Stream: Bear Creek

Executive Summary

Water Division: 2
Water District: 10
CDOW#: 29157
CWCB ID: 08/2/A-008

Segment: Headwaters to above Bear Creek Pipeline

Upper Terminus: HEADWATERS IN THE VICINTY OF
(Latitude: 38° 48’ 20.79”N) (Longitude: 104° 58’ 7.48” W)

Lower Terminus: ABOVE BEAR CREEK PIPELINE AT
(Latitude: 38° 48’ 39.74” N) (Longitude: 104° 54’ 8.28” W)

Watershed: Fountain (HUC #: 11020003)
Counties: El Paso and Teller
Length: 5.6 miles
USGS Quad(s): Manitou Springs NW, NE, SW & SE
Flow Recommendation: 1.8 cfs (April 15 – August 15)
1.3 cfs (August 16-October 31)
0.75 cfs (November 1 – April 14)

Staff Analysis and Recommendation

Summary

The information contained in this report and the associated instream flow appendices (see CD entitled 2008 Instream Flow Recommendations) forms the basis for staff's instream flow recommendation to be considered by the Board. It is staff's opinion that the information contained in this report is sufficient to support the findings required in Rule 5.40.

Colorado's Instream Flow Program 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 CWCB 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 Instream Flow Program, the statute directs the CWCB to request instream flow recommendations from other state and federal agencies. Trout Unlimited (TU) and the Colorado Division of Wildlife (CDOW) recommended this segment of Bear Creek to the CWCB for inclusion into the Instream Flow Program. Bear Creek is being considered for inclusion into the Instream Flow Program because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

Bear Creek originates in a saddle between Mount Garfield and Almagre Mountain, west of Colorado Springs. The stream flows generally eastward towards Colorado Springs and its confluence with Fountain Creek. The total drainage area of the creek is approximately 4.86 square miles. This recommendation covers a perennial reach stretching from Bear Creek's headwaters at approximately 10,400 feet to just above the Bear Creek Pipeline diversion at 6,500 feet, a distance of approximately 5.6 miles. The stream does not run through any private land.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership			
			% Private	% USFS	% CSU	% State
Headwaters	Above Diversion	5.6	0%	38%	42%	20%

Approximately 42 % (2.3 miles) traverses lands held by Colorado Springs Utilities, 38% (2.1 miles) flows through U.S. Forest Service land and the remaining 20% (1.1 miles) flows through Bear Creek Canyon Park

Instream Flow Recommendations

TU and CDOW are recommending instream flow appropriations of 1.8 cfs during the summer (4/15 – 8/15), 1.3 cfs during the fall (8/16 – 10/31) and 0.75 cfs during the winter (11/1 – 4/14). These recommendations are based on the physical and biological data collected to date and incorporate water availability constraints. An R2CROSS analysis of cross-sectional data collected on 8/10//06 was relied on to develop these recommendations (Table 1).

Biological Data

The CDOW has documented the occurrence of greenback cutthroat trout in Bear Creek. This population has been shown to be genetically pure. This is significant because greenback cutthroat trout have been identified by the CDOW and federal agencies as "species of greatest conservation need" and are currently listed as "threatened" under the Endangered Species Act.

Field Survey Data & Biological Flow Quantification

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 by 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, two data sets were collected with the results shown in Table 1 below. The final flow recommendation was calculated as the average of the two data sets. Table 1 shows who collected the data (Party), the date the data was collected (Date), 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.

Although most of the modeling results from this effort were within the confidence interval produced by the R2CROSS model, the estimate of minimum instream summer flows from the first cross section was above the upper confidence interval and was therefore set to the value of this confidence interval.

Table 1: Bear Creek R2Cross Summary

			Confidence Interval (cfs)	Recommended Flows * (cfs)	
Party	**Date**	**Q (cfs)**	**250%-40%**	**Summer 3/3**	**Winter 2/3**
TU	8/10/2006	0.87	2.2 - 0.3	2.2**	0.93
TU	8/10/2006	0.99	2.5 - 0.4	1.31	0.57

* Recommendations based on meeting specified number of hydrologic criteria (average depth, percent wetted perimeter and average velocity)

** Estimate of 2.35 cfs was abvoe Upper Confidence Inerval, so it was assigned maximum value of 2.2 cfs.

Hydrologic Data and Analysis

After receiving the cooperating agency's biologic recommendation, the CWCB staff conducted an evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. This evaluation was done through a computation that is, in essence, a "water balance". In concept a "water balance" computation can be viewed as an accounting exercise. When done in its most rigorous form, the water balance parses precipitation into all the avenues water pursues after it is deposited as rain, snow, or ice. In other words, given a specified amount of water deposition (input), the balance tries to account for all water depletions (losses) until a selected end point is reached. Water losses include depletions due to evaporation and transpiration, deliveries into ground water storage, temporary surface storage, incorporations into plant and animal tissue and so forth. These losses are individually or collectively subtracted from the input to reveal the net amount of stream runoff as

represented by the discharge measured by stream gages. Of course, the measured stream flow need not be the end point of interest; indeed, when looking at issues of water use to extinction stream flow measurements may only describe intermediate steps in the complex accounting process that is a water balance carried out to a net value of zero.

In its analysis, CWCB staff has attempted to use this idea of balancing inputs and losses to determine if water is available for the recommended Instream Flow Appropriation. Of course, this analysis must be a practical exercise rather than a lengthy, and costly, scientific investigation. As a result, staff has simplified the process by lumping some variables and employing certain rational and scientifically supportable assumptions. The process may be described through the following description of the steps used to complete the evaluation for this particular stream.

The first step required in determining water availability is a determination of the hydrologic regime at the Lower Terminus (LT) of the recommended ISF reach. In the best case this means looking at the data from a gage at the LT. Further, this data, in the best case, has been collected for a long period of time (the longer the better) including wet and dry periods. In the case of **Bear Creek** there is a USGS gage record on the creek. However, the gage station is downstream from the LT. The USGS gage is BEAR CREEK NEAR COLORADO SPRINGS, CO (USGS 07105000); it has an available 15 year period of record (POR) collected between 1992 and 2006. The gage is at an approximate elevation of 6520 ft above mean sea level (amsl) and has a drainage area of 9.93 mi^2. While this is encouraging, the recommending entity has been able to acquire a stream gage record that is both longer and located at the LT. Colorado Springs Utilities (CSU) has been measuring stream flow data at the approximate site of the LT since 1949. With an available 57 year POR, collected between 1949 and 2006, this data set provides a superior description of the Bear Creek's hydrology at the LT of the subject reach. Consequently, the hydrograph (plot of discharge over time) produced by this gage was used directly in the evaluation of water availability. No adjustments for losses to diversions were needed in this case allowing for a direct computation of the hydrograph.

The following hydrograph depicts the mean monthly discharge of Bear Creek. Included in the hydrograph are the recommended ISF values. The data used in the creation of this hydrograph are displayed in Table #2.

Fig 1 - Bear Cr Ave Monthly Discharge & ISFs (Using Colo Spr Utilities Data)

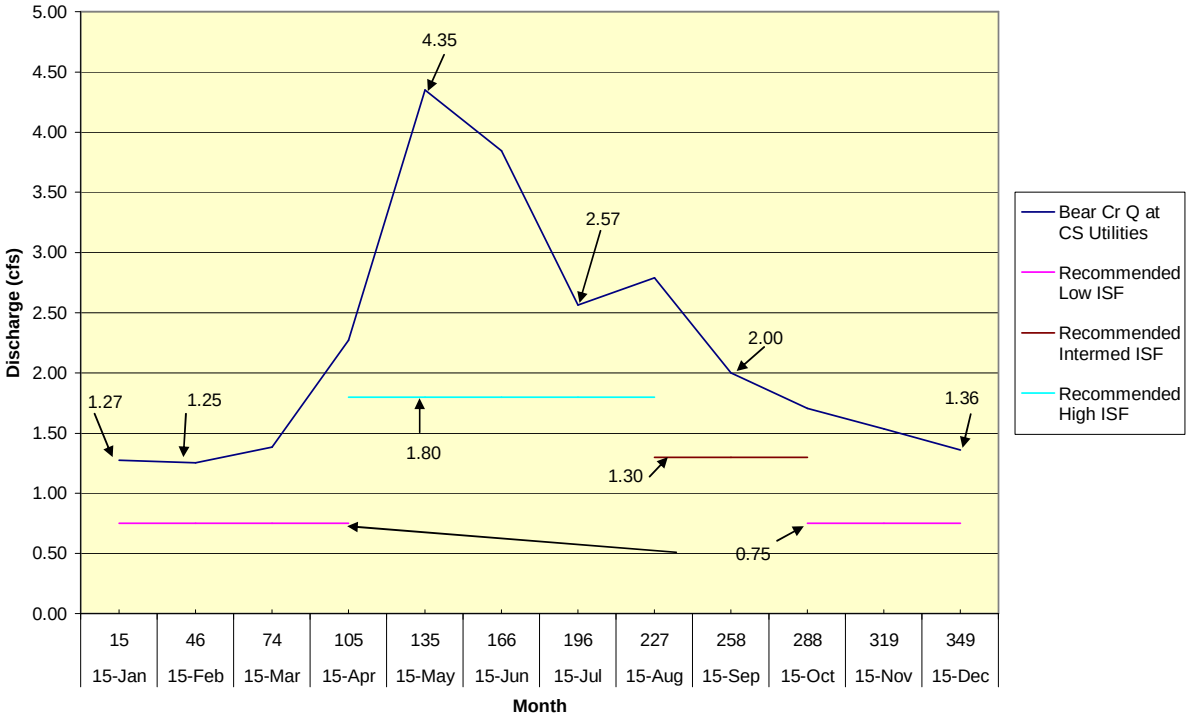


Table 2 – Mean Monthly Discharge and Recommended Instream Flows – Bear Cr.

	Julian Day	Bear Cr. (cfs)	Recommended ISF (cfs)
15-Jan	15	1.27	0.75
15-Feb	46	1.25	0.75
15-Mar	74	1.39	0.75
14-Apr	104	2.27	0.75
15-Apr	105	2.27	1.8
15-May	135	4.35	1.8
15-Jun	166	3.84	1.8
15-Jul	196	2.57	1.8
15-Aug	227	2.79	1.8
16-Aug	228	2.79	1.3
15-Sep	258	2.00	1.3
15-Oct	288	1.71	1.3
31-Oct	304	1.71	1.3
1-Nov	305	1.53	0.75
15-Nov	319	1.53	0.75
15-Dec	349	1.36	0.75

Existing Water Right Information

Staff has analyzed the water rights tabulation to identify any potential water availability problems. There are no existing water rights on the proposed reach. Colorado Springs Utilities Bear Creek Pipeline is below the proposed reach and because the instream flow appropriation will be junior to these water rights, there will be no material injury to CSU. Based on this analysis staff has determined that water is available for appropriation on Bear Creek, from the Headwaters to just above Bear Creek Pipeline, to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

CWCB Staff's Instream Flow Recommendation

Staff recommends the Board form its intent to appropriate on the following stream reach:

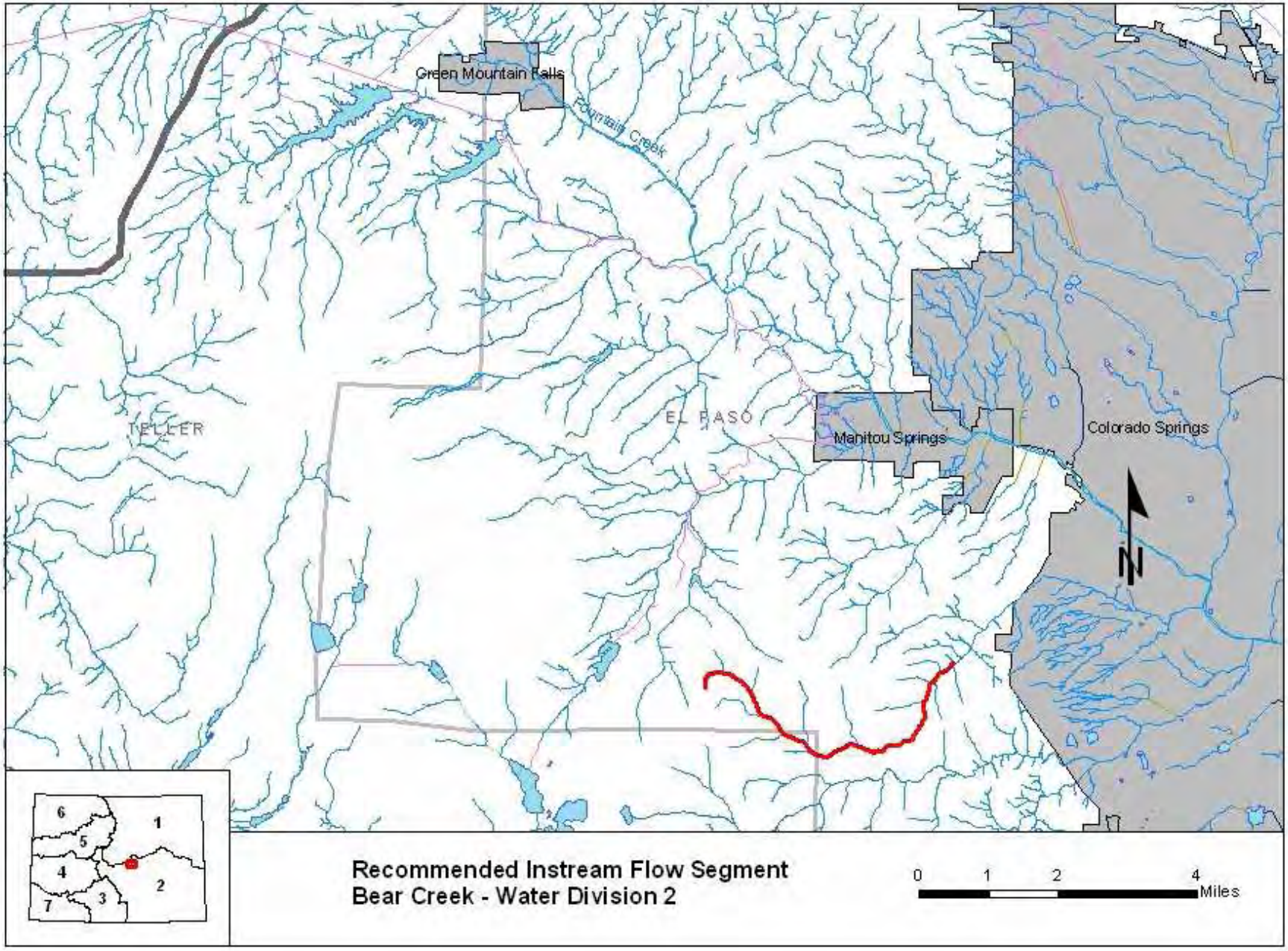
Segment: Headwaters to above Bear Creek Pipeline

Upper Terminus: HEADWATERS IN THE VICINTY OF
(Latitude: 38° 48' 20.79"N) (Longitude: 104° 58' 7.48" W)
UTM = 4295224.2 N UTM = 502713.9 E
SE NW S26 T14S R68W 6PM
2395' South of the North Section Line; 2225 East of the West Section Line

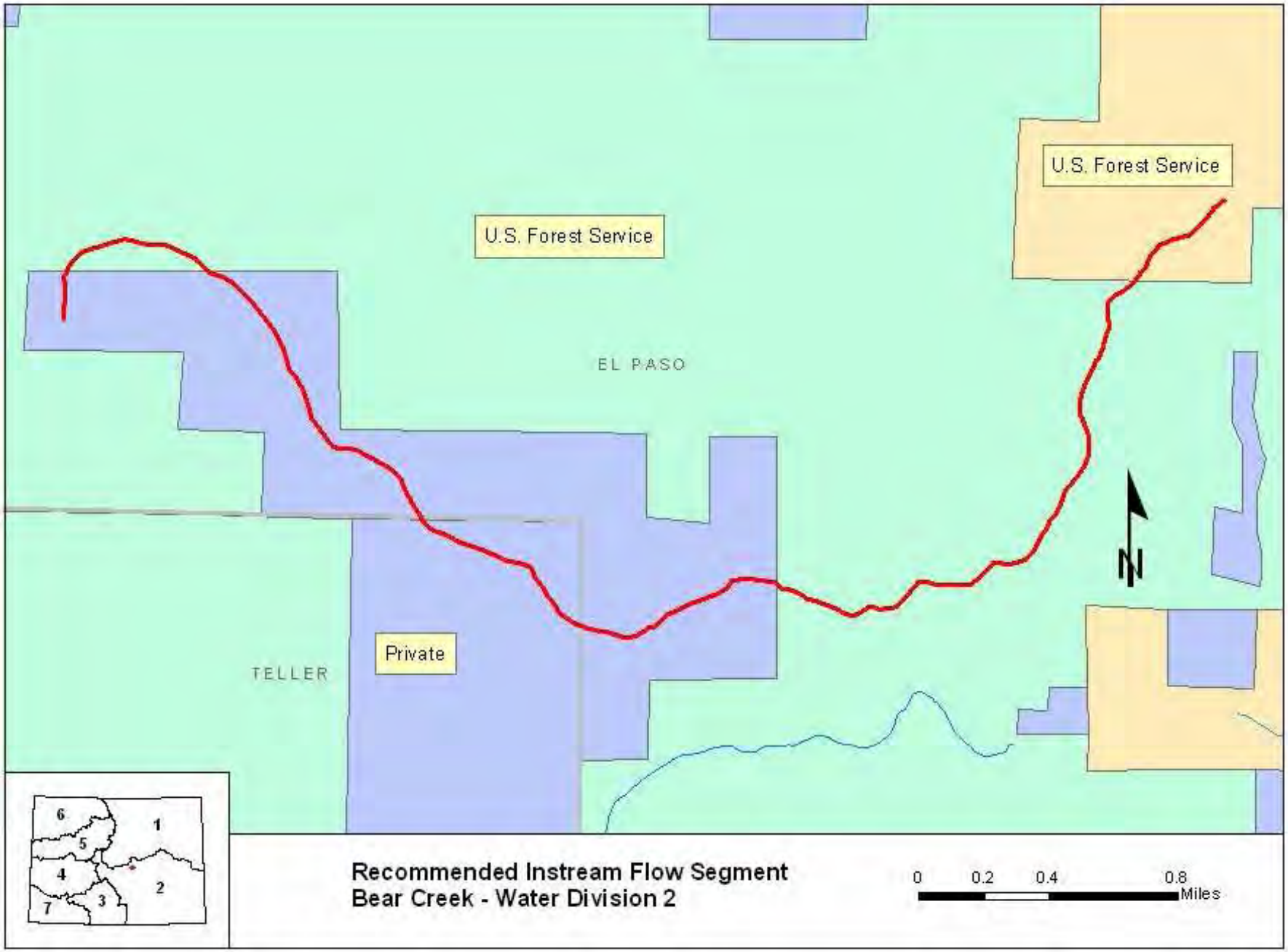
Lower Terminus: ABOVE BEAR CREEK PIPELINE AT
(Latitude: 38° 48' 39.74" N) (Longitude: 104° 54' 8.28" W)
UTM = 4295812.3 N UTM = 508482.5 E
SW SW S21 T14S R67W 6PM
215' North of the South Section Line; 1070 East of the West Section Line

Watershed: Fountain (HUC #: 11020003)
Counties: El Paso and Teller
Length: 5.6 miles
USGS Quad(s): Manitou Springs NW, NE, SW & SE
Flow Recommendation: 1.8 cfs (April 15 – August 15)
1.3 cfs (August 16-October 31)
0.75 cfs (November 1 – April 14)

Vicinity Map



Land Use Map


U.S. Forest Service
U.S. Forest Service
EL PASO
Private
TELLER
N
6
1
5
4
2
7
3
Recommended Instream Flow Segment
Bear Creek - Water Division 2
0
0.2
0.4
0.8
Miles

Topographic & Water Rights Map

John Roach, Ph.D.
Aquatics Specialist
Colorado Water Project
1320 Pearl Street, Suite 320
Boulder, CO 80302
303.440.2937

February 21, 2007

Mr. Jeff Baessler and Mr. Todd Doherty
Stream and Lake Protection Section
Colorado Water Conservation Board
1313 Sherman Street, Room 723
Denver, Colorado 80203

Re: Trout Unlimited Instream Flow Recommendations for Bear Creek.

Dear Mr. Baessler and Mr. Doherty,

Trout Unlimited (TU) in conjunction with the Colorado Division of Wildlife (CDOW) is formally submitting this instream flow recommendation for Bear Creek, which flows through El Paso County and a small portion of Teller County. It is located in Water Division 2.

Location and Land Status. Bear Creek originates in a saddle between Mount Garfield and Almagre Mountain, west of Colorado Springs. The stream flows generally eastward towards Colorado Springs and its confluence with Fountain Creek. This recommendation covers a perennial reach stretching from Bear Creek's headwaters at approximately 10,400 feet to just above the Bear Creek Pipeline diversion at 6,500 feet, a distance of approximately 5.6 miles. Of this length approximately 42 % (2.3 miles) traverses lands held by Colorado Springs Utilities, 38% (2.1 miles) flows through U.S. Forest Service land and the remaining 20% (1.1 miles) flows through Bear Creek Canyon Park.

Biological Summary and R2CROSS Analysis. In August of 2006 TU and CDOW collected stream cross sectional data, natural environment data, and other data needed to quantify Instream Flow needs. Additional fishery surveys conducted in 1994 by the CDOW indicate that the stream supports a self-sustaining population of genetically pure greenback cutthroat trout. The potential of this stream to help protect this threatened species enhances both its biologic and conservation value.

Stream cross sectional data were analyzed using the R2CROSS program, and the output was evaluated using the methods described in Nehring (1979) and Espegren (1996). Data were collected from two transects on Bear Creek. Based on the average results from the two R2CROSS analyses and the available biological data Trout Unlimited and CDOW

recommend that the CWCB appropriate the following flow amounts to preserve the natural environment of Bear Creek to a reasonable degree:

- From **April 15 to August 15**, the R2CROSS analysis indicates and the water availability analysis supports an instream flow appropriation of **1.8 cfs** to maintain the three principal criteria of average depth, average velocity and percent wetted perimeter;

- Based on the R2CROSS and water availability analyses instream flows from **August 16 to October 31** should be set at **1.3 cfs**. This flow comes close to ensuring the three principal criteria while reflecting the decline in water availability in late summer.

- R2CROSS analysis at indicated that **0.75 cfs** from **November 1 to April 14** is sufficient to maintain two of the three principal criteria. At both sites the two criteria were average velocity and average depth.

Water Availability. Colorado Springs Utilities (CSU) has maintained a gage on Bear Creek since 1949 (IPN# 1291) by the Bear Creek Pipeline diversion. TU used this gage to estimate daily discharges through Bear Creek. With the exception of some isolated missing dates, daily discharge data were available for complete water years (10/1 – 9/30) spanning 1950 – 1965 and 1990 – 2006. An analysis of these data showed that estimated average daily flows above the Bear Creek Diversion exceeded the recommended instream flows. While the monthly 50% exceedences were greater than the recommended flows throughout the winter, the 50% exceedence was slightly lower than the recommend flow in September and October. Therefore, Trout Unlimited and CDOW suggest that the summer instream flow recommendation be decreased from 1.83 cfs to 1.61 cfs during these months.

Neither TU nor CDOW is aware of any existing water rights on the proposed reach. Because CSU's Bear Creek Pipeline is below the proposed reach and because the instream flow appropriation will be junior to these water rights, no material injury to CSU or any other part is anticipated.

Relationship to Existing State Policy. Trout Unlimited and the CDOW are forwarding this instream flow recommendation to the CWCB to meet the State of 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." C.R.S. 33-1-101(1). Further, the CDOW Strategic Plan states "Healthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The Division desires to protect and enhance the quality and quantity of aquatic habitats." TU and CDOW recommend that Bear Creek be considered for inclusion in the Instream Flow Program because doing so would help meet these stated policies. Specifically, establishing minimum flows through this reach would

preserve the natural environment of the stream, including the native greenback cutthroat trout, to a reasonable degree.

Attached in Appendix B, please find copies of the field data sheets, the R2CROSS modeling runs, fishery survey information, and stream photographs. Attached in Appendix C, please find copies of the water availability analysis spanning 11/1/73 to 9/30/2006 as well as precipitation data from Colorado Springs for the years 1948 – 2006. Relevant diversion records are attached in Appendix D. If you have any questions regarding the attached information or the instream flow recommendations, please feel free to contact me at (303) 440-2937.

Trout Unlimited thanks Colorado Springs Utilities, Colorado Division of Wildlife and the Colorado Water Conservation Board Staff for their support in preparing this recommendation.

Sincerely,

W. John Roach, Ph.D.
Trout Unlimited
Aquatic Specialist

Cc: Gary Dowler, CDOW Aquatic Biologist – w/o attachments
Doug Krieger, CDOW Aquatic Biologist – w/o attachments
Abby Ortega, Colorado Springs Utilities Project Engineer
Kirsta Scherff-Norris, Colorado Springs Utilities
Kurt Schroeder, Colorado Springs Parks – w/o attachments
Jay Skinner, CDOW Water Unit Program Manager – w/o attachments
Mark Uppendahl, CDOW Instream Flow Program Coordinator
Melissa Walker, Colorado Springs Parks – w/o attachments

March 20, 2007

Mr. Jeff Baessler and Mr. Todd Doherty
Stream and Lake Protection Section
Colorado Water Conservation Board
1313 Sherman Street, Room 723
Denver, Colorado 80203

RE: Instream flow recommendations for Bear Creek, Severy Creek, and North Cheyenne Creek.

Dear Mr. Baessler and Mr. Doherty,

I am writing to suggest that the lower termini of the proposed instream flow reaches on Bear Creek and North Cheyenne Creek be moved upstream from the locations initially proposed by Trout Unlimited and Colorado Division of Wildlife (CDOW). Colorado Springs Utilities (CSU) has expressed a desire to move the termini on these two streams in order to reduce the potential for future conflicts. On Bear Creek, CSU would like to see the lower terminus moved approximately one mile upstream to where High Drive crosses the creek. On North Cheyenne Creek CSU would prefer the lower terminus be moved upstream to where Gold Camp Road crosses the creek. They have not raised any objections to the Severy Creek instream flow proposals. Because the greenback cutthroat trout in both Bear Creek and North Cheyenne Creek are in the upper reaches, moving the termini as requested would still provide adequate protection for these populations.

Because moving the termini upstream would address the concerns expressed by CSU and because the greenback cutthroat trout would still be protected, both Trout Unlimited and CDOW support modifying the proposed instream flow reaches as suggested. We believe that adopting these changes will significantly reduce the likelihood that any objections to these instream flow proposals will be raised. The attached map identifies the extent of the new instream flow reaches and associated watersheds for both streams, the portion of each watershed that is now excluded, as well as the relevant diversion and sampling points.

Please do not hesitate to contact me with any questions at 303-440-2937, ext 103.

Sincerely,

W. John Roach, Ph.D.
Trout Unlimited
Aquatic Specialist

Cc: Gary Dowler, CDOW Aquatic Biologist
Scott Howell, Colorado Springs Utilities
Doug Krieger, CDOW Aquatic Biologist
Abby Ortega, Colorado Springs Utilities
Kirsta Schereff-Norris, Colorado Springs Utilities
Kurt Schroeder, City of Colorado Springs, Parks Recreation & Cultural Services
Mark Shae, Colorado Springs Utilities
Jay Skinner, CDOW Water Unit Program Manager
Mark Uppendahl, CDOW Instream Flow Program Coordinator
Melissa Walker, City of Colorado Springs, Starsmore Discovery Center

APPENDIX – B

Field Data

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

LOCATION INFORMATION

STREAM NAME:	Bear Creek
XS LOCATION:	N 38º 49.269 W 104º 53.596
XS NUMBER:	1
DATE:	10-Aug-06
OBSERVERS:	A. Todd, K. Kirkeby
1/4 SEC:	NW
SECTION:	21
TWP:	14S
RANGE:	67W
PM:	0
COUNTY:	El Paso
WATERSHED:	Arkansas River
DIVISION:	2
DOW CODE:	0
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

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

TAPE WT:	0.0106
TENSION:	99999

CHANNEL PROFILE DATA

SLOPE:	0.006122

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

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

STREAM NAME: Bear Creek
XS LOCATION: N 38º 49.269 W 104º 53.596
XS NUMBER: 1

DATA POINTS= 26

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	S	0.00	6.75			0.00		0.00	0.00	0.0%
		1.70	7.49			0.00		0.00	0.00	0.0%
1	G	3.30	7.98			0.00		0.00	0.00	0.0%
		3.80	8.30			0.00		0.00	0.00	0.0%
	W	3.90	8.50	0.20	0.42	0.22	0.20	0.04	0.02	1.9%
		4.20	8.67	0.40	0.57	0.34	0.40	0.12	0.07	7.8%
		4.50	8.71	0.40	0.73	0.30	0.40	0.12	0.09	10.0%
		4.80	8.49	0.20	1.01	0.37	0.20	0.06	0.06	6.9%
		5.10	8.50	0.20	0.79	0.30	0.20	0.06	0.05	5.4%
		5.40	8.60	0.30	0.64	0.32	0.30	0.09	0.06	6.6%
		5.70	8.59	0.25	0.50	0.30	0.25	0.08	0.04	4.3%
		6.00	8.59	0.25	0.46	0.30	0.25	0.08	0.03	3.9%
		6.30	8.61	0.30	0.58	0.30	0.30	0.09	0.05	6.0%
		6.60	8.61	0.30	0.71	0.30	0.30	0.09	0.06	7.3%
		6.90	8.56	0.30	1.06	0.30	0.30	0.09	0.10	10.9%
		7.20	8.54	0.20	0.91	0.30	0.20	0.06	0.05	6.2%
		7.50	8.50	0.20	1.05	0.30	0.20	0.06	0.06	7.2%
		7.80	8.47	0.15	1.29	0.30	0.15	0.05	0.06	6.6%
		8.10	8.44	0.10	1.30	0.30	0.10	0.03	0.04	4.5%
		8.40	8.40	0.05	0.89	0.30	0.05	0.02	0.01	1.5%
		8.70	8.40	0.05	0.60	0.30	0.05	0.02	0.01	1.0%
		9.00	8.39	0.05	0.54	0.30	0.05	0.02	0.01	0.9%
		9.30	8.38	0.05	0.46	0.30	0.05	0.02	0.01	0.8%
	W	9.60	8.37	0.00	0.00	0.30		0.00	0.00	0.0%
1	G	12.50	7.97			0.00		0.00	0.00	0.0%
	S	12.90	7.81			0.00		0.00	0.00	0.0%
	TOTALS ----------					6.07	0.4 (Max.)	1.17	0.87	100.0%

Manning's n = 0.0515
Hydraulic Radius= 0.191803165

STREAM NAME: Bear Creek
XS LOCATION: N 38º 49.269 W 104º 53.596
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.17	1.07	-8.4%
8.09	1.17	2.84	144.0%
8.11	1.17	2.68	130.1%
8.13	1.17	2.52	116.5%
8.15	1.17	2.37	103.2%
8.17	1.17	2.22	90.1%
8.19	1.17	2.07	77.4%
8.21	1.17	1.92	65.0%
8.23	1.17	1.78	52.9%
8.25	1.17	1.64	41.1%
8.27	1.17	1.51	29.6%
8.29	1.17	1.38	18.4%
8.30	1.17	1.31	12.9%
8.31	1.17	1.25	7.5%
8.32	1.17	1.19	2.1%
8.33	1.17	1.13	-3.2%
8.34	1.17	1.07	-8.4%
8.35	1.17	1.01	-13.5%
8.36	1.17	0.95	-18.6%
8.37	1.17	0.89	-23.6%
8.38	1.17	0.83	-28.6%
8.39	1.17	0.78	-33.2%
8.41	1.17	0.68	-41.7%
8.43	1.17	0.59	-49.3%
8.45	1.17	0.50	-56.7%
8.47	1.17	0.42	-63.7%
8.49	1.17	0.35	-70.3%
8.51	1.17	0.28	-76.3%
8.53	1.17	0.21	-81.6%
8.55	1.17	0.16	-86.4%
8.57	1.17	0.11	-90.6%
8.59	1.17	0.07	-94.2%

WATERLINE AT ZERO
AREA ERROR = 8.319

STREAM NAME: Bear Creek
XS LOCATION: N 38º 49.269 W 104º 53.596
XS NUMBER: 1 Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	7.98	9.13	0.41	0.73	3.75	9.52	100.0%	0.39	4.55	1.21
	8.02	8.78	0.39	0.69	3.40	9.16	96.2%	0.37	3.97	1.17
	8.07	8.34	0.36	0.64	2.98	8.71	91.4%	0.34	3.28	1.10
	8.12	7.90	0.33	0.59	2.57	8.25	86.6%	0.31	2.66	1.04
	8.17	7.46	0.29	0.54	2.19	7.79	81.8%	0.28	2.11	0.97
	8.22	7.02	0.26	0.49	1.82	7.33	77.0%	0.25	1.63	0.89
	8.27	6.58	0.23	0.44	1.48	6.87	72.2%	0.22	1.20	0.81
WL	8.32	6.16	0.19	0.39	1.16	6.43	67.5%	0.18	0.84	0.72
	8.37	5.77	0.15	0.34	0.87	6.00	63.1%	0.14	0.54	0.62
	8.42	4.40	0.14	0.29	0.62	4.60	48.3%	0.13	0.36	0.59
	8.47	3.93	0.10	0.24	0.41	4.09	43.0%	0.10	0.20	0.48
	8.52	3.03	0.08	0.19	0.23	3.15	33.1%	0.07	0.09	0.40
	8.57	2.21	0.05	0.14	0.10	2.29	24.1%	0.04	0.03	0.28
	8.62	0.51	0.06	0.09	0.03	0.56	5.9%	0.05	0.01	0.32
	8.67	0.36	0.02	0.04	0.01	0.37	3.9%	0.02	0.00	0.17

Calculate Flow recommendations based on Average Depth (0.2 ft), Percent Wetted Perimeter (50%), and Average Velocity (1 ft/s).

2 of 3
Greater of Average Depth and Percent Wetted Perimeter

(x - 0.84)/(0.2 - 0.19) = (1.20 - 0.84)/(0.23-0.19)
x = 0.93 cfs

3 of 3
(x - 2.11)/(1.0 - 0.97) = (2.66 - 2.11)/(1.04-0.97)
x = 2.35 cfs

Because 2.35 cfs is greater than upper Confidence Interval, flow assigned maximum value of 2.2 cfs.

STREAM NAME: Bear Creek
XS LOCATION: N 38º 49.269 W 104º 53.596
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.87	cfs
CALCULATED FLOW (Qc)=	0.84	cfs
(Qm-Qc)/Qm * 100 =	3.7	%
MEASURED WATERLINE (WLm)=	8.34	ft
CALCULATED WATERLINE (WLc)=	8.32	ft
(WLm-WLc)/WLm * 100 =	0.2	%
MAX MEASURED DEPTH (Dm)=	0.40	ft
MAX CALCULATED DEPTH (Dc)=	0.39	ft
(Dm-Dc)/Dm * 100	2.2	%
MEAN VELOCITY=	0.72	ft/sec
MANNING'S N=	0.052	
SLOPE=	0.006122	ft/ft
.4 * Qm =	0.3	cfs
2.5 * Qm=	2.2	cfs

RECOMMENDED INSTREAM FLOW:
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FLOW (CFS)	PERIOD
===========	========
____________________	____________________
____________________	____________________
____________________	____________________
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RATIONALE FOR RECOMMENDATION:
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RECOMMENDATION BY: ……………………………………………… AGENCY……………………………………………… DATE:……………………

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

Data Input & Proofing

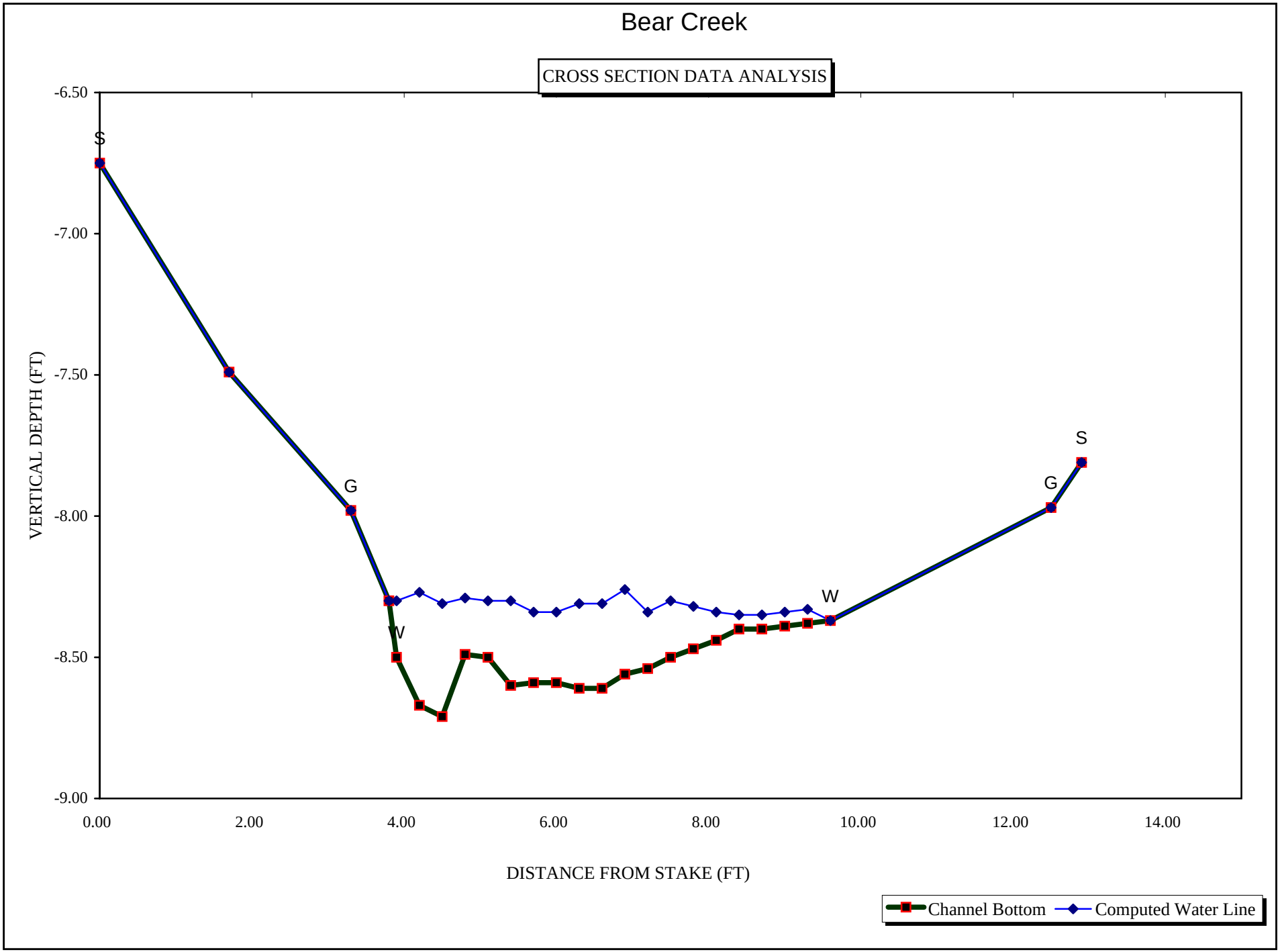
STREAM NAME:	Bear Creek
XS LOCATION:	N 38º 49.269 W 104º 53.596
XS NUMBER:	1
DATE:	8/10/06
OBSERVERS:	A. Todd, K. Kirkeby
1/4 SEC:	NW
SECTION:	21
TWP:	14S
RANGE:	67W
PM:	
COUNTY:	El Paso
WATERSHED:	Arkansas River
DIVISION:	2
DOW CODE:	
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.006122 ft / ft

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

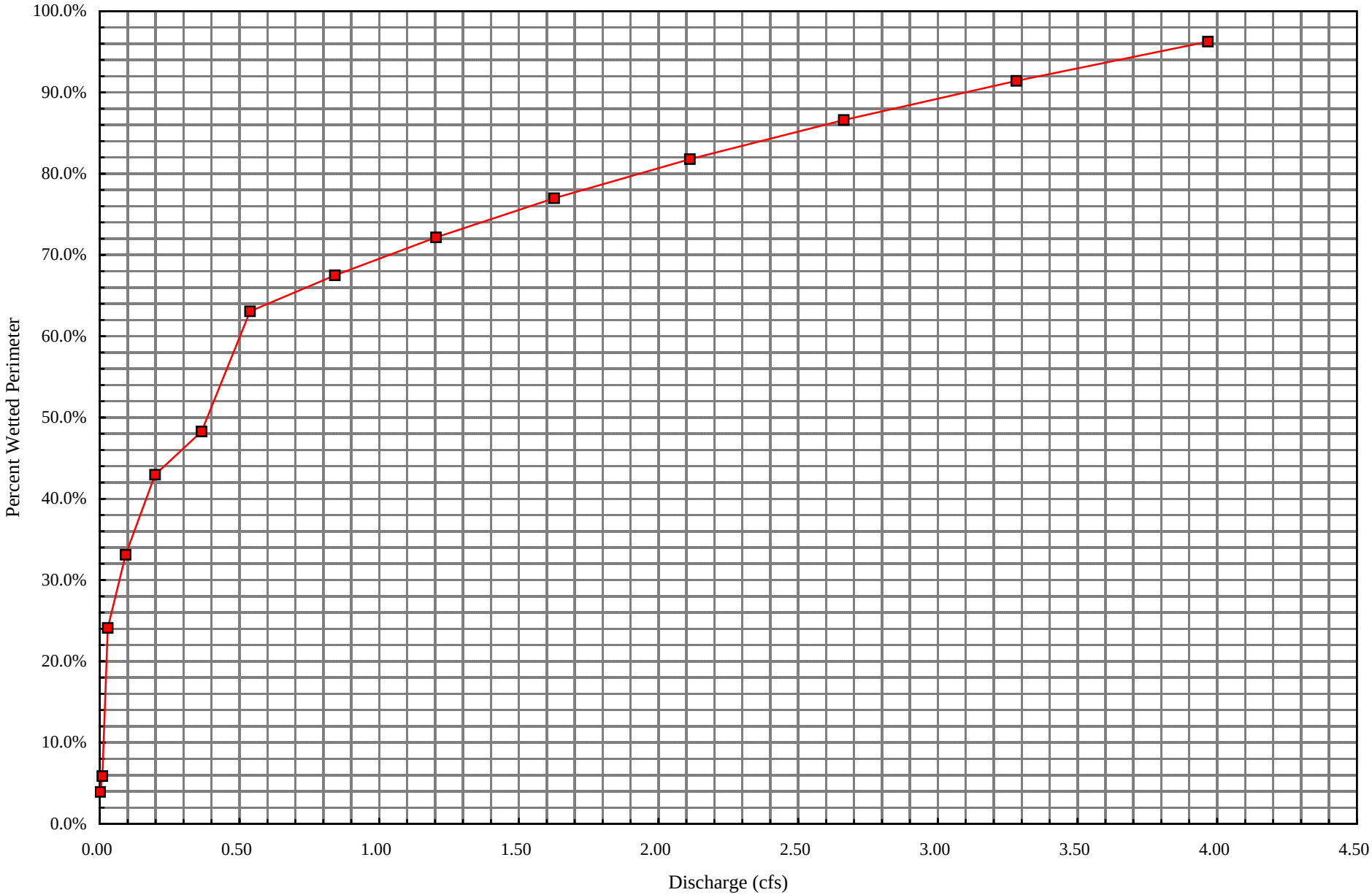
ASSIGNED TO: .....DATE.....

Total Data Points = 26

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	S	0.00	6.75			0.00	0.00	0.00
		1.70	7.49			0.00	0.00	0.00
1	G	3.30	7.98			0.00	0.00	0.00
		3.80	8.30			0.00	0.00	0.00
	W	3.90	8.50	0.20	0.42	0.04	0.02	8.30
		4.20	8.67	0.40	0.57	0.12	0.07	8.27
		4.50	8.71	0.40	0.73	0.12	0.09	8.31
		4.80	8.49	0.20	1.01	0.06	0.06	8.29
		5.10	8.50	0.20	0.79	0.06	0.05	8.30
		5.40	8.60	0.30	0.64	0.09	0.06	8.30
		5.70	8.59	0.25	0.50	0.08	0.04	8.34
		6.00	8.59	0.25	0.46	0.08	0.03	8.34
		6.30	8.61	0.30	0.58	0.09	0.05	8.31
		6.60	8.61	0.30	0.71	0.09	0.06	8.31
		6.90	8.56	0.30	1.06	0.09	0.10	8.26
		7.20	8.54	0.20	0.91	0.06	0.05	8.34
		7.50	8.50	0.20	1.05	0.06	0.06	8.30
		7.80	8.47	0.15	1.29	0.05	0.06	8.32
		8.10	8.44	0.10	1.30	0.03	0.04	8.34
		8.40	8.40	0.05	0.89	0.02	0.01	8.35
		8.70	8.40	0.05	0.60	0.02	0.01	8.35
		9.00	8.39	0.05	0.54	0.02	0.01	8.34
		9.30	8.38	0.05	0.46	0.02	0.01	8.33
	W	9.60	8.37	0.00	0.00	0.00	0.00	0.00
1	G	12.50	7.97			0.00	0.00	0.00
	S	12.90	7.81			0.00	0.00	0.00
					Totals			
					Totals	1.17	0.87	


Bear Creek
CROSS SECTION DATA ANALYSIS
-6.50
-7.00
-7.50
-8.00
-8.50
-9.00
VERTICAL DEPTH (FT)
S
G
W
W
G
S
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line

Percent Wetted Perimeter vs. Discharge



COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

2/

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: BEAR CREEK					CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: E 509265 38° 49.269 N					
N 4296935 -104° 53.596 W 7801					
DATE: 8/10/06	OBSERVERS: A. TODD, K. KIRKEBY				
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 21	TOWNSHIP: 14 N/S	RANGE: 67 E/W	PM:
COUNTY: EL PASO	WATERSHED: ARKANSAS	WATER DIVISION: 2	DOW WATER CODE:		
MAP(S):	USGS:				
	USFS:				

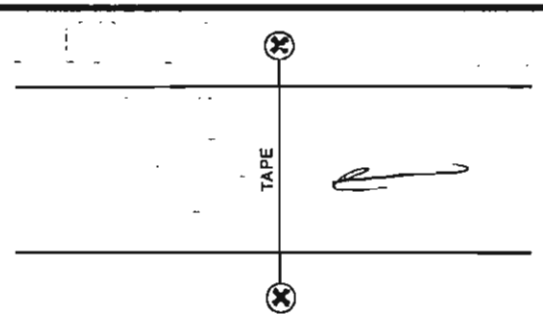
SUPPLEMENTAL DATA

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: gravel	PHOTOGRAPHS TAKEN: (YES) NO	NUMBER OF PHOTOGRAPHS: (4)		

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	8.34 / 8.37
② WS Upstream	3	8.37
③ WS Downstream	6.8	8.43
SLOPE	.06 / 9.8 = .006 ft/ft	

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: BEAR CREEK	CROSS-SECTION NO.: 1	DATE: 8/10/06	SHEET 1 OF 1

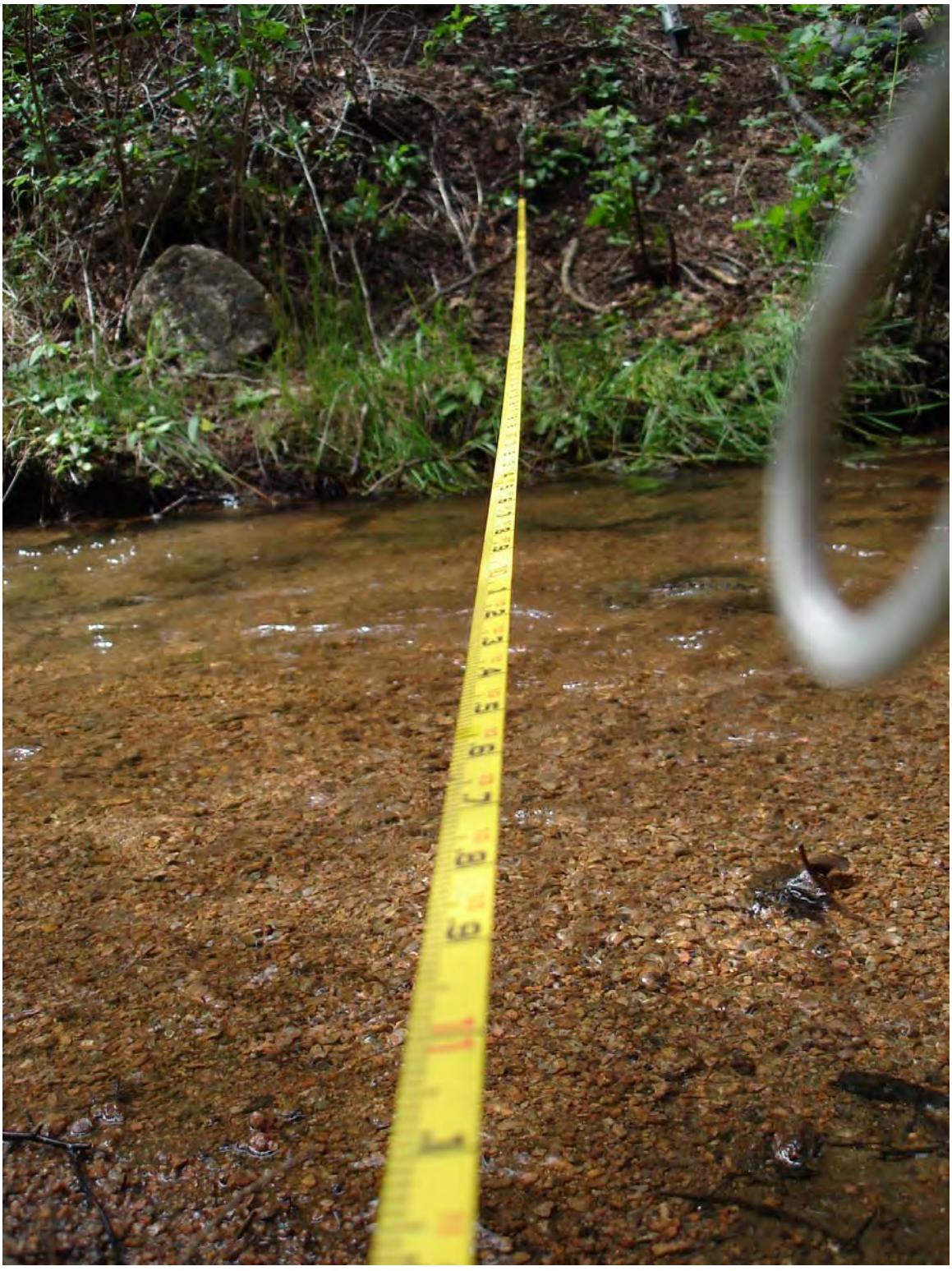
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (0.0 AT STAKE) (LEFT) RIGHT	Gage Reading: ____ ft	TIME: 2:00

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 (ft²)	Discharge (cfs)
on stake			6.67								
S	0		6.75								
	1.7		7.49								
G	3.3		7.98 8.3								
W	3.9 3.8	ws 8.34	8.50		.2			.42			
	4.2		8.67		.4			.57			
	4.5		8.71		.4			.73			
	4.8		8.49		.2			1.01			
	5.1		8.50		.2			.79			
	5.4		8.60		.3			.64			
	5.7		8.59		.25			.50			
	6.0		8.59		.25			.46			
	6.3		8.61		.3			.58			
	6.6		8.61		.3			.71			
	6.9		8.56		.3			1.06			
	7.2		8.54		.2			.91			
	7.5		8.50		.2			1.05			
	7.8		8.47		.15			1.29			
	8.1		8.44		.1			1.30			
	8.4		8.40		.05			.89			
	8.7		8.40		.05			.60			
	9.0		8.39		.05			.54			
	9.3		8.38		.05			.46			
W	9.6		8.37		0			0			
G	12.5		7.97								
S	12.9		7.81								
on top			7.64								
TOTALS:											

End of Measurement	Time: 2:20	Gage Reading: ____ ft	CALCULATIONS PERFORMED BY:	CALCULATIONS CHECKED BY:

Bear Creek #1 Downstream Photograph

Bear Creek #1 Right Bank Photograph



Bear Creek #1 Left Bank Photograph

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

LOCATION INFORMATION

STREAM NAME:	Bear Creek #2
XS LOCATION:	N 38º 49.012 W 104º 53.808
XS NUMBER:	2
DATE:	10-Aug-06
OBSERVERS:	A. Todd, K. Kirkeby
1/4 SEC:	NW
SECTION:	21
TWP:	14S
RANGE:	67W
PM:	0
COUNTY:	El Paso
WATERSHED:	Arkansas River
DIVISION:	2
DOW CODE:	0
USGS MAP:	0
USFS MAP:	0

SUPPLEMENTAL DATA

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

TAPE WT:	0.0106
TENSION:	99999

CHANNEL PROFILE DATA

SLOPE:	0.03076923

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

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

STREAM NAME: Bear Creek #2
XS LOCATION: N 38º 49.012 W 104º 53.808
XS NUMBER: 2

DATA POINTS= 21

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	S	0.00	6.69			0.00		0.00	0.00	0.0%
		1.00	7.13			0.00		0.00	0.00	0.0%
1	G	1.50	7.45			0.00		0.00	0.00	0.0%
	W	2.30	7.80	0.00	0.00	0.00		0.00	0.00	0.0%
		2.60	7.95	0.10	0.97	0.34	0.10	0.03	0.03	2.9%
		2.90	7.95	0.15	1.33	0.30	0.15	0.05	0.06	6.0%
		3.20	7.89	0.15	1.15	0.31	0.15	0.05	0.05	5.2%
		3.50	7.98	0.20	0.83	0.31	0.20	0.06	0.05	5.0%
		3.80	8.07	0.20	0.97	0.31	0.20	0.06	0.06	5.9%
		4.10	8.04	0.25	1.66	0.30	0.25	0.08	0.12	12.5%
		4.40	7.93	0.10	1.27	0.32	0.10	0.03	0.04	3.8%
		4.70	7.98	0.15	0.92	0.30	0.15	0.05	0.04	4.2%
		5.00	8.15	0.30	1.16	0.34	0.30	0.09	0.10	10.5%
		5.30	8.15	0.30	1.40	0.30	0.30	0.09	0.13	12.7%
		5.60	8.07	0.20	1.27	0.31	0.20	0.06	0.08	7.7%
		5.90	8.12	0.30	0.79	0.30	0.30	0.09	0.07	7.2%
		6.20	8.09	0.20	1.95	0.30	0.20	0.06	0.12	11.8%
		6.50	8.06	0.10	1.12	0.30	0.10	0.04	0.04	4.5%
	W	7.00	7.85	0.00	0.00	0.54		0.00	0.00	0.0%
1	G	9.70	7.30			0.00		0.00	0.00	0.0%
	S	10.70	6.43			0.00		0.00	0.00	0.0%
	TOTALS ----------					4.90	0.3 (Max.)	0.82	0.99	100.0%

Manning's n = 0.0654
Hydraulic Radius= 0.167426282

STREAM NAME: Bear Creek #2
XS LOCATION: N 38º 49.012 W 104º 53.808
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	0.82	0.89	8.8%
7.58	0.82	2.31	181.5%
7.60	0.82	2.18	165.7%
7.62	0.82	2.05	150.2%
7.64	0.82	1.93	135.1%
7.66	0.82	1.81	120.3%
7.68	0.82	1.69	105.9%
7.70	0.82	1.57	91.8%
7.72	0.82	1.46	78.0%
7.74	0.82	1.35	64.7%
7.76	0.82	1.24	51.6%
7.78	0.82	1.14	39.0%
7.79	0.82	1.09	32.8%
7.80	0.82	1.04	26.6%
7.81	0.82	0.99	20.6%
7.82	0.82	0.94	14.7%
7.83	0.82	0.89	8.8%
7.84	0.82	0.84	3.0%
7.85	0.82	0.80	-2.7%
7.86	0.82	0.75	-8.3%
7.87	0.82	0.71	-13.8%
7.88	0.82	0.66	-19.3%
7.90	0.82	0.57	-30.2%
7.92	0.82	0.49	-40.5%
7.94	0.82	0.41	-50.2%
7.96	0.82	0.34	-58.8%
7.98	0.82	0.28	-66.0%
8.00	0.82	0.22	-72.6%
8.02	0.82	0.17	-78.7%
8.04	0.82	0.13	-84.3%
8.06	0.82	0.09	-89.3%
8.08	0.82	0.05	-93.4%

WATERLINE AT ZERO
AREA ERROR = 7.840

STREAM NAME: Bear Creek #2
XS LOCATION: N 38º 49.012 W 104º 53.808
XS NUMBER: 2

Constant Manning's n

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
GL	7.45	7.46	0.43	0.70	3.19	7.77	100.0%	0.41	7.00	2.20
	7.49	7.17	0.40	0.66	2.89	7.47	96.1%	0.39	6.11	2.11
	7.54	6.81	0.37	0.61	2.54	7.10	91.3%	0.36	5.10	2.01
	7.59	6.45	0.34	0.56	2.21	6.72	86.5%	0.33	4.19	1.90
	7.64	6.09	0.31	0.51	1.90	6.35	81.6%	0.30	3.37	1.78
	7.69	5.73	0.28	0.46	1.60	5.97	76.8%	0.27	2.65	1.66
	7.74	5.37	0.25	0.41	1.32	5.60	72.0%	0.24	2.01	1.52
	7.79	5.02	0.21	0.36	1.06	5.22	67.2%	0.20	1.46	1.38
WL	7.84	4.67	0.18	0.31	0.82	4.86	62.5%	0.17	1.00	1.22
	7.89	4.42	0.13	0.26	0.59	4.59	59.0%	0.13	0.60	1.02
	7.94	3.70	0.11	0.21	0.39	3.83	49.2%	0.10	0.34	0.87
	7.99	2.65	0.09	0.16	0.24	2.74	35.3%	0.09	0.18	0.78
	8.04	2.14	0.05	0.11	0.12	2.19	28.2%	0.05	0.07	0.56
	8.09	1.10	0.03	0.06	0.03	1.13	14.6%	0.03	0.01	0.39
	8.14	0.35	0.01	0.01	0.00	0.36	4.6%	0.01	0.00	0.17

Calculate Flow recommendations based on Average Depth (0.2 ft), Percent Wetted Perimeter (50%), and Average Velocity (1 ft/s).

2 of 3
Greater of Average Velocity and Percent Wetted Perimeter, which is Average Velocity

(x - 0.34)/(1.0 - 0.87) = (0.6 - 0.34)/(1.02 - 0.87)
x = 0.57 cfs

3 of 3
(x - 1.00)/(0.2 - 0.18) = (1.46 - 1.00)/(0.21-0.18)
x = 1.31 cfs

So, average winter flow recommendation from XS1 & XS 2 is 0.75 cfs
and average summer flow recommendation from XS1 & XS2 is 1.8 cfs.

STREAM NAME: Bear Creek #2
XS LOCATION: N 38º 49.012 W 104º 53.808
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	0.99	cfs
CALCULATED FLOW (Qc)=	1.00	cfs
(Qm-Qc)/Qm * 100 =	-0.6	%
MEASURED WATERLINE (WLm)=	7.83	ft
CALCULATED WATERLINE (WLc)=	7.84	ft
(WLm-WLc)/WLm * 100 =	-0.2	%
MAX MEASURED DEPTH (Dm)=	0.30	ft
MAX CALCULATED DEPTH (Dc)=	0.31	ft
(Dm-Dc)/Dm * 100	-3.2	%
MEAN VELOCITY=	1.22	ft/sec
MANNING'S N=	0.065	
SLOPE=	0.03076923	ft/ft
.4 * Qm =	0.4	cfs
2.5 * Qm=	2.5	cfs

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

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

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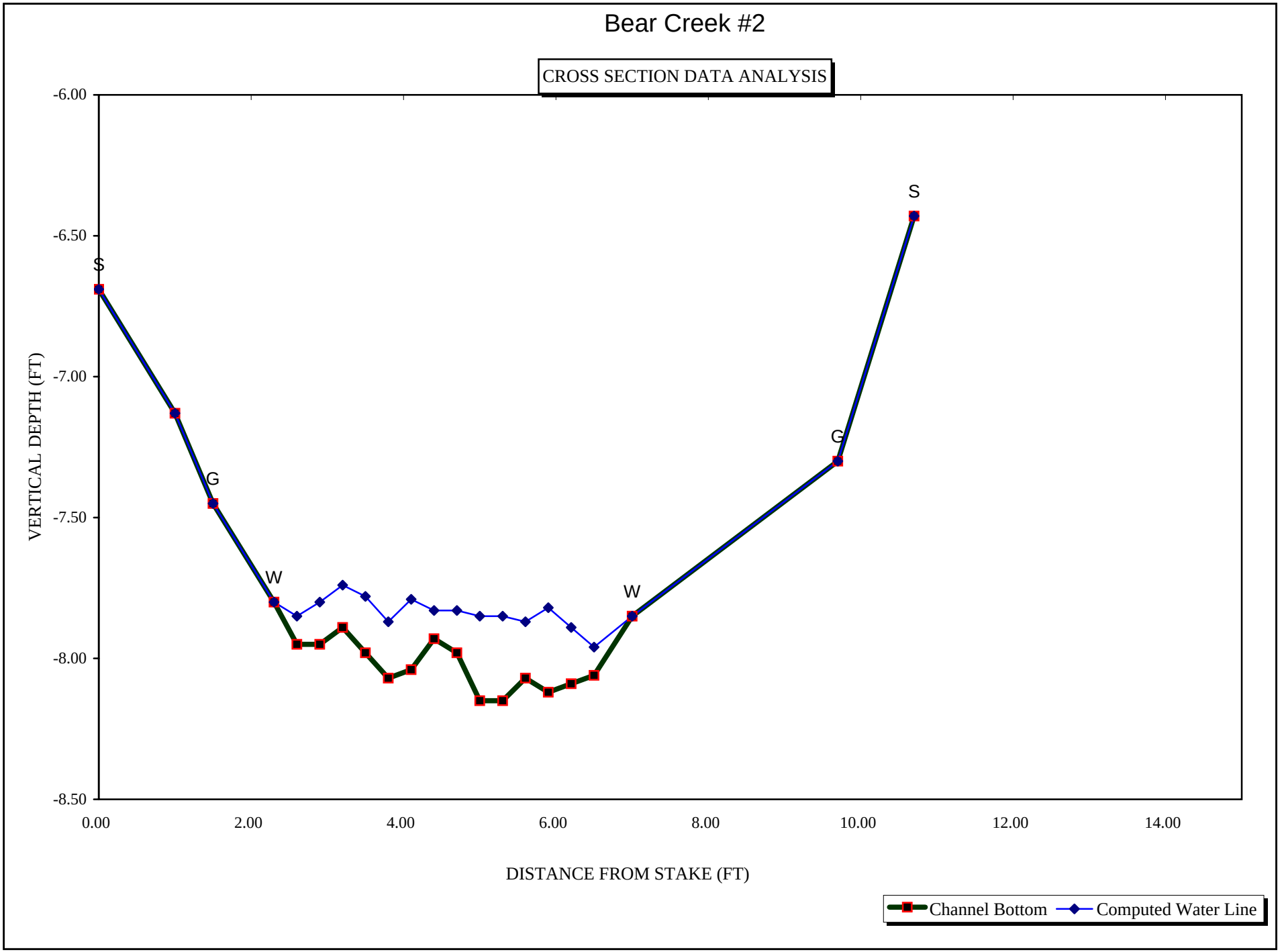
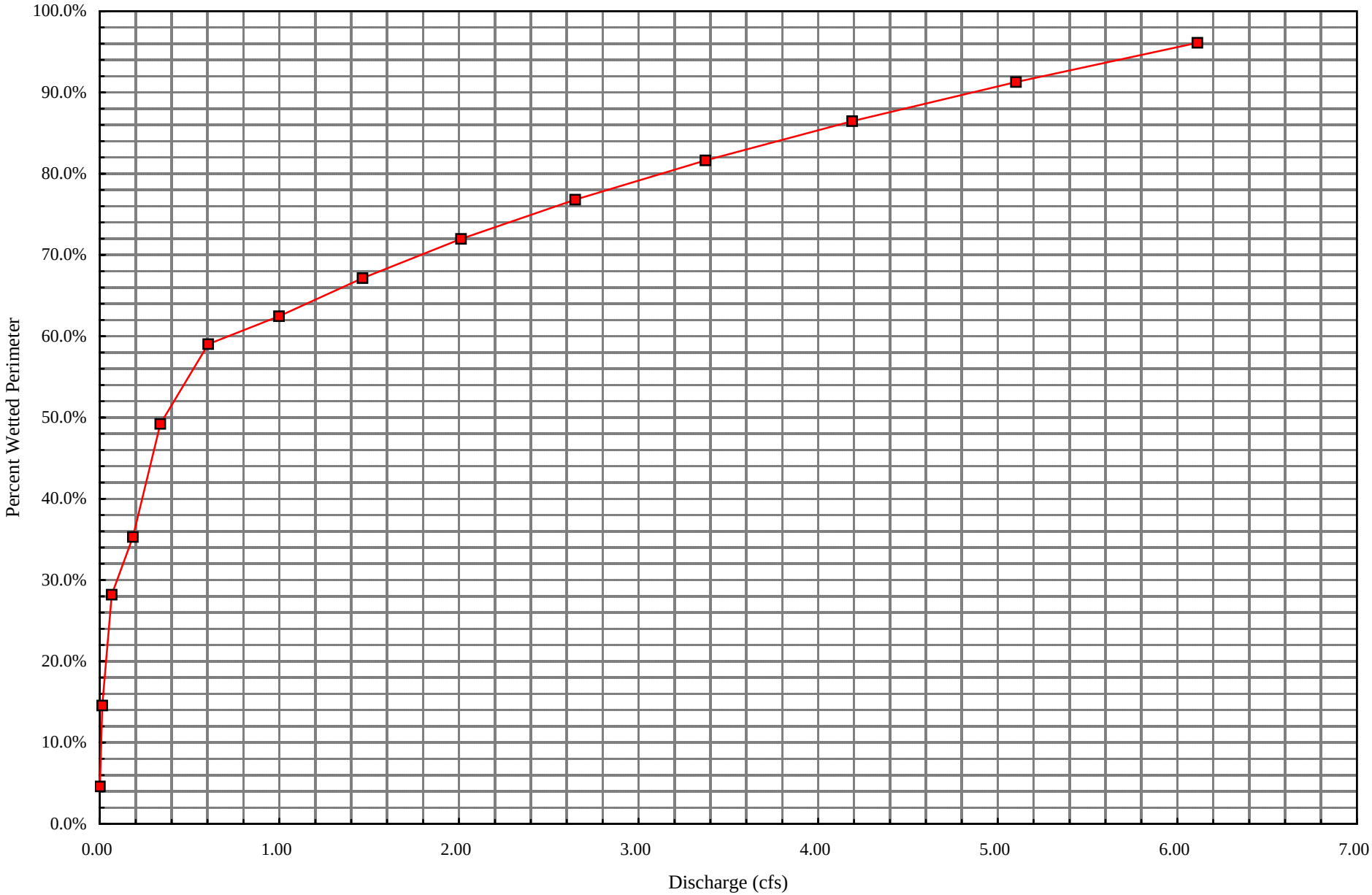
RECOMMENDATION BY: ………………….………..…................................ AGENCY..……………………......…...…...…….…...... DATE:......…..…......……………

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


Bear Creek #2
CROSS SECTION DATA ANALYSIS
-6.00
-6.50
-7.00
-7.50
-8.00
-8.50
VERTICAL DEPTH (FT)
S
G
W
W
G
S
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line

Percent Wetted Perimeter vs. Discharge



Data Input & Proofing

STREAM NAME:	Bear Creek #2
XS LOCATION:	N 38º 49.012 W 104º 53.808
XS NUMBER:	2
DATE:	8/10/06
OBSERVERS:	A. Todd, K. Kirkeby
1/4 SEC:	NW
SECTION:	21
TWP:	14S
RANGE:	67W
PM:	
COUNTY:	El Paso
WATERSHED:	Arkansas River
DIVISION:	2
DOW CODE:	
USGS MAP:	
USFS MAP:	
	Level and Rod Survey
TAPE WT:	0.0106 lbs / ft
TENSION:	99999 lbs
SLOPE:	0.030769231 ft / ft

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

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

Total Data Points = 21

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	S	0.00	6.69			0.00	0.00	0.00
		1.00	7.13			0.00	0.00	0.00
1	G	1.50	7.45			0.00	0.00	0.00
	W	2.30	7.80	0.00	0.00	0.00	0.00	0.00
		2.60	7.95	0.10	0.97	0.03	0.03	7.85
		2.90	7.95	0.15	1.33	0.05	0.06	7.80
		3.20	7.89	0.15	1.15	0.05	0.05	7.74
		3.50	7.98	0.20	0.83	0.06	0.05	7.78
		3.80	8.07	0.20	0.97	0.06	0.06	7.87
		4.10	8.04	0.25	1.66	0.08	0.12	7.79
		4.40	7.93	0.10	1.27	0.03	0.04	7.83
		4.70	7.98	0.15	0.92	0.05	0.04	7.83
		5.00	8.15	0.30	1.16	0.09	0.10	7.85
		5.30	8.15	0.30	1.40	0.09	0.13	7.85
		5.60	8.07	0.20	1.27	0.06	0.08	7.87
		5.90	8.12	0.30	0.79	0.09	0.07	7.82
		6.20	8.09	0.20	1.95	0.06	0.12	7.89
		6.50	8.06	0.10	1.12	0.04	0.04	7.96
	W	7.00	7.85	0.00	0.00	0.00	0.00	0.00
1	G	9.70	7.30			0.00	0.00	0.00
	S	10.70	6.43			0.00	0.00	0.00
					Totals	0.82	0.99	

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: BEAR CREEK					CROSS-SECTION NO.: 2	
CROSS-SECTION LOCATION: E 508959 38° 49.012 N						
N 4296459 -104° 53.808 W 6700 Altitude						
DATE: 8/10/06	OBSERVERS: A. TODD, K. KIRKEBY					
LEGAL DESCRIPTION	¼ SECTION: NW	SECTION: 21	TOWNSHIP: 14 N/S	RANGE: 67 E/W	PM:	
COUNTY: EL PASO	WATERSHED: ARKANSAS	WATER DIVISION: 2	DOW WATER CODE:			
MAP(S):	USGS:					
	USFS:					

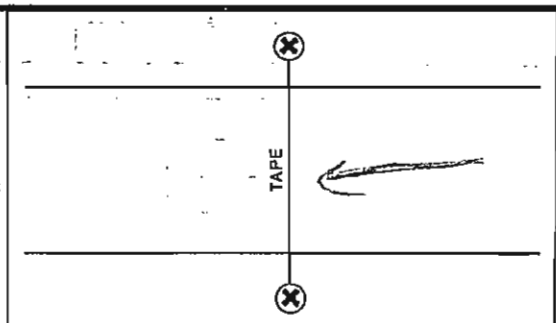
SUPPLEMENTAL DATA

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: gravel to large cobble	PHOTOGRAPHS TAKEN: (YES)/NO	NUMBER OF PHOTOGRAPHS: 4		

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	7.80/7.85
② WS Upstream	2.2	7.79
③ WS Downstream	3	7.95
SLOPE		

SKETCH



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

AQUATIC SAMPLING SUMMARY

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

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

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

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

COMMENTS

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: BEAR CREEK	CROSS-SECTION NO.: 2	DATE: 8/10/06	SHEET 1 OF 1
BEGINNING OF MEASUREMENT	EDGE OF WATER LOOKING DOWNSTREAM: (LEFT) RIGHT (D.D AT STAKE)	Gage Reading: _____ ft	TIME: 2:45

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 Obaervation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
on top	0		6.50								
S	0		6.69								
	1		7.13								
G	1.5		7.45								
W	2.3		7.80	Ø				Ø			
	2.6		7.95		.1			.97			
	2.9		7.95		.15			1.33			
	3.2		7.89		.15			1.15			
	3.5		7.98		.2			.83			
	3.8		8.07		.2			.97			
	4.1		8.04		.25			1.66			
	4.4		7.93		.10			1.27			
	4.7		7.98		.15			.92			
	5.0		8.15		.3			1.16			
	5.3		8.15		.3			1.40			
	5.6		8.07		.2			1.27			
	5.9		8.12		.3			.79			
	6.2		8.09		.2			1.95			
	6.5		8.06		.1			1.12			
W	7.0		7.85		Ø			Ø			
G	9.7		7.30								
S	10.7		6.43								
			6.13								
TOTALS:											

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

Bear Creek #2 Left Bank Photograph

Bear Creek #2 Right Bank Photograph

Bear Creek #2 Upstream Photograph

Bear Creek #2 Downstream Photograph

Biological Data

Greenback Cutthroat Trout Data for Bear Creek

Bear Creek: Sampled in July 1994 with the following results:

Station #1 (300 Ft.), Fence line at road switchback

Number of fish sampled	15
Weight of fish sampled	1.2 lbs
Biomass LB/Acre	21.6
#/Mile	270
#/Acre	279

Station #2 (300Ft.), Exit gate fence

Number of fish sampled	2
Weight of fish sampled	0.1 lbs
Biomass LB/Acre	0.6
#/Mile	35
#/Acre	36

Informal surveys/monitoring have revealed natural reproduction

Gary Dowler, an Area Aquatic Biologist with the Division of Wildlife, has documented that the greenback cutthroat trout population in Bear Creek is genetically pure. This is significant as hybridization has diluted the gene pool of many greenback cutthroat trout populations elsewhere in the state and makes the protection of this population all the more imperative.

APPENDIX – C

Water Availability Analysis

TU conducted a preliminary evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. Discharge in Bear Creek (Fig. 1) was estimated from gage data collected by Colorado Springs Utilities (CSU). CSU collected daily discharge data for the period of record. The United States Geological Survey (USGS) also maintained a gage on Bear Creek, however, this gage is below the Bear Creek Pipeline diversion and its flow estimates are affected by withdrawals from this structure. On the other hand, the CSU gage is located near the Bear Creek Pipeline at the terminus of the reach proposed for protection and thus provides better estimates of flows through this reach. Further, the period of record for this gage is longer. Consequently, data from this gage were used for the water availability analysis.

The water availability analysis used a water year beginning on 10/1 of the previous year and ending on 9/30 of the year of record. Only complete water years were included in the analysis. While the occasional missing data point was not considered a cause for concern, there were some significant data gaps. Although CSU collected data on Bear Creek from 1/1/49 to 9/30/06, the data from 1/1/66 – 8/29/89 are missing and were therefore excluded. The final water availability analysis included the water years 1950 – 1965 and 1990 – 2006. Data from these years were used to calculate the average discharge for each day of the year (Fig 2) as well as the average, minimum and maximum daily discharge rate for each month (Table 3).

The R2CROSS analyses indicated that between November 1 and April 14 flows should be at least 0.75 cfs while between April 15 and October 31 flows should be at least 1.8 cfs. According to the water availability analysis, estimated average daily flows just above the diversion point (Fig. 2) were always higher than the flows recommended by the R2CROSS analyses. Similarly, for during the winter months, 50% of flows exceeded the recommended flows (Table 1). However, in September and October the 50% exceedences were 1.69 cfs and 1.38 cfs, respectively, suggesting that it may make sense to reduce the instream appropriation for these months to 1.3 cfs. Although the 50% exceedence for July was also slightly below the recommend flow of 1.8 cfs, this reflects a slight dip in the hydrograph before the late summer rains. Because temperatures are frequently high at this time of the year and greenback cutthroat are such an important species, we recommend maintaining instream flows at 1.8 cfs throughout July. Further the water availability analysis suggests that at least 44% of the time there are adequate flows to meet this appropriation.

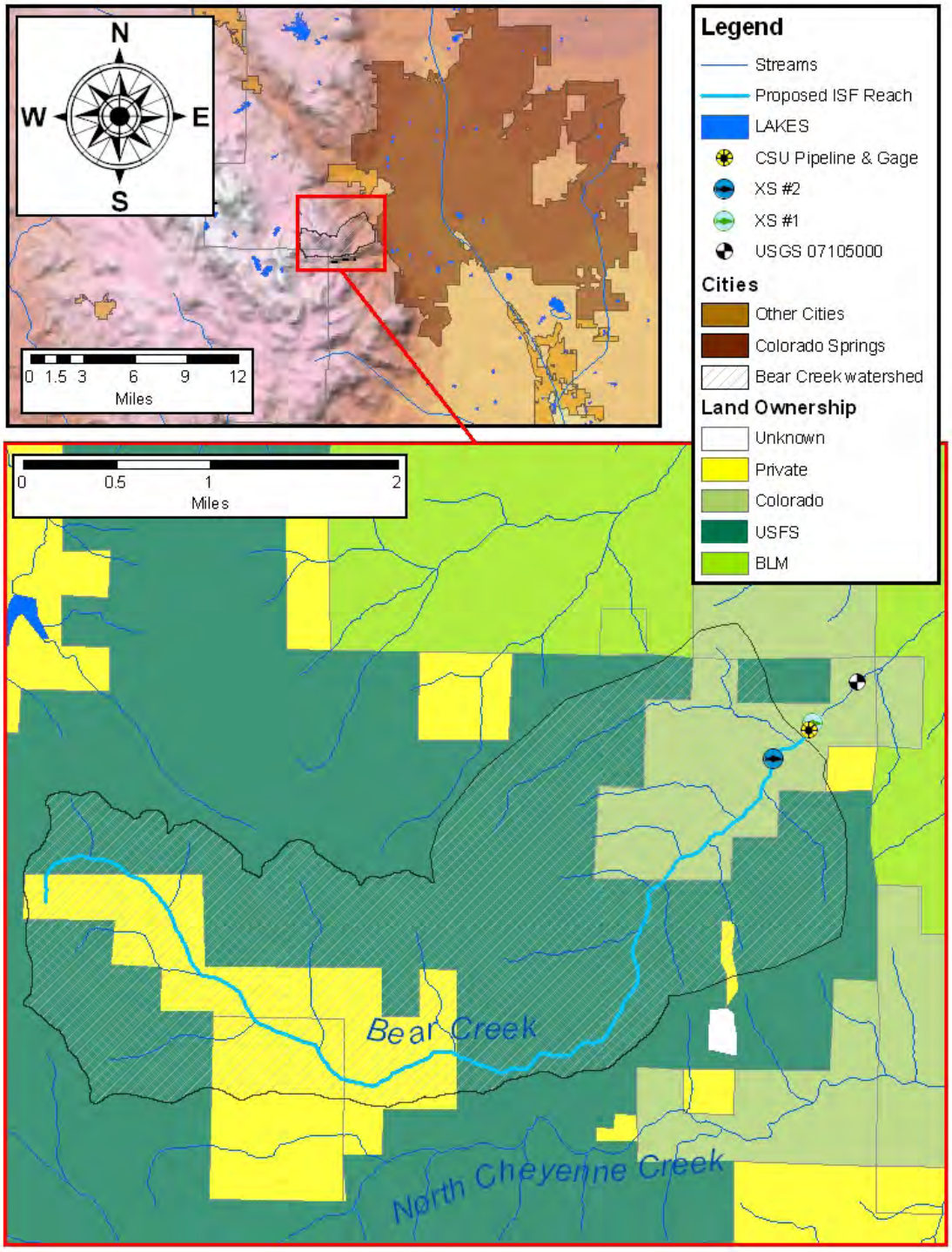


Fig 1. Map of Colorado Springs region with detail of Bear Creek watershed. The locations of the Bear Creek Pipeline, the Colorado Springs Utilities gage and withdrawal site, are shown as are the approximate locations of Bear Creek cross-sections. The proposed reach for the instream flow appropriation is highlighted in light blue. The location of the nearest USGS stream gage is also noted.

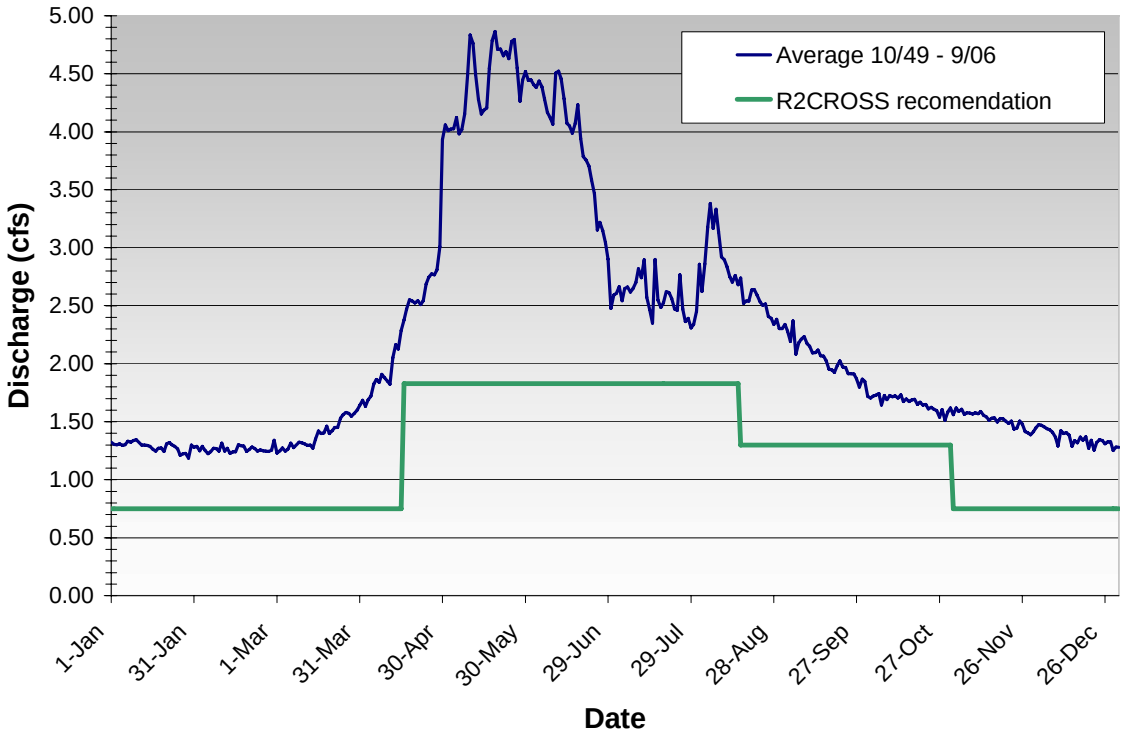


Fig. 2. Comparison of discharge in Bear Creek to recommended flows. The average daily flows through Bear Creek above the Bear Creek Pipeline for the period of record are plotted. The original R2CROSS analyses indicated that flows should be 1.8 cfs throughout the summer. However, to ensure that the 50% exceedences were met, the flows between 8/16 and 10/31 were reduced to 1.3 cfs.

Table 1. Summary statistics of mean daily discharge through Bear Creek. For each month, the discharge that 50% of flows were equal to or greater than is highlighted. Yellow indicates summer months, orange late summer months and blue indicates winter months.

Station: Bear Creek near the Bear Creek Diversion
Prameter: Discharge
Year: portions of 10/1/49 - 9/30/06
State: Colorado
County: El Paso

ID: CSU gage 1291
Statistic: Mean Daily Discharge
Latitude: 38: 49: 26
Longitude: 104: 53: 39.7
Elevation: ~6250 ft
Drainage Area: 6.61 mi^2

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
# days	1019	930	1021	987	1020	988	1022	1020	985	1018	988	1017	**12015**
Avg Day	1.29	1.26	1.40	2.31	4.42	3.90	2.57	2.71	2.05	1.67	1.52	1.36	**2.20**
Max Day	4	4	4	29	29	29	19	15	10	5	4	3	**29**
Min Day	0.49	0.04	0.20	0.37	0.59	0.37	0.49	0.55	0.45	0.49	0.42	0.01	**0.01**
# months	33	30	33	32	33	32	33	33	32	33	33	33	**30**
Sdev Month	0.58	0.50	0.53	1.11	4.82	5.13	2.07	1.90	1.22	0.87	0.72	0.59	
Skew Month	0.84	0.80	0.72	0.79	2.16	3.24	1.61	1.24	0.68	0.92	0.84	0.76	
Min Month	0.56	0.54	0.53	0.76	0.87	0.66	0.64	0.72	0.54	0.55	0.58	0.57	
Max Month	2.75	2.51	2.64	4.81	19.95	26.63	9.59	8.29	4.95	4.10	3.32	2.82	
Percentiles*													
1%	2.78	2.59	3.40	6.80	29.47	29.46	11.62	9.02	5.48	4.28	3.40	2.98	13.44
5%	2.40	2.40	2.40	5.36	16.18	14.68	6.65	6.56	4.51	3.20	2.88	2.59	5.74
10%	2.31	2.03	2.03	4.21	10.16	8.78	5.48	5.66	3.83	2.88	2.59	2.31	4.04
20%	1.69	1.69	1.78	2.98	6.65	4.53	4.05	4.51	3.19	2.40	2.18	1.86	2.68
50%	1.08	1.14	1.31	1.95	2.40	2.03	1.61	1.86	1.69	1.38	1.30	1.15	**1.53**
80%	0.78	0.78	0.84	1.24	1.27	1.20	1.03	1.08	0.92	0.92	0.89	0.83	0.94
90%	0.68	0.72	0.75	0.96	1.06	0.87	0.81	0.89	0.77	0.82	0.81	0.77	0.78
95%	0.59	0.67	0.68	0.79	0.88	0.73	0.66	0.78	0.64	0.55	0.63	0.59	0.68
99%	0.54	0.50	0.57	0.69	0.67	0.59	0.59	0.61	0.50	0.54	0.54	0.55	0.55

* Percentiles estimate the value (discharge) in the record associated with a given percentile. They provide an estimate of the percentage of days on which a given flow is exceeded. Percentiles were calculated using the PERCENTILE function in MicroSoft Excel.

Local Precipitation Data for the period 1948 to 2006.

COLORADO SPRINGS WSO AP, COLORADO

Period of Record General Climate Summary - Precipitation

Station:(051778) COLORADO SPRINGS WSO AP														
From Year=1948 To Year=2006														
	Precipitation											Total Snowfall		
	Mean	High	Year	Low	Year	1 Day Max.		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year
	in.	in.	-	in.	-	in.	dd/yyyy or yyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	0.30	1.17	1987	0.00	1953	0.77	15/1987	4	1	0	0	5.1	28.7	1987
February	0.32	2.45	1987	0.00	1991	1.49	26/1987	4	1	0	0	4.7	23.2	1987
March	0.90	2.42	1998	0.01	1966	1.63	18/1998	7	3	0	0	8.7	23.2	1984
April	1.38	7.50	1999	0.01	1964	2.63	30/1999	8	3	1	0	6.5	42.7	1957
May	2.18	5.67	1957	0.33	1970	2.23	18/1955	10	5	1	0	1.3	19.4	1978
June	2.38	8.00	1965	0.13	1990	2.65	20/1970	10	5	1	0	0.0	1.1	1975
July	2.91	5.27	1968	0.67	1987	3.63	29/1997	13	7	2	0	0.0	0.0	1949
August	2.93	7.04	1999	0.15	1962	3.98	04/1999	12	6	2	0	0.0	0.2	1952
September	1.21	4.28	1976	0.00	1953	1.38	29/1959	7	3	1	0	0.9	27.9	1959
October	0.80	5.01	1984	0.01	1955	1.54	18/1960	5	2	0	0	3.1	25.9	1984
November	0.47	2.21	1957	0.00	1949	0.81	19/1979	4	1	0	0	5.2	26.3	1991
December	0.32	1.05	1988	0.00	1970	0.66	21/1981	4	1	0	0	5.1	18.2	1983
Annual	16.10	27.58	1999	7.85	2002	3.98	19990804	90	39	8	2	40.7	96.4	1957
Winter	0.94	3.90	1987	0.16	1997	1.49	19870226	13	3	0	0	15.0	56.3	1987
Spring	4.47	12.13	1957	1.41	1963	2.63	19990430	26	11	2	1	16.6	63.1	1957
Summer	8.22	16.85	1965	2.70	1964	3.98	19990804	35	18	5	1	0.0	1.1	1975
Fall	2.48	6.55	1972	0.54	1948	1.54	19601018	16	7	1	0	9.2	37.7	1959

Table updated on Jul 28, 2006
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May

Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

Western Regional Climate Center, wrcc@dri.edu

COLORADO SPRINGS WSO AP, COLORADO

Monthly Total Precipitation (inches)

(051778)

File last updated on Jul 24, 2006

*** Note *** Provisional Data *** After Year/Month 200603

a = 1 day missing, b = 2 days missing, c = 3 days, ..etc..,

z = 26 or more days missing, A = Accumulations present

Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.

MAXIMUM ALLOWABLE NUMBER OF MISSING DAYS : 5

Individual Months not used for annual or monthly statistics if more than 5 days are missing.

Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR(S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1948	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	4.62	0.40	0.12	0.02	0.29	5.45
1949	0.32	0.13	0.67	0.68	1.14	4.22	3.59	0.54	0.26	0.98	0.00	0.08	12.61
1950	0.32	0.03	0.33	0.42	1.00	1.59	4.50	0.84	2.82	0.12	0.14	0.06	12.17
1951	0.59	0.22	0.36	0.31	1.54	1.38	4.42	4.31	0.85	1.52	0.53	0.11	16.14
1952	0.04	0.10	1.13	1.36	2.21	0.37	1.19	3.79	0.37	0.04	0.23	0.13	10.96
1953	0.00	0.13	0.21	1.58	1.33	1.30	2.19	1.88	0.00	0.74	0.57	0.23	10.16
1954	0.22	0.06	0.59	0.62	2.57	3.69	3.13	1.98	1.91	0.22	0.23	0.21	15.43
1955	0.29	0.57	0.32	0.33	4.88	0.43	2.34	2.46	1.35	0.01	0.30	0.08	13.36
1956	1.12	0.19	0.84	1.10	0.88	0.41	3.03	1.42	0.59	0.14	0.91	0.30	10.93
1957	0.45	0.48	0.56	5.90	5.67	1.08	3.65	1.78	1.25	2.02	2.21	0.02	25.07
1958	0.09	0.28	1.29	0.99	4.79	3.01	4.42	1.20	1.38	0.58	0.22	0.20	18.45
1959	0.43	0.47	1.19	2.03	3.48	1.61	0.94	2.63	3.58	0.97	0.05	0.03	17.41
1960	0.11	0.73	0.95	0.59	1.61	0.93	2.22	0.78	0.61	1.97	0.23	0.54	11.27
1961	0.14	0.65	1.21	0.56	0.84	3.86	2.14	2.26	1.91	0.98	0.44	0.43	15.42
1962	0.42	0.34	0.88	0.44	0.63	3.36	1.60	0.15	0.41	0.97	0.89	0.03	10.12
1963	0.53	0.20	0.62	0.02	0.77	1.22	1.35	5.22	1.84	0.39	0.46	0.62	13.24
1964	0.00	0.22	1.08	0.01	2.54	0.96	1.14	0.60	1.33	0.03	0.46	0.22	8.59
1965	0.14	0.72	1.12	1.61	1.81	8.00	5.02	3.83	2.24	0.49	0.00	0.45	25.43
1966	0.39	0.49	0.01	0.79	0.95	2.56	2.91	2.00	2.12	0.36	0.16	0.17	12.91
1967	0.31	0.15	0.18	2.04	2.18	2.74	5.26	3.09	0.73	1.68	0.25	0.67	19.28
1968	0.10	0.22	0.37	0.54	0.62	0.15	5.27	2.12	1.03	0.43	1.32	0.24	12.41
1969	0.11	0.12	0.77	1.83	4.46	2.72	3.90	2.38	1.13	2.86	0.39	0.32	20.99
1970	0.05	0.17	1.06	0.91	0.33	3.63	3.79	4.24	1.09	0.95	0.27	0.00	16.49
1971	0.34	0.53	0.34	1.36	2.24	0.39	2.82	1.99	1.36	0.23	0.03	0.23	11.86
1972	0.27	0.25	0.55	0.42	1.46	2.07	4.08	3.55	4.13	1.34	1.08	0.83	20.03
1973	0.06	0.06	1.16	1.72	4.27	0.47	3.31	0.89	1.03	0.35	0.15	0.64	14.11
1974	0.26	0.18	0.52	1.92	0.33	1.29	1.42	1.14	0.43	1.36	0.23	0.42	9.50
1975	0.13	0.29	0.24	0.68	1.00	2.97	2.65	2.06	0.16	0.52	1.00	0.07	11.77
1976	0.32	0.23	0.63	1.63	2.09	2.46	1.75	5.94	4.28	0.49	0.40	0.12	20.34
1977	0.29	0.20	1.18	2.57	1.12	3.87	3.02	5.11	0.45	0.19	0.60	0.18	18.78
1978	0.25	0.38	0.40	1.15	3.58	0.54	2.14	2.51	0.05	0.90	0.37	1.01	13.28
1979	0.53	0.04	2.38	1.83	3.13	1.58	2.73	2.50	0.92	0.55	1.82	1.02	19.03
1980	0.25	0.54	1.30	3.64	4.99	1.60	1.69	4.59	0.65	0.01	0.35	0.05	19.66
1981	0.07	0.12	0.93	0.13	3.14	1.98	3.64	5.24	0.52	0.37	0.03	0.82	16.99
1982	0.25	0.27	0.73	0.76	3.07	3.81	3.64	5.37	3.02	0.22	0.10	0.70	21.94
1983	0.43	0.09	1.79	0.97	3.08	2.41	0.99	2.59	0.37	0.28	1.09	0.70	14.79
1984	0.32	0.09	1.93	1.66	0.74	1.54	3.97	4.03	0.93	5.01	0.14	0.64	21.00
1985	0.42	0.24	1.68	2.07	3.36	0.78	4.92	1.56	1.49	0.52	0.42	0.55	18.01
1986	0.01	0.30	0.31	0.65	1.89	2.47	1.63	6.06	0.61	1.41	0.64	0.28	16.26
1987	1.17	2.45	1.79	0.50	3.82	2.89	0.67	2.77	0.55	0.54	0.44	0.64	18.23
1988	0.43	0.68	0.90	0.27	1.01	1.69	2.07	2.88	1.19	0.08	0.36	1.05	12.61
1989	0.23	1.23	0.49	1.06	1.11	3.42	2.26	2.63	2.30	0.28	0.02	0.41	15.44
1990	0.53	0.59	1.77	2.04	3.90	0.13	5.13	1.45	1.50	1.46	0.30	0.27	19.07
1991	0.09	0.00	0.42	1.76	0.80	3.07	2.87	4.57	0.56	0.88	2.05	0.45	17.52
1992	0.06	0.02	2.36	0.92	2.07	3.91	0.76	3.37	0.13	0.30	0.75	0.11	14.76
1993	0.52	0.21	0.79	1.02	1.60	1.27	2.38	2.17	1.44	0.90	0.97	0.11	13.38

YEAR(S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1994	0.18	0.28	0.77 a	1.54	4.10	4.34	1.29	3.92	1.54	2.68	0.36	0.18 a	21.18
1995	0.00 b	0.21	0.71 a	3.05	4.82	7.79	2.02	1.77	1.87	0.02	0.00	0.00	22.26
1996	0.16	0.34	0.82	0.39	2.22	1.58	4.46	3.46	2.04	0.89	0.17	0.04	16.57
1997	0.11	0.01	0.34	3.30	1.16	5.44	4.63	4.70	1.78	0.98	0.22	0.10	22.77
1998	0.03	0.34	2.42	1.38	0.72	1.27	5.26	2.75	0.51	0.93	0.44	0.15	16.20
1999	0.12	0.05	0.41	7.50	3.57	1.36	4.70	7.04	0.52	1.10	1.01	0.20	27.58
2000	0.68	0.23	1.97	0.62	1.27	1.73	2.72	5.82	0.55	0.86	0.19	0.25	16.89
2001	0.82	0.26	1.38	0.98	3.21	2.14	3.25	1.47	1.01	0.02	0.37	0.09	15.00
2002	0.25	0.11	0.29	0.02	1.12	1.17	1.62	0.43	1.31	1.33	0.09	0.11	7.85
2003	0.03	0.63	1.02	0.97	0.90	5.07	1.14	1.89	0.58	0.09	0.04	0.06	12.42
2004	0.52	0.39	0.38	2.68	0.61	6.01	4.13	4.84	0.50	0.18	0.65	0.24	21.13
2005	0.78	0.04	1.03	1.08	0.73	2.10	1.91	2.65	0.68	0.48	0.08	0.30	11.86
2006	0.24	0.04	0.24	0.09	0.85	0.83	3.96 j	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	2.29
Period of Record Statistics													
MEAN	0.30	0.32	0.90	1.36	2.16	2.36	2.91	2.93	1.21	0.80	0.47	0.32	16.12
S.D.	0.26	0.37	0.59	1.32	1.44	1.74	1.34	1.64	0.95	0.86	0.49	0.28	4.44
SKEW	1.41	3.69	0.93	2.55	0.69	1.29	0.18	0.45	1.42	2.52	1.84	1.05	0.38
MAX	1.17	2.45	2.42	7.50	5.67	8.00	5.27	7.04	4.28	5.01	2.21	1.05	27.58
MIN	0.00	0.00	0.01	0.01	0.33	0.13	0.67	0.15	0.00	0.01	0.00	0.00	7.85
NO YRS	58	58	58	58	58	58	57	58	58	58	58	58	57

http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?cocspr

APPENDIX – D

Diversion Records

There appear to be three sets of records associated with the Bear Creek Ditch Diversion. All three diversions are believed to be withdrawn from the same place and simply represent the evolution of the structure's management. Between 1958 and 1973, it was managed as structure 534, between 1973 and 1993 it appears to have been managed as 535, and since that time it has been managed as 7043. Although these diversions do not affect the proposed reach, the relevant Structure Summary Reports and Annual Water Diversion Reports are attached (Appendix D) as further evidence of the magnitude of flows through the upstream reach.

Structure Summary Report

State of Colorado

HydroBase

Structure Name: BEAR CREEK DITCH NO 1 **Water District:** 10 **Structure ID Number:** 534

Source: BEAR CREEK

Location:	Q10	Q40	Q160	Section	Twnshp	Range	PM
				14	14S	67W	S

Distance From Section From N/S Line: From E/W Line:

UTM Coordinates (NAD 83): Northing (UTM 4298126 Easting (UTM x): 512223.9 Spotted from PLSS distances from section lines

Latitude/Longitude (decimal degrees): 38.831846 -104.859165

Water Rights Summary:						
Total Decreed Rate(s) (CFS):	Absolute: 2.6600	Conditional: 0.0000	AP/EX: 0.0000
Total Decreed Volume(s) (AF):	Absolute: 0.0000	Conditional: 0.0000	AP/EX: 0.0000

Water Rights -- Transactions

Case Number	Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority Number	Decreed Amount		Adjudication Type	Uses	Action Comment
CA0751	1882-02-15	1861-12-31	4383.00000	0		8.0000	C	O	1	ORIGINAL RIGHT AMOUNT AND LOCATION FROM
CA13801	1882-02-15	1861-12-31	4383.00000	0		5.3400	C	O,TF	1	TT BEAR CREEK PIPELINE
84CW0204	1919-06-02	1901-03-31	18717.00000	0		8.8000	C	S,AB	1	ABANDONED 84CW204 AS PART OF 84CW67 WHITE
CA10146	1919-06-02	1901-03-31	18717.00000	0		8.8000	C	S	1	WHITE TEMPLETON ENLARGEMENT ORIGINAL RIGHT

Water Rights -- Net Amounts

Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority/Case Number	Rate (CFS)			Volume (Acre-Feet)		
					Absolute	Conditional	AP/EX	Absolute	Conditional	AP/EX
1882-02-15	1861-12-31	4383.00000	0	CA0751	2.6600	0	0	0	0	0

Irrigated Acres Summary -- Totals From Various Sources

GIS Total (Acres):		Reported:	
Diversion Comments Total (Acres):	0	Reported:	1987
Structure Total (Acres):		Reported:	

Irrigated Acres From GIS Data

Year	Land Use	Acres Flood	Acres Furrow	Acres Sprinkler	Acres Drip	Acres	Acres Total

No data available for this report

Diversion Summary in Acre-Feet - Total Water Through Structure

Year	FDU	LDU	DWC	Maxq & Day	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Total
1958	1957-11-01	1958-10-31	365	3 06-01	107	89	78	69	77	136	176	173	149	125	93	85	1357
1959	1958-11-01	1959-10-31	365	3 05-01	98	88	67	67	86	148	158	118	85	69	8	118	1111
1960	1959-11-01	1960-10-31	366	3 04-01	80	63	57	58	96	150	143	110	92	71	52	73	1044
1961	1960-11-01	1961-10-31	365	3 08-01	60	57	55	55	98	106	101	154	173	190	155	119	1323
1962 *					93	78	77	72	111	114	109	93	78	58	54	61	999
1963 *					54	53	42	53	73	67	53	64	46	58	127	93	784
1964	1964-04-15	1964-10-31	200	2 06-08	0	0	0	0	0	57	95	125	73	75	42	50	516
1965 *					48	52	58	45	51	54	121	127	165	118	194	170	1203
1966	1965-11-07	1966-10-31	359	2 07-25	96	112	84	66	73	88	95	75	85	113	82	60	1028
1967	1966-11-01	1967-10-31	365	7 06-01	40	69	63	54	63	77	77	189	185	173	106	104	1199
1968	1967-11-01	1968-10-31	366	3 05-06	91	83	85	70	89	108	166	132	101	128	96	86	1235
1969	1968-11-04	1969-10-31	356	5 06-18	65	76	70	59	68	85	102	194	142	119	112	155	1248
1970	1969-11-01	1970-10-31	365	5 05-27	152	121	103	89	95	171	234	188	148	133	104	104	1644
1971	1970-11-01	1971-10-31	365	4 05-01	93	105	91	80	83	117	183	146	112	92	83	80	1266
1972	1971-11-01	1972-10-31	366	2 09-05	77	76	73	61	70	74	82	66	56	64	108	73	880
1973	1972-11-01	1973-10-31	365	10 05-14	69	74	60	48	70	126	536	380	205	123	92	104	1885
		Minimum		2	0	0	0	0	0	54	53	64	46	58	8	50	516
		Maximum:		10	152	121	103	89	111	171	536	380	205	190	194	170	1885
		Average		4	76	75	66	59	75	105	152	146	118	107	94	96	1170

16.00 years with diversion records

Notes: The average considers all years with diversion records, even if no water is diverted.
The above summary lists total monthly diversions.
* = Infrequent Diversion Record. All other values are derived from daily records.
Average values include infrequent data if infrequent data are the only data for the year.

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comment
1958			DOMESTIC
1961		0	
1962			DOM
1963			DOM
1965			DOM EL PASO FARM
1966			DOM
1967			DOM
1969		0	DOM
1970		0	DOM NOT USED CITY FURNISHES WATER
1971			DOM
1972			DOM
1974			CITY COLO SPGS FURNISHES WATER TO EL PASO CO
1975			
1976			
1977			ON ABANDONMENT LIST
1978			ON ABANDONMENT LIST
1987		0	WATER FURNISHED BY COLO. SPRINGS

Note: Diversion comments and reservoir comments may be shown for a structure, if both are available.

Structure Summary Report

State of Colorado

HydroBase

Structure Name: BEAR CREEK PIPELINE **Water District:** 10 **Structure ID Number:** 535

Source: BEAR CREEK

Location:	Q10	Q40	Q160	Section	Twnshp	Range	PM
		SW	NE	21	14S	67W	S

Distance From Section From N/S Line: From E/W Line:

UTM Coordinates (NAD 83): Northing (UTM 4296724 Easting (UTM x): 509236.5 Spotted from PLSS distances from section lines

Latitude/Longitude (decimal degrees): 38.819242 -104.893602

Water Rights Summary:						
Total Decreed Rate(s) (CFS):	Absolute:	37.9400	Conditional:	0.0000	AP/EX:	0.0000
Total Decreed Volume(s) (AF):	Absolute:	0.0000	Conditional:	0.0000	AP/EX:	0.0000

Water Rights -- Transactions

Case Number	Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority Number	Decreed Amount	Adjudication Type	Uses	Action Comment
CA13801	1882-02-15	1861-12-31	4383.00000	0		5.3400 C	O,TT	2	TF BEAR CREEK DITCH NO 1
CA13801	1882-02-15	1863-03-21	4828.00000	0		5.0000 C	O,TT	2	TF MATTHEWS DITCH
CA13801	1882-02-15	1866-09-21	6108.00000	0		6.0000 C	O,TT	2	TF WELLESLEY & HOWBERT DITCH
CA13801	1882-02-15	1875-03-21	9211.00000	0		8.0000 C	O,TT	2	TF WELLESLEY & FISHER DITCH
CA13801	1954-02-08	1889-04-15	14350.00000	0		9.4000 C	O	2	ORIGINAL RIGHT
CA13801	1954-02-08	1907-03-15	20892.00000	0		4.2000 C	O	2	ORIGINAL RIGHT

Water Rights -- Net Amounts

Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority/Case Number	Rate (CFS)			Volume (Acre-Feet)		
					Absolute	Conditional	AP/EX	Absolute	Conditional	AP/EX
1882-02-15	1875-03-21	9211.00000	0	CA13801	8.0000	0	0	0	0	0
1954-02-08	1889-04-15	14350.00000	0	CA13801	9.4000	0	0	0	0	0
1954-02-08	1907-03-15	20892.00000	0	CA13801	4.2000	0	0	0	0	0
1882-02-15	1861-12-31	4383.00000	0	CA13801	5.3400	0	0	0	0	0
1882-02-15	1863-03-21	4828.00000	0	CA13801	5.0000	0	0	0	0	0
1882-02-15	1866-09-21	6108.00000	0	CA13801	6.0000	0	0	0	0	0

Irrigated Acres Summary -- Totals From Various Sources

GIS Total (Acres):		Reported:	
Diversion Comments Total (Acres):	0	Reported:	2005
Structure Total (Acres):	0	Reported:	

Irrigated Acres From GIS Data

Year	Land Use	Acres Flood	Acres Furrow	Acres Sprinkler	Acres Drip	Acres	Acres Total

No data available for this report

Diversion Summary in Acre-Feet - Total Water Through Structure

Year	FDU	LDU	DWC	Maxq & Day	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Total
1974	1973-11-01	1974-10-31	365	2 03-18	89	87	85	77	91	81	87	69	60	63	47	70	905
1975	1974-11-01	1975-10-31	365	7 06-16	59	54	61	51	66	84	90	213	168	137	95	81	1161
1976	1975-11-01	1976-10-31	366	3 09-27	80	75	65	61	60	79	102	79	55	101	90	116	964
1977	1976-11-01	1977-10-31	365	3 05-02	83	76	68	56	67	112	128	88	61	100	63	63	964
1978	1977-11-01	1978-10-31	365	2 05-15	59	55	50	48	59	66	110	80	60	49	35	48	718
1979	1978-11-01	1979-10-31	358	7 04-23	48	46	41	43	66	250	231	273	191	126	96	86	1498
1980	1979-11-01	1980-10-31	296	6 04-28	83	84	81	84	87	128	46	0	144	179	140	125	1182
1981	1980-11-01	1981-10-31	365	4 08-03	111	115	97	83	98	97	96	124	139	184	113	96	1352
1982	1981-11-01	1982-10-31	365	6 08-23	90	78	81	79	82	88	161	271	170	235	236	171	1743
1983	1982-11-01	1983-10-31	323	11 06-20	136	116	106	85	94	140	169	147	448	446	280	209	2375
1984	1983-11-01	1984-10-31	366	7 10-08	159	151	121	104	109	150	255	174	124	198	204	313	2061
1985	1984-11-01	1985-10-31	347	10 05-20	351	199	165	118	128	302	245	375	285	329	222	181	2901
1986	1985-11-01	1986-10-31	365	3 11-04	151	138	125	106	123	47	53	122	103	104	76	83	1231
1987	1986-11-01	1987-10-31	358	6 05-11	79	73	64	66	117	126	332	233	172	139	128	104	1633
1988	1987-11-01	1988-10-31	359	2 04-18	95	89	79	71	75	108	117	101	95	124	61	82	1097
1989	1988-11-01	1989-10-31	357	2 05-21	70	70	71	63	78	86	110	79	73	74	38	44	856
1990	1989-11-02	1990-10-31	364	18 05-23	292	293	255	247	355	224	430	244	72	302	172	126	3011
1991	1990-11-01	1991-10-31	325	2 01-01	41	26	32	36	24	60	46	42	50	23	30	38	449
1992	1991-11-01	1992-10-31	343	3 08-29	37	27	21	47	53	36	42	45	38	85	81	88	601
1993	1992-11-01	1993-10-05	331	4 12-10	76	105	105	91	99	114	111	86	76	77	78	12	1032
		Minimum		2	37	26	21	36	24	36	42	0	38	23	30	12	449
		Maximum:		18	351	293	255	247	355	302	430	375	448	446	280	313	3011
		Average		5	109	98	89	81	97	119	148	142	129	154	114	107	1387

20.00 years with diversion records

Notes: The average considers all years with diversion records, even if no water is diverted.

The above summary lists total monthly diversions.

* = Infrequent Diversion Record. All other values are derived from daily records.

Average values include infrequent data if infrequent data are the only data for the year.

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comment
1969			
1970		0	NOT USED. CITY FURNISHES WATER
1971			DOM CITY FURNISHES WATER
1972			DOM CITY FURNISHES WATER P L NOT USED
1973			
1974			DOMESTIC
1975			DOMESTIC
1976			DOMESTIC
1978			DOMESTIC
1980			DOMESTIC
1981			DOMESTIC
1982			DOMESTIC
1989		0	MUNICIPAL, CITY OF COLORADO SPRINGS
1990		0	MUNICIPAL, CITY OF COLORADO SPRINGS
1991		0	MUNICIPAL, CITY OF COLORADO SPRINGS
1992		0	MUNICIPAL, CITY OF COLORADO SPRINGS
1993		0	MUNICIPAL, CITY OF COLORADO SPRINGS
1994		0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS IY 93-94 DUE TO FACILITY
1995	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS IY 94-95 DUE TO FACILITY
1996	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS IY 94-95 DUE TO FACILITY
1997	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
1998	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
1999	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
2000	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
2001	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
2002	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
2003	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
2004	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA
2005	Water available, but not taken	0	MUNICIPAL, CITY OF COLORADO SPRINGS; NO NATIVE DIVERSIONS DUE TO FACILITY CONSTRUCTION (EPA

Note: Diversion comments and reservoir comments may be shown for a structure, if both are available.

Structure Summary Report

State of Colorado

HydroBase

Structure Name: BEAR CREEK EXCHANGE **Water District:** 10 **Structure ID Number:** 7043

Source: TRANSBASIN WATER

Location:	Q10	Q40	Q160	Section	Twnshp	Range	PM
		SW	NE	21	14S	67W	S

Distance From Section From N/S Line: From E/W Line:

UTM Coordinates (NAD 83): Northing (UTM 4296724 Easting (UTM x): 509236.5 Spotted from PLSS distances from section lines

Latitude/Longitude (decimal degrees): 38.819242 -104.893602

Water Rights Summary:						
Total Decreed Rate(s) (CFS):	Absolute: 0.0000	Conditional: 0.0000	AP/EX: 0.0000
Total Decreed Volume(s) (AF):	Absolute: 0.0000	Conditional: 0.0000	AP/EX: 0.0000

Water Rights -- Transactions

Case Number	Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority Number	Decreed Amount	Adjudication Type	Uses	Action Comment
84CW0202	1984-12-31	1975-04-30	48942.45775	0		3.1000 C	S,C,EX	X	MAY EXCHANGE TM RETURN FLOWS AT BEAR

Water Rights -- Net Amounts

Adjudication Date	Appropriation Date	Administration Number	Order Number	Priority/Case Number	Rate (CFS)			Volume (Acre-Feet)		
					Absolute	Conditional	AP/EX	Absolute	Conditional	AP/EX
1984-12-31	1975-04-30	48942.45775	0	84CW0202	0	0	3.1000	0	0	0

Irrigated Acres Summary -- Totals From Various Sources

GIS Total (Acres): Reported:

Diversion Comments Total (Acres): 0 Reported: 2005

Structure Total (Acres): Reported:

Irrigated Acres From GIS Data

Year	Land Use	Acres Flood	Acres Furrow	Acres Sprinkler	Acres Drip	Acres	Acres Total

No data available for this report

Diversion Summary in Acre-Feet - Total Water Through Structure

Year	FDU	LDU	DWC	Maxq & Day	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Total

No data available for this report

Minimum
Maximum:
Average

Notes: The average considers all years with diversion records, even if no water is diverted.
The above summary lists total monthly diversions.
* = Infrequent Diversion Record. All other values are derived from daily records.
Average values include infrequent data if infrequent data are the only data for the year.

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comment
1999		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK PIPELINE.
2000		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK PIPELINE.
2001		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK PIPELINE.
2002		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK PIPELINE.
2003		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK PIPELINE.
2004		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK PIPELINE.
2005		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK PIPELINE.

Note: Diversion comments and reservoir comments may be shown for a structure, if both are available.

State of Colorado

Annual Water Diversion Report

HydroBase

Structure Name: BEAR CREEK DITCH NO 1 **Division:** 2 **Water District:** 10 **Structure Id:** 534

Location:	Q10	Q40	Q160	Section	Twnshp	Range	PM
				14	14S	67W	S

Distance From Section From N/S Line: From E/W Line:

UTM Coordinates (NAD 83): Northing (UTM 4298126 Easting (UTM x): 512223.9 Spotted from PLSS distances from section lines

Latitude/Longitude (decimal degrees): 38.831846 -104.859165

IYR	Identifier	FDU	LDU	DWC	Max Q/Date	NOB	NUS	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual Total	Unit
1958	Total	1957-11	10-1958	365	2.90 06-01	24	0	106.51	88.54	78.09	68.87	76.86	136.27	176.47	172.57	148.80	125.44	93.42	84.85	1356.69	AF
1959	Total	1958-11	10-1959	365	2.57 05-01	36	0	98.18	87.93	67.02	67.20	86.08	148.17	158.03	118.42	85.47	68.87	8.03	118.06	1111.45	AF
1960	Total	1959-11	10-1960	366	2.52 04-01	24	0	79.74	62.72	57.18	57.52	95.92	149.95	142.65	110.08	92.23	70.71	52.36	72.56	1043.64	AF
1961	Total	1960-11	10-1961	365	3.09 08-01	24	0	60.10	57.18	55.34	54.98	98.38	105.92	100.84	153.52	172.78	190.00	154.71	119.29	1323.05	AF
1964	Total	1964-04	10-1964	200	2.40 06-08	29	0	0.00	0.00	0.00	0.00	0.00	56.59	94.59	124.84	73.35	75.37	41.59	49.98	516.33	AF
1966	Total	1965-11	10-1966	359	2.40 07-25	70	0	95.53	111.93	83.90	66.09	72.79	87.77	95.01	74.86	84.81	113.50	81.58	60.08	1027.85	AF
1967	Total	1966-11	10-1967	365	6.52 06-01	69	0	39.89	68.93	62.80	54.01	62.94	77.32	76.80	188.79	184.82	172.72	106.12	103.74	1198.87	AF
1968	Total	1967-11	10-1968	366	3.39 05-06	71	0	90.57	83.27	84.99	69.94	89.02	108.04	165.62	132.08	100.50	128.25	96.42	86.02	1234.73	AF
1969	Total	1968-11	10-1969	356	5.11 06-18	67	0	65.30	76.07	70.26	59.15	68.23	85.39	102.25	193.93	142.04	118.55	111.77	155.47	1248.40	AF
1970	Total	1969-11	10-1970	365	4.63 05-27	365	0	152.02	120.70	103.24	89.26	95.19	171.30	234.19	188.47	148.47	132.56	104.09	104.35	1643.83	AF
1971	Total	1970-11	10-1971	365	3.68 05-01	365	0	92.75	105.11	90.92	79.70	83.37	117.17	183.28	146.18	112.11	92.03	83.31	80.33	1266.25	AF
1972	Total	1971-11	10-1972	366	2.40 09-05	366	0	77.36	75.59	72.87	61.23	70.43	74.12	81.74	65.56	56.07	64.23	108.08	72.79	880.08	AF
1973	Total	1972-11	10-1973	365	10.00 05-14	365	0	68.85	73.91	59.66	47.90	69.68	125.64	535.70	380.28	204.72	122.50	92.29	103.58	1884.70	AF

Legend for identifier string coding:

Source (S): 1 - Natural Streamflow, 2 - Reservoir Storage, 3 - Ground water (wells), 4 - Transbasin, 5 - Non-stream (springs, run-off), 6 - Combined, 7 - Transdistrict, 8 - Re-used, 9 - Multiple, R - Remeasured and rediverted

From (F): From structure WDID

Use (U): 0 - Storage, 1 - Irrigation, 2 - Municipal, 3 - Commercial, 4 - Industrial, 5 - Recreation, 6 - Fishery, 7 - Fire, 8 - Domestic, 9 - Stock, A - Augmentation, B - Export from basin, C - Cumulative accretion to river, D - Cumulative depletion from river, E - Evaporation, F - Federal reserve, G - Geothermal, H - Household use only, K - Snow making, M - Minimum streamflow, N - Net effect of river, P - Power generation, Q - Other, R - Recharge, S - Export from state, T - Transmountain export, W - Wildlife, X - All beneficial use

Diversion Type (T): 0 - Administrative record only, 1 - Exchange, 2 - Trade, 3 - Carrier, 4 - Alternate point of diversion, 5 - Re-used, 6 - Replacement to river, 7 - Released by river, 8 - Released to stream, A - Augmented, G - Geothermal,

Group (G): Group structure WDID

State of Colorado

Annual Water Diversion Report

HydroBase

Structure Name: BEAR CREEK PIPELINE **Division:** 2 **Water District:** 10 **Structure Id:** 535

Location:	Q10	Q40	Q160	Section	Twnshp	Range	PM
		SW	NE	21	14S	67W	S

Distance From Section From N/S Line: From E/W Line:

UTM Coordinates (NAD 83): Northing (UTM 4296724 Easting (UTM x): 509236.5 Spotted from PLSS distances from section lines

Latitude/Longitude (decimal degrees): 38.819242 -104.893602

IYR	Identifier	FDU	LDU	DWC	Max Q/Date	NOB	NUS	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual Total	Unit
1974	Total	1973-11	10-1974	365	1.69 03-18	349	0	88.66	87.08	84.85	77.06	90.55	81.26	86.76	68.99	59.74	62.50	46.67	70.49	904.62	AF
1974	S:1 F: U:8 T:	1973-11	10-1974	365	1.69 03-18	349	0	88.66	87.08	84.85	77.06	90.55	81.26	86.76	68.99	59.74	62.50	46.67	70.49	904.62	AF
1975	Total	1974-11	10-1975	365	7.20 06-16	365	0	58.89	53.97	61.37	50.54	65.99	84.40	89.56	213.48	168.44	137.44	95.49	81.24	1160.80	AF
1975	S:1 F: U:8 T:	1974-11	10-1975	365	7.20 06-16	365	0	58.89	53.97	61.37	50.54	65.99	84.40	89.56	213.48	168.44	137.44	95.49	81.24	1160.80	AF
1976	Total	1975-11	10-1976	366	3.39 09-27	160	0	79.58	75.02	64.88	61.29	60.16	79.38	102.45	79.48	54.88	101.12	90.33	115.56	964.12	AF
1976	S:1 F: U:8 T:	1975-11	10-1976	366	3.39 09-27	160	0	79.58	75.02	64.88	61.29	60.16	79.38	102.45	79.48	54.88	101.12	90.33	115.56	964.12	AF
1977	Total	1976-11	10-1977	365	2.88 05-02	113	0	83.09	76.19	68.07	56.09	66.63	111.87	127.78	87.69	60.74	100.07	63.10	63.08	964.38	AF
1977	S:1 F: U:8 T:	1976-11	10-1977	365	2.88 05-02	113	0	83.09	76.19	68.07	56.09	66.63	111.87	127.78	87.69	60.74	100.07	63.10	63.08	964.38	AF
1978	Total	1977-11	10-1978	365	2.40 05-15	117	0	59.19	54.94	49.71	47.82	58.63	65.93	110.34	79.62	60.04	49.03	35.21	47.84	718.31	AF
1978	S:1 F: U:8 T:	1977-11	10-1978	365	2.40 05-15	117	0	59.19	54.94	49.71	47.82	58.63	65.93	110.34	79.62	60.04	49.03	35.21	47.84	718.31	AF
1979	Total	1978-11	10-1979	358	6.92 04-23	115	0	47.80	46.35	41.26	42.98	65.73	250.10	231.12	272.95	190.87	126.27	96.36	85.97	1497.76	AF
1979	S:1 F: U:8 T:	1978-11	10-1979	358	6.92 04-23	115	0	47.80	46.35	41.26	42.98	65.73	250.10	231.12	272.95	190.87	126.27	96.36	85.97	1497.76	AF
1980	Total	1979-11	10-1980	296	5.86 04-28	99	0	83.23	84.02	81.30	84.36	86.76	127.66	46.49	0.00	144.08	178.87	140.17	124.60	1181.55	AF
1980	S:1 F: U:8 T:	1979-11	10-1980	296	5.86 04-28	99	0	83.23	84.02	81.30	84.36	86.76	127.66	46.49	0.00	144.08	178.87	140.17	124.60	1181.55	AF
1981	Total	1980-11	10-1981	365	3.83 08-03	112	0	111.49	114.51	96.83	82.75	97.73	96.89	95.96	124.17	139.14	183.89	113.18	95.66	1352.21	AF
1981	S:1 F: U:8 T:	1980-11	10-1981	365	3.83 08-03	112	0	111.49	114.51	96.83	82.75	97.73	96.89	95.96	124.17	139.14	183.89	113.18	95.66	1352.21	AF
1982	Total	1981-11	10-1982	365	6.39 08-23	122	0	90.31	78.17	81.44	78.73	81.80	87.59	161.46	271.48	170.22	235.34	236.26	170.54	1743.34	AF
1982	S:1 F: U:8 T:	1981-11	10-1982	365	6.39 08-23	122	0	90.31	78.17	81.44	78.73	81.80	87.59	161.46	271.48	170.22	235.34	236.26	170.54	1743.34	AF
1983	Total	1982-11	10-1983	323	10.60 06-20	103	0	136.35	115.84	105.88	84.95	93.90	139.98	169.09	147.18	447.64	445.53	279.99	208.51	2374.83	AF
1983	S:1 F: U:8 T:	1982-11	10-1983	323	10.60 06-20	103	0	136.35	115.84	105.88	84.95	93.90	139.98	169.09	147.18	447.64	445.53	279.99	208.51	2374.83	AF
1984	Total	1983-11	10-1984	366	7.48 10-08	120	0	158.70	150.65	121.35	103.76	109.21	150.09	254.78	173.66	124.33	197.68	203.71	313.04	2060.94	AF
1984	S:1 F: U:8 T:	1983-11	10-1984	366	7.48 10-08	120	0	158.70	150.65	121.35	103.76	109.21	150.09	254.78	173.66	124.33	197.68	203.71	313.04	2060.94	AF
1985	Total	1984-11	10-1985	347	9.54 05-20	108	0	351.24	199.36	165.23	117.70	128.23	301.51	244.69	375.30	285.03	329.18	222.39	181.01	2900.87	AF
1985	S:1 F: U:8 T:	1984-11	10-1985	347	9.54 05-20	108	0	351.24	199.36	165.23	117.70	128.23	301.51	244.69	375.30	285.03	329.18	222.39	181.01	2900.87	AF
1986	Total	1985-11	10-1986	365	2.68 11-04	118	0	150.59	137.89	125.40	105.70	123.02	47.19	53.14	122.07	103.22	104.49	75.55	83.13	1231.38	AF
1986	S:1 F: U:8 T:	1985-11	10-1986	365	2.68 11-04	118	0	150.59	137.89	125.40	105.70	123.02	47.19	53.14	122.07	103.22	104.49	75.55	83.13	1231.38	AF
1987	Total	1986-11	10-1987	358	5.86 05-11	114	0	79.10	72.93	64.48	65.77	116.63	125.71	332.42	233.14	172.41	139.28	127.74	103.82	1633.43	AF
1987	S:1 F: U:8 T:	1986-11	10-1987	358	5.86 05-11	114	0	79.10	72.93	64.48	65.77	116.63	125.71	332.42	233.14	172.41	139.28	127.74	103.82	1633.43	AF
1988	Total	1987-11	10-1988	359	2.49 04-18	113	0	94.55	89.28	79.02	71.29	75.29	107.84	117.13	100.78	94.57	124.27	60.99	82.02	1097.03	AF
1988	S:1 F: U:8 T:	1987-11	10-1988	359	2.49 04-18	113	0	94.55	89.28	79.02	71.29	75.29	107.84	117.13	100.78	94.57	124.27	60.99	82.02	1097.03	AF
1989	Total	1988-11	10-1989	357	2.13 05-21	0	172	69.80	70.36	70.85	62.68	78.27	86.14	110.30	78.55	72.91	74.30	37.51	44.09	855.76	AF

IYR	Identifier	FDU	LDU	DWC	Max Q/Date	NOB	NUS	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual Total	Unit
1989	S:1 F: U:2 T:	1988-11	10-1989	357	2.13 05-21	0	172	69.80	70.36	70.85	62.68	78.27	86.14	110.30	78.55	72.91	74.30	37.51	44.09	855.76	AF
1990	Total	1989-11	10-1990	364	18.25 05-23	0	59	291.77	293.10	255.18	247.24	354.87	224.24	429.94	243.57	71.51	301.55	171.77	126.05	3010.79	AF
1990	S:1 F: U:2 T:	1989-11	10-1990	364	18.25 05-23	0	59	291.77	293.10	255.18	247.24	354.87	224.24	429.94	243.57	71.51	301.55	171.77	126.05	3010.79	AF
1991	Total	1990-11	10-1991	325	1.54 01-01	0	317	40.74	25.77	32.49	36.38	24.40	60.14	46.28	42.31	49.55	23.25	29.85	38.32	449.46	AF
1991	S:1 F: U:2 T:	1990-11	10-1991	325	1.54 01-01	0	317	40.74	25.77	32.49	36.38	24.40	60.14	46.28	42.31	49.55	23.25	29.85	38.32	449.46	AF
1992	Total	1991-11	10-1992	343	2.97 08-29	0	343	36.87	27.17	20.75	47.41	53.22	35.86	42.45	45.48	38.22	85.21	81.19	87.51	601.33	AF
1992	S:1 F: U:2 T:	1991-11	10-1992	343	2.97 08-29	0	343	36.87	27.17	20.75	47.41	53.22	35.86	42.45	45.48	38.22	85.21	81.19	87.51	601.33	AF
1993	Total	1992-11	10-1993	331	3.73 12-10	0	331	76.09	105.42	104.53	91.04	99.12	114.45	111.41	86.46	76.27	77.32	77.85	11.68	1031.64	AF
1993	S:1 F: U:2 T:	1992-11	10-1993	331	3.73 12-10	0	331	76.09	105.42	104.53	91.04	99.12	114.45	111.41	86.46	76.27	77.32	77.85	11.68	1031.64	AF

Legend for identifier string coding:

Source (S): 1 - Natural Streamflow, 2 - Reservoir Storage, 3 - Ground water (wells), 4 - Transbasin, 5 - Non-stream (springs, run-off), 6 - Combined, 7 - Transdistrict, 8 - Re-used, 9 - Multiple, R - Remeasured and rediverted

From (F): From structure WDID

Use (U): 0 - Storage, 1 - Irrigation, 2 - Municipal, 3 - Commercial, 4 - Industrial, 5 - Recreation, 6 - Fishery, 7 - Fire, 8 - Domestic, 9 - Stock, A - Augmentation, B - Export from basin, C - Cumulative accretion to river, D - Cumulative depletion from river, E - Evaporation, F - Federal reserve, G - Geothermal, H - Household use only, K - Snow making, M - Minimum streamflow, N - Net effect of river, P - Power generation, Q - Other, R - Recharge, S - Export from state, T - Transmountain export, W - Wildlife, X - All beneficial use

Diversion Type (T): 0 - Administrative record only, 1 - Exchange, 2 - Trade, 3 - Carrier, 4 - Alternate point of diversion, 5 - Re-used, 6 - Replacement to river, 7 - Released by river, 8 - Released to stream, A - Augmented, G - Geothermal,

Group (G): Group structure WDID

Diversion Comment Report

State of Colorado HydroBase

Structure Name: **BEAR CREEK EXCHANGE** **Division:** **2** **Water District:** **10** **Structure Id:** **7043**

Location:	Q10	Q40	Q160	Section	Twnshp	Range	PM
		SW	NE	21	14S	67W	S

Distance From Section Lines: From N/S Line: From E/W Line:

UTM Coordinates (NAD 83): Northing (UTM 4296724 Easting (UTM x): 509236.5

Latitude/Longitude (decimal degrees): 38.819242 -104.893602

IYR	Not Used Code	Acres Irrigated	Diversion Comment
1999		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK
2000		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK
2001		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK
2002		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK
2003		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK
2004		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK
2005		0	COLORADO SPRINGS MAY EXCHANGE TM RETURN FLOWS AT BEAR CREEK