

Stream: Lester Creek

Executive Summary

Water Division: 6
Water District: 58
CDOW#: 23254
CWCB ID#: 06/06/A-015

Segment:

Upper Terminus: Pearl Lake

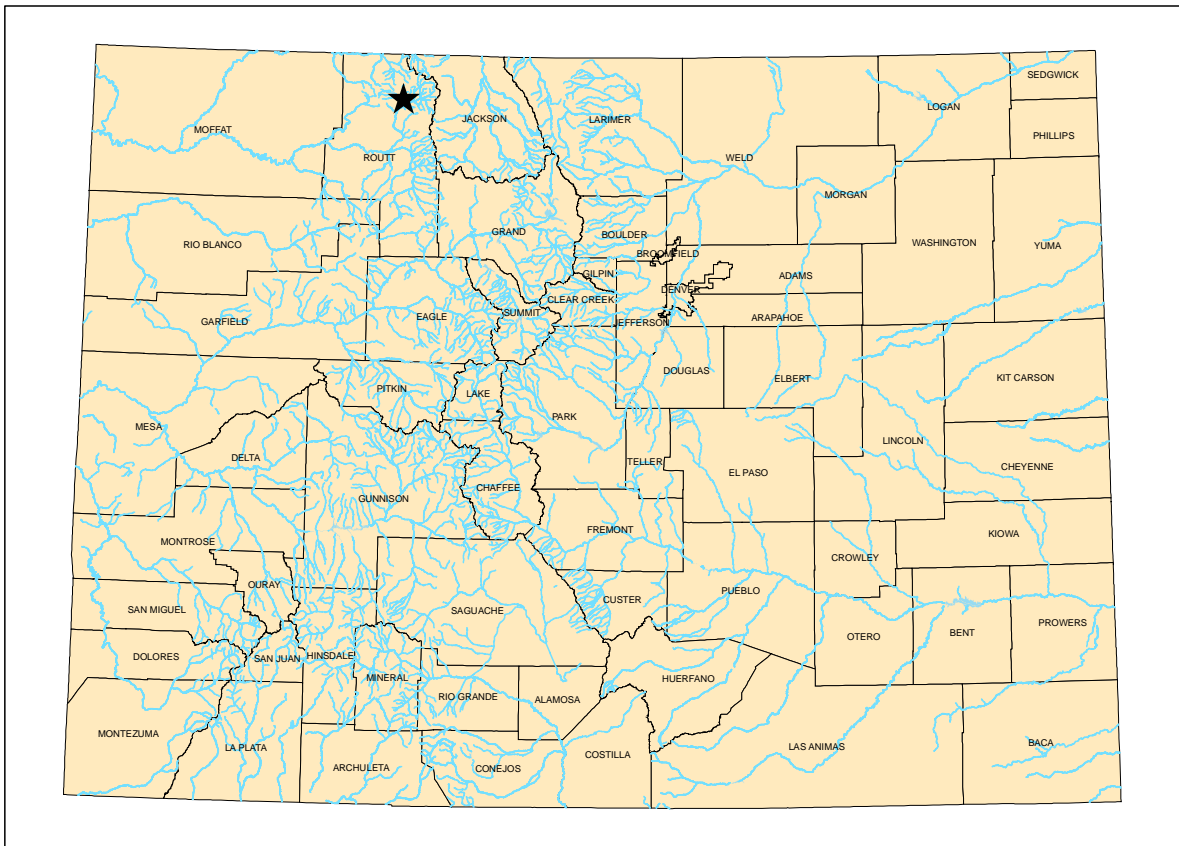
Latitude: 40d46'43.7"N Longitude: 106d53'21.55"W
UTM North: 4515919.936 UTM East: 340571.026
SE1/4, SW1/4, Sctn35, T10N, R85W, 6th PM
2387 ft, E of the W Section Line, 895 ft, N of the S Section Line

Lower Terminus: Willow Creek

Latitude: 40d45'43.82"N Longitude: 106d53'53.6"W
UTM North: 4514089.838 UTM East: 339779.871
SE1/4, SE1/4, Sctn3, T9N, R85W, 6th PM
52 ft, W of the E Section Line, 25 ft, N of the S Section Line
Counties: Routt
Length: 1.50 miles
USGS Quad(s): Hahns Peak
ISF Appropriation: 3.00 cfs (05/01 – 07/31), 0.75 cfs (08/01 – 04/30)



Lester 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 Colorado Division of Wildlife (CDOW) recommended this segment of Lester Creek to the CWCB for inclusion into the Instream Flow Program. Lester 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 CDOW is forwarding this stream flow recommendation to the CWCB to meet the State of Colorado's policy "... that the wildlife and their environment are to be protected, preserved, enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its

visitors ... and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilities for wildlife-related opportunities” C.R.S. 33-1-101 (1). The CDOW Strategic Plan states “Healthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The Division desires to protect and enhance the quality and quantity of aquatic habitats.”

Lester Creek is approximately 6.7 miles long. It begins on the south side of Farwell Mountain at an elevation of approximately 10,000 feet and terminates at the confluence with Willow Creek at an elevation of approximately 7980 feet. Of the 1.5 mile segment addressed by this report, approximately 100% of the segment is located on public lands. Lester Creek is located within Routt County. The total drainage area of the river is approximately 5.12 square miles. Lester Creek generally flows in a southerly direction.

The subject of this report is a segment of Lester Creek beginning at Pearl Lake and extending downstream to Willow Creek. The staff has received one recommendation for this segment from the CDOW. The recommendation for this segment is discussed below.

Instream Flow Recommendation(s)

The CDOW has recommended 3.0 cfs, summer, and 1.4 cfs, winter, based on their 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
Pearl Lake	Willow Creek	1.50	0%	100%

100% of the public lands are owned by the USFS.

Biological and Field Survey Data

As reported in the letter from CDOW to the CWCB, “The DOW, in October of 1997, collected stream cross section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of Lester Creek. Lester Creek is classified as a small stream (between 10 to 19 feet wide) and fishery surveys indicate the stream environment of Lester Creek supports Colorado River cutthroat trout (*Salmo clarki pleuriticus*), Brook trout (*Salvelinus fontinalis*), Rainbow trout (*Salmo gairdneri*), and Mountain sucker (*Catostomus platyrhynchus*).

Colorado River cutthroat trout and Mountain sucker have been identified by the DOW and several other state and federal agencies as “species of greatest conservation need”. DOW is involved in developing Conservation and Management Plans for these species. The intention of these plans is to increase populations and distributions of identified species, thereby assisting in the long-term persistence of each species. The success of such plans could potentially curtail the

need for federal listing of these species under the Endangered Species Act (ESA). These species are not currently federally listed” (See CDOW Fish Survey in Appendix B).

Field Survey Data

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

Biological Flow Recommendation

The 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; Espregen 1996).

For this segment of stream, one data set was collected with the results shown in Table 1 below. Table 1 shows who collected the data (Party), the date the data was collected (October 1997), the measured discharge at the time of the survey (Q), the accuracy range of the predicted flows based on Manning’s Equation (240% and 40% of Q), the summer flow recommendation based on meeting 3 of 3 hydraulic criteria and the winter flow recommendation based upon 2 of 3 hydraulic criteria.

Table 1: Data

Party	Date	Q	250%-40%	Summer (3/3)	Winter (2/3)
DOW	10/15/1997	1.54	3.8 – 0.6	3.0	1.4

DOW = Division of Wildlife

Biologic Flow Recommendation

The summer flow recommendation, which met 3 of 3 criteria and is within the accuracy range of the R2CROSS model is 3.0 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 1.4 cfs (See Table 1).

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 Lester Creek, the next best approach is to look at the flow records of nearby streams with stream gage records. In this case Granite Creek (USGS Gage 9238770) and Middle Fork Fish Creek (USGS Gage

9238750) were the closest gaged streams with similar watershed aspects, drainage areas, and elevation. These creeks have drainage areas of 1.37 square miles and 2.82 square miles, respectively, and 12 years of stream gage record each. The hydrograph below was derived by apportioning the averaged stream flow from these basins, using a drainage area ratio. The total drainage area of Lester Creek is approximately 5.12 square miles.

Table 2: Estimated Stream Flow on Lester Creek

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
cfs	0.80	0.75	0.85	1.33	21.12	83.02	7.35	1.71	1.21	1.30	1.44	1.13

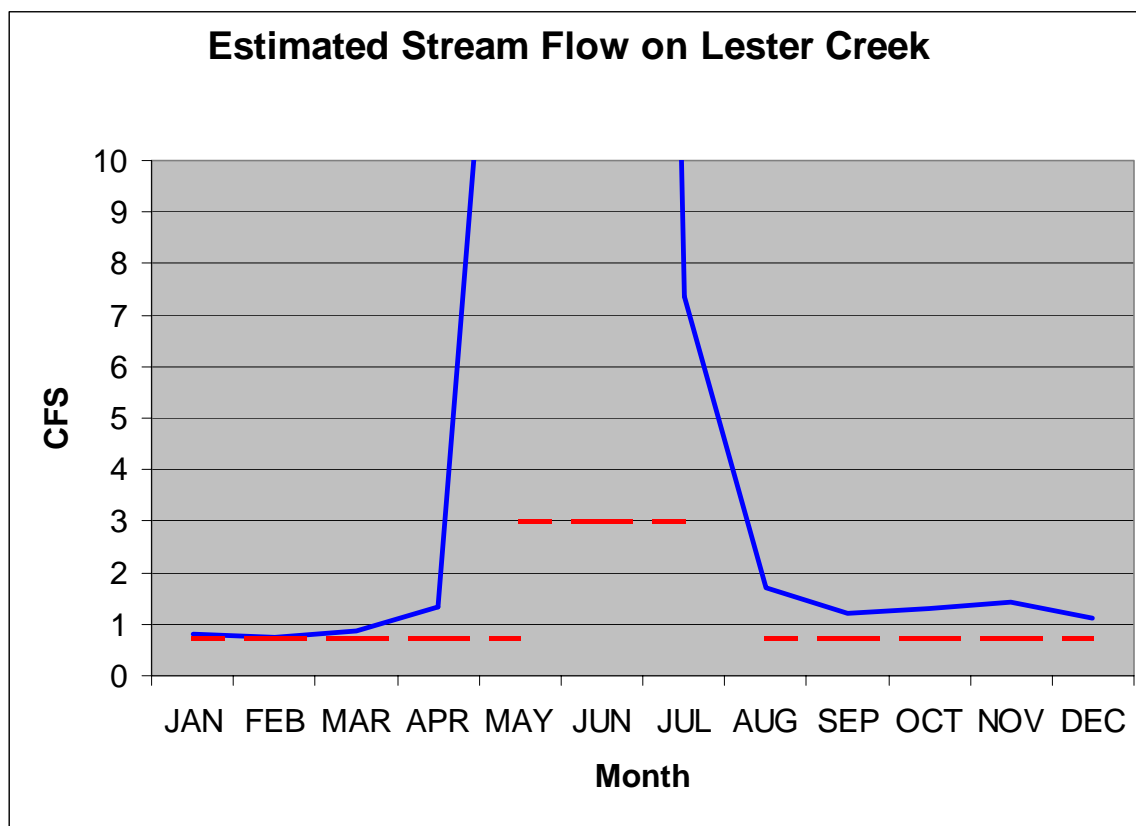


Table 2 shows that the summer flow recommendation of 3.0 cfs is available at least 50% of the time for the months of May 1st through July 31st. The winter flow recommendation of 1.4 cfs is not available at least 50% of the time from August 1st through April 31st. Based on water availability, the winter recommendation was further reduced to 0.75 cfs August 1st through April 30th.

Precipitation Data

Staff reviewed a local precipitation data set from one site located around the Granite Creek and Middle Fork Fish Creek Drainages (See Precipitation Data in Appendix C). Table 3 shows the water year and the percent of average precipitation recorded at each site. It is staff's opinion that the 12 years of stream-flow data analyzed is representative of average water-years.

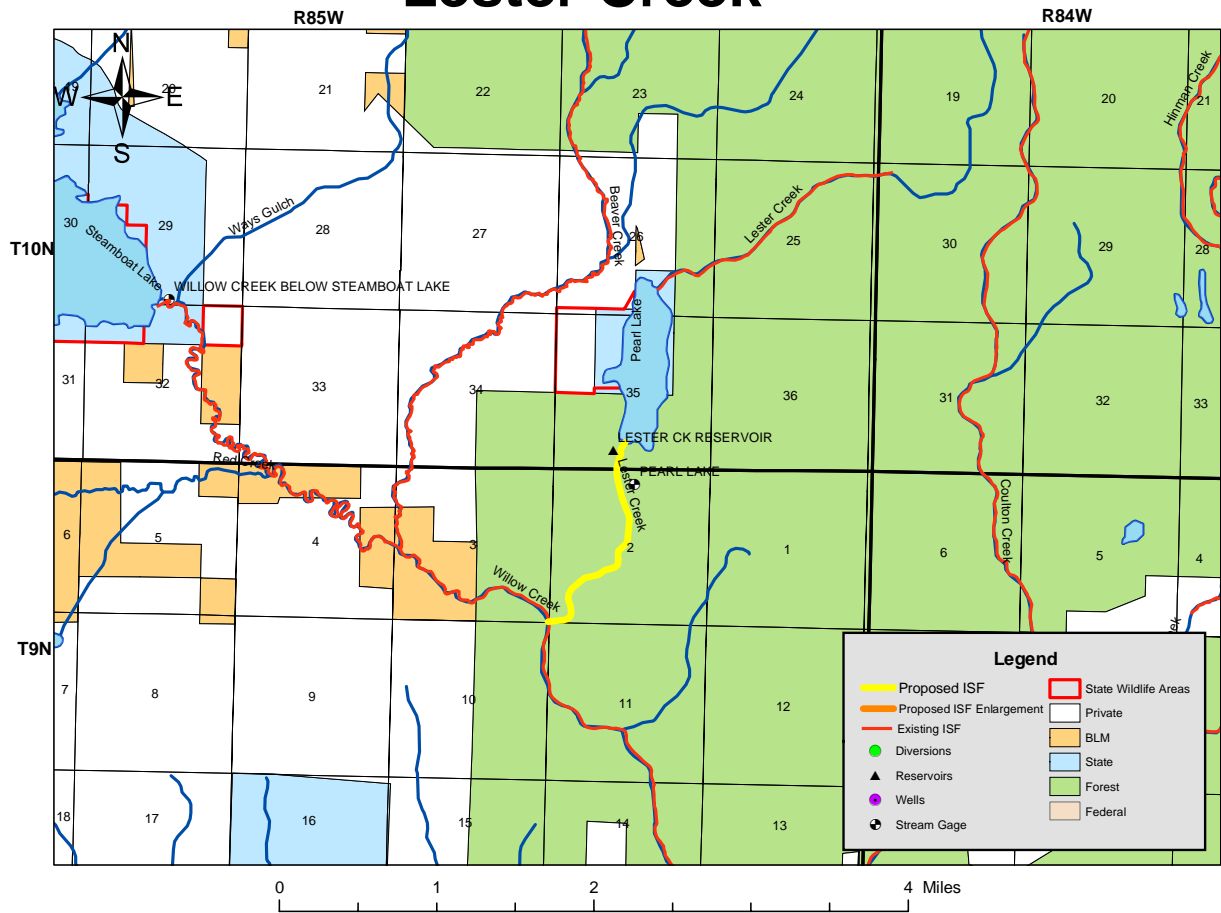
Table 3: Precipitation Data as a percentage of Average

	Elevation = 7890 Lat 40 09 Long 106 54 Yampa 59265
Year	
1984	93.6%
1985	108.7%
1986	89.6%
1987	74.0%
1988	101.8%
1989	102.4%
1991	110.3%
1992	92.4%
1993	92.0%
Average	96.1%

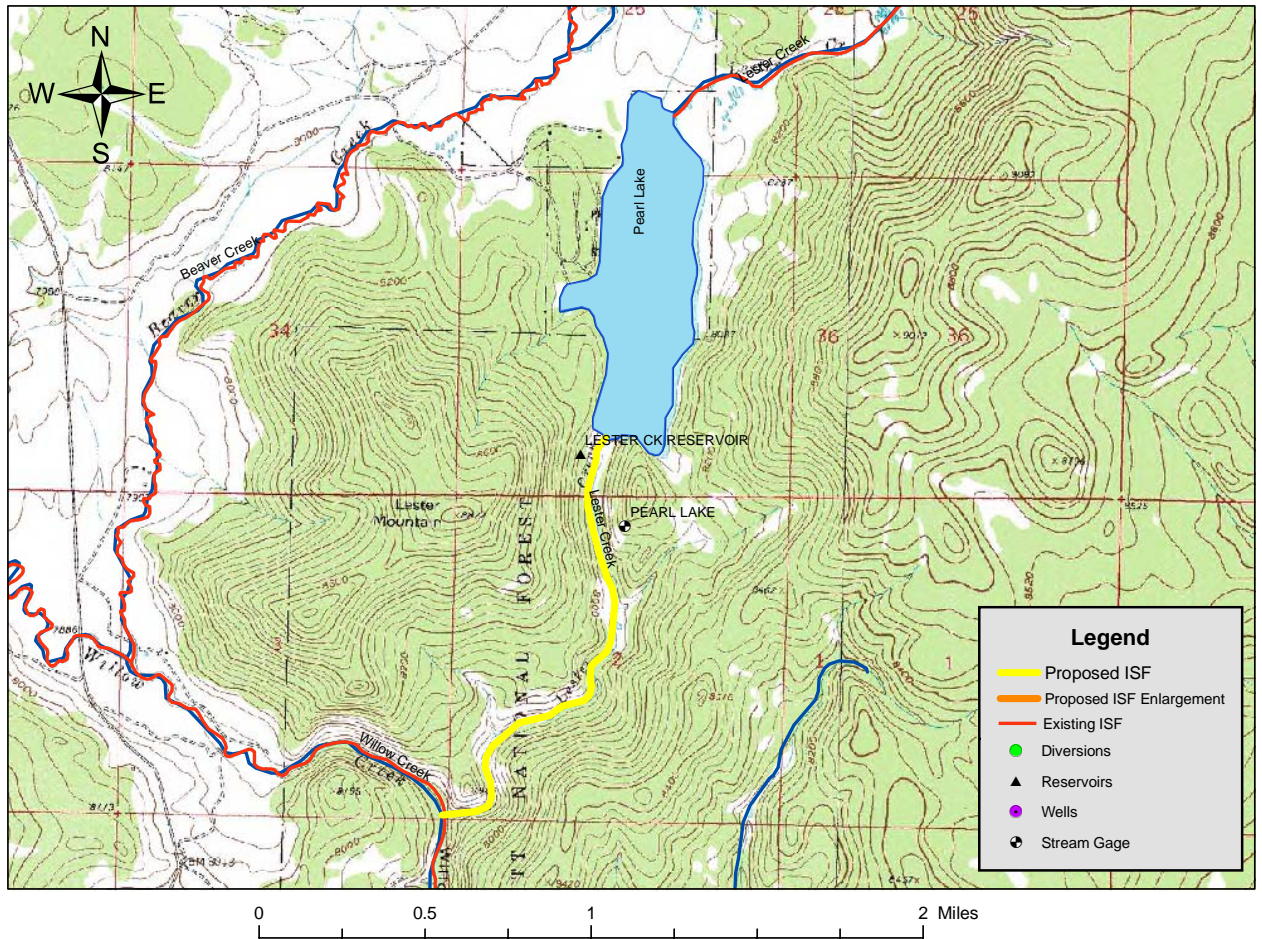
Existing Water Right Information

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 Lester Creek (see Appendix D). 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 Lester Creek, from Pearl Lake to Willow Creek, to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

Lester Creek



Lester Creek



CWCB Staff's Instream Flow Recommendation

Based on the CDOW recommendation, staff recommends the Board form its intent to appropriate on the following stream reach:

Stream: Lester Creek

Segment:

Upper Terminus: Pearl Lake

Latitude: 40d46'43.7"N Longitude: 106d53'21.55"W
UTM North: 4515919.936 UTM East: 340571.026
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USGS Quad(s): Hahns Peak
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APPENDIX – A

ISF Recommendation

STATE OF COLORADO

Bill Owens, Governor

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WILDLIFE

AN EQUAL OPPORTUNITY EMPLOYER

Bruce McCloskey, Director
6060 Broadway
Denver, Colorado 80216
Telephone (303) 297-1192



*For Wildlife-
For People*

December 15, 2005

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

Re: Colorado Division of Wildlife Instream Flow Recommendations for Lester Creek.

Dear Dan and Todd,

The purpose of this letter is to officially transmit the Colorado Division of Wildlife's (DOW) Instream Flow Recommendations for Lester Creek in Routt County. The reach of stream covered by this flow recommendation is from the outlet of Pearl Lake (a.k.a. Lester Creek Reservoir) to the confluence with Willow Creek, a distance of approximately 1.5 miles.

The DOW, in October of 1997, collected stream cross section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of Lester Creek. Lester Creek is classified as a small stream (between 10 to 19 feet wide) and fishery surveys indicate the stream environment of Lester Creek supports Colorado River cutthroat trout (*Salmo clarki pleuriticus*), Brook trout (*Salvelinus fontinalis*), Rainbow trout (*Salmo gairdneri*), and Mountain sucker (*Catostomus platyrhynchus*).

Colorado River cutthroat trout and Mountain sucker have been identified by the DOW and several other state and federal agencies as "species of greatest conservation need". DOW is involved in developing Conservation and Management Plans for these species. The intention of these plans is to increase populations and distributions of identified species, thereby assisting in the long-term persistence of each species. The success of such plans could potentially curtail the need for federal listing of these species under the Endangered Species Act (ESA). These species are not currently federally listed."

The stream cross section data was analyzed using the R2CROSS program. The R2CROSS output was evaluated using the methods described in Nehring (1979) and Espegren (1996). The CDOW has reviewed the data collected to date and based on that review recommends that the CWCB appropriated the following flow amounts to preserve the natural environment of Lester Creek to a reasonable degree:

DEPARTMENT OF NATURAL RESOURCES, Russell George, Executive Director
WILDLIFE COMMISSION, Jeffrey Crawford, Chair • Tom Burke, Vice Chair • Ken Torres, Secretary
Members, Bernard Black • Rick Enstrom • Philip James • Claire O'Neal • Brad Phelps • Robert Shoemaker
Ex Officio Members, Russell George and Don Ament

APPENDIX – B
Field Data

$$2/3 = 14.1\%$$

LOCATION INFORMATION

圖 1 臺灣省各縣市人口密度分布圖

SUPPLEMENTAL DATA

*** NOTE ***

CHANNEL PROFILE DATA

INPUT DATA CHECKED BY. DATE

ASSIGNED TO DATE:

STREAM NAME LESTER CREEK
 XS LOCATION 1/8 MILE BELOW DAM
 XS NUMBER 1

INPUT DATA # DATA POINTS- 35

VALUES COMPUTED FROM RAW FIELD DATA

FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	WETTED PERIM	WATER DEPTH	AREA (A _w)	Q (Q _m)	V Q CELL
S	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	2.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
I G	3.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	4.00	1.55	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
W	5.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	5.50	2.00	0.10	0.00	0.50	0.10	0.05	0.00	0.0%
	6.00	2.00	0.10	0.00	0.50	0.10	0.05	0.00	0.0%
R	6.50	2.00	0.00	0.00	0.50	0.00	0.00	0.00	0.0%
BR	7.00	2.10	0.30	0.00	0.50	0.30	0.12	0.00	0.0%
	7.30	2.10	0.35	0.20	0.40	0.35	0.10	0.02	1.4%
BS	7.60	2.35	0.35	0.04	0.30	0.35	0.10	0.00	0.3%
	7.90	2.25	0.30	0.70	0.32	0.30	0.09	0.06	4.1%
	8.20	2.35	0.40	0.75	0.32	0.40	0.12	0.09	5.5%
	8.50	2.35	0.40	0.61	0.30	0.40	0.12	0.07	4.9%
	8.80	2.25	0.30	0.49	0.32	0.30	0.09	0.04	2.9%
	9.10	2.30	0.30	0.25	0.31	0.30	0.09	0.02	1.5%
	9.40	2.35	0.40	0.83	0.30	0.40	0.12	0.10	6.5%
	9.70	2.40	0.40	1.18	0.30	0.40	0.12	0.14	9.2%
	10.00	2.50	0.50	1.15	0.32	0.50	0.15	0.18	11.6%
R	10.30	2.20	0.20	0.97	0.42	0.20	0.06	0.06	3.0%
	10.60	2.20	0.25	1.34	0.30	0.25	0.07	0.10	6.5%
	10.90	2.30	0.30	1.63	0.32	0.30	0.09	0.13	9.5%
	11.20	2.50	0.55	1.45	0.36	0.55	0.17	0.24	15.5%
	11.50	2.20	0.30	1.56	0.42	0.30	0.09	0.14	9.1%
	11.80	2.15	0.20	1.47	0.30	0.20	0.06	0.09	5.7%
	12.10	2.10	0.10	0.93	0.30	0.10	0.03	0.03	1.8%
W	12.40	2.00	0.00	0.00	0.32	0.00	0.00	0.00	0.0%
	13.00	1.65	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	13.50	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	14.00	1.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	14.50	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
	15.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
I D	15.20	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
E	15.90	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
					7.91	0.55	1.90	1.54	100.0%

(Max)

Manning's n

0.0935

STREAM NAME LESTER CREEK
 XS LOCATION 1/4 MILE BELOW DAM
 XS NUMBER 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
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1-77	1-90	3-59	69-2%
1-79	1-90	3-43	80-4%
1-81	1-90	3-26	71-7%
1-82	1-90	3-10	63-1%
1-83	1-90	2-94	54-6%
1-87	1-90	2-78	46-2%
1-89	1-90	2-62	37-9%
1-91	1-90	2-46	29-6%
1-93	1-90	2-31	21-4%
1-95	1-90	2-15	13-3%
1-97	1-90	2-00	5-3%
1-98	1-90	1-92	1-3%
1-99	1-90	1-85	-2-7%
2-00	1-90	1-77	-6-6%
2-01	1-90	1-70	-10-5%
2-02	1-90	1-63	-14-3%
2-03	1-90	1-57	-17-4%
2-04	1-90	1-51	-20-5%
2-05	1-90	1-45	-23-5%
2-06	1-90	1-40	-26-5%
2-07	1-90	1-34	-29-5%
2-09	1-90	1-23	-35-4%
2-11	1-90	1-12	-41-2%
2-13	1-90	1-01	-46-9%
2-15	1-90	0-90	-52-4%
2-17	1-90	0-80	-57-7%
2-19	1-90	0-70	-63-0%
2-21	1-90	0-61	-68-0%
2-23	1-90	0-52	-72-7%
2-25	1-90	0-43	-77-2%
2-27	1-90	0-35	-81-5%

WATERLINE AT ZERO

AREA ERROR = 1-987

STREAM NAME: ESTER CREEK
XS LOCATION: 1/8 MILE BELOW DAM
XS NUMBER: 1

GL = lowest Grassline elevation corrected for sag

STAGING TABLE *WL* = waterline corrected for variations in field measured water surface elevations and sag

	DISH TO WATER (FT)	TOP WIDTH (FT)	AVG DEPTH (FT)	MAX DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PER (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG VELOCITY (FT/SEC)
GL	1 12	12 19	0 86	1 41	10 50	13 09	100 0%	0 80	19 00	1 81
	1 14	12 11	0 84	1 39	10 23	13 00	99 3%	0 79	18 28	1 79
	1 15	11 53	0 81	1 34	9 63	12 80	97 8%	0 75	16 70	1 73
	1 24	11 75	0 77	1 25	9 04	12 59	96 2%	0 72	15 18	1 68
	1 29	11 52	0 73	1 24	8 45	12 33	94 2%	0 69	13 78	1 63
	1 34	11 24	0 70	1 19	7 88	12 04	92 0%	0 65	12 47	1 59
	1 35	10 97	0 67	1 14	7 33	11 75	89 7%	0 62	11 22	1 53
	1 44	10 69	0 63	1 09	6 75	11 45	87 5%	0 59	10 04	1 48
	1 49	10 47	0 60	1 04	6 26	11 16	85 3%	0 56	8 93	1 43
	1 54	10 15	0 57	0 99	5 75	10 87	83 0%	0 53	7 88	1 37
	1 59	9 70	0 54	0 94	5 25	10 41	79 5%	0 50	6 57	1 33
	1 64	9 11	0 52	0 89	4 78	9 81	74 9%	0 49	6 20	1 30
	1 65	8 70	0 50	0 84	4 32	9 38	71 6%	0 46	5 43	1 25
	1 74	8 50	0 46	0 79	3 90	9 16	70 0%	0 43	4 64	1 19
	1 79	8 31	0 42	0 74	3 48	8 94	68 3%	0 39	3 90	1 12
	1 84	8 11	0 38	0 69	3 07	8 72	66 6%	0 35	3 22	1 05
	1 89	7 52	0 34	0 61	2 67	8 50	64 9%	0 31	2 52	0 97
	1 94	7 72	0 30	0 59	2 28	8 28	63 2%	0 28	2 03	0 82
WL	1 99	7 53	0 25	0 54	1 90	8 06	51 5%	0 24	1 52	0 60
	2 04	5 82	0 27	0 49	1 55	6 33	48 3%	0 25	1 27	0 62
	2 09	5 59	0 23	0 44	1 27	5 07	46 4%	0 21	0 93	0 74
	2 14	5 30	0 19	0 39	0 99	5 76	44 0%	0 17	0 64	0 55
	2 19	4 52	0 15	0 31	0 74	3 37	41 0%	0 14	0 41	0 56
	2 24	4 27	0 12	0 29	0 50	4 68	35 8%	0 11	0 24	0 47
	2 29	3 74	0 08	0 24	0 30	4 09	31 2%	0 07	0 11	0 37
	2 34	2 33	0 06	0 19	0 14	2 58	19 7%	0 06	0 04	0 31
	2 39	0 99	0 05	0 14	0 06	1 16	8 9%	0 05	0 02	0 30
	2 44	0 55	0 04	0 09	0 02	0 64	5 1%	0 04	0 01	0 23
	2 49	0 23	0 02	0 04	0 00	0 27	2 1%	0 01	0 00	0 13

$$3/3 = 3.0$$

$$2/3 = 1.4$$

STREAM NAME	LESTER CREEK
XS LOCATION	1/8 MILE BELOW DAM
XS NUMBER	1

SUMMARY SHEET

MEASURED FLOW (Qm) =	1.54 cfs
CALCULATED FLOW (Qc) =	1.52 cfs
$\frac{Qm - Qc}{Qm} \times 100 =$	1.2 %

RECOMMENDED INSTREAM FLOW

MEASURED WATERLINE (W _M) =	2 02 ft
CALCULATED WATERLINE (W _C) =	1 99 ft
(W _M -W _C)/W _M * 100 =	1 5 %

FLOW (CFS)	PERIOD
*****	*****

MAX MEASURED DEPTH (cm):	0.55 ft
MAX CALCULATED DEPTH (cm):	0.54 ft
(cm Ex)/cm * 100	2.6 %

```

MEAN VELOCITY=                3.80 ft/sec
MANNING'S N=                  0.093
SLOPE=                        0.0174 ft/ft

```

4 • Qm.	0 6 cfs
7 5 • Qm.	3 8 cfs

RATIONALE FOR RECOMMENDATION

第 12 章 数据库系统概论

[illegible]

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

CWCR REVIEW BY _____ DATE _____

PROOF SHEET

LOCATION INFORMATION

INPUT DATA

DATA POINTS

35

FEATURE

DIST

VERT

DEPTH

WATER

DEPTH

VEL

A

C

TAPE TO

WATER

STREAM NAME DESTER CREEK
XS LOCATION 1/8 MILE BELOW DAM
XS NUMBER 1

S

0.00

1.05

0.00

0.00

0.00

0.00

1.00

1.00

0.00

0.00

0.00

0.00

DATE 10/15/97
OBSERVERS UPPELDAHL, SULLIVAN, RAMP

1 G

2.00

1.10

0.00

0.00

0.00

0.00

3.00

1.10

0.00

0.00

0.00

0.00

4.00

1.55

0.00

0.00

0.00

0.00

1/4 SEC
SECTION
TWP
RANGE
RM

W

5.00

2.00

0.00

0.00

0.00

0.00

5.50

2.00

0.10

0.00

0.00

1.92

6.00

2.00

0.10

0.00

0.00

1.92

R

6.50

2.00

0.00

0.00

0.00

0.00

BR

7.00

1.30

0.10

0.00

0.12

0.00

7.10

2.30

0.35

0.20

0.10

0.02

COUNTY ROUTT
WATERSHED YAMPA RIVER
DIVISION 6
DOW CODE 20963

BR

7.60

2.35

0.35

0.04

0.10

0.00

7.90

2.25

0.30

0.70

0.09

0.06

8.10

2.75

0.40

0.75

0.12

0.00

8.50

2.35

0.40

0.61

0.12

0.07

8.80

2.25

0.30

0.49

0.09

0.04

USGS MAP HAIN'S PEAK
USGS MAP ROUTT N F

9.10

2.30

0.30

0.25

0.09

0.02

9.40

2.35

0.40

0.63

0.12

0.10

9.70

2.40

0.40

1.18

0.12

0.14

SUPPLEMENTAL DATA

R

10.00

2.50

0.50

1.19

0.15

0.18

10.30

2.20

0.20

0.97

0.06

0.06

10.60

2.20

0.25

1.24

0.07

0.10

TAPE W1 0 0100
TENSION 13.5

10.90

2.30

0.30

1.63

0.09

0.15

11.20

2.50

0.55

1.45

0.17

0.24

11.50

2.10

0.30

1.56

0.09

0.14

CHANNEL PROFILE DATA

W

11.80

2.15

0.20

1.47

0.06

0.09

12.10

2.10

0.10

0.93

0.03

0.04

SLOPE 0 0174

12.40

2.00

0.00

0.00

0.00

0.00

13.00

1.65

0.00

0.00

0.00

0.00

13.50

1.60

0.00

0.00

0.00

0.00

CHECKED BY DATE

14.00

1.55

0.00

0.00

0.00

0.00

14.50

1.40

0.00

0.00

0.00

0.00

ASSIGNED TO DATE

15.00

1.25

0.00

0.00

0.00

0.00

1 G

15.20

1.10

0.00

0.00

0.00

0.00

S

15.90

0.85

0.00

0.00

0.00

0.00

TOTALS

1.90

1.94



FIELD DATA FOR INSTREAM FLOW DETERMINATIONS



COLORADO WATER
CONSERVATION BOARD

LOCATION INFORMATION

STREAM NAME

Legion Creek

CROSS-SECTION NO

CROSS-SECTION LOCATION

1/8 mile below Dam

N 40° 46' 6" E

106 53 88 4

DATE 10/1/97 OBSERVERS

LEGAL DESCRIPTION

1/4 SECTION

SECTION

TOWNSHIP

RANGE

E/W PM

COUNTY

Route 1

WATERSHED

Yampa River

WATER DIVISION

6

DOW WATER CODE

20963

MAP(S)

USGS

USFS

Holmes Peak

Route N.F.

SUPPLEMENTAL DATA

SAG TAPE SECTION SAME AS DISCHARGE SECTION

YES/NO

METER TYPE

Measuring tape

METER NUMBER

5413

DATE RATED

CALIB/SPIN

sec

TAPE WEIGHT

0.0106

lbs/100ft

TAPE TENSION

13.5

lbs

CHANNEL BED MATERIAL SIZE RANGE

3.4 to cobble

PHOTOGRAPHS TAKEN

YES/NO

NUMBER OF PHOTOGRAPHS

3

CHANNEL PROFILE DATA

STATION

DISTANCE FROM TAPE (ft)

ROD READING (ft)

1 Tape @ Stake LB

0.0

4.53

2 Tape @ Stake RB

0.0

4.53

3 WS @ Tape LB/RB

0.0

6.53

4 WS Upstream

12'

6.53

5 WS Downstream

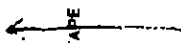
7'

6.53

SLOPE

0.0174

SKETCH



LEGEND

Stake

Station

Photo

Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED YES/NO

DISTANCE ELECTROFISHED 500 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)

Rainbow Trout

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>15	TOTAL
																4
																5

AQUATIC INSECTS IN STREAM SECTION BY COMMON OR SCIENTIFIC ORDER NAME

COMMENTS

Under deep 7' C

DISCHARGE/CROSS SECTION NOTES

STREAM NAME:

CROSS-SECTION NO

DATE

SHEET 1 OF 1

BEGINNING OF MEASUREMENT

EDGE OF WATER LOOKING DOWNSTREAM
(00 AT STAKE)

(LEFT) RIGHT

Gage Reading

TIME

Features

Stake Grassline (S) Waterline (W) Rock (R)	Distance From Initial Point (ft)	Width (ft)	Total Vertical Depth From Tape/Inst (ft)	Water Depth (ft)	Depth of Observ- ation (ft)	Revolutions	Time (sec)	Velocity (ft/sec)	Area (ft ²)	Discharge (cfs)
	0		1.05							
	1		1.0							
	2		1.1							
	3		1.1							
	4		1.55							
W	5	.95	2.0	.10						
	5.5	.90	2.0	.10						
	6.0	.90	2.0	.10						
R	6.5	.90	2.0	.10						
BR	7.0	.90	2.3	.30						
	7.3	.90	2.3	.35						
BR	7.6	.90	2.35	.35						
	7.9	.90	2.35	.30						
	8.2	.90	2.35	.40						
	8.5	.90	2.35	.40						
	8.8	.90	2.25	.30						
	9.1	.90	2.3	.30						
	9.4	.90	2.35	.40						
	9.7	.90	2.40	.40						
	10.0	.90	2.50	.50						
R	10.3	.90	2.20	.20						
	10.6	.90	2.20	.25						
	10.9	.90	2.30	.30						
	11.2	.90	2.50	.55						
	11.5	.90	2.20	.30						
	11.8	.90	2.15	.20						
	12.1	.90	2.10	.10						
W	12.4	.90	2.0	.10						
	13		1.65							
	13.5		1.6							
	14		1.55							
	14.5		1.4							
	15		1.25							
	15.2		1.1							
	15.9		.85							

TOTALS

End of Measurement

Time

11:31

Gage Reading

CALCULATIONS PERFORMED BY

CALCULATIONS CHECKED BY

1.52895

WATER	WATERNAME	AT	CO	SAMPDAT	SPEC	COMM
69092	PEARL LAKE	16	B2	10/25/1995	MOS	MOUNTAIN SUCKER
69092	PEARL LAKE	16	B2	10/25/1995	CRA	CRAPPIE (S U.)
69092	PEARL LAKE	16	B2	10/25/1995	GRA	ARCTIC GRAYLING
69092	PEARL LAKE	16	B2	10/26/1982	BRK	BROOK TROUT
69092	PEARL LAKE	16	B2	10/25/1995	BRK	BROOK TROUT
69092	PEARL LAKE	16	B2	10/26/1982	CRN	CO RIVER CUTTHROAT
69092	PEARL LAKE	16	B2	10/25/1995	CRN	CO RIVER CUTTHROAT
69092	PEARL LAKE	16	B2	10/26/1982	SRN	SNAKE RIVER CUTTHROAT





APPENDIX – C

Water Availability Analysis

Station Name MD FK FISH CRR BUFFALO PASS, CO

Station ID
 9238750

Param
 STREAM FLOW CFS

Statistic
 Mean

State
 CO

County
 NGUII

Latitude
 40 29 54

Longitude
 106 41 30

Elevation
 1984

Start Year
 1993

End Year
 12

Num Years
 12

area 1.37 sq miles

	January	February	March	April	May	June	July	August	September	October	November	December
# Days	341	310	341	330	341	330	341	341	330	330	341	341
Avg Day	0.205	0.192	0.228	1.55	11.77	25.68	5.05	0.485	0.377	0.377	0.437	0.315
Max Day	0.45	0.5	0.7	56	56	97	65	2.8	3.2	3.2	1.4	0.57
Min Day	0	0	0	0.03	0.07	0.29	0.5	0.12	0.08	0.08	0.11	0
# Months	11	11	11	11	11	11	11	11	11	11	11	11
StDev Month	0.106	0.11	0.11	2.41	7.63	12.25	7.51	0.223	0.183	0.183	0.172	0.078
Skew Month	0.581	1.18	1.18	2.93	0.241	-0.362	2.50	0.165	-0.281	-0.281	0.411	0.125
Min Month	0.062	0.054	0.075	0.26	1.8	6.42	0.595	0.128	0.113	0.113	0.203	0.194
Max Month	0.426	0.453	0.474	8.56	24.41	47.13	25.9	0.827	0.577	0.577	1.38	0.445
Exceedences												
1%	0.45	0.5	0.632	29.1	44.54	79.7	57.56	2.16	2.34	2.34	1.1	0.55
5%	0.4	0.44	0.479	4.7	34	57.5	25.9	1.2	0.94	0.94	1.4	0.515
10%	0.34	0.32	0.35	3	25	50	14	0.947	0.8	0.8	0.69	0.45
20%	0.28	0.27	0.28	1.6	23	42	5	0.6	0.51	0.51	0.93	0.35
50%	0.200	0.170	0.200	0.360	7.100	25.000	1.700	0.380	0.250	0.250	0.380	0.300
80%	0.1	0.12	0.15	0.26	1.42	7.5	0.56	0.25	0.16	0.16	0.3	0.24
90%	0.031	0.04	0.11	0.23	0.45	3.1	0.39	0.16	0.13	0.13	0.16	0.15
95%	0.01	0.03	0.07	0.19	0.37	1.8	0.22	0.12	0.09	0.09	0.13	0.15
99%	0	0	0.054	0.07	0.302	0.86	0.144	0.09	0.08	0.08	0.114	0.104

Exceedences	January	February	March	April	May	June	July	August	September	October	November	December
1%	1.68	1.87	2.44	108.75	165.63	257.84	215.21	5.07	8.74	8.74	4.11	2.06
5%	1.49	1.64	1.79	17.56	177.06	214.80	96.79	4.48	3.51	3.51	2.82	1.94
10%	1.27	1.20	1.31	11.21	108.37	186.85	52.32	3.54	2.99	2.99	2.58	1.68
20%	1.05	1.01	1.05	5.98	85.95	156.95	18.60	2.74	1.91	1.91	2.24	1.46
50%	0.75	0.64	0.75	1.35	26.53	93.43	6.35	1.42	0.93	0.93	1.27	1.12
80%	0.37	0.45	0.56	0.97	5.31	28.03	2.09	0.93	0.60	0.60	0.71	0.90
90%	0.12	0.15	0.41	0.86	1.68	11.58	1.46	0.60	0.49	0.49	0.60	0.71
95%	0.04	0.11	0.26	0.71	1.38	6.73	0.87	0.45	0.34	0.34	0.49	0.56
99%	0.00	0.00	0.20	0.16	1.13	3.21	0.54	0.34	0.30	0.30	0.43	0.39

Station Name
 GRANITE C. NR BUFFALO PASS, CO.

Station ID
 9232770

Param
 STREAM FLOW CFS

Statistic
 Mean

State
 CO

County
 ROUT 1

Latitude
 40 26 35

Longitude
 106 41 31

Elevation
 9875

Start Year
 1984

End Year
 1995

Num Years
 12

area 2.82 sq miles

	January	February	March	April	May	June	July	August	September	October	November	December
# Days	341	310	341	330	341	341	330	341	341	330	341	341
Avg Day	0.468	0.468	0.56	2.13	17.09	42.26	9.04	1.55	1.06	1.06	1.19	0.9
Max Day	0.9	0.76	1.6	4.0	8.0	12.6	5.9	7.5	6.5	6.5	5.5	2.7
Min Day	0.17	0.15	0.13	0.18	0.31	2.8	0.95	0.45	0.41	0.41	0.28	0.24
# Months	11	11	11	11	11	11	11	11	11	11	11	11
Stdv Month	0.183	0.17	0.294	2.83	12.09	17.87	9.83	0.864	0.473	0.473	0.875	0.379
Skew Month	-0.349	-0.408	0.64	2.73	-0.091	0.731	1.71	0.794	0.678	0.678	0.639	0.191
Min Month	0.196	0.178	0.19	0.333	2.4	17.18	2.07	0.75	0.515	0.515	0.422	0.393
Max Month	0.729	0.706	1.16	10.2	34.35	71.4	32.97	2.95	2.05	2.05	2.5	1.47
Exceedences												
1%	0.9	0.76	1.6	7.5	75.18	103	61.56	5.54	5.44	5.44	4.95	2.21
5%	0.78	0.72	1.7	8.1	52	87.5	38.85	4.39	2.4	2.4	2.79	1.6
10%	0.7	0.69	0.978	3.5	45	76	29.8	3.3	1.9	1.9	2.4	1.4
20%	0.638	0.64	0.74	2	35.8	63	14	2.08	1.3	1.3	2	1.2
50%	0.47	0.48	0.53	0.72	8.65	40	4.6	1.1	0.82	0.82	0.73	0.8
80%	0.23	0.27	0.24	0.44	1.92	17	1.9	0.682	0.52	0.52	0.48	0.49
90%	0.19	0.23	0.191	0.32	0.9	10	1.3	0.61	0.48	0.48	0.43	0.43
95%	0.19	0.18	0.18	0.26	0.601	7.3	1.11	0.56	0.46	0.46	0.41	0.37
99%	0.17	0.16	0.14	0.23	0.401	3.59	0.981	0.408	0.43	0.43	0.314	0.278
January		February	March	April	May	June	July	August	September	October	November	December
1%	1.63	1.36	2.90	63.55	136.50	187.01	111.82	11.87	9.88	9.88	9.01	4.01
5%	1.42	1.31	2.18	14.71	54.41	158.87	70.54	7.97	4.36	4.36	5.07	2.90
10%	1.27	1.25	1.78	6.35	81.70	137.90	54.10	5.99	3.45	3.45	4.36	2.54
20%	1.16	1.16	1.34	3.63	65.00	114.38	25.42	3.78	2.36	2.36	3.63	2.18
50%	0.85	0.87	0.96	1.31	15.70	72.62	8.35	2.00	1.49	1.49	1.33	1.14
80%	0.47	0.49	0.44	0.80	3.49	30.87	3.45	1.24	0.94	0.94	0.87	0.89
90%	0.34	0.42	0.35	0.58	1.63	18.16	2.36	1.11	0.87	0.87	0.78	0.78
95%	0.34	0.33	0.33	0.47	1.09	13.25	2.02	1.07	0.81	0.81	0.74	0.67
99%	0.31	0.29	0.29	0.42	0.73	8.52	1.79	0.89	0.78	0.78	0.57	0.50

Lester Creek Analysis

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MD FK FISH C NR BI	0.75	0.64	0.75	1.35	26.53	93.43	6.35	1.42	0.93	1.27	1.42	1.12
GRANITE C NR BUF	0.85	0.87	0.96	1.31	15.70	72.62	8.35	2.00	1.49	1.33	1.45	1.14
Average	0.80	0.75	0.85	1.33	21.12	83.02	7.35	1.71	1.21	1.30	1.44	1.13
					3	3	3	3		1.1	1.1	1.1
	0.75	0.75	0.75	0.75								

Precipitation
Yampa-59265

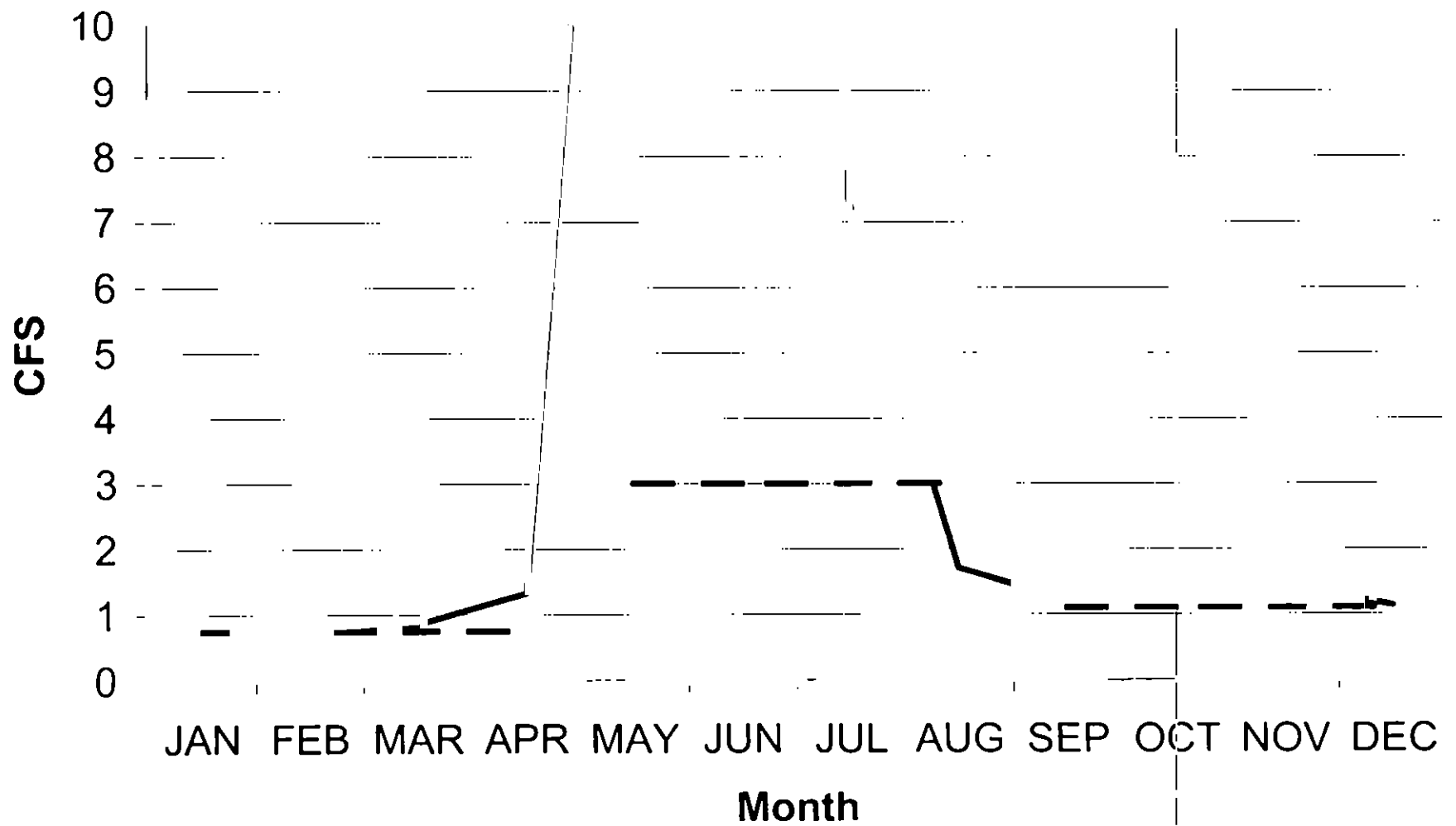
1984	16.75	83.6%
1985	19.45	108.7%
1986	16.03	89.6%
1987	13.23	74.0%
1988	18.22	101.8%
1989	18.32	102.4%
1990	no data	
1991	19.73	110.3%
1992	16.53	92.4%
1993	16.46	92.0%
1994	no data	

long-term ave 17.89

17.19111

96.1%

Estimated Stream Flow on Lester Creek



Station **MD FK FISH C NR BUFFALO PASS, CO.**
 Parameter **STREAM FLOW CFS**
 Year **1984-1995**
 State **CO**
 County **ROUTT**

ID **09238750**
 Statistic **Mean**
 Latitude **40 29 54**
 Longitude **106.41 30**
 Elevation
 Drainage Area **1 37**

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	341	310	341	330	341	330	341	341	330	341	330	341	4017
Avg Day	0 205	0 192	0 228	1 55	11 77	25 68	5 06	0 486	0 377	0 558	0 437	0 315	3 90
Max Day	0 450	0 500	0 700	66 00	56 00	97 00	65 00	2 80	3 20	3 10	1 40	0 570	97 00
Min Day	0	0	0 030	0 070	0 290	0 500	0 120	0 070	0 080	0 110	0 170	0	0
# Months	11	11	11	11	11	11	11	11	11	11	11	11	11
SDev Month	0 106	0 110	0 110	2 41	7 63	12 25	7 51	0 223	0 183	0 424	0 172	0 078	0 774
Skew Month	0 681	1 18	1 18	2 93	0 241	-0 362	2 56	0 165	-0 281	0 983	0 411	0 129	-0 208
Min Month	0 062	0 054	0 075	0 260	1 80	6 42	0 295	0 126	0 113	0 172	0 203	0 194	2 55
Max Month	0 426	0 453	0 474	8 56	24 41	42 13	25 90	0 827	0 577	1 38	0 727	0 449	4 94
Exceedences													
1%	0 450	0 500	0 652	29 10	44 59	79 70	57 59	2 16	2 34	2 66	1 10	0 550	50 00
5%	0 400	0 440	0 479	4 70	34 00	57 50	25 90	1 20	0 940	1 40	0 755	0 519	28 00
10%	0 340	0 320	0 350	3 00	29 00	50 00	14 00	0 947	0 800	1 19	0 690	0 450	13 00
20%	0 280	0 270	0 280	1 60	23 00	42 00	5 00	0 600	0 510	0 930	0 600	0 390	1 86
50%	0 200	0 170	0 200	0 360	7 10	25 00	1 70	0 380	0 250	0 340	0 380	0 300	0 350
80%	0 100	0 120	0 150	0 260	1 42	7 50	0 560	0 250	0 160	0 190	0 300	0 240	0 190
90%	0 031	0 040	0 110	0 230	0 450	3 10	0 390	0 160	0 130	0 160	0 230	0 190	0 150
95%	0 010	0 030	0 070	0 190	0 370	1 80	0 220	0 120	0 090	0 130	0 200	0 150	0 100
99%	0	0	0 054	0 070	0 302	0 860	0 144	0 090	0 080	0 114	0 190	0 104	0 020

Station **GRANITE C NR BUFFALO PASS, CO.**
 Parameter **STREAM FLOW CFS**
 Year **1984-1995**
 State **CO**
 County **ROUTT**

ID **09238770**
 Statistic **Mean**
 Latitude **40 29 35**
 Longitude **106 41 31**
 Elevation **9875 00**
 Drainage Area **2 82**

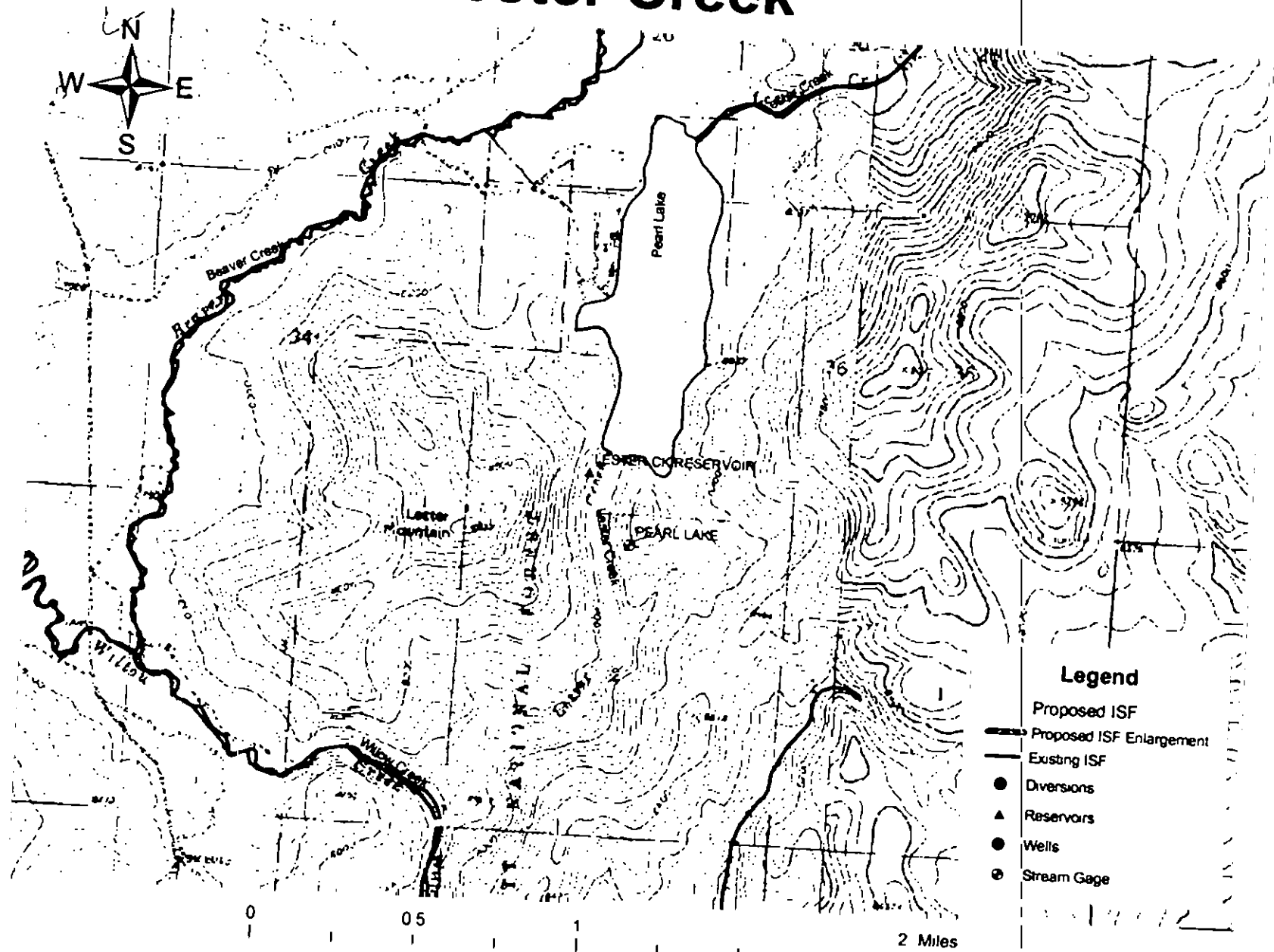
Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	341	310	341	330	341	330	341	341	330	341	330	341	4017
Avg Day	0 468	0 468	0 560	2 13	17 69	42 26	9 64	1 55	1 06	1 19	0 900	0 641	6 54
Max Day	0 900	0 760	1 60	40 00	80 00	126 0	69 00	7 50	6 50	5 50	2 70	1 20	126 0
Min Day	0 170	0 150	0 130	0 180	0 310	2 80	0 960	0 460	0 410	0 260	0 240	0 170	0 130
# Months	11	11	11	11	11	11	11	11	11	11	11	11	11
SDev Month	0 183	0 170	0 294	2 83	12 08	17 82	9 83	0 864	0 473	0 825	0 379	0 277	1 12
Skew Month	-0 349	-0 408	0 640	2 73	-0 091	0 231	1 71	0 794	0 678	0 639	0 125	0 191	0 091
Min Month	0 196	0 178	0 190	0 333	2 40	17 18	2 07	0 750	0 515	0 422	0 393	0 214	5 01
Max Month	0 729	0 706	1 16	10 20	34 35	71 40	32 97	2 95	2 05	2 50	1 47	1 15	8 21
Exceedences													
1%	0 900	0 760	1 60	35 00	75 18	103 0	61 59	6 54	5 44	4 96	2 21	1 20	73 83
5%	0 780	0 720	1 20	8 10	52 00	87 50	38 85	4 39	2 40	2 79	1 60	1 20	44 00
10%	0 700	0 690	0 978	3 50	45 00	76 00	29 80	3 30	1 90	2 40	1 40	1 00	24 00
20%	0 638	0 640	0 740	2 00	35 80	63 00	14 00	2 08	1 30	2 00	1 20	0 916	4 00
50%	0 470	0 480	0 530	0 720	8 65	40 00	4 60	1 10	0 820	0 730	0 800	0 630	0 800
80%	0 230	0 270	0 240	0 440	1 92	17 00	1 90	0 682	0 520	0 480	0 490	0 402	0 480
90%	0 190	0 230	0 191	0 320	0 900	10 00	1 30	0 610	0 480	0 430	0 430	0 221	0 360
95%	0 190	0 180	0 180	0 260	0 601	7 30	1 11	0 560	0 460	0 410	0 370	0 210	0 230
99%	0 170	0 160	0 140	0 230	0 404	3 59	0 984	0 488	0 430	0 314	0 278	0 184	0 180

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
58	1702	GLENNS DITCH & ALT PT	1	154	BRUCE CK OF LESTER CK	54		SW	NE	26	10 N	85 W	S	9	0.033	C	S	33603	33238	33146	0	51499.51407		91CW0102	1		0	AP @ GLENN'S DITCH ALT PT
58	1702	GLENNS DITCH & ALT PT	1	154	BRUCE CK OF LESTER CK	54		SW	NE	26	10 N	85 W	S	1	1	C	S,C	33603	33238	33146	0	51499.51407		91CW0102	2		0	AP @ GLENN'S DITCH ALT PT; DIL 98CW32
58	2130	GLENNS DITCH ALT PT	1	154	BRUCE CK OF LESTER CK	54		SW	NE	26	10 N	85 W	S	9	0.033	C	S,AP	33603	33238	33146	0	51499.51407		91CW0102	1		5801702	AP FOR GLENN'S DITCH
58	2130	GLENNS DITCH ALT PT	1	154	BRUCE CK OF LESTER CK	54		SW	NE	26	10 N	85 W	S	1	1	C	S,C,AP	33603	33238	33146	0	51499.51407		91CW0102	2		5801702	AP FOR GLENN'S DITCH; DIL 98CW32
58	3521	LESTER CK RESERVOIR	3	153	LESTER CK	54		SE	SW	35	10 N	85 W	S	6	5657	A	S	23466	20993	21675	0	39936	40	CA3538	1		0	
58	2265	LESTER CREEK MSF	0	153	LESTER CK	54		NW	NW	30	10 N	84 W	S	M	1	C	S	28490	28125	28391	0	46652		W1274-77	1		0	HEAD WATERS TO LESTER CK RESERVOIR
58	1878	BOAT HOUSE PUMP & PL	1	153	LESTER CK	54		SE	SW	26	10 N	85 W	S	1	0.17	C	S	35795	35430	26451	0	53691.44712		97CW0054	1		0	

Lester Creek



The upstream and downstream termini for the proposed in-stream flows are subject to change.