Stream: Mesa Creek

Executive Summary

Water Division: 4
Water District: 63
CDOW#: 47060
CWCB ID#: 06/04/A-004

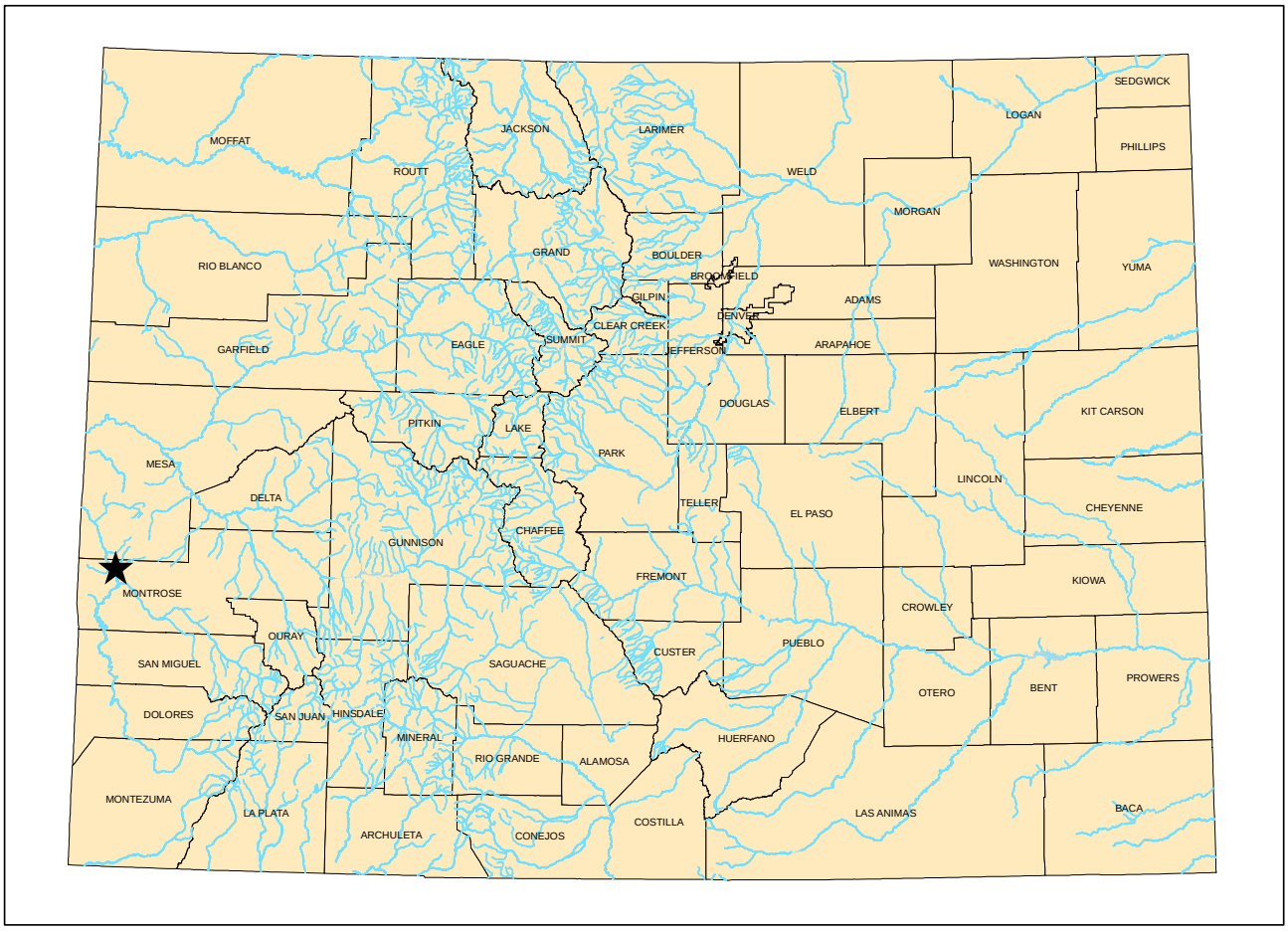
Segment:

Upper Terminus: North and South Fork
Latitude: 38d27'09.88"N Longitude: 108d49'02.11"W
UTM North: 4262956.580 UTM East: 166869.953
SE1/4, NE1/4, Sctn2, T48N, R18W
625 ft. W of the E Section Line, 2500 ft. S of the N Section Line

Lower Terminus: Dolores River
Latitude: 38d26'14.81"N Longitude: 108d50'22.39"W
UTM North: 4261339.375 UTM East: 164852.466
SW1/4, SE1/4, Sctn3, T48N, R18W
1813 ft. W of the E Section Line, 182 ft. N of the S Section Line

Counties: Montrose
Length: 1.97 miles
USGS Quad(s): Red Canyon
ISF Appropriation: 3.7 cfs (April 1 – May 31)

Mesa Creek



Summary

The information contained in this report and the associated instream flow file folder forms the basis for staff's instream flow recommendation to be considered by the Board. It is staff's opinion that the information contained in this report is sufficient to support the findings required in Rule 5i.

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 recommended this segment of Mesa Creek to the CWCB for inclusion into the Instream Flow Program. Mesa 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 very interested in protecting stream flows because Mesa Creek provides important connectivity between the fisheries in South Fork Mesa Creek and North Fork Mesa Creek and the Dolores River.

In addition, BLM believes the creek provides spawning habitat for sensitive fish species that live in cool-water and warm-water habitats. These species are among three species (flannelmouth sucker, bluehead sucker, and roundtail chub) that are the focus of a multi--state, coordinated conservation effort. State

wildlife agencies for all states located within the Colorado River basin have signed a range-wide conservation strategy with the objective of preventing a listing of these species under the federal Endangered Species Act. Under this comprehensive strategy, each state will develop an individual conservation plan that contains specific, on-the-ground conservation objectives, including protection of flow through stream reaches that support the species. The Bureau of Land Management is a cooperating agency in this effort throughout the Colorado River basin. BLM Colorado intends to be a signatory to the Colorado plan that is under development by the Colorado Division of Wildlife.

Mesa Creek is 1.97 miles long. It begins at the confluence of North Fork Mesa Creek and South Fork Mesa Creek at an elevation of approximately 4,900 feet. It terminates at the confluence with the Dolores River at an elevation of approximately 4,760 feet. Approximately 30% of the 1.97-mile segment addressed by this report is located on federal lands. Mesa Creek is located within Montrose County. The total drainage area of the creek is approximately 102.2 square miles. Mesa Creek generally flows in a southwesterly direction.

The subject of this report is a segment of Mesa Creek beginning at the confluence of the North and South Forks of Mesa Creeks and extending downstream to the confluence with the Dolores River. The proposed segment is located northwest of the town of Naturita. The staff has received one recommendation for this segment from the BLM. The recommendation for this segment is discussed below.

Instream Flow Recommendation(s)

BLM recommended 3.7 cfs (April 1 – June 30), based on data collection efforts on April 17, 2001, April 9, 2002, and March 26, 2004. The modeling results from these survey efforts are within the confidence interval produced by the R2Cross model.

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
North and South Mesa Creeks	Dolores River	1.97	70%	30%

This segment is approximately 30% public land, managed by the BLM and 70% private land.

Biological Data

The BLM has 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 "Mesa Creek is a moderate gradient stream with suitable substrate for sensitive fish species. Because of naturally low streamflows in late summer and agricultural diversions, the stream typically has sufficient water for fish habitat only during the snowmelt runoff season. During the snowmelt runoff period, rainbow trout can pass through this reach to create connectivity with other trout populations in South Fork Mesa Creek and the Dolores River. In addition, flannelmouth suckers and bluehead suckers can utilize this habitat for spawning purposes." (See BLM 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 CDOW has determined that maintaining these three hydraulic parameters at adequate levels across riffle habitat types, aquatic habitat in pools and runs will also be maintained for most life stages of fish and aquatic invertebrates (Nehring 1979; Espegren 1996).

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

Table 1: Data

Party	Date	Q	250%-40%	Summer (3/3)	Winter (2/3)
BLM	03/26/2004	6.16	15.4 – 2.5	4.0	(1)
BLM	04/09/2002	1.41	3.3 – 0.5	2.8	2.8
BLM	04/17/2001	9.27	23.2 – 3.7	4.2	(1)

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 R2CROSS Staging Table.

Biologic Flow Recommendation

The snowmelt runoff flow recommendation, which meets 3 of 3 criteria and is within the accuracy range of the R2CROSS model is 3.7 cfs (See Table 1). This recommendation was derived by averaging the results of the three data sets. It is our belief that recommendations that fall outside of the accuracy range of the model, over 250% of the measured discharge or under 40% of the measured discharge may not give an accurate estimate of the necessary instream flow required.

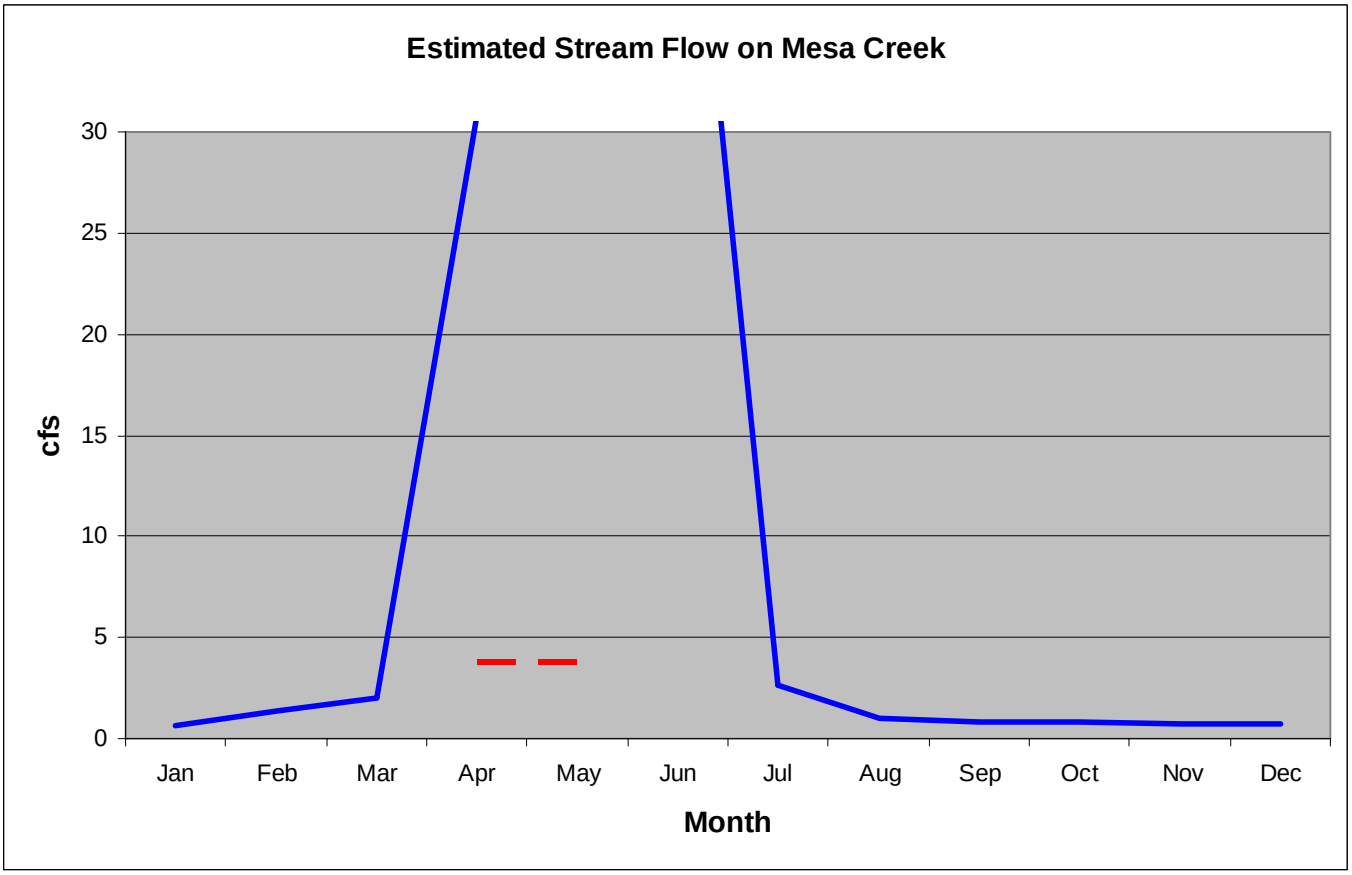
Hydrologic Data

After receiving the cooperating agency's biologic recommendation, the CWCB and BLM staff, conducted an evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. Although there is a substantial amount of streamflow gage data available for the Uncompahgre Plateau and Glade Park, most of this data is severely impacted by diversions and irrigation use. This situation makes it difficult to estimate the natural flow regime for the watersheds on the Plateau. Without specific gage data to evaluate, the next best approach is 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 the Uncompahgre Plateau and Glade Park based on basin drainage area, mean annual precipitation, mean basin elevation and mean basin slope. The report "Uncompahgre Plateau and Glade Park Annual Hydrograph Estimation" in Appendix C, explains staff's water availability analysis in more detail. Table 2 below displays the estimated stream flow of Mesa Creek.

For this reach, the synthetic hydrograph shows that the summer flow recommendation of 3.7 cfs is available from April 1st to May 31st.

Table 2: Estimated Average Stream Flow in Mesa Creek:

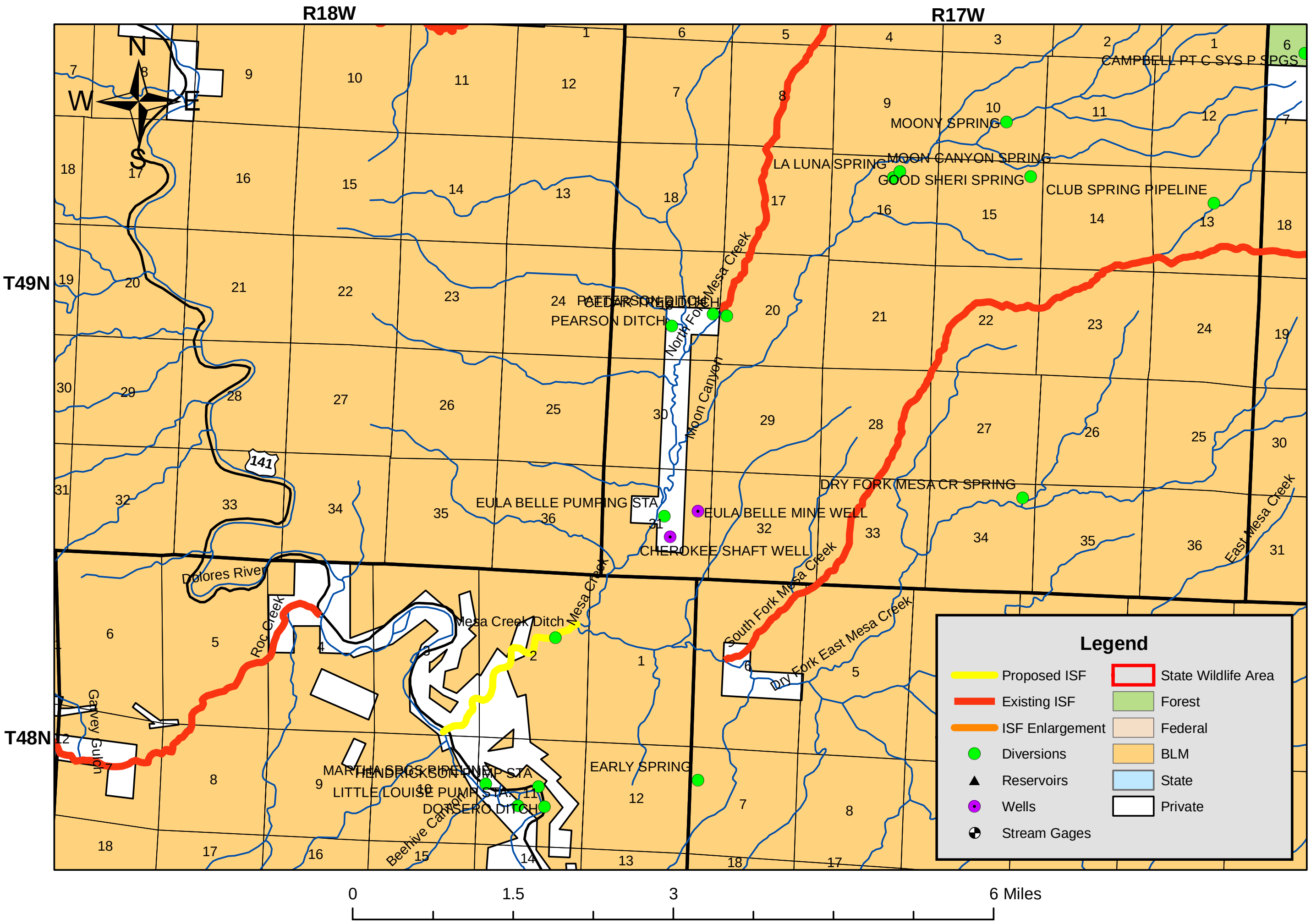
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(cfs)	0.65	1.41	2.03	30.77	112.23	51.50	2.63	1.01	0.84	0.79	0.77	0.71



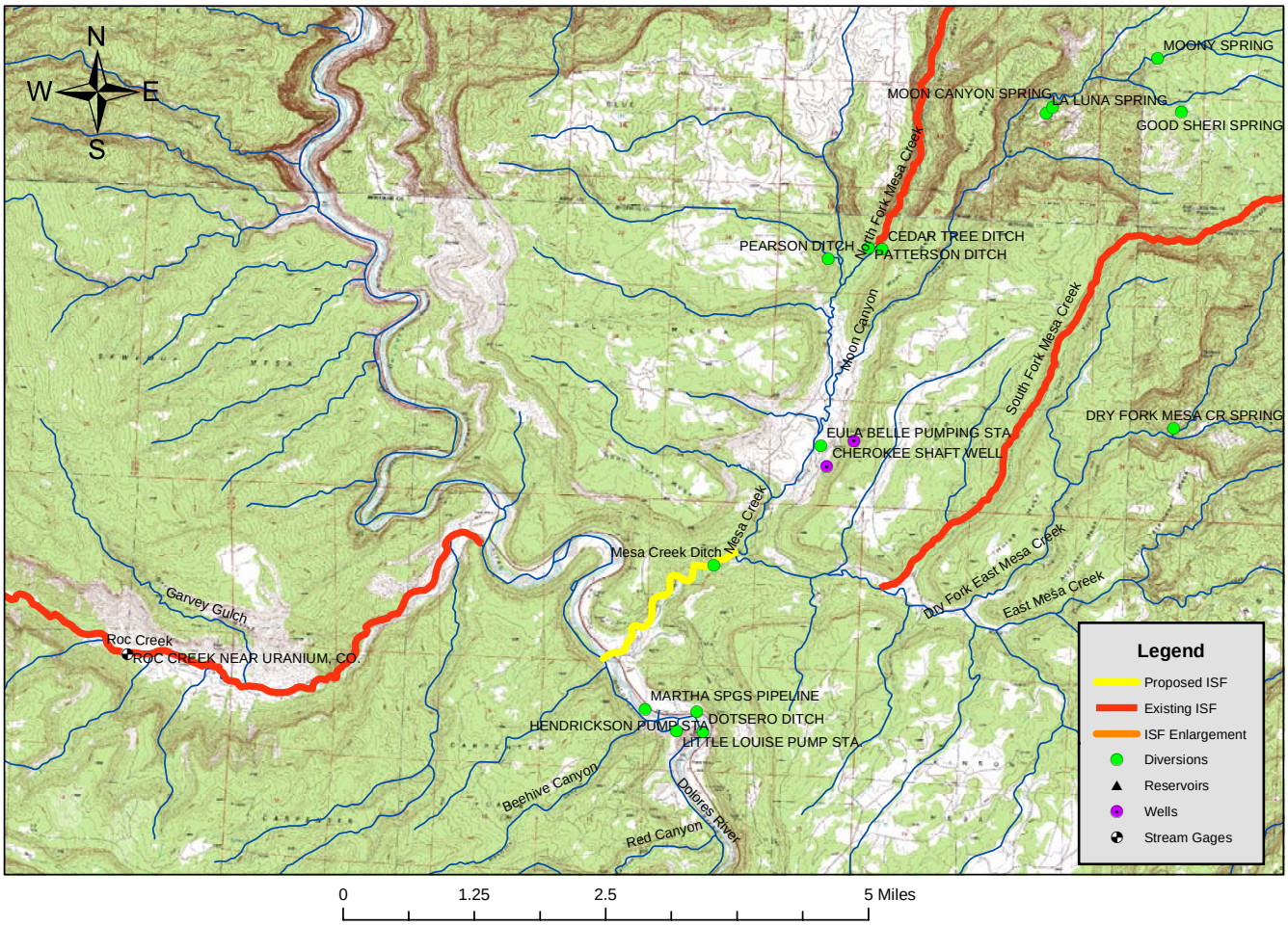
Existing Water Right Information

Staff has analyzed the water rights tabulation and consulted with the Division Engineer Office (DEO) to identify any potential water availability problems. There is one decreed surface diversion within this reach of stream, Mesa Ditch. Based on this analysis and conversations with the DEO, Staff has determined that water is available for appropriation on Mesa Creek, from the confluence of North and South Mesa Creek to the confluence of the Dolores River, to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

Mesa Creek


R18W
R17W
T49N
T48N
N
W
E
S
Legend
Proposed ISF
Existing ISF
ISF Enlargement
Diversions
Reservoirs
Wells
Stream Gages
State Wildlife Area
Forest
Federal
BLM
State
Private
0
1.5
3
6 Miles
Dolores River
North Fork Mesa Creek
Moon Canyon
Mesa Creek
Mesa Creek Ditch
South Fork Mesa Creek
Dry Fork East Mesa Creek
East Mesa Creek
Roc Creek
Beehive Canyon
Garvey Gulch
141
MOONY SPRING
LA LUNA SPRING
MOON CANYON SPRING
GOOD SHERI SPRING
CLUB SPRING PIPELINE
CAMPBELL PT C SYS P SPGS
PEARSON DITCH
EULA BELLE PUMPING STA
EULA BELLE MINE WELL
CHEROKEE SHAFT WELL
DRY FORK MESA CR SPRING
EARLY SPRING
LITTLE LOUISE PUMP STA
DOTSERO DITCH

Mesa Creek


N
W
E
S
MOONY SPRING
MOON CANYON SPRING
LA LUNA SPRING
GOOD SHERI SPRING
North Fork Mesa Creek
PEARSON DITCH
CEDAR TREE DITCH
PATTERSON DITCH
Moon Canyon
South Fork Mesa Creek
DRY FORK MESA CR SPRING
EULA BELLE PUMPING STA
CHEROKEE SHAFT WELL
Mesa Creek
Mesa Creek Ditch
Dry Fork East Mesa Creek
East Mesa Creek
Garvey Gulch
Roc Creek
ROC CREEK NEAR URANIUM, CO.
MARTHA SPGS PIPELINE
DOTSERO DITCH
HENDRICKSON PUMP STA
LITTLE LOUISE PUMP STA
Beehive Canyon
Dolores River
Red Canyon
Legend
Proposed ISF
Existing ISF
ISF Enlargement
Diversions
Reservoirs
Wells
Stream Gages
0
1.25
2.5
5 Miles

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: Mesa Creek

Segment:

Upper Terminus: North and South Fork
Latitude: 38d27'09.88"N Longitude: 108d49'02.11"W
UTM North: 4262956.580 UTM East: 166869.953
SE1/4, NE1/4, Sctn2, T48N, R18W
625 ft, W of the E Section Line, 2500 ft, S of the N Section Line

Lower Terminus: Dolores River
Latitude: 38d26'14.81"N Longitude: 108d50'22.39"W
UTM North: 4261339.375 UTM East: 164852.466
SW1/4, SE1/4,Sctn3, T48N, R18W
1813 ft, W of the E Section Line, 182 ft, N of the S Section Line

Counties: Montrose
Length: 1.97 miles
USGS Quad(s): Red Canyon
ISF Appropriation: 3.7 cfs (April 1 – May 31)

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 Mesa Creek, located in Water Division 4.

Location and Land Status. Mesa Creek is tributary to the Dolores River approximately 20 miles northwest of Naturita. The stream reach covered by the surveys conducted on BLM lands runs from the confluence of the North Fork and South Fork to the confluence with the San Miguel River. Approximately 30% of the 1.97 mile reach is located on BLM lands.

Biological Summary. Mesa Creek is a moderate gradient stream with suitable substrate for native fish species. Because of naturally low stream flows in late summer and agricultural diversions, the stream typically has sufficient water for fish habitat only during the snowmelt runoff season. During the snowmelt runoff period, rainbow trout can pass through this reach to create connectivity with other trout populations in South Fork Mesa Creek, North Fork Mesa Creek, and the Dolores River. In addition, flannelmouth suckers and bluehead suckers can utilize this habitat for spawning purposes. . Flannelmouth sucker and bluehead sucker are sensitive species in decline. BLM is working to keep these species off the list of threatened and endangered species by protecting suitable habitat.

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.

> 3.70 cubic feet per second is recommended for the snowmelt runoff period from April 1 to May 31. This recommendation is driven by the average depth criteria, because the stream channel is wide. Maintaining the average depth criteria is important for spawning and for providing additional physical habitat for sensitive species that move up into the creek from the Dolores River during snowmelt runoff. Protecting snowmelt runoff flows is also important for recharging the alluvial aquifer, which provides groundwater supplies to the riparian community during the late summer.

BLM is not making an instream flow recommendation for the remainder of the year. Naturally low flows, combined with upstream irrigation diversion, results in extremely low flows during the remainder of the year. Accordingly, BLM recommends that CWCB make an appropriation only for the snowmelt runoff season, and that CWCB appropriate additional water at other times of the year only if additional flows become available

Water Availability. BLM is aware of one decreed water right in this reach, the Mesa Creek Ditch. In addition, there are three water rights located upstream on North Fork Mesa Creek, including the Cedar Tree Ditch, Pearson Ditch, and Patterson Ditch. BLM is not aware of any historic gaging data for this stream reach. As an alternative, BLM recommends using the synthetic hydrograph methodology developed by BLM for the Uncompahgre Plateau to obtain an estimate of water availability.

Relationship to Management Plans. This stream segment is important to BLM because it is located in a watershed for which BLM has created a coordinated resource management plan. The goals of this plan include improving both aquatic habitat and riparian habitat along streams via improved grazing management and transportation route management. BLM is also working with numerous stakeholders in an effort improve overall wildlife habitat on the Uncompahgre Plateau for both terrestrial and aquatic species.

The BLM requests that the Board recognize that this recommendation is based only upon the minimum flows necessary to support cool and 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. Anania

Linda M. Anania
Deputy State Director
Resources and Fire

4 Enclosures

cc: Jim Ferguson, Uncompahgre Field Office
Dennis Murphy, Uncompahgre Field Office
Barb Sharrow, Uncompahgre Field Office

APPENDIX – B
Field Data

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

RADO WATER VATION BOARD

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

NAME: Mesa Creek - main stem | CROSS-SECTION NO

SECTION LOCATION: 1/3 mile below confluence of north & south forks

14-17-01 | OBSERVERS: R. Smith, D. Murphy

AL CRIPTION | ¼ SECTION: NE | SECTION: 2 | TOWNSHIP: 48 (N)S | RANGE: 18 E(W) | PM: N.M.

UNTY: Montrose | WATERSHED: Dolores | WATER DIVISION: 4 | DOW WATER CODE: 47060

MAP(S) | USGS: Red Canyon 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/100' | TAPE TENSION surveyed ____ lbs

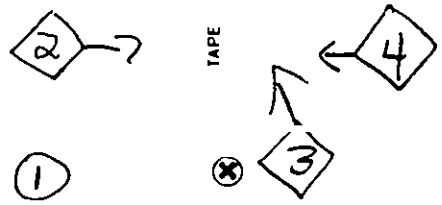
CHANNEL BED MATERIAL SIZE RANGE: gravel to 18" boulders | PHOTOGRAPHS TAKEN (YES)/NO | NUMBER OF PHOTOGRAPHS: 3

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	6.45/6.45
② WS Upstream	12.0	6.36
③ WS Downstream	12.0	6.54

SLOPE | 0.18 / 24.0' = .0075

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

mayfly, caddisfly

COMMENTS

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Mesa Creek | CROSS-SECTION NO: 1 | DATE: 4-17-01 | SHEET 1 OF 1

BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading 0.3 ft | TIME 3:00 pm

Bank (S) Estimate (G) Waterline (W) Check (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
S	37.0		4.20								
G	28.0		5.40								
W	25.0	0.5	6.45							0.20	0.14
	24.0	1	6.65	0.20					0.70	~~0.30~~	~~0.210~~
	23.0	1	6.70	0.25					1.29	0.25	0.323
	22.0		6.85	0.40					1.40	0.40	0.560
	21.0		6.90	0.45					1.51	0.45	0.680
	20.0		6.80	0.35					1.56	0.35	0.546
	19.0		6.85	0.40					1.84	0.40	0.736
	18.0		6.75	0.30					0.92	0.30	0.276
	17.0		6.70	0.25					0.93	0.25	0.233
	16.0		6.80	0.35					1.76	0.35	0.616
	15.0		6.75	0.30					2.30	0.30	0.690
	14.0		6.75	0.30					2.52	0.30	0.756
	13.0		6.90	0.45					2.61	0.45	1.175
	12.0		6.90	0.45					1.43	0.45	0.644
	11.0		6.80	0.35					1.53	0.35	0.536
	10.0		6.80	0.35					1.43	0.35	0.501
	9.0		6.80	0.35					1.68	0.35	0.588
	8.0		6.75	0.30					1.58	0.30	0.474
	7.0	1	6.70	0.25					0.84	0.25	0.210
	6.0	0.75	6.55	0.10					0.09	~~0.075~~	~~0.009~~ 0.008
											14.76 cfs
W	5.5	0.25	6.45								
G	3.0		5.50								
S	0.5		4.80								
TOTALS											

Method of Measurement | Time 3:30 | Gage Reading 0.3 ft | CALCULATIONS PERFORMED BY | CALCULATIONS CHECKED BY

****
* COLORADO WATER CONSERVATION B
* INSTREAM FLOW / NATURAL LAKE LEVE
* STREAM CROSS-SECTION AND FLOW AN
****

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

STREAM NAME: Mesa Creek
XS LOCATION: 1/2 mi. below North and South Forks
XS NUMBER: 2

DATE: 4/17/01
OBSERVERS: R. Smith D. Murphy

1/4 SEC: NE
SECTION: 2
TWP: 48N
RANGE: 18W
PM: NM

COUNTY: Montrose
WATERSHED: Dolores
DIVISION: 4
DOW CODE: 47060

USGS MAP: Red Canyon 7.5'
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: 0.0075

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

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

STREAM NAME: Mesa Creek
XS LOCATION: 1/3 mi. below North and South Forks
XS NUMBER: 2

INPUT DATA # DATA POINTS= 25

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM.	WATER DEPTH	AREA (Am)
	S	0.50	4.80	0.00	0.00	0.00	0.00	0.00
1	G	3.00	5.50	0.00	0.00	0.00	0.00	0.00
	W	5.50	6.45	0.00	0.00	0.00	0.00	0.00
		6.00	6.55	0.20	0.09	0.51	0.20	0.15
		7.00	6.70	0.25	0.84	1.01	0.25	0.25
		8.00	6.75	0.40	1.58	1.00	0.40	0.40
		9.00	6.80	0.45	1.68	1.00	0.45	0.45
		10.00	6.80	0.35	1.43	1.00	0.35	0.35
		11.00	6.80	0.40	1.53	1.00	0.40	0.40
		12.00	6.90	0.30	1.43	1.00	0.30	0.30
		13.00	6.90	0.25	2.61	1.00	0.25	0.25
		14.00	6.75	0.35	2.52	1.01	0.35	0.35
		15.00	6.75	0.30	2.30	1.00	0.30	0.30
		16.00	6.80	0.30	1.76	1.00	0.30	0.30
		17.00	6.70	0.45	0.93	1.00	0.45	0.45
		18.00	6.75	0.45	0.92	1.00	0.45	0.45
		19.00	6.85	0.35	1.84	1.00	0.35	0.35
		20.00	6.80	0.35	1.56	1.00	0.35	0.35
		21.00	6.90	0.35	1.51	1.00	0.35	0.35
		22.00	6.85	0.30	1.40	1.00	0.30	0.30
		23.00	6.70	0.25	1.29	1.01	0.25	0.25
		24.00	6.65	0.10	0.70	1.00	0.10	0.10
	W	25.00	6.45	0.00	0.00	1.02	0.00	0.00
1	G	28.00	5.40	0.00	0.00	0.00	0.00	0.00
	S	32.00	4.20	0.00	0.00	0.00	0.00	0.00
	TOTALS					19.59	0.45 (Max.)	6.10

VALUES COMPUTED FROM RAW F

Manning's n =

:ELD DATA

Q (Qm)	% Q CELL
0.00	0.0%
0.00	0.0%
0.00	0.0%
0.01	0.1%
0.21	2.3%
0.63	6.8%
0.76	8.2%
0.50	5.4%
0.61	6.6%
0.43	4.6%
0.65	7.0%
0.88	9.5%
0.69	7.4%
0.53	5.7%
0.42	4.5%
0.41	4.5%
0.64	6.9%
0.55	5.9%
0.53	5.7%
0.42	4.5%
0.32	3.5%
0.07	0.8%
0.00	0.0%
0.00	0.0%
0.00	0.0%
9.27	100.0%

.0389

STREAM NAME: Mesa Creek
XS LOCATION: 1/3 mi. below
XS NUMBER: 2

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
6.20	6.10	11.17	83.1%
6.22	6.10	10.76	76.3%
6.24	6.10	10.34	69.5%
6.26	6.10	9.93	62.8%
6.28	6.10	9.52	56.1%
6.30	6.10	9.11	49.4%
6.32	6.10	8.71	42.7%
6.34	6.10	8.30	36.1%
6.36	6.10	7.90	29.5%
6.38	6.10	7.50	23.0%
6.40	6.10	7.11	16.5%
6.41	6.10	6.91	13.3%
6.42	6.10	6.71	10.0%
6.43	6.10	6.52	6.8%
6.44	6.10	6.32	3.6%
6.45	6.10	6.12	0.4%
6.46	6.10	5.93	-2.8%
6.47	6.10	5.74	-6.0%
6.48	6.10	5.54	-9.1%
6.49	6.10	5.35	-12.2%
6.50	6.10	5.16	-15.4%
6.52	6.10	4.78	-21.6%
6.54	6.10	4.41	-27.7%
6.56	6.10	4.04	-33.8%
6.58	6.10	3.68	-39.7%
6.60	6.10	3.31	-45.7%
6.62	6.10	2.96	-51.5%
6.64	6.10	2.61	-57.3%
6.66	6.10	2.26	-62.9%
6.68	6.10	1.93	-68.4%
6.70	6.10	1.60	-73.8%

WATERLINE AT ZERO
AREA ERROR = 6.451

ıred water surface elevations and sag

HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
1.08	94.40	3.48
1.08	94.23	3.48
1.04	87.90	3.40
1.00	81.77	3.32
0.97	75.84	3.23
0.93	70.11	3.15
0.89	64.59	3.06
0.85	59.27	2.97
0.81	54.15	2.88
0.77	49.23	2.79
0.73	44.52	2.69
0.69	40.02	2.59
0.65	35.73	2.49
0.61	31.65	2.39
0.57	27.78	2.28
0.53	24.13	2.17
0.49	20.70	2.05
0.44	17.49	1.93
0.40	14.51	1.80
0.36	11.77	1.66
0.31	9.27	1.52
0.27	7.09	1.38
0.23	5.16	1.23
0.18	3.51	1.07
0.14	2.14	0.89
0.10	1.12	0.71
0.07	0.48 %4P	0.57
0.05	0.16	0.47
0.03	0.03	0.33

STREAM NAME: Mesa Creek
XS LOCATION: 1/3 mi. below North and South Forks
XS NUMBER: 2

SUMMARY SHEET

MEASURED FLOW (Qm)=	9.27 cfs	RECOMMENDED INSTR
CALCULATED FLOW (Qc)=	9.27 cfs	==========
(Qm-Qc)/Qm * 100 =	-0.0 %	
		FLOW (CFS)
MEASURED WATERLINE (WLm)=	6.45 ft	==========
CALCULATED WATERLINE (WLc)=	6.45 ft	
(WLm-WLc)/WLm * 100 =	-0.0 %	
MAX MEASURED DEPTH (Dm)=	0.45 ft	
MAX CALCULATED DEPTH (Dc)=	0.45 ft	
(Dm-Dc)/Dm * 100	0.3 %	____
MEAN VELOCITY=	1.52 ft/sec	
MANNING'S N=	0.039	
SLOPE=	0.0075 ft/ft	
.4 * Qm =	3.7 cfs	
2.5 * Qm=	23.2 cfs	

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

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

CWCB REVIEW BY: .....

STREAM NAME: Mesa Creel
XS LOCATION: 1/3 mi. below North and South Forks
XS NUMBER: 2

STAGING TABLE

GL = lowest Grassline elevation corrected for sag
WL = Waterline corrected for variations in field meas

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PER (%)
GL*	5.50	24.71	1.10	1.40	27.13	25.14	100.0%
	5.50	24.71	1.10	1.40	27.10	25.13	100.0%
	5.55	24.43	1.06	1.35	25.87	24.84	98.8%
	5.60	24.16	1.02	1.30	24.65	24.55	97.6%
	5.65	23.88	0.98	1.25	23.45	24.26	96.5%
	5.70	23.61	0.94	1.20	22.26	23.97	95.3%
	5.75	23.34	0.90	1.15	21.09	23.67	94.2%
	5.80	23.06	0.86	1.10	19.93	23.38	93.0%
	5.85	22.79	0.82	1.05	18.78	23.09	91.8%
	5.90	22.51	0.78	1.00	17.65	22.80	90.7%
	5.95	22.24	0.74	0.95	16.53	22.51	89.5%
	6.00	21.96	0.70	0.90	15.43	22.21	88.4%
	6.05	21.69	0.66	0.85	14.34	21.92	87.2%
	6.10	21.41	0.62	0.80	13.26	21.63	86.0%
	6.15	21.14	0.58	0.75	12.19	21.34	84.9%
	6.20	20.87	0.53	0.70	11.14	21.05	83.7%
	6.25	20.59	0.49	0.65	10.11	20.75	82.5%
	6.30	20.32	0.45	0.60	9.09	20.46	81.4%
	6.35	20.04	0.40	0.55	8.08	20.17	80.2%
	6.40	19.77	0.36	0.50	7.08	19.88	79.1%
WL*	6.45	19.49	0.31	0.45	6.10	19.58	77.9%
	6.50	18.99	0.27	0.40	5.14	19.07	75.8%
	6.55	18.49	0.23	0.35	4.20	18.56	73.8%
	6.60	17.90	0.18	0.30	3.29	17.96	71.5%
	6.65	17.30	0.14	0.25	2.41	17.35	69.0%
	6.70	15.93	0.10	0.20	1.58	15.98	63.5%
	6.75	12.07	0.07	0.15	0.86	12.11	48.2%
	6.80	6.42	0.05	0.10	0.35	6.44	25.6%
	6.85	3.27	0.03	0.05	0.10	3.28	13.1%

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME: Mesa Creek | CROSS-SECTION NO: 1

CROSS SECTION LOCATION: 500' downstream from confluence of N. Fk. + S Fk.

DATE: 4-9-02 | OBSERVERS: R. Smith, D. Murphy

LEGAL DESCRIPTION: ¼ SECTION: NE | SECTION: 2 | TOWNSHIP: 48 (N)S | RANGE: 18 E(W) | PM: NM

COUNTY: Montrose | WATERSHED: Dolores | WATER DIVISION: 4 | DOW WATER CODE: 47060

MAP(S): USGS: Red Canyon | 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

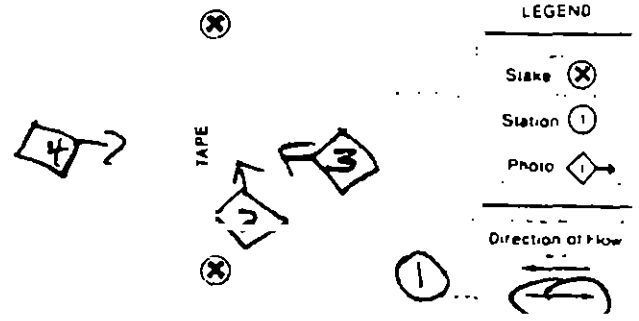
CHANNEL BED MATERIAL SIZE RANGE: gravel to 12" boulders | PHOTOGRAPHS TAKEN: (YES)/NO | NUMBER OF PHOTOGRAPHS: (4)

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	5.10 / 5.10
2	WS Upstream	10.0	4.88
3	WS Downstream	10.0	5.35

SLOPE: 0.47 / 20.0 = 0.0235

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

mayfly, caddisfly, beetle larvae

COMMENTS

TDS = 500 Ph = 8.2 Temp = 15°C

DISCHARGE/CROSS SECTION NOTES

STREAM NAME: Mesa Creek | CROSS-SECTION NO: 1 | DATE: 4-9-02 | SHEET __ OF __

BEGINNING OF MEASUREMENT: EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading: .3 ft | TIME: 1:05 pm

Features (Stake (S) Grassline (G) Waterline (W) Rock (R))	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
LS	0.5		2.90								
G	4.5		4.66								
W	6.0		5.10								
	6.5		5.19	0.1				Ø			
	7.0		5.26	0.25				0.27			
	7.5		5.42	0.30				1.47			
	8.0		5.45	0.35				2.24			
	8.5		5.41	0.30				1.89			
	9.0		5.28	0.20				1.00			
	9.5		5.31	0.20				Ø			
	10.0		5.20	0.10				Ø			
	10.5		5.30	0.2				0.42			
	11.0		5.22	0.1				0.86			
RL	11.5			Ø				Ø			
RL	12.0		5.00	+0.1				Ø			
	12.5		5.21	0.10				-.38			
	13.0		5.24	0.15				-.75			
	13.5		5.25	0.15				1.43			
	14.0		5.14	0.05				Ø			
	14.5		5.19	0.10				0.66			
RL	15.0			Ø				Ø			
	15.5		5.18	0.10				Ø			
	16.0		5.19	0.10				.18			
	16.5		5.19	0.10				Ø			
LS	17.0		5.10								
	21.0		4.72								
G	32.0		4.63								
	36.0		4.20								
RS	41.0		3.46								
TOTALS											

End of Measurement | Time 1:20 | Gage Reading .3 ft | CALCULATIONS PERFORMED BY | CALCULATIONS CHECKED BY

PROOF SHEET

INPUT DATA # DATA POINTS= 29

FEATURE	LIST	VERT DEPTH	WATER DEPTH	VEL.	A	Q	TAPE TO WATER
LS	0 5	2.9	0	0	0	0	0
G	4 5	4 66	0	0	0	0	0
W	6	5 1	0	0	0	0	0
	6 5	5 19	0 1	0	0 05	0	5 09
	7	5.26	0 25	0 27	0 13	0 03	5 01
	7.5	5 42	0 3	1 47	0 15	0 22	5 12
	8	5 45	0 35	2 24	0 18	0 39	5 1
	8 5	5 41	0 3	1 89	0 15	0 28	5 11
	9	5 28	0 2	1	0 1	0 1	5 08
	9 5	5 31	0 2	0	0 1	0	5 11
	10	5.2	0 1	0	0 05	0	5 1
	10 5	5 3	0.2	0 42	0 1	0 04	5 1
	11	5 22	0 1	0 86	0 05	0 04	5 12
	11 5	5	0	0	0	0	0
	12	5	0 1	0	0 05	0	4 9
	12 5	5 21	0.1	0 38	0 05	0 02	5 11
	13	5 24	0 15	0 75	0 08	0 06	5 09
	13 5	5 25	0 15	1 43	0 08	0 11	5 1
	14	5 14	0 05	0	0 03	0	5 09
	14 5	5 19	0 1	0 66	0 05	0 03	5 09
	15	5 18	0	0	0	0	0
	15 5	5 18	0 1	0	0 05	0	5 08
	16	5 19	0 1	0 18	0 05	0 01	5 09
	16 5	5 19	0 1	0	0 05	0	5 09
W	17	5 1	0	0	0	0	0
	21	4 72	0	0	0	0	0
G	32	4 63	0	0	0	0	0
	36	4 2	0	0	0	0	0
RS	41	3 46	0	0	0	0	0
				TOTALS	1 53	1 34	

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
4 93	1 53	3 43	124 70%
4 95	1 53	3 16	107 30%
4 97	1 53	2 9	90 30%
4 99	1 53	2 65	73 70%
5 01	1 53	2 41	57 80%
5 03	1 53	2 18	42 70%
5 05	1 53	1 95	28 10%
5 07	1 53	1 74	13 90%
5 09	1 53	1 53	0 30%
5 11	1 53	1 33	-12 90%
5 13	1 53	1 13	-25 60%
5 14	1 53	1 04	-31 80%
5 15	1 53	0 95	-37 90%
5 16	1 53	0 86	-43 80%
5 17	1 53	0 77	-49 40%
5 18	1 53	0 69	-54 90%
5 19	1 53	0 62	-59 50%
5 2	1 53	0 56	-63 30%
5 21	1 53	0 5	-67 00%
5 22	1 53	0 45	-70 50%
5 23	1 53	0 4	-73 60%
5 25	1 53	0 32	-79 00%
5 27	1 53	0 26	-83 20%
5 29	1 53	0 2	-86 80%
5 31	1 53	0 16	-89 50%
5 33	1 53	0 13	-91 60%
5 35	1 53	0 1	-93 60%
5 37	1 53	0 07	-95 40%
5 39	1 53	0 04	-97 10%
5 41	1 53	0 02	-98 50%
5 43	1 53	0 01	-99 60%

WATERLINE AT ZERO
AREA ERROR = 5 09

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

LOCATION INFORMATION

STREAM NAME	Mesa Creek
XS LOCATION	500' downstream from confluence of NF and SF Mesa Creeks
XS NUMBER	1
DATE	4/9/02
OBSERVERS	South and Murphy
1/4 SEC	NE
SECTION	2
TWP	48N
RANGE	18W
PM	NM
COUNTY	Montrose
WATERSHED	Dolores
DIVISION	4
DOW CODE	47960
USGS MAP	Red Canyon
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	0.0235

INPUT DATA CHECKED BY DATE

ASSIGNED TO DATE

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.34 cfs
CALCULATED FLOW (Qc)=	1.41 cfs
(Qm-Qc)/Qm * 100 =	-5.20%
MEASURED WATERLINE (WLm)=	5.18 ft
CALCULATED WATERLINE (WLc)=	5.09 ft
(WLm-WLc)/WLm * 100 =	1.70%
MAX MEASURED DEPTH (Dm)=	0.35 ft
MAX CALCULATED DEPTH (Dc)=	0.36 ft
(Dm-Dc)/Dm * 100	-2.70%
MEAN VELOCITY=	0.92 ft/sec
MANNING'S N=	0.069
SLOPE=	0.0235 ft/ft
4 * Qm =	0.5 cfs
2.5 * Qm=	3.3 cfs ✓

RECOMMENDED INSTREAM FLOW

FLOW (CFS)	PERIOD
2.72	Winter
2.73	Summer

RATIONALE FOR RECOMMENDATION

In this case, all three criteria (5.2% wetted perimeter, 1 ft/sec and velocity and 0.2' depth) were met at a flow of 2.72 cfs for summer and winter

RECOMMENDATION BY AGENCY DATE

CWCB REVIEW BY DATE

Stream Name: Mesa Creek
XS Location: 500' downstream from confluence of NE and SE Mesa Creeks
XS Number: 1

STAGING TABLE

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

	DIST TO WATER (ft)	TOP WIDTH (ft)	AVG DEPTH (ft)	MAX DEPTH (ft)	AREA (ft²)	WETTED PERIM (ft)	PERCENT WET PERIM (%)	HYDR RADIUS (ft)	FLOW (cfs)	AVG VELOCITY (ft/sec)
	4.66	23.83	0.32	0.79	7.75	24.11	100.00%	0.32	12.05	1.56
GL	4.69	20.01	0.35	0.76	7.08	20.28	84.10%	0.35	11.64	1.64
	4.74	16.01	0.39	0.71	6.21	16.28	67.50%	0.38	10.84	1.75
	4.79	15.31	0.35	0.66	5.43	15.57	64.60%	0.35	8.92	1.64
	4.84	14.62	0.32	0.61	4.68	14.86	61.60%	0.31	7.18	1.54
	4.89	13.92	0.28	0.56	3.97	14.16	58.70%	0.28	5.63	1.42
	4.94	13.22	0.25	0.51	3.29	13.45	55.80%	0.24	4.26	1.3
	4.99	12.53	0.21	0.46	2.64	12.75	52.90%	0.21	3.07	1.16
	5.04	11.14	0.18	0.41	2.06	11.33	47.00%	0.18	2.19	1.06
	5.09	10.21	0.15	0.36	1.52	10.38	43.00%	0.15	1.41	0.92
WL	5.14	9.39	0.11	0.31	1.04	9.52	39.50%	0.11	0.78	0.76
	5.19	5.88	0.1	0.26	0.61	5.98	24.80%	0.1	0.45	0.73
	5.24	4.15	0.09	0.21	0.36	4.21	17.50%	0.08	0.23	0.64
	5.29	2.39	0.08	0.16	0.2	2.43	10.10%	0.08	0.13	0.63
	5.34	1.52	0.07	0.11	0.11	1.54	6.40%	0.07	0.06	0.58
	5.39	1.17	0.04	0.06	0.04	1.18	4.90%	0.04	0.02	0.37
	5.44	0.28	0	0.01	0	0.28	1.20%	0	0	0.09

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 (Qin)	% Q CELL
LS	0.5	2.9	0	0	0	0	0	0	0.00%
G	4.5	4.66	0	0	0	0	0	0	0.00%
W	6	5.1	0	0	0	0	0	0	0.00%
	6.5	5.19	0.1	0	0.51	0.1	0.05	0	0.00%
	7	5.26	0.25	0.27	0.5	0.25	0.13	0.03	2.50%
	7.5	5.42	0.3	1.47	0.52	0.3	0.15	0.22	16.50%
	8	5.45	0.35	2.24	0.5	0.35	0.18	0.39	29.30%
	8.5	5.41	0.3	1.89	0.5	0.3	0.15	0.28	21.20%
	9	5.28	0.2	1	0.52	0.2	0.1	0.1	7.50%
	9.5	5.31	0.2	0	0.5	0.2	0.1	0	0.00%
	10	5.2	0.1	0	0.51	0.1	0.05	0	0.00%
	10.5	5.3	0.2	0.42	0.51	0.2	0.1	0.04	3.10%
	11	5.22	0.1	0.56	0.51	0.1	0.05	0.04	3.20%
	11.5	5	0	0	0.55	0	0	0	0.00%
	12	5	0.1	0	0.5	0.1	0.05	0	0.00%
	12.5	5.21	0.1	0.38	0.54	0.1	0.05	0.02	1.40%
	13	5.24	0.15	0.75	0.5	0.15	0.08	0.06	4.20%
	13.5	5.25	0.15	1.43	0.5	0.15	0.08	0.11	8.00%
	14	5.14	0.05	0	0.51	0.05	0.03	0	0.00%
	14.5	5.19	0.1	0.66	0.5	0.1	0.05	0.03	2.50%
	15	5.18	0	0	0.5	0	0	0	0.00%
	15.5	5.18	0.1	0	0.5	0.1	0.05	0	0.00%
	16	5.19	0.1	0.18	0.5	0.1	0.05	0.01	0.70%
	16.5	5.19	0.1	0	0.5	0.1	0.05	0	0.00%
W	17	5.1	0	0	0.51	0	0	0	0.00%
	21	4.72	0	0	0	0	0	0	0.00%
G	32	4.63	0	0	0	0	0	0	0.00%
	38	4.2	0	0	0	0	0	0	0.00%
RS	41	3.46	0	0	0	0	0	0	0.00%
			TOTALS		11.2	0.35	1.53	1.34	100.00%
						(Max.)			

Manning's n = 0.0687

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

COLORADO DIVISION OF WILDLIFE

LOCATION INFORMATION

STREAM NAME Mesa Creek | CROSS-SECTION NO 1

CROSS SECTION LOCATION 500' upstream from Wymer diversion

DATE 3-26-04 | OBSERVERS M. Potter, R. Smith

LEGAL DESCRIPTION | ¼ SECTION NE | SECTION 2 | TOWNSHIP 48 (N)S | RANGE 18 E/(W) | PM NM

COUNTY Montrose | WATERSHED Dolores | WATER DIVISION 4 | DOW WATER CODE 47060

MAP(S) | USGS Red Canyon 7.5' | USFS

SUPPLEMENTAL DATA

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

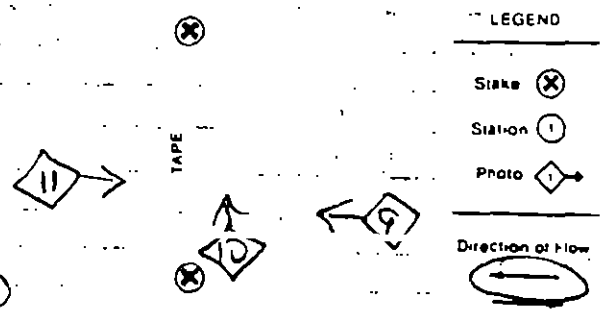
METER NUMBER | DATE RATED | CALIB/SPIN ____ sec | TAPE WEIGHT surveyed ____ lbs/1000 | TAPE TENSION surveyed lbs

CHANNEL BED MATERIAL SIZE RANGE gravel to 12" boulders | PHOTOGRAPHS TAKEN (YES)/NO | NUMBER OF PHOTOGRAPHS 4

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	7.12 / 7.11
② WS Upstream	15.0	6.74
③ WS Downstream	15.0	7.34
SLOPE	0.60 / 30.0 =	0.02

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
See previous survey																	

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

mayfly, caddisfly, beetle larvae - all very small

COMMENTS

Ph < 7.9 TDS: 370 Water Temp: 5°C

DISCHARGE/CROSS SECTION NOTES

STREAM NAME Mesa Creek | CROSS-SECTION NO 1 | DATE 3-26-04 | SHEET __ OF __

BEGINNING OF MEASUREMENT | EDGE OF WATER LOOKING DOWNSTREAM (0.0 AT STAKE) | LEFT / RIGHT | Gage Reading 0.4 ft | TIME 10:50

Stake (S) Grassline (G) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observation (ft)	Revolutions	Time (sec)	Velocity (ft/sec) At Point	Velocity (ft/sec) Mean in Vertical	Area (ft^2)	Discharge (cfs)
RS	0.0		6.48								
G	6.6		10.54								
W	7.8		7.11								
	8.5		7.24	0.15				0.16			
	9.0		7.23	0.15				0.21			
	9.5		7.28	0.15				0.39			
	10.0		7.30	0.20				1.18			
	10.5		7.32	0.20				1.22			
	11.0		7.39	0.25				1.76			
	11.5		7.21	0.10				2.48			
	12.0		7.19	0.05				0.41			
	12.5		7.32	0.20				1.86			
	13.0		7.39	0.25				2.91			
	13.5		7.39	0.30				1.51			
	14.0		7.46	0.35				1.63			
	14.5		7.43	0.35				1.14			
	15.0		7.56	0.45				2.90			
	15.5		7.62	0.50				3.40			
	16.0		7.62	0.50				2.11			
	16.5		7.54	0.40				2.24			
	17.0		7.33	0.20				1.41			
	17.5		7.32	0.20				2.11			
	18.0		7.45	0.35				2.00			
	18.5		7.41	0.30				2.18			
	19.0		7.36	0.25				2.18			
	19.5		7.56	0.45				1.70			
	20.0		7.43	0.25				0.70			
	20.5		7.30	0.20				0			
W	21.0		7.12								
G	22.6		6.44								
LS	25.4		6.58								

TOTALS

End of Measurement | Time 11:15 | 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.	Mesa Creek
XS LOCATION	500 ft. us from Wymer Diversion
XS NUMBER	1
DATE:	26-Mar-04
OBSERVERS	M Potter and R. Smith
1/4 SEC·	NE
SECTION·	2
TWP·	48N
RANGE	18W
PM.	N.M
COUNTY	Montrose
WATERSHED:	Dolores
DIVISION	4
DOW CODE	47060
USGS MAP	Red Canyon 7 5' quad
USFS MAP	0

SUPPLEMENTAL DATA

TAPE WT	0.0106
TENSION.	99999

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

CHANNEL PROFILE DATA

SLOPE· 0 02

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

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

STREAM NAME Mesa Creek
XS LOCATION 500 ft us from Wymer Diversion
XS NUMBER 1

DATA POINTS= 31

VALUES COMPUTED FROM RAW FIELD DATA

	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM	WATER DEPTH	AREA (Am)	Q (Qm)	% Q CELL
	RS	0 00	6 48			0.00		0 00	0.00	0.0%
1	G	6 60	6 54			0.00		0 00	0.00	0 0%
	W	7.80	7.11			0.00		0 00	0.00	0 0%
		8.50	7.24	0 15	0.16	0 71	0.15	0.09	0.01	0 2%
		9 00	7.23	0.15	0.21	0 50	0.15	0.08	0.02	0.3%
		9 50	7.28	0.15	0 39	0 50	0 15	0.08	0.03	0.5%
		10.00	7.30	0 20	1 18	0.50	0 20	0.10	0 12	1.9%
		10.50	7 32	0 20	1 22	0.50	0 20	0 10	0 12	2.0%
		11 00	7 39	0 25	1.76	0 50	0.25	0 13	0.22	3.6%
		11 50	7 21	0.10	2.48	0 53	0.10	0 05	0 12	2 0%
		12 00	7.19	0.05	0.41	0 50	0 05	0 03	0.01	0.2%
		12.50	7.32	0 20	1 86	0.52	0 20	0.10	0 19	3.0%
		13 00	7 39	0 25	2.91	0.50	0 25	0.13	0.36	5 9%
		13 50	7.39	0.30	1.51	0 50	0.30	0 15	0.23	3.7%
		14.00	7 46	0 35	1 63	0.50	0 35	0 18	0 29	4.6%
		14 50	7.43	0.35	1.14	0.50	0.35	0 18	0 20	3 2%
		15 00	7 56	0 45	2 90	0.52	0 45	0 23	0.65	10 6%
		15 50	7 62	0 50	3.40	0 50	0 50	0.25	0 85	13.8%
		16.00	7 62	0 50	2.11	0 50	0 50	0 25	0 53	8.6%
		16 50	7.54	0 40	2.24	0 51	0 40	0 20	0.45	7 3%
		17.00	7.33	0 20	1 41	0 54	0.20	0.10	0 14	2.3%
		17 50	7.32	0 20	2 11	0 50	0.20	0.10	0 21	3 4%
		18 00	7 45	0 35	2 00	0.52	0 35	0 18	0 35	5.7%
		18 50	7.41	0.30	2 18	0 50	0 30	0 15	0.33	5.3%
		19 00	7.36	0 25	2 18	0.50	0.25	0 13	0.27	4.4%
		19.50	7.56	0.45	1.70	0.54	0 45	0.23	0 38	6 2%
		20 00	7.43	0.25	0 70	0 52	0 25	0 13	0.09	1.4%
		20 50	7 30	0 20	0.00	0.52	0.20	0 10	0.00	0.0%
	W	21 00	7 12			0 53		0.00	0.00	0.0%
1	G	22.60	6.44			0 00		0 00	0 00	0.0%
	LS	25.40	6.58			0.00		0 00	0 00	0 0%
	TOTALS ----------					13.47	0.5 (Max)	3 39	6.16	100.0%

Manning's n = 0.0461
Hydraulic Radius= 0.251629296

STREAM NAME. Mesa Creek
XS LOCATION 500 ft. us from Wymer Diversion
XS NUMBER 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	3 39	3.40	0.3%
6 87	3.39	6.84	101 7%
6.89	3.39	6 55	93.3%
6 91	3 39	6.27	85.0%
6.93	3.39	5.99	76 6%
6.95	3.39	5 71	68.4%
6.97	3 39	5.43	60.2%
6.99	3.39	5.15	52 0%
7 01	3.39	4.88	43.9%
7.03	3 39	4 61	35 9%
7.05	3.39	4 33	27.9%
7 07	3 39	4.07	19 9%
7.08	3.39	3 93	16.0%
7.09	3 39	3.80	12 0%
7.10	3.39	3.66	8.1%
7.11	3.39	3.53	4 2%
7 12	3 39	3.40	0 3%
7.13	3.39	3.27	-3.6%
7 14	3.39	3 14	-7.4%
7.15	3 39	3.01	-11.3%
7.16	3.39	2 88	-15.1%
7 17	3.39	2 75	-18 9%
7.19	3.39	2.50	-26 4%
7.21	3.39	2.25	-33.7%
7 23	3 39	2.01	-40.6%
7.25	3.39	1.79	-47.2%
7.27	3 39	1 58	-53.4%
7 29	3.39	1.38	-59.3%
7.31	3.39	1.19	-64.9%
7.33	3 39	1.01	-70.1%
7 35	3 39	0.86	-74 7%
7.37	3 39	0.71	-78 9%

WATERLINE AT ZERO
AREA ERROR = 7.116

STREAM NAME Mesa Creek
XS LOCATION 500 ft us from Wymer Diversion
XS NUMBER 1

Constant Manning's n

STAGING TABLE

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

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG DEPTH (FT)	MAX DEPTH (FT)	AREA (SQ FT)	WETTED PERIM (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG VELOCITY (FT/SEC)
"GL"	6 54	16 56	0 71	1 08	11 74	17 08	100 0%	0 69	41 73	3 55
	6 57	15 94	0 71	1 05	11 33	16 44	96 2%	0 69	40 30	3 56
	6 62	15 43	0 68	1 00	10 55	15 91	93 1%	0 66	36 57	3 47
	6 67	15 20	0 64	0.95	9 78	15 67	91 7%	0 62	32 59	3 33
	6 72	14 98	0 60	0 90	9 03	15 42	90 3%	0.59	28 81	3 19
	6 77	14 76	0 56	0 85	8 28	15 18	88 9%	0 55	25 23	3 05
	6 82	14 54	0 52	0 80	7 55	14 94	87 4%	0 51	21 86	2 90
	6 87	14 31	0 48	0 75	6 83	14 69	86 0%	0 46	18 69	2 74
	6 92	14 09	0 43	0 70	6 12	14 45	84 6%	0 42	15 74	2 57
	6 97	13 87	0 39	0 65	5 42	14 20	83 1%	0 38	13 01	2 40
	7 02	13 64	0 35	0 60	4 73	13 96	81 7%	0 34	10 50	2 22
	7 07	13 42	0 30	0 55	4 06	13 71	80 3%	0 30	8 21	2 02
"WL"	7.12	13 18	0 26	0 50	3 39	13 45	78 7%	0 25	6 17	1 82
	7 17	12 77	0 21	0 45	2 74	13 03	76 3%	0.21	4 42	1 61
	7 22	11 75	0 18	0 40	2 12	11 99	70 2%	0 18	3 05	1 44
	7 27	10 29	0 15	0 35	1 57	10 50	61 5%	0 15	2 02	1 29
	7 32	8 77	0 12	0 30	1 09	8 96	52 4%	0 12	1 23	1 12
	7 37	6 83	0 10	0 25	0 71	6 98	40 9%	0.10	0 70	0 99
	7 42	4 59	0 09	0 20	0 43	4 70	27 5%	0 09	0 39	0 92
	7 47	2 64	0 09	0 15	0 25	2 70	15 8%	0 09	0 23	0 93
	7 52	2 01	0 07	0 10	0 13	2 04	12 0%	0 06	0 10	0 73
	7 57	1 29	0 04	0 05	0 05	1 30	7 6%	0 04	0 02	0 51
	7 62	0 56	0 00	0 00	0 00	0 56	3 3%	0 00	0 00	0 12

Criteria

Flow Range: 2.5 - 15.4 cfs

1. 0.2 ave. depth:

0.18	3.05 cfs	$\frac{0.02}{0.03} = \frac{x}{1.37} = 0.913$
0.2	x	
0.21	4.42 cfs	

x = 3.96 cfs

2. 50% wetted perimeter:

40.9%	0.7 cfs	
50	x	$= \frac{9.1}{11.5} = \frac{x}{0.53} = 42$
52.4%	1.23 cfs	

x = 1.12 cfs

3. 1 ft/sec ave. velocity:

0.99	0.7	$= \frac{0.01}{0.13} = \frac{x}{0.53}$
1	x	
1.12	1.23	

x = 0.74 cfs

STREAM NAME Mesa Creek
XS LOCATION 500 ft us from Wymer Diversion
XS NUMBER 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	6 16	cfs
CALCULATED FLOW (Qc)=	6 17	cfs
(Qm-Qc)/Qm * 100 =	-0 1	%
MEASURED WATERLINE (WLm)=	7 12	ft
CALCULATED WATERLINE (WLc)=	7 12	ft
(WLm-WLc)/WLm * 100 =	0 0	%
MAX MEASURED DEPTH (Dm)=	0 50	ft
MAX CALCULATED DEPTH (Dc)=	0 50	ft
(Dm-Dc)/Dm * 100	-0 9	%
MEAN VELOCITY=	1 82	ft/sec
MANNING'S N=	0 046	
SLOPE=	0 02	ft/ft
4 * Qm =	2 5	cfs
2 5 * Qm=	15 4	cfs

RECOMMENDED INSTREAM FLOW

FLOW (CFS)	PERIOD
3.96	winter

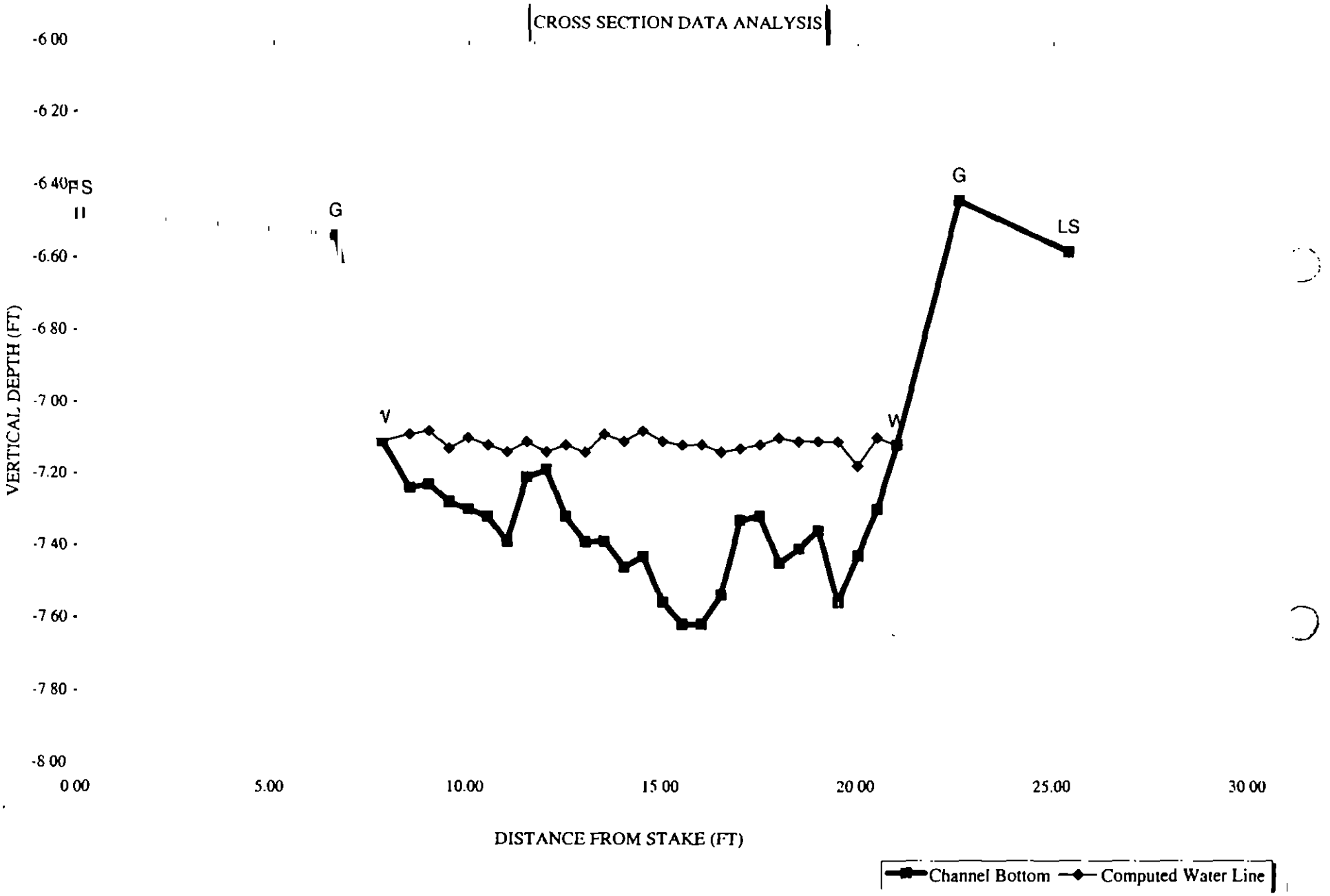
RATIONALE FOR RECOMMENDATION

RECOMMENDATION BY AGENCY DATE

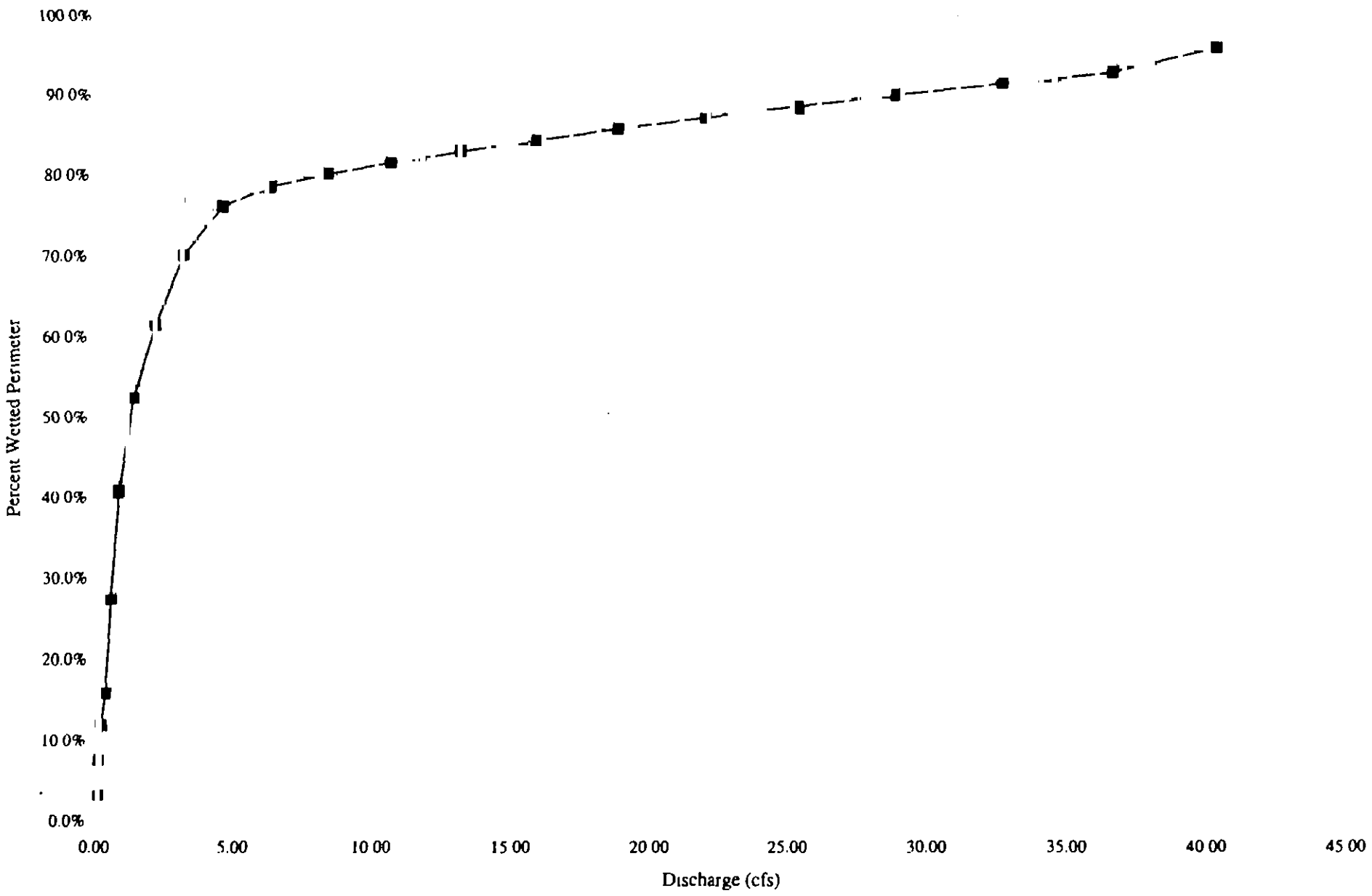
CWCB REVIEW BY DATE

2 criteria out of flow range.

Mesa Creek


CROSS SECTION DATA ANALYSIS
-6 00
-6 20
-6 40
-6.60
-6 80
-7 00
-7.20
-7 40
-7 60
-7 80
-8 00
VERTICAL DEPTH (FT)
FS
G
V
W
G
LS
0 00
5.00
10.00
15 00
20 00
25.00
30 00
DISTANCE FROM STAKE (FT)
Channel Bottom
Computed Water Line

Percent Wetted Perimeter vs. Discharge



CDOW STREAM SURVEY (1991 RE[illegible]ION)

LEVEL 2: FIELD SURVEY SUMMARY

STREAM: Mesa Creek SEC#: _____ WATER CODE: 47060 CDOW REGION: _____

SURVEYORS: D. Smith Klousmith Jim Fergusson DATE OF SURVEY: 5/11/2000

SURVEY LOCATION: T 49N R 18W S 2 ELEVATION: 4900 STATION #: 1

UTM ZONE: _____ UTM X: UTM Y:

LOCATION DESCRIPTION: just downstream of S. Fork confluence

STREAM FLOW PROFILE (Y or N): N IF YES-DATE AND TYPE

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: 300 (FEET)

AVG. WIDTH: 12 (FEET) TOTAL STATION AREA: (ACRES)

FLOW (CFS) AT TIME OF SURVEY: 11 cfs METHOD: cross section

LIMITING FACTORS TO FISHERY: low flows, sediments

COMMENTS:

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

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.
BHS	4	26	9-34	253	8-411	40%			
SPD	5	6.7	6.7-8.5	4.8	3-8	50%			
RBT	1	14.5	14.5	31	31	10%			

COLORADO DIVISION OF WILDLIFE

Page __ of __

Length-Weight Data File

Stream Name Mesa Creek

CDOW Water Code _____ Date 9/6/2000

Gear Electroshock

Effort _____ Station No. _____

Species Code	Total Length	Weight	Species Code	Total Length	Weight	Species Code	Total Length	Weight
BHS	20 cm	250 gr.	SPD	8.5 cm	8 gr.			
BHS	34 cm	411 gr.	SPD	7 cm	4 gr.			
BHS	32 cm	344 gr.	SPD	6 cm	5 gr.			
BHS	8.3 cm	8 gr.	SPD	6.2 cm	4 gr.			
			SPD	5.7 cm	2 gr.			
RBT	14.5 cm	31 gr.						

Comments: Area was just downstream of confluence with the South Fork

Bob Kauffmer
Joe Miller

C1_____ C2_____

Page 1 of 1
R.A. URA
County Montrose

FISH SAMPLING FORM

Sample Site Mesa Creek
Legal Description T. 45N, R. 18W, Sec. 2
Sampling Method Dip Net
Length of Reach Ft. Average Width_____Ft. Acres_____
Maximum Depth_____Ft. Minimum Depth_____Ft. Average Depth_____Ft.

Date
River Mile

Species	Length (cm.)	Weight (gm.)	Sex	Disposition	Notes

Water
Flow 2.15 c.f.s.
Temp RC °F
Conductivity 720

Shocker
Voltage_____
Pulse Width_____
Frequency_____
Amps
Seconds_____

Fish
Catch Per Unit Effort_____
Game Fish/lbs. per ac._____
Non Game Fish/lbs. per ac._____
Total Population
$N = \frac{(C1)^2}{C1-C2}$ =

Comments Approximately 30 ½" to 4" suckers were found in each of the 2 pools. We did not electroshock at this site due to the entire fish population being composed of non-game fish. Locating these fish will allow us to strike for an instream flow right.

STREAM : MESA CREEK
DATE : 7/12/90

	LOCATION *
TIME :	3:30 P.M.
H2O TEMP. °C :	30
°F :	86
COND. (UMHOS/CM @20°C) :	H2O
FLOW (CFS) :	~0.15

COMMENTS: - APPROXIMATELY 30 +/- 2" SUCKERS IN EACH OF 2 POOLS. SEE PHOTO

- FOLIAGE AROUND
- SINCE NORTH FORK MESA CREEK IS CONTRIBUTING ALL FLOW TO MESA CREEK, H2O INFO APPLIES TO IT AS WELL.

* IMMEDIATELY DOWNSTREAM FROM CONFLUENCE WITH NORTH FORK / SOUTH FORK MESA CREEK.

T48N R13W SEC 2.

AD = Above Diversion CDOW STREAM SURVEY (1991 REGION)
BD = Below Diversion LEVEL 2: FIELD SURVEY SUMMARY

STREAM: Mesa Creek SEC#: — WATER CODE: 47060 CDOW REGION: SW
SURVEYORS: D. Smith, H Metz, Brent Smith DATE OF SURVEY: 10 June 96
SURVEY LOCATION: T 48N R 18W S 2 ELEVATION: 4,915 STATION #: —
UTM ZONE: 12 UTM X: 690292 UTM Y: 4257850
LOCATION DESCRIPTION: .25 miles downstream of the confluence of N.F.K. & S.F.K.

STREAM FLOW PROFILE (Y or N): Y IF YES-DATE AND TYPE R-2 Cross Sag Type
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: Total 450' (FEET)
AVG. WIDTH: 10.7' (AD) 6.7' (BD) (FEET) TOTAL STATION AREA: .10 (AD) .02 (BD) (ACRES)
FLOW (CFS) AT TIME OF SURVEY: ~1 cfs (AD) ~.25 cfs (BD) METHOD: Visual
LIMITING FACTORS TO FISHERY: A 1. 11. 14. 12 : B 2 : C 1
COMMENTS: One ~10" RBT was ID'd but not captured below the diversion.
Dace were not individually weighed or measured.

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
DAC																									

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.
Above Diversion	DAC	25	—	—	—	—	100 %	1.2	950	—
Below Diversion	DAC	38	—	—	—	—	100 %	11.0	1,900	—

COLORADO DIVISION OF WILDLIFE

Page __ of __

Length-Weight Data File

Stream Name Mesa Creek

CDOW Water Code 47060 Date 10 June 96

Gear Electroshocker

Effort —

Station No. —

	Species Code	Total Length	Total Weight g	Species Code	Total Length	Weight	Species Code	Total Length	Weight
Above Diversion	DAC	—	55						
Below Diversion	DAC	—	98						

Comments:

APPENDIX – C
Water Availability Analysis

Colorado Water Conservation Board

Estimation of Natural Streamflow Characteristics

Based upon USGS WRI 85-4066

By: Francis Rentiers and Mark Mause | Date: 6/30/2005

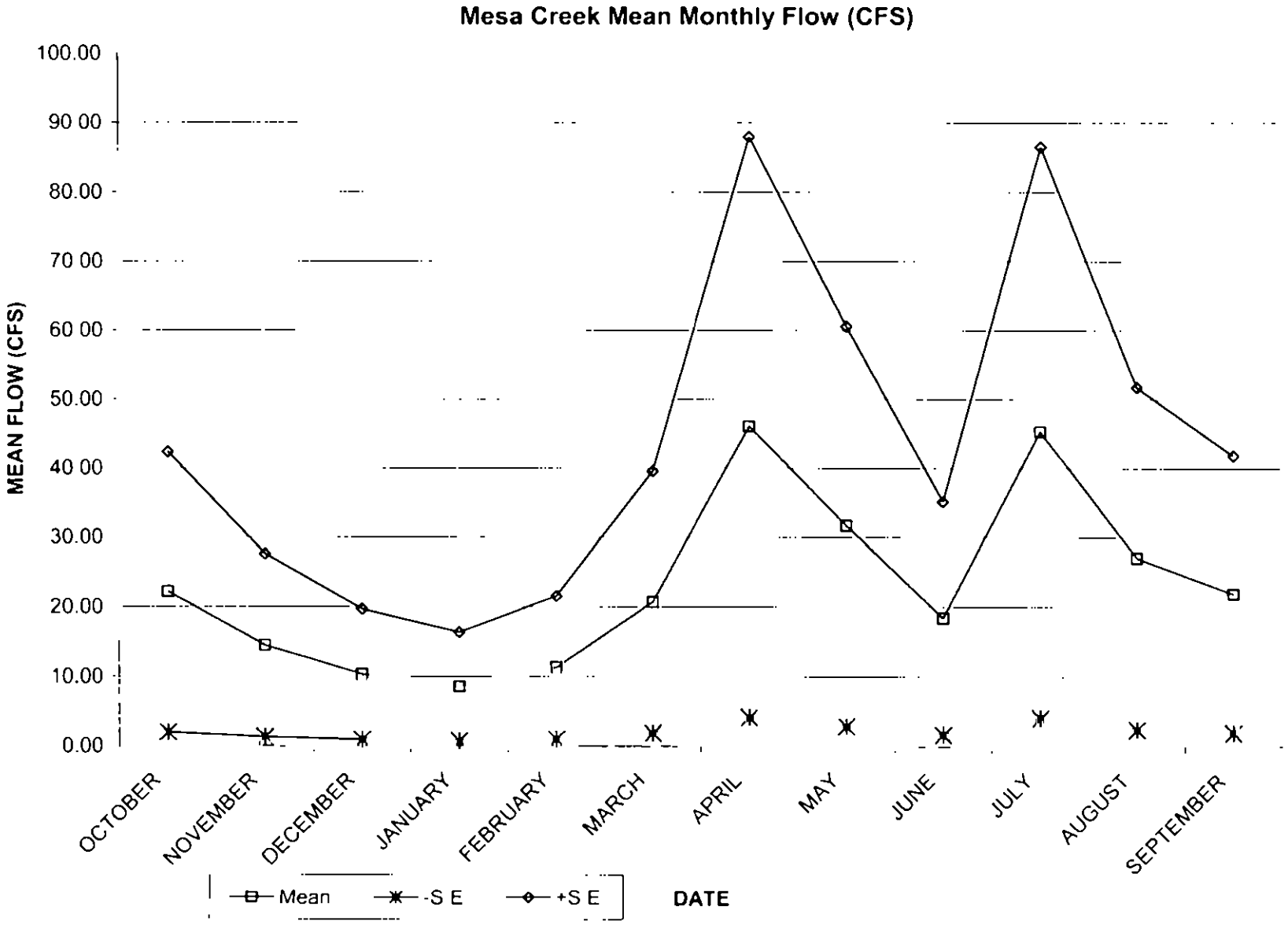
STREAM	STREAM NAME	BASIN AREA (MI^2)	102 72	102 72
COUNTY	COUNTY NAME	MEAN ELEV (FEET)	6842	1 842
REGION	2	MEAN PPT (INCHES)	19 5	9 5
1=MT,2=SW,3=NW,4=RG		MEAN SLOPE (FT/FT)	0 2205	0 2205
CROSS-SECTION				
LOCATION				

AVE ANNUAL FLOW (CFS)

PERCENT DURATION	FLOW (CFS)
90	3 79
70	8 29
50	15 44
25	46 54
10	140 40

2-YR 7 DAY LOW FLOW (CFS)	5 02
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	22 18	2 00	42 36
NOVEMBER	14 45	1 30	27 61
DECEMBER	10 31	0 93	19 69
JANUARY	8 56	0 77	16 36
FEBRUARY	11 29	1 02	21 56
MARCH	20 71	1 86	39 56
APRIL	46 06	4 15	87 98
MAY	31 72	2 85	60 58
JUNE	18 41	1 66	35 16
JULY	45 30	4 08	86 51
AUGUST	27 08	2 44	51 72
SEPTEMBER	21 89	1 97	41 80


Mesa Creek Mean Monthly Flow (CFS)
MEAN FLOW (CFS)
100.00
90 00
80.00
70 00
60 00
50.00
40 00
30.00
20.00
10.00
0.00
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
Mean
-S E
+S E
DATE

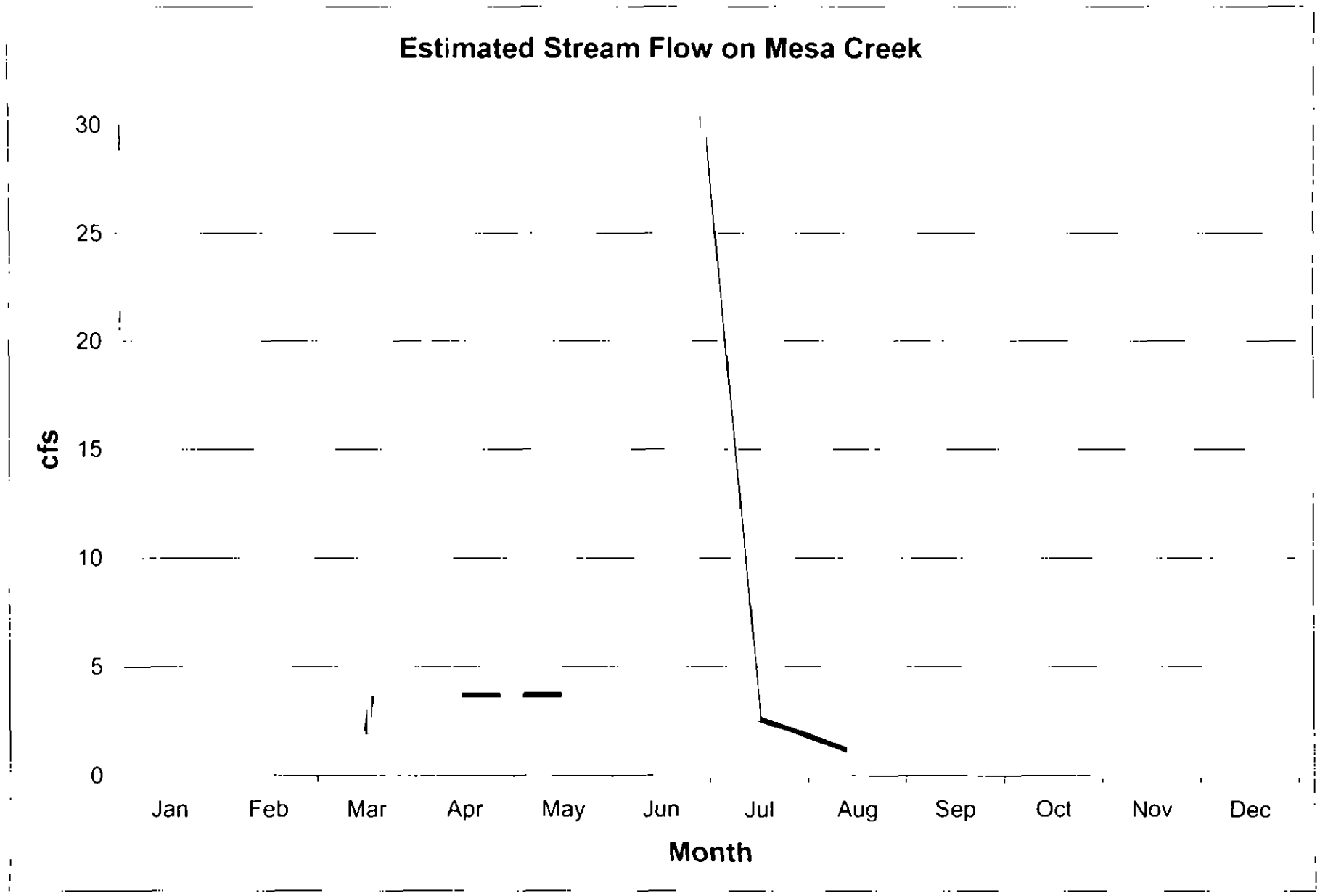
Water Yield Estimates from Equation for SW Region as defined in USGS WRI-85-4086

Watershed **Mesa Creek**
Location.

Drainage Area Square Miles	102 2
Mean Basin Elev Ft	6847
Mean Basin Elev -5000 ft/1000 ft	1 847

Mean Annual Flow cfs	17 172
Mean Annual Yield AF	12432

	%of flow	AF/Month	AF/Day	Mean Monthly flow cfs	Recommended flow
Jan	0 0032	39 790	1 284	0 648	
Feb	0 0065	80 824	2 787	1 408	
Mar	0 0100	124 344	4 011	2 026	
Apr	0 1470	1827 858	60.929	30 772	3 7
May	0 5541	6888 663	222 215	112 230	3 7
Jun	0 2461	3058 865	101 962	51.496	
Jul	0 0130	161 647	5 214	2 634	
Aug	0 0050	62 172	2 006	1 013	
Sep	0 0040	49 738	1 658	0 837	
Oct	0 0039	48 494	1 564	0 790	
Nov	0 0037	46 007	1 534	0 775	
Dec	0 0035	43 520	1 404	0 709	


Estimated Stream Flow on Mesa Creek
30
25
20
15
10
5
0
cfs
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

Uncompahgre Plateau and Glade Park Annual Hydrograph Estimation

Although there is a substantial amount of streamflow gage data available for the Uncompahgre Plateau and Glade Park, most of this data is severely impacted by diversions and irrigation use. This situation makes it difficult to estimate the natural flow regime for the watersheds on the Plateau. Without specific gage data to evaluate the next best approach is 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 the Uncompahgre Plateau and Glade Park. The equation that applies is as follows:

$$Q_{ann} = 9.7 \times 10^{-2} (A^{0.888})(F_b^{1.74})(1.98)(365)$$

Q_{ann} = mean annual volume in acre - feet

A= drainage area in square miles

F_b = (mean basin elevation –5000)/1000

In order to verify the validity of this equation, the results were checked against gages that provided estimates of the natural annual discharge. Three gages were located that provide a diversion free estimate of a natural hydrograph.

Spring Creek near Beaver Hill: Period of record; 1978 -1980

Potter Creek near Olathe: Period of record; 1980

Hay Press Creek above Fruita Reservoir #3: Period of record, 1984 – 1987

Using the period of record for each of the gages a mean annual volume was calculated and compared to the results obtained using the regional equation.

Spring Creek near Beaver Hill:

Mean annual gage volume: 11,100 ac-ft

Annual volume regional equation. 11,300 ac-ft

Potter Creek near Olathe.

Mean annual gage volume: 5,000 ac-ft

Annual volume regional equation: 6,000 ac-ft

Hay Press Creek above Fruita Reservoir #3:

Mean annual gage volume: 575 ac-ft

Annual volume regional equation 625 ac-ft

The largest comparative difference in these gages is Potter Creek at about 17%. This is well within the standard error of the regional equation. However, the gage record for each of these creeks is limited. Therefore, two other creeks with a longer representative period of record were chosen to compare with the regional equations.

Escalante Creek near Delta Period of record; 1977 – 1988

Tabeguache Creek near Nucla: Period of record; 1947 –1952

Both of these gages are affected by diversions and irrigation. Using data obtained from Colorado River Decision Support Systems (Colorado Water Conservation Board, Department of Water Resources) that reflects diversion volumes, along with local estimates of irrigated acreage and return flows, the annual gage volumes were adjusted for these variations to estimate a natural annual volume.

Escalante Creek near Delta:

Mean annual adjusted gage volume: 84,000 ac-ft

Annual volume regional equation: 75,000 ac-ft

Tabeguache Creek near Nucla:

Mean annual adjusted gage volume: 15,000 ac-ft

Annual volume regional equation: 13,900 ac-ft

The gage data-regional equation comparison between these two gages coupled with the results from Potter Creek, Hay Creek, and Spring Creek indicates that the regional

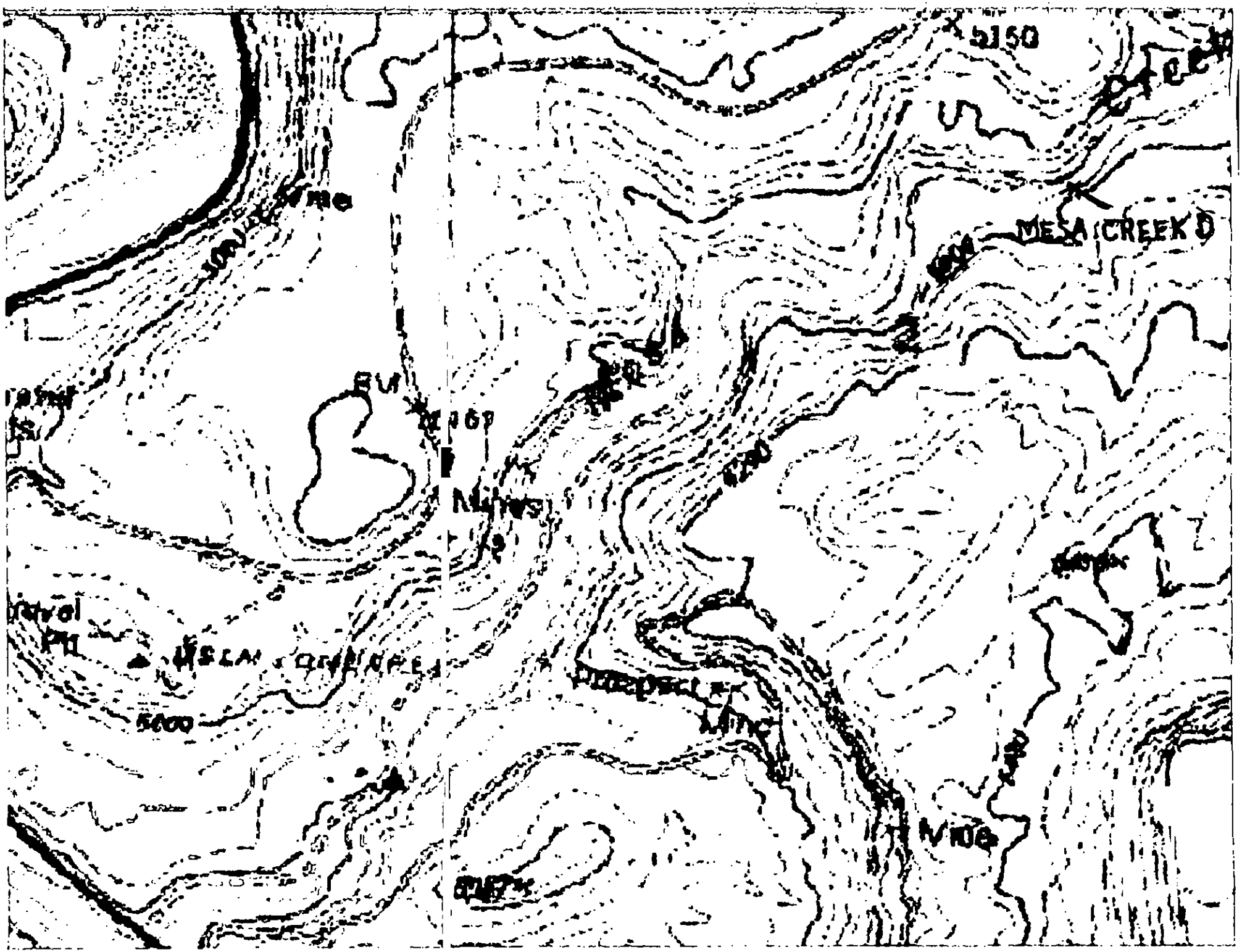
equations apparently provide a reasonably accurate estimate of the total annual flow volume.

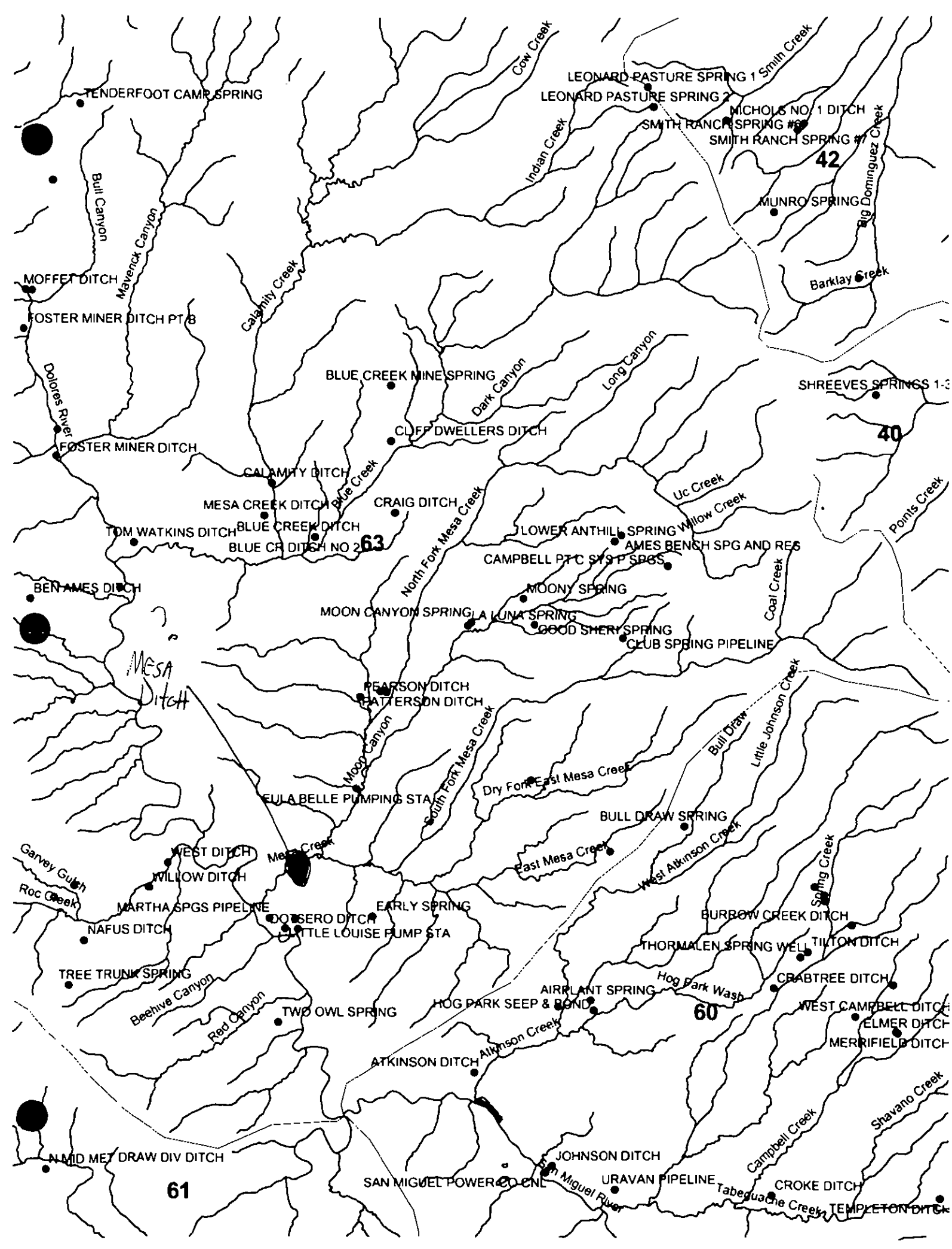
Once total annual volumes can be estimated, the question then becomes how to allocate this volume over a 12-month period. A mean annual monthly distribution was calculated using the annual hydrographs from Potter Creek, Spring Creek, and Hay Press Creek. These three creeks were used since they are the best unaltered representations of a natural plateau flow regime. The monthly distribution of volume based on a percentage of annual total volume is as follows:

January 0.32
February. 0.6
March. 1.0
April: 14.7
May: 55.4
June. 24.6
July. 1.3
August: 0.55
September. 0.45
October: 0.39
November: 0.35
December. 0.34

The regional equation with the proper input values was used to generate estimates of annual volumes for the following Uncompahgre Plateau and Glade Park watersheds. These annual volumes were then distributed according to the monthly distributions above. The distribution of water volumes across the months of the year was translated into mean monthly flows in the following spreadsheets.

APPENDIX – D
Diversion Records


5150
MESA CREEK D
5000


TENDERFOOT CAMP SPRING
Bull Canyon
Maverick Canyon
MOFFET DITCH
FOSTER MINER DITCH PT 8
Dolores River
FOSTER MINER DITCH
Calamity Creek
CALAMITY DITCH
MESA CREEK DITCH
BLUE CREEK DITCH
BLUE CR DITCH NO 2
TOM WATKINS DITCH
BEN AMES DITCH
MESA DITCH
Cow Creek
LEONARD PASTURE SPRING 1
LEONARD PASTURE SPRING 2
Indian Creek
Smith Creek
NICHOLS NO. 1 DITCH
SMITH RANCH SPRING #6
SMITH RANCH SPRING #7
42
MUNRO SPRING
Big Dominguez Creek
Barklay Creek
BLUE CREEK MINE SPRING
Dark Canyon
Long Canyon
CLIFF DWELLERS DITCH
SHREEVES SPRINGS 1-3
40
Blue Creek
CRAIG DITCH
63
North Fork Mesa Creek
Uc Creek
Willow Creek
Points Creek
LOWER ANTHILL SPRING
AMES BENCH SPG AND RES
CAMPBELL PT C SPG
MOONY SPRING
MOON CANYON SPRING
LA LUNA SPRING
GOOD SHERY SPRING
CLUB SPRING PIPELINE
Coal Creek
PEARSON DITCH
PATTERSON DITCH
Moon Canyon
South Fork Mesa Creek
Dry Fork East Mesa Creek
Bull Draw
Little Johnson Creek
EULA BELLE PUMPING STA
BULL DRAW SPRING
Garvey Gulch
WEST DITCH
Mesa Creek
WILLOW DITCH
Roc Creek
MARTHA SPGS PIPELINE
EARLY SPRING
DOTSERO DITCH
LITTLE LOUISE PUMP STA
NAFUS DITCH
East Mesa Creek
West Atkinson Creek
Spring Creek
BURROW CREEK DITCH
THORMALEN SPRING WELL
TILTON DITCH
TREE TRUNK SPRING
Beehive Canyon
Red Canyon
TWO OWL SPRING
AIRPLANT SPRING
HOG PARK SEEP & POND
Hog Park Wash
60
CRABTREE DITCH
WEST CAMPBELL DITCH
ELMER DITCH
MERRIFIELD DITCH
Atkinson Creek
ATKINSON DITCH
Shavano Creek
Campbell Creek
N MID MET DRAW DIV DITCH
61
JOHNSON DITCH
SAN MIGUEL POWER CO CNL
San Miguel River
URAVAN PIPELINE
Tabeguache Creek
CROKE DITCH
TEMPLETON DITCH

Structure Name: MESA CREEK DITCH **Water District:** 63 **ID Number:** 542

Source	MESA CREEK								Acres Irrigated	86
Location	Q160	Q40	Q10	Section	Twnshp		Range	PM	CIU	A
	NE	SW	NW	2	49	N	18 W	N		

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

UTM Coordinates (NAD 83) Northing (UTM y) 4273088 7 Easting (UTM x) 165310 3 Spotted from PLSS quarters

Latitude/Longitude (decimal degrees) 38 5433 -108 8399

Measuring Device/Recorder

Contact	CURT W. WEIMER(AGENT)	Phone	
Address	16825 P8 ROAD	Cell Phone	
		E-mail	
	NATURITA, CO 81422		

Water Rights Summary	Total Decreed Rate(s)	Abs	7 5000	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	CA4952	2/11/1939	5/1/1909	30079 21670	0	57	2 5 C	S	1		MESA CR, LEGAL IN ERROR
2	CA4952	2/11/1939	2/10/1939	32547 00000	0		5 C	S	1		SEE CA4952 FOR STIP EXCESS WATER ONLY P131, I

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	04/18	10/15	181	3	0	0	0	0	0	70 9	176	157	122	95 2	66 3	25 3	714
1979	04/29	10/02	157	2 95	0	0	0	0	0	10 9	171	129	85.3	61 5	91 0	6 67	557
1980	05/09	10/07	152	3 25	0	0	0	0	0	0	139	148	111	66 6	66 2	14 6	548
1981	04/10	10/06	180	3 5	0	0	0	0	0	114	179	147	136	171	74 6	13 7	837
1982	05/03	10/28	179	3 /5	0	0	0	0	0	0	203	141	172	126	99 0	91 6	836
1983	04/29	10/31	186	5	0	0	0	0	0	11 9	259	215	171	155	126	141	1082
1984	11/22	10/17	331	5	28 6	98 4	98 4	92 0	98 4	98 0	260	223	183	137	139	70 2	1528
1985	11/23	09/19	287	5	25 4	98 4	98 4	88 9	98 4	56 3	261	228	184	182	53 1	0	1376
1986	04/22	10/18	180	3 1	0	0	0	0	0	53 6	185	180	141	129	124	71 4	886
1987	04/28	08/27	122	3	0	0	0	0	0	17 9	184	177	182	160	0	0	724
1988	05/10	09/07	121	3 6	0	0	0	0	0	0	139	158	142	147	31 2	0	619
1989	04/19	08/27	131	4	0	0	0	0	0	92 2	183	165	207	51 2	0	0	700
1990	04/06	06/17	73	4 3	0	0	0	0	0	201	178	37 6	0	0	0	0	418
1991	04/27	07/22	87	4	0	0	0	0	0	23 8	224	138	72 4	0	0	0	459
1992	04/27	08/30	117	5	0	0	0	0	0	39.7	268	107	156	52 4	0	0	625
1993	04/07	09/27	162	5	0	0	0	0	0	214	305	255	198	156	130	0	1262
1994	04/06	07/04	76	5	0	0	0	0	0	205	307	93 2	15 9	0	0	0	622
1995	04/17	08/29	135	5	0	0	0	0	0	117	307	264	214	149	0	0	1053
1996	04/15	08/25	133	5	0	0	0	0	0	144	307	241	208	103	0	0	1007
1997	04/14	09/22	162	5	0	0	0	0	0	120	297	297	215	184	110	0	1225
1998	04/17	09/20	157	5	0	0	0	0	0	97 2	295	297	243	173	79 3	0	1187
1999	05/03	09/21	142	5	0	0	0	0	0	0	285	245	201	156	83 3	0	973
2000	05/02	08/10	101	4	0	0	0	0	0	0	238	215	139	19 8	0	0	613
2001	04/27	08/05	101	4	0	0	0	0	0	31 7	244	197	161	24 8	0	0	661
2002	05/01	06/02	33	2	0	0	0	0	0	0	120	3 97	0	0	0	0	125
2003	04/21	06/27	68	3	0	0	0	0	0	59 5	165	120	0	0	0	0	346
2004	04/26	07/04	70	4	0	0	0	0	0	34 7	238	133	14 7	0	0	0	421
		Minimum		2	0	0	0	0	0	0	120	3 97	0	0	0	0	124
		Maximum		5	28 6	98 4	98 4	92 0	98 4	214	307	297	243	184	139	141	1528
		Average		4 0907	2 00	7 29	7 29	6 70	7 29	67 2	227	174	136	92 9	47 2	16 1	792

Structure Name: MESA CREEK DITCH **Water District:** 63 **ID Number:** 542

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1996		86	
1997		86	
1998		86	
1999		86	
2000		86	
2001		86	
2002		86	
2003		86	
2004		86	

Structure Name: PATTERSON DITCH **Water District:** 63 **ID Number:** 550

Source	MESA CREEK							*Acres Irrigated*	
Location	Q160	Q40	Q10	Section	Twnshp	Range	PM	*CIU*	A
	SE	NE	NE	19	49 N	17 W	N		

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

UTM Coordinates (NAD 83) *Northing (UTM y)* 4267622 6 *Easting (UTM x)* 168918 1 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees) 38 4955 -108 7960

Measuring Device/Recorder

Contact	CURT W. WEIMER(OWNER)			*Phone*			
Address	16825 P8 ROAD			*Cell Phone*			
				E-mail			
	NATURITA, CO 81422						

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	14 1200	*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	CA4952	2/11/1939	3/1/1915	30079 23800	0	73	2 5	C	S	1	MESA CR P163, P231
2	CA4952	2/11/1939	3/10/1915	30079 23809	0	74	1 2	C	S	1	MESA CR PATTERSON LONE TREE ENLT OF PATTEF
3	CA4952	2/11/1939	3/10/1915	30079 23809	0	74	1 04	C	S,C	1	MESA CR COND PATTERSON LONE TREE ENLT OF PATTERSON
6	W0140	2/11/1939	3/10/1915	30079 23809	0		1 04	C	S,CA	1	MESA CR PATTERSON LONE TREE ENL OF PATTERS DITCH
5	CA4952	2/11/1939	2/10/1939	32547 00000	0		2 08	C	S,C	1	COND PATTERSON LONE TREE ENL OF PATTERSON EXCESS ONLYP163,231
7	W0140	2/11/1939	2/10/1939	32547 00000	0		2 08	C	S,CA	1	EXCESS WATER WHEN AVAILABLE MESA CR TRIB DOLORES RIVER
4	CA4952	2/11/1939	2/10/1939	32547 00000	0		7 3	C	S	1	PATTERSON LONE TREE ENL OF PATTERSON DITCH EXCESS ONLY P163,231

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	04/19	07/10	83	2 5	0	0	0	0	0	59 5	138	94 4	12 9	0	0	0	306
1979	05/04	08/30	119	2 75	0	0	0	0	0	0	152	108	49 2	35 7	0	0	346
1980	05/23	08/21	91	2.6	0	0	0	0	0	0	46 4	133	49 0	26 4	0	0	255
1981	04/10	06/03	55	2 1	0	0	0	0	0	87 5	103	2 98	0	0	0	0	194
1982	05/03	08/05	88	2 15	0	0	0	0	0	0	115	60 5	60 7	7 93	0	0	245
1983	04/29	08/01	95	5	0	0	0	0	0	7 93	277	258	213	4 56	0	0	762
1984	04/30	08/06	99	5	0	0	0	0	0	3 97	179	252	190	17 9	0	0	645
1985	04/29	09/29	154	2 75	0	0	0	0	0	7 93	122	119	122	122	145	0	641
1986	04/22	09/11	143	3 25	0	0	0	0	0	53 6	191	176	143	90 5	20 7	0	675
1987	04/28	08/27	122	3 15	0	0	0	0	0	17 9	191	169	137	107	0	0	624
1988	05/10	08/14	97	4	0	0	0	0	0	0	140	144	99 5	27 8	0	0	412
1989	04/25	08/27	125	3 6	0	0	0	0	0	41 7	218	182	136	60 6	0	0	641
1990	04/03	06/24	83	4 5	0	0	0	0	0	230	193	58 6	0	0	0	0	482
1991	05/06	08/18	105	4 25	0	0	0	0	0	0	212	231	185	75 4	0	0	705
1992	04/17	08/30	128	5	0	0	0	0	0	138	271	112	139	87 1	0	0	750
1993	05/03	05/10	8	2 5	0	0	0	0	0	0	39 7	0	0	0	0	0	39 7
1994	04/08	07/10	83	4	0	0	0	0	0	167	245	75 4	22 3	0	0	0	511
1995	04/17	08/29	135	5	0	0	0	0	0	117	307	236	183	120	0	0	965
1996	04/15	08/25	133	4	0	0	0	0	0	99 2	245	210	148	90 2	0	0	795
1997	04/21	09/21	154	3 5	0	0	0	0	0	40 7	153	194	152	165	83 6	0	790
1998	04/20	09/21	155	3 5	0	0	0	0	0	49 1	181	181	152	157	89 6	0	813

Structure Name: PATTERSON DITCH **Water District:** 63 **ID Number:** 550

1999	04/19	09/21	156	3	0	0	0	0	0	47 6	151	156	140	146	83 3	0	726
2000	04/24	07/10	78	3	0	0	0	0	0	41 7	158	119	39 7	0	0	0	359
2001	04/27	07/19	84	3	0	0	0	0	0	23 8	154	119	57 5	0	0	0	355
2003	05/05	07/10	67	3 5	0	0	0	0	0	0	183	142	34 7	0	0	0	361
2004	04/19	06/06	49	3	0	0	0	0	0	53 6	169	11 9	0	0	0	0	235
		Minimum		2 1	0	0	0	0	0	0	39 7	0	0	0	0	0	39 7
		Maximum		5	0	0	0	0	0	230	307	258	213	165	145	0	964
		Average		3 4846	0	0	0	0	0	49 6	174	136	95 1	51 7	16 2	0	524

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1996		86	
1997		86	
1998		86	
1999		86	
2000		86	
2001		86	
2002	No water available	86	
2003		86	
2004		86	

Structure Name: PEARSON DITCH **Water District:** 63 **ID Number:** 551

Source	MESA CREEK									*Acres Irrigated.*	0
Location.	Q160	Q40	Q10	Section	Twnshp		Range		PM	*CIU.*	H
	SE	NW	SW	19	49	N	17	W	N		

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

UTM Coordinates (NAD 83) *Northing (UTM y)* 4267446 1 *Easting (UTM x)* 168298 5 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees) 38 4936 -108 8030

Measuring Device/Recorder

Contact CURT W. WEIMER(OWNER) *Phone*

Address 16825 P8 ROAD *Cell Phone*

E-mail

NATURITA, CO 81422

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	1 1700	*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	CA4952	2/11/1939	4/15/1933	30420 00000	0	96	0.39 C	S,C	1	MESA CR COND DCR P205
4	W0140	2/11/1939	4/15/1933	30420 00000	0		0 39 C	S,CA	1	MESA CR TRIB DOLORES RIVER
3	W0140	2/11/1939	2/10/1939	32547 00000	0		0 78 C	S,CA	1	MESA CR TRIB DOLORES RIVER EXCESS WATER WH AVAILABLE
2	CA4952	2/11/1939	2/10/1939	3254 / 00000	0		0 78 C	S,C	1	MESA CR COND DCR SEE CA4952 FOR STIP EXCES: ONLY P205

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	04/19	07/05	78	0 75	0	0	0	0	0	17 9	46 1	35 1	4 95	0	0	0	104
1979	05/04	07/05	63	1	0	0	0	0	0	0	49 1	39 2	2 48	0	0	0	90 7
1980	05/23	07/02	41	1	0	0	0	0	0	0	17 9	50 6	0 99	0	0	0	69 4
1981	04/10	05/31	52	1	0	0	0	0	0	41 7	37 9	0	0	0	0	0	79 5
1982	05/02	06/30	60	1 35	0	0	0	0	0	0	45 8	60 6	0	0	0	0	106
1983	05/06	08/01	88	2 5	0	0	0	0	0	0	128	133	104	1 98	0	0	369
1984	05/01	08/06	98	2 5	0	0	0	0	0	0	153	133	120	17 3	0	0	425
1985	05/10	07/07	59	5	0	0	0	0	0	0	183	141	13 9	0	0	0	339
1986	04/22	08/07	108	2	0	0	0	0	0	32 1	114	97 0	70 4	13 2	0	0	328
1987	04/28	08/17	94	2	0	0	0	0	0	9 52	119	102	53 4	15 9	0	0	300
1988	05/10	06/23	45	2	0	0	0	0	0	0	72 9	47 9	0	0	0	0	121
		Minimum		0 75	0	0	0	0	0	0	17 9	0	0	0	0	0	69 4
		Maximum		5	0	0	0	0	0	41 7	183	141	120	17 3	0	0	425
		Average		1 9182	0	0	0	0	0	9 20	88 1	76 5	33 7	4 39	0	0	212

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1996	Water available, but not taken	0	
1997	Structure not usable	0	
1998	Structure not usable	0	
1999	Structure not usable	0	
2000	Structure not usable	0	
2001	Structure not usable	0	
2002	Structure not usable	0	
2003	Structure not usable	0	

Structure Name: EULA BELLE PUMPING STA **Water District:** 63 **ID Number:** 582

Source	MESA CREEK								Acres Irrigated	0
Location	Q160	Q40	Q10	Section	Twnshp		Range	PM	CIU	I
	NE	SW	SW	31	49	N	17 W	N		

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

UTM Coordinates (NAD 83): Northing (UTM y) 4264585 6; Easting (UTM x) 168180 7; Spotted from PLSS quarters

Latitude/Longitude (decimal degrees): 38.4679; -108 8030

Measuring Device/Recorder

Contact: CURT W. WEIMER(OWNER) Phone.

Address: 16825 P8 ROAD Cell Phone.

E-mail

NATURITA, CO 81422

Water Rights Summary							
Total Decreed Rate(s)	Abs	2 0000	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	W2782	12/31/1976	3/10/1976	46090 00000	0		2 C	S		1		

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1996	Water available, but not taken	0	
1997	Water available, but not taken	0	
1998	Water available, but not taken	0	
1999	Water available, but not taken	0	
2000	Water available, but not taken	0	
2001	Water available, but not taken	0	
2002	Water available, but not taken	0	
2003	Water available, but not taken	0	

Structure Name: CEDAR TREE DITCH **Water District:** 63 **ID Number:** 516

Source:	MESA CREEK								*Acres Irrigated*	
Location	Q160	Q40	Q10	Section	Twnshp		Range	PM	*CIU*	U
	SW	NW	NW	20	49	N	17 W	N		

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

UTM Coordinates (NAD 83) *Northing (UTM y)* 4267597.6 *Easting (UTM x)* 169120 5 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees) 38 4953 -108 7937

Measuring Device/Recorder:

Contact	CURT W WEIMER(OWNER)	*Phone:*	
Address	16825 P8 ROAD	*Cell Phone*	
		E-mail	
	NATURITA, CO 81422		

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	5 4600	*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	CA4952	2/11/1939	3/19/1918	30079 24914	0	81	0 26 C	S	1	MESA CR
2	CA4952	2/11/1939	3/19/1918	30079 24914	0	81	1 56 C	S,C	1	MESA CR COND DCR P184
4	W0140	2/11/1939	3/19/1918	30079 24914	0		1 56 C	S,CA	1	MESA CR TRIB DOLORES RIVER
3	CA4952	2/11/1939	2/10/1939	32547 00000	0		0 52 C	S	1	MESA CR SEE CA4952 FOR STIP FLOOD WATER DEC P184
5	W0140	2/11/1939	2/10/1939	32547 00000	0		3 12 C	S,CA	1	EXCESS WATER WHEN AVAILABLE MESA CR TRIB DOLORES RIVER
6	CA4952	2/11/1939	2/10/1939	32547 00000	0		3 12 C	S,C	1	FLOOD WATER DECREE P184

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	04/19	07/05	78	3 25	0	0	0	0	0	47 6	182	121	4 96	0	0	0	357
1979	04/27	09/06	133	4	0	0	0	0	0	24 6	213	111	54.0	36 9	7 14	0	448
1980	05/22	09/04	106	2 1	0	0	0	0	0	0	41 7	114	59 9	27 0	3 57	0	246
1981	04/10	06/03	55	2	0	0	0	0	0	47 9	76 7	1 19	0	0	0	0	126
1982	05/01	07/29	75	2	0	0	0	0	0	0	105	14 9	57 5	0	0	0	178
1983	04/29	08/01	62	3	0	0	0	0	0	7 54	124	27 8	99 3	3 67	0	0	263
1984	04/30	07/31	78	3	0	0	0	0	0	3 77	124	69 4	173	0	0	0	371
1985	04/29	07/07	70	2 9	0	0	0	0	0	7 54	121	140	25 7	0	0	0	295
1986	04/22	08/07	108	2 2	0	0	0	0	0	35 7	126	97 8	85 9	13 9	0	0	360
1987	04/20	08/09	112	2	0	0	0	0	0	43 6	122	105	70 2	17 9	0	0	360
1988	04/13	06/06	34	2 5	0	0	0	0	0	55 5	69 4	29.8	0	0	0	0	155
		Minimum		2	0	0	0	0	0	0	41 7	1 19	0	0	0	0	125
		Maximum		4	0	0	0	0	0	55 5	213	140	173	36 9	7 14	0	448
		Average		2 6318	0	0	0	0	0	24 9	119	75 8	57 3	9 03	0 97	0	287

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1996	Water available, but not taken	0	
1997	Water taken in another structure	0	WATER TAKEN IN THE PATTERSON DITCH
1998	Water taken in another structure	0	WATER TAKEN IN THE PATTERSON DITCH
1999	Water taken in another structure	0	WATER TAKEN IN THE PATTERSON DITCH
2000	Water taken in another structure	0	WATER TAKEN IN THE PATTERSON DITCH
2001	Water taken in another structure	0	WATER TAKEN IN THE PATTERSON DITCH

2002	Water taken in another structure	0 WATER TAKEN IN THE PATTERSON DITCH
2003	Water taken in another structure	0 WATER TAKEN IN THE PATTERSON DITCH
2004	Water taken in another structure	0 WATER TAKEN IN THE PATTERSON DITCH ID 550

Structure Name: CRAIG DITCH **Water District:** 63 **ID Number:** 521

Source	MESA CREEK									*Acres Irrigated*	0
Location	Q160	Q40	Q10	Section	Twnshp		Range		PM	*CIU*	H
	NW	NW	NW	5	49	N	17	W	N		

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

UTM Coordinates (NAD 83) *Northing (UTM y)* 4273181 7 *Easting (UTM x)* 169369 9 *Spotted from PLSS quarters*

Latitude/Longitude (decimal degrees) 38 5456 -108 7935

Measuring Device/Recorder

Contact CURT W. WEIMER(OWNER) *Phone*

Address 16825 P8 ROAD *Cell Phone*

E-mail

NATURITA, CO 81422

Water Rights Summary	*Total Decreed Rate(s)*	*Abs*	5 0700	*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	CA4952	2/11/1939	11/24/1915	30079 24068	0	76	0 52 C	S	1	MESA CR
2	CA4952	2/11/1939	4/1/1932	30079 30041	0	94	1 17 C	S,C	1	MESA CR COND DCR P169
5	W2505	2/11/1939	4/1/1932	30079 30041	0		1 17 C	S,CA	1	CA 4952
6	W2506	2/11/1939	2/10/1939	32547 00000	0		2 34 C	S,CA	1	MESA CR COND DCR SEE CA 4952 FOR STIP FLOOD WATER DECREE
3	CA4952	2/11/1939	2/10/1939	32547 00000	0		1 04 C	S	1	MESA CR SEE CA4952 FOR STIP FLOOD WATER DE(P169
4	CA4952	2/11/1939	2/10/1939	32547 00000	0		2 34 C	S C	1	MESA CR COND DCR SEE CA4952 FOR STIP FLOOD WATER DECREE

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	04/18	07/10	84	1 65	0	0	0	0	0	31 8	101	66 5	12 9	0	0	0	213
1979	04/27	07/19	84	2 05	0	0	0	0	0	11 9	122	71 8	15 7	0	0	0	222
1980	05/23	07/21	60	2 05	0	0	0	0	0	0	36 6	104	25 0	0	0	0	166
1981	05/01	05/18	18	1	0	0	0	0	0	0	32 7	0	0	0	0	0	32 7
1982	05/03	05/25	23	0 75	0	0	0	0	0	0	34 2	0	0	0	0	0	34 2
1983	05/24	06/07	15	1	0	0	0	0	0	0	15 9	13 9	0	0	0	0	29 8
1984	05/21	05/31	11	1	0	0	0	0	0	0	21 8	0	0	0	0	0	21 8
1985	05/17	06/13	28	1	0	0	0	0	0	0	29 8	22 3	0	0	0	0	52 1
1986	05/05	06/10	37	2	0	0	0	0	0	0	104	17 9	0	0	0	0	122
1987	05/04	05/27	24	2	0	0	0	0	0	0	95 2	0	0	0	0	0	95 2
		Minimum		0 75	0	0	0	0	0	0	15 9	0	0	0	0	0	21 8
		Maximum		2 05	0	0	0	0	0	31 8	122	104	25 0	0	0	0	222
		Average		1 45	0	0	0	0	0	4 37	59 5	29 7	5 36	0	0	0	98 9

Diversion Comments

IYR	NUC Code	Acres Irrigated	Comments
1996	Water available, but not taken	0	
1997	Water available, but not taken	0	
1998	Water available, but not taken	0	
1999	Water available, but not taken	0	
2000	Water available, but not taken	0	
2001	Water available, but not taken	0	

2002	Water available, but not taken	0
2003	Water available, but not taken	0

Sorted by Water Right Name and Admin Number — WATER RIGHTS REPORT — Monday,
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WD	ID#	Water Right Name	Struct Type	#	Stream Name	Qty	Q-Q-Q	Sec	TS	Rng	PM	Use Codes	Decreed Amount	U	Adj Type	Adjudicatn Date	Prev Adj. Date	Approprn Date	O #	Admin Number	Phor Number	Court Case	Seq#	P A	Alter ID#
63	691	AMES BENCH SPG AND RES	4	6	MESA CREEK	39	NE SE NW	1	49 N	17 W	N	SW	0 0040		CS	12/31/1987	12/31/1986	01/26/1967	0	50038 42759		87CW0282	1		0
63	615	CAMPBELL PT C SYS P SPGS	5	6	MESA CREEK	39	SE	SW 6	49 N	16 W	N	189	0 2500		CS	12/31/1980	12/31/1979	06/01/1935	0	47481 31197		80CW0009	1		0
COLLECTION OF THREE SPGS TO ONE PT																									
63	516	CEDAR TREE DITCH	1	6	MESA CREEK	43	NW NW SW	20	49 N	17 W	N	1	0 2600		CS	02/11/1939	05/09/1932	03/19/1918	0	30079 24914	81	CA4952	1		0
MESA CR																									
63	516	CEDAR TREE DITCH	1	6	MESA CREEK	43	NW NW SW	20	49 N	17 W	N	1	1 5600		CS,C	02/11/1939	05/09/1932	03/19/1918	0	30079 24914	81	CA4952	2		0
MESA CR COND DCR P184																									
63	516	CEDAR TREE DITCH	1	6	MESA CREEK	43	NW NW SW	20	49 N	17 W	N	1	1 5600		CS,CA	02/11/1939	05/09/1932	03/19/1918	0	30079 24914		W0140	4		0
MESA CR TRIB DOLORES RIVER																									
63	516	CEDAR TREE DITCH	1	6	MESA CREEK	43	NW NW SW	20	49 N	17 W	N	1	0 5200		CS	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	3		0
MESA CR SEE CA4952 FOR STIP FLOOD WATER DECREE P184																									
63	516	CEDAR TREE DITCH	1	6	MESA CREEK	43	NW NW SW	20	49 N	17 W	N	1	3 1200		CS,CA	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		W0140	5		0
EXCESS WATER WHEN AVAILABLE MESA CR TRIB DOLORES RIVER																									
63	516	CEDAR TREE DITCH	1	6	MESA CREEK	43	NW NW SW	20	49 N	17 W	N	1	3 1200		CS,C	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	6		0
FLOOD WATER DECREE P184																									
63	5003	CHEROKEE SHAFT WELL	2	6	MESA CREEK	39	NW SE	31	49 N	17 W	N	48	0 1600		CS	12/31/1971	12/31/1970	01/01/1954	0	44194 37986		W0326	1		0
63	580	CLUB SPRING PIPELINE	4	6	MESA CREEK	39	NW SW NE	13	49 N	17 W	N	89	0 1500		CS	12/31/1976	12/31/1975	04/01/1973	0	46020 45016		W2831	1		0
63	521	CRAIG DITCH	1	6	MESA CREEK	43	NW NW NW	5	49 N	17 W	N	1	0 5200		CS	02/11/1939	05/09/1932	11/24/1915	0	30079 24068	76	CA4952	1		0
MESA CR																									
63	521	CRAIG DITCH	1	6	MESA CREEK	43	NW NW NW	5	49 N	17 W	N	1	1 1700		CS,C	02/11/1939	05/09/1932	04/01/1932	0	30079 30041	94	CA4952	2		0
MESA CR COND DCR P169																									
63	521	CRAIG DITCH	1	6	MESA CREEK	43	NW NW NW	5	49 N	17 W	N	1	1 1700		CS,CA	02/11/1939	05/09/1932	04/01/1932	0	30079 30041		W2505	5		0 CA
4952																									
63	521	CRAIG DITCH	1	6	MESA CREEK	43	NW NW NW	5	49 N	17 W	N	1	2 3400		CS,CA	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		W2506	6		0
MESA CR COND DCR SEE CA 4952 FOR STIP FLOOD WATER DECREE																									
63	521	CRAIG DITCH	1	6	MESA CREEK	43	NW NW NW	5	49 N	17 W	N	1	1 0400		CS	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	3		0
MESA CR SEE CA4952 FOR STIP FLOOD WATER DECREE P169																									
63	521	CRAIG DITCH	1	6	MESA CREEK	43	NW NW NW	5	49 N	17 W	N	1	2 3400		CS,C	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	4		0
MESA CR COND DCR SEE CA4952 FOR STIP FLOOD WATER DECREE																									
63	719	DRY FORK MESA CR SPRING	4	6	MESA CREEK	43	NE NE	34	49 N	17 W	N	9W	0 0040		CS	12/31/1993	12/31/1992	07/01/1987	0	52230 50220		93CW0079	1		0 USA
FILING																									
63	757	EARLY SPRING	4	6	MESA CREEK	43	NW SW NW	7	48 N	17 W	N	9W	0 0006		CS	12/31/1996	12/31/1995	06/17/1986	0	53325 49841		96CW0137	1		0 USA
FILING																									
63	720	EAST MESA CREEK SPRING	4	6	MESA CREEK	43	NW NE	2	48 N	17 W	N	9W	0 0030		CS	12/31/1993	12/31/1992	07/01/1987	0	52230 50220		93CW0079	1		0
63	5004	EULA BELLE MINE WELL	2	6	MESA CREEK	43	SE NE	31	49 N	17 W	N	48	0 0310		CO	12/31/1971		01/15/1963	0	40557 00000		W0325	1		0
WELL NO 7667																									
63	582	EULA BELLE PUMPING STA	6	6	MESA CREEK	43	SW SW NE	31	49 N	17 W	N	1	2 0000		CS	12/31/1975	12/31/1975	03/10/1976	0	46090 00000		W2782	1		0
63	718	GOOD SHERI SPRING	4	6	MESA CREEK	43	NE NE	15	49 N	17 W	N	9W	0 0010		CS	12/31/1993	12/31/1992	07/01/1987	0	52230 50220		93CW0079	1		0 USA
FILING																									
63	689	LA LUNA SPRING	4	6	MESA CREEK	39	SW NW NE	16	49 N	17 W	N	9W	0 0200		CS	12/31/1987	12/31/1986	07/01/1987	0	50220 00000		87CW0285	1		0 USA
FILING																									
63	758	LOWER ANTHILL SPRING	4	6	MESA CREEK	39	SW SE NW	1	49 N	17 W	N	9W	0 0050		CS	12/31/1996	12/31/1995	06/17/1982	0	53325 48441		96CW0137	1		0 USA
FILING																									
63	542	MESA CREEK DITCH	1	6	MESA CREEK	43	NW SW NE	2	49 N	18 W	N	1	2 5000		CS	02/11/1939	05/09/1932	05/01/1909	0	30079 21670	57	CA4952	1		0
MESA CR LEGAL IN ERROR																									
63	542	MESA CREEK DITCH	1	6	MESA CREEK	43	NW SW NE	2	49 N	18 W	N	1	5 0000		CS	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	2		0 SEE
CA4952 FOR STIP EXCESS WATER ONLY P131 P231																									
63	716	MOON CANYON SPRING	4	6	MESA CREEK	43	NW NE	16	49 N	17 W	N	9W	0 0100		CS	12/31/1993	12/31/1992	07/01/1987	0	52230 50220		93CW0079	1		0 USA
FILING																									
63	717	MOONY SPRING	4	6	MESA CREEK	43	NW SE	10	49 N	17 W	N	9W	0 0010		CS	12/31/1993	12/31/1992	07/01/1987	0	52230 50220		93CW0079	1		0
63	673	NORTH FORK MESA CREEK	3	6	MESA CREEK	43	SW NW	20	49 N	17 W	N	M	2 7500		CS	12/31/2002	12/31/2001	01/23/2002	0	55540 00000		02CW0274	1		0
1 9CFS MARCH 1 - MARCH 31 0 5CFS JUNE 1 - FEB 29 LONG CAN 5 9M																									
63	550	PATTERSON DITCH	1	6	MESA CREEK	43	NE NE SE	19	49 N	17 W	N	1	2 5000		CS	02/11/1939	05/09/1932	03/01/1915	0	30079 23800	73	CA4952	1		0
MESA CR P163 P231																									
63	550	PATTERSON DITCH	1	6	MESA CREEK	43	NE NE SE	19	49 N	17 W	N	1	1 2000		CS	02/11/1939	05/09/1932	03/10/1915	0	30079 23809	74	CA4952	2		0
MESA CR PATTERSON LONE TREE ENLT OF PATTERSON																									
63	550	PATTERSON DITCH	1	6	MESA CREEK	43	NE NE SE	19	49 N	17 W	N	1	1 0400		CS,C	02/11/1939	05/09/1932	03/10/1915	0	30079 23809	74	CA4952	3		0
MESA CR COND PATTERSON LONE TREE ENLT OF PATTERSON																									
63	550	PATTERSON DITCH	1	6	MESA CREEK	43	NE NE SE	19	49 N	17 W	N	1	1 0400		CS,CA	02/11/1939	05/09/1932	03/10/1915	0	30079 23809		W0140	6		0
MESA CR PATTERSON LONE TREE ENL OF PATTERSON DITCH																									
63	550	PATTERSON DITCH	1	6	MESA CREEK	43	NE NE SE	19	49 N	17 W	N	1	2 0600		CS,C	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	5		0

COND PATTERSON LONE TREE ENL OF PATTERSON EXCESS ONLYP163.231																						
63	550	PATTERSON DITCH	1	6	MESA CREEK	43	NE NE SE	19	49 N	17 W	N 1	7 3000	CS	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	4	0
PATTERSON LONE TREE ENL OF PATTERSON DITCH EXCESS ONLY P163.231																						
63	550	PATTERSON DITCH	1	6	MESA CREEK	43	NE NE SE	19	49 N	17 W	N 1	7 0800	CS,CA	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		W0140	7	0
EXCESS WATER WHEN AVAILABLE MESA CR TRIB DOLORES RIVER																						
63	551	PEARSON DITCH	1	6	MESA CREEK	43	SW NW SE	19	49 N	17 W	N 1	0 3900	CS,C	02/11/1939	05/09/1932	04/15/1933	0	30420 00000	96	CA4952	1	0
MESA CR COND DCR P205																						
63	551	PEARSON DITCH	1	6	MESA CREEK	43	SW NW SE	19	49 N	17 W	N 1	0 3900	CS,CA	02/11/1939	05/09/1932	04/15/1933	0	30420 00000		W0140	4	0
MESA CR TRIB DOLORES RIVER																						
63	551	PEARSON DITCH	1	6	MESA CREEK	43	SW NW SE	19	49 N	17 W	N 1	0 7800	CS,C	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		CA4952	2	0
MESA CR COND DCR SEE CA4952 FOR STIP EXCESS ONLY P205																						
63	551	PEARSON DITCH	1	6	MESA CREEK	43	SW NW SE	19	49 N	17 W	N 1	0 7800	CS,CA	02/11/1939	05/09/1932	02/10/1939	0	32547 00000		W0140	3	0
MESA CR TRIB DOLORES RIVER EXCESS WATER WHEN AVAILABLE																						
63	692	SOUTH FORK MESA CREEK	0	6	MESA CREEK	39	SW SW	10	49 N	16 W	N M	2 0000	CS	12/31/2002	12/31/2001	01/23/2002	0	55540 00000		02CW0278	1	0 1 25
MAR 1-31, 0 3CFS JUNE-FEB 29, 10 4 MILES DOWNSTREAM																						