Stream: Beaver Creek

Executive Summary

Water Division: 6
Water District: 56
CDOW#: 19124
CWCB ID#: 06/06/A-011

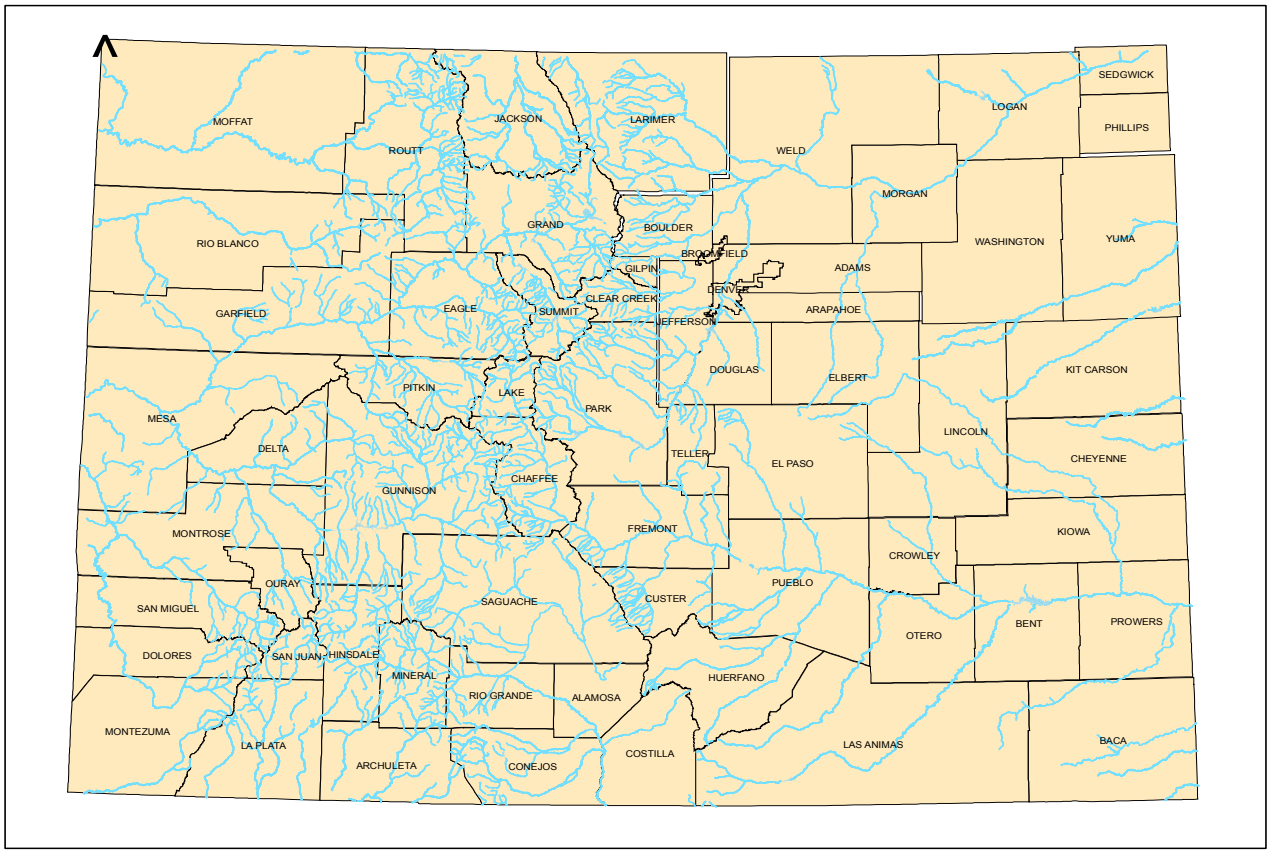
Segment:

Upper Terminus: 2 Bar Creek
Latitude: 40d56'06.8"N Longitude: 108d58'02.48"W
UTM North: 4539149.895 UTM East: 165974.661
SE1/4, SW1/4, Sctn3, T11N, R103W
1504 ft E of the W Section Line, 98 ft, N of the S Section Line

Lower Terminus: Utah Border
Latitude: 40d54'40.75"N Longitude: 109d02'57.47"W
UTM North: 4536812.186 UTM East: 158951.006
NW1/4, SW1/4, Sctn13, T11N, R104W
0 ft E of the W Section Line, 2021 ft, N of the S Section Line

Counties: Moffat
Length: 5.35 miles
USGS Quad(s): Beaver Basin, Willow Creek Butte
ISF Appropriation: 1.8 cfs (May 1 to October 31), 1.1 cfs (November 1 to April 30)

Beaver Creek



Summary
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 Board. It is staff's opinion that the information contained in this report is sufficient to support the findings required in Rule 5 i.

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. The Bureau of Land Management (BLM) recommended this segment of Beaver Creek to the CWCB for inclusion into the Instream Flow Program. Beaver 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.

The BLM is forwarding this recommendation to the CWCB for multiple reasons. The stream supports brook trout in the lower portion of the reach and Colorado River Cutthroat Trout in the upper portion of the reach. BLM's wildlife management policy is to establish alternative means

of protecting the habitat of sensitive species to prevent the listing of species under the Endangered Species Act. In addition, the stream reach flows through BLM's West Cold Spring Wilderness Study Area and BLM is interested in maintaining the pristine character of the creek. Despite the roadless character of the reach, there is still potential for the reach to be dewatered, because the reach is located midstream and private lands are located upstream. Finally, the creek supports a healthy and diverse riparian community.

Beaver Creek is approximately 14.5 miles long. It begins on the south flank of Middle Mountain at an elevation of approximately 9200 feet and terminates at the confluence with the Green River at an elevation of 5,400 feet. Approximately one mile of the creek flows through the State of Utah. Of the 5.35 mile segment addressed by this report, approximately 96% of the segment, or 5.1 miles, is located on public lands, while the remainder of the segment, 0.25 miles, is located on private lands. Beaver Creek is located within Moffat County. The total drainage area of the river is approximately 44.17 square miles. Beaver Creek generally flows in a southerly direction.

The CWCB holds an existing instream flow water right on Beaver Creek downstream from the segment recommended in this report. The existing instream flow water right begins at the Utah-Colorado border and extends 4.7 miles downstream to the headgate of the Jarvee Ditch. The instream flow right for this reach holds a 1992 priority for 3.25 cubic feet per second from April 1 through August 31, and 2.0 cfs from September 1 through March 31.

The subject of this report is a segment of the Beaver Creek beginning at the confluence with 2 Bar Creek and extending downstream to the Utah-Colorado border. The proposed segment is located north of Brown's Park National Wildlife Refuge and Dinosaur National Park. The staff has received one recommendation for this segment from the BLM. The recommendation for this segment is discussed below.

Instream Flow Recommendation(s)

The BLM has recommended 1.8 cfs, summer, and 1.1 cfs, winter, based on its data collection efforts (see Table 1 and Appendix A). The modeling results from this survey effort are within the confidence interval produced by the R2CROSS model.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
2 Bar Creek	Utah Border	5.35	4%	96%

79% of the public lands are owned by the BLM and 17% of the public lands are owned by the CDOW.

Biological and Field Survey Data

The BLM and CDOW have conducted field surveys of the fishery resources on this stream and have found a natural environment that can be preserved. As reported in the letter from BLM to the CWCB "Beaver Creek is classified as a small, high gradient stream with a stable channel and large substrate. Cover, woody debris, water temperatures, and aquatic insect density are excellent

for supporting salmonid populations. Fishery surveys indicate the stream environment supports self-sustaining populations of mottled sculpin, brook trout, and Colorado River Cutthroat Trout." (See Fish Survey in Appendix B).

Field Survey Data

BLM 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 CWCB staff relied 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 BLM 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 the stream, two 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)
BLM	09/04/2003	1.08	0.4 – 2.7	1.9	0.9
BLM	09/04/2003	1.69	0.7 – 4.2	1.7	1.3

BLM = Bureau of Land Management DOW = Division of Wildlife
(1) Predicted flow outside of the accuracy range of Manning's Equation. ? = Criteria never met in R2PRUDEN Staging Table.
* Estimated Flow based on a calculated D^{84} value of 0.55.

Biologic Flow Recommendation

The summer flow recommendation, which met 3 of 3 criteria and is within the accuracy range of the R2CROSS model is 1.8 cfs. (See Table 1). The winter flow recommendation, which met 2 of 3 criteria and is within the accuracy range of the R2CROSS model range is 1.1 cfs (See Table 1). These recommendations were derived by averaging the results of the two cross sections.

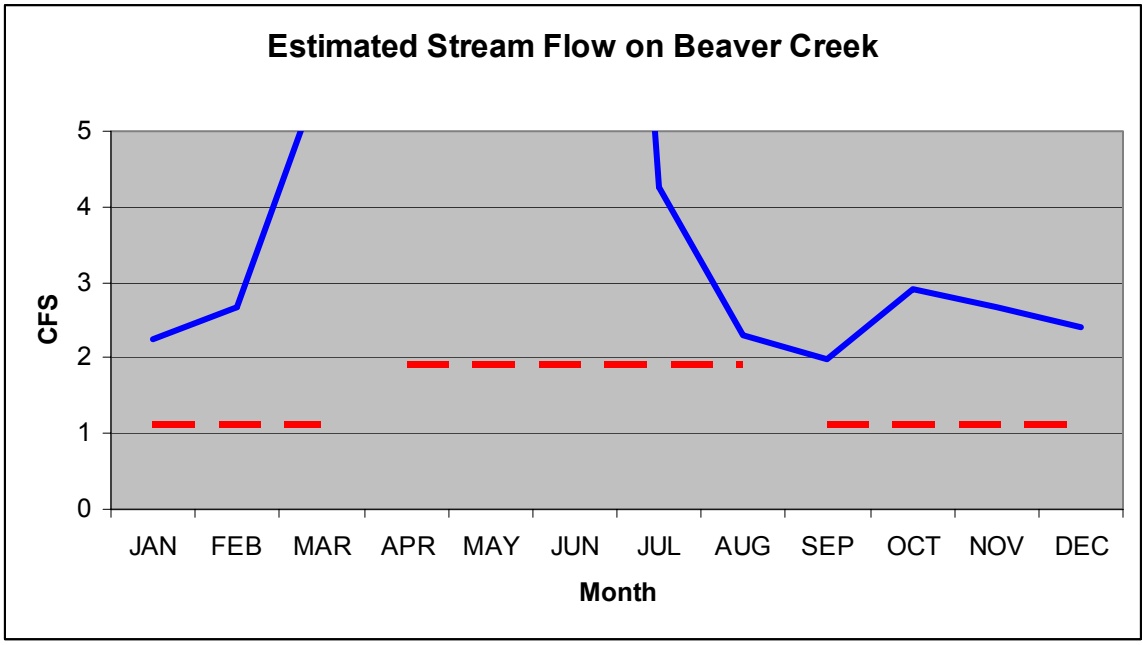
Hydrologic Data

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. Because there are no existing stream gages on Beaver Creek or similar watersheds in the region, the next best approach is to use a regional equation that estimates annual flow characteristics. The USGS has developed regional equations (Estimation of Natural Streamflow Characteristics in Western Colorado, Water Resources Investigations Report 85-4086, 1985) that apply to Beaver Creek based on basin drainage area, mean annual precipitation, mean basin elevation, and mean basin slope. The total drainage area of Beaver Creek is approximately 44.17 square miles.

For this reach, the synthetic hydrograph shows that the summer flow recommendation of 1.9 cfs is available only from April 1 to August 31, and the winter flow recommendation of 1.1 cfs is available from September 1 to March 31. Table 2 below displays the estimated average monthly stream flow in Beaver Creek.

Table 2: Estimated Stream Flow in Beaver Creek

	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	oct
cfs	2.67	2.4	2.25	2.67	5.73	6.78	10.62	19.65	4.25	2.31	1.99	2.91

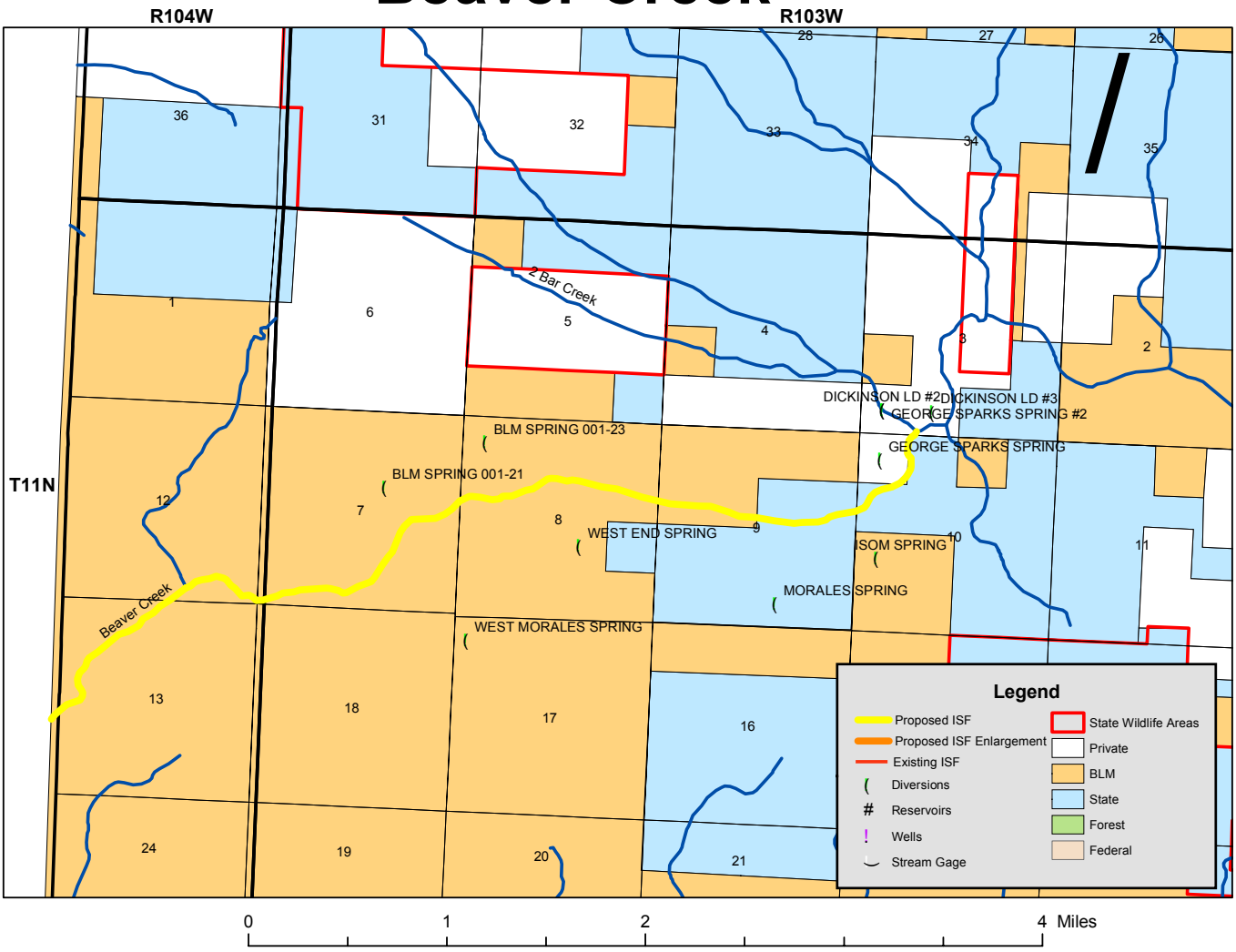


Existing Water Right Information

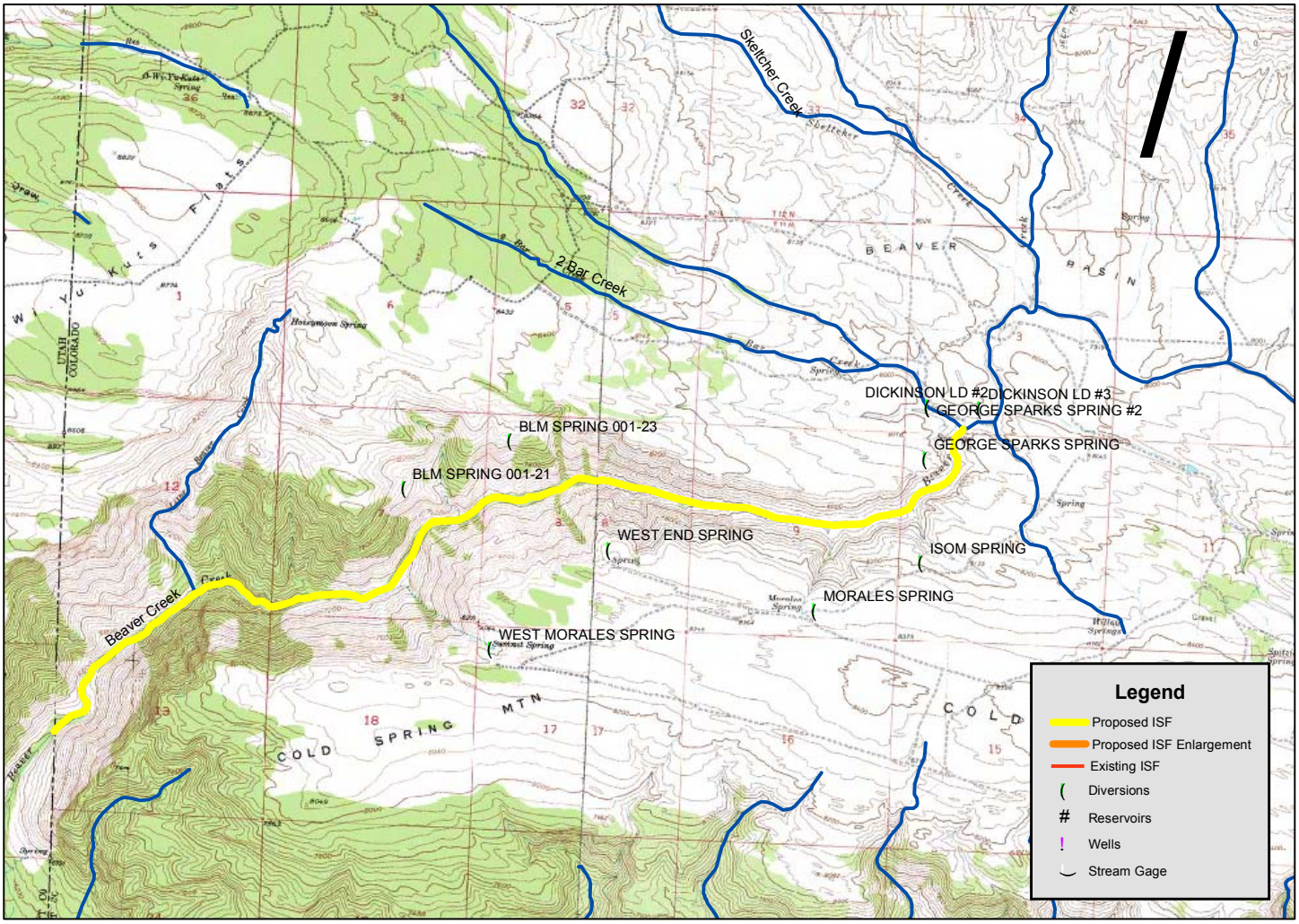
Staff has analyzed the water rights tabulation and consulted with the Division Engineer's Office (DEO) to identify any potential water availability problems. Records indicate that there are no surface water diversions located within this reach of Beaver Creek. According to the DEO, there is usually sufficient water available within this stream reach to satisfy the recommended instream flow amount. Based on this analysis, staff has determined that water is available for

appropriation on Beaver Creek, from 2 Bar Creek to the Utah border, to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

Beaver Creek



Beaver Creek



CWCB Staff's Instream Flow Recommendation
Based on the BLM recommendation, staff recommends the Board form its intent to appropriate on the following stream reach:

Stream Name: Beaver Creek

Segment:

Upper Terminus: 2 Bar Creek
Latitude: 40d56'06.8"N Longitude: 108d58'02.48"W
UTM North: 4539149.895 UTM East: 165974.661
SE1/4, SW1/4, Sctn3, T11N, R103W, 6th PM
1504 ft E of the W Section Line, 98 ft, N of the S Section Line

Lower Terminus: Utah Border
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0 ft E of the W Section Line, 2021 ft, N of the S Section Line

Counties: Moffat
Length: 5.35 miles
USGS Quad(s): Beaver Basin, Willow Creek Butte
ISF Appropriation: 1.8 cfs (May 1 to October 31), 1.1 cfs (November 1 to April 30)

APPENDIX – A
ISF Recommendation

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7093

www.co.blm.gov

IN REPLY REFER TO:
CO-932
7250

DEC 14 2005

Mr. Dan Merriman
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

Dear Mr Merriman:

The Bureau of Land Management (BLM) is writing this letter to formally communicate its instream flow recommendation for Beaver Creek, located in Water Division 6.

Location and Land Status. Beaver Creek is tributary to the Green River near the Colorado-Utah border in Brown's Park. This recommendation covers the stream reach beginning at the confluence with 2 Bar Creek and extends downstream to the Colorado-Utah border. Approximately 96% of the 5.35- mile reach is federally owned, while the remaining 4% is privately owned.

Biological Summary. Beaver Creek is classified as a small, high gradient stream with a stable channel and large substrate. Cover, woody debris, water temperatures, and aquatic insect density are excellent for supporting salmonid populations. Fishery surveys indicate the stream environment supports self-sustaining populations of mottled sculpin, brook trout, and Colorado River Cutthroat Trout. The riparian community is vigorous and diverse, providing sufficient cover for maintaining water temperatures suitable for salmonids even during low flow, high temperature periods.

R2Cross Analysis. BLM's data analysis, coordinated with the Division of Wildlife, indicates that the following flows are needed to protect the fishery and natural environment to a reasonable degree.

1.8 cubic feet per second is recommended for the high temperature period from May 1 to October 31. This recommendation is driven by the average velocity criteria and wetted perimeter criteria. Many portions of this reach have large substrate, and it is important to provide adequate velocity and physical habitat in this type of environment for fish spawning and incubation of eggs. Protecting flows during this time period is also important for recharging the alluvial aquifer, which discharges water to the stream and maintains flow levels during later summer.

1.1 cubic feet per second is recommended from November 1 through April 30 This recommendation is driven by the average depth criteria. This flow rate will allow fish to survive in pools, provide sufficient physical habitat in riffles between pools, and will prevent the riparian environment from being seriously stressed.

Water Availability. BLM is not aware of any decreed water rights within this reach. However, there are three decreed ditches located upstream on a tributary to Beaver Creek called Skeltcher Creek. These ditches include Corral Ditch #1 and Allen Ditches 1 and 2. In addition, there are numerous small reservoirs and spring developments located in the watersheds that feed Beaver Creek. BLM is not aware of any historic gaging information for this creek As an alternative, BLM recommends that the CWCB compare the size of this watershed with the watershed that feeds USGS Gage 09235450, Vermillion Creek at Ink Springs Ranch. When using the Vermillion Creek gage, adjustments must be made for diversions located upstream. Another indication of water availability would be diversion records for ditches located downstream in Brown's Park National Wildlife Refuge.

Relationship to Management Plans. This stream reach flows through BLM's West Cold Spring Wilderness Study Area and accordingly, BLM is interested in maintaining the pristine character of the creek. Despite the roadless character of the reach, there is still potential for the reach to be dewatered, because the reach is located midstream and private lands are located upstream. This fishery has been maintained because of the remote location of the creek and very low fishing pressure. In addition, the creek is a recreational resource for individuals who traverse the wilderness study area via the trail that parallels the creek.

The BLM requests that the Board recognize that this recommendation is based only upon the minimum flows necessary to support cold-water fishery values. BLM may wish to work with the Board and/or through the Colorado water rights system to appropriate flows to optimally protect fish values and to protect other water-dependent values specified in BLM resource management plans.

Data sheets, R2Cross output, fishery survey information, and photographs of the cross section are enclosed to support this recommendation. We thank both the Division of Wildlife and the Water Conservation Board for their cooperation in this effort.

If you have any questions regarding our instream flow recommendation, please contact Roy Smith at 303-239-3940.

Sincerely,

/s/ Linda M. Anañia

Linda M. Anañia
Deputy State Director
Resources and Fire

4 Enclosures

cc: John Husband, Little Snake Field Office
Ole Olsen, Little Snake Field Office
David Blackstun, Little Snake Field Office

APPENDIX – B
Field Data

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Beaver Creek | CROSS-SECTION NO.: 2

CROSS-SECTION LOCATION: 300 ft. upstream from Colo-Utah border

DATE: 9-4-03 | OBSERVERS: R. Smith, G. Roberts, J. McClain

LEGAL DESCRIPTION | % SECTION: SW | SECTION: 13 | TOWNSHIP: 11 (N)S | RANGE: 104 (E)W | PM: 6th

COUNTY: Moffatt | WATERSHED: Green | WATER DIVISION: 6 | DOW WATER CODE: 19124

MAP(S) | USGS: Willow Creek Butte Colo-Utah 7.5' | USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES) NO | METER TYPE: Marsh-McBirney

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

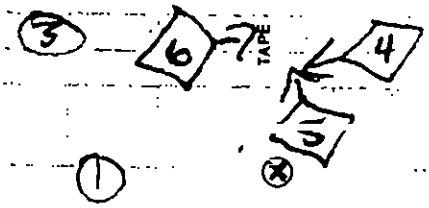
CHANNEL BED MATERIAL SIZE RANGE: gravel to 1-foot boulders | PHOTOGRAPHS TAKEN: (YES) NO | NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	5.56 / 5.55
② WS Upstream	18.0'	4.60
③ WS Downstream	9.0'	5.82

SLOPE: 1.22'/27.0' = 0.04518

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
see attached survey																	

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

caddisfly, stonefly, abundant insects

COMMENTS

TDS = 230
Ph = 7.6
Temp = 11°C

riparian in superb condition
water cress = groundwater fed
abundant woody debris
muddy of cobbls

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Beaver Creek | CROSS-SECTION NO: 2 | DATE: 9-4-03 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM. (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading: 0.4 ft | TIME: 12:15

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)
RS	0.0										
G	1.7		4.90								
	4.0		5.02								
	6.0		5.34								
W	6.6		5.55	0							
R	7.0		5.52	0					0.00		
	7.5		5.62	0.05					0.16		
	7.8		5.62	0.05					1.26		
	8.1		5.64	0.10					2.20		
	8.4		5.74	0.20					1.38		
	8.7		5.60	0.05					0.94		
	9.0		5.94	0.40					1.76		
	9.3		5.96	0.40					1.14		
	9.6		5.72	0.15					0.70		
	9.9		5.68	0.10					0.00		
	10.2		5.62	0.05					0.00		
	10.5		5.62	0.05					0.13		
	10.8		5.74	0.20					0.69		
	11.1		5.86	0.30					1.06		
	11.4		5.98	0.45					0.95		
	11.7		6.02	0.50					0.48		
	12.0		5.92	0.40					2.28		
	12.3		5.98	0.45					0.98		
	12.6		5.84	0.30					0.80		
	12.9		5.96	0.40					1.86		
	13.2		5.86	0.30					0.80		
	13.6		5.68	0.15					0.00		
W	13.9		5.56	0					0.00		
S+G	16.0		4.92								

TOTALS:

End of Measurement | Time 12:40 | Gage Reading 0.4 ft | CALCULATIONS PERFORMED BY | CALCULATIONS CHECKED BY

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

LOCATION INFORMATION

STREAM NAME	Beaver Creek
XS LOCATION	300 ft upstream from CO - Utah border
XS NUMBER	2
DATE	9/4/03
OBSERVERS	Smith, Roberts, McClain
1/4 SEC	SW
SECTION	13
TWP	11N
RANGE	104W
PM	6th
COUNTY	Moffat
WATERSHED	Green
DIVISION	6
DOW CODE	19124
USGS MAP	Willow Creek Butte 7.5' quad
USFS MAP	

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	0.04518

INPUT DATA CHECKED BY . DATE .

ASSIGNED TO . . . . DATE

STREAM NAME: Beaver Creek
XS LOCATION: 300 ft. upstream from CO - Utah border
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.69 cfs
CALCULATED FLOW (Qc)=	1.71 cfs
(Qm-Qc)/Qm * 100 =	-1.1 %
MEASURED WATERLINE (WLm)=	5.54 ft
CALCULATED WATERLINE (WLc)=	5.55 ft
(WLm-WLc)/WLm * 100 =	-0.2 %
MAX MEASURED DEPTH (Dm)=	0.5 ft
MAX CALCULATED DEPTH (Dc)=	0.47 ft
(Dm-Dc)/Dm * 100	5.9 %
MEAN VELOCITY=	1.11 ft/sec
MANNING'S N=	0.101
SLOPE=	0.04518 ft/ft
.4 * Qm =	0.7 cfs
2.5 * Qm=	4.2 cfs

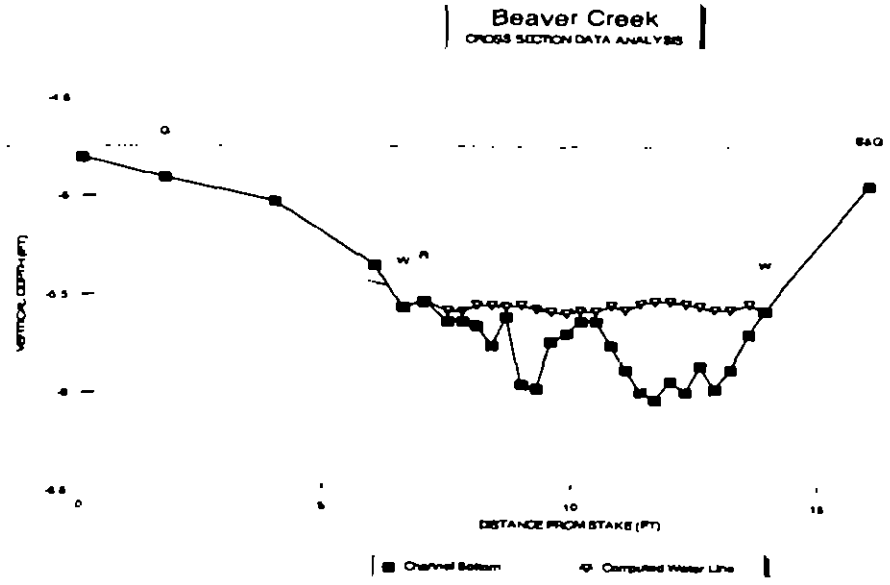
RECOMMENDED INSTREAM FLOW

FLOW (CFS)	PERIOD
1.32	Winter
1.69	Summer

RATIONALE FOR RECOMMENDATION

RECOMMENDATION BY AGENCY DATE

CWCB REVIEW BY DATE



STREAM NAME Beaver Creek
XS LOCATION 300 ft. upstream from CO - Utah border
XS NUMBER 2

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

STAGING TABLE

	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)
	4 92	13 92	0 56	1 1	7 73	14 61	100 00%	0.53	15 81	2.04
	4 95	13 25	0.55	1 07	7 33	13 94	95 40%	0.53	14 92	2 03
	5	12 13	0.55	1 02	6 7	12 8	87 70%	0.52	13.57	2 03
GL	5 05	11.39	0 54	0 97	6 11	12 06	82.50%	0.51	12 13	1 99
	5 1	10 91	0 51	0 92	5.55	11.57	79.20%	0 48	10 64	1 91
	5 15	10 44	0 48	0 87	5 02	11 08	75 80%	0 45	9 25	1 84
	5 2	9 96	0 45	0 82	4 51	10.59	72 50%	0 43	7 97	1 77
	5 25	9 48	0 42	0 77	4 02	10 1	69 20%	0 4	6 8	1 69
	5 3	9 01	0 4	0 72	3 56	9 62	65 80%	0 37	5 74	1 61
	5 35	8 56	0 36	0 67	3 12	9 16	62 70%	0 34	4 76	1 52
	5 4	8 26	0 33	0 62	2 7	8 84	60 50%	0 31	3 83	1 42
	5 45	7 95	0 29	0 57	2 3	8 51	58 30%	0 27	3	1 3
	5 5	7 64	0 25	0 52	1 91	8 19	56 10%	0 23	2 26	1 18
	5.55	6 79	0 23	0 47	1 54	7 31	50 10%	0 21	1 71	1 11
	5 6	6 4	0 19	0 42	1 21	6 92	47 40%	0 18	1 19	0 98
	5 65	4 87	0 19	0 37	0 93	5 33	36.50%	0 17	0 91	0 98
WL	5 7	4 03	0 18	0 32	0 71	4 42	30 30%	0 16	0 65	0 92
	5 75	3 35	0 16	0 27	0 53	3 68	25 20%	0 14	0 45	0 85
	5 8	3 01	0 12	0 22	0 37	3 27	22 40%	0 11	0 27	0 73
	5 85	2 62	0 09	0 17	0 23	2 82	19 30%	0 08	0 13	0 58
	5 9	2 02	0 05	0 12	0 11	2 13	14 60%	0 05	0 05	0 43
	5 95	1 03	0 03	0 07	0 03	1 06	7 30%	0 03	0 01	0 28
	6	0 21	0 01	0 02	0	0 22	1.50%	0 01	0	0 14

Criteria

Range 0.7 - 4.2 cfs

1) $0.2' \overline{d}$ = 1.32 cfs

2) 50% WP = 1.69 cfs

3) 1 ft/sec $\overline{v}$ = 1.28 cfs

STREAM NAME Beaver Creek
XS LOCATION 300 ft. upstream from CO - Utah border
XS NUMBER 2

PROOF SHEET

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
5 29	1 54	3 65	136 70%
5 31	1 54	3 47	125 00%
5 33	1 54	3 29	113 60%
5 35	1 54	3 12	102 40%
5 37	1 54	2 95	91 30%
5 39	1 54	2 78	80 50%
5 41	1 54	2 62	69 80%
5 43	1 54	2 46	59 20%
5 45	1 54	2 3	48 90%
5 47	1 54	2 14	38 60%
5 49	1 54	1 98	28 60%
5 5	1 54	1 91	23 60%
5 51	1 54	1 83	18 70%
5 52	1 54	1 75	13 80%
5 53	1 54	1 68	9 00%
5 54	1 54	1 61	4 30%
5 55	1 54	1 54	-0 10%
5 56	1 54	1 47	-4 50%
5 57	1 54	1 41	-8 80%
5 58	1 54	1 3[illegible]	-13 10%
5 59	1 54	1 28	-17 30%
5 61	1 54	1 15	-25 60%
5 63	1 54	1 03	-33 20%
5 65	1 54	0 93	-39 70%
5 67	1 54	0 84	-45 90%
5 69	1 54	0 75	-51 50%
5 71	1 54	0 67	-56 70%
5 73	1 54	0 59	-61 50%
5 75	1 54	0 53	-66 00%
5 77	1 54	0 46	-70 20%
5 79	1 54	0 4	-74 30%

WATERLINE AT ZERO
AREA ERROR = 5 55

INPUT DATA # DATA POINTS= 29

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	TAPE TO WATER
S	0	4 8	0	0	0	0	0
G	1 7	4 9	0	0	0	0	0
	4	5 02	0	0	0	0	0
	6	5 34	0	0	0	0	0
W	6 6	5 55	0	0	0	0	0
R	7	5 52	0	0	0	0	0
	7 5	5 62	0 05	0 16	0 02	0	5 57
	7 8	5 62	0 05	1 26	0 02	0 02	5 57
	8 1	5 64	0 1	2 2	0 03	0 07	5 54
	8 4	5 74	0 2	1 38	0 06	0 08	5 54
	8 7	5 6	0 05	0 94	0 02	0 01	5 55
	9	5 94	0 4	1 76	0 12	0 21	5 54
	9 3	5 96	0 4	1 14	0 12	0 14	5 56
	9 6	5 72	0 15	0 7	0 04	0 03	5 57
	9 9	5 68	0 1	0	0 03	0	5 58
	10 2	5 62	0 05	0	0 02	0	5 57
	10 5	5 62	0 05	0 13	0 02	0	5 57
	10 8	5 74	0 2	0 69	0 06	0 04	5 54
	11 1	5 86	0 3	1 06	0 09	0 1	5 56
	11 4	5 98	0 45	0 95	0 13	0 13	5 53
	11 7	6 02	0 5	0 48	0 15	0 07	5 52
	12	5 92	0 4	2 28	0 12	0 27	5 52
	12 3	5 98	0 45	0 98	0 14	0 13	5 53
	12 6	5 84	0 3	0 8	0 09	0 07	5 54
	12 9	5 96	0 4	1 86	0 12	0 22	5 56
	13 2	5 86	0 3	0 8	0 11	0 08	5 56
	13 6	5 68	0 15	0	0 05	0	5 53
W	13 9	5 56	0	0	0	0	0
S&G	16	4 92	0	0	0	0	0
				TOTALS	1 54	1 69	

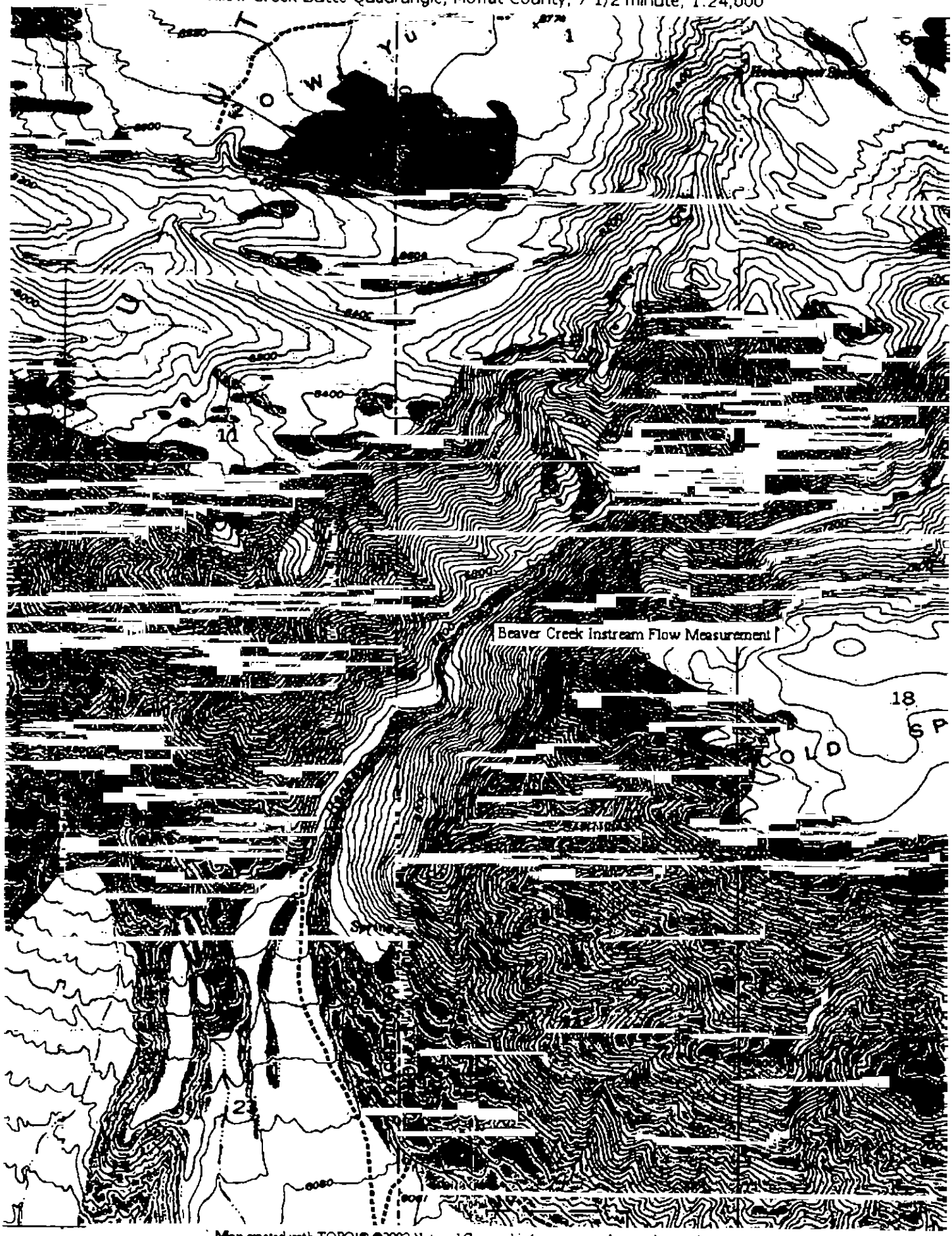
STREAM NAME: Beaver Creek
XS LOCATION: 300 ft. upstream from CO - Utah border
XS NUMBER: 2

INPUT DATA # DATA POINTS= 29 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	4 8	0	0	0	0	0	0	0 00%
G	1 7	4 9	0	0	0	0	0	0	0 00%
	4	5 02	0	0	0	0	0	0	0 00%
	6	5 34	0	0	0	0	0	0	0 00%
W	6 6	5 55	0	0	0	0	0	0	0 00%
R	7	5.52	0	0	0	0	0	0	0.00%
	7 5	5 62	0 05	0 16	0 51	0 05	0 02	0	0 20%
	7 8	5 62	0 05	1 26	0 3	0 05	0 02	0 02	1 10%
	8 1	5 64	0 1	2 2	0 3	0 1	0 03	0 07	3 90%
	8 4	5 74	0 2	1 38	0 32	0 2	0 06	0 08	4 90%
	8 7	5 6	0 05	0 94	0 33	0 05	0 02	0 01	0 80%
	9	5 94	0 4	1 76	0 45	0 4	0 12	0 21	12 50%
	9 3	5 96	0 4	1 14	0 3	0 4	0 12	0 14	8 10%
	9 6	5 72	0 15	0 7	0 38	0 15	0 04	0 03	1 90%
	9 9	5 68	0 1	0	0 3	0 1	0 03	0	0 00%
	10 2	5 62	0 05	0	0 31	0 05	0 02	0	0 00%
	10 5	5 62	0 05	0 13	0 3	0 05	0 02	0	0 10%
	10 8	5 74	0 2	0 69	0 32	0 2	0 06	0 04	2 50%
	11 1	5 86	0 3	1 06	0 32	0 3	0 09	0 1	5 60%
	11 4	5 98	0 45	0 95	0 32	0 45	0 13	0 13	7 60%
	11 7	6 02	0 5	0 48	0 3	0 5	0 15	0 07	4 30%
	12	5 92	0 4	2 28	0 32	0 4	0 12	0 27	16 20%
	12 3	5 98	0 45	0 98	0 31	0 45	0 14	0 13	7 80%
	12 6	5 84	0 3	0 8	0 33	0 3	0 09	0 07	4 30%
	12 9	5 96	0 4	1 86	0 32	0 4	0 12	0 22	13 20%
	13 2	5 86	0 3	0 8	0 32	0 3	0 11	0 08	5 00%
	13 6	5 68	0 15	0	0 44	0 15	0 05	0	0 00%
W	13 9	5 56	0	0	0 32	0	0	0	0 00%
S&G	16	4 92	0	0	0	0	0	0	0 00%
TOTALS					7 43	0 5 (Max)	1 54	1 69	100 00%

Manning's n = 0 1011

Willow Creek Butte Quadrangle, Moffat County, 7 1/2 minute, 1:24,000



FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

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

CROSS-SECTION LOCATION: 300 ft. upstream from Colo - Utah border

DATE: 9-4-03 | OBSERVERS: R. Smith, J. McClain, G. Roberts

LEGAL DESCRIPTION | ¼ SECTION: SW | SECTION: 13 | TOWNSHIP: 11 (N)/S | RANGE: 104 E/(W) 6th PM

COUNTY: Moffatt | WATERSHED: Green | WATER DIVISION: 6 | DOW WATER CODE: 19124

MAP(S) | USGS: Willow Creek Butte, Colo-Utah 7.5' | USFS: | GPS T12 0664727 4531135 ±600 ft

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION (YES)/NO | METER TYPE: Marsh-McBirney

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

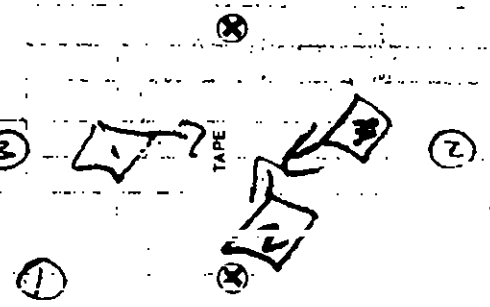
CHANNEL BED MATERIAL SIZE RANGE: gravel to 1-foot boulder | PHOTOGRAPHS TAKEN (YES)/NO | NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	4.32 / 4.32
② WS Upstream	16.0	3.54
③ WS Downstream	15.3	4.69

SLOPE | 1.14 / 31.3' = 0.0364

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

Coagulatfly stoneflies abundant insects

COMMENTS

TA< = 230
Ph = 7.6
Temp = 11°C

Riparian in severe condition
Water uses indicates ammoniated water fed stream
Abundant woody debris
Density of roots

ISF FD:1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Beaver Creek | CROSS-SECTION NO 1 | DATE 9-4-03 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading 0.3 ft | TIME 11:15 am

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.0		3.38								
G	2.0		3.78								
	4.0		3.95								
	6.0		4.02								
W	5.8		4.32	Ø							
	6.1		4.38	0.05					0.0		
	6.4		4.52	0.20					0.0		
	6.7		4.56	0.25					0.0		
	7.0		4.50	0.20					0.74		
	7.3		4.[illegible]	0.25					1.00		
	7.6		4.58	0.25					1.34		
	7.9		4.62	0.30					1.85		
	8.2		4.51	0.25					1.22		
	8.5		4.60	0.25					0.79		
	8.8		4.74	0.40					0.91		
	9.1		4.60	0.30					1.05		
	9.4		4.68	0.35					1.03		
	9.7		4.64	0.35					1.02		
	10.0		4.78	0.55					0.38		
	10.3		4.58	0.25					0.37		
	10.6		4.48	0.15					0.59		
	10.9		4.34	0.05					0.28		
W	11.5		4.32	Ø					0.0		
G	12.5		3.90								
RS	13.3		2.58								

TOTALS

End of Measurement | Time 11:30 | Gage Reading 0.3 ft | CALCULATIONS PERFORMED BY | CALCULATIONS CHECKED BY

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

LOCATION INFORMATION

STREAM NAME	Beaver Creek
XS LOCATION	300 ft upstream from CO - Utah border
XS NUMBER	1
DATE	9/4/03
OBSERVERS	Smith, Roberts, and McClain
1/4 SEC	SW
SECTION	13
TWP	11N
RANGE	104W
PM	6th
COUNTY	Moffat
WATERSHED	Green
DIVISION	6
DOW CODE	19124
USGS MAP	Willow Creek Butte
USFS MAP	

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	0.0364

INPUT DATA CHECKED BY . . DATE

ASSIGNED TO . DATE

STREAM NAME Beaver Creek
XS LOCATION 300 ft upstream from CO - Utah border
XS NUMBER 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.08 cfs
CALCULATED FLOW (Qc)=	1.08 cfs
(Qm-Qc)/Qm * 100 =	0.4 %
MEASURED WATERLINE (WLm)=	4.32 ft
CALCULATED WATERLINE (WLc)=	4.31 ft
(WLm-WLc/WLm * 100 =	0.2 %
MAX MEASURED DEPTH (Dm)=	0.55 ft
MAX CALCULATED DEPTH (Dc)=	0.47 ft
(Dm-Dc)/Dm * 100	14.9 %
MEAN VELOCITY =	0.81 ft/sec
MANNING'S N=	0.128
SLOPE=	0.0364 ft/ft
4 * Qm =	0.4 cfs
2.5 * Qm=	2.7 cfs

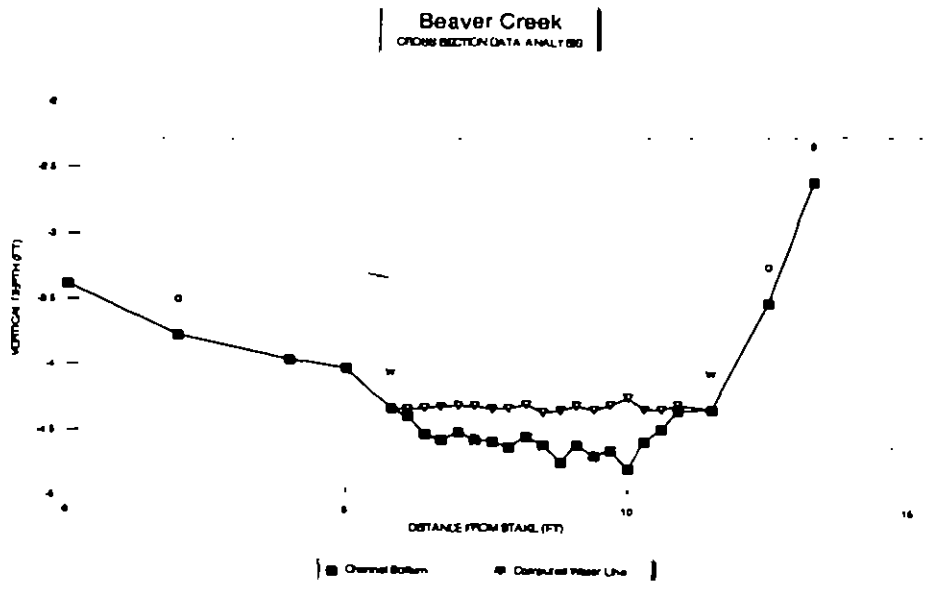
RECOMMENDED INSTREAM FLOW

FLOW (CFS)	PERIOD
0.89	winter
1.96	Summer

RATIONALE FOR RECOMMENDATION

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

CWCB REVIEW BY . . . . DATE



STREAM NAME: Beaver Creek
XS LOCATION: 300 ft. upstream from CO - Utah border
XS NUMBER: 1

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

STAGING TABLE

	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)
	3 78	10 16	0.51	1	5 22	10 7	100 00%	0 49	7 19	1 38
	3 81	9 74	0 5	0 97	4 91	10 27	96 00%	0.48	6 65	1 36
	3 86	9 1	0 49	0 92	4 44	9 61	89 80%	0 46	5 88	1 33
GL	3 91	8 45	0 47	0 87	4	8 94	83 50%	0 45	5 19	1 3
	3 96	7 77	0 46	0 82	3 59	8 24	77 00%	0 44	4 58	1 28
	4 01	6 99	0 46	0 77	3 22	7 44	69 50%	0 43	4 09	1 27
	4 06	6 7	0 43	0 72	2 88	7 13	66 60%	0 4	3.5	1 21
	4 11	6.51	0 39	0 67	2 55	6 91	64 50%	0 37	2 92	1 14
	4 16	6 31	0 35	0 62	2 23	6 69	62 50%	0 33	2 38	1 07
	4 21	6.12	0 31	0 57	1 92	6 46	60 40%	0 3	1 9	0 99
	4 26	5 93	0 27	0.52	1 62	6 24	58 30%	0 26	1 46	0 9
	4 31	5 73	0 23	0 47	1 33	6 02	56 30%	0 22	1 08	0 81
	4 36	4 84	0.22	0 42	1 07	5 12	47 80%	0 21	0 83	0 78
	4 41	4.58	0 18	0 37	0 83	4 83	45 20%	0 17	0 57	0 69
WL	4 46	4 36	0 14	0 32	0 61	4 6	43 00%	0 13	0 35	0.58
	4.51	4	0 1	0 27	0 4	4 21	39 40%	0 09	0 18	0 46
	4 56	2 83	0 08	0 22	0 22	3 02	28 20%	0 07	0 09	0 39
	4 61	1 75	0 06	0 17	0 11	1 9	17 80%	0 06	0 04	0 33
	4 66	0 97	0 04	0 12	0 04	1 07	10 00%	0 04	0 01	0 25
	4 71	0 37	0.03	0 07	0 01	0 47	4 40%	0 02	0	0 19
	4 76	0 07	0 01	0 02	0	0 08	0 70%	0 01	0	0 09

Criteria

1) $0.2' \overline{d} = 0.7$ cfs

2) 50% WP = 0.89 cfs

3) 1 ft/sec $\overline{V}$ = 1.96 cfs

Range
0.4 - 2.7 cfs

STREAM NAME Beaver Creek
XS LOCATION 300 ft. upstream from CO - Utah border
XS NUMBER 1

PROOF SHEET

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
4.07	1.33	2.83	113.00%
4.09	1.33	2.69	103.00%
4.11	1.33	2.56	93.10%
4.13	1.33	2.43	83.40%
4.15	1.33	2.31	73.70%
4.17	1.33	2.18	64.20%
4.19	1.33	2.05	54.80%
4.21	1.33	1.93	45.50%
4.23	1.33	1.81	36.30%
4.25	1.33	1.69	27.30%
4.27	1.33	1.57	18.30%
4.28	1.33	1.51	13.90%
4.29	1.33	1.45	9.50%
4.3	1.33	1.4	5.10%
4.31	1.33	1.34	0.80%
4.32	1.33	1.28	-3.50%
4.33	1.33	1.23	-7.70%
4.34	1.33	1.17	-11.60%
4.35	1.33	1.12	-15.30%
4.36	1.33	1.08	-19.00%
4.37	1.33	1.03	-22.60%
4.39	1.33	0.93	-29.70%
4.41	1.33	0.84	-36.70%
4.43	1.33	0.75	-43.60%
4.45	1.33	0.66	-50.30%
4.47	1.33	0.57	-56.90%
4.49	1.33	0.49	-63.30%
4.51	1.33	0.4	-69.60%
4.53	1.33	0.33	-75.40%
4.55	1.33	0.26	-80.60%
4.57	1.33	0.2	-84.90%

WATERLINE AT ZERO
AREA ERROR = 4.312

INPUT DATA # DATA POINTS= 25

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	O	TAPE TO WATER
S	0	3.38	0	0	0	0	0
G	2	3.78	0	0	0	0	0
	4	3.95	0	0	0	0	0
	5	4.02	0	0	0	0	0
W	5.8	4.32	0	0	0	0	0
	6.1	4.38	0.05	0	0.02	0	4.33
	6.4	4.52	0.2	0	0.06	0	4.32
	6.7	4.56	0.25	0	0.08	0	4.31
	7	4.5	0.2	0.74	0.06	0.04	4.3
	7.3	4.56	0.25	1	0.08	0.08	4.31
	7.6	4.58	0.25	1.34	0.08	0.1	4.33
	7.9	4.62	0.3	1.85	0.09	0.17	4.32
	8.2	4.54	0.25	1.22	0.08	0.09	4.29
	8.5	4.6	0.25	0.79	0.08	0.06	4.35
	8.8	4.74	0.4	0.91	0.12	0.11	4.34
	9.1	4.6	0.3	1.05	0.09	0.09	4.3
	9.4	4.68	0.35	1.03	0.1	0.11	4.33
	9.7	4.64	0.35	1.02	0.11	0.11	4.29
	10	4.78	0.55	0.38	0.17	0.06	4.23
	10.3	4.58	0.25	0.37	0.08	0.03	4.35
	10.6	4.48	0.15	0.59	0.04	0.03	4.33
	10.9	4.34	0.05	0.28	0.02	0.01	4.29
W	11.5	4.32	0	0	0	0	0
G	12.5	3.5	0	0	0	0	0
S	13.3	2.58	0	0	0	0	0
				TOTALS	1.33	1.08	

STREAM NAME Beaver Creek
XS LOCATION 300 ft upstream from CO - Utah border
XS NUMBER 1

INPUT DATA # DATA POINTS= 25 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	3 38	0	0	0	0	0	0	0 00%
G	2	3 78	0	0	0	0	0	0	0 00%
	4	3 95	0	0	0	0	0	0	0 00%
	5	4 02	0	0	0	0	0	0	0 00%
W	5 8	4 32	0	0	0	0	0	0	0 00%
	6 1	4 38	0 05	0	0 31	0 05	0 02	0	0 00%
	6 4	4 52	0 2	0	0 33	0 2	0 06	0	0 00%
	6 7	4 56	0 25	0	0 3	0 25	0 08	0	0 00%
	7	4 5	0 2	0 74	0 31	0 2	0 06	0 04	4 10%
	7 3	4 56	0 25	1	0 31	0 25	0 08	0 08	6 90%
	7 6	4 58	0 25	1 34	0 3	0 25	0 08	0 1	9 30%
	7 9	4 62	0 3	1 85	0 3	0 3	0 09	0 17	15 40%
	8 2	4 54	0 25	1 22	0 31	0 25	0 08	0 09	8 50%
	8 5	4 6	0 25	0 79	0 31	0 25	0 08	0 06	5 50%
	8 8	4 74	0 4	0 91	0 33	0 4	0 12	0 11	10 10%
	9 1	4 6	0 3	1 05	0 33	0 3	0 09	0 09	8 80%
	9 4	4 68	0 35	1 03	0 31	0 35	0 1	0 11	10 00%
	9 7	4 64	0 35	1 02	0 3	0 35	0 11	0 11	9 90%
	10	4 78	0 55	0 38	0 33	0 55	0 17	0 06	5 80%
	10 3	4 58	0 25	0 37	0 35	0 25	0 08	0 03	2 60%
	10 6	4 48	0 15	0 59	0 32	0 15	0 04	0 03	2 50%
	10 9	4 34	0 05	0 28	0 33	0 05	0 02	0 01	0 60%
W	11 5	4 32	0	0	0 6	0	0	0	0 00%
G	12 5	3 5	0	0	0	0	0	0	0 00%
S	13 3	2 58	0	0	0	0	0	0	0 00%
TOTALS					5 99	0 55 (Max)	1 33	1 08	100 00%

Manning's n = 0 1277

CDOW STREAM SURVEY (1991 REVISION)

LEVEL 2: FIELD SURVEY SUMMARY County:

STREAM: Beaver Cr. SEC#: — WATER CODE: _____ CDOW REGION: NW

SURVEYORS: Tim Novotney, David Smith DATE OF SURVEY: 4 Sept. 03

SURVEY LOCATION: T_____ R_____ S_____ ELEVATION: _____ STATION #: 1

UTM ZONE: 12 UTM X: 664727 UTM Y: 4531135

LOCATION DESCRIPTION: At end of road near Canyon mouth

STREAM FLOW PROFILE (Y or N): Y IF YES-DATE AND TYPE 4 Sept. 03, R2Cross

HABITAT EVALUATION (Y or N): N IF YES-DATE AND TYPE —

WATER CHEMISTRY ANALYSIS (Y or N): N IF YES-ATTACH SEPARATE ANALYSIS SHEET

FISH PRESENT (Y or N): Y POP. EST. METHOD: — STATION LENGTH: 100 (FEET)

AVG. WIDTH: 6 (FEET) TOTAL STATION AREA: .01 (ACRES)

FLOW (CFS) AT TIME OF SURVEY: 4 cfs METHOD: Pete McBurney

LIMITING FACTORS TO FISHERY: All. Ba

COMMENTS: All fish healthy & robust. Adequate macroinvertebrates.

TDS = 230

pH = 7.6

Temp = 57.8F

LENGTH FREQUENCY RECORD (CM)

SPECIES	0 2 4	6 8 10 12 14 16 18 20 22 24	26 28 30 32	34 36 38 40 42 44 46	48 50
	↓ ↓ ↓	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	↓ ↓ ↓ ↓	↓ ↓ ↓ ↓ ↓ ↓ ↓	↓ ↓
	2 4 6	8 10 12 14 16 18 20 22 24 26	28 30 32 34	36 38 40 42 44 46 48	50 UP
BRK		• • • • • •			
MTS	• • •	⊠ • •			

SUMMARY INFORMATION

SPECIES	NO. FISH CAUGHT	AVG. LENGTH (CM)	LENGTH RANGE (CM)	AVG. WEIGHT (Grams)	WEIGHT RANGE (Grams)	% TOTAL CATCH	BIOMASS lb/Acre	DENSITY No./Acre	DENSITY Conf. Int.
BRK	6	13.8	9.5-17.5	34.3	9-62	25	45.4	600	
MTS	18	8.7	4.3-12.4	7.8	1-21	75	30.9	1,800	

COLORADO DIVISION OF WILDLIFE

Length-Weight Data File

Stream Name Beaver Creek

CDOW Water Code _____ Date 4 Sept 03

Gear Electro shocker

Effort —

Station No. 1

Species Code	Total Length (cm)	Weight (g)	Species Code	Total Length (cm)	Weight (g)	Species Code	Total Length	Weight
BRK	16.7	61	MTS	4.3	1			
"	17.5	62	"	4.6	1			
"	15.4	38						
"	13.9	24						
"	9.8	12						
"	9.5	9						
MTS	12.4	21						
"	8.9	8						
"	9.8	10						
"	10.2	10						
"	9.5	9						
"	9.5	8						
"	8.9	9						
"	8.6	8						
"	9.2	8						
"	8.6	7						
"	8.6	7						
"	9.0	8						
"	8.6	8						
"	8.1	6						
"	7.6	5						
"	9.9	6						

Comments:

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Beaver Creek | CROSS-SECTION NO 2

CROSS-SECTION LOCATION 300 ft. upstream from Colo-Utah border

DATE 9-4-03 | OBSERVERS R. Smith, G. Roberts, J. McClain

LEGAL DESCRIPTION | ¼ SECTION: SW | SECTION 13 | TOWNSHIP 11 (N)S | RANGE 104 E(W) | PM 6th

COUNTY Moffatt | WATERSHED: Green | WATER DIVISION 6 | DOW WATER CODE 19124

MAP(S): USGS: Willow Creek Butte Colo-Utah 7.5' | USFS:

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION (YES)/NO | METER TYPE: Marsh-McBirney

METER NUMBER | DATE RATED | CALIB/SPIN ____ sec | TAPE WEIGHT surveyed ____ lbs/foot | TAPE TENSION surveyed ____ lbs

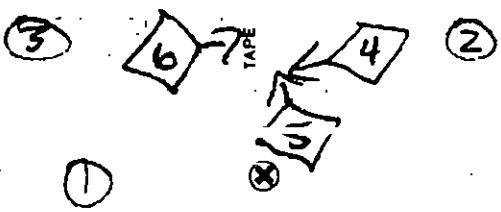
CHANNEL BED MATERIAL SIZE RANGE gravel to 1-foot boulders | PHOTOGRAPHS TAKEN (YES)/NO | NUMBER OF PHOTOGRAPHS 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	5.56 / 5.55
② WS Upstream	18.0'	4.60
③ WS Downstream	9.0'	5.82

SLOPE | 1.22'/27.0' = 0.04518

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
see attached survey																	

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

caddisfly, stonefly, abundant insects

COMMENTS

TDS = 230
Ph = 7.6
Temp = 11°C

riparian in superb condition
water cress = groundwater fed
abundant woody debris
muddy to cobble

FORM #ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME Beaver Creek | CROSS-SECTION NO 2 | DATE 9-4-03 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading. 0.4 ft | TIME 12:15

Features	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
RS	0.0										
G	1.7		4.90								
	4.0		5.07								
	6.0		5.34								
W	6.6		5.55	0							
R	7.0		5.52	0					0.00		
	7.5		5.62	0.05					0.16		
	7.8		5.62	0.05					1.26		
	8.1		5.64	0.10					2.20		
	8.4		5.74	0.20					1.38		
	8.7		5.60	0.05					0.94		
	9.0		5.94	0.40					1.76		
	9.3		5.96	0.40					1.14		
	9.6		5.72	0.15					0.70		
	9.9		5.68	0.10					0.00		
	10.2		5.62	0.05					0.00		
	10.5		5.62	0.05					0.13		
	10.8		5.74	0.20					0.69		
	11.1		5.86	0.30					1.06		
	11.4		5.98	0.45					0.95		
	11.7		6.02	0.50					0.48		
	12.0		5.92	0.40					2.28		
	12.3		5.98	0.45					0.98		
	12.6		5.84	0.30					0.80		
	12.9		5.96	0.40					1.86		
	13.2		5.86	0.30					0.80		
	13.6		5.68	0.15					0.00		
W	13.9		5.56	0					0.00		
St G	16.0		4.92								

TOTALS

End of Measurement | Time 12:40 Gage Rea. 0.4 ft | CALCULATIONS PERFORMED BY | CALCULATIONS CHECKED BY

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

LOCATION INFORMATION

STREAM NAME	Beaver Creek
XS LOCATION	300 ft upstream from CO - Utah border
XS NUMBER	2
DATE	9/4/03
OBSERVERS	Smith, Roberts, McClain
1/4 SEC	SW
SECTION	13
TWP	11N
RANGE	104W
PM	6th
COUNTY	Moffat
WATERSHED	Green
DIVISION	6
DOW CODE	19124
USGS MAP	Willow Creek Butte 7.5' quad
USFS MAP	

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	0.04518

INPUT DATA CHECKED BY DATE

ASSIGNED TO DATE

STREAM NAME Beaver Creek
XS LOCATION 300 ft upstream from CO - Utah border
XS NUMBER 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.69 cfs
CALCULATED FLOW (Qc)=	1.71 cfs
(Qm-Qc)/Qm * 100 =	-1.1 %
MEASURED WATERLINE (WLm)=	5.54 ft
CALCULATED WATERLINE (WLc)=	5.55 ft
(WLm-WLc)/WLm * 100 =	-0.2 %
MAX MEASURED DEPTH (Dm)=	0.5 ft
MAX CALCULATED DEPTH (Dc)=	0.47 ft
(Dm-Dc)/Dm * 100	5.9 %
MEAN VELOCITY=	1.11 ft/sec
MANNING'S N=	0.101
SLOPE=	0.04518 ft/ft
4 * Qm =	0.7 cfs
2.5 * Qm=	4.2 cfs

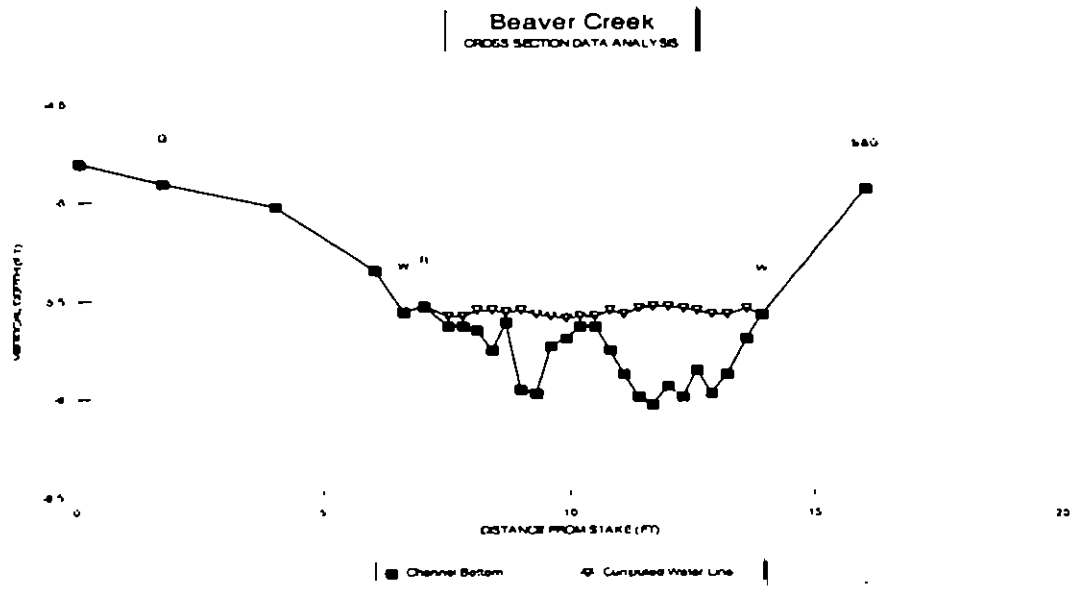
RECOMMENDED INSTREAM FLOW

FLOW (CFS)	PERIOD
1.32	Winter
1.69	Summer

RATIONALE FOR RECOMMENDATION

RECOMMENDATION BY AGENCY DATE

CWCB REVIEW BY DATE



STREAM NAME Beaver Creek
XS LOCATION 300 ft upstream from CO - Utah border
XS NUMBER 2

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

STAGING TABLE

	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)
	4 92	13 92	0 56	1 1	7 73	14 61	100 00%	0 53	15 81	2 04
	4 95	13 25	0 55	1 07	7 33	13 94	95 40%	0 53	14 92	2 03
	5	12 13	0 55	1 02	6 7	12 8	87 70%	0 52	13 57	2 03
GL	5 05	11 39	0 54	0 97	6 11	12 06	82 50%	0 51	12 13	1 99
	5 1	10 91	0 51	0 92	5 55	11 57	79 20%	0 48	10 64	1 91
	5 15	10 44	0 48	0 87	5 02	11 08	75 80%	0 45	9 25	1 84
	5 2	9 96	0 45	0 82	4 51	10 59	72 50%	0 43	7 97	1 77
	5 25	9 48	0 42	0 77	4 02	10 1	69 20%	0 4	6 8	1 69
	5 3	9 01	0 4	0 72	3 56	9 62	65 80%	0 37	5 74	1 61
	5 35	8 56	0 36	0 67	3 12	9 16	62 70%	0 34	4 76	1 52
	5 4	8 26	0 33	0 62	2 7	8 84	60 50%	0 31	3 83	1 42
	5 45	7 95	0 29	0 57	2 3	8 51	58 30%	0 27	3	1 3
	5 5	7 64	0 25	0 52	1 91	8 19	56 10%	0 23	2 26	1 18
	5 55	6 79	0 23	0 47	1 54	7 31	50 10%	0 21	1 71	1 11
	5 6	6 4	0 19	0 42	1 21	6 92	47 40%	0 18	1 19	0 98
	5 65	4 87	0 19	0 37	0 93	5 33	36 50%	0 17	0 91	0 98
WL	5 7	4 03	0 18	0 32	0 71	4 42	30 30%	0 16	0 65	0 92
	5 75	3 35	0 16	0 27	0 53	3 68	25 20%	0 14	0 45	0 85
	5 8	3 01	0 12	0 22	0 33	3 27	22 40%	0 1	0 27	0 75
	5 85	2 62	0 09	0 17	0 23	2 82	19 30%	0 08	0 13	0 58
	5 9	2 02	0 05	0 12	0 11	2 13	14 60%	0 05	0 05	0 43
	5 95	1 03	0 03	0 07	0 03	1 06	7 30%	0 03	0 01	0 28
	6	0 21	0 01	0 02	0	0 22	1 50%	0 01	0	0 14

Criteria

Range 0.7 - 4.2 cfs

1) 0.2' $\overline{d}$ = 1.32 cfs

2) 50% WP = 1.69 cfs

3) 1 ft/sec $\overline{v}$ = 1.28 cfs

STRLAM NAME Beaver Creek
XS LOCATION 300 ft upstream from CO - Utah border
XS NUMBER 2

PROOF SHEET

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
5 29	1 54	3 65	136 70%
5 31	1 54	3 47	125 00%
5 33	1 54	3 29	113 60%
5 35	1 54	3 12	102 40%
5 37	1 54	2 95	91 30%
5 39	1 54	2 78	80 50%
5 41	1 54	2 62	69 80%
5 43	1 54	2 46	59 20%
5 45	1 54	2 3	48 90%
5 47	1 54	2 14	38 60%
5 49	1 54	1 98	28 60%
5 5	1 54	1 91	23 60%
5 51	1 54	1 83	18 70%
5 52	1 54	1 75	13 80%
5 53	1 54	1 68	9 00%
5 54	1 54	1 61	4 30%
5 55	1 54	1 54	-0 10%
5 56	1 54	1 47	-4 50%
5 57	1 54	1 41	-8 60%
5 58	1 54	1 34	-13 10%
5 59	1 54	1 28	-17 30%
5 61	1 54	1 15	-25 60%
5 63	1 54	1 03	-33 20%
5 65	1 54	0 93	-39 70%
5 67	1 54	0 84	-45 90%
5 69	1 54	0 75	-51 50%
5 71	1 54	0 67	-56 70%
5 73	1 54	0 59	-61 50%
5 75	1 54	0 53	-66 00%
5 77	1 54	0 46	-70 20%
5 79	1 54	0 4	-74 30%

WATERLINE AT ZERO
AREA ERROR = 5 55

INPUT DATA # DATA POINTS= 29

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	TAPE TO WATER
S	0	4 8	0	0	0	0	0
G	1 7	4 9	0	0	0	0	0
	4	5 02	0	0	0	0	0
	6	5 34	0	0	0	0	0
W	6 6	5 55	0	0	0	0	0
R	7	5 52	0	0	0	0	0
	7 5	5 62	0 05	0 16	0 02	0	5 57
	7 8	5 62	0 05	1 26	0 02	0 02	5 57
	8 1	5 64	0 1	2 2	0 03	0 07	5 54
	8 4	5 74	0 2	1 38	0 06	0 08	5 54
	8 7	5 6	0 05	0 94	0 02	0 01	5 55
	9	5 94	0 4	1 76	0 12	0 21	5 54
	9 3	5 96	0 4	1 14	0 12	0 14	5 56
	9 6	5 72	0 15	0 7	0 04	0 03	5 57
	9 9	5 68	0 1	0	0 03	0	5 58
	10 2	5 62	0 05	0	0 02	0	5 57
	10 5	5 62	0 05	0 13	0 02	0	5 57
	10 8	5 74	0 2	0 69	0 06	0 04	5 54
	11 1	5 86	0 3	1 06	0 09	0 1	5 56
	11 4	5 98	0 45	0 95	0 13	0 13	5 53
	11 7	6 02	0 5	0 48	0 15	0 07	5 52
	12	5 92	0 4	2 28	0 12	0 27	5 52
	12 3	5 98	0 45	0 98	0 14	0 13	5 53
	12 6	5 84	0 3	0 8	0 09	0 07	5 54
	12 9	5 96	0 4	1 86	0 12	0 22	5 56
	13 2	5 86	0 3	0 8	0 11	0 08	5 56
	13 6	5 68	0 15	0	0 05	0	5 53
W	13 9	5 56	0	0	0	0	0
S&G	16	4 92	0	0	0	0	0
				TOTALS	1 54	1 69	

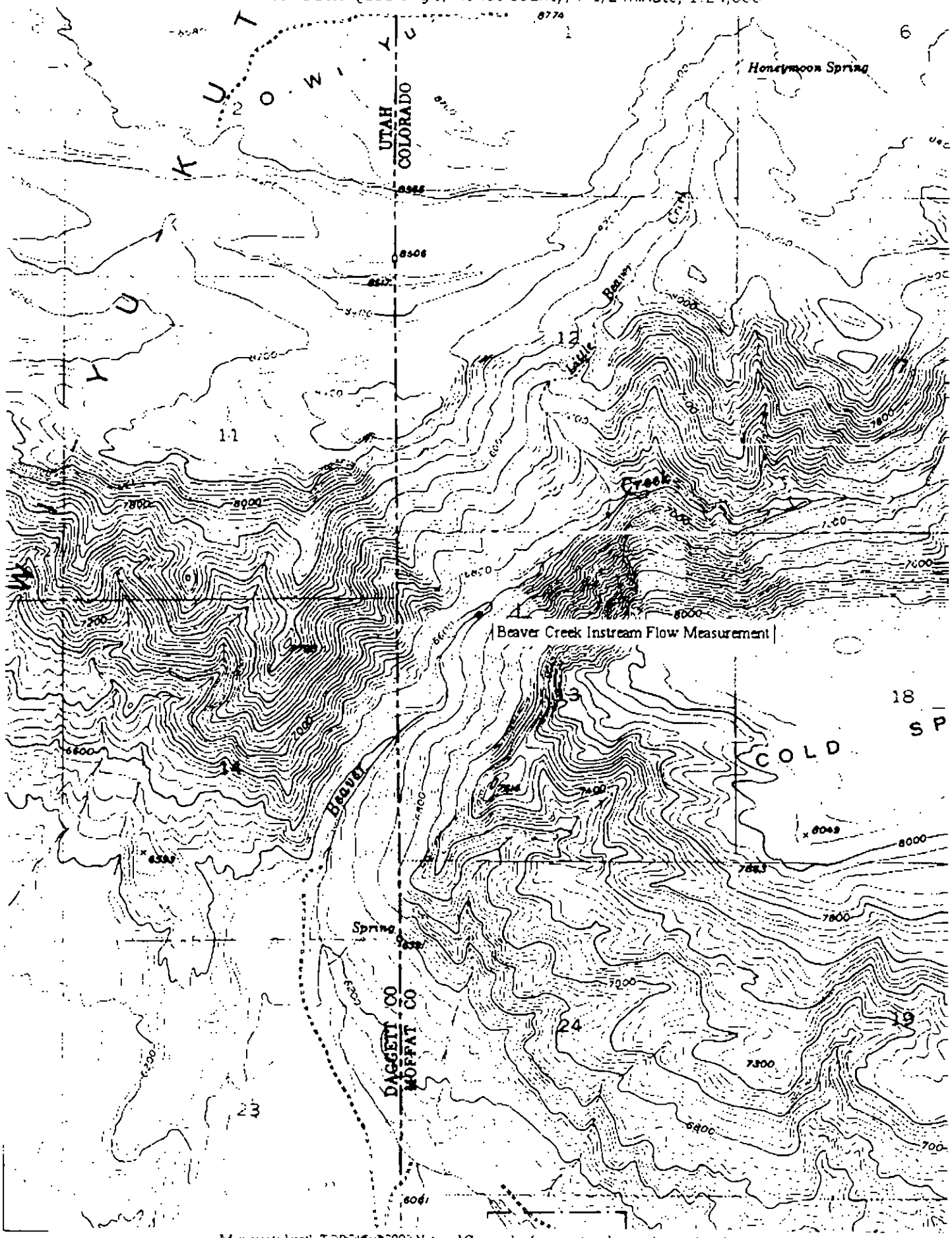
STREAM NAME Beaver Creek
XS LOCATION 300 ft upstream from CO - Utah border
XS NUMBER 2

INPUT DATA # DATA POINTS= 29 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	4 8	0	0	0	0	0	0	0 00%
G	1 7	4 9	0	0	0	0	0	0	0 00%
	4	5 02	0	0	0	0	0	0	0 00%
	6	5 34	0	0	0	0	0	0	0 00%
W	6 6	5 55	0	0	0	0	0	0	0 00%
R	7	5 52	0	0	0	0	0	0	0 00%
	7 5	5 62	0 05	0 16	0 51	0 05	0 02	0	0 20%
	7 8	5 62	0 05	1 26	0 3	0 05	0 02	0 02	1 10%
	8 1	5 64	0 1	2 2	0 3	0 1	0 03	0 07	3 90%
	8 4	5 74	0 2	1 38	0 32	0 2	0 06	0 08	4 90%
	8 7	5 6	0 05	0 94	0 33	0 05	0 02	0 01	0 80%
	9	5 94	0 4	1 76	0 45	0 4	0 12	0 21	12 50%
	9 3	5 96	0 4	1 14	0 3	0 4	0 12	0 14	8 10%
	9 6	5 72	0 15	0 7	0 38	0 15	0 04	0 03	1 90%
	9 9	5 68	0 1	0	0 3	0 1	0 03	0	0 00%
	10 2	5 62	0 05	0	0 31	0 05	0 02	0	0 00%
	10 5	5 62	0 05	0 13	0 3	0 05	0 02	0	0 10%
	10 8	5 74	0 2	0 69	0 32	0 2	0 06	0 04	2 50%
	11 1	5 66	0 3	1 06	0 32	0 3	0 09	0 1	5 60%
	11 4	5 98	0 45	0 95	0 32	0 45	0 13	0 13	7 60%
	11 7	6 02	0 5	0 48	0 3	0 5	0 15	0 07	4 30%
	12	5 92	0 4	2 28	0 32	0 4	0 12	0 27	16 20%
	12 3	5 98	0 45	0 98	0 31	0 45	0 14	0 13	7 80%
	12 6	5 84	0 3	0 8	0 33	0 3	0 09	0 07	4 30%
	12 9	5 96	0 4	1 86	0 32	0 4	0 12	0 22	13 20%
	13 2	5 86	0 3	0 8	0 32	0 3	0 11	0 08	5 00%
	13 6	5 68	0 15	0	0 44	0 15	0 05	0	0 00%
W	13 9	5 56	0	0	0 32	0	0	0	0 00%
S&G	16	4 92	0	0	0	0	0	0	0 00%
TOTALS					7 43	0 5 (Max)	1 54	1 69	100 00%

Manning's n = 0 1011

Willow Creek Butte Quadrangle, Moffat County, 7 1/2 minute, 1:24,000



FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO WATER CONSERVATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

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

CROSS-SECTION LOCATION: 300 ft. upstream from Colo-Utah border

DATE: 9-4-03 | OBSERVERS: R. Smith, J. McClain, G. Roberts

LEGAL DESCRIPTION: ¼ SECTION: SW | SECTION: 13 | TOWNSHIP: 11 (N)/S | RANGE: 104 E/(W) | PM: 6th

COUNTY: Moffatt | WATERSHED: Green | WATER DIVISION: 6 | DOW WATER CODE: 19124

MAP(S): USGS: Willow Creek Butte | GPS T12 0664727 4531135

USFS: Colo-Utah 7.5' | 1600 ft

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION: (YES)/NO | METER TYPE: Marsh-McBirney

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

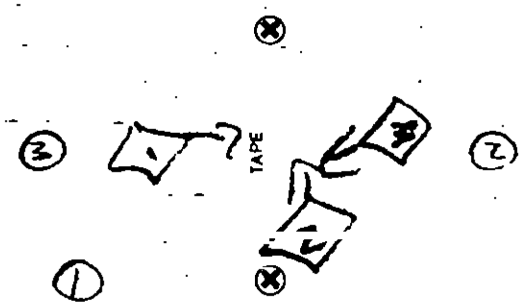
CHANNEL BED MATERIAL SIZE RANGE: gravel to 1-foot boulder | PHOTOGRAPHS TAKEN: (YES)/NO | NUMBER OF PHOTOGRAPHS: 3

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	surveyed
⊗ Tape @ Stake RB	0.0	surveyed
① WS @ Tape LB/RB	0.0	4.32 / 4.32
② WS Upstream	16.0	3.54
③ WS Downstream	15.3	4.68

SLOPE: 1.14 / 31.3' = 0.0364

SKETCH



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

AQUATIC SAMPLING SUMMARY

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

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

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

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

Caddisfly, stoneflies abundant insects

COMMENTS

TDS = 230
Ph = 7.6
Temp = 11°C

Riparian in superb condition
Water clearness indicates groundwater fed stream
Abundant woody debris
Plenty of pools

ISF FD 1-85

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Beaver Creek | CROSS-SECTION NO 1 | DATE 9-4-03 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading. 0.3 ft | TIME 11:50 am

Features: Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.0		3.38								
G	2.0		3.78								
	4.0		3.95								
	5.0		4.02								
W	5.8		4.32	0							
	6.1		4.38	0.05					0.0		
	6.4		4.52	0.20					0.0		
	6.7		4.56	0.25					0.0		
	7.0		4.50	0.20					0.74		
	7.3		4.[illegible]	0.25					1.00		
	7.6		4.58	0.25					1.34		
	7.9		4.62	0.30					1.85		
	8.2		4.51	0.25					1.22		
	8.5		4.60	0.25					0.79		
	8.8		4.74	0.40					0.91		
	9.1		4.60	0.30					1.05		
	9.4		4.68	0.35					1.03		
	9.7		4.64	0.35					1.02		
	10.0		4.78	0.55					0.38		
	10.3		4.58	0.25					0.37		
	10.6		4.48	0.15					0.59		
	10.9		4.34	0.05					0.28		
W	11.5		4.32	0					0.0		
G	12.5		3.50								
RS	13.3		2.58								

TOTALS

End of Measurement | Time. 11:30 | Gage Reading 0.3 ft | CALCULATIONS PERFORMED BY | CALCULATIONS CHECKED BY

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

LOCATION INFORMATION

STREAM NAME	Beaver Creek
XS LOCATION	300 ft upstream from CO - Utah border
XS NUMBER	1
DATE	9/4/03
OBSERVERS	Smith, Roberts, and McClain
1/4 SEC	SW
SECTION	13
TWP	11N
RANGE	104W
PM	6th
COUNTY	Moffat
WATERSHED	Green
DIVISION	6
DOW CODE	19124
USGS MAP	Willow Creek Butte
USFS MAP	

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	0.0364

INPUT DATA CHECKED BY DATE

ASSIGNED TO DATE

STREAM NAME Beaver Creek
XS LOCATION 300 ft upstream from CO - Utah border
XS NUMBER 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	1 08 cfs
CALCULATED FLOW (Qc)=	1 08 cfs
(Qm-Qc)/Qm * 100 =	0 4 %
MEASURED WATERLINE (WLm)=	4 32 ft
CALCULATED WATERLINE (WLc)=	4 31 ft
(WLm-WLc)/WLm * 100 =	0 2 %
MAX MEASURED DEPTH (Dm)=	0 55 ft
MAX CALCULATED DEPTH (Dc)=	0 47 ft
(Dm-Dc)/Dm * 100	14 9 %
MEAN VELOCITY=	0 81 ft/sec
MANNING'S N=	0 128
SLOPE=	0 0364 ft/ft
4 * Qm =	0 4 cfs
2 5 * Qm=	2 7 cfs

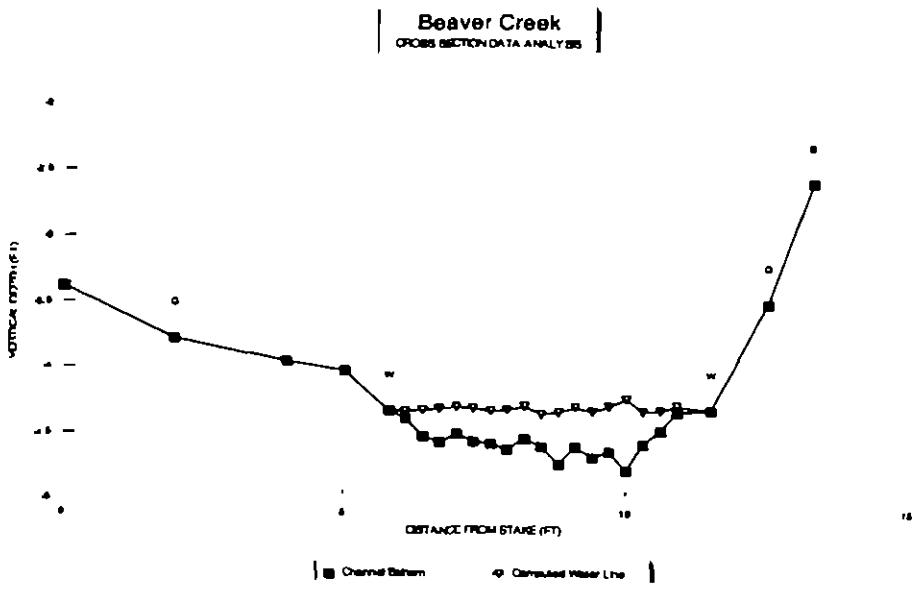
RECOMMENDED INSTREAM FLOW

FLOW (CFS)	PERIOD
0.89	winter
1.96	Summer

RATIONALE FOR RECOMMENDATION

RECOMMENDATION BY . . . . AGENCY . DATE .

CWCB REVIEW BY . . DATE . . .



STREAM NAME: Beaver Creek
XS LOCATION: 300 ft. upstream from CO - Utah border
XS NUMBER: 1

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

STAGING TABLE

	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)
	3 78	10 16	0.51	1	5 22	10 7	100 00%	0 49	7 19	1 38
	3 81	9 74	0 5	0 97	4 91	10 27	96 00%	0 48	6 65	1 36
	3 86	9 1	0 49	0 92	4 44	9 61	89 80%	0 46	5 88	1 33
GL	3 91	8 45	0 47	0 87	4	8 94	83 50%	0 45	5 19	1.3
	3 96	7 77	0 46	0 82	3 59	8 24	77 00%	0 44	4 58	1 28
	4 01	6 99	0 46	0 77	3 22	7 44	69 50%	0 43	4 09	1 27
	4 06	6 7	0 43	0 72	2 88	7 13	66 60%	0 4	3.5	1 21
	4 11	6.51	0 39	0 67	2.55	6 91	64 50%	0 37	2 92	1 14
	4 16	6 31	0 35	0 62	2 23	6 69	62 50%	0 33	2.38	1 07
	4 21	6 12	0 31	0 57	1 92	6 46	60 40%	0 3	1 9	0 99
	4 26	5 93	0 27	0 52	1 62	6 24	58 30%	0 26	1 46	0 9
	4 31	5 73	0 23	0 47	1 33	6 02	56 30%	0 22	1 08	0 81
	4 36	4 84	0 22	0 42	1 07	5 12	47 80%	0 21	0 83	0 78
	4 41	4 58	0 18	0 37	0 83	4.83	45 20%	0 17	0 57	0 69
WL	4 46	4.36	0 14	0 32	0 61	4 6	43 00%	0 13	0 35	0 58
	4 51	4	0 1	0 27	0 4	4 21	39 40%	0 09	0 18	0 46
	4.56	2 83	0 08	0 22	0 22	3 02	28 20%	0 07	0 09	0 39
	4 61	1.75	0 06	0 17	0 11	1 9	17 80%	0 06	0 04	0.33
	4 66	0 97	0 04	0 12	0 04	1 07	10 00%	0 04	0 01	0 25
	4 71	0 37	0 03	0 07	0 01	0 47	1 90%	0 02	0	0 19
	4.76	0 07	0 01	0 02	0	0 08	0 70%	0 01	0	0 09

Criteria

1) $0.2' \overline{d}$ = 0.7 cfs

Range
0.4 - 2.7 cfs

2) 50% WP = 0.89 cfs

3) 1 ft/sec $\overline{v}$ = 1.96 cfs

STREAM NAME Beaver Creek
XS LOCATION 300 ft. upstream from CO - Utah border
XS NUMBER 1

PROOF SHEET

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
4 07	1 33	2 83	113 00%
4 09	1 33	2 69	103 00%
4 11	1 33	2 56	93 10%
4 13	1 33	2 43	83 40%
4 15	1 33	2 31	73 70%
4 17	1 33	2.18	64 20%
4 19	1 33	2.05	54 80%
4 21	1 33	1 93	45 50%
4 23	1 33	1 81	36 30%
4 25	1 33	1 69	27 30%
4 27	1 33	1 57	18 30%
4 28	1 33	1 51	13 90%
4 29	1 33	1 45	9 50%
4 3	1 33	1 4	5 10%
4 31	1 33	1 34	0 80%
4 32	1 33	1 28	-3 50%
4 33	1 33	1 23	-7 70%
4 34	1 33	1 17	-11 60%
4 35	1 33	1 12	-15 30%
4 36	1 33	1 08	-19 00%
4 37	1 33	1 03	-22 60%
4 39	1 33	0 93	-29 70%
4 41	1 33	0 84	-36 70%
4 43	1 33	0 75	-43 60%
4 45	1 33	0 66	-50 30%
4 47	1 33	0 57	-56 90%
4 49	1 33	0 49	-63 30%
4 51	1 33	0 4	-69 60%
4 53	1 33	0 33	-75 40%
4 55	1 33	0 26	-80 60%
4 57	1 33	0 2	-84 90%

WATERLINE AT ZERO
AREA ERROR = 4 312

INPUT DATA # DATA POINTS= 25

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	O	TAPE TO WATER
S	0	3 38	0	0	0	0	0
G	2	3 78	0	0	0	0	0
	4	3 95	0	0	0	0	0
	5	4 02	0	0	0	0	0
W	5 8	4 32	0	0	0	0	0
	6 1	4 38	0 05	0	0 02	0	4 33
	6 4	4 52	0 2	0	0 06	0	4 32
	6 7	4 56	0 25	0	0 08	0	4 31
	7	4 5	0 2	0 74	0 06	0 04	4 3
	7 3	4 56	0 25	1	0 08	0 08	4 31
	7 6	4 58	0 25	1 34	0 08	0 1	4 33
	7 9	4 62	0 3	1 85	0 09	0 17	4 32
	8 2	4 54	0 25	1 22	0 08	0 09	4 29
	8 5	4 6	0 25	0 79	0 08	0 06	4 35
	8 8	4 74	0 4	0 91	0 12	0 11	4 34
	9 1	4 6	0 3	1 05	0 09	0 09	4 3
	9 4	4 68	0 35	1 03	0 1	0 11	4 33
	9 7	4 64	0 35	1 02	0 11	0 11	4 29
	10	4 78	0 55	0 38	0 17	0 06	4 23
	10 3	4 58	0 25	0 37	0 08	0 07	4 33
	10 6	4 48	0 15	0 59	0 04	0 03	4 33
	10 9	4 34	0 05	0 28	0 02	0 01	4 29
W	11 5	4 32	0	0	0	0	0
G	12 5	3 5	0	0	0	0	0
S	13 3	2 58	0	0	0	0	0
				TOTALS	1 33	1 08	

STREAM NAME: Beaver Creek
XS LOCATION: 300 ft upstream from CO - Utah border
XS NUMBER: 1

INPUT DATA # DATA POINTS= 25 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	3 38	0	0	0	0	0	0	0 00%
G	2	3 78	0	0	0	0	0	0	0 00%
	4	3 95	0	0	0	0	0	0	0 00%
	5	4 02	0	0	0	0	0	0	0 00%
W	5 8	4.32	0	0	0	0	0	0	0 00%
	6 1	4 38	0 05	0	0 31	0 05	0 02	0	0 00%
	6 4	4 52	0 2	0	0 33	0 2	0 06	0	0 00%
	6 7	4 56	0 25	0	0 3	0 25	0 08	0	0 00%
	7	4.5	0 2	0 74	0 31	0 2	0 06	0 04	4 10%
	7 3	4 56	0 25	1	0 31	0 25	0 08	0 08	6 90%
	7 6	4 58	0 25	1 34	0 3	0 25	0 08	0 1	9 30%
	7 9	4 62	0 3	1 85	0 3	0 3	0 09	0 17	15 40%
	8 2	4 54	0 25	1 22	0 31	0 25	0 08	0 09	8 50%
	8 5	4 6	0 25	0 79	0 31	0 25	0 08	0 06	5 50%
	8 8	4 74	0 4	0 91	0 33	0 4	0 12	0 11	10 10%
	9 1	4 6	0 3	1 05	0 33	0 3	0 09	0 09	8 80%
	9 4	4 68	0 35	1 03	0 31	0 35	0 1	0 11	10 00%
	9 7	4 64	0 35	1 02	0 3	0 35	0 11	0 11	9 90%
	10	4 78	0 55	0 38	0 33	0 55	0 17	0 06	5 80%
	10 3	4 58	0 25	0 37	0 34	0 25	0 09	0 03	2 60%
	10 6	4 48	0 15	0 59	0 32	0 15	0 04	0 03	2 50%
	10 9	4 34	0 05	0 28	0 33	0 05	0 02	0 01	0 60%
W	11 5	4 32	0	0	0 6	0	0	0	0 00%
G	12 5	3 5	0	0	0	0	0	0	0 00%
S	13 3	2 58	0	0	0	0	0	0	0 00%
	TOTALS				5 99	0 55 (Max)	1 33	1 08	100 00%

Manning's n = 0 1277

CDOW STREAM SURVEY (1991 REVISION)

LEVEL 2: FIELD SURVEY SUMMARY County:

STREAM: Beaver Cr. SEC#: — WATER CODE: _____ CDOW REGION: NW

SURVEYORS: Tim Nosotsev, David Smith DATE OF SURVEY: 4 Sept. 03

SURVEY LOCATION: T_____ R_____ S_____ ELEVATION: _____ STATION #: 1

UTM ZONE: 12 UTM X: 664727 UTM Y: 4531435

LOCATION DESCRIPTION: At end of road near canyon mouth

STREAM FLOW PROFILE (Y or N): Y IF YES-DATE AND TYPE 4 Sept. 03. R2Cross

HABITAT EVALUATION (Y or N): N IF YES-DATE AND TYPE —

WATER CHEMISTRY ANALYSIS (Y or N): N IF YES-ATTACH SEPARATE ANALYSIS SHEET

FISH PRESENT (Y or N): Y POP. EST. METHOD: — STATION LENGTH: 100 (FEET)

AVG. WIDTH: 6 (FEET) TOTAL STATION AREA: .01 (ACRES)

FLOW (CFS) AT TIME OF SURVEY: 4 cfs METHOD: Pace Mc Burney

LIMITING FACTORS TO FISHERY: All. BS

COMMENTS: All fish healthy & robust. Adequate macroinvertebrates.
TDS = 230
pH = 7.6
Temp = 57.8F

LENGTH FREQUENCY RECORD (CM)

SPECIES	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-22	22-24	24-26	26-28	28-30	30-32	32-34	34-36	36-38	38-40	40-42	42-44	44-46	46-48	48-50	50 UP
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	
BRK					•	•	=	•		• •																
MTS			• • •		18	•	•																			
					• •																					

Heads:
County
Elev
Water Code
Comments

SUMMARY INFORMATION

SPECIES	NO. FISH CAUGHT	AVG. LENGTH (CM)	LENGTH RANGE (CM)	AVG. WEIGHT (Grams)	WEIGHT RANGE (Grams)	% TOTAL CATCH	BIOMASS lb/Acre	DENSITY No./Acre	Conf. Int.
BRK	6	13.8	9.5-17.5	34.3	9-62	25	45.4	600	
MTS	18	8.7	8.3-12.4	7.8	1-21	75	30.9	1,800	

COLORADO DIVISION OF WILDLIFE

Length-Weight Data File

Stream Name Beaver Creek CDOW Water Code _____ Date 4 Sept. 03

Gear Electro shocker Effort — Station No. 1

Species Code	Total Length	Weight	Species Code	Total Length	Weight	Species Code	Total Length	Weight
BRK	16.7	61	MTS	4.3	1			
"	17.5	62	"	4.6	1			
"	15.4	38						
"	13.9	24						
"	9.8	12						
"	9.5	9						
MTS	12.4	21						
"	8.9	8						
"	9.8	10						
"	10.2	10						
"	9.5	9						
"	9.5	8						
"	8.9	9						
"	8.6	8						
"	9.2	8						
"	8.6	7						
"	8.6	7						
"	9.0	8						
"	8.6	8						
"	8.1	6						
"	7.6	5						
"	9.9	6						

Comments:

Roy - 239-3933

Specie List by DOW CODE # 11/9/2005

WATER	WATERNAME	AT	COD	SAMPDATE	SPEC	COMM
19124	BEAVER CREEK	12	A1	9/1/1970	MOS	MOUNTAIN SUCKER
19124	BEAVER CREEK	12	A1	9/1/1970	MOS	MOUNTAIN SUCKER
19124	BEAVER CREEK	12	A1	9/1/1970	BRK	BROOK TROUT
19124	BEAVER CREEK	12	A1	9/1/1970	BRK	BROOK TROUT
19124	BEAVER CREEK	12	A1	9/1/1970	BRK	BROOK TROUT
19124	BEAVER CREEK	12	A1	9/1/1970	BRK	BROOK TROUT
19124	BEAVER CREEK	12	A1	7/24/1980	LOC	BROWN TROUT
19124	BEAVER CREEK	12	A1	7/24/1980	CRN	CO RIVER CUTTHROAT
19124	BEAVER CREEK	12	A1	9/1/1970	CRN	CO RIVER CUTTHROAT
19124	BEAVER CREEK	12	A1	9/26/1967	CRN	CO RIVER CUTTHROAT
19124	BEAVER CREEK	12	A1	9/1/1970	CRN	CO RIVER CUTTHROAT
19124	BEAVER CREEK	12	A1	9/1/1970	CRN	CO RIVER CUTTHROAT
19124	BEAVER CREEK	12	A1	9/1/1970	CRN	CO RIVER CUTTHROAT
19124	BEAVER CREEK	12	A1	9/1/1999	CRN	CO RIVER CUTTHROAT
19124	BEAVER CREEK	12	A1	9/1/1970	RBT	RAINBOW TROUT
19124	BEAVER CREEK	12	A1	9/1/1970	RBT	RAINBOW TROUT

COLORADO STREAM SURVEY E (1976 REVISION)

Surveyed by: Bennett (X) if stream has no fishery value ☐

	Record Data
Codo No.	
Date	[illegible] 80
Section No.	1
Stream Name:	Beaver Creek
Primary Drainage:	
Major Drainage	Green R. 35GR
Lower terminus FISHERY	//////////
Location:	confluence with Green River
T.	10 N
R.	104 W
S.	13
Width	10
Elevation	5440
Flow (c.f.s.)	2.5
pH	
prth	
MO	
EDTA	
Conductivity	
X if stream profile obtained	
Upper terminus	//////////
Location:	Headwaters
T.	12 N
R.	103 W
S.	2
Width	6
Elevation	8800
Flow	
pH	
phch	
MO	
EDTA	
Conductivity	
X if stream profile obtained	
Section Summary	//////////
Meander factor	1.1
Length in Miles	14
Width in feet	8
Acreage	14
Observed Flow	normal
X if inundated by reservoir	
Mileage unsectioned	1
Counties where section located	//////////
County	Moffat
Miles	14
County	
Miles	
County	
Miles	

	Record Dat
Region	NW
Beaver Dams	//////////
Number (count or estimate)	
Estimated acreage	
Physical stream damage (% of section affected)	//////////
Bank degradation	30
Channelization	2
Dredging	
Mine tailing encroachment	
Road encroachment	
Accessibility (miles)	//////////
Surfaced	.1
Non-Surfaced car	.1
4-Wheel	
Established trail	
No established trail	13.8
Boat only	
No access	
Land Status and mileage	//////////
USFS FWS	3
BLM	4.0
Municipal	
Div. of Wild.	2
Private, no public access	
Private, open to public	1.5
State Land Board	2
County State of Utah	1.5
Mixed small tracts, open	
Mixed small tracts, closed	
Stocking	//////////
Miles creel size	
Miles fingerling	4
Miles Fry	
Miles not stocked	10
Aquatic Vegetation	//////////
Filamentous algae (x one)	//////////
Absent	
Rare	x
Common	
Abundant	
Watercress	//////////
X if present	
Size Classification (X one)	//// //////
Large river > 100'	
River 60-99'	
Large stream 36-59'	
Medium 20-35'	
Small 10-19'	
Minor 4-9'	
Very small stream 4'	x
Gradient (computer entry)	//////////
Percent per mile	4.5

	Record Data
Fishery Value (X one)	
None	
Poor	
Below average	
Average	
Above Average	X
Excellent	
Fishery Value - limiting factors	
Silty	A-4

	Record Data
Upper Station	
Elevation	
Describe or map station location below	

South side of Beaver Basin below start of springs

FISH SAMPLING

Lower or only station	
Elevation	
Describe or map station location below	

at Highway 318 on DOW lands

Sampling method	Shock
Length - feet	200
Sampling adequate	X
Sampling inadequate	
% if scales collected	
Estimated % fish biomass	
Rough Fish	
Game Fish	100
Est. % rough fish biomass	
Bullheads	
Carp	
Cottids	
Dace	
Minnows	
Suckers	
Sunfish	

Sampling method	Shock
Length - feet	100
Sampling adequate	X
Sampling inadequate	
% if scales collected	
Estimated % fish biomass	
Rough Fish	
Game Fish	1000
Est. % rough fish biomass	
Bullheads	
Carp	
Cottids	
Dace	
Minnows	
Suckers	
Sunfish	
Combined stations	
Estimated % fish biomass	
Rough Fish	
Game Fish	100
Est. % rough fish biomass	
Bullheads	
Carp	
Cottids	
Dace	
Minnows	
Suckers	
Sunfish	
No. of game fish 6.0	
per mile	

Length-frequency distribution by one-inch size groups (1.0 - 1.9 etc.)

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	>15		Total
LOWER STATION																	
Rainbow																	
Brown		2	2	3	2	3	3									100	15
Brook																	
Native																	
Whitefish																	
Total		2	2	3	2	3	3										15
UPPER STATION																	
Rainbow																	
Brown																	
Brook																	
Native																	
Whitefish							1	1	1	1	1					100	5
Total							1	1	1	1	1						5
COMBINED STATIONS																	
Rainbow																	
Brown																76	
Brook																	
Native																	
Whitefish																25	
Total																	

WCO says the lower section is mainly brooks.he stocked brown at roadand they must have displaced the brook. The stream is 10' wide when it starts below the springs in beaver basin.

...survey, indicate the presence of these species with an X.

CODE		
	CATOSTOMIDAE	
RCS	_	River Carpsucker Carpiodes carpio carpio
PCS	_	Plains Carpsucker Carpiodes cyprinus
WS	_	White Sucker Catostomus commersoni
FMS	_	Flannelmouth Sucker Catostomus latipinnis
LGS	_	Western Longnose Sucker Catostomus catostomus
BHS	_	Bluehead Sucker Catostomus discobolus
MOS	_	Mountain Sucker Catostomus platyrhynchus
RGS	_	Rio Grande Sucker Catostomus plebius
NR	_	Northern Redhorse Moxostoma macrolepidotum
RBS	_	Razorback Sucker Xyrauchen texanus
	CYPRINIDAE	
CP	_	European Carp Cyprinus carpio
GF	_	Goldfish Carassius auratus
ST	_	Stoneroller Campostoma anomalum
NRD	_	Northern Redbelly Dace Phoxinus eos
SRD	_	Southern Redbelly Dace Phoxinus erythrogaster
FD	_	Finescale Dace Phoxinus neogaeus
LD	_	Longnose Dace Rhinichthys cataractae
SD	_	Colorado Speckled Dace Rhinichthys osculus
SQ	_	Colorado Squawfish Ptychocheilus lucius
WA	_	White Amur Ctenopharyngodon idella
RGC	_	Rio Grande Chub Gila pandora
RTC	_	Roundtail Chub Gila robusta
BC	_	Bonytail Chub Gila elegans
HPC	_	Humpback Chub Gila cypha
CRC	_	Creek Chub Semotilus atromaculatus
HRC	_	Hornyhead Chub Nocomis biguttatus
ASC	_	Arkansas River Speckled Chub Hybopsis aestivalis tetranema
FC	_	Flathead Chub Hybopsis gracilis
LC	_	Lake Chub Couesius plumbeus
SC	_	Silver Chub Hybopsis storeriana
SM	_	Suckermouth Minnow Phenacobius mirabilis
FM	_	Fathead Minnow Pimephales promelas
BM	_	Brassy Minnow Hybognathus hankinsoni
PM	_	Plains Minnow Hybognathus placitus
RSS	_	Redside Shiner Richardsonius balteatus
CS	_	Common Shiner Notropis cornutus
RS	_	River Shiner Notropis blennius
RDS	_	Red Shiner Notropis lutrensis
SS	_	Sand Shiner Notropis stramineus
BS	_	Blacknose Shiner Notropis heterolepis
BMS	_	Bigmouth Shiner Notropis dorsalis
SPS	_	Spottail Shiner Notropis hudsonius
GDS	_	Golden Shiner Notemigonus crysoleucas
T	_	Tench Tinca tinca
	ATHERINIDAE	
MS	_	Mississippi Silverside Menidia audens
	POECHILIIDAE	
MSQ	_	Mosquitofish Gambusia affinis
	CYPRINODONTIDAE	
CPK	_	Central Plains Killifish Fundulus kansae
PYM	_	Plains Topminnow Fundulus sciadicus
	PERCIDAE	
LP	_	Logperch Percina caprodes
YP	_	Yellow perch Perca flavescens
JD	_	Johnny Darter Etheostoma nigrum
ID	_	Iowa Darter Etheostoma exile
AD	_	Arkansas Darter Etheostoma cragini
POD	_	Plains Orangethroat Darter Etheostoma spectabile pulchellum
W	_	Walleye Stizostedion vitreum
SG	_	Sauger Stizostedion canadense
	SCIAENIDAE	
D	_	Freshwater Drum Aplodinotus grunniens

CODE		
	PERCICHTHYIDAE	
WB	_	White Bass Morone chrysops
SB	_	Striped Bass Morone saxatilis
	COTTIDAE	
PS	_	Piute Sculpin Cottus beldingi
MTS	_	Mottled Sculpin Cottus bairdi
	CENTRARCHIDAE	
SNF	_	Green Sunfish Lepomis cyanellus
OS	_	Orangespotted Sunfish Lepomis humilis
PKS	_	Pumpkinseed Lepomis gibbosus
WXM	_	Warmouth Lepomis gulosus
BG	_	Bluegill Lepomis macrochirus
SP	_	Sacramento Perch Archoplites interruptu
RB	_	Rock Bass Ambloplites rupestris
WCR	_	White Crappie Pomixis annularis
BCR	_	Black Crappie Pomoxis nigromaculatus
SMB	_	Smallmouth Bass Micropterus dolomieui
LMB	_	Largemouth Bass Micropterus salmoides
	GASTEROSTEIDAE	
BST	_	Brook Stickleback Culaea inconstans
	CICHLIDAE	
TIL	_	Tilapia Sartherodon mossambica
	CLUPEIDAE	
GS	_	Gizzard Shad Dorosoma cepedianum
THS	_	Threadfin Shad Dorosoma petenense
ALW	_	Alewife Alosa pseudoharengus
	OSMERIDAE	
AMS	_	American Smelt Osmerus mordax
	ESOCIDAE	
GRP	_	Grass Pickerel Esox americanus vermiculat
NP	_	Northern Pike Esox lucius
	SALMONIDAE	
COH	_	Coho (Silver) Salmon Oncorhynchus kisutch
K	_	Kokanee (Sockeye) Salmon Oncorhynchus nerka kennerlyi
MF	_	Mountain Whitefish Prosopium williamsoni
LW	_	Lake Whitefish Coregonus clupeaformis
BLC	_	Bear Lake (Bonneville) Cisco Prosopium gem
GO	_	Golden Trout Salmo aguabonita
RGN	_	Rio Grande Cutthroat Salmo clarki virginal
CRN	X	Colorado Cutthroat Salmo clarki pleuriticus
GRN	_	Greenback Cutthroat Salmo clarki stomias
SRC	_	Snake River Cutthroat Salmo clarki
N	_	Yellowstone Cutthroat Salmo clarki lewisi
R	_	Rainbow Trout Salmo gairdneri
L	X	Brown Trout Salmo trutta
B	X	Brook (Trout) Char Salvelinus fontinalis
M	_	Lake (Trout) Char Salvelinus namaycush
SPL	_	Splake Salvelinus fontinalis x Salvelinus n
GR	_	Arctic Grayling Thymallus arcticus
	ANGUILLIDAE	
EEL	_	American Eel Anguilla rostrata
	ICTALURIDAE	
CC	_	Channel Catfish Ictalurus punctatus
BCT	_	Blue Catfish Ictalurus furcatus
BB	_	Black Bullhead Ictalurus melas
YB	_	Yellow Bullhead Ictalurus natalis
BRB	_	Brown Bullhead Ictalurus nebulosus
FLC	_	Flathead Catfish Pylodictis olivaris
STP	_	Stonecat Noturus flavus

☑ '72-'73 FISHERIES INVENTORY / 1041 RELATED DATA

Stream Code 19124

'72-'73 Inventory S- _____

Stream Name Berrier Creek

Percent Open to Public 100,
('72 Inventory)

1041 Form

Quality of Water	10,
Pool-riffle Ratio	5,
Temperature of Water	4,
Clarity of Water	10,
Fish Food Supply	5,
Condition of Fish	7,
Legal Access	10,
Physical Access*	—,
Aesthetic Value	5,
Meanders Value	5,
Improvement Potential	5.

'72 Inventory

Stocking Status	access.	(regularly, occasionally, rarely or never)
Population Status	normal	(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

~~LAKE~~ CODE 19124

STOCKING

STOCK 79-83 0 YRS

STOCKYRS N N N N N

SPECIES-SIZE STOCKED:

FISH SAMPLING

SAMPLE DATE: 07 / 24 / 80

METHODS: ELEC

	SPECIES	#TAKEN	AVG. LENGTH (cm)	RANGE (cm)	AVG. WT (g)	RANGE (g)	%TOTAL CATCH
1.	L..	15	14.6	8-20			75
2.	CRN	5	25.4	20-30			25
3.	B..						
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

N

APPENDIX – C
Water Availability Analysis

Colorado Water Conservation Board
Estimation of Natural Streamflow Characteristics
Based upon USGS WRI 85-4086
Francis Rengers and Marc Mitisek

By

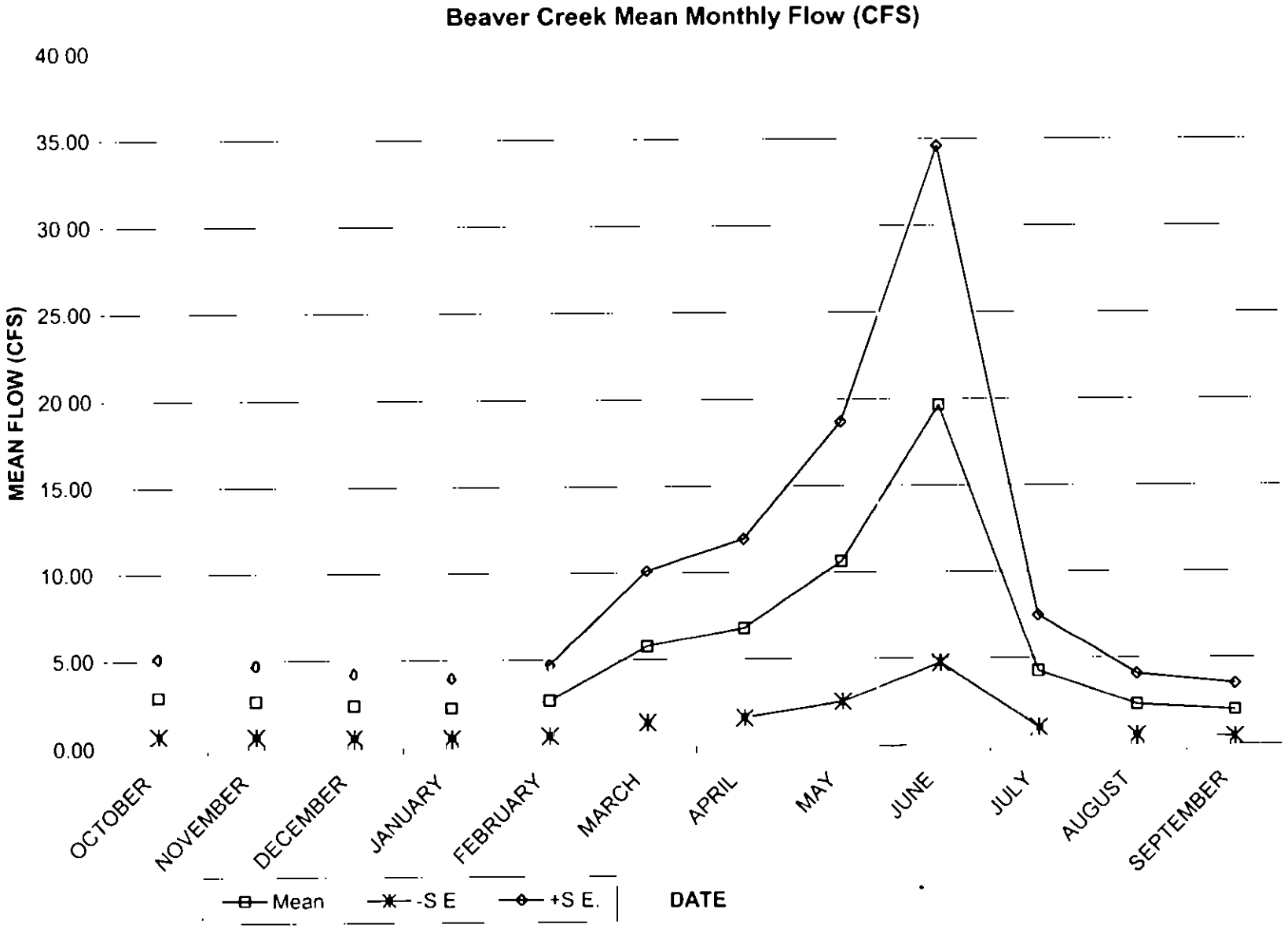
Date 6/30/2005

STREAM	Beaver Creek	BASIN AREA (MI²)	44 17
COUNTY	Moffat	MEAN ELEV (FEET)	7665
REGION	3	MEAN PPT (INCHES)	12 3
1-MT,2=SW,3=NW,4=RG		MEAN SLOPE (FT/FT)	0 1712
CROSS-SECTION			
LOCATION			
AVE ANNUAL FLOW (CFS)			

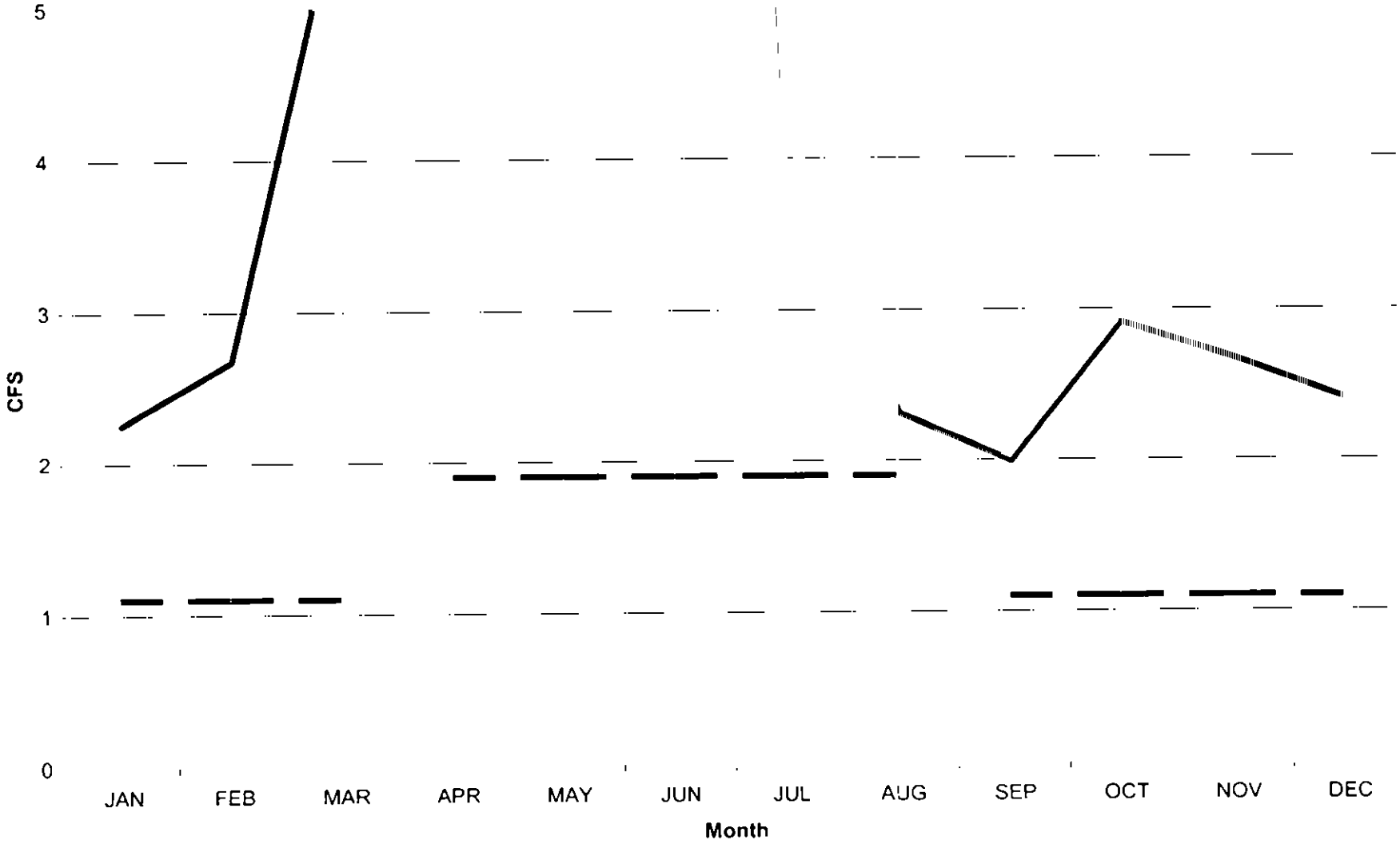
PERCENT DURATION	FLOW (CFS)		
90	0 60		
70	1 86		
50	3 06		
25	7 71		
10	27 52		

2-YR 7 DAY LOW FLOW (CFS)	0 44		
10-YR 7 DAY LOW FLOW (CFS)	0 00		
50-YR 7 DAY LOW FLOW (CFS)	0 00		

MEAN MONTHLY FLOW	AVERAGE FLOW (CFS)	-S E	+S E
OCTOBER	2 91	0 70	5 12
NOVEMBER	2 67	0 64	4 70
DECEMBER	2 40	0 58	4 23
JANUARY	2 25	0 54	3 96
FEBRUARY	2 67	0 64	4 70
MARCH	5 73	1 38	10 09
APRIL	6 78	1 63	11 93
MAY	10 62	2 55	18 69
JUNE	19 65	4 72	34 58
JULY	4 25	1 02	7 47
AUGUST	2 31	0 55	4 07
SEPTEMBER	1 99	0 48	3 51


Beaver Creek Mean Monthly Flow (CFS)
40 00
35.00
30 00
25.00
20 00
15.00
10.00
5.00
0.00
MEAN FLOW (CFS)
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
Mean
-S E
+S E.
DATE

Estimated Stream Flow on Beaver Creek



Ditch		30 nov	31 dec	31 jan	28 feb	31 mar	30 apr	31 may	30 jun	31 jul	31 aug	30 sep	31 oct
Beaver Ditch	AF	0	0	0	1.18	24.2	140	191	91.7	15.3	4.3	2.71	0
Apple Ditch		0	0	0	0	1.14	29.4	36.8	23.1	2.61	2.12	6.07	5.53
Goodman Ditch						5.09	80.2	113	76.5	38.4	27.5	12.6	5.78
McKnight No. 1						4.3	33.5	68.4	48.4	16	13.6	6.32	0.53
McKnight No. 2							29.8	55.3	50.9	19.1	16.1	2.75	
Thomas Double Ditch No 1						13.4	107	173	131	41	24.3	14.1	7.75
Thomas Double Ditch No. 2						3.31	61.3	95.6	59.2	19.2	18.3	15	6.89
Walker Ditch												17.9	
sum (af)	af	0	0	0	1.18	51.44	481.2	733.1	480.8	151.61	106.22	77.45	26.48
Total Diversions	cfs	0 00	0.00	0.00	0 02	0.84	8.09	11.92	8 08	2.47	1.73	1.30	0.43
USGS Syn Hydr	cfs	2.67	2.4	2.25	2.67	5 73	6.78	10.62	19.65	4.25	2.31	1.99	2.91

USGS Synth Hydrol.	OCTOBEF	2 91
	NOVEMBE	2 67
	DECEMBE	2 40
	JANUARY	2 25
	FEBRUAR	2 67
	MARCH	5.73
	APRIL	6.78
	MAY	10.62
	JUNE	19 65
	JULY	4 25
	AUGUST	2 31
	SEPTEMB	1 99

ESTIMATION OF NATURAL STREAMFLOW CHARACTERISTICS IN WESTERN COLORADO

By James E. Kircher, Anne F. Choquette, and Brian D. Richter

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 85-4086

Prepared in cooperation with the

U.S. BUREAU OF LAND MANAGEMENT

Lakewood, Colorado
1985

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maximum 7-day discharge.--The maximum mean discharge occurring over a period of 7 consecutive days, with average recurrence intervals of 2, 10, 50, and 100 years. Also referred to as high flows throughout this report.

multiple-regression relations.--A statistical technique by which a relation between a dependent variable and two or more independent variables can be derived. The result usually is expressed as a regression equation.

natural flow.--Stream discharge that is not significantly affected by human land use or water use, such as flow diversion, regulation, or vegetative alteration.

normalize.--To transform a variable so that the probability distribution of the transformed variable approximates a normal distribution.

orographic effect.--The lifting of moisture-laden air over a high barrier such as a mountain range resulting in a consequent release of precipitation.

parameter.--A descriptive measure of a population, such as a mean, a measure of variability, or a regression coefficient.

peak discharge.--Instantaneous maximum discharges that were exceeded on the average of once every 2, 5, 10, 25, 50, 100, 200, and 500 years.

recurrence interval.--The mean interval of time, in years, within which a given flood discharge will be exceeded once.

regression.--A statistical technique applied to paired data to determine the degree of mutual association between a dependent variable and one or more independent variables.

residual.--The discrepancy between measured streamflow and the regression estimate of flow at that site.

METRIC CONVERSION FACTORS

Inch-pound units used in this report may be converted to International System of Units (SI) by using the following conversion factors:

To convert inch-pound unit	*Multiply by*	*To obtain metric unit*
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
inch (in.)	25.40	millimeter
foot (ft)	0.3048	meter
square mile (mi^2)	2.590	square kilometer

ESTIMATION OF NATURAL STREAMFLOW CHARACTERISTICS IN WESTERN COLORADO

By James E. Kircher, Anne F. Choquette, and Brian D. Richter

ABSTRACT

Regression relations were determined for estimating mean annual discharge, mean monthly discharge, flow-duration series, peak discharge, and minimum and maximum 7-day discharges for natural-flow streams in western Colorado. The techniques can be applied to both gaged and ungaged streams. Multiple regression analyses were used to determine the best regression relations for each of the streamflow characteristics. Separate regression relations were developed for each of four hydrologically distinctive regions in the study area. The mean standard errors associated with the regression relations generally were less than 100 percent except for the low-flow relations which had standard errors ranging from 62 to greater than 200 percent. Basin drainage area, mean annual precipitation, mean basin elevation, and mean basin slope are used in the regression relations to determine flow characteristics of streams in the study area.

INTRODUCTION

Description of Study Area

The study area, located in western Colorado (pl. 1), extends westward from the Front Range in the northeast and the Sangre de Cristo Mountains in the southeast to the Colorado-Utah state line. The eastern border of the study area follows the 7,500-ft elevation contour in the Platte River basin and the 9,500-ft contour in the Arkansas River basin and coincides approximately with the boundary between the Southern Rockies and the Great Plains physiographic provinces (Fenneman, 1931).

In the eastern part of the study area, the major landforms are the Rocky Mountains which range in elevation from about 7,500 to more than 14,000 ft. The western part of the study area consists predominantly of broad plateaus and mesas; elevations range from about 5,000 to 7,500 ft except for Grande Mesa, 11,000 ft, the Uncompahgre Plateau, 10,000 ft, and the Roan Plateau, 8,500 ft. Annual precipitation ranges from less than 7 in. at lower elevations to more than 60 in. in the high mountains (Colorado Climate Center, 1984).

The study was conducted in cooperation with the U.S. Bureau of Land Management to provide a methodology to assess streamflow characteristics for land use, planning, impact assessment, and identifying potential project locations.

The regression relations were developed using multiple regression analyses and are based on 10 or more years of streamflow records for 264 stations located in and adjacent to the study area (pl. 1). The study area was divided into four hydrologic or streamflow-characteristic regions to remove geographic bias resulting from differences in basin physiography and climate. Separate regression relations were developed for each of these four regions.

DEVELOPMENT OF ESTIMATING RELATIONS

Analytical Technique

The regional regression relations discussed in this report are regression equations that relate streamflow characteristics to easily measured drainage basin and climatic measurements. The streamflow characteristic being estimated, the dependent variable, is determined from a selected set of *basin characteristics*, the independent variables. The expected accuracy of the regression estimates is indicated by the difference between the estimates and the gaged streamflow data.

Dividing an area into smaller subregions may reduce the variability of streamflow from site to site and result in more accurate streamflow estimates from regression equations. Regional analysis is based on the spatial variation of streamflow due to regional differences in the physical characteristics that directly or indirectly affect streamflow. Accuracy of the resulting streamflow regression relations for each hydrologic region is limited by: (1) The accuracy with which basin and climatic characteristics can be measured; (2) the difficulty in describing and measuring more variable or complex factors, such as vegetation water use, soil depth, and soil permeability that affect streamflow; and (3) the adequacy of the selected regression models to describe the hydrologic system.

Logarithmic transformations were performed on all streamflow and basin characteristics prior to the regression analyses. These data were transformed in order to: (1) *Normalize* the variables and *residuals*; (2) obtain a constant variance of the residuals about the regression line; and (3) obtain linear relations between dependent and independent variables. All of these specifications are needed to meet the statistical assumptions of regression analyses and to derive unbiased regression estimates.

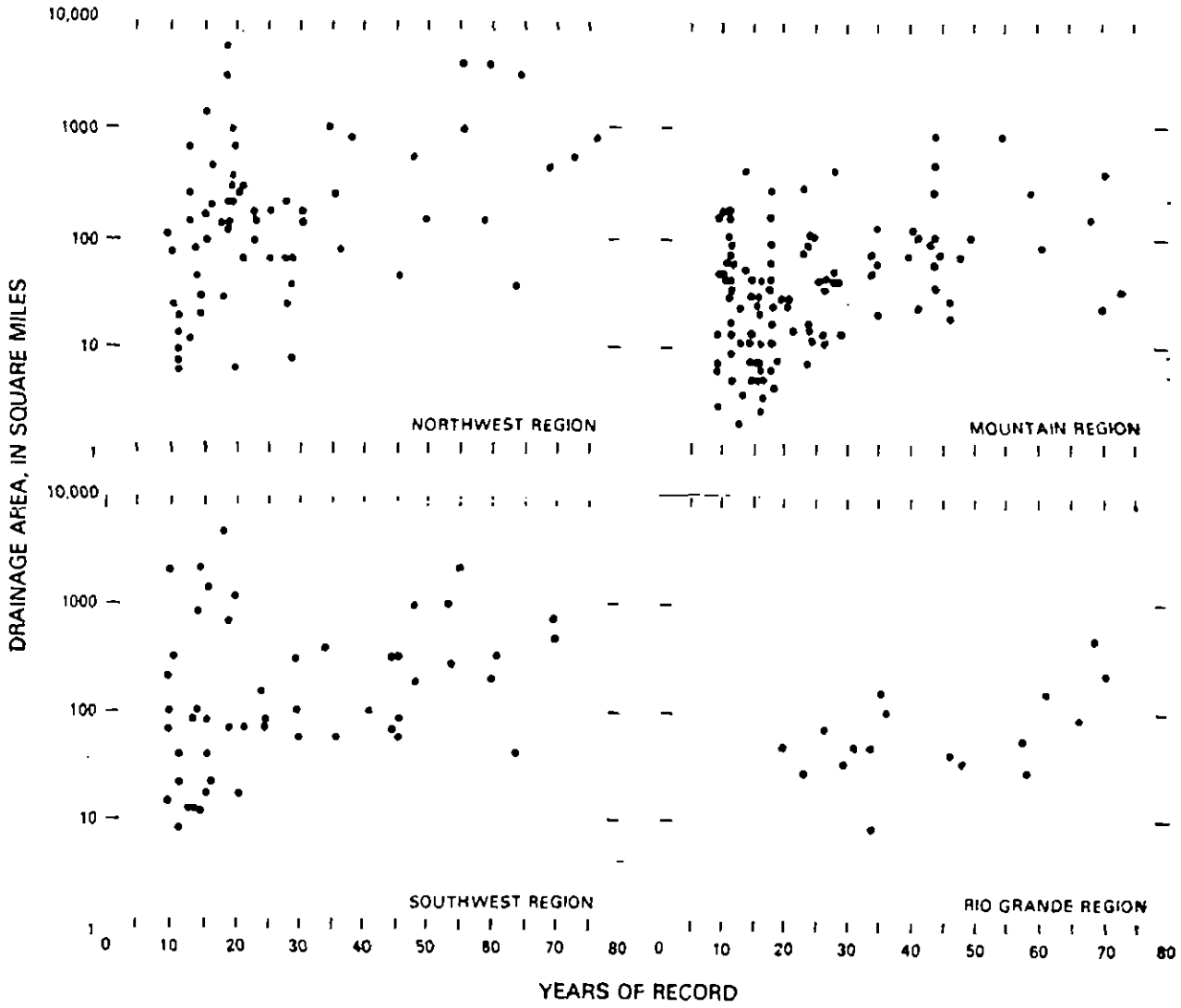

Figure 1.--Basin drainage area and length of record for the gaging stations used in the regression analyses.

Table 1.--*Gaging-station records used to determine regression relations for the mountain region*
[X, gaging station was used in the analysis]

Station number	Station name	Mean annual discharge	Mean monthly discharge	Flow-duration series	Minimum 7-day discharge	Maximum 7-day discharge	Peak discharge
06615500	Michigan River near Lindland, Colo.	X	X	X	X	X	X
06619500	Canadian River at Cowdrey, Colo.	X	X	X	X	X	X
06623800	Encampment River above Hog Park Creek near Encampment, Wyo.	X	X	X	X	X	X
06698500	Tarryall Creek near Jefferson, Colo.	X	X	X	X	X	X
06706000	North Fork South Platte River below Geneva Creek at Grant, Colo.	X	X	X	X	X	X
06716500	Clear Creek near Lawson, Colo.	X	X	X	X	X	X
06722500	South St. Vrain Creek near Ward, Colo.	X	X	X	X	X	X
06725500	Middle Boulder Creek at Nederland, Colo.	X	X	X	X	X	X
06726000	North Boulder Creek at Silver Lake, Colo.	X	X	X	X	X	
06729000	South Boulder Creek near Valmont, Colo.	X	X	X	X	X	
06732000	Glacier Creek near Estes Park, Colo.	X	X	X	X	X	X
06748200	Fall Creek near Rustic, Colo.	X	X	X	X	X	X
06748510	Little Beaver Creek near Idylwilde, Colo.	X	X	X	X	X	X
06748530	Little Beaver Creek near Rustic, Colo.	X	X	X	X	X	X
06748600	South Fork Cache la Poudre River near Rustic, Colo.	X	X	X	X	X	X
07079500	East Fork Arkansas River near Leadville, Colo.	X	X	X	X	X	X
07081000	Tennessee Creek near Leadville, Colo.	X	X	X	X	X	X
07082000	Lake Fork above Sugar Loaf Reservoir, Colo.	X	X	X	X	X	
07083000	Halfmoon Creek near Malta, Colo.	X	X	X	X	X	X
07086500	Clear Creek above Clear Creek Reservoir, Colo.	X	X	X	X	X	X
07089000	Cottonwood Creek below Hot Springs, near Buena Vista, Colo.	X	X	X	X	X	X
07093500	South Arkansas River near Salida, Colo.	X	X	X	X	X	X
09010500	Colorado River below Baker Gulch, near Grand Lake, Colo.	X	X	X	X	X	X
09010501	Colorado River below Baker Gulch plus Grand River Ditch, Colo.	X	X	X	X	X	
09011000	Colorado River near Grand Lake, Colo.	X	X	X	X	X	X
09016500	Arapaho Creek at Monarch Lake Outlet, Colo.	X	X	X		X	X
09020000	Willow Creek near Granby, Colo.	X	X	X	X	X	X
09024000	Fraser River near Winter Park, Colo.	X	X	X	X	X	X
09026500	St. Louis Creek near Fraser, Colo.	X	X	X	X	X	X
09032000	Ranch Creek near Fraser, Colo.	X	X	X	X	X	X
09032500	Ranch Creek near Tabernash, Colo.	X	X	X	X	X	X
09033000	Meadow Creek near Tabernash, Colo.	X	X	X	X	X	X
09034000	Fraser River at Granby, Colo.	X	X	X	X	X	
09034900	Bobtail Creek near Jones Pass, Colo.	X	X	X	X	X	X
09035500	Williams Fork below Steelman Creek, Colo.	X	X	X	X	X	X
09035700	Williams Fork above Darling Creek, near Leal, Colo.	X	X	X	X	X	
09035800	Darling Creek near Leal, Colo.	X	X	X	X	X	X
09035900	South Fork of Williams Fork near Leal, Colo.	X	X	X	X	X	X
09036000	Williams Fork near Leal, Colo.	X	X	X	X	X	X
09036500	Keyser Creek near Leal, Colo.	X	X	X	X	X	X

Table 1 --*Gaging-station records used to determine regression relations for the mountain region*--Continued

Station number	Station name	Mean annual discharge	Mean monthly discharge	Flow-duration series	Minimum 7-day discharge	Maximum 7-day discharge	Peak discharge
09073900	No Name Creek near Aspen, Colo.	X	X	X	X	X	X
09074000	Hunter Creek near Aspen, Colo.	X	X	X	X	X	X
09074800	Castle Creek above Aspen, Colo.	X	X	X	X	X	X
09075700	Maroon Creek above Aspen, Colo.	X	X	X	X	X	X
09077200	Fryingpan River near Ivanhoe Lake, Colo.	X	X	X	X	X	
09077800	South Fork Fryingpan River at Upper Station near Norrie, Colo.	X	X	X	X	X	
09078000	Fryingpan River at Norrie, Colo.	X	X	X	X	X	X
09078100	North Fork Fryingpan River above Cunningham Creek near Norrie, Colo.	X	X	X	X	X	X
09078200	Cunningham Creek near Norrie, Colo.	X	X	X	X	X	X
09078500	North Fork Fryingpan River near Norrie, Colo.	X	X	X	X	X	X
09080100	Fryingpan River at Meredith, Colo.	X	X	X	X	X	X
09082800	North Thompson Creek near Carbondale, Colo.	X	X	X	X	X	X
09084000	Cattle Creek near Carbondale, Colo.	X	X	X	X	X	X
09089000	West Divide Creek below Willow Creek, near Raven, Colo.	X	X	X	X	X	X
09096000	Plateau Creek at Upper Station near Collbran, Colo.	X	X	X	X	X	X
09096800	Buzzard Creek below Owens Creek, near Meiberger, Colo.	X	X	X	X	X	X
09097600	Brush Creek near Collbran, Colo.	X	X	X	X	X	X
09110000	Taylor River at Almont, Colo.	X	X	X	X	X	X
09110500	East River near Crested Butte, Colo.	X	X	X	X	X	X
09111500	Slate River near Crested Butte, Colo.	X	X	X	X	X	X
09112000	Cement Creek near Crested Butte, Colo.	X	X	X	X	X	X
09112200	East River below Cement Creek near Crested Butte, Colo.	X	X	X	X	X	X
09112500	East River at Almont, Colo.	X	X	X	X	X	X
09113300	Ohio Creek at Baldwin, Colo.	X	X	X	X	X	X
09113500	Ohio Creek near Baldwin, Colo.	X	X	X	X	X	X
09114500	Gunnison River near Gunnison, Colo.	X	X	X	X	X	X
09115500	Tomichi Creek at Sargents, Colo.	X	X	X	X	X	X
09117000	Tomichi Creek at Parlin, Colo.	X	X	X	X	X	X
09118000	Quartz Creek near Ohio City, Colo.	X	X	X	X	X	X
09119000	Tomichi Creek at Gunnison, Colo.	X	X	X	X	X	X
09122000	Cebolla Creek at Powderhorn, Colo.	X	X	X	X	X	X
09122500	Soap Creek near Sapinero, Colo.	X	X	X	X	X	X
09123500	Lake Fork at Lake City, Colo.	X	X	X	X	X	X
09124500	Lake Fork at Gateview, Colo.	X	X	X	X	X	X
09125000	Curecanti Creek near Sapinero, Colo.	X	X	X	X	X	X
09127500	Crystal Creek near Maher, Colo.	X	X	X	X	X	X
09130600	West Muddy Creek near Ragged Mountain, Colo.	X	X	X	X	X	X
09132900	West Hubbard Creek near Paonia, Colo.	X	X	X	X	X	X
09139200	Ward Creek near Grand Mesa, Colo.	X	X	X	X	X	X
09140200	Kiser Creek near Grand Mesa, Colo.	X	X	X	X	X	X
09143000	Surface Creek near Cedaredge, Colo	X	X	X	X	X	X
09147100	Cow Creek near Ridgway, Colo	X	X	X	X	X	X
09244500	Elkhead Creek near Clark, Colo.	X	X	X	X	X	X
09302450	Lost Creek near Buford, Colo.	X	X	X	X	X	X

Table 3.--*Gaging-station records used to determine regression relations for the southwest region*
(X, gaging station was used in the analysis)

Station number	Station name	Mean annual discharge	Mean monthly discharge	Flow-duration series	Minimum 7-day discharge	Maximum 7-day discharge	Peak discharge
09145000	Uncompahgre River at Ouray, Colo.	X	X	X	X	X	X
09146000	Uncompahgre River below Ouray, Colo.	X	X	X	X	X	X
09146400	West Fork Dallas Creek near Ridgway, Colo.	X	X	X	X	X	X
09146500	East Fork Dallas Creek near Ridgway, Colo.	X	X	X	X	X	X
09146600	Pleasant Valley Creek near Noel, Colo.	X	X	X	X	X	X
09165000	Dolores River below Rico, Colo.	X	X	X	X	X	X
09166500	Dolores River at Dolores, Colo.	X	X	X	X	X	X
09167500	Dolores River near McPhee, Colo.	X	X	X	X	X	X
09168100	Disappointment Creek near Dove Creek, Colo.	X	X	X	X	X	X
09169500	Dolores River at Bedrock, Colo.	X	X	X	X	X	X
09171100	Dolores River near Bedrock, Colo.	X	X	X	X	X	X
09172500	San Miguel River near Placerville, Colo.	X	X	X	X	X	X
09175500	San Miguel River at Naturita, Colo.	X	X	X	X	X	X
09177000	San Miguel River at Uravan, Colo.	X	X	X	X	X	X
09179500	Dolores River at Gateway, Colo.	X	X	X	X	X	X
09339900	East Fork San Juan River above Sand Creek, near Pagosa Springs, Colo.	X	X	X	X	X	X
09340000	East Fork San Juan River near Pagosa Springs, Colo.	X	X	X	X	X	X
09340500	West Fork San Juan River above Barns Lake near Pagosa Springs, Colo.	X	X	X	X	X	X
09341500	West Fork San Juan River near Pagosa Springs, Colo.	X	X	X	X	X	X
09342000	Turkey Creek near Pagosa Springs, Colo.	X	X	X	X	X	X
09342500	San Juan River at Pagosa Springs, Colo.	X	X	X	X	X	X
09343000	Rio Blanco near Pagosa Springs, Colo.	X	X	X	X	X	X
09343300	Rio Blanco below Blanco Diversion Dam, near Pagosa Springs, Colo.	X	X	X	X	X	
09343500	Rio Blanco near Pagosa Springs, Colo.	X	X	X	X	X	X
09344000	Navajo River at Banded Peak Ranch, near Chromo, Colo.	X	X	X	X	X	X
09344300	Navajo River above Chromo, Colo.	X	X	X	X	X	X
09344400	Navajo River below Oso Diversion Dam, near Chromo, Colo.	X	X	X	X	X	
09345200	Little Navajo River below Lake Oso Diversion Dam, near Chromo, Colo.	X	X	X	X	X	
09345500	Little Navajo River at Chromo, Colo.	X	X	X	X	X	X
09346000	Navajo River at Edith, Colo.	X	X	X	X	X	X
09346400	San Juan River near Carracas, Colo.	X	X	X	X	X	X
09347500	Piedra River at Bridge Ranger Station near Pagosa Springs, Colo.	X	X	X	X	X	X
09349500	Piedra River near Piedra, Colo.	X	X	X	X	X	X
09349800	Piedra River near Arboles, Colo.	X	X	X	X	X	X
09350500	San Juan River at Rosa, N. Mex.	X	X	X	X	X	X
09352900	Vallecito Creek near Bayfield, Colo.	X	X	X	X	X	X
09353500	Los Pinos River near Bayfield, Colo.	X	X	X	X	X	X
09355000	Spring Creek at La Boca, Colo.	X	X	X	X	X	X
09357500	Animas River at Howardsville, Colo.	X	X	X	X	X	X
09359000	Mineral Creek near Silverton, Colo.	X	X	X	X	X	X

Table 4.--*Gaging-station records used to determine regression relations for the northwest region*
(X, gaging station was used in the analysis)

Station number	Station name	Mean annual discharge	Mean monthly discharge	Flow-duration series	Minimum 7-day discharge	Maximum 7-day discharge	Peak discharge
09040500	Troublesome Creek near Troublesome, Colo.---	X	X	X	X	X	X
09059500	Piney River near State Bridge, Colo --------	X	X	X	X	X	X
09067500	Eagle River at Eagle, Colo.----------	X	X	X	X	X	X
09068000	Brush Creek near Eagle, Colo.----------	X	X	X	X	X	X
09069000	Eagle River at Gypsum, Colo.----------	X	X	X	X	X	X
09070000	Eagle River below Gypsum, Colo.----------	X	X	X	X	X	X
09080300	Rocky Fork Creek near Meredith, Colo.-------	X	X	X	X	X	X
09080400	Fryingpan River near Ruedi, Colo.----------	X	X	X	X	X	
09081550	Crystal River at Placita, Colo.----------	X	X	X	X	X	X
09081600	Crystal River above Avalanche Creek near Redstone, Colo ----------	X	X	X	X	X	X
09082500	Crystal River near Redstone, Colo ----------	X	X	X	X	X	X
09083000	Thompson Creek near Carbondale, Colo.-------	X	X	X	X	X	X
09085200	Canyon Creek above New Castle, Colo.--------	X	X	X	X	X	X
09085300	East Canyon Creek near New Castle, Colo.----	X	X	X	X	X	X
09085400	Possum Creek near New Castle, Colo.---------	X	X	X	X	X	X
09089500	West Divide Creek near Raven, Colo.---------	X	X	X	X	X	X
09091500	East Rifle Creek near Rifle, Colo.----------	X	X	X	X	X	
09092000	Rifle Creek near Rifle, Colo.----------	X	X	X	X	X	X
09092500	Beaver Creek near Rifle, Colo.----------	X	X	X	X	X	X
09093000	Parachute Creek near Parachute, Colo.-------	X	X	X	X	X	X
09093500	Parachute Creek at Parachute, Colo.---------	X	X	X	X	X	X
09095000	Roan Creek near De Beque, Colo.----------	X	X	X	X	X	X
09097500	Buzzard Creek near Collbran, Colo.----------	X	X	X	X	X	X
09104500	Mesa Creek near Mesa, Colo.----------	X	X	X	X	X	X
09123000	Soap Creek at Sapinero, Colo.----------	X	X	X	X	X	X
09128500	Smith Fork near Crawford, Colo.----------	X	X	X	X	X	X
09130500	East Muddy Creek near Bardine, Colo.--------	X	X	X	X	X	X
09132500	North Fork Gunnison River near Somerset, Colo.----------	X	X	X	X	X	X
09134500	Leroux Creek near Cedaredge, Colo.----------	X	X	X	X	X	X
09136200	Gunnison River near Lazear, Colo.----------	X	X	X	X	X	X
09137800	Dirty George Creek near Grand Mesa, Colo.---	X	X	X	X	X	X
09141200	Younge Creek near Grand Mesa, Colo.---------	X	X	X	X	X	X
09143500	Surface Creek at Cedaredge, Colo.----------	X	X	X	X	X	X
09144200	Tongue Creek at Cory, Colo.----------	X	X	X	X	X	X
09146200	Uncompahgre River near Ridgway, Colo.-------	X	X	X	X	X	X
09147000	Dallas Creek near Ridgway, Colo.----------	X	X	X	X	X	X
09147500	Uncompahgre River at Colona, Colo.----------	X	X	X	X	X	X
09150500	Roubideau Creek at mouth, near Delta, Colo.-	X	X	X	X	X	X
09239500	Yampa River at Steamboat Springs, Colo.-----	X	X	X	X	X	X
09242500	Elk River near Trull, Colo.----------	X	X	X	X	X	X
09244100	Fish Creek near Milner, Colo.----------	X	X	X	X	X	X
09244410	Yampa River below Diversion, near Hayden, Colo.----------	X	X	X	X	X	X
09245000	Elkhead Creek near Elkhead, Colo.----------	X	X	X	X	X	X
09245500	North Fork Elkhead Creek near Elkhead, Colo.----------	X	X	X	X	X	X
09247000	Fortification Creek at Craig, Colo.---------	X	X	X		X	X

selected flow characteristics using data from all of the gaging stations. These relations included four independent variables selected from the previously defined set of basin and climatic characteristics and were defined using stepwise regression procedures (explained in the following section titled, "Regression Relations"). Residuals, which are the differences between the logs of measured and estimated flow values, then were plotted on a location map of the gaging stations. Boundaries were drawn around physiographic regions in which the regression relations tended to overestimate or underestimate streamflow.

After these initial regions were defined, regression relations were determined independently for each region. Techniques used to select variables for the final regression relations are described in detail later in this report. The regions then were reevaluated on the basis of areal plots of the residuals obtained from these refined models. If consistent deviations occurred in specific areas of a hydrologic region, regional boundaries were redefined, and regression relations were then redetermined. This procedure was repeated until residuals failed to show systematic areal distributions, and further subdivision failed to improve the precision of the estimates from the regression relation.

Four hydrologic regions were delineated in the study area (pl. 1), based on relations between streamflow and basin characteristics. These regions are subsequently referred to as the mountain region, Rio Grande region, southwest region, and northwest region.

The mountain region consists predominantly of the high peaks of the Rocky Mountains north of the Rio Grande drainage basin. Minimum elevation in this region is 7,500 ft, and the area exhibits high topographic relief. The Rio Grande region includes the Rio Grande drainage basin and the headwaters of the Arkansas drainage basin on the eastern slope of the Sangre de Cristo Mountains. The Rio Grande region includes the eastern San Juan Mountains, the San Luis Valley, and the Sangre de Cristo Mountains; elevations range from about 7,500 to 14,000 ft. The southwest region includes an area that extends west from the Continental Divide in the San Juan Mountains and south from the Uncompahgre Plateau. Elevations in this region range from about 5,000 ft near the Colorado-Utah border to 14,000 ft along the Continental Divide. The northwest region is located north of the Uncompahgre Plateau and west of the mountain region and is an area of comparatively low elevations. Elevations in this region range from about 5,000 to 7,500 ft, with the exception of the 8,000 to 9,000-ft high Roan Plateau in the central part of the region.

The boundaries between the hydrologic regions were determined initially on the basis of statistical analyses, physiography, and climate. The Continental Divide forms a topographic barrier between the mountain and Rio Grande regions and between the Rio Grande and southwest regions. The Uncompahgre Plateau, which reaches elevations of 9,000 to 10,000 ft, separates the northwest and southwest regions. The Uncompahgre Plateau forms a major *orographic* barrier to air masses moving from the south and southwest; annual precipitation south of the Uncompahgre Plateau, in the southwest region, ranges from about 12 to 25 in., decreasing to 8 in. at the lower elevations north of the Uncompahgre Plateau in the northwest region (Colorado Climate Center, 1984).

Table 5.--*Summary of regression relations for the mountain region*

Model: $Q = aA^{(b_1)} P^{(b_2)} E_B{}^{(b_3)} S_B{}^{(b_4)}$

[Q, discharge, in cubic feet per second; A, drainage area in square miles; P, (mean annual precipitation, in inches -10 inches); E_B, (mean basin elevation, in feet -5,000 feet) per 1,000 feet; S_B, mean basin slope, in feet per feet; a, b_1, b_2, b_3, b_4, regression coefficients]

Discharge characteristic Q	Regression constant a	Regression coefficient of basin characteristics b_1	b_2	b_3	b_4	Number of stations	Mean standard error (in percent)
Annual mean--------	4.22×10^{-2}	0.852		2.15		123	43
October mean-------	1.64×10^{-3}	.969		3.16		123	50
November mean------	2.43×10^{-3}	1.02		2.65		123	43
December mean------	2.05×10^{-3}	1.04		2.55		123	45
January mean-------	1.76×10^{-3}	1.05		2.52		123	49
February mean------	2.65×10^{-3}	1.06		2.24		123	49
March mean---------	1.78×10^{-2}	1.06		1.21		123	43
April mean---------	1.27×10^{-1}	1.07	.373			123	56
May mean-----------	5.60×10^{-1}	.895	.602			123	58
June mean----------	4.74×10^{-2}	.800		3.04		123	51
July mean----------	3.94×10^{-4}	.859		5.19		123	63
August mean--------	2.01×10^{-4}	.963		4.81		123	70
September mean-----	3.96×10^{-4}	.965		4.12		123	63
90 percent duration	5.54×10^{-4}	1.09		2.94		123	59
70 percent duration	1.53×10^{-3}	1.04		2.70		123	46
50 percent duration	2.25×10^{-3}	0.998		2.84		123	45
25 percent duration	6.79×10^{-3}	0.934		2.97		123	53
10 percent duration	1.55×10^{-1}	.813		2.11		123	52
2-year-7-day low---	2.77×10^{-4}	1.08		3.31		122	62
10-year-7-day low--	2.54×10^{-5}	1.14		4.27		122	101
50-year-7-day low--	3.39×10^{-6}	1.18		5.13		122	158
2-year-7-day high--	4.23×10^{1}	.736			.861	123	50
10-year-7-day high-	5.45×10^{1}	.754			.721	123	42
50-year-7-day high-	6.38×10^{1}	.760			.668	123	42
100-year-7-day high	6.74×10^{1}	.761			.652	123	43
2-year peak ------	7.43×10^{1}	.693			.894	112	51
5-year peak--------	8.15×10^{1}	.698			.719	112	46
10-year peak-------	8.61×10^{1}	.699			.635	112	45
25-year peak-------	9.15×10^{1}	.699			.550	112	44
50-year peak-------	9.49×10^{1}	.699			.497	112	44
100-year peak------	9.85×10^{1}	.698			.452	112	45
200-year peak------	1.02×10^{2}	.697			.412	112	45
500-year peak------	1.06×10^{2}	.696			.364	112	46

Table 7.--*Summary of regression relations for the southwest region*

Model: $Q = aA^{(b_1)} P^{(b_2)} E_B^{(b_3)} S_B^{(b_4)}$

[Q, discharge, in cubic feet per second; A, drainage area in square miles; P, (mean annual precipitation, in inches -10 inches); E_B, (mean basin elevation, in feet -5,000 feet) per 1,000 feet; S_B, mean basin slope, in feet per feet; a, b_1, b_2, b_3, b_4, regression coefficients]

Discharge characteristic Q	Regression constant a	Regression coefficient of basin characteristics b_1	b_2	b_3	b_4	Number of stations	Mean standard error (in percent)
Annual mean--------	9.70×10^{-2}	0.888		1.74		54	55
October mean-------	2.84	.806			1.11	54	100
November mean------	1.83	.815			1.13	54	87
December mean------	1.22	.872			1.26	54	77
January mean-------	9.33×10^{-1}	.916			1.34	54	77
February mean------	6.47×10^{-1}	.913			.906	54	77
March mean---------	1.24×10^{-1}	.861	0.502			54	53
April mean---------	4.22×10^{-2}	.961	1.13			54	62
May mean-----------	1.00×10^{-1}	.948		2.24		54	55
June mean----------	3.17×10^{-2}	1.01		2.76		54	98
July mean----------	1.12×10^{1}	.850			1.68	54	123
August mean--------	5.13	.790			1.32	54	135
September mean-----	3.65	.811			1.30	54	142
90 percent duration	1.35	.902			2.08	54	179
70 percent duration	1.61	.863			1.56	54	108
50 percent duration	2.10	.855			1.30	54	106
25 percent duration	6.51	.862			1.34	54	88
10 percent duration	2.01×10^{1}	0.857			1.34	54	65
2-year-7-day low---	1.87	.830			2.22	54	177
10-year-7-day low	------ No Usable Relation Defined ------						
50-year-7-day low	------ No Usable Relation Defined ------						
2-year-7-day high--	5.01×10^{-1}	.847		1.89		54	51
10-year-7-day high-	1.54	.845		1.58		54	41
50-year-7-day high-	3.24	.834		1.36		54	37
100-year-7-day high	4.27	.829		1.28		54	38
2-year peak--------	7.87	.732		.847		51	38
5-year peak--------	5.39×10^{1}	.686				51	42
10-year peak-------	6.94×10^{1}	.685				51	41
25-year peak-------	9.11×10^{1}	.683				51	41
50-year peak-------	1.09×10^{2}	.682				51	43
100-year peak------	1.28×10^{2}	.680				51	45
200-year peak------	1.49×10^{2}	.679				51	47
500-year peak------	1.79×10^{2}	.677				51	52

Note: The results for stations used in this study suggest that the peak-flow models for the southwest region tend to overestimate peak flow by about 25 to 100 percent when site elevation is lower than about 5,500.

Table 8.--*Summary of regression relations for the northwest region*

Model: $Q = aA^{(b_1)} P^{(b_2)} E_B^{(b_3)} S_B^{(b_4)}$

[Q, discharge, in cubic feet per second; A, drainage area in square miles; P, (mean annual precipitation, in inches -10 inches); E_B, (mean basin elevation, in feet -5,000 feet) per 1,000 feet; S_B, mean basin slope, in feet per feet; a, b_1, b_2, b_3, b_4, regression coefficients]

Discharge characteristic Q	Regression constant a	Regression coefficient of basin characteristics b_1	b_2	b_3	b_4	Number of stations	Mean standard error (in percent)
Annual mean--------	2.05×10^{-2}	0.973		2.63		69	56
October mean-------	2.95×10^{-3}	1.01		3.13		69	74
November mean------	2.86×10^{-3}	1.05		2.92		69	71
December mean------	2.78×10^{-3}	1.05		2.84		69	71
January mean-------	2.79×10^{-3}	1.05		2.77		69	71
February mean------	4.53×10^{-3}	1.05		2.45		69	67
March mean---------	2.72×10^{-2}	1.04		1.44		69	62
April mean---------	1.08×10^{-1}	.916	0.804			69	67
May mean-----------	1.44×10^{-1}	.878	1.17			69	85
June mean----------	9.59×10^{-3}	1.04		3.76		69	88
July mean----------	8.28×10^{-4}	1.07		4.58		69	77
August mean--------	8.13×10^{-4}	1.01		4.21		69	92
September mean-----	9.96×10^{-4}	1.00		3.89		69	95
90 percent duration	1.00×10^{-4}	1.05		4.81		69	137
70 percent duration	1.37×10^{-3}	1.04		3.34		69	78
50 percent duration	3.33×10^{-3}	1.02		3.02		69	63
25 percent duration	1.04×10^{-2}	1.02		2.80		69	56
10 percent duration	4.30×10^{-2}	.989		2.77		69	74
2-year-7-day low---	4.89×10^{-4}	1.03		4.34	.766	68	149
10-year-7-day low	------ No Usable Relation Defined ------						
50-year-7-day low	------ No Usable Relation Defined ------						
2-year-7-day high--	1.94×10^{-1}	.875	1.26			69	90
10-year-7-day high-	6.23×10^{-1}	.843	1.09			69	70
50-year-7-day high-	1.15	.825	.990			69	65
100-year-7-day high	1.42	.818	.959			69	66
2-year peak--------	7.95×10^{-1}	.820	1.00			67	71
5-year peak--------	1.86	.794	.871			67	65
10-year peak-------	2.86	.781	.802			67	63
25-year peak-------	4.45	.768	.732			67	63
50-year peak-------	5.90	.759	.686			67	63
100-year peak------	7.54	.752	.646			67	63
200-year peak------	9.49	.745	.609			67	65
500-year peak------	1.24×10^{1}	.737	.565			67	67

—

"Weighted estimates are used for unregulated streams to reduce the time-sampling error that may occur in a station flood-frequency estimate. This time-sampling error is associated with the length of record for a station. A station with a short period of record may have a large time-sampling error because its record may not be representative of the actual flood history of the site which would be based on a large number of years. The observed period of record at a station has the possibility of falling within a wet or dry climatic cycle. The weighted estimate of flood frequency should be a better indicator of the true values because the regression estimate is an average of the flood histories of many gaging stations over a long period of time" (Thomas and Lindskov, 1983).

The weighting procedure to use for peak discharge in this report is described by Sauer (1974). This procedure weights the station flood frequency and the regression estimate of flood frequency by the years of record at the station and the equivalent years of record of the regression estimate. The following equation should be used:

$$Q_{T(w)} = \frac{Q_{T(s)} \times N + Q_{T(r)} \times E}{N + E}$$

where $Q_{T(w)}$ = The weighted discharge, in cubic feet per second, for recurrence interval T-years;

$Q_{T(s)}$ = the station value of the flood based on the historical record, in cubic feet per second, for recurrence interval T-years (from Richter and others, 1984);

N = the number of years of station data used to compute $Q_{T(s)}$;

$Q_{T(r)}$ = the regression estimate of the flood, in cubic feet per second, for recurrence interval T-years; and

E = the equivalent years of record for $Q_{T(r)}$ = 10 years (U.S. Water Resources Council, 1981, p. 21).

The Water Resources Council's (U.S. Water Resources Council, 1981, p. 21) recommendation for equivalent years of record only pertains to the 100-year flood; therefore, the assumption for this study is that the equivalent years of record = 10 years applies to other recurrence intervals.

Ungaged Sites

This method consists of using the regional relations shown in tables 5-8. Hydrologic characteristics at ungaged sites can be computed by one of the following procedures: Procedure 1 is for sites where the regression relations for one region are used. Procedure 2 is for sites that are near regional boundaries. Procedure 3 is for sites that are near state boundaries.

Procedure 1 is used when the entire drainage area of a basin falls in a single hydrologic region (see pl. 1).

Procedure 2 is used when the basin drainage area upstream from the site of interest crosses over a hydrologic region boundary. Where a site is near a regional boundary, the estimates of that particular characteristic can be quite different depending on the regional relation used. Therefore, a weighting procedure is recommended that utilizes the regression relations for both regions whereby each estimate is weighted by the percentage of the drainage area that lies in each region, and then the two are summed. For example, if the 10-year peak discharge is to be determined at a site where 50 percent of the drainage area lies in the mountain region and 50 percent of the drainage area lies in the northwest region, then the 10-year peak discharge is computed using the appropriate relation (P_{10}) for the northwest region multiplied by 0.50 and the appropriate relation (P_{10}) for the mountain region multiplied by 0.50. The two results then are added together to get the estimate of the 10-year peak discharge at the ungaged site.

Procedure 3 applies to sites where the upstream drainage area of the site crosses a state line. Studies presenting relations for peak discharge characteristics have been completed in Utah (Thomas and Lindskov, 1983), Wyoming (Lowham, 1976) and New Mexico (Thomas and Gold, 1982), and each of these states is working on updates which will include relations for estimating additional streamflow characteristics. No major differences are apparent between the results of this study and those for Utah, New Mexico, and Wyoming. However, when a station lies near a state line, streamflow characteristics should be determined by averaging estimates from the relations for both states. For example, to determine the 10-year peak discharge at a site near the Colorado-Wyoming State line, the 10-year peak discharge should be calculated using both Colorado's relation (tables 5-8) and Wyoming's relation (Lowham, 1976); then an arithmetic mean of the two results should be considered the best estimate of the 10-year peak discharge.

Limitations and Accuracy

The regression relations defined in this study provide estimates of flow in streams where the flow is not significantly altered by regulation, diversion, or other man-made influences. The relations cannot be used to estimate present or future flows in streams in urban areas unless the effects of urbanization on streamflow are insignificant. For example, the relations could be applied to a large stream (large rural drainage) flowing in a natural channel through an urban area.

The mean standard error of the regression relations applies only to flow estimates derived for basins in which the values of the independent variables are within the range of the measurements in the gaged basins. The range and distribution of the variables that appear in the regression relations are shown in figure 2. The accuracy of the regression relations for ungaged basins having climatic or physiographic characteristics outside the range of the gaged basins is untested and therefore is unknown.

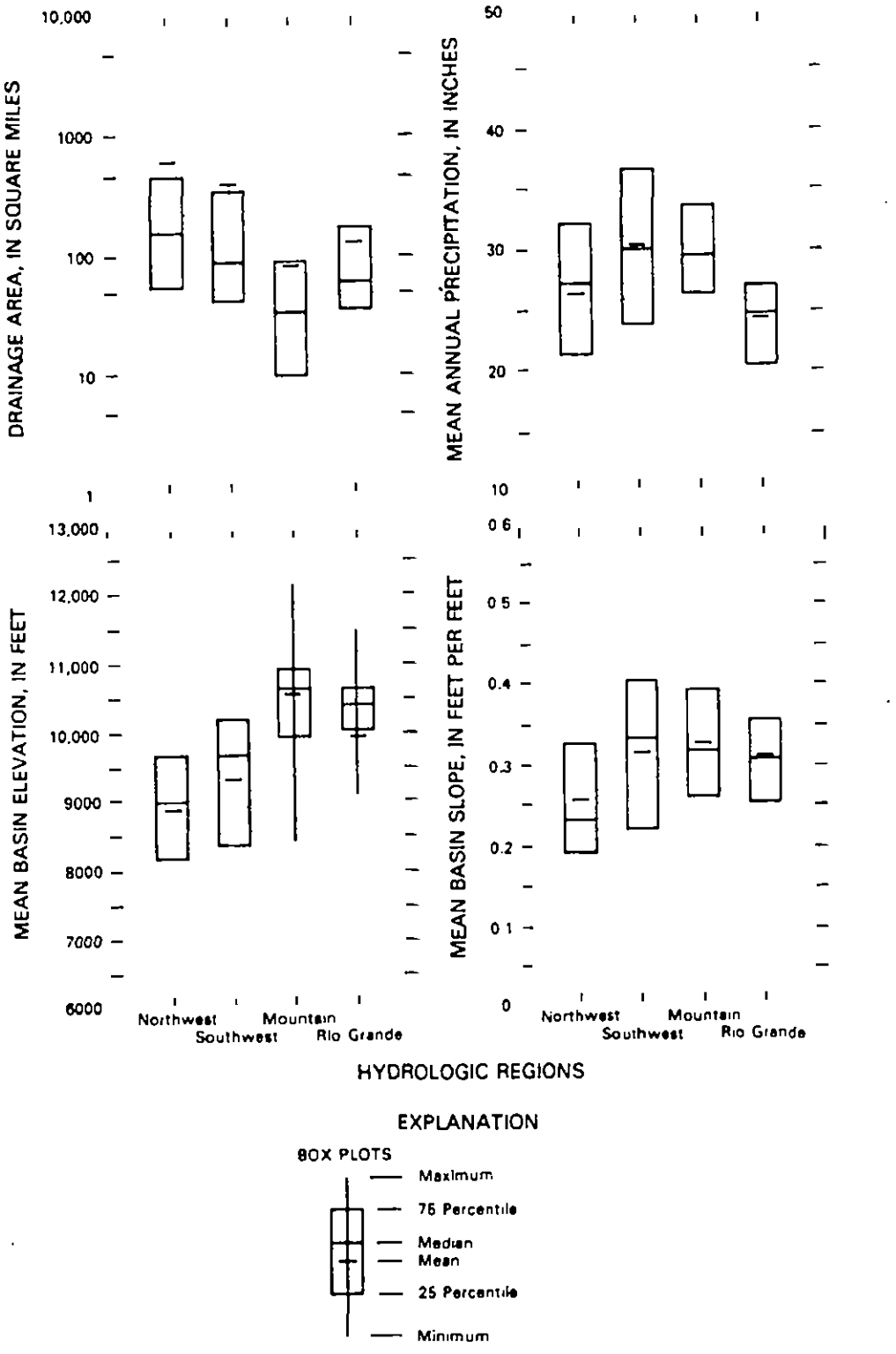

Figure 2.--Range and distribution of basin characteristics used in regression relations for each hydrologic region.

The accuracy of the regression relations differs between hydrologic regions and specific flow characteristics (fig. 3). Based on averages of the mean standard error for all types of flows excluding minimum 7-day discharges, the accuracy of the predictions decreases in the following order: mountain region, 49 percent; Rio Grande region, 64 percent; northwest region, 73 percent; and southwest region, 73 percent. The regression relations show the smallest mean standard error (about 45 to 70 percent) for estimates of mean annual discharge and flood volumes. The accuracy of the regression relation varies by month for mean monthly discharge but generally is best during November through March, except in the southwest region, where the February through May regression relations show the smallest mean standard error. However, discharges and the range in discharge are generally small during November through March, and comparisons between monthly standard errors (in percent) can be misleading.

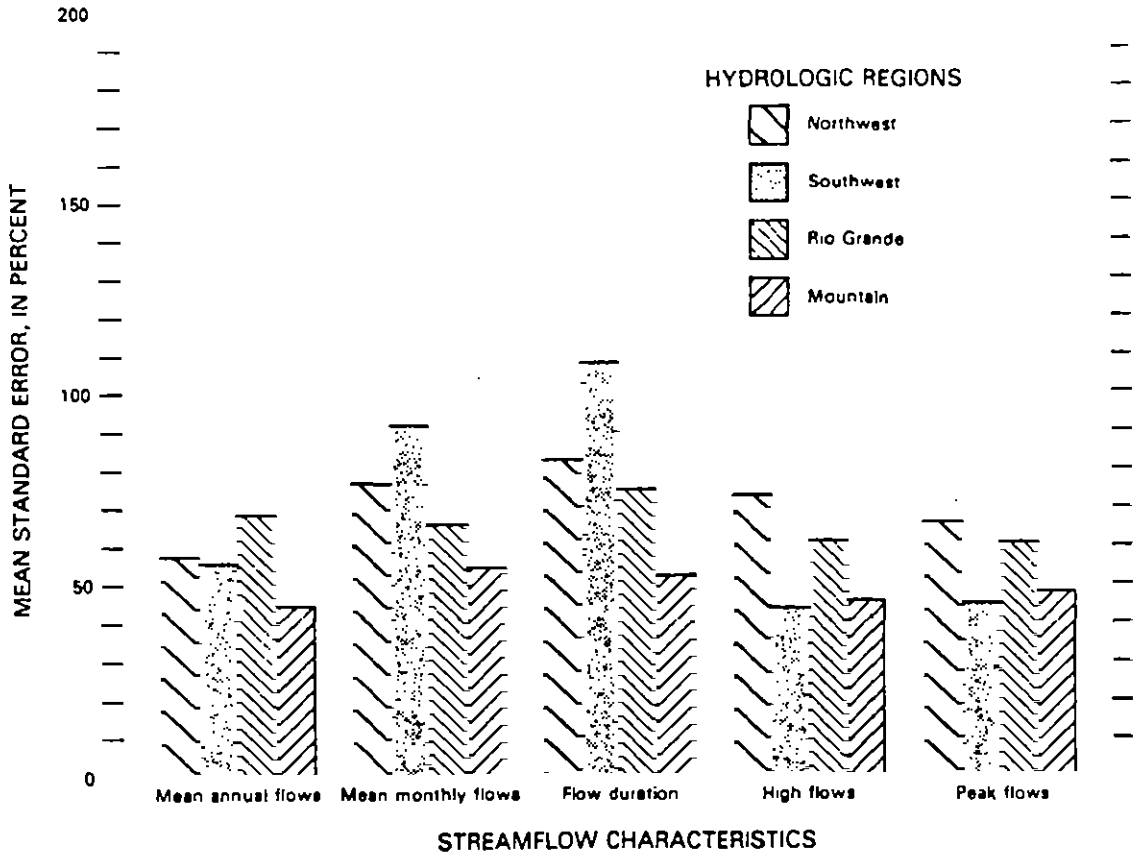

Figure 3.--Mean standard error of regression estimates for selected flow characteristics in each hydrologic region.

Sullivan's opinion

Mean standard errors associated with low-flow relations were commonly in excess of 100 percent, and in five of the nine attempted relations, no usable relation could be defined because of exceedingly high mean standard errors. The difficulty of modeling low-flow volumes reflects large low-flow variability that is not explained by independent variables that can be easily quantified. Low flows can be strongly affected by factors such as structure of the bedrock, depth and permeability of soils, and type and density of vegetation. In addition, even small irrigation diversions can affect low-flow volumes and contribute to the variability of gaged low flows.

For these reasons, most reported attempts at low-flow regionalization encompassing large geographic regions have been unsuccessful (Riggs, 1973). More reliable results generally can be obtained at an ungaged site by relating a series of low flows at an ungaged site to concurrent flows at a nearby gaging station at which the low-flow frequency curve is defined (Riggs, 1965, 1970; Hardison and Moss, 1972). Based on this relation, other low-flow characteristics at the ungaged site can be extrapolated from the frequency curve for the gaged site.

The residuals of the peak-discharge relations in the southwest region indicate that for site elevations lower than about 5,500 ft, the peak-discharge relations tend to overestimate flow by about 50 percent (mean standard error). Because few gaging stations in the southwest region are located below 5,500 ft, the consistency of this bias is uncertain; however, the peak discharge estimates from the regression equations may overestimate flood volumes at other low-elevation sites in this region.

Several guidelines apply to use of the estimates obtained from the regression relations. The mean standard error (tables 5-8) is only an approximate indication of the expected accuracy of the estimate; based on the data from which the relations were developed, the discrepancy between the estimate and actual streamflow will exceed the mean standard error about 30 percent of the time. The large mean standard errors associated with low-flow estimates (tables 5-8) indicate that estimates of low-flow volumes, including minimum 7-day discharge, mean monthly discharge for low-flow months, or flow-durations involving base flow, are only approximate estimates of actual flows. These flow characteristics might be better estimated using other techniques (Riggs, 1970, 1972).

An additional source of error may be associated with estimates of flows having long recurrence intervals. The median length of record in the four hydrologic regions was about 20 years, and the maximum length of record was about 70 years. Length of record has been shown to be the most important single factor affecting the accuracy of streamflow values estimated by the log-Pearson distribution (Benson, 1952; Ott, 1971; Nasseri, 1976).

Because distribution of streamflow-gaging stations on natural-flow channels is not uniform throughout western Colorado (pl. 1), site location is an additional factor to consider in evaluating the accuracy of the regression relations for ungaged basins. Several areas that are physiographically or geologically distinctive and contain few or no gaging stations include the following:

(1) San Luis Valley (below an elevation of about 8,000 ft);
(2) Uncompahgre Plateau;
(3) Roan Plateau;
(4) North Park and South Park; and
(5) Low-elevation areas (less than about 6,000 ft) in the western part of the northwest hydrologic region.

The lack of streamflow records that met the specifications of this study prevented verification of the hydrologic similarity of these areas to other parts of the hydrologic region in which they occur. When such areas lacking gaging stations were located near hydrologic region boundaries, boundaries necessarily were determined by considering other physical controls on streamflow amounts such as topography, geology, and climatic characteristics.

SUMMARY AND CONCLUSIONS

Regression relations for estimating streamflow characteristics were developed for western Colorado. Regression relations were determined for 33 flow characteristics, which include mean annual and mean monthly discharges, flow-duration series, peak discharge, and minimum and maximum 7-day discharges of various recurrence intervals. The study area was divided into four hydrologically distinct regions to decrease the variablilty in streamflow caused by differences in basin physiography and climate. Records from 264 stations located in the study area were used to determine relations for the four hydrologic regions.

Drainage area was the most significant variable in all of the streamflow relations. Other significant variables in the regression relations were mean annual precipitation, *mean basin elevation*, and mean basin slope. The final regression relations include these four basin and climatic characteristics.

It is not recommended that the relations be applied where basin characteristics are outside the range of the data from which the relations were developed or are in local regions of the study area where gaged records of *natural flow* were not available to develop the relations. The low-flow relations should be used only as an indicator of expected flows because of large mean standard errors associated with the regression estimates of low flows.

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U S GOVERNMENT PRINTING OFFICE 1985—580-671/25015 REGION NO 8

Station **VERMILLION CREEK AT INK SPRINGS RANCH, CO.**
Parameter: STREAM FLOW CFS
Year 1977-1981
State CO
County. MOFFAT

ID: 09235450
Statistic. Mean
Latitude. 40.45 43
Longitude. 108 43 33
Elevation 5725 00
Drainage Area 816 00

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	124	113	124	120	124	138	155	155	150	124	120	124	1571
Avg Day	5 43	14 29	21 94	27 32	30 61	8 40	4 09	5 16	4 65	4 69	3 21	3 79	10 70
Max Day	86 00	150 0	76 00	137 0	232 0	38 00	40 00	80 00	100 0	62 00	6 30	7 00	232 0
Min Day	2 00	2 00	7 00	4 50	5 00	1 80	1 40	1 10	1 30	1 80	1 80	2 00	1 10
# Months	4	4	4	4	4	4	5	5	5	4	4	4	4
SDev Month	2 45	11 94	10 11	21 79	35 18	6 84	1 64	3 32	2 45	4 12	0 656	1 52	7 22
Skew Month	1 60	1 96	-0 678	0 267	1 95	0 798	0 773	0 523	0 998	1 84	0 664	1 11	1 56
Min Month	3 40	7 27	9 15	7 44	8 68	3 86	2 17	1 89	2 40	2 09	2 55	2 36	6 05
Max Month	8 98	31 99	30 65	51 97	83 16	18 19	6 60	9 21	8 44	10 78	4 05	5 87	21 65
Exceedences													
1%	76 88	144 5	74 80	134 4	217 1	37 24	34 50	80 00	70 00	60 08	6 24	7 00	100 0
5%	7 70	60 50	53 60	86 00	123 2	27 20	9 70	28 50	16 50	19 60	5 40	6 50	40 00
10%	6 50	29 40	37 60	61 00	83 40	19 00	5 50	5 50	5 30	5 04	4 50	6 00	27 00
20%	5 10	15 00	31 00	41 00	48 00	14 00	4 00	3 10	3 40	4 00	4 00	5 10	12 00
50%	3 90	7 75	20 00	16 00	13 00	5 60	2 70	2 50	2 50	2 40	2 80	3 50	4 00
80%	3 20	4 50	9 86	7 60	8 44	2 36	2 20	2 00	2 00	2 10	2 40	2 50	2 30
90%	2 60	4 00	8 58	6 30	7 58	2 00	2 00	1 80	2 00	2 00	2 30	2 30	2 00
95%	2 40	3 39	7 90	5 60	6 00	1 98	1 98	1 50	1 55	2 00	2 20	2 00	2 00
99%	2 00	2 13	7 10	4 84	5 24	1 80	1 50	1 20	1 40	2 00	2 00	2 00	1 50

APPENDIX – D
Diversion Records

WD	ID	WRNAME	STRTYPE	WRSTRNO	WRSTRNAME	CTY	Q10	Q40	Q160	SEC	TS	RNG	PM	USETYPE	DCRAMT	DCRUNITS	ADJTYPE	ADJDATE	PADJDATE	APRODATE	ORDNO	ADMINNO	PRIORNO	CANO	SEQNO	PLANS	ALTERID	COMMENT
56	536	THOMAS DOUDLE DITCH	1	4	BEAVER CK	41		SE	SE	25	11 N	104 W	S	1	1.6600	C	O	09/22/1894		04/15/1880	0	11063.00000	1		1		0	
56	524	BEAVER DITCH	1	4	BEAVER CK	41		SW	SW	24	11 N	104 W	S	1	2.0000	C	O	09/22/1894		04/01/1893	0	15797.00000	8		1		0	
56	562	MCKNIGHT NO 1	1	4	BEAVER CK	41		SW	SW	31	11 N	103 W	S	1	5.0000	C	S	10/09/1964	06/17/1936	09/01/1956	0	38960.00000	22	CA1899	1		0	ERROR IN LEGAL DESCRIPTION
56	563	MCKNIGHT NO 2	1	4	BEAVER CK	41		SE	NW	6	10 N	103 W	S	1	3.0000	C	S	10/09/1964	06/17/1936	09/01/1956	0	38960.00000	22A	CA1899	1		0	ERROR IN LEGAL DESCRIPTION
56	587	DEJOURNETTE D NO 1	1	4	BEAVER CK	41		NE	SW	6	10 N	103 W	S	160	1.0000	C	S	12/31/1972	12/31/1971	09/05/1916	0	44559.24354		W0089-72	1		0	
56	614	DEJOURNETTE D NO 2	1	4	BEAVER CK	41		NW	NW	7	10 N	103 W	S	160	0.5000	C	S	12/31/1972	12/31/1971	09/05/1916	0	44559.24354		W0398-72	1		0	LEGAL DESCRIPTION TIED TO OLD SURVEY.
56	614	DEJOURNETTE D NO 2	1	4	BEAVER CK	41		NW	NW	7	10 N	103 W	S	160	0.5000	C	S,AB	12/31/1972	12/31/1971	09/05/1916	0	44559.24354		91CW0116	2		0	
56	588	JARVIE DITCH	1	4	BEAVER CK	41		SW	SE	12	10 N	104 W	S	160	2.0000	C	S	12/31/1972	12/31/1971	09/05/1916	0	44559.24354		W0088-72	1		0	
56	524	BEAVER DITCH	1	4	BEAVER CK	41		SW	SW	24	11 N	104 W	S	160	5.0000	C	S	12/31/1972	12/31/1971	06/01/1930	0	44559.29371		W0097-72	2		0	
56	536	THOMAS DOUDLE DITCH	1	4	BEAVER CK	41		SE	SE	25	11 N	104 W	S	160	4.3400	C	S	12/31/1972	12/31/1971	06/01/1930	0	44559.29371		W0090-72	2		0	
56	622	APPLE DITCH	1	4	BEAVER CK	41		SW	SW	24	11 N	104 W	S	160	3.0000	C	S	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		W0095-72	1		0	
56	589	CARMA SPG & DITCH	1	4	BEAVER CK	41		SW	NW	31	11 N	103 W	S	168	0.2500	C	S	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		W0096-72	1		0	
56	621	GOODMAN DITCH	1	4	BEAVER CK	41		SE	NW	25	11 N	104 W	S	160	5.0000	C	S	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		W0094-72	1		0	
56	623	PIE DITCH	1	4	BEAVER CK	41		NW	SW	7	10 N	103 W	S	160	3.0000	C	S	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		W0092-72	1		0	
56	623	PIE DITCH	1	4	BEAVER CK	41		NW	SW	7	10 N	103 W	S	160	3.0000	C	S,AB	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		01CW0117	2		0	
56	586	THOMAS DOUDLE NO 2	1	4	BEAVER CK	41		NE	NE	36	11 N	104 W	S	160	3.0000	C	S	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		W0093-72	1		0	
56	615	WALKER DITCH	1	4	BEAVER CK	41		NE	SW	6	10 N	103 W	S	160	3.0000	C	S	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		W0091-72	1		0	
56	615	WALKER DITCH	1	4	BEAVER CK	41		NE	SW	6	10 N	103 W	S	160	3.0000	C	S,AB	12/31/1972	12/31/1971	12/31/1933	0	44559.30680		01CW0117	2		0	
56	587	DEJOURNETTE D NO 1	1	4	BEAVER CK	41		NE	SW	6	10 N	103 W	S	160	3.0000	C	S	12/31/1972	12/31/1971	05/01/1962	0	44559.41028		W0089-72	2		0	
56	588	JARVIE DITCH	1	4	BEAVER CK	41		SW	SE	12	10 N	104 W	S	160	13.0000	C	S	12/31/1972	12/31/1971	02/03/1970	0	44559.43863		W0088-72	2		0	
56	1419	BEAVER CK STK DIV LOW PT	1	4	BEAVER CK	41		SE	NW	3	11 N	103 W	S	9	0.0300	C	S,AP	12/31/1989	12/31/1988	10/18/1935	0	50769.31336		89CW0002	1		5601219	ALT PT FOR ID1219
56	1219	BEAVER CK STOCK DIV.	1	4	BEAVER CK	41		SW	SE	27	12 N	103 W	S	9	0.0300	C	S	12/31/1989	12/31/1988	10/18/1935	0	50769.31336		89CW0002	1		0	ALT PT AT ID1419
56	1272	BEAVER CREEK MSF	0	4	BEAVER CK	41		SW	SW	24	11 N	104 W	S	M	3.2500	C	S	12/31/1992	12/31/1991	09/16/1992	0	52124.00000		92CW0075	1		0	2 CFS FROM 9/1-3/31. FROM UTAH-COLO LINE TO JARVEE D.
56	1282	SOUTH MIDDLE MTN SPRING	4	46	SKELTCHER CK	41		NE	NE	28	12 N	103 W	S	9W	0.0100	C	O	12/31/1970		04/17/1926	0	27865.00000		W0086	1		0	
56	2004	FIDDLER SPG	4	46	SKELTCHER CK	41		NW	NW	20	12 N	103 W	S	X	0.0111	C	S	12/31/1975	12/31/1974	06/01/1930	0	45655.29371		W0803-75	1		0	
56	2007	LOWER SIDE HILL SPG	4	46	SKELTCHER CK	41		SW	SW	21	12 N	103 W	S	X	0.0066	C	S	12/31/1975	12/31/1974	06/01/1930	0	45655.29371		W0803-75	1		0	
56	2014	UPPER SIDE HILL SPG	4	46	SKELTCHER CK	41		NE	SW	21	12 N	103 W	S	X	0.0066	C	S,C	12/31/1975	12/31/1974	06/01/1930	0	45655.29371		W0803-75	1		0	
56	2014	UPPER SIDE HILL SPG	4	46	SKELTCHER CK	41		NE	SW	21	12 N	103 W	S	X	0.0066	C	S,CA	12/31/1975	12/31/1974	06/01/1930	0	45655.29371		80CW0020	2		0	
56	2039	WORLEY SPG	4	46	SKELTCHER CK	41		SW	NE	20	12 N	103 W	S	X	0.0110	C	S,C	12/31/1975	12/31/1974	06/01/1930	0	45655.29371		W0803-75	1		0	
56	2039	WORLEY SPG	4	46	SKELTCHER CK	41		SW	NE	20	12 N	103 W	S	X	0.0110	C	S,C,AB	12/31/1975	12/31/1974	06/01/1930	0	45655.29371		W0803-75	4		0	ABANDONED 3/19/87
56	2016	WILSON NO 1 SPG	4	46	SKELTCHER CK	41		NW	SW	34	12 N	103 W	S	X	0.0111	C	S	12/31/1975	12/31/1974	06/01/1931	0	45655.29736		W0803-75	1		0	
56	2039	WORLEY SPG	4	46	SKELTCHER CK	41		SW	NE	20	12 N	103 W	S	9	0.0110	C	S,CA	12/31/1981	12/31/1980	11/23/1981	0	48174.00000		86CW0156	3		0	
56	2039	WORLEY SPG	4	46	SKELTCHER CK	41		SW	NE	20	12 N	103 W	S	9	0.0110	C	S,C	12/31/1981	12/31/1980	11/23/1981	0	48174.00000		81CW0248	2		0	
56	2066	ALLEN DITCH NO 1	1	46	SKELTCHER CK	41		SW	SE	29	12 N	103 W	S	19	2.0000	C	S	12/31/1982	12/31/1981	07/15/1932	0	48212.30146		82CW0114	1		0	
56	2055	ALLEN SPG NO 3	4	46	SKELTCHER CK	41		SW	NE	30	12 N	103 W	S	89	0.3342	C	S	12/31/1982	12/31/1981	06/01/1933	0	48212.30467		82CW0114	1		0	
56	2056	ALLEN SPG NO 4	4	46	SKELTCHER CK	41		NW	NE	30	12 N	103 W	S	9	0.0334	C	S	12/31/1982	12/31/1981	06/15/1933	0	48212.30481		82CW0114	1		0	
56	2054	ALLEN SPG NO 1	4	46	SKELTCHER CK	41		SE	SE	30	12 N	103 W	S	189	0.1114	C	S	12/31/1982	12/31/1981	07/10/1933	0	48212.30506		82CW0114	1		0	
56	2058	ALLEN SPG NO 9	4	46	SKELTCHER CK	41		SW	NW	29	12 N	103 W	S	9	0.0334	C	S	12/31/1982	12/31/1981	07/15/1942	0	48212.33798		82CW0114	1		0	
56	2057	ALLEN SPG NO 8	4	46	SKELTCHER CK	41		NE	SW	19	12 N	103 W	S	9	0.0334	C	S	12/31/1982	12/31/1981	06/01/1965	0	48212.42155		82CW0114	1		0	
56	1140	NO NAME HUNTER CAMP SPG	4	46	SKELTCHER CK	41		NW	NW	27	12 N	103 W	S	90	0.0110	C	S	12/31/1982	12/31/1981	09/30/1981	0	48212.48120		82CW0188	1		0	
56	1133	OIKI SPRING	4	46	SKELTCHER CK	41		NE	NE	28	12 N	103 W	S	90	0.0110	C	S	12/31/1982	12/31/1981	09/30/1981	0	48212.48120		82CW0188	1		0	
56	1009	TREELINE SPRING	4	46	SKELTCHER CK	41		NE	NE	28	12 N	103 W	S	90	0.0110	C	S	12/31/1982	12/31/1981	09/30/1981	0	48212.48120		82CW0188	1		0	
56	2095	SHIELDS SPRING	4	46	SKELTCHER CK	41		SW	SW	35	12 N	103 W	S	9	0.0330	C	S,C	12/31/1982	12/31/1981	01/06/1982	0	48218.00000		82CW0001	1		0	
56	2095	SHIELDS SPRING	4	46	SKELTCHER CK	41		SW	SW	35	12 N	103 W	S	9	0.0330	C	S,C,AB	12/31/1982	12/31/1981	01/06/1982	0	48218.00000		82CW0001	2		0	ABANDONED 2/16/90
56	2067	ALLEN DITCH NO 2	1	46	SKELTCHER CK	41		NW	NE	28	12 N	103 W	S	9	3.0000	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0	
56	2067	ALLEN DITCH NO 2	1	46	SKELTCHER CK	41		NW	NE	28	12 N	103 W	S	9	3.0000	C	S,C,AB	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	2		0	ABAN 4/7/88
56	4435	ALLEN RES NO 1	3	46	SKELTCHER CK	41		NE	SE	19	12 N	103 W	S	9	1.0000	A	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0115	1		0	
56	4435	ALLEN RES NO 1	3	46	SKELTCHER CK	41		NE	SE	19	12 N	103 W	S	9	1.0000	A	S,C,AB	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0115	2		0	ABANDONED 4/7/88
56	4437	ALLEN RES NO 3	3	46	SKELTCHER CK	41		SE	NW	33	12 N	103 W	S	9	3.0000	A	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0115	1		0	DILIGENCE 87CW87.
56	4437	ALLEN RES NO 3	3	46	SKELTCHER CK	41		SE	NW	33	12 N	103 W	S	9	3.0000	A	S,C,AB	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0087	2		0	ABANDONED 8/5/93
56	2059	ALLEN SPG NO 2	4	46	SKELTCHER CK	41		NW	NE	31	12 N	103 W	S	9	0.0334	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0	
56	2059	ALLEN SPG NO 2	4	46	SKELTCHER CK	41		NW	NE	31	12 N	103 W	S	9	0.0334	C	S,CA	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0093	2		0	
56	2060	ALLEN SPG NO 5	4	46	SKELTCHER CK	41		SE	SW	19	12 N	103 W	S	9	0.0334	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0	
56	2060	ALLEN SPG NO 5	4	46	SKELTCHER CK	41		SE	SW	19	12 N	103 W	S	9	0.0334	C	S,CA	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0093	2		0	
56	2061	ALLEN SPG NO 6	4	46	SKELTCHER CK	41		NE	SW	19	12 N	103 W	S	9	0.0334	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0	
56	2061	ALLEN SPG NO 6	4	46	SKELTCHER CK	41		NE	SW	19	12 N	103 W	S	9	0.0334	C	S,CA	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0093	2		0	
56	2062	ALLEN SPG NO 7	4	46	SKELTCHER CK	41		NE	NE	30	12 N	103 W	S	9	0.0334	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0	
56	2062	ALLEN SPG NO 7	4	46	SKELTCHER CK	41		NE	NE	30	12 N	103 W	S	9	0.0334	C	S,CA	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0093	2		0	
56	2063	ALLEN SPG NO 10	4	46	SKELTCHER CK	41		NE	NW	29	12 N	103 W	S	9	0.0334	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0	
56	2063	ALLEN SPG NO 10	4	46	SKELTCHER CK	41		NE	NW	29	12 N	103 W	S	9	0.0334	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0093	2		0	
56	1085	BLM SPRING 002-80	4	46	SKELTCHER CK	41		SE	SW	22	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/12/1985	0	49673.49532		86CW0067	1		0	
56	1086	BLM SPRING 002-81	4	46	SKELTCHER CK	41		SE	SW	22	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/12/1985	0	49673.49532		86CW0067	1		0	
56	1117	BLM SPRING 002-113	4	46	SKELTCHER CK	41		SE	SW	22	12 N	103 W	S	90	0.0050	C	S	12/31/1987	12/31/1986	10/29/1986	0	50038.49975		87CW0055	1		0	
56	1118	BLM SPRING 002-128	4	46	SKELTCHER CK	41		SW	SW	22	12 N	103 W	S	90	0.0050	C	S	12/31/1987	12/31/1986	10/29/1986	0	50038.49975		87CW0055	1		0	
56	3535	NORTH SKELTCHER CK RES	3	46	SKELTCHER CK	41		SE	NE	33	12 N	103 W	S	9	1.5000	A	S	12/31/1989	12/31/1988	10/17/1950	0	50769.36814		89CW0004	1		0	
56	1234	NORTH SKELTCHER SPRING	4	46	SKELTCHER CK	41		SE	NE	33	12 N	103 W	S	9	0.0100	C	S	12/31/1989	12/31/1988	10/17/1950	0	50769.36814		89CW0005	1		0	

56	1266	SIMPSON SPRING NO 2	4	46	SKELTCHER CK	41		NE	SE	20	12 N	103 W	S	9	0.0110	C	S	12/31/1991	12/31/1990	09/01/1927	0	51499.28367		91CW0036	1		0		
56	1267	SIMPSON SPRING NO 3	4	46	SKELTCHER CK	41		SE	SE	20	12 N	103 W	S	9	0.0110	C	S	12/31/1991	12/31/1990	09/01/1927	0	51499.28367		91CW0036	1		0		
56	1268	SIMPSON STOCK DIVER 1	0	46	SKELTCHER CK	41		NW	SW	20	12 N	103 W	S	9	0.0110	C	S	12/31/1991	12/31/1990	09/01/1927	0	51499.28367		91CW0036	1		0		
56	3568	BLM RES G	3	46	SKELTCHER CK	41		SW	SW	22	12 N	103 W	S	9	1.0000	A	S	12/31/1991	12/31/1990	11/05/1990	0	51499.51443		91CW0010	1		0		
56	1301	SKELTCHER CREEK DITCH	1	46	SKELTCHER CK	41		SW	SW	34	12 N	103 W	S	19	1.0000	C	S	12/31/1995	12/31/1994	07/01/1984	0	52960.49125		95CW0058	1		0		
56	1313	CORRAL DITCH #1	1	46	SKELTCHER CK	41		NE	SE	20	12 N	103 W	S	19	0.0780	C	S	12/31/1998	12/31/1997	07/01/1968	0	54056.43281		98CW0033	1		0		
56	1266	SIMPSON SPRING NO 2	4	46	SKELTCHER CK	41		NE	SE	20	12 N	103 W	S	8	0.0220	C	S	12/31/1998	12/31/1997	07/01/1997	0	54056.53873		98CW0033	2		0		
56	1012	BLM SUMMIT SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	17	11 N	103 W	S	9W	0.0060	C	O	12/31/1970		04/17/1926	0	27865.00000		W0086	1		0	LEGAL CORRECTED AND NAME CHANGED 9/16/97 90CW111	
56	625	BROWNS PARK WLDLF SPG 2	4	10	TRIBUTARIES-BEAVER CK	41		NW	NE	14	11 N	103 W	S	9	0.0500	C	S	12/31/1974	12/31/1973	05/21/1953	0	45290.37761		W0592-74	1		0		
56	1056	BARREL SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SE	NE	11	11 N	103 W	S	X	0.0110	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	2022	CROUSE SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	15	11 N	103 W	S	X	0.0110	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0	DECREED AS CROUSE SPRING	
56	1068	GEORGE SPARKS SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	10	11 N	103 W	S	X	0.0330	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	1055	ISAM SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	SE	11	11 N	103 W	S	X	0.0110	C	S,C	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	1055	ISAM SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	SE	11	11 N	103 W	S	X	0.0110	C	S,C,AB	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	2		0	ABANDONED 12/19/1985	
56	1069	MORALES SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	SE	9	11 N	103 W	S	X	0.0220	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	1010	NIGGER CABIN SPG	4	10	TRIBUTARIES-BEAVER CK	41		NW	NE	14	11 N	103 W	S	X	0.0110	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0	DECREED AS NIGGER CABIN SPG	
56	1059	WASH SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	13	11 N	103 W	S	X	0.0170	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	1008	WEST END SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	SE	8	11 N	103 W	S	X	0.0110	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	1057	WEST ISAM SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	11	11 N	103 W	S	X	0.0130	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	1061	WEST WILLOW SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	NE	10	11 N	103 W	S	X	0.0220	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	1058	WILLOW SPRINGS #2	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	11	11 N	103 W	S	X	0.0110	C	S	12/31/1975	12/31/1974	06/01/1900	0	45655.18414		W0806-75	1		0		
56	2040	WILSON SPG NO 2 81-248	4	10	TRIBUTARIES-BEAVER CK	41		NE	SW	3	11 N	103 W	S	X	0.0111	C	S,C	12/31/1975	12/31/1974	06/01/1931	0	45655.29736		W0803-75	1		0		
56	2040	WILSON SPG NO 2 81-248	4	10	TRIBUTARIES-BEAVER CK	41		NE	SW	3	11 N	103 W	S	X	0.0111	C	S,CA	12/31/1975	12/31/1974	06/01/1931	0	45655.29736		80CW0020	2		0		
56	1070	G THUM SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	SE	4	11 N	103 W	S	X	0.0110	C	S	12/31/1975	12/31/1974	06/01/1933	0	45655.30467		W0806-75	1		0		
56	1012	WEST MORALES SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	17	11 N	103 W	S	X	0.0060	C	S	12/31/1975	12/31/1974	06/01/1964	0	45655.41790		W0802-75	2		0		
56	2022	CROUSE SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	15	11 N	103 W	S	890	0.0220	C	S	12/31/1980	12/31/1979	06/01/1934	0	47481.30832		80CW0024	2		0	DECREED AS JEANS SPRING BY COLO DOW	
56	1010	NIGGER CABIN SPG	4	10	TRIBUTARIES-BEAVER CK	41		NW	NE	14	11 N	103 W	S	890	0.0220	C	S	12/31/1980	12/31/1979	06/01/1934	0	47481.30832		80CW0024	2		0	DECREED AS UPPER CALLOWAY SPG BY COLO DOW	
56	2024	MANGUS SPG	4	10	TRIBUTARIES-BEAVER CK	41		NE	NW	31	12 N	103 W	S	890	0.0330	C	S,C	12/31/1980	12/31/1979	03/11/1980	0	47552.00000		80CW0024	1		0		
56	2024	MANGUS SPG	4	10	TRIBUTARIES-BEAVER CK	41		NE	NW	31	12 N	103 W	S	890	0.0330	C	S,CA	12/31/1980	12/31/1979	03/11/1980	0	47552.00000		85CW0169	2		0		
56	2040	WILSON SPG NO 2 81-248	4	10	TRIBUTARIES-BEAVER CK	41		NE	SW	3	11 N	103 W	S	89	0.0220	C	S	12/31/1981	12/31/1980	06/01/1931	0	47847.29736		81CW0248	3		0		
56	4436	ALLEN RES NO 2	3	10	TRIBUTARIES-BEAVER CK	41		SE	NE	5	11 N	103 W	S	9	2.0000	A	S	12/31/1982	12/31/1981	07/15/1942	0	48212.33798		82CW0115	1		0		
56	4474	CORRAL PASTURE RES 1	3	10	TRIBUTARIES-BEAVER CK	41		SE	NW	2	11 N	103 W	S	9	1.0000	A	S	12/31/1982	12/31/1981	09/10/1973	0	48212.45178		82CW0051	1		0		
56	6002	HEADQUARTERS WELL	2	10	TRIBUTARIES-BEAVER CK	41		SE	SW	31	11 N	103 W	S	8	0.0220	C	S	12/31/1982	12/31/1981	11/26/1979	0	48212.47448		82CW0195	1		0	PERMIT #24481F	
56	1134	EAST DEAD ASPEN SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NE	SW	27	12 N	103 W	S	90	0.0300	C	S	12/31/1982	12/31/1981	09/30/1981	0	48212.48120		82CW0188	1		0		
56	1150	ISOM DART SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SE	SW	5	11 N	103 W	S	90	0.0300	C	S	12/31/1982	12/31/1981	09/30/1981	0	48212.48120		82CW0188	1		0		
56	1135	WEST DEAD ASPEN SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NE	SW	27	12 N	103 W	S	90	0.0110	C	S	12/31/1982	12/31/1981	09/30/1981	0	48212.48120		82CW0188	1		0		
56	1008	WEST END SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	SE	8	11 N	103 W	S	90	0.0300	C	S	12/31/1982	12/31/1981	09/30/1981	0	48212.48120		82CW0188	2		0	BLM FILING	
56	4475	CORRAL PASTURE RES 2	3	10	TRIBUTARIES-BEAVER CK	41		NW	NW	12	11 N	103 W	S	9	1.0000	A	S	12/31/1982	12/31/1981	10/12/1981	0	48212.48132		82CW0051	1		0		
56	2064	ALLEN SPG NO 11	4	10	TRIBUTARIES-BEAVER CK	41		SW	NW	5	11 N	103 W	S	89	0.0557	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0		
56	2064	ALLEN SPG NO 11	4	10	TRIBUTARIES-BEAVER CK	41		SW	NW	5	11 N	103 W	S	89	0.0557	C	S,CA	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0093	2		0		
56	2065	ALLEN SPG NO 12	4	10	TRIBUTARIES-BEAVER CK	41		NE	SE	5	11 N	103 W	S	9	0.0334	C	S,C	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		82CW0114	1		0		
56	2065	ALLEN SPG NO 12	4	10	TRIBUTARIES-BEAVER CK	41		NE	SE	5	11 N	103 W	S	9	0.0334	C	S,CA	12/31/1982	12/31/1981	07/26/1982	0	48419.00000		87CW0093	2		0		
56	2087	HONEYMOON SPG	4	10	TRIBUTARIES-BEAVER CK	41		NW	SW	6	11 N	103 W	S	9	0.0330	C	S	12/31/1983	12/31/1982	07/01/1973	0	48577.45107		83CW0077	1		0	STIPULATION	
56	2088	LOWER HONEYMOON SPG	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	12	11 N	104 W	S	9	0.0330	C	S	12/31/1983	12/31/1982	07/01/1973	0	48577.45107		83CW0077	1		0	STIPULATION	
56	1040	ISOM SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	SW	10	11 N	103 W	S	890	0.0240	C	S	12/31/1983	12/31/1982	09/30/1982	0	48577.48485		83CW0217	1		0		
56	1039	PERENNIAL MUD SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	5	11 N	103 W	S	890	0.0010	C	S	12/31/1983	12/31/1982	09/30/1982	0	48577.48485		83CW0217	1		0		
56	1028	BLM SPRING 001-08	4	10	TRIBUTARIES-BEAVER CK	41		NW	NE	12	11 N	104 W	S	089	0.0010	C	S	12/31/1984	12/31/1983	07/22/1983	0	48942.48780		84CW0171	1		0		
56	1027	BLM SPRING 001-09 #1	4	10	TRIBUTARIES-BEAVER CK	41		NW	NE	12	11 N	104 W	S	089	0.0010	C	S	12/31/1984	12/31/1983	07/22/1983	0	48942.48780		84CW0170	1		0		
56	1091	BLM SPRING 002-99	4	10	TRIBUTARIES-BEAVER CK	41		NE	SE	26	12 N	103 W	S	590	0.0010	C	S	12/31/1986	12/31/1985	08/11/1985	0	49673.49531		86CW0071	1		0		
56	1087	BLM SPRING 002-100	4	10	TRIBUTARIES-BEAVER CK	41		SE	SE	22	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/12/1985	0	49673.49532		86CW0072	1		0		
56	1088	BLM SPRING 002-101	4	10	TRIBUTARIES-BEAVER CK	41		SE	SE	22	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/12/1985	0	49673.49532		86CW0072	1		0		
56	1089	BLM SPRING 002-102	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/12/1985	0	49673.49532		86CW0073	1		0		
56	2110	BLM SPRING 002-103	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/12/1985	0	49673.49532		86CW0073	1		0		
56	1093	BLM SPRING 002-78	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/12/1985	0	49673.49532		86CW0066	1		0		
56	2111	BLM SPRING 002-105	4	10	TRIBUTARIES-BEAVER CK	41		SE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/13/1985	0	49673.49533		86CW0074	1		0		
56	2112	BLM SPRING 002-106	4	10	TRIBUTARIES-BEAVER CK	41		SE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/13/1985	0	49673.49533		86CW0074	1		0		
56	1094	BLM SPRING 002-107	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/13/1985	0	49673.49533		86CW0075	1		0		
56	1095	BLM SPRING 002-108	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/13/1985	0	49673.49533		86CW0075	1		0		
56	1096	BLM SPRING 002-109	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/13/1985	0	49673.49533		86CW0075	1		0		
56	1097	BLM SPRING 002-110	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/13/1985	0	49673.49533		86CW0075	1		0		
56	1098	BLM SPRING 002-111	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	27	12 N	103 W	S	590	0.0050	C	S	12/31/1986	12/31/1985	08/13/1985	0	49673.49533		86CW0076	1		0		
56	1079	BLM SPRING 001-23	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	8	11 N	103 W	S	590	0.0100	C	S	12/31/1986	12/31/1985	08/14/1985	0	49673.49534		86CW0089	1		0		
56	2113	BLM SPRING 001-31	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	12	11 N	104 W	S	590	0.0100	C	S	12/31/1986	12/31/1985	08/14/1985	0	49673.49534		86CW0087	1		0		
56	2115	BLM SPRING 001-33	4	10	TRIBUTARIES-BEAVER CK	41		NW	NE	12	11 N	104 W	S	590	0.0100	C	S	12/31/1986	12/31/1985	08/14/1985	0	49673.49534		86CW0087	1		0		
56	1078	BLM SPRING 001-21	4	10	TRIBUTARIES-BEAVER CK	41		SW	NE	7	11 N	103 W	S	590	0.0100	C	S	12/31/1986	12/31/1985	08/15/1985	0	49673.49535		86CW0088	1		0		
56	1125	BLM SPRING 001-32	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	12	11 N	104 W	S	90	0.0050	C	S	12/31/1987	12/31/1986	08/14/1985	0	50038.49534		87CW0052	1		0		

56	1114	BLM SPRING 002-118	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	15	12 N	103 W	S	90	0.0050	C	S	12/31/1987	12/31/1986	09/18/1986	0	50038.49934		87CW0058	1		0								
56	1131	BLM SPRING 001-09 #2	4	10	TRIBUTARIES-BEAVER CK	41		NE	SW	24	11 N	104 W	S	90	0.0050	C	S	12/31/1987	12/31/1986	10/28/1986	0	50038.49974		87CW0050	1		0								
56	1132	BLM SPRING 001-10	4	10	TRIBUTARIES-BEAVER CK	41		NE	SW	24	11 N	104 W	S	90	0.0050	C	S	12/31/1987	12/31/1986	10/28/1986	0	50038.49974		87CW0050	1		0								
56	1129	BLM SPRING 001-11	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	24	11 N	104 W	S	90	0.0200	C	S	12/31/1987	12/31/1986	10/28/1986	0	50038.49974		87CW0051	1		0								
56	1130	BLM SPRING 001-12	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	24	11 N	104 W	S	90	0.0200	C	S	12/31/1987	12/31/1986	10/28/1986	0	50038.49974		87CW0051	1		0								
56	1221	BUCKLEY COW CAMP SPG 1	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	31	12 N	102 W	S	9	0.0300	C	S	12/31/1989	12/31/1988	08/24/1935	0	50769.31281		89CW0002	1		0								
56	1222	BUCKLEY COW CAMP SPG 2	4	10	TRIBUTARIES-BEAVER CK	41		SE	SW	31	12 N	102 W	S	9	0.0100	C	S	12/31/1989	12/31/1988	08/24/1935	0	50769.31281		89CW0002	1		0								
56	1220	BUCKLEY COW CAMP CAB SPG	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	31	12 N	102 W	S	8	0.0100	C	S	12/31/1989	12/31/1988	07/21/1950	0	50769.36726		89CW0002	1		0								
56	3537	RICHIES RESERVOIR	3	10	TRIBUTARIES-BEAVER CK	41		SE	SW	26	12 N	103 W	S	9	1.0000	A	S	12/31/1989	12/31/1988	10/10/1950	0	50769.36807		89CW0004	1		0								
56	1236	RICHIES SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SE	SW	26	12 N	103 W	S	9	0.0200	C	S	12/31/1989	12/31/1988	10/10/1950	0	50769.36807		89CW0005	1		0								
56	3536	BOBS RESERVOIR	3	10	TRIBUTARIES-BEAVER CK	41		NW	SW	26	12 N	103 W	S	9	1.0000	A	S	12/31/1989	12/31/1988	10/12/1950	0	50769.36809		89CW0004	1		0								
56	1235	BOBS SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	SW	26	12 N	103 W	S	9	0.0200	C	S	12/31/1989	12/31/1988	10/12/1950	0	50769.36809		89CW0005	1		0								
56	3539	MARI KATHERINE RES 2	3	10	TRIBUTARIES-BEAVER CK	41		NW	NW	36	12 N	103 W	S	9	0.5000	A	S	12/31/1989	12/31/1988	10/18/1950	0	50769.36815		89CW0004	1		0								
56	1238	MARI KATHERINE SPG NO 2	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	36	12 N	103 W	S	9	0.0200	C	S	12/31/1989	12/31/1988	10/18/1950	0	50769.36815		89CW0005	1		0								
56	3541	ANTONE GAP RES NO 1	3	10	TRIBUTARIES-BEAVER CK	41		NE	NE	36	12 N	103 W	S	9	1.0000	A	S	12/31/1989	12/31/1988	10/22/1951	0	50769.37184		89CW0004	1		0								
56	1241	ANTONE GAP SPRING NO 1	4	10	TRIBUTARIES-BEAVER CK	41		NE	NE	36	12 N	103 W	S	9	0.0200	C	S	12/31/1989	12/31/1988	10/22/1951	0	50769.37184		89CW0005	1		0								
56	1244	ANTELOPE SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	SE	36	12 N	103 W	S	9	0.0200	C	S	12/31/1989	12/31/1988	10/23/1951	0	50769.37185		89CW0005	1		0								
56	3544	ANTELOPE SPRING RES	3	10	TRIBUTARIES-BEAVER CK	41		NW	SE	36	12 N	103 W	S	9	2.0000	A	S	12/31/1989	12/31/1988	10/23/1951	0	50769.37185		89CW0004	1		0								
56	3538	MARI KATHERINE RES 1	3	10	TRIBUTARIES-BEAVER CK	41		NE	NE	35	12 N	103 W	S	9	0.5000	A	S	12/31/1989	12/31/1988	08/08/1988	0	50769.50624		89CW0004	1		0								
56	1237	MARI KATHERINE SPG NO 1	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	36	12 N	103 W	S	9	0.0200	C	S	12/31/1989	12/31/1988	08/08/1988	0	50769.50624		89CW0005	1		0								
56	3542	ANTONE GAP RES NO 2	3	10	TRIBUTARIES-BEAVER CK	41		SE	NE	36	12 N	103 W	S	9	0.5000	A	S	12/31/1989	12/31/1988	08/23/1988	0	50769.50639		89CW0004	1		0								
56	1242	ANTONE GAP SPRING NO 2	4	10	TRIBUTARIES-BEAVER CK	41		SE	NE	36	12 N	103 W	S	9	0.0100	C	S	12/31/1989	12/31/1988	08/23/1988	0	50769.50639		89CW0005	1		0								
56	3543	ANTONE GAP RES NO 3	3	10	TRIBUTARIES-BEAVER CK	41		NW	SE	36	12 N	103 W	S	9	0.5000	A	S	12/31/1989	12/31/1988	08/25/1988	0	50769.50641		89CW0004	1		0								
56	1243	ANTONE GAP SPRING NO 3	4	10	TRIBUTARIES-BEAVER CK	41		SE	NE	36	12 N	103 W	S	9	0.0100	C	S	12/31/1989	12/31/1988	08/25/1988	0	50769.50641		89CW0005	1		0								
56	1299	SHIELD SPRING #1	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	35	12 N	103 W	S	9	0.0330	C	S	12/31/1995	12/31/1994	06/01/1930	0	52960.29371		95CW0058	1		0								
56	1300	SHIELD SPRING #2	4	10	TRIBUTARIES-BEAVER CK	41		SE	NE	3	11 N	103 W	S	9	0.0040	C	S	12/31/1995	12/31/1994	06/01/1930	0	52960.29371		95CW0058	1		0								
56	1283	DENNISON SPRING #1	4	10	TRIBUTARIES-BEAVER CK	41		NE	NW	6	11 N	103 W	S	9	0.0020	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1284	DENNISON SPRING #2	4	10	TRIBUTARIES-BEAVER CK	41		SE	NE	6	11 N	103 W	S	9	0.0110	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1285	DENNISON SPRING #3	4	10	TRIBUTARIES-BEAVER CK	41		SW	NE	6	11 N	103 W	S	9	0.0110	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1286	DICKINSON LD #1	0	10	TRIBUTARIES-BEAVER CK	41		SE	NE	31	12 N	103 W	S	9	0.0350	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1287	DICKINSON LD #2	0	10	TRIBUTARIES-BEAVER CK	41		SW	SW	3	11 N	103 W	S	9	0.0350	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1288	DICKINSON LD #3	0	10	TRIBUTARIES-BEAVER CK	41		SE	SW	3	11 N	103 W	S	9	0.0350	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1292	GEORGE SPARKS SPRING #2	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	3	11 N	103 W	S	9	0.0110	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1293	GEORGE SPARKS SPRING #3	4	10	TRIBUTARIES-BEAVER CK	41		SE	SE	4	11 N	103 W	S	9	0.0110	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1294	GEORGE SPARKS SPRING #4	4	10	TRIBUTARIES-BEAVER CK	41		SW	SW	4	11 N	103 W	S	9	0.0020	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1295	GEORGE SPARKS SPRING #5	4	10	TRIBUTARIES-BEAVER CK	41		SE	SW	4	11 N	103 W	S	9	0.0110	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	1296	ISOM SPRING	4	10	TRIBUTARIES-BEAVER CK	41		SW	SE	11	11 N	103 W	S	9	0.0110	C	S	12/31/1995	12/31/1994	07/16/1930	0	52960.29416		95CW0058	1		0								
56	3589	DENNISON RESERVOIR #2	3	10	TRIBUTARIES-BEAVER CK	41		SE	NE	6	11 N	103 W	S	9	0.5000	A	S	12/31/1995	12/31/1994	07/01/1990	0	52960.51316		95CW0057	1		0								
56	3591	FIDDLER SPRING RESERVOIR	3	10	TRIBUTARIES-BEAVER CK	41		NW	NW	20	12 N	103 W	S	9	1.0000	A	S	12/31/1995	12/31/1994	07/01/1990	0	52960.51316		95CW0057	1		0								
56	3592	HONEYMOON RESERVOIR	3	10	TRIBUTARIES-BEAVER CK	41		NW	SW	6	11 N	103 W	S	9	1.0000	A	S	12/31/1995	12/31/1994	07/01/1990	0	52960.51316		95CW0057	1		0								
56	3601	WORLEY SPG RES	3	10	TRIBUTARIES-BEAVER CK	41		SW	NE	20	12 N	103 W	S	9	4.0000	A	S	12/31/1995	12/31/1994	07/01/1990	0	52960.51316		95CW0057	1		0								
56	3588	DENNISON RESERVOIR #1	3	10	TRIBUTARIES-BEAVER CK	41		NE	NW	6	11 N	103 W	S	9	0.5000	A	S	12/31/1995	12/31/1994	09/01/1993	0	52960.52474		95CW0057	1		0								
56	3590	DENNISON RESERVOIR #3	3	10	TRIBUTARIES-BEAVER CK	41		SW	NE	6	11 N	103 W	S	9	0.5000	A	S	12/31/1995	12/31/1994	09/01/1994	0	52960.52839		95CW0057	1		0								
56	1320	FOREST MEADOW SPRING	4	10	TRIBUTARIES-BEAVER CK	41		NW	NW	5	11 N	103 W	S	9W	0.0022	C	S	12/31/2000	12/31/1999	06/28/1934	0	54786.30859		00CW0073	1		0								

Structure Name: DICKINSON LD #2 **Water District:** 56 **ID Number:** 1287

Source.	TRIBUTARIES-BEAVER CK								*Acres Irrigated*	
Location	Q160	Q40	Q10	Section	Twnshp		Range	PM	*CIU*	U
	SW	SW		3	11	N	103 W	S		

Distance from section lines. *From N/S line* *From E/W line*

UTM Coordinates (NAD 83): *Northing (UTM y)* 4539326 2 *Easting (UTM x)* 165721 4 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees). 40 9367 -108 9705

Measuring Device/Recorder

Contact	DICKINSON, M S TRUST	*Phone*	
Address	MAYBELL, CO 81640	*Cell Phone*	
		E-mail	

Water Rights Summary	*Total Decreed Rate(s).*	*Abs*	0 0350	*Cond*	0 0000	*AP/EX.*	0.0000	
	Total Decreed Volume(s)	*Abs*	0 0000	*Cond*	0.0000	*AP/EX*	0 0000	

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount	Adj Type	Uses	Comments
1	95CW0058	12/31/1995	7/16/1930	52960.29416	0		0 035 C	S	9	

Structure Name: BEAVER DITCH **Water District:** 56 **ID Number:** 524

Source	BEAVER CK @ Mile 45 63									*Acres Irrigated*	57
Location	Q160	Q40	Q10	Section	Twnshp		Range		PM	*CIU*	A
	SW	SW		24	11	N	104	W	S		

Distance from section lines *From N/S line* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4534796 0 *Easting (UTM x)* 158918 0 *GPS*

Latitude/Longitude (decimal degrees)

Measuring Device/Recorder 18 IN PARSHALL

Contact	USA NWR(OWNER)	*Phone*	
Address	GREYSTONE COLO	*Cell Phone*	
		E-mail	

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	7 0000	*Cond*	0 0000	*AP/EX*	0.0000	
	Total Decreed Volume(s)	*Abs*	0 0000	*Cond*	0 0000	*AP/EX*	0 0000	

Water Rights – Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin. Number	O #	Priority Number	Decreed Amount	Adj Type	Uses	Comments
1		9/22/1894	4/1/1893	15797 00000	0	8	2 C	O	1	
2	W0097-72	12/31/1972	6/1/1930	44559 29371	0		5 C	S	160	

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct.	Total
1970	03/13	06/26	96	7	0	0	0	0	113	257	267	194	0	0	0	0	833
1971	03/24	06/29	98	6	0	0	0	0	31 7	234	253	240	0	0	0	0	760
1972	03/20	06/25	98	4	0	0	0	0	47 6	204	218	134	0	0	0	0	605
1973	03/19	07/03	107	4	0	0	0	0	51 6	162	236	170	11 9	0	0	0	633
1974	03/23	06/21	91	6	0	0	0	0	35 7	174	309	83 3	0	0	0	0	603
1975	04/03	07/19	108	7	0	0	0	0	0	134	341	416	263	0	0	0	1156
1976	04/05	06/25	82	5	0	0	0	0	0	198	307	198	0	0	0	0	704
1977	03/08	04/24	48	3	0	0	0	0	95 2	142	0	0	0	0	0	0	238
1978	03/05	06/25	113	4	0	0	0	0	111	178	214	148	0	0	0	0	653
1979	03/28	06/07	72	4	0	0	0	0	15 9	156	214	27 8	0	0	0	0	415
1980	04/04	06/26	84	4	0	0	0	0	0	119	231	128	0	0	0	0	479
1981	03/28	06/05	70	2	0	0	0	0	15 9	119	71 4	9 92	0	0	0	0	216
1982	04/02	06/30	90	4	0	0	0	0	0	93 2	194	178	0	0	0	0	466
1983	04/15	07/15	92	4	0	0	0	0	0	63 5	234	172	59 5	0	0	0	530
1984	04/20	07/02	74	5	0	0	0	0	0	43 6	259	168	7 93	0	0	0	480
1985	04/10	06/06	58	4	0	0	0	0	0	138	162	11 9	0	0	0	0	313
1986	04/01	06/15	76	3	0	0	0	0	0	166	184	59 5	0	0	0	0	411
1988	04/03	04/24	22	2	0	0	0	0	0	47 6	0	0	0	0	0	0	47 6
1989	04/01	05/26	49	6	0	0	0	0	0	219	92 6	0	0	0	0	0	312
1990	04/01	05/21	22	3 39	0	0	0	0	0	54 6	66 9	0	0	0	0	0	121
1993	03/26	07/05	65	3	0	0	0	0	24 5	154	89 3	16 8	9 32	0	0	0	294
1994	03/29	06/06	70	2	0	0	0	0	9 40	119	61 5	11 9	0	0	0	0	202
1995	03/13	06/30	110	0 94	0	0	0	0	35 4	55 9	57 8	55 9	0	0	0	0	205
1996	02/18	06/18	91	3	0	0	0	37 6	56 4	71 4	142	33 6	0	0	0	0	342
1997	03/19	06/09	83	7 8	0	0	0	0	38 2	400	264	9 10	0	0	0	0	712
1998	04/02	06/29	89	24	0	0	0	0	0	245	876	190	0	0	0	0	1312
1999	03/27	09/30	174	4	0	0	0	0	28 5	91 1	245	163	57 8	57 8	55 9	0	700
2000	04/24	05/15	22	2 6	0	0	0	0	0	36 1	77 4	0	0	0	0	0	113
2001	04/18	09/12	148	2 46	0	0	0	0	0	63 4	151	107	79 9	79 9	30 9	0	513
2002	04/10	05/25	46	5	0	0	0	0	0	208	173	0	0	0	0	0	382

Structure Name: BEAVER DITCH **Water District:** 56 **ID Number:** 524

2003	05/13	05/22	10	2	0	0	0	0	0	0	39 7	0	0	0	0	0	39 7
2004	03/18	05/17	61	3 09	0	0	0	0	63 5	141	76 1	0	0	0	0	0	281
		Minimum		0 94	0	0	0	0	0	0	0	0	0	0	0	0	39 7
		Maximum		24	0	0	0	37 6	113	400	876	416	263	79 9	55 9	0	1312
		Average		4 6025	0	0	0	1 18	24 2	140	191	91 7	15 3	4 30	2 71	0	471

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1970		60	
1971		60	
1972		60	
1973		60	
1974		70	
1976		60	
1977		60	
1978		60	
1979		60	
1980		100	
1981		100	
1982		54	
1983		60	
1984		60	
1985		60	
1987		60	
1988		60	
1989		60	
1990		60	
1991		60	
1992		60	
1993		60	
1994		60	
1995		60	
1996		57	
1997		57	
1998		57	
1999		57	
2000		57	
2001		57	
2002		57	Also used for stock, though not decreed for stock
2003		57	Also used for stock, though not decreed for stock
2004		57	Also used for stock, though not decreed for stock

Structure Name: APPLE DITCH **Water District:** 56 **ID Number:** 622

Source	BEAVER CK @ Mile 45 56									*Acres Irrigated*	3
Location	Q160	Q40	Q10	Section	Twnshp		Range		PM	*CIU*	A
	SW	SW		24	11	N	104	W	S		

Distance from section lines *From N/S line* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4534846 0 *Easting (UTM x)* 158991 0 *GPS*

Latitude/Longitude (decimal degrees)

Measuring Device/Recorder 9 IN PARSHALL

Contact COLO DOW *Phone*

Address *Cell Phone*

E-mail

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	3 0000	*Cond*	0.0000	*AP/EX*	0 0000
	Total Decreed Volume(s)	*Abs*	0 0000	*Cond*	0 0000	*AP/EX*	0 0000

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount		Adj Type	Uses	Comments
1	W0095-72	12/31/1972	12/31/1933	44559 30680	0		3	C	S	160	

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov.	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total
1981	04/03	10/31	152	1	0	0	0	0	0	55 5	61 5	34.7	8 93	0	22 8	30 7	214
1982	04/02	06/30	90	1	0	0	0	0	0	34 7	61 5	59 5	0	0	0	0	156
1983	04/29	06/30	63	1	0	0	0	0	0	1 98	61 5	56 5	0	0	0	0	120
1984	09/09	10/31	53	0 5	0	0	0	0	0	0	0	0	0	0	21 8	30 7	52 6
1985	04/20	09/30	100	0 5	0	0	0	0	0	10 9	30 7	29 8	0	0	27 8	0	99 2
1986	03/30	06/03	66	1	0	0	0	0	3 97	29 8	30 7	2 98	0	0	0	0	67 4
1987	04/18	10/31	197	0 5	0	0	0	0	0	12 9	30 7	29 8	30 7	30 7	29 8	30 7	195
1988	04/05	10/31	210	0 59	0	0	0	0	0	29 2	7 38	7 14	7 38	7 38	7 14	7 38	73 0
1989	04/01	04/30	30	0 14	0	0	0	0	0	6 15	0	0	0	0	0	0	6 15
1990	04/01	04/30	30	0 2	0	0	0	0	0	11 9	0	0	0	0	0	0	11 9
1993	03/15	06/30	108	0 49	0	0	0	0	16 5	29 2	30 1	29 2	0	0	0	0	105
1994	04/12	05/31	50	0 6	0	0	0	0	0	22 6	36 9	0	0	0	0	0	59 5
1995	05/01	06/30	61	2	0	0	0	0	0	0	87 3	119	0	0	0	0	206
1997	04/01	05/31	61	2	0	0	0	0	0	119	61 5	0	0	0	0	0	180
1998	04/16	05/14	29	2	0	0	0	0	0	43 6	55 5	0	0	0	0	0	99 2
1999	04/01	06/30	91	1	0	0	0	0	0	59 5	61 5	46 6	0	0	0	0	168
2000	04/01	05/31	61	1	0	0	0	0	0	59 5	45 6	0	0	0	0	0	105
2004	04/08	04/08	1	1 74	0	0	0	0	0	3 45	0	0	0	0	0	0	3 45
	Minimum			0 14	0	0	0	0	0	0	0	0	0	0	0	0	3 45
	Maximum			2	0	0	0	0	16 5	119	87 3	119	30 7	30 7	29 8	30 7	214
	Average			0 9589	0	0	0	0	1 14	29 4	36 8	23 1	2 61	2 12	6 07	5 53	106

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1976	Structure not usable		
1977	No water available		
1978	Structure not usable		
1979	Structure not usable		
1980	Water available, but not taken		

Structure Name: **APPLE DITCH** ***Water District:*** **56** ***ID Number:*** **622**

1982		3
1984		5
1985		5
1987		5
1988		5
1989		5
1990		5
1991		5
1992		5
1993		5
1994		5
1995		5
1996	Water available, but not taken	
1997	Water available, but not taken	
1998		3
1999		3
2000		3
2001	Water available, but not taken	0
2002	Water available, but not taken	0 Has other uses, but no water was used
2003	Water available, but not taken	0 Has other uses, but no water was used
2004		0

Structure Name: GOODMAN DITCH **Water District:** 56 **ID Number:** 621

Source BEAVER CK @ Mile 45.03 *Acres Irrigated* 30

Location Q160 Q40 Q10 Section Twnshp Range PM *CIU* A

NW SE 25 11 N 104 W S

Distance from section lines *From N/S line* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4534126.0 *Easting (UTM x)* 159667 0 *GPS*

Latitude/Longitude (decimal degrees)

Measuring Device/Recorder 18 IN PARSHALL

Contact COLO DOW *Phone*

Address *Cell Phone*

E-mail

Water Rights Summary *Total Decreed Rate(s)* *Abs* 5 0000 *Cond* 0 0000 *AP/EX* 0 0000

Total Decreed Volume(s) *Abs* 0 0000 *Cond* 0 0000 *AP/EX* 0 0000

Structure Comments

40 ACRES HISTORICALLY IRRIGATED

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount	Adj Type	Uses	Comments
1	W0094-72	12/31/1972	12/31/1933	44559 30680	0		5 C	S	160	

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept.	Oct	Total
1978	06/17	07/08	22	2	0	0	0	0	0	0	0	55 5	31 7	0	0	0	87 3
1979	05/28	07/14	48	2	0	0	0	0	0	0	7 93	105	55 5	0	0	0	169
1980	05/01	08/28	110	2	0	0	0	0	0	0	122	119	62 5	83 3	0	0	388
1981	04/14	10/31	154	2	0	0	0	0	0	67 4	97 2	54 5	0	31 7	59 5	61 5	372
1982	04/02	09/14	152	2	0	0	0	0	0	69 4	122	119	50 6	92 2	41 7	0	496
1983	04/15	08/25	119	3	0	0	0	0	0	63 5	184	119	67 4	99 2	0	0	534
1984	04/20	10/24	163	3	0	0	0	0	0	32 7	160	130	75 4	71 4	89 3	71 4	632
1985	04/10	08/01	96	3	0	0	0	0	0	105	124	89 3	51 6	3 97	0	0	375
1986	04/02	08/31	150	2 4	0	0	0	0	0	115	122	84 9	138	147	0	0	609
1987	04/01	09/30	183	2 5	0	0	0	0	0	114	103	100 0	103	103	100 0	0	625
1988	04/03	07/31	112	4 93	0	0	0	0	0	153	97 2	94.0	97 2	0	0	0	442
1989	03/25	06/30	44	2	0	0	0	0	27 8	43 6	51 6	38 7	0	0	0	0	162
1993	04/16	07/09	75	3	0	0	0	0	0	74 4	152	79 3	35 7	0	0	0	342
1994	04/01	06/20	65	2	0	0	0	0	0	119	59 5	39 7	0	0	0	0	218
1995	04/15	05/31	47	3	0	0	0	0	0	63 5	184	0	0	0	0	0	248
1996	05/01	06/25	46	2	0	0	0	0	0	0	122	59 5	0	0	0	0	182
1997	04/20	06/20	46	3	0	0	0	0	0	43 6	89 3	79 3	0	0	0	0	212
1998	04/20	07/10	51	3	0	0	0	0	0	43 6	89 3	59.5	39 7	0	0	0	232
1999	04/10	07/05	87	3	0	0	0	0	0	83 3	184	170	19 8	0	0	0	458
2000	04/07	07/09	70	3	0	0	0	0	0	142	184	23 8	35 7	0	0	0	387
2001	03/23	07/10	110	5	0	0	0	0	89 3	265	170	85 7	19 8	0	0	0	631
2002	04/12	05/09	28	5	0	0	0	0	0	188	53 6	0	0	0	0	0	242
2003	04/20	06/26	68	3	0	0	0	0	0	54 2	122	51 6	0	0	0	0	229
		Minimum		2	0	0	0	0	0	0	0	0	0	0	0	0	87 3
		Maximum		5	0	0	0	0	89 3	265	184	170	138	147	100 0	71 4	631
		Average		2 8622	0	0	0	0	5 09	80 2	113	76 5	38 4	27 5	12 6	5 78	359

Diversion Comments

Structure Name: **GOODMAN DITCH** ***Water District:*** **56** ***ID Number:*** **621**

IYR	NUC Code	Acres Irrigated	Comments
1976	Structure not usable		
1977	No water available		
1978	No water available		
1979		40	
1980		40	
1982		45	
1984		40	
1985		40	
1987		40	
1988		40	
1989		40	
1990	No water available	0	
1995		27	
1996		30	
1997		30	
1998		30	
1999		30	
2000		30	
2001		30	
2002		30	
2003		30	
2004	No water available		NOT ENOUGH WATER FOR ALL THE DITCHES

Structure Name: MCKNIGHT NO 1 **Water District:** 56 **ID Number:** 562

Source: BEAVER CK @ Mile 43.31 Acres Irrigated: 48

Location: Q160 Q40 Q10 Section Twnshp Range PM — SW SW 31 11 N 103 W S CIU: A

Distance from section lines: From N/S line From E/W line

UTM Coordinates (NAD 83): Northing (UTM y) 4531593 0 Easting (UTM x) 160827 0 GPS

Latitude/Longitude (decimal degrees):

Measuring Device/Recorder: 9 IN PARSHALL

Contact: USA NWR Phone:

Address: Cell Phone:

E-mail:

Water Rights Summary: Total Decreed Rate(s) Abs 5 0000 Cond 0 0000 AP/EX 0 0000

Total Decreed Volume(s) Abs. 0 0000 Cond 0.0000 AP/EX 0 0000

Water Rights – Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin. Number	O #	Priority Number	Decreed Amount	Adj. Type	Uses	Comments
1	CA1899	10/9/1964	9/1/1956	38960.00000	0	22	5 C	S	1	ERROR IN LEGAL DESCRIPTION

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total
1970	04/10	07/14	86	5	0	0	0	0	0	154	208	204	55 5	0	0	0	623
1971	04/22	08/12	55	4	0	0	0	0	0	53 6	117	69 4	7 93	23 8	0	0	272
1972	04/23	10/05	130	3	0	0	0	0	0	47 6	115	114	43 6	41 7	89 3	14 9	466
1973	05/11	08/31	77	3	0	0	0	0	0	0	124	124	12 9	25 8	0	0	289
1974	04/27	08/31	99	3	0	0	0	0	0	23 8	154	101	37 7	29 8	0	0	347
1975	04/25	09/12	54	3	0	0	0	0	0	35 7	89 3	0	0	62 5	35 7	0	223
1976	05/13	08/20	56	3	0	0	0	0	0	0	113	130	53 6	23 8	0	0	321
1977	04/25	06/29	23	3	0	0	0	0	0	35 7	47 6	17 9	0	0	0	0	101
1978	03/22	06/25	96	2	0	0	0	0	39 7	119	122	99 2	0	0	0	0	381
1979	05/02	05/11	10	3	0	0	0	0	0	0	59 5	0	0	0	0	0	59 5
1982	07/02	08/02	32	1	0	0	0	0	0	0	0	0	59 5	3 97	0	0	63 5
1983	05/17	09/10	111	2	0	0	0	0	0	0	41 7	113	49 6	30 7	9 92	0	245
1984	05/09	07/02	55	2	0	0	0	0	0	0	91 2	71 4	3.97	0	0	0	167
1985	05/12	09/30	128	1 5	0	0	0	0	0	0	59 5	47 6	30 7	30 7	29 8	0	198
1986	05/15	08/31	109	1	0	0	0	0	0	0	16 9	29 8	53 6	61 5	0	0	162
1988	04/10	04/22	13	1	0	0	0	0	0	25 8	0	0	0	0	0	0	25 8
1989	04/18	06/07	37	0 75	0	0	0	0	0	16 8	25 1	10 4	0	0	0	0	52.3
1990	04/05	06/07	35	1 1	0	0	0	0	0	33 4	11 1	8 63	0	0	0	0	53 1
1993	03/19	06/30	79	0 62	0	0	0	0	6 19	20 9	24 6	17 9	0	0	0	0	69 5
1994	04/15	05/31	36	0 62	0	0	0	0	0	17 2	27 1	0	0	0	0	0	44 3
1995	05/06	05/15	10	0 76	0	0	0	0	0	0	15 1	0	0	0	0	0	15 1
1996	03/09	05/06	59	0 9	0	0	0	0	41 1	53 6	10 7	0	0	0	0	0	105
1997	04/22	06/23	63	0 9	0	0	0	0	0	16 1	55 3	16 9	0	0	0	0	88 3
1998	04/29	09/10	135	0 62	0	0	0	0	0	2 46	38 1	36 9	38 1	38 1	12 3	0	166
1999	06/01	08/10	40	0 62	0	0	0	0	0	0	0	36 9	0	7 34	0	0	44 2
2000	04/01	05/31	61	5	0	0	0	0	0	205	226	0	0	0	0	0	431
2001	05/23	06/12	21	5 1	0	0	0	0	0	0	91 0	104	0	0	0	0	195
2003	03/19	05/12	55	1 3	0	0	0	0	33 5	77 4	29 8	0	0	0	0	0	141
		Minimum		0 62	0	0	0	0	0	0	0	0	0	0	0	0	15 1
		Maximum		5 1	0	0	0	0	41 1	205	226	204	59 5	62 5	89 3	14 9	622
		Average		2 0996	0	0	0	0	4 30	33 5	68 4	48 4	16 0	13 6	6 32	0 53	191

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1970		45	
1971		45	
1973		45	
1976		45	
1977		45	
1978		45	
1979		45	
1980	Water available, but not taken		
1981	Water available, but not taken		
1982		40	
1983		45	
1984		45	
1985		45	
1987		45	
1988		45	
1989		45	
1990		45	
1991		45	
1992		45	
1994		45	
1995		45	
1996		48	
1997		48	
1998		48	
1999	No information available	48	
2000		48	
2001		48	
2002	Water available, but not taken	48	
2003		48	
2004	Water available, but not taken		

Structure Name: MCKNIGHT NO 2 **Water District:** 56 **ID Number:** 563

Source	BEAVER CK @ Mile 42 74							*Acres Irrigated*	
Location	Q160	Q40	Q10	Section	Twnshp	Range	PM	*CIU*	A
	NW	SE		6	10 N	103 W	S		
Distance from section lines	*From N/S line*			*From E/W line*					
UTM Coordinates (NAD 83)	*Northing (UTM y)*	4531068 0		*Easting (UTM x)*	160910.0	*GPS*			
Latitude/Longitude (decimal degrees)									
Measuring Device/Recorder	9 IN PARSHALL								

Contact	USA NWR			*Phone*			
Address				*Cell Phone*			
				E-mail			

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	3 0000	*Cond*	0 0000	*AP/EX*	0 0000
	Total Decreed Volume(s)	*Abs*	0 0000	*Cond*	0 0000	*AP/EX*	0 0000

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount		Adj Type	Uses	Comments
1	CA1899	10/9/1964	9/1/1956	38960 00000	0	22A	3 C	S	1		ERROR IN LEGAL DESCRIPTION

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total
1970	04/11	08/17	95	4	0	0	0	0	0	124	83 3	119	50 6	29 8	0	0	408
1971	04/24	09/08	85	3	0	0	0	0	0	27 8	83 3	63 5	2 98	30 7	15 9	0	224
1972	04/23	08/25	105	2	0	0	0	0	0	31 7	84 3	84 3	45 6	54 5	0	0	301
1973	05/09	08/31	79	2	0	0	0	0	0	0	91 2	103	12 9	12 9	0	0	220
1974	04/27	08/31	99	2	0	0	0	0	0	15 9	107	50 6	18 8	29 8	0	0	222
1975	04/14	09/12	65	2	0	0	0	0	0	67 4	59 5	0	0	41 7	23 8	0	192
1976	05/13	07/09	50	2	0	0	0	0	0	0	75 4	87 3	35 7	0	0	0	198
1977	04/04	08/28	129	2	0	0	0	0	0	107	91 2	79 3	61 5	55 5	0	0	395
1978	04/09	06/25	78	1	0	0	0	0	0	43 6	61 5	49 6	0	0	0	0	155
1979	05/02	05/17	16	1 5	0	0	0	0	0	0	47 6	0	0	0	0	0	47 6
1982	04/26	08/02	99	1	0	0	0	0	0	9 92	61 5	59 5	61 5	3 97	0	0	196
1983	05/17	09/10	111	2	0	0	0	0	0	0	41 7	113	49 6	30 7	9 92	0	245
1984	05/09	07/02	55	1	0	0	0	0	0	0	45 6	59 5	3 97	0	0	0	109
1989	05/15	06/03	20	0 63	0	0	0	0	0	0	19 5	3 75	0	0	0	0	23 2
1990	04/09	06/03	28	0 61	0	0	0	0	0	16 2	10 3	3 63	0	0	0	0	30 1
1993	04/15	06/30	47	0 76	0	0	0	0	0	24 1	11.7	11 0	0	0	0	0	46 9
1994	04/26	06/15	30	1	0	0	0	0	0	9 92	19 8	29 8	0	0	0	0	59 5
1995	04/07	04/27	21	1 4	0	0	0	0	0	58 3	0	0	0	0	0	0	58 3
	Minimum			0 61	0	0	0	0	0	0	0	0	0	0	0	0	23 2
	Maximum			4	0	0	0	0	0	124	107	119	61 5	55 5	23 8	0	407
	Average			1 6611	0	0	0	0	0	29 8	55 3	50 9	19 1	16 1	2 75	0	173

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1970		20	
1971		20	
1973		20	
1974		20	
1976		26	

1977		20
1978		20
1979		20
1980	Water available, but not taken	
1981	Water available, but not taken	
1982		20
1983		20
1984		20
1985		20
1987	Water available, but not taken	0
1988	Water available, but not taken	
1993		0
1995		11
1996	Water available, but not taken	
1997	Water available, but not taken	
1998	Structure not usable	0
1999	Water available, but not taken	0
2000	No water available	No water available
2001	Water available, but not taken	0
2002	Water available, but not taken	0
2003	Water available, but not taken	0
2004	Water available, but not taken	0

Structure Name: THOMAS DOUDLE DITCH **Water District:** 56 **ID Number:** 536

Source	BEAVER CK @ Mile 44 4								*Acres Irrigated*	21
Location	Q160	Q40	Q10	Section	Twnshp		Range	PM	*CIU*	A
	SE	SE		25	11	N	104 W	S		

Distance from section lines *From N/S line* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4533153 0 *Easting (UTM x)* 160238 0 *GPS*

Latitude/Longitude (decimal degrees)

Measuring Device/Recorder 18 IN PARSHALL

Contact COLO DOW *Phone*

Address *Cell Phone*

E-mail

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	6 0000	*Cond*	0 0000	*AP/EX*	0 0000	
	Total Decreed Volume(s)	*Abs*	0 0000	*Cond*	0 0000	*AP/EX*	0 0000	

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount		Adj. Type	Uses	Comments
1		9/22/1894	4/15/1880	11063 00000	0	1	1 66	C O	1		
2	W0090-72	12/31/1972	6/1/1930	44559 29371	0		4 34	C S	160		

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total
1970	03/27	10/04	182	10	0	0	0	0	39 7	307	430	275	105	76 4	91 2	15 9	1342
1971	04/14	07/11	89	5	0	0	0	0	0	117	285	145	43 6	0	0	0	592
1972	06/12	07/08	27	2	0	0	0	0	0	0	0	62 5	31 7	0	0	0	94 2
1973	04/27	07/19	84	5	0	0	0	0	0	23 8	234	166	69 4	0	0	0	494
1974	04/27	07/19	84	3	0	0	0	0	0	23.8	184	110	56 5	0	0	0	375
1975	04/25	07/25	92	5	0	0	0	0	0	35 7	247	297	247	0	0	0	829
1976	05/08	07/23	77	5	0	0	0	0	0	0	214	172	91 2	0	0	0	478
1977	04/07	07/14	64	2	0	0	0	0	0	15 9	47 6	99 2	27 8	0	0	0	190
1978	03/11	07/19	118	3	0	0	0	0	75 4	113	184	115	67 4	0	0	0	555
1979	04/20	07/14	86	3	0	0	0	0	0	65 5	184	138	55 5	0	0	0	444
1980	04/11	08/28	130	4	0	0	0	0	0	124	236	178	83 3	111	0	0	734
1981	03/22	08/18	136	2	0	0	0	0	39 7	119	122	79 3	43 6	35 7	0	0	440
1982	04/02	08/31	135	4	0	0	0	0	0	138	194	178	27.8	61 5	0	0	601
1983	04/25	09/10	119	4	0	0	0	0	0	23 8	218	200	31 7	61 5	19 8	0	555
1984	04/24	09/24	120	4	0	0	0	0	0	27 8	214	168	23 8	43 6	47 6	0	526
1985	04/10	09/30	150	4	0	0	0	0	0	138	162	79 3	21 4	108	80 9	0	591
1986	04/07	09/15	147	3	0	0	0	0	0	119	169	116	47 6	92 2	44 6	0	589
1987	04/07	10/31	185	3 85	0	0	0	0	0	142	236	229	23 8	92 2	89 3	92 2	906
1988	04/03	10/31	124	5 55	0	0	0	0	0	156	0	0	29 9	94 1	91 0	94 1	466
1989	04/12	06/29	51	2 87	0	0	0	0	0	98 9	82 3	66 4	0	0	0	0	248
1990	03/24	07/07	57	4	0	0	0	0	39 7	91 6	98 6	72 2	27 8	0	0	0	330
1993	04/16	07/10	86	4	0	0	0	0	0	89 3	245	116	37 3	0	0	0	489
1994	04/01	06/20	81	3	0	0	0	0	0	178	122	79 3	0	0	0	0	381
1995	04/20	07/10	82	3	0	0	0	0	0	43 6	184	148	39 7	0	0	0	417
1996	04/15	06/15	46	3 39	0	0	0	0	0	107	100	100	0	0	0	0	309
1997	04/20	06/30	56	4	0	0	0	0	0	87 3	119	178	0	0	0	0	385
1998	04/15	06/30	77	4	0	0	0	0	0	95 2	245	178	0	0	0	0	520
1999	04/15	08/17	107	5	0	0	0	0	0	95 2	273	183	80 1	23 8	0	0	657
2000	04/07	06/30	85	3	0	0	0	0	0	142	184	119	0	0	0	0	446
2001	03/26	07/03	100	5	0	0	0	0	59 5	240	192	59 5	5 95	0	0	0	557

Structure Name: THOMAS DOUDLE DITCH **Water District:** 56 **ID Number:** 536

2002	03/28	10/30	153	5	0	0	0	0	39 7	178	121	108	30 7	0	0	53 6	532
2003	03/21	07/06	108	6	0	0	0	0	130	286	61 5	29 8	2 98	0	0	0	511
2004	03/26	06/30	97	3 09	0	0	0	0	17 5	128	121	96 5	0	0	0	0	364
		Minimum		2	0	0	0	0	0	0	0	0	0	0	0	0	94 2
		Maximum		10	0	0	0	0	130	307	430	297	247	111	91 2	94 1	1341
		Average		4 0227	0	0	0	0	13 4	107	173	131	41 0	24 3	14 1	7 75	513

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1970		55	
1971		55	
1972		55	
1973		55	
1974		55	
1975		60	
1976		60	
1977		60	
1978		60	
1979		60	
1980		60	
1981		60	
1982		60	
1983		60	
1984		60	
1985		60	
1987		60	
1988		60	
1989		60	
1990		60	
1991		60	
1992		60	
1993		60	
1994		60	
1995		60	
1996		21	
1997		21	
1998		21	
1999		21	
2000		21	
2001		21	
2002		21	
2003		21	
2004		21	

Structure Name: THOMAS DOUDLE NO 2 **Water District:** 56 **ID Number:** 586

Source	BEAVER CK @ Mile 44 07									*Acres Irrigated*	37
Location	Q160	Q40	Q10	Section	Twnshp		Range		PM	*CIU*	A
	NE	NE		36	11	N	104	W	S		

Distance from section lines *From N/S line* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4532691 0 *Easting (UTM x)* 160393 0 *GPS*

Latitude/Longitude (decimal degrees).

Measuring Device/Recorder 18 IN PARSHALL

Contact COLO DOW *Phone*

Address *Cell Phone*

E-mail

Water Rights Summary	*Total Decreed Rate(s)*	*Abs.*	3 0000	*Cond*	0 0000	*AP/EX*	0 0000	
	Total Decreed Volume(s)	*Abs*	0 0000	*Cond*	0 0000	*AP/EX*	0 0000	

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount		Adj. Type	Uses	Comments
1	W0093-72	12/31/1972	12/31/1933	44559 30680	0		3 C	S		160	

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total
1970	03/20	07/10	98	3	0	0	0	0	47 6	126	69 4	119	39 7	0	0	0	403
1971	04/09	09/18	97	3	0	0	0	0	0	93 2	39 7	15 9	23 8	30 7	35 7	0	239
1972	04/05	10/07	158	3	0	0	0	0	0	93 2	89 3	41 7	15 9	61 5	67 4	20 8	390
1973	04/23	10/06	118	3	0	0	0	0	0	23 8	166	37 7	0	105	103	11 9	448
1974	04/06	10/14	164	3	0	0	0	0	0	86 3	154	50 6	18 8	29 8	87 3	41 7	469
1975	04/23	07/25	94	4	0	0	0	0	0	47 6	216	178	99 2	0	0	0	541
1976	05/08	08/02	54	4	0	0	0	0	0	0	166	19 8	35 7	3 97	0	0	226
1977	04/01	05/20	33	2	0	0	0	0	0	47 6	35 7	0	0	0	0	0	83 3
1978	03/30	06/25	88	2	0	0	0	0	3 97	79 3	122	75 4	0	0	0	0	282
1979	04/20	07/14	86	2	0	0	0	0	0	43 6	122	91 2	27 8	0	0	0	286
1980	04/11	08/28	130	3	0	0	0	0	0	85.3	174	119	41 7	55 5	0	0	476
1981	03/25	08/19	125	1	0	0	0	0	13 9	59 5	35 7	29 8	8 93	17 9	0	0	166
1982	04/02	08/31	135	2	0	0	0	0	0	69 4	122	119	13 9	30 7	0	0	356
1983	04/29	09/10	109	2	0	0	0	0	0	3 97	122	113	9 92	30 7	9 92	0	291
1984	04/24	09/30	142	3	0	0	0	0	0	20 8	160	109	25 8	61 5	43 6	0	421
1985	04/10	07/02	80	4	0	0	0	0	0	122	162	59 5	3 97	0	0	0	349
1986	04/07	07/09	94	1 5	0	0	0	0	0	71 4	75 4	33 7	8 93	0	0	0	189
1987	04/08	10/31	207	1	0	0	0	0	0	38 7	30 7	29.8	30.7	30 7	29 8	30 7	221
1988	04/03	10/31	210	2 8	0	0	0	0	0	88 3	122	118	122	122	118	122	815
1989	05/10	06/30	30	1 5	0	0	0	0	0	0	41 7	31 7	0	0	0	0	73 4
1990	04/08	07/07	49	1 5	0	0	0	0	0	27 8	41 7	27 8	13 9	0	0	0	111
1993	03/26	06/16	53	2	0	0	0	0	23 8	75 4	47 6	63 5	0	0	0	0	210
1994	04/10	06/15	45	2	0	0	0	0	0	63 5	55 5	29 8	0	0	0	0	149
1995	04/26	07/10	62	2	0	0	0	0	0	19 8	122	63 5	39 7	0	0	0	246
1996	04/15	06/30	48	2	0	0	0	0	0	63 5	67 4	59 5	0	0	0	0	190
1997	04/20	06/30	47	2	0	0	0	0	0	43 6	59 5	83 3	0	0	0	0	186
1998	04/15	06/30	61	2	0	0	0	0	0	63 5	59 5	119	0	0	0	0	242
1999	04/15	08/26	82	3	0	0	0	0	0	63 5	152	29 8	17 9	21 8	0	0	286
2000	04/09	06/12	65	2	0	0	0	0	0	87 3	122	23 8	0	0	0	0	234
2001	03/31	07/03	95	3	0	0	0	0	5 95	178	122	34 2	1 49	0	0	0	343
2002	04/02	07/31	85	1	0	0	0	0	0	57 5	23 8	12 9	30 7	0	0	0	125

Structure Name: THOMAS DOUDLE NO 2 **Water District:** 56 **ID Number:** 586

2003	03/28	07/06	101	1	0	0	0	0	7.93	55 6	30 7	14 9	2 98	0	0	0	112
2004	03/26	05/22	58	0 5	0	0	0	0	5 95	22 6	14 0	0	0	0	0	0	42 5
		Minimum		0 5	0	0	0	0	0	0	14 0	0	0	0	0	0	42 5
		Maximum		4	0	0	0	0	47 6	178	216	178	122	122	118	122	814
		Average		2 2667	0	0	0	0	3 31	61 3	95 6	59 2	19 2	18 3	15 0	6 89	278

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1972		25	
1974		40	
1975		30	
1976		30	
1977		30	
1978		30	
1979		30	
1980		30	
1982		45	
1983		30	
1984		30	
1985		30	
1987		30	
1988		30	
1989		30	
1990		30	
1991		30	
1992		30	
1993		30	
1994		30	
1995		30	
1996		37	
1997		37	
1998		37	
1999		37	
2000		37	
2001		37	
2002		37	
2003		37	AMOUNTS ESTAMATED
2004		37	AMOUNTS ESTAMATED

Structure Name: WALKER DITCH **Water District:** 56 **ID Number:** 615

Source	BEAVER CK @ Mile 42 45									*Acres Irrigated*	25
Location	Q160	Q40	Q10	Section	Twnshp		Range		PM	*CIU*	U
	SW	NE		6	10	N	103	W	S		

Distance from section lines *From N/S line* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4530272 6 *Easting (UTM x).* 160893 6 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees) 40 8534 -109 0227

Measuring Device/Recorder NONE

Contact	USA NWR(OWNER)	*Phone*	
Address	GREYSTONE CO	*Cell Phone*	
		E-mail.	

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	*Cond*	*AP/EX*
	Total Decreed Volume(s)	*Abs*	*Cond.*	*AP/EX*

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount	Adj	Type	Uses	Comments
1	W0091-72	12/31/1972	12/31/1933	44559 30680	0		3	C	S	160	
2	01CW0117	12/31/1972	12/31/1933	44559 30680	0		3	C	S,AB	160	

Diversion Summary in Acre-Feet - Total Water through Structure

IYR	FDU	LDU	DWC	Max Q	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Total
1989	09/20	09/22	3	3	0	0	0	0	0	0	0	0	0	0	17 9	0	17 9
	Minimum			3	0	0	0	0	0	0	0	0	0	0	17 9	0	17.9
	Maximum			3	0	0	0	0	0	0	0	0	0	0	17 9	0	17 9
	Average			3	0	0	0	0	0	0	0	0	0	0	17 9	0	17 9

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1976	Structure not usable		
1977	No water available		
1978	Structure not usable		
1979	Structure not usable		
1980	Water available, but not taken		
1981	Structure not usable		
1982			
1983			
1984	Structure not usable	0	
1985	Structure not usable		
1986	Structure not usable		
1987	Structure not usable	0	
1988	Structure not usable		
1997	Structure not usable		
1999	No information available	25	
2000	No information available		On 2000 abandonment list
2002	Water available, but not taken		Has storage, and fishery but did not use any water
2003	Water available, but not taken		Has storage, and fishery but did not use any water
2004	Water available, but not taken		Has storage, and fishery but did not use any water

Structure Name: **DEJOURNETTE D EXT** ***Water District:*** **56** ***ID Number:*** **535**

Source	DRY CK of POT CK @ Mile 24 61									*Acres Irrigated*	40
Location:	Q160	Q40	Q10	Section	Twnshp		Range		PM	*CIU*	A
	NW	NE		30	9	N	103	W	S		

Distance from section lines *From N/S line.* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4515015 5 *Easting (UTM x)* 160204 2 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees) 40 7160 -109 0226

Measuring Device/Recorder NONE

Contact ALLEN, DR(OWNER) *Phone*

Address. 175 N 100 W *Cell Phone.*

E-mail.

VERNAL , UT 84078

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	5 8807	*Cond*	0 0000	*AP/EX*	0 0000	
	Total Decreed Volume(s)	*Abs*	0 0000	*Cond*	0 0000	*AP/EX*	0 0000	

Structure Name: DICKINSON LD #1 **Water District:** 56 **ID Number:** 1286

Source	TRIBUTARIES-BEAVER CK									Acres Irrigated	
Location	Q160	Q40	Q10	Section	Twnshp		Range		PM	CIU	U
	NE	SE		31	12	N	103	W	S		

Distance from section lines: From N/S line: From E/W line:

UTM Coordinates (NAD 83): Northing (UTM y): 4541897 7 Easting (UTM x): 162233 4 Spotted from PLSS quarters

Latitude/Longitude (decimal degrees): 40 9584 -109 0132

Measuring Device/Recorder:

Contact: DICKINSON, A.W TRUST(CLAIMANT) Phone:

Address: MAYBELL, CO 81640 Cell Phone

E-mail

Water Rights Summary							
Total Decreed Rate(s).	Abs	0 0350	Cond	0 0000	APEX	0 0000	
Total Decreed Volume(s)	Abs	0 0000	Cond	0 0000	APEX	0 0000	

Water Rights -- Transactions

Seq. #	Case Number	Adjudication Date	Appropriation Date	Admin Number	O #	Priority Number	Decreed Amount	Adj Type		Uses	Comments
1	95CW0058	12/31/1995	7/16/1930	52960 29416	0		0 035 C	S		9	

Structure Name: DICKINSON LD #2 **Water District:** 56 **ID Number:** 1287

Source	TRIBUTARIES-BEAVER CK								*Acres Irrigated*	
Location	Q160	Q40	Q10	Section	Twnshp		Range	PM	*CIU:*	U
	SW	SW		3	11	N	103 W	S		

Distance from section lines *From N/S line* *From E/W line*

UTM Coordinates (NAD 83) *Northing (UTM y)* 4539326 2 *Easting (UTM x)* 165721 4 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees) 40 9367 -108.9705

Measuring Device/Recorder

Contact	DICKINSON, M S TRUST	*Phone*	
Address	MAYBELL, CO 81640	*Cell Phone*	
		E-mail	

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	0.0350	*Cond*	0 0000	*AP/EX*	0 0000
	Total Decreed Volume(s)	*Abs*	0.0000	*Cond*	0 0000	*AP/EX*	0.0000

Water Rights -- Transactions

Seq #	Case Number	Adjudication Date	Appropriation Date	Admin. Number	O #	Priority	Decreed Amount	Adj Type	Uses	Comments
1	95CW0058	12/31/1995	7/16/1930	52960 29416	0		0 035 C	S	9	

Doherty, Todd

From: roy_smith@blm gov
Sent: Wednesday, December 07, 2005 10:57 AM
To: Doherty, Todd
Subject: Beaver Creek - water rights in Utah

Yes, there are water rights in Utah on Beaver Creek, but they are small. One water right (number 41-406) is for watering up to 995 cattle directly from Beaver Creek, and one right (number 41-409) is for watering up to 2.12 acres. Not surprisingly, they are owned by the Dickinson family. The livestock watering right would consume about 10 gallons per minute, and the irrigation right would consume 0.05 cfs max.