.30	0.15	0.00	0.0%
	9.30	6.59	0.20	0.41	0.60	0.20	0.10	0.04	1.2%
	9.70	6.75	0.35	2.10	0.43	0.35	0.16	0.33	9.4%
	10.20	6.68	0.35	0.90	0.50	0.35	0.18	0.16	4.5%
	10.70	6.72	0.40	0.50	0.50	0.40	0.20	0.10	2.8%
	11.20	6.75	0.45	1.25	0.50	0.45	0.23	0.28	8.0%
	11.70	6.82	0.30	1.80	0.50	0.30	0.15	0.27	7.7%
	12.20	6.48	0.10	0.50	0.60	0.10	0.06	0.03	0.8%
	12.80	6.79	0.25	1.20	0.68	0.25	0.13	0.15	4.3%
	13.20	6.86	0.40	0.90	0.41	0.40	0.18	0.16	4.6%
	13.70	6.64	0.10	0.60	0.55	0.10	0.05	0.03	0.9%
	14.20	6.71	0.25	0.60	0.50	0.25	0.13	0.08	2.1%
	14.70	6.84	0.35	1.15	0.52	0.35	0.18	0.20	5.7%
	15.20	6.76	0.30	0.80	0.51	0.30	0.15	0.12	3.4%
	15.70	6.54	0.30	0.45	0.55	0.30	0.15	0.07	1.9%
	16.20	6.45	0.00	0.00	0.51	0.00	0.00	0.00	0.0%
	16.70	6.51	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	17.10	6.67	0.10	0.85	0.43	0.10	0.05	0.04	1.2%
	17.70	7.02	0.50	1.25	0.69	0.50	0.28	0.34	9.8%
	18.20	7.09	0.50	0.25	0.50	0.50	0.25	0.06	1.8%
	18.70	6.98	0.45	1.15	0.51	0.45	0.23	0.26	7.4%
	19.20	6.76	0.25	1.43	0.55	0.25	0.14	0.20	5.6%
	19.80	6.78	0.20	0.65	0.60	0.20	0.10	0.07	1.8%
	20.20	6.61	0.05	0.21	0.43	0.05	0.02	0.00	0.1%
WL	20.70	6.63	0.00	0.00	0.50	0.00	0.00	0.00	0.0%
	21.70	5.82	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
1 BF	24.00	5.38	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	24.70	5.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	25.10	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
S	27.40	3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
TOTALS					15.56	0.5 (Max.)	3.90	3.52	100.0%

Manning's n = 0.1262

STREAM NAME: CUCHARAS RIVER
XS LOCATION: 93K
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
6.32	3.90	6.11	56.9%
6.34	3.90	5.80	48.8%
6.36	3.90	5.48	40.7%
6.38	3.90	5.17	32.6%
6.40	3.90	4.85	24.5%
6.42	3.90	4.54	16.5%
6.44	3.90	4.23	8.5%
6.46	3.90	3.92	0.6%
6.48	3.90	3.62	-7.1%
6.50	3.90	3.33	-14.5%
6.52	3.90	3.05	-21.8%
6.53	3.90	2.91	-25.3%
6.54	3.90	2.77	-28.8%
6.55	3.90	2.64	-32.3%
6.56	3.90	2.50	-35.8%
6.57	3.90	2.37	-39.2%
6.58	3.90	2.24	-42.6%
6.59	3.90	2.10	-46.0%
6.60	3.90	1.97	-49.3%
6.61	3.90	1.85	-52.6%
6.62	3.90	1.72	-55.7%
6.64	3.90	1.49	-61.7%
6.66	3.90	1.27	-67.4%
6.68	3.90	1.06	-72.7%
6.70	3.90	0.87	-77.6%
6.72	3.90	0.71	-81.7%
6.74	3.90	0.59	-84.9%
6.76	3.90	0.49	-87.4%
6.78	3.90	0.41	-89.5%
6.80	3.90	0.35	-91.1%
6.82	3.90	0.30	-92.4%

WATERLINE AT ZERO
AREA ERROR = 6.462

STREAM NAME: CUCHARAS RIVER
XS LOCATION: 93K
XS NUMBER: 1

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 PER (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	5.40	19.66	1.11	1.69	21.77	21.69	100.0%	1.00	49.63	2.28
	5.46	19.16	1.07	1.63	20.58	21.09	97.2%	0.98	46.04	2.24
	5.51	18.76	1.05	1.58	19.63	20.59	94.9%	0.95	43.23	2.20
	5.56	18.36	1.02	1.53	18.70	20.10	92.7%	0.93	40.52	2.17
	5.61	17.95	0.99	1.48	17.79	19.61	90.4%	0.91	37.92	2.13
	5.66	17.55	0.96	1.43	16.91	19.12	88.1%	0.88	35.42	2.09
	5.71	17.18	0.93	1.38	16.04	18.67	86.1%	0.86	32.96	2.06
	5.76	16.90	0.90	1.33	15.19	18.35	84.6%	0.83	30.44	2.00
	5.81	16.62	0.86	1.28	14.35	18.03	83.1%	0.80	28.02	1.95
	5.86	16.51	0.82	1.23	13.52	17.87	82.4%	0.76	25.53	1.89
	5.91	16.44	0.77	1.18	12.70	17.74	81.8%	0.72	23.10	1.82
	5.96	16.36	0.73	1.13	11.88	17.60	81.2%	0.67	20.77	1.75
	6.01	16.28	0.68	1.08	11.06	17.47	80.6%	0.63	18.54	1.68
	6.06	16.21	0.63	1.03	10.25	17.34	79.9%	0.59	16.41	1.60
	6.11	16.13	0.59	0.98	9.44	17.21	79.3%	0.55	14.38	1.52
	6.16	16.05	0.54	0.93	8.64	17.08	78.7%	0.51	12.46	1.44
	6.21	15.98	0.49	0.88	7.83	16.95	78.1%	0.46	10.65	1.36
	6.26	15.90	0.44	0.83	7.04	16.82	77.5%	0.42	8.95	1.27
	6.31	15.82	0.39	0.78	6.24	16.68	76.9%	0.37	7.37	1.18
	6.36	15.75	0.35	0.73	5.46	16.55	76.3%	0.33	5.92	1.08
	6.41	15.67	0.30	0.68	4.67	16.42	75.7%	0.28	4.59	0.98
WL	6.46	15.15	0.26	0.63	3.89	15.87	73.2%	0.25	3.47	0.89
	6.51	14.05	0.23	0.58	3.17	14.72	67.9%	0.22	2.58	0.82
	6.56	13.39	0.19	0.53	2.48	13.99	64.5%	0.18	1.78	0.72
	6.61	12.54	0.15	0.48	1.83	13.05	60.2%	0.14	1.12	0.61
	6.66	10.67	0.12	0.43	1.25	11.09	51.1%	0.11	0.66	0.53
	6.71	7.85	0.10	0.38	0.78	8.16	37.6%	0.10	0.37	0.47
	6.76	4.51	0.11	0.33	0.48	4.72	21.7%	0.10	0.24	0.50
	6.81	2.49	0.13	0.28	0.32	2.62	12.1%	0.12	0.18	0.56
	6.86	1.54	0.14	0.23	0.22	1.63	7.5%	0.14	0.13	0.60
	6.91	1.34	0.11	0.18	0.15	1.40	6.5%	0.11	0.08	0.51
	6.96	1.14	0.08	0.13	0.09	1.18	5.4%	0.07	0.03	0.40
	7.01	0.87	0.04	0.08	0.04	0.89	4.1%	0.04	0.01	0.27
	7.06	0.33	0.01	0.03	0.00	0.34	1.6%	0.01	0.00	0.13

4.85

2.00

D = 1.98
V = 4.85
%WP = 0.64

STREAM NAME: CUCHARAS RIVER
XS LOCATION: 93K
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm) =	3.52 cfs	
CALCULATED FLOW (Qc) =	3.47 cfs	
(Qm-Qc)/Qm * 100 =	1.3 %	
MEASURED WATERLINE (WLm) =	6.57 ft	
CALCULATED WATERLINE (WLc) =	6.46 ft	
(WLm-WLc)/WLm * 100 =	1.7 %	
MAX MEASURED DEPTH (Dm) =	0.50 ft	
MAX CALCULATED DEPTH (Dc) =	0.63 ft	
(Dm-Dc)/Dm * 100	-25.7 %	
MEAN VELOCITY=	0.89 ft/sec	
MANNING'S N=	0.126	
SLOPE=	0.0373 ft/ft	
.4 * Qm =	1.4 cfs	
2.5 * Qm=	8.8 cfs	

RECOMMENDED INSTREAM FLOW:

FLOW (CFS)	PERIOD

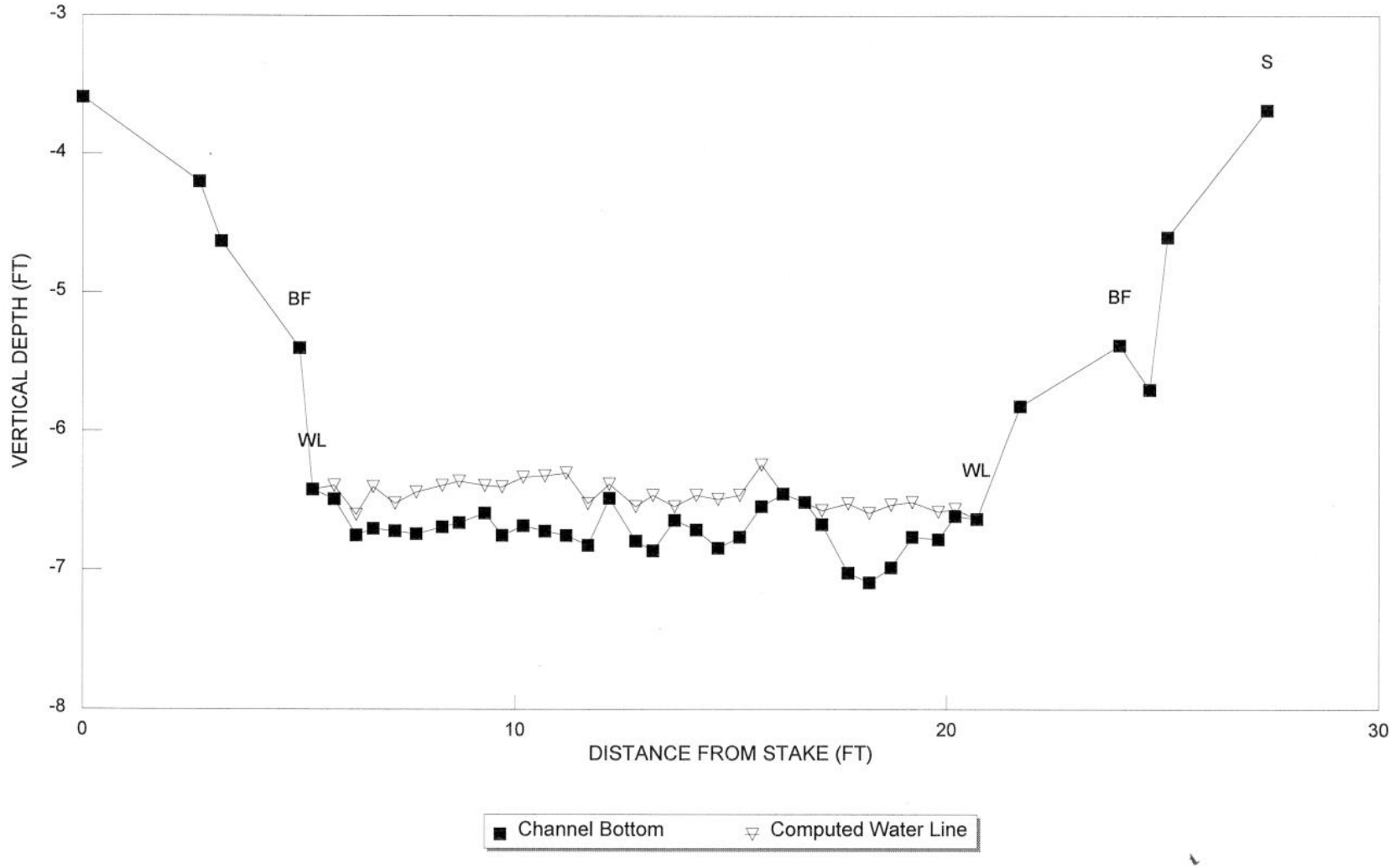
RATIONALE FOR RECOMMENDATION:

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

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

CUCHARAS RIVER

CROSS SECTION DATA ANALYSIS



PROOF SHEET

LOCATION INFORMATION

STREAM NAME: CUCHARAS RIVER
XS LOCATION: 93K
XS NUMBER: 1

DATE: 4/23/97
OBSERVERS: CHAVEZ GALLAGER MURPHY

1/4 SEC:
SECTION:
TWP:
RANGE:
PM:

COUNTY:
WATERSHED: ARKANSAS
DIVISION: 2
DOW CODE:

USGS MAP:
USFS MAP: SAN IS

SUPPLEMENTAL DATA

TAPE WT: 0.0001
TENSION: 99999

CHANNEL PROFILE DATA

SLOPE: 0.0373

CHECKED BY:.....DATE.....

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

INPUT DATA # DATA POINTS= 41

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	TAPE TO WATER
S	0.00	3.59	0.00	0.00	0.00	0.00	0.00
	2.70	4.20	0.00	0.00	0.00	0.00	0.00
	3.20	4.63	0.00	0.00	0.00	0.00	0.00
1 BF	5.00	5.40	0.00	0.00	0.00	0.00	0.00
WL	5.30	6.42	0.00	0.00	0.00	0.00	0.00
	5.80	6.49	0.10	0.03	0.05	0.00	6.39
	6.30	6.75	0.15	0.98	0.07	0.07	6.60
	6.70	6.70	0.30	0.96	0.13	0.13	6.40
	7.20	6.72	0.20	0.83	0.10	0.08	6.52
	7.70	6.74	0.30	1.15	0.17	0.19	6.44
	8.30	6.69	0.30	0.40	0.15	0.06	6.39
	8.70	6.66	0.30	0.00	0.15	0.00	6.36
	9.30	6.59	0.20	0.41	0.10	0.04	6.39
	9.70	6.75	0.35	2.10	0.16	0.33	6.40
	10.20	6.68	0.35	0.90	0.18	0.16	6.33
	10.70	6.72	0.40	0.50	0.20	0.10	6.32
	11.20	6.75	0.45	1.25	0.23	0.28	6.30
	11.70	6.82	0.30	1.80	0.15	0.27	6.52
	12.20	6.48	0.10	0.50	0.06	0.03	6.38
	12.80	6.79	0.25	1.20	0.13	0.15	6.54
	13.20	6.86	0.40	0.90	0.18	0.16	6.46
	13.70	6.64	0.10	0.60	0.05	0.03	6.54
	14.20	6.71	0.25	0.60	0.13	0.08	6.46
	14.70	6.84	0.35	1.15	0.18	0.20	6.49
	15.20	6.76	0.30	0.80	0.15	0.12	6.46
	15.70	6.54	0.30	0.45	0.15	0.07	6.24
	16.20	6.45	0.00	0.00	0.00	0.00	0.00
	16.70	6.51	0.00	0.00	0.00	0.00	0.00
	17.10	6.67	0.10	0.85	0.05	0.04	6.57
	17.70	7.02	0.50	1.25	0.28	0.34	6.52
	18.20	7.09	0.50	0.25	0.25	0.06	6.59
	18.70	6.98	0.45	1.15	0.23	0.26	6.53
	19.20	6.76	0.25	1.43	0.14	0.20	6.51
	19.80	6.78	0.20	0.65	0.10	0.07	6.58
	20.20	6.61	0.05	0.21	0.02	0.00	6.56
WL	20.70	6.63	0.00	0.00	0.00	0.00	0.00
	21.70	5.82	0.00	0.00	0.00	0.00	0.00
1 BF	24.00	5.38	0.00	0.00	0.00	0.00	0.00
	24.70	5.70	0.00	0.00	0.00	0.00	0.00
	25.10	4.60	0.00	0.00	0.00	0.00	0.00
S	27.40	3.68	0.00	0.00	0.00	0.00	0.00
TOTALS					3.90	3.52	

Date	Q	3/3	2/3	
5/30/95	13.5			
4/23/97	3.5	4.85	2.0	8.8 - 1.4
5/10/06	2.2	7.9 OR	1.3	5.5 - 0.9
7/19/06	2.7	7.8 OR	1.4	6.8 - 1.1
		4.9	1.6	

Appendix - C

Water Availability Analysis

Station: **CUCHARAS RIVER AT BOYD RANCH, NEAR LA VETA, CO.**
Parameter: STREAM FLOW CFS
Year: 1934-1981
State: CO
County: HUERFANO

ID: 07114000
Statistic: Mean
Latitude: 37:25:12
Longitude: 105:03:08
Elevation: 7781.00
Drainage Area: 56.00

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	1457	1328	1457	1410	1457	1410	1457	1457	1410	1457	1410	1457	17167
Avg Day	7.04	7.26	8.81	22.83	70.86	69.36	28.34	16.13	10.44	9.28	8.69	7.61	22.27
Max Day	16.00	16.00	28.00	283.0	358.0	373.0	176.0	78.00	39.00	36.00	28.00	16.00	373.0
Min Day	2.00	2.00	3.10	3.50	5.80	4.00	2.60	2.30	2.00	3.20	2.00	2.00	2.00
# Months	47	47	47	47	47	47	47	47	47	47	47	47	47
SDev Month	1.69	1.88	2.45	16.68	55.06	50.06	17.83	8.27	4.25	3.46	2.84	2.17	11.25
Skew Month	0.560	2.24	1.20	2.40	1.05	0.973	1.47	1.13	0.955	1.23	1.52	0.817	0.717
Min Month	4.08	4.66	5.46	6.63	7.96	7.22	3.63	4.27	3.27	3.93	3.97	3.87	7.47
Max Month	12.00	16.00	16.00	96.00	233.0	221.7	94.97	40.90	24.07	19.00	19.00	15.00	51.73
Exceedences													
1%	12.43	16.00	22.00	120.0	280.1	265.1	112.4	48.00	27.00	23.00	20.00	15.00	190.0
5%	11.00	11.00	16.00	67.00	206.6	186.0	65.00	34.00	20.00	17.00	15.00	12.00	90.00
10%	9.50	9.24	13.00	45.00	170.3	148.0	54.00	28.00	16.00	13.00	12.00	11.00	52.00
20%	8.50	8.40	11.00	29.00	113.0	108.0	40.00	23.00	14.00	11.00	10.00	9.00	25.00
50%	6.90	7.00	8.00	16.00	48.00	55.00	23.00	14.00	9.50	9.00	8.10	7.00	9.80
80%	5.50	5.50	6.40	9.10	20.00	23.00	13.00	8.80	7.00	6.20	6.30	5.80	6.70
90%	4.80	5.30	5.60	7.70	12.00	17.00	10.00	7.00	5.20	5.10	5.60	4.80	5.60
95%	4.39	5.00	5.20	6.50	8.48	13.00	7.79	5.59	4.10	4.60	5.00	4.40	5.00
99%	3.31	3.86	4.40	5.50	7.00	7.01	3.31	3.70	3.20	3.80	3.80	3.11	3.70

9.4/56 @ LT 1.2 1.2 1.3 2.7 8.1 9.2 3.9 2.4 1.6 1.5 1.4 1.2

Qm 3.5 13.5 2.7

2.2

4.9 (5/15 - 6/30)
1.6 (7/1 - 9/15)
1.2 (9/16 - 3/31)
1.6 (4/1 - 5/15)

Station: **CUCHARAS RIVER NEAR LA VETA, CO.**
Parameter: STREAM FLOW CFS
Year: 1923-1934
State: CO
County: HUERFANO

ID: 07114500
Statistic: Mean
Latitude: 37:27:00
Longitude: 105:02:12
Elevation: 7500.00
Drainage Area: 75.00

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	93	85	155	360	372	360	372	372	360	279	180	93	3081
Avg Day	6.00	6.87	7.98	26.76	94.94	58.24	22.31	20.38	7.54	5.67	6.37	7.12	29.30
Max Day	10.00	12.00	25.00	201.0	624.0	248.0	116.0	293.0	31.00	19.00	18.00	12.00	624.0
Min Day	3.00	3.00	1.00	1.00	9.00	6.00	4.00	2.00	1.00	1.00	1.00	2.00	1.00
# Months	3	3	5	12	12	12	12	12	12	9	6	3	2
SDev Month	3.61	4.56	4.58	26.94	98.62	38.58	9.69	22.85	5.38	3.56	4.17	4.44	23.31
Skew Month	1.15	1.50	1.82	1.87	1.61	0.545	-0.230	2.03	0.886	2.51	0.737	-1.69	
Min Month	3.00	3.43	4.55	6.10	14.68	11.73	5.97	3.87	1.27	3.13	2.23	2.00	16.76
Max Month	10.00	12.00	15.84	89.63	315.5	125.6	35.68	76.87	17.17	14.74	13.03	10.00	49.73
Exceedences													
1%	10.00	12.00	23.90	185.0	498.4	220.4	95.00	121.2	29.00	18.00	17.20	12.00	269.2
5%	10.00	12.00	20.00	99.00	344.4	147.0	52.00	90.20	20.00	15.05	16.00	12.00	119.9
10%	10.00	12.00	15.00	69.00	247.0	131.0	38.80	46.00	18.00	12.00	14.00	12.00	72.00
20%	10.00	12.00	10.00	35.00	154.8	101.0	31.00	20.00	12.00	6.20	12.00	10.80	34.00
50%	5.00	5.00	6.00	15.00	52.00	42.00	19.00	11.00	6.00	5.00	4.00	10.00	12.00
80%	3.00	4.00	5.00	8.00	23.00	22.00	12.00	7.00	3.00	3.00	3.00	2.00	5.00
90%	3.00	3.00	4.00	6.00	16.00	13.00	8.00	5.00	2.00	3.00	2.00	2.00	3.00
95%	3.00	3.00	2.00	4.00	14.00	10.00	6.00	4.00	1.00	2.95	2.00	2.00	2.00
99%	3.00	3.00	2.00	1.60	10.00	6.00	4.00	3.00	1.00	2.00	1.80	2.00	1.00

Monthly Climatic Data for LA VETA for years 1963 - 1971
Station - 54865 Latitude - 3730 Longitude - 10500 Elevation - 7030

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total monthly precipitation.													
1963	M	M	M	M	M	M	M	208	151	68	16	92	
1964	78	321	194	119	153	64	97	198	143	0	144	77	15.88
1965	32	86	139	154	102	308	432	198	185	0	0	27	16.63
1966	41	6	0	182	146	73	356	232	310	0	10	28	13.84
1967	56	131	83	77	353	199	397	350	80	138	31	206	21.01
1968	40	120	186	278	110	52	408	398	131	69	71	40	19.03
1969	8	30	172	168	304	200	196	212	202	121	10	199	18.22
1970	1	93	307	129	48	0	0	204	359	83	38	0	12.62
1971	60	10	55	71	88	M	M	M	M	M	M	M	
Ave	0.40	1.00	1.42	1.47	1.63	1.28	2.69	2.50	1.95	0.60	0.40	0.84	16.75
Max	0.78	3.21	3.07	2.78	3.53	3.08	4.32	3.98	3.59	1.38	1.44	2.06	21.01
Year	1964	1964	1970	1968	1967	1965	1965	1968	1970	1967	1964	1967	1967
Min	0.01	0.06	0.00	0.71	0.48	0.00	0.00	1.98	0.80	0.00	0.00	0.00	12.62
Year	1970	1966	1966	1971	1970	1970	1970	1965+	1967	1966+	1965	1970	1970
Count	8	8	8	8	8	7	7	8	8	8	8	8	7

Monthly Climatic Data for LA VETA PASS for years 1931 - 1953
Station - 54870 Latitude - 3728 Longitude - 10510 Elevation - 9240

Total monthly precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1931	66	615	437	243	234	83	132	70	232	59	321	14	25.06
1932	285	87	424	54	166	216	190	301	78	123	27	120	20.71
1933	172	9	152	361	240	148	63	103	117	12	81	163	16.21
1934	105	279	53	239	36	12	55	11	13	3	123	60	9.89
1935	50	123	126	264	404	1	4	1	81	137	10	1	12.02
1936	81	1	85	46	320	2	3	70	252	122	100	91	11.73
1937	53	109	292	248	28	217	48	35	96	96	5	109	13.36
1938	202	251	197	348	237	223	210	165	325	108	328	33	26.27
1939	369	358	10	158	200	25	142	238	171	10	92	26	17.99
1940	147	495	258	436	328	26	181	447	321	115	310	334	33.98
1941	106	62	586	429	435	131	140	111	427	512	36	60	30.35
1942	62	178	356	884	42	18	192	112	98	390	31	229	25.92
1943	55	111	153	64	168	86	139	433	197	86	95	285	18.72
1944	161	115	223	773	359	120	169	66	15	185	60	150	23.96
1945	183	220	260	379	72	88	301	244	80	240	13	51	21.31
1946	177	122	174	112	122	22	460	223	27	266	625	23	23.53
1947	87	73	176	346	291	563	169	150	126	167	151	231	25.30
1948	M	M	M	M	M	M	M	120	120	149	463	63	
1949	428	127	246	198	186	221	237	85	90	218	10	275	23.21
1950	75	156	48	105	284	311	234	113	146	63	117	62	17.14
1951	385	105	430	594	262	121	168	231	40	92	92	190	27.10
1952	210	84	220	209	207	4	28	12	102	0	119	40	12.35
1953	40	149	150	170	280	60	0	0	0	0	136	257	12.42
Ave	1.59	1.74	2.30	3.03	2.23	1.23	1.48	1.45	1.37	1.37	1.45	1.25	20.39
Max	4.28	6.15	5.86	8.84	4.35	5.63	4.60	4.47	4.27	5.12	6.25	3.34	33.98
Year	1949	1931	1941	1942	1941	1947	1946	1940	1941	1941	1946	1940	1940
Min	0.40	0.01	0.10	0.46	0.28	0.01	0.00	0.00	0.00	0.00	0.05	0.01	9.89
Year	1953	1936	1939	1936	1937	1935	1953	1953	1953	1953+	1937	1935	1934
Count	22	22	22	22	22	22	22	23	23	23	23	23	22

Monthly Climatic Data for NORTH LAKE for years 1931 - 1980
Station - 55990 Latitude - 3713 Longitude - 10503 Elevation - 8800

Total monthly precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1931	32	315	331	359	329	72	451	271	194	117	155	47	26.73
1932	186	125	199	131	151	141	160	339	150	152	81	132	19.47
1933	40	76	151	203	165	322	131	219	216	35	53	110	17.21
1934	25	176	79	121	227	36	207	82	161	0	158	50	13.22
1935	32	80	54	113	293	55	293	480	282	110	5	T	17.97
1936	104	66	14	141	238	245	365	441	268	213	38	45	21.78
1937	39	89	343	271	193	328	193	88	152	92	42	47	18.77
1938	117	72	254	219	235	377	296	223	272	199	148	103	25.15
1939	125	100	68	131	167	36	250	281	154	47	58	23	14.40
1940	180	207	170	133	224	201	289	438	255	34	242	132	25.05
1941	54	71	506	378	303	216	416	291	311	414	22	51	30.33
1942	26	136	158	543	73	95	266	272	238	115	22	135	20.79
1943	115	80	201	27	273	100	240	405	30	102	78	193	18.44
1944	117	96	172	467	146	139	422	85	85	201	94	142	21.66
1945	98	163	233	431	74	151	232	247	219	126	7	81	20.62
1946	89	101	227	213	164	19	541	669	100	236	175	20	25.54
1947	105	149	182	367	388	236	332	433	60	65	66	166	25.49
1948	M	M	M	M	M	M	M	203	152	84	77	106	
1949	135	24	187	276	302	403	426	234	96	65	24	80	22.52
1950	154	61	32	28	5	75	48	18	20	0	3	25	4.69
1951	45	46	181	130	47	76	29	190	60	70	173	170	12.17
1952	128	169	117	265	444	10	235	296	211	0	97	4	19.76
1953	7	58	50	97	162	10	499	181	0	87	171	50	13.72
1954	33	68	143	55	457	15	336	224	117	147	16	48	16.59
1955	17	196	83	254	663	68	0	0	0	0	73	40	13.94
1956	158	117	120	97	250	82	315	171	25	56	123	38	15.52
1957	192	42	181	412	569	85	597	602	88	156	305	8	32.37
1958	63	15	304	432	154	157	206	501	38	114	94	51	21.29
1959	93	83	158	399	259	240	274	469	166	215	98	93	25.47
1960	40	213	126	96	49	35	496	132	127	493	66	118	19.91
1961	80	193	163	232	134	375	379	532	204	168	147	117	27.24
1962	117	103	172	171	26	103	238	70	98	163	97	55	14.13
1963	73	192	70	2	95	196	96	467	307	67	27	66	16.58
1964	69	171	120	141	147	51	205	319	162	15	104	157	16.61
1965	100	160	163	325	174	312	581	379	294	109	131	87	28.15
1966	41	93	18	211	131	395	339	409	81	32	32	148	19.30
1967	68	167	126	46	207	182	549	469	109	137	48	275	23.83
1968	30	77	192	263	177	23	343	443	60	53	142	25	18.28
1969	118	57	168	68	181	453	571	404	188	248	35	129	26.20
1970	18	144	443	175	90	54	440	334	176	259	62	49	22.44
1971	68	82	38	80	139	34	469	182	293	127	117	102	17.31

1972	68	48	176	40	154	73	144	330	121	250	106	104	16.14
1973	64	9	308	240	162	76	295	182	99	112	13	187	17.47
1974	191	22	134	58	97	46	286	204	136	171	77	156	15.78
1975	111	163	263	86	120	157	541	105	184	70	183	0I	19.83
1976	181	13	249	105	245	46	173	246	516	165	293	268	25.00
1977	73	191	151	217	23	159	590	228	183	M	M	6	
1978	72	M	229	M	388	151	356	253	18	167	M	M	
1979	133	37	196	47	591	247	M	390	114	275	144	80	
1980	219	84	257	351	422	M	M	M	148	77	M	M	
Ave	0.91	1.08	1.77	2.01	2.19	1.49	3.22	2.95	1.55	1.31	0.96	0.90	20.11
Max	2.19	3.15	5.06	5.43	6.63	4.53	5.97	6.69	5.16	4.93	3.05	2.75	32.37
Year	1980	1931	1941	1942	1955	1969	1957	1946	1976	1960	1957	1967	1957
Min	0.07	0.09	0.14	0.02	0.05	0.10	0.00	0.00	0.00	0.00	0.03	0.00	4.69
Year	1953	1973	1936	1963	1950	1953+	1955	1955	1955+	1955+	1950	1975+	1950
Count	49	48	49	48	49	48	47	49	50	49	47	48	45

Monthly Climatic Data for AGUILAR 18WSW for years 1998 - 1999
Station - 50105 Latitude - Longitude - Elevation -

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total monthly precipitation.													
1998	M	M	M	220	33	16	680	474	82	267	190	15	
1999	83	3	65	578	418	209	501	461	121	200	25	153	28.17
Ave	0.83	0.03	0.65	3.99	2.25	1.12	5.90	4.68	1.02	2.33	1.08	0.84	28.17
Max	0.83	0.03	0.65	5.78	4.18	2.09	6.80	4.74	1.21	2.67	1.90	1.53	28.17
Year	1999	1999	1999	1999	1999	1999	1998	1998	1999	1998	1998	1999	1999
Min	0.83	0.03	0.65	2.20	0.33	0.16	5.01	4.61	0.82	2.00	0.25	0.15	28.17
Year	1999	1999	1999	1998	1998	1998	1999	1999	1998	1999	1999	1998	1999
Count	1	1	1	2	2	2	2	2	2	2	2	2	1

Station: **CUCHARAS RIVER NEAR LA VETA, CO.**
Parameter: STREAM FLOW CFS
Year: 1923-1934
State: CO
County: HUERFANO

ID: 07114500
Statistic: Mean
Latitude: 37:27:00
Longitude: 105:02:12
Elevation: 7500.00
Drainage Area: 75.00

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	93	85	155	360	372	360	372	372	360	279	180	93	3081
Avg Day	6.00	6.87	7.98	26.76	94.94	58.24	22.31	20.38	7.54	5.67	6.37	7.12	29.30
Max Day	10.00	12.00	25.00	201.0	624.0	248.0	116.0	293.0	31.00	19.00	18.00	12.00	624.0
Min Day	3.00	3.00	1.00	1.00	9.00	6.00	4.00	2.00	1.00	1.00	1.00	2.00	1.00
# Months	3	3	5	12	12	12	12	12	12	9	6	3	2
SDev Month	3.61	4.56	4.58	26.94	98.62	38.58	9.69	22.85	5.38	3.56	4.17	4.44	23.31
Skew Month	1.15	1.50	1.82	1.87	1.61	0.545	-0.230	2.03	0.886	2.51	0.737	-1.69	
Min Month	3.00	3.43	4.55	6.10	14.68	11.73	5.97	3.87	1.27	3.13	2.23	2.00	16.76
Max Month	10.00	12.00	15.84	89.63	315.5	125.6	35.68	76.87	17.17	14.74	13.03	10.00	49.73
Exceedences													
1%	10.00	12.00	23.90	185.0	498.4	220.4	95.00	121.2	29.00	18.00	17.20	12.00	269.2
5%	10.00	12.00	20.00	99.00	344.4	147.0	52.00	90.20	20.00	15.05	16.00	12.00	119.9
10%	10.00	12.00	15.00	69.00	247.0	131.0	38.80	46.00	18.00	12.00	14.00	12.00	72.00
20%	10.00	12.00	10.00	35.00	154.8	101.0	31.00	20.00	12.00	6.20	12.00	10.80	34.00
50%	5.00	5.00	6.00	15.00	52.00	42.00	19.00	11.00	6.00	5.00	4.00	10.00	12.00
80%	3.00	4.00	5.00	8.00	23.00	22.00	12.00	7.00	3.00	3.00	3.00	2.00	5.00
90%	3.00	3.00	4.00	6.00	16.00	13.00	8.00	5.00	2.00	3.00	2.00	2.00	3.00
95%	3.00	3.00	2.00	4.00	14.00	10.00	6.00	4.00	1.00	2.95	2.00	2.00	2.00
99%	3.00	3.00	2.00	1.60	10.00	6.00	4.00	3.00	1.00	2.00	1.80	2.00	1.00