<u>Stream:</u> Lake Fork Middle Fork South Arkansas River

Executive Summary

Water Division: 2
Water District: 11
CDOW#: 29074
CWCB ID: 08/2/A-004

Segment: Headwaters to Inlet of Boss Lake
Upper Terminus: HEADWATERS IN THE VICINTY OF
(Latitude: 38º 33’ 38.35”N) (Longitude: 106º 20’ 32.03”W)

Lower Terminus: INLET OF BOSS LAKE AT
(Latitude: 38º 33’ 18.47”N) (Longitude: 106º 19’ 18.34”W)

Watershed: Arkansas Headwaters (HUC #: 11020001)
Counties: Chaffee
Length: 1.5 miles
USGS Quad(s): Garfield
Flow Recommendation: 1.75 cfs (May 1 – July 31)
0.75 cfs (August 1 – September 30)
0.20 cfs (October 1 – April 30)

Staff Analysis and Recommendation

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 5.40.

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

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

Lake Fork Middle Fork South Arkansas River is approximately 2.5 miles long. It begins on the east side of Bald Mountain at an elevation of approximately 11824 feet and terminates at the confluence with the Middle Fork South Arkansas River at an elevation of approximately 10875 feet. Of the 1.5 mile segment addressed by this report, approximately 100% of the segment, or 1.5 miles, is located on public lands. Lake Fork Middle Fork South Arkansas River is located within Chaffee County. The total drainage area of the river is approximately 1.24 square miles. The Lake Fork Middle Fork South Arkansas River generally flows in an easterly direction.

The subject of this report is a segment of the Lake Fork Middle Fork South Arkansas River beginning at its headwaters and extending downstream to Inlet of Boss Lake. The proposed segment is located west of the City of Salida. The recommendation for this segment is discussed below.

Instream Flow Recommendation(s)

The CDOW is recommending 1.75 cfs, summer, 0.75 cfs, late summer and 0.20 cfs, winter, based on their data collection efforts.

- 1.75 cubic feet per second is recommended is required to maintain the three principal hydraulic criteria of average depth, average velocity and percent wetted perimeter;
- 0.75 cubic feet per second is based on water availability limitations..
- 0.20 cubic feet per second is based on water availability limitations

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

Land Status Review

Upper Terminus	Lower Terminus	Total Length (miles)	Land Ownership	
			% Private	% Public
Headwaters	Inlet of Boss Lake	1.5	0%	100%

100% of the public lands are managed by the United States Forest Service (USFS)

Biological Data

The CDOW, in August of 2006, collected stream cross section information, natural environment data, and other data needed to quantify the instream flow needs for this reach of Lake Fork Middle Fork South Arkansas River. Lake Fork Middle Fork South Arkansas River is classified as a minor stream (between 4 to 9 feet wide) and fishery surveys indicate the stream environment of Lake Fork Middle Fork South Arkansas River supports Greenback cutthroat trout (*Oncorhynchus clarkii stomias*). Greenback cutthroat trout 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 currently state and federally listed as "Threatened".

Field Survey Data & Biological Flow Quantification

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.

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

For this segment of stream, 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, 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: Lake Fork Middle Fork South Arkansas River R2Cross Summary

			Confidence Intervals	Recommended Flows (cfs)	
Party	**Date**	**Q (cfs)**	**250% - 40%**	**Summer (3/3)**	**Winter (2/3)**
DOW	8/10/2006	1.74	4.3 - 0.7	1.75	1.35

Dow = Division of Wildlife

The summer flow recommendation, which met 3 of 3 criteria and is within the accuracy range of the R2CROSS model is 1.75 cfs (See Table 1). The late summer flow recommendation, which is based on water availability limitations, is 0.75 cfs. The winter flow recommendation, which is based on water availability limitations, is 0.20 cfs (See Table 1).

Hydrologic Data and Analysis

After receiving the cooperating agency's biologic recommendation, the CWCB staff conducted an evaluation of the stream hydrology to determine if water was physically available for an instream flow appropriation. This evaluation was done through a computation that is, in essence, a "water balance". In concept a "water balance" computation can be viewed as an accounting exercise. When done in its most rigorous form, the water balance parses precipitation into all the avenues water pursues after it is deposited as rain, snow, or ice. In other words, given a specified amount of water deposition (input), the balance tries to account for all water depletions (losses) until a selected end point is reached. Water losses include depletions due to evaporation and transpiration, deliveries into ground water storage, temporary surface storage, incorporations into plant and animal tissue and so forth. These losses are individually or collectively subtracted from the input to reveal the net amount of stream runoff as represented by the discharge measured by stream gages. Of course, the measured stream flow need not be the end point of interest; indeed, when looking at issues of water use to extinction stream flow measurements may only describe intermediate steps in the complex accounting process that is a water balance carried out to a net value of zero.

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

The first step required in determining water availability is a determination of the hydrologic regime at the Lower Terminus (LT) of the recommended ISF reach. In the best case this means looking at the data from a gage at the LT. Further, this data, in the best case, has been collected for a long period of time (the longer the better) including wet and dry periods. In the case of **Lake Fork Middle Fork South Arkansas River** no such gage is available at the LT. In fact, there is no gage on Lake Fork Middle Fork South Arkansas River. It is thus necessary to describe the normal flow regime at the Lake Fork Middle Fork South Arkansas River LT through a "representative" gage station. The gage station selected for this was CHALK CREEK (LOWER) NEAR ST. ELMO, CO (USGS 07090500), a gage with a 5 year period of record (POR) collected between 1911 and 1916.[1] The gage is at an elevation of 9,000 ft above mean sea level (amsl) and has a drainage area of 83 mi^2. The hydrograph (plot of discharge over time) produced by this gage includes the consumptive uses of several upstream diversions. To make the measured data transferable to Lake Fork Middle Fork South Arkansas River the consumptive portions of these upstream diversions were added back to the measured hydrograph. The resulting adjusted hydrograph was then used on Lake Fork Middle Fork South Arkansas River by multiplying the adjusted Chalk Creek (lower) near St. Elmo discharge values (hydrograph) by the ratio of Lake Fork Middle Fork South Arkansas River basin area (1.24 mi^2 above the LT) to Chalk Creek (lower) near St. Elmo, CO basin area (83 mi^2). There was no need to further adjust the resulting proportioned hydrograph due to the absence of upstream diversions for consumptive irrigation.

The following hydrograph depicts the mean monthly discharge of Lake Fork Middle Fork South Arkansas River (proportioned off Chalk Creek (lower) near St. Elmo, CO). Included in the hydrograph are the recommended ISF values. The data used in the creation of this hydrograph are displayed in Table #2.

[1] The gage record is longer than shown (1949 to 2006). However, much of the data is of no value because the station was moved in the late 1960's or early 1970's a distance roughly 4.6 miles downstream.

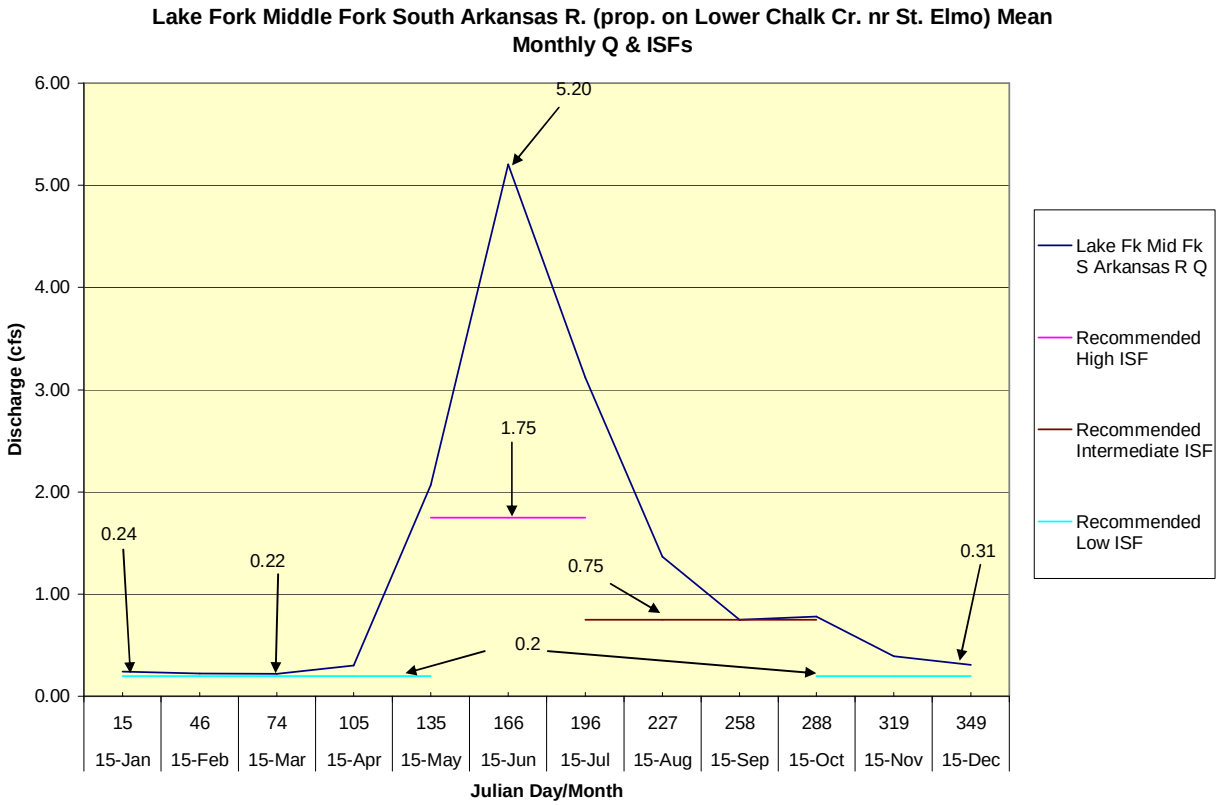

Table 2 – Mean Monthly Discharge and Recommended Instream Flows – Lake Fork Middle Fork South Arkansas River

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	Julian Day	Lk Fk M Fk S Ark	Recommended ISFs
15-Jan	15	0.24	0.20
15-Feb	46	0.22	0.20
15-Mar	74	0.22	0.20
15-Apr	105	0.30	0.20
30-Apr	120	0.30	0.20
1-May	121	2.07	1.75
15-May	135	2.07	1.75
15-Jun	166	5.20	1.75
15-Jul	196	3.12	1.75
31-Jul	212	3.12	1.75
1-Aug	213	1.36	0.75
15-Aug	227	1.36	0.75
15-Sep	258	0.75	0.75
30-Sep	273	0.75	0.75
1-Oct	274	0.78	0.20
15-Oct	288	0.78	0.20
15-Nov	319	0.39	0.20
15-Dec	349	0.31	0.20

Existing Water Right Information

Staff has analyzed the water rights tabulation to identify any potential water availability problems. Records indicate that there are no surface water diversions that are located within this reach of Lake Fork Middle Fork South Arkansas River. Based on this analysis staff has determined that water is available for appropriation on Lake Fork Middle Fork South Arkansas River, from the Headwaters to the inlet of Boss Lake, to preserve the natural environment to a reasonable degree without limiting or foreclosing the exercise of valid existing water rights.

CWCB Staff's Instream Flow Recommendation

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

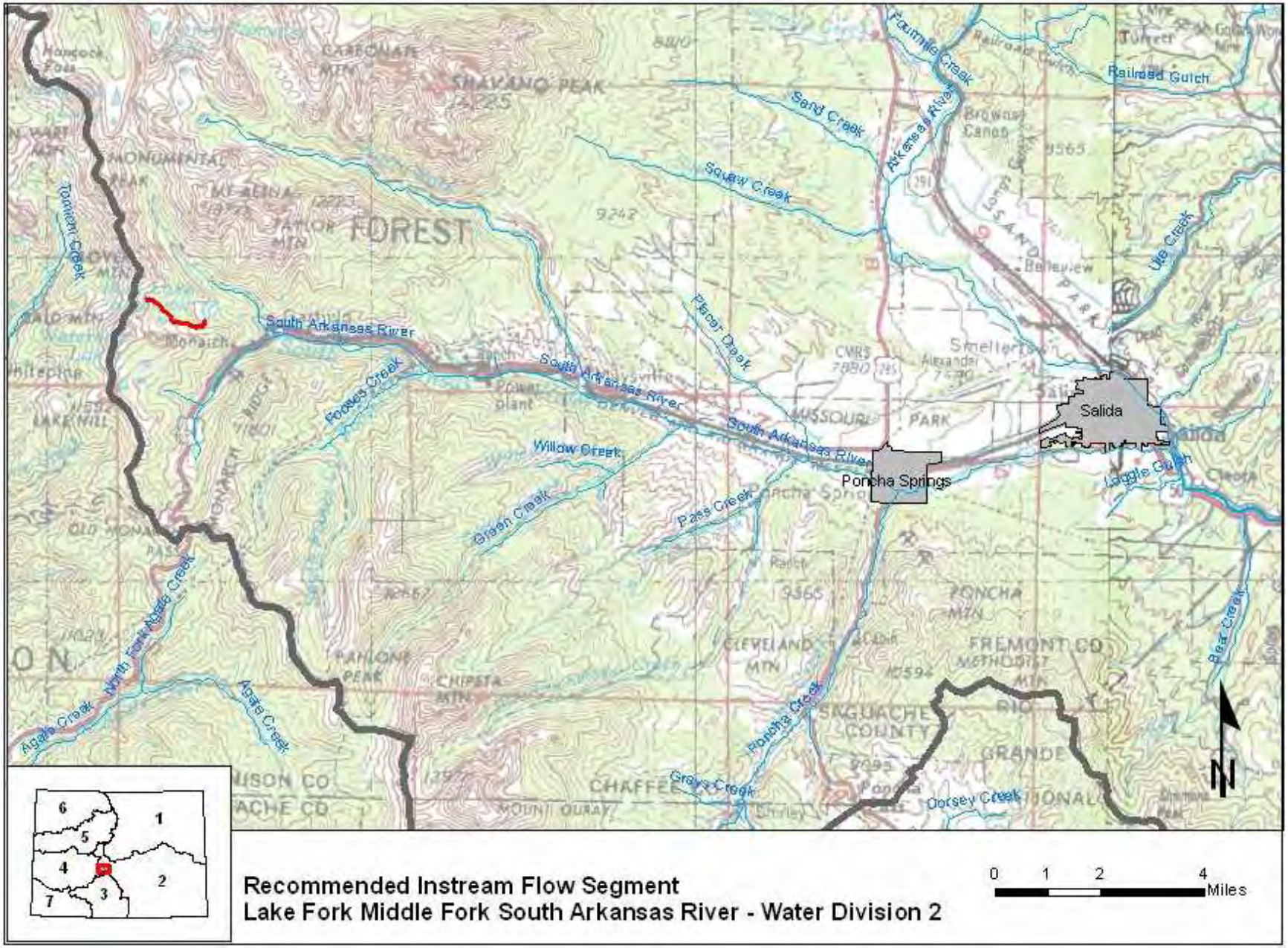
Segment: Headwaters to Inlet of Boss Lake

Upper Terminus: HEADWATERS IN THE VICINTY OF
(Latitude: 38º 33' 38.35"N) (Longitude: 106º 20' 32.03"W)
UTM = 4268877.5 N UTM = 383056.2 E
SW NE S30 T50N R6E NMPM
1535' South of the North Section Line; 1310' West of the East Section Line

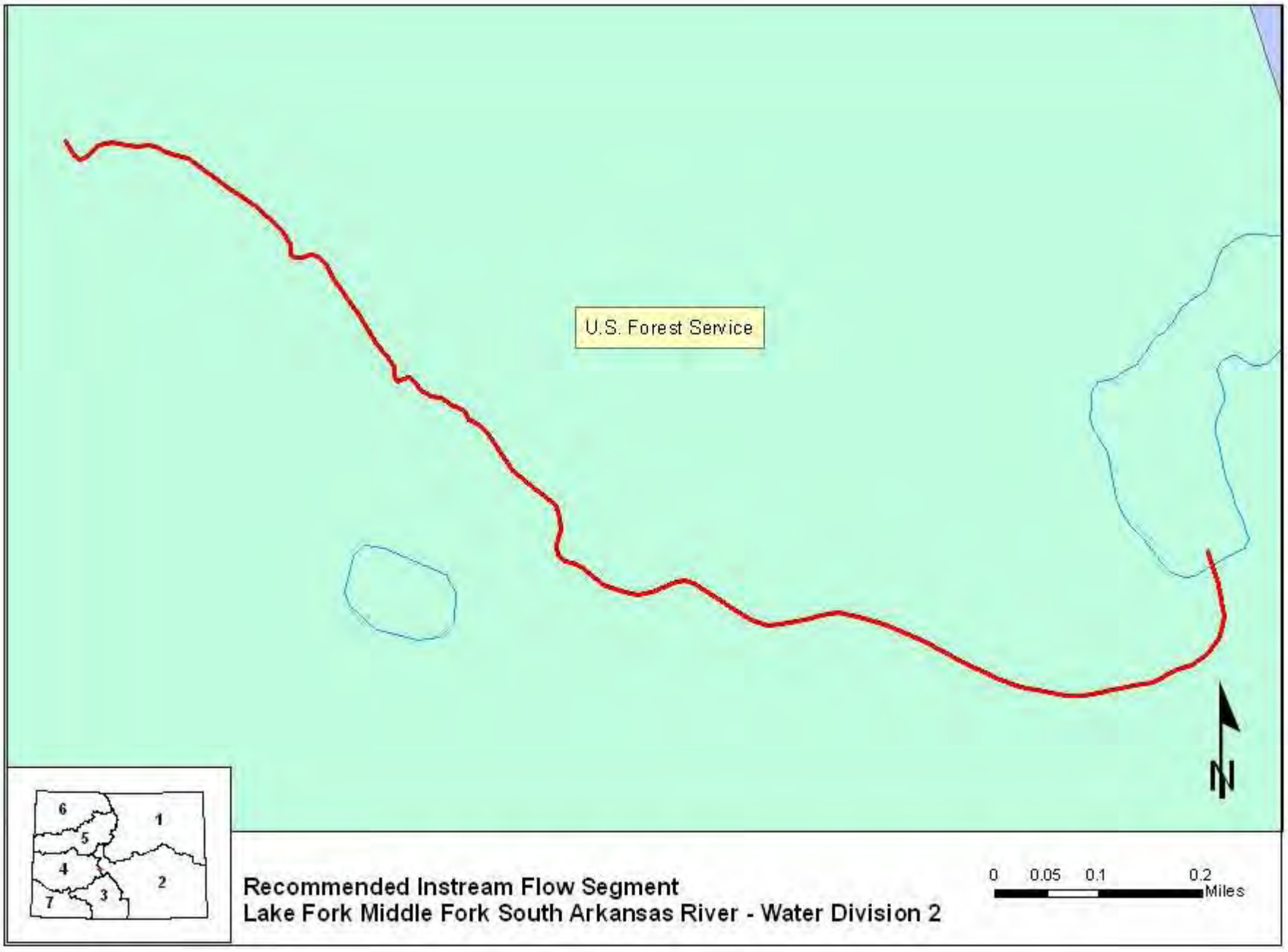
Lower Terminus: INLET OF BOSS LAKE AT
(Latitude: 38º 33' 18.47"N) (Longitude: 106º 19' 18.34"W)
UTM = 4268238.9 N UTM = 384830.8 E
NE SW S29 T50N R6E NMPM
1620' North of the South Section Line; 580' West of the East Section Line

Watershed: Arkansas Headwaters (HUC #: 11020001)
Counties: Chaffee
Length: 1.5 miles
USGS Quad(s): Garfield
Flow Recommendation: 1.75 cfs (May 1 – July 31)
0.75 cfs (August 1 – September 30)
0.20 cfs (October 1 – April 30)

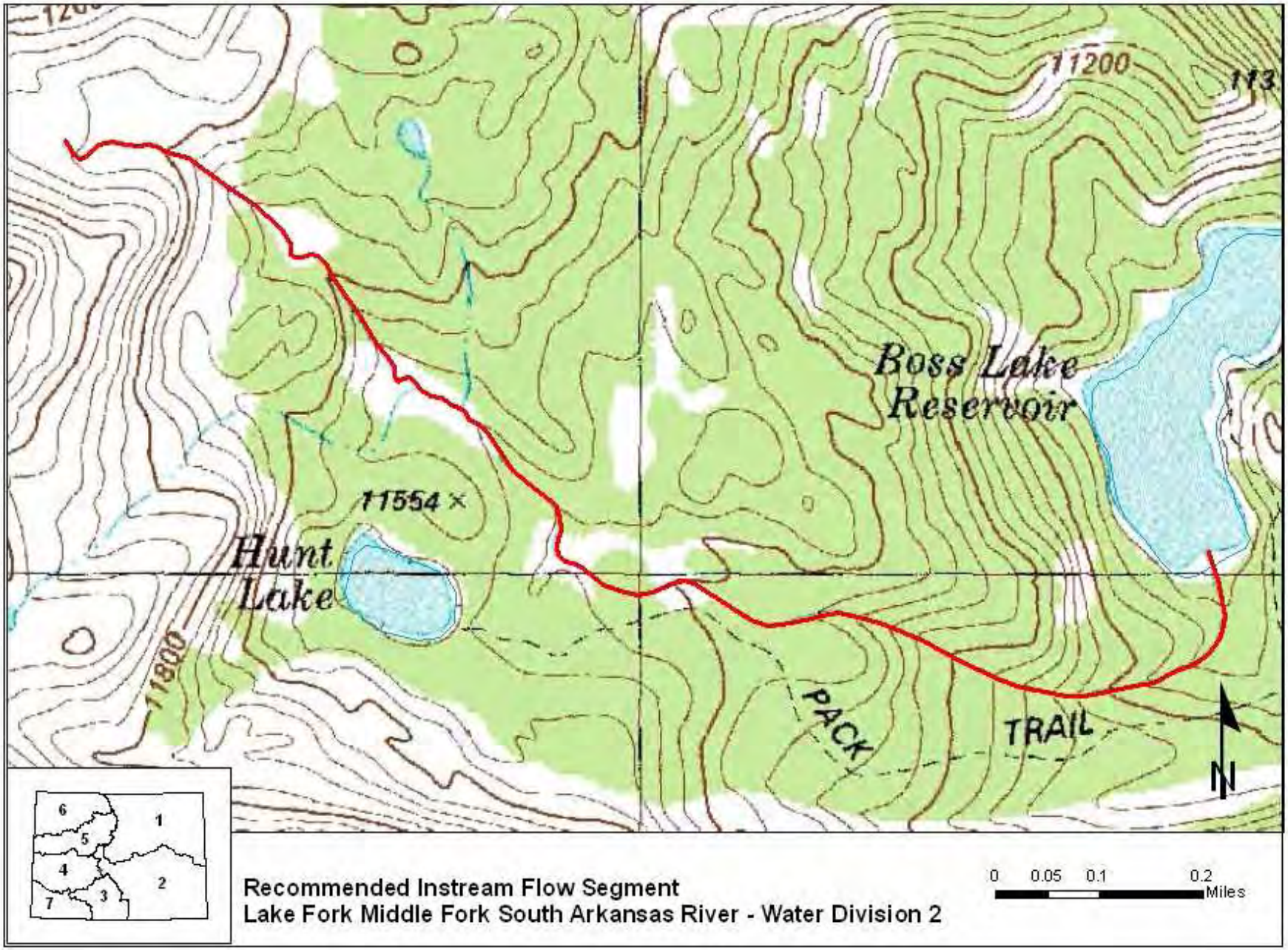
Vicinity Map



Land Use Map


U.S. Forest Service
N
6
1
5
4
2
3
7
Recommended Instream Flow Segment
Lake Fork Middle Fork South Arkansas River - Water Division 2
0
0.05
0.1
0.2
Miles

Topographic & Water Rights Map



STATE OF COLORADO

Bill Ritter, Jr., Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER

Bruce McCloskey, Director
6060 Broadway
Denver, Colorado 80216
Telephone: (303) 297-1192
wildlife.state.co.us

For Wildlife-
For People

February 20, 2007

Mr. Jeff Baessler 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 Lake Fork Middle Fork South Arkansas River.

Dear Jeff and Todd,

The purpose of this letter and attached report is to formally transmit the Colorado Division of Wildlife's (CDOW) Instream Flow Recommendations for the Lake Fork segment of the Middle Fork segment of the South Arkansas River. The CDOW has collected data, including stream cross section information and natural environment data, needed to quantify the instream flow requirements for this reach of the Lake Fork Middle Fork South Arkansas River identified in the report to preserve the natural environment to a reasonable degree. In addition, CDOW staff has conducted a preliminary evaluation of the stream hydrology to determine if water is physically available for an instream flow appropriation. The Lake Fork Middle Fork South Arkansas River should be considered for inclusion into the Instream Flow Program (ISFP) because it has a natural environment that can be preserved to a reasonable degree with an instream flow water right.

The State of Colorado's ISFP was created in 1973 when the Colorado State Legislature recognized "the need to correlate the activities of mankind with some reasonable preservation of the natural environment" (See §37-92-102 (3) C.R.S.). The statute vests the Colorado Water Conservation Board (Board) with the exclusive authority to appropriate and acquire instream flow and natural lake level water rights. In order to encourage other entities to participate in Colorado's ISFP, the statute directs the Board to request instream flow recommendations from other state and federal agencies. The CDOW is recommending this segment of the Lake Fork Middle Fork South Arkansas River to the Board for inclusion into the ISFP.

The CDOW is forwarding this instream flow recommendation to the Board to meet Colorado's policy "... that the wildlife and their environment are to be protected, preserved, enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its visitors ... and that, to carry out such

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

This stream reach is important to the CDOW and Colorado because it supports a naturally reproducing population of Greenback cutthroat trout (*Oncorhynchus clarkii stomias*). Greenback cutthroat trout are currently considered a state and federal "Threatened" species. This species inhabits cold water streams and lakes with adequate stream spawning habitat present in the spring of the year. A Greenback Cutthroat Trout Recovery Plan has been developed by an interagency group of scientists operating under the sponsorship of the U.S. Fish and Wildlife Service. Instream flow maintenance has been identified in the Recovery Plan as an important tool in the recovery of the species.

The information contained in the attached report forms the basis for the instream flow recommendation to be considered by the Board. It is the CDOW staff's opinion that the information is sufficient for the Board's staff to begin the investigations required to support the findings required in Rule 5 (i) of the Instream Flow Rules.

If you have any questions regarding the attached report or the instream flow recommendations, please contact me at (303)-291-7267.

Sincerely,

Mark Uppendahl
Colorado Division of Wildlife
Instream Flow Program Coordinator

Cc: Grady McNeill, CDOW Resource Support Section Manager – w/o attachments
Jay Skinner, CDOW Water Unit Program Manager – w/o attachments
John Tonko, CDOW SE Water Resource Specialist – w/o attachments
Doug Krieger, CDOW Senior Fish Biologist – Southeast Region – w/o attachments
Greg Policky, CDOW Aquatic Biologist – w/o attachments
Jim Aragon, CDOW AWM Area 13 – w/o attachments
Ron Dobson, CDOW DWM District 261 – w/o attachments

Appendix - B

Field Data

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

LOCATION INFORMATION

STREAM NAME:	Lake Fork Middle Arkansas River
XS LOCATION:	100 yds u/s of Boss Lake
XS NUMBER:	1
DATE:	10-Aug-06
OBSERVERS:	Uppendahl
1/4 SEC:	0
SECTION:	0
TWP:	0
RANGE:	0
PM:	0
COUNTY:	CHAFFEE
WATERSHED:	ARKANSAS
DIVISION:	2
DOW CODE:	0
USGS MAP:	Garfield
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:	0.04613861

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

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

STREAM NAME: Lake Fork Middle Arkansas River
XS LOCATION: 100 yds u/s of Boss Lake
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
TS	0.00	6.19			0.00		0.00	0.00	0.0%
BS	0.01	7.40			0.00		0.00	0.00	0.0%
	1.40	7.25			0.00		0.00	0.00	0.0%
1 GL	2.00	7.25			0.00		0.00	0.00	0.0%
	2.60	7.40			0.00		0.00	0.00	0.0%
	3.00	7.50			0.00		0.00	0.00	0.0%
WL	3.10	8.31	0.00	0.00	0.00		0.00	0.00	0.0%
	3.50	8.36	0.05	0.05	0.40	0.05	0.02	0.00	0.1%
	4.00	8.36	0.05	0.50	0.50	0.05	0.03	0.01	0.7%
	4.50	8.51	0.20	0.41	0.52	0.20	0.10	0.04	2.4%
	5.00	8.41	0.10	0.85	0.51	0.10	0.05	0.04	2.4%
	5.50	8.41	0.10	0.17	0.50	0.10	0.05	0.01	0.5%
TR	6.00	8.32	0.01	0.05	0.51	0.01	0.01	0.00	0.0%
	6.50	8.46	0.15	1.21	0.52	0.15	0.06	0.07	4.2%
	6.80	8.51	0.20	1.70	0.30	0.20	0.06	0.10	5.9%
	7.10	8.56	0.25	1.11	0.30	0.25	0.08	0.08	4.8%
	7.40	8.66	0.35	0.85	0.32	0.35	0.11	0.09	5.1%
	7.70	8.81	0.50	1.67	0.34	0.50	0.15	0.25	14.4%
	8.00	8.81	0.50	1.36	0.30	0.50	0.15	0.20	11.7%
	8.30	8.81	0.50	1.45	0.30	0.50	0.15	0.22	12.5%
	8.60	8.91	0.60	2.01	0.32	0.60	0.18	0.36	20.8%
	8.90	8.51	0.20	2.03	0.50	0.20	0.06	0.12	7.0%
	9.20	8.51	0.20	1.30	0.30	0.20	0.06	0.08	4.5%
	9.50	8.51	0.20	0.86	0.30	0.20	0.06	0.05	3.0%
	9.80	8.36	0.05	0.00	0.34	0.05	0.01	0.00	0.0%
WL	10.00	8.32	0.00	0.00	0.20		0.00	0.00	0.0%
	10.10	7.51			0.00		0.00	0.00	0.0%
1 GL	10.50	7.25			0.00		0.00	0.00	0.0%
	11.00	6.90			0.00		0.00	0.00	0.0%
	13.00	6.26			0.00		0.00	0.00	0.0%
S	13.50	6.20			0.00		0.00	0.00	0.0%
TOTALS ----------					7.28	0.6 (Max.)	1.38	1.74	100.0%

Manning's n = 0.0831
Hydraulic Radius= 0.188930494

STREAM NAME: Lake Fork Middle Arkansas River
XS LOCATION: 100 yds u/s of Boss Lake
XS NUMBER: 1

WATER LINE COMPARISON TABLE

WATER LINE	MEAS AREA	COMP AREA	AREA ERROR
	1.38	1.34	-2.4%
8.07	1.38	3.07	123.6%
8.09	1.38	2.94	113.5%
8.11	1.38	2.80	103.3%
8.13	1.38	2.66	93.2%
8.15	1.38	2.52	83.1%
8.17	1.38	2.38	73.0%
8.19	1.38	2.24	63.0%
8.21	1.38	2.10	52.9%
8.23	1.38	1.96	42.8%
8.25	1.38	1.83	32.7%
8.27	1.38	1.69	22.7%
8.28	1.38	1.62	17.7%
8.29	1.38	1.55	12.6%
8.30	1.38	1.48	7.6%
8.31	1.38	1.41	2.6%
8.32	1.38	1.34	-2.4%
8.33	1.38	1.27	-7.4%
8.34	1.38	1.21	-12.2%
8.35	1.38	1.14	-16.8%
8.36	1.38	1.08	-21.3%
8.37	1.38	1.03	-25.4%
8.39	1.38	0.92	-33.0%
8.41	1.38	0.82	-40.2%
8.43	1.38	0.74	-46.4%
8.45	1.38	0.66	-52.0%
8.47	1.38	0.59	-57.2%
8.49	1.38	0.52	-62.0%
8.51	1.38	0.46	-66.3%
8.53	1.38	0.42	-69.5%
8.55	1.38	0.38	-72.3%
8.57	1.38	0.34	-74.9%

WATERLINE AT ZERO
AREA ERROR = 8.310

STREAM NAME: Lake Fork Middle Arkansas River
XS LOCATION: 100 yds u/s of Boss Lake
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"	7.25	9 89	0.92	1.66	9 10	11.97	100.0%	0.76	29 13	3.20
	7.31	9 00	0.95	1.60	8.54	10.99	91.8%	0.78	27.69	3.24
	7.36	8.26	0 98	1.55	8.10	10 17	85.0%	0.80	26.74	3.30
	7.41	7 61	1 01	1.50	7.71	9.46	79 1%	0.81	25.82	3.35
	7.46	7.34	1 00	1 45	7.33	9.17	76.6%	0.80	24.28	3.31
	7.51	7.10	0.98	1 40	6.97	8.90	74 4%	0.78	22.78	3.26
	7.56	7.09	0.93	1.35	6 62	8.80	73.5%	0.75	21.03	3.18
	7.61	7 07	0 89	1.30	6 27	8.70	72.7%	0 72	19 33	3.09
	7 66	7.06	0.84	1.25	5 91	8.60	71.8%	0.69	17.69	2 99
	7.71	7 05	0.79	1.20	5.56	8.50	71.0%	0.65	16 09	2.89
	7.76	7 04	0.74	1.15	5.21	8.40	70.2%	0.62	14.54	2.79
	7.81	7.02	0.69	1.10	4.86	8.30	69.3%	0.59	13.05	2.69
	7.86	7.01	0.64	1.05	4.51	8 19	68.5%	0.55	11.61	2.58
	7.91	7.00	0.59	1.00	4.16	8.09	67 6%	0.51	10.23	2.46
	7.96	6.99	0 54	0.95	3.81	7.99	66.8%	0 48	8.91	2.34
	8.01	6.98	0.50	0.90	3.46	7 89	66.0%	0.44	7 65	2.21
	8.06	6.96	0.45	0 85	3.11	7.79	65 1%	0.40	6.47	2.08
	8.11	6.95	0.40	0.80	2 76	7.69	64.3%	0.36	5.35	1.94
	8 16	6.94	0.35	0.75	2.41	7.59	63.4%	0 32	4.32	1.79
	8.21	6.93	0.30	0 70	2.07	7.49	62.6%	0.28	3.36	1.63
	8 26	6.91	0.25	0 65	1.72	7.39	61.7%	0.23	2.50	1.45
"WL"	8.31	6.90	0.20	0.60	1.37	7.29	60.9%	0.19	1.74	1.26
	8.36	5.43	0 19	0.55	1 05	5.79	48.4%	0.18	1 29	1.23
	8.41	4.21	0.19	0.50	0 80	4.54	37.9%	0.18	0.96	1.20
	8.46	3 51	0.17	0.45	0.60	3.81	31.9%	0.16	0.68	1.12
	8.51	2 10	0.21	0 40	0.45	2.37	19.8%	0.19	0.57	1.27
	8.56	1.76	0 20	0.35	0.35	2.00	16.8%	0.18	0 43	1.21
	8.61	1.57	0.17	0.30	0 27	1.78	14.9%	0.15	0.29	1 09
	8.66	1.39	0.14	0.25	0.20	1.56	13.1%	0.13	0.19	0.96
	8.71	1.25	0.10	0.20	0.13	1.39	11.6%	0.09	0.10	0.79
	8 76	1.11	0.06	0.15	0.07	1.21	10.2%	0.06	0.04	0.58
	8.81	0.37	0.05	0.10	0.02	0.44	3.7%	0.04	0.01	0.47
	8.86	0 19	0.02	0.05	0.00	0 22	1.8%	0.02	0.00	0.29

3/3 → 1.75
2/3 → 1.35

STREAM NAME: Lake Fork Middle Arkansas River
XS LOCATION: 100 yds u/s of Boss Lake
XS NUMBER: 1

SUMMARY SHEET

MEASURED FLOW (Qm)=	1.74	cfs
CALCULATED FLOW (Qc)=	1.74	cfs
(Qm-Qc)/Qm * 100 =	0 1	%
MEASURED WATERLINE (WLm)=	8.32	ft
CALCULATED WATERLINE (WLc)=	8 31	ft
(WLm-WLc)/WLm * 100 =	0.1	%
MAX MEASURED DEP TH (Dm)=	0 60	ft
MAX CALCULATED DEPTH (Dc)=	0 60	ft
(Dm-Dc)/Dm * 100	0.0	%
MEAN VELOCITY=	1.26	ft/sec
MANNING'S N=	0.083	
SLOPE=	0 04613861	ft/ft
.4 * Qm =	0 7	cfs
2.5 * Qm=	4.3	cfs

RECOMMENDED INSTREAM FLOW:

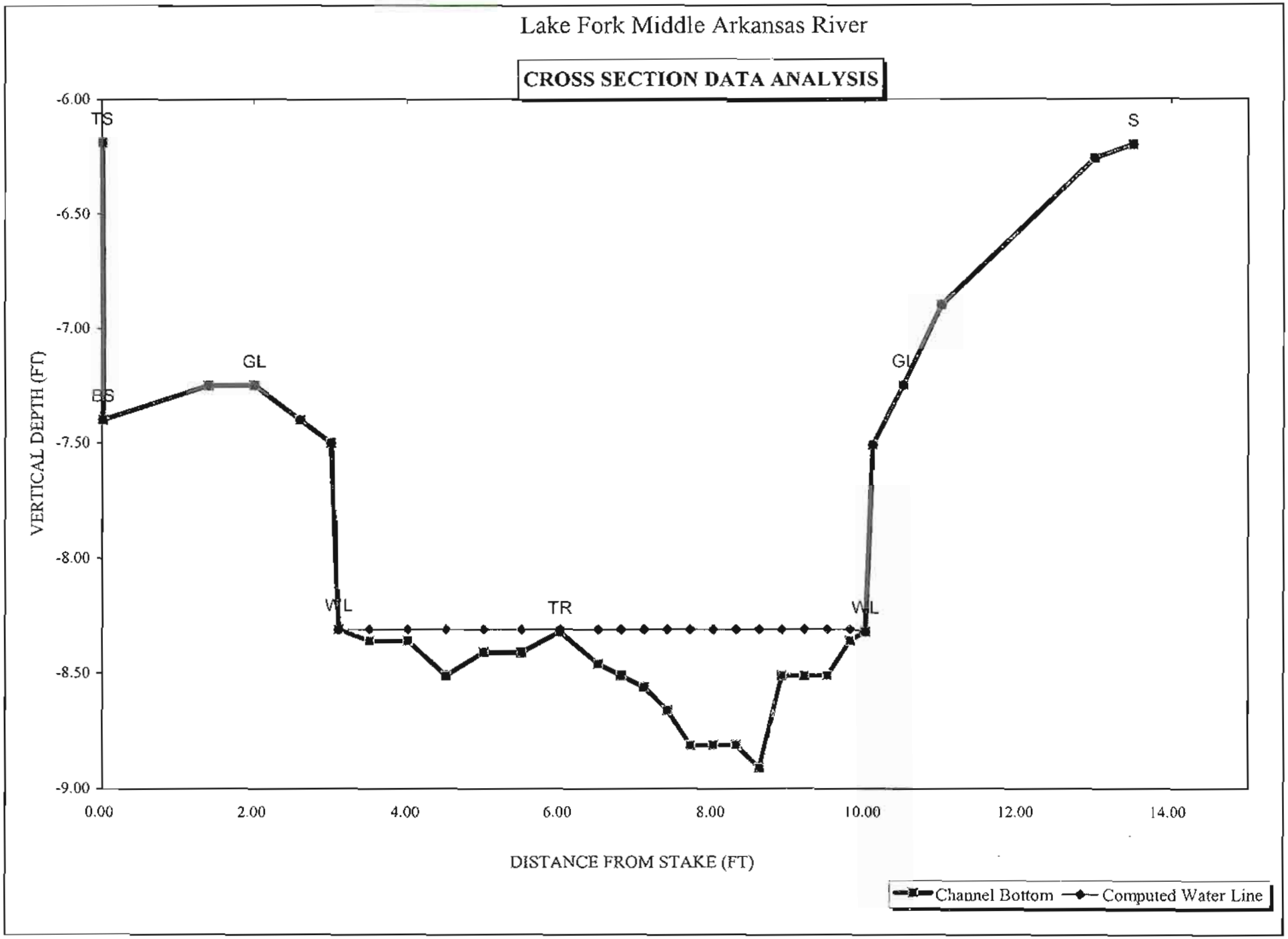
FLOW (CFS)	PERIOD

RATIONALE FOR RECOMMENDATION:

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

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

Lake Fork Middle Arkansas River



Data Input & Proofing

STREAM NAME: Lake Fork Middle Arkansas River
XS LOCATION: 100 yds u/s of Boss Lake
XS NUMBER: 1
DATE: 8/10/2006
OBSERVERS: Uppendahl

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

COUNTY: CHAFFEE
WATERSHED: ARKANSAS
DIVISION: 2
DOW CODE:
USGS MAP: Garfield
USFS MAP:

Level and Rod Survey

TAPE WT: 0.0106 lbs / ft
TENSION: 99999 lbs

SLOPE: 0.046138614 ft / ft

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

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

Total Data Points = 31

GL=1	FEATURE	DIST	VERT DEPTH	WATER DEPTH	VEL	A	Q	Tape to Water
	TS	0.00	6.19			0.00	0.00	0.00
	BS	0.01	7.40			0.00	0.00	0.00
		1.40	7.25			0.00	0.00	0.00
1	GL	2.00	7.25			0.00	0.00	0.00
		2.60	7.40			0.00	0.00	0.00
		3.00	7.50			0.00	0.00	0.00
	WL	3.10	8.31	0.00	0.00	0.00	0.00	0.00
		3.50	8.36	0.05	0.05	0.02	0.00	8.31
		4.00	8.36	0.05	0.50	0.03	0.01	8.31
		4.50	8.51	0.20	0.41	0.10	0.04	8.31
		5.00	8.41	0.10	0.85	0.05	0.04	8.31
		5.50	8.41	0.10	0.17	0.05	0.01	8.31
	TR	6.00	8.32	0.01	0.05	0.01	0.00	8.31
		6.50	8.46	0.15	1.21	0.06	0.07	8.31
		6.80	8.51	0.20	1.70	0.06	0.10	8.31
		7.10	8.56	0.25	1.11	0.08	0.08	8.31
		7.40	8.66	0.35	0.85	0.11	0.09	8.31
		7.70	8.81	0.50	1.67	0.15	0.25	8.31
		8.00	8.81	0.50	1.36	0.15	0.20	8.31
		8.30	8.81	0.50	1.45	0.15	0.22	8.31
		8.60	8.91	0.60	2.01	0.18	0.36	8.31
		8.90	8.51	0.20	2.03	0.06	0.12	8.31
		9.20	8.51	0.20	1.30	0.06	0.08	8.31
		9.50	8.51	0.20	0.86	0.06	0.05	8.31
		9.80	8.36	0.05	0.00	0.01	0.00	8.31
	WL	10.00	8.32	0.00	0.00	0.00	0.00	0.00
		10.10	7.51			0.00	0.00	0.00
1	GL	10.50	7.25			0.00	0.00	0.00
		11.00	6.90			0.00	0.00	0.00
		13.00	6.26			0.00	0.00	0.00
	S	13.50	6.20			0.00	0.00	0.00
					Totals	1.38	1.74	

COLORADO WATER CONSERVATION BOARD

FIELD DATA FOR INSTREAM FLOW DETERMINATIONS

LOCATION INFORMATION

STREAM NAME: LAKE FK of Middle FK					CROSS-SECTION NO.: 1
CROSS-SECTION LOCATION: 100 YDS us OF Boss Lake					
WP# 45 38 33 16.7 105 19 16.9					
DATE: 8/10/00	OBSERVERS: Uppendahl				
LEGAL DESCRIPTION	¼ SECTION:	SECTION:	TOWNSHIP: N/S	RANGE: E/W	PM:
COUNTY: Chaffee	WATERSHED: Arkansas	WATER DIVISION: 2	DOW WATER CODE:		
MAP(S): USGS: Garfield					
USFS:					

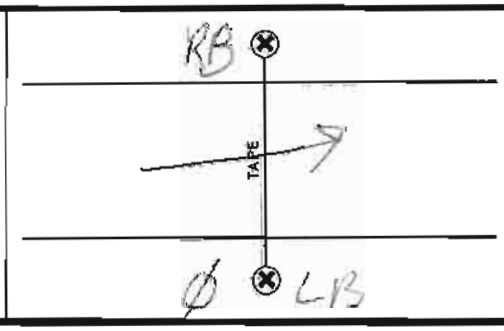
SUPPLEMENTAL DATA

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

CHANNEL PROFILE DATA

STATION	DISTANCE FROM TAPE (ft)	ROD READING (ft)
⊗ Tape @ Stake LB	0.0	
⊗ Tape @ Stake RB	0.0	
① WS @ Tape LB/RB	0.0	8.31 / 8.32
② WS Upstream	28.0	6.91
③ WS Downstream	22.5	9.24
SLOPE	2.33 / 50.5 =	

SKETCH



LEGEND: Stake ⊗ · Station ① · Photo ① · Direction of Flow

AQUATIC SAMPLING SUMMARY

STREAM ELECTROFISHED: YES/NO	DISTANCE ELECTROFISHED: 0 ft	FISH CAUGHT: YES/NO	WATER CHEMISTRY SAMPLED: YES/NO

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

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

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

COMMENTS

FORM #ISF FD 1-85

STREAM NAME: Lake Fork Middle Arkansas River
XS LOCATION: 100 yds u/s of Boss Lake
XS NUMBER: 1

Thorne-Zevenbergen D84 Correction Applied
Estimated D84 = 0 33

STAGING TABLE

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

Velocity based on test of R/D84>1

	DIST TO WATER (FT)	TOP WIDTH (FT)	AVG. DEPTH (FT)	MAX. DEPTH (FT)	AREA (SQ FT)	WETTED PERIM. (FT)	PERCENT WET PERIM (%)	HYDR RADIUS (FT)	FLOW (CFS)	AVG. VELOCITY (FT/SEC)
"GL"	7.25	9.89	0.92	1.66	9.10	11.97	100.0%	0.76	53.00	5.82
	7.31	9.00	0.95	1.60	8.54	10.99	91.8%	0.78	50.28	5.89
	7.36	8.26	0.98	1.55	8.10	10.17	85.0%	0.80	48.49	5.98
	7.41	7.61	1.01	1.50	7.71	9.46	79.1%	0.81	46.75	6.06
	7.46	7.34	1.00	1.45	7.33	9.17	76 6%	0.80	43.64	5.95
	7.51	7.10	0.98	1.40	6.97	8.90	74.4%	0.78	40.60	5.82
	7.56	7.09	0.93	1.35	6.62	8.80	73.5%	0.75	37.08	5.60
	7.61	7.07	0.89	1.30	6.27	8.70	72.7%	0.72	33.68	5.37
	7.66	7.06	0.84	1.25	5.91	8.60	71.8%	0.69	30.40	5.14
	7.71	7.05	0.79	1.20	5.56	8.50	71.0%	0.65	27.25	4.90
	7.76	7.04	0.74	1.15	5.21	8.40	70.2%	0.62	24.23	4.65
	7.81	7.02	0.69	1.10	4.86	8.30	69.3%	0.59	21.35	4.40
	7 86	7.01	0.64	1.05	4.51	8.19	68.5%	0.55	18.62	4.13
	7.91	7.00	0.59	1.00	4.16	8.09	67.6%	0.51	16.04	3.86
	7.96	6.99	0.54	0.95	3.81	7.99	66.8%	0.48	13.61	3.58
	8.01	6.98	0.50	0.90	3.46	7.89	66.0%	0.44	11.34	3.28
	8.06	6.96	0.45	0.85	3.11	7.79	65.1%	0.40	9.25	2.98
	8.11	6.95	0.40	0.80	2.76	7.69	64.3%	0.36	7.34	2.66
	8.16	6.94	0.35	0.75	2.41	7.59	63.4%	0.32	7.11	2.95
	8.21	6.93	0.30	0.70	2.07	7.49	62.6%	0.28	4.72	2.28
	8.26	6.91	0.25	0.65	1.72	7.39	61.7%	0 23	2.97	1.73
"WL"	8.31	6.90	0.20	0.60	1.37	7.29	60.9%	0.19	1.74	1.26
	8.36	5.43	0.19	0.55	1.05	5.79	48.4%	0.18	1.27	1.21
	8.41	4.21	0.19	0.50	0.80	4.54	37.9%	0.18	0.92	1.16
	8.46	3.51	0.17	0.45	0.60	3.81	31.9%	0.16	0.60	0.99
	8.51	2.10	0.21	0.40	0.45	2.37	19.8%	0.19	0.61	1.35
	8.56	1.76	0.20	0.35	0.35	2.00	16.8%	0.18	0.42	1.18
	8.61	1.57	0.17	0.30	0.27	1.78	14.9%	0.15	0.24	0.88
	8.66	1.39	0.14	0.25	0.20	1.56	13.1%	0.13	0.12	0.62
	8.71	1.25	0.10	0.20	0.13	1.39	11.6%	0.09	0.05	0.38
	8.76	1.11	0.06	0.15	0.07	1.21	10.2%	0.06	0.01	0.19
	8.81	0.37	0.05	0.10	0.02	0.44	3.7%	0.04	0.00	0.07
	8.86	0.19	0.02	0.05	0.00	0.22	1.8%	0 02	0.00	0.02

Lk. Fk. Mid Fk. S. Arkansas River

100 yds u/s of Boss Lake

COLORADO STREAM SURVEY E (1976 REVISION)

Surveyed by: Lennihan and Yancik (X) if stream has no fishery value ☐

	Record Data
Code No.	29074
Date	July 14, 1978
Section No.	1
Stream Name:	Mid. Fk. S. Ark.
Primary Drainage:	Middle Fk. S. Ark. R.
Major Drainage	Arkansas R., Sec. 6
Lower terminus	FISHERY
Location:	200 yds upstream from intersection Arkansas River and Hwy. 50, accessible by dead end road from Garfield.
T.	50 N.
R.	6 E.
S.	27
Width	12.9
Elevation	9650'
Flow (c.f.s.)	19.64
pH	8.5
phth	17.1 ppm
MO	34.2 ppm
EDTA	34.2 ppm
Conductivity	45
X if stream profile obtained	X
Upper terminus	
Location:	.2 mi downstream from roads end(1st major bvr. pond). 3.6 mi, up Boss Lk. Trail road from Hwy. 50.
T.	50N
R.	6E
S.	18
Width	11.5'
Elevation	11,150'
Flow	9.8
pH	9.0
phth	17.1 ppm
MO	51.3 ppm
EDTA	34.2 ppm
Conductivity	30
X if stream profile obtained	X
Section Summary	
Meander factor	1.03
Length in Miles	3.5
Width in feet	12.2'
Acreage	5.35
Observed Flow	
X if inundated by reservoir	
Mileage unsectioned	
Counties where section located	
County	Chaffee
Miles	3.5
County	
Miles	
County	
Miles	

	Record Data
Region	SE
Beaver Dams	
Number (count or estimate)	3+
Estimated acreage	
Physical stream damage (% of section affected)	
Bank degredation	
Channelization	
Dredging	
Mine tailing encroachment	
Road encroachment	
Accessibility (miles)	
Surfaced	
Non-Surfaced car	
4-Wheel	3.6
Established trail	
No established trail	
Boat only	
No access	
Land Status and mileage	
USFS	3.0
BLM	
Municipal	
Div. of Wild.	
Private, no public access	.5
Private, open to public	
State Land Board	
County	
Mixed small tracts, open	
Mixed small tracts, closed	
Stocking	
Miles creel size	
Miles fingerling	
Miles Fry	
Miles not stocked	
Aquatic Vegetation	
Filamentous algae (x one)	
Absent	
Rare	X
Common	
Abundant	
Watercress	
X if present	
Size Classification (X one)	
Large river > 100'	
River 60-99'	
Large stream 36-59'	
Medium 20-35'	
Small 10-19'	X
Minor 4-9'	
Very small stream <4'	
Gradient (computer entry)	
Percent per mile	.025

8.1

	Record Data
Fishery Value (X one)	
None	
Poor	X
Below average	
Average	
Above Average	
Excellent	
Fishery Value - limiting factors	
Possibly pollution	

FISH SAMPLING	
Lower or only station	
Elevation	9650"
Describe or map station location below	

Approx. 200 yds. upstream from intersection of Arkansas R. and Hwy. 50, accessible by side road (dead end) from Garfield.

Sampling method	Electrofish
Length - feet	500'
Sampling adequate	X
Sampling inadequate	
X if scales collected	
Estimated % fish biomass	
Rough Fish	
Game Fish	100%
Est. % rough fish biomass	
Bullheads	
Carp	
Cottids	
Dace	
Minnows	
Suckers	
Sunfish	

	Record Data
Upper Station	
Elevation	11,150'
Describe or map station location below	

Approx. .2 mi. downstream from first major beaver pond (road's end), approx. 3.6 miles up "Boss lake Trail" road from Hwy. 50.

We were accompanied by the regional WCO, and although we neither turned up any fish nor saw any of >4 or 5 inches, he reported knowledge of a rainbow/native population, particularly in the beaver ponds aboue.

Sampling method	Electrofish
Length - feet	500'
Sampling adequate	
Sampling inadequate	X
X if scales collected	
Estimated % fish biomass	
Rough Fish	
Game Fish	
Est. % rough fish biomass	
Bullheads	
Carp	
Cottids	
Dace	
Minnows	
Suckers	
Sunfish	
Combined stations	
Estimated % fish biomass	
Rough Fish	
Game Fish	
Est. % rough fish biomass	
Bullheads	
Carp	
Cottids	
Dace	
Minnows	
Suckers	
Sunfish	
No. of game fish per mile.	6.0

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

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	≥15	Total
						LOWER STATION										
Rainbow						1	1	1								100 3
Brown																
Brook																
Native																
Whitefish																
Total																
						UPPER STATION										
Rainbow	several less than 4 inches; rainbow/cutthroat hybrids															3
Brown																
Brook																
Native																
Whitefish																
Total																
						COMBINED STATIONS										
Rainbow																
Brown																
Brook																
Native																
Whitefish																
Total																@ 6

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

Stream Code _____

'72-'73 Inventory S - _____

Stream Name _____

Percent Open to Public 100,
('72 Inventory)

1041 Form

- Quality of Water 10,
- Pool-riffle Ratio 9,
- Temperature of Water 6,
- Clarity of Water 10,
- Fish Food Supply 7,
- Condition of Fish 8,
- Legal Access 10,
- Physical Access* —,
- Aesthetic Value 9,
- Meanders Value 9,
- Improvement Potential 3,

'72 Inventory

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

☐ MINIMUM STREAM FLOW DATA

SB-97 Computer run Step A

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

"Filed on" Blue book

- Decreed Flow _____,
- Initial Month _____,
- Initial Day _____,
- Initial Year _____*

CDOW SAMPLE
RICK ANDERSON

STREAMS 1985
Area 13

Date	Location	Length	Method	Species	Number Collected	Average Length	Range	#Over 12 Inches
10/7/85	South Arkansas (29050) NS (Garfield)	400 Ft.	2 Trodes	Brook	9	8.3	6.7- 9.1	0
				Rainbow	6	10.0	9.0-11.4	0
				Cutthroat	7	9.2	6.3-12.0	1
10/7/85	Middle Fork of South Arkansas (29074) SUR (Above Stables)	200 Ft.	2 Trodes	Brook	1	8.3		0
				Rainbow	5	8.4	6.6-10.0	0
				Cutthroat	4	7.0	6.3- 8.0	0
10/8/85	Green Creek (29947) SUR (Road Crossing, trailhead)	380 Ft.	2 Trodes	Brown	25	7.5	2.8-11.0	0
				Brook	1	5.0		0
10/8/85	Little Cochetopa Creek (Forest Service Property) (29391) NS	165 Ft.	2 Trodes	Brown	26	8.0	4.0-11.4	0
10/8/85	North Fork of South Arkansas (2 Mi. Above Maysville) (29062) SUR	500 Ft.	2 Trodes	Brown	44	8.1	6.7-11.0	0
				Brook	3	5.5	5.0- 6.0	0
				Rainbow	2	10.2	10.2-10.2	0
6/30/85	North Fork of South Arkansas (Below North Fork Reservoir) (29062) SUR	400 Ft.	2 Trodes	Rainbow	31	6.8	3.1-10.2	0
				Cutthroat	24	7.2	4.3-11.0	0
				Grayling	1	10.0		0
10/8/85	Fooses Creek (29745) SUR (Above Reservoir)	200 Ft.	2 Trodes	Brown	22	8.5	4.7-11.4	0
				Brook	3	5.8	2.8- 8.7	0
10/7/85	South Arkansas (29050) NS (Maysville)	400 ft.	2 trodes	Brown	54	9.0	2.8-12.6	4
				Brook	11	8.0	6.0-12.2	1
				Rainbow	9	10.8	10.0-12.2	1
10/30/85	Arkansas River #6 (29000) NS (Gold Medal Area)	2.5 mile	Boat	Brown	1,264	10.6	4.0-21.0	240
				Rainbow	349	9.0	5.5-13.8	4
				Suckers	many	?	6.0-14.0	

STOCKING AND FISH SAMPLING DATA

~~LAKE~~ CODE 29074

STOCKING

STOCK 79-83 1 YRS

STOCKYRS N N N Y N

SPECIES-SIZE STOCKED:

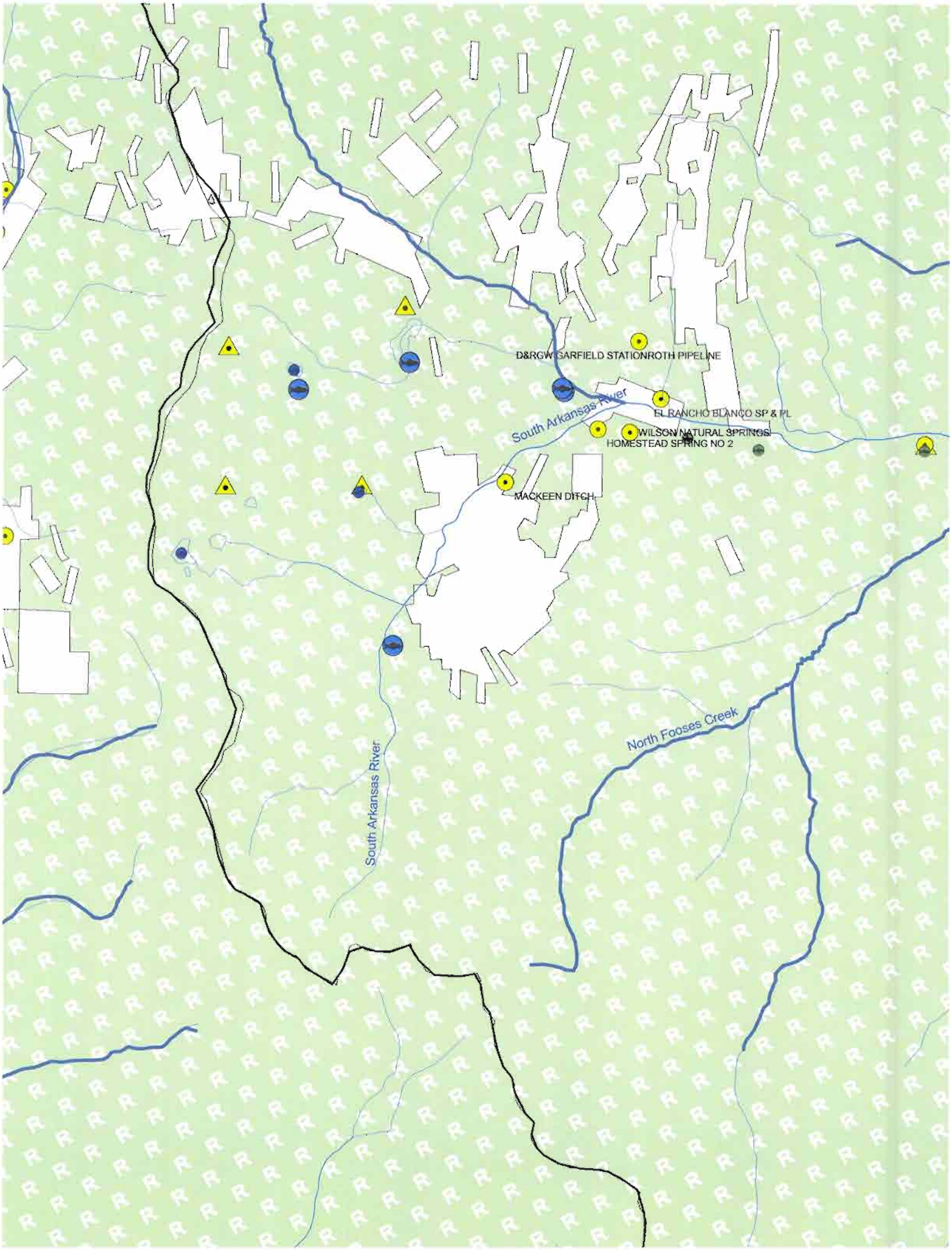
N.1

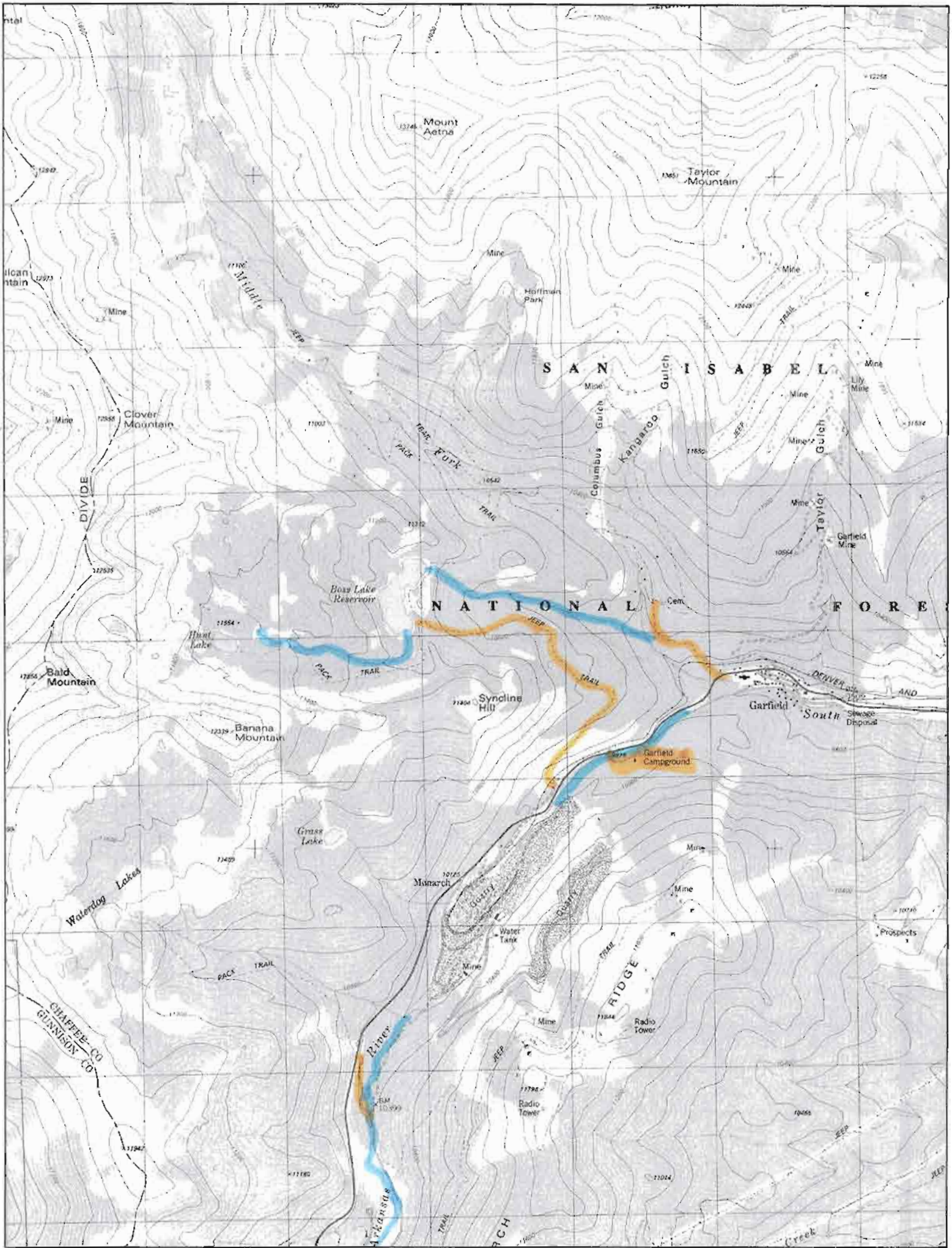
FISH SAMPLING 10/07/85

SAMPLE DATE: ~~07/14/70~~

METHODS: ELEC

	SPECIES	#TAKEN	AVG.LENGTH (cm)	RANGE (cm)	AVG.WT (g)	RANGE (g)	%TOTAL CATCH	N
1.	~~R.~~	~~3~~	~~17.8~~	~~15-20~~			~~50~~	
From MSS SURVEY 2.	RXC	3		[illegible]			[illegible]	
3.	B.	1	8.3	8-8			10	
4.	R.	5	8.4	7-10			50	
5.	N.	4	7.0	6-8			40	
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								


D&RGW GARFIELD STATIONROTH PIPELINE
South Arkansas River
EL RANCHO BLANCO SP & PL
WILSON NATURAL SPRINGS
HOMESTEAD SPRING NO 2
MACKEEN DITCH
South Arkansas River
North Fooses Creek



CWCB = 2-79CW121

29074

5 CFS (1/1 - 12/31)

D	Q	3	2
7/28/92	16.3	2.5①	2.0①
8/10/06	1.74	1.75	1.35

Area 1.15 m²

Limit 1.5

38 33 8F.3
106 20 32.2

38 33 18.0
106 19 18.2

1.75 (May 1 - July 31)
7 (5/1 - 9/30)
.2 (10/1 - 4/30)

Precip

Sargents #7460
Salida 3W 73
Salida 7370

Appendix - C

Water Availability Analysis

Station: **CHALK CREEK (UPPER STATION) NEAR ST. ELMO, CO.**
Parameter: STREAM FLOW CFS
Year: 1913-1919
State: CO
County: CHAFFEE

ID: 07090000
Statistic: Mean
Latitude: 38:42:29
Longitude: 106:19:12
Elevation: 9670.00
Drainage Area: 48.00

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	186	169	186	180	186	180	186	186	180	186	180	186	2191
Avg Day	9.01	8.26	9.73	19.09	104.6	222.4	107.0	47.47	26.40	19.39	12.51	10.77	49.81
Max Day	13.00	11.00	31.00	88.00	320.0	432.0	296.0	123.0	75.00	32.00	23.00	17.00	432.0
Min Day	7.00	7.00	7.00	8.00	18.00	84.00	19.00	21.00	14.00	12.00	7.00	9.00	7.00
# Months	6	6	6	6	6	6	6	6	6	6	6	6	6
SDev Month	1.33	0.997	1.75	6.05	31.15	61.79	38.07	13.07	7.95	4.13	2.40	1.21	7.61
Skew Month	1.11	0.505	1.31	1.28	-0.454	0.180	1.54	-0.257	1.19	0.519	1.75	1.25	-0.246
Min Month	8.00	7.00	8.00	13.73	66.71	140.8	74.39	29.94	17.93	14.81	10.37	10.00	38.15
Max Month	11.23	9.75	12.87	29.83	137.4	307.2	177.2	64.29	40.27	24.65	17.07	12.77	60.73
Exceedences													
1%	12.14	10.31	31.00	88.00	283.9	431.2	277.9	117.0	64.60	32.00	21.40	16.14	350.3
5%	12.00	10.00	14.70	50.00	244.1	395.0	218.0	90.00	46.00	27.70	20.00	13.00	218.0
10%	12.00	10.00	12.00	34.00	213.2	359.0	167.4	80.40	40.00	26.00	17.00	13.00	149.8
20%	10.00	9.10	10.00	25.00	164.8	311.0	143.0	65.00	33.00	24.00	15.00	12.00	79.00
50%	8.00	8.00	9.00	14.00	86.00	204.0	103.0	41.00	24.00	18.00	12.00	10.00	18.00
80%	8.00	7.00	8.00	11.00	46.20	143.0	65.00	28.00	20.00	15.20	10.00	9.20	9.00
90%	8.00	7.00	8.00	10.00	23.00	118.0	50.80	26.00	16.00	14.00	9.00	9.00	8.00
95%	8.00	7.00	8.00	9.00	20.30	102.0	46.00	24.00	15.00	13.00	8.00	9.00	8.00
99%	7.00	7.00	7.00	8.00	18.00	86.00	31.18	21.86	14.00	12.00	7.80	9.00	7.00

Station: **CHALK CREEK NEAR ST. ELMO, CO.**
Parameter: STREAM FLOW CFS
Year: 1911-1916
State: CO
County: CHAFFEE

ID: 07090500
Statistic: Mean
Latitude: 38:42:46
Longitude: 106:14:06
Elevation: 9000.00
Drainage Area: 83.00

Monthly Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
# Days	186	170	186	150	155	150	155	155	150	155	150	155	1917
Avg Day	16.12	14.99	14.66	20.09	138 3	348.2	208 8	91.29	50.16	52.21	26.25	20.48	80 44
Max Day	25.00	42.00	28.00	60.00	425.0	621.0	367.0	235.0	146.0	380 0	96.00	29.00	621.0
Min Day	8.00	9.00	8.00	8.00	25.00	114.0	68.00	41.00	26.00	18.00	16.00	12.00	8.00
# Months	6	6	6	5	5	5	5	5	5	5	5	5	4
SDev Month	4.81	4.73	5.08	5.21	29.36	69.07	70.60	33.34	11.13	39.30	4.31	3.62	19.36
Skew Month	-0.016	1.18	1.13	0.625	-0.627	0.416	-0.193	0.284	0.674	2.18	0.419	0.434	0.691
Min Month	9.48	9.79	9.90	14.67	95.74	270.2	121.8	53.74	36.27	28.68	21.30	16.45	61.63
Max Month	23.16	23.31	23.55	27.67	169.0	439.8	290.3	135.0	67.20	122.2	32.37	25.45	105.9
Exceedences													
1%	25.00	36.40	28.00	57.50	425.0	620.5	349.4	213.0	146.0	380.0	68.50	29.00	445.0
5%	25.00	22.00	25 00	38.50	356.3	557.5	324.3	185.8	89.50	137.8	37.50	26.25	337.0
10%	22.00	22.00	22.00	30.00	292.5	480.0	311.0	170.0	75.00	88.00	34.00	25.00	260.0
20%	18.00	17.00	17.00	26.00	250.0	420.0	285 0	140.0	60.00	54.00	30.00	25.00	135.0
50%	17.00	15.00	15.00	19.00	114.0	355.0	217.5	74.00	45.00	35.50	25.00	20.00	28.00
80%	12.00	12.00	10.00	14.00	42.00	270.0	146.0	56.00	38.00	27.00	20.00	17.00	16.00
90%	10.00	10.00	10.00	11.00	31.00	200.0	90.00	56.00	37.00	23.00	18.00	16.00	12.00
95%	9.00	10.00	10.00	9.00	28.75	174.0	74.00	46.25	35.50	20.00	17.00	13.75	10.00
99%	9.00	9.00	9.00	9.00	25.55	123.5	74.00	41.00	27.50	18.55	16.00	12.00	9.00

USGS StreamStats

Streamflow Statistics Report

LAKE FK MID FK S. ARK R

Date: Tue Nov 28 2006 13:39:33
Site Location: Colorado
Latitude: 38.5551
Longitude: -106.3218
Drainage Area: 1.17 mi2

Peak Flow Basin Characteristics			
100% Mountain Region Peak Flow (1.17 mi2)			
Parameter	**Value**	**Min**	**Max**
Drainage Area (square miles)	1.17 (below min value 5.5)	5.5	945
Mean Basin Slope ft per ft (dimensionless)	0.19	0.126	0.554

Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.

Low Flow Basin Characteristics			
100% Mountain Region Low Flow (1.17 mi2)			
Parameter	**Value**	**Min**	**Max**
Drainage Area (square miles)	1.17	1	1150
Mean Basin Elevation (feet)	11600	8400	12200
Mean Annual Precipitation (inches)	32.5	17.5	39.4

Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.

Streamflow Statistics					
Statistic	**Flow (ft^3/s)**	**Standard Error (percent)**	**Equivalent years of record**	**90-Percent Prediction Interval**	
				Minimum	**Maximum**
PK2	22.3				
PK5	32.1				
PK10	38.6				
PK25	46.5				
PK50	52.4				
PK100	58.1				
PK200	63.7				

PK500	71.1				

Streamflow Statistics

Statistic	Flow (ft^3/s)	Estimation Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
Q1	0.24	49			
Q2	0.21	49			
Q3	0.21	43			
Q4	0.48	56			
Q5	4.2	58			
Q6	16.7	510			
Q7	8.08	63			
Q8	2.05	70			
Q9	1.1	63			
QA	2.79	43			
Q10	0.74	50			
Q11	0.42	43			
Q12	0.3	45			
Low-Flow Statistics					
M7D2Y	0.17	62			
M7D10Y	0.0959	100			
M7D50Y	0.0653	160			

Q_m = 16.3 · JUNE 28 $Q_{P_{SM}}$ 17.0

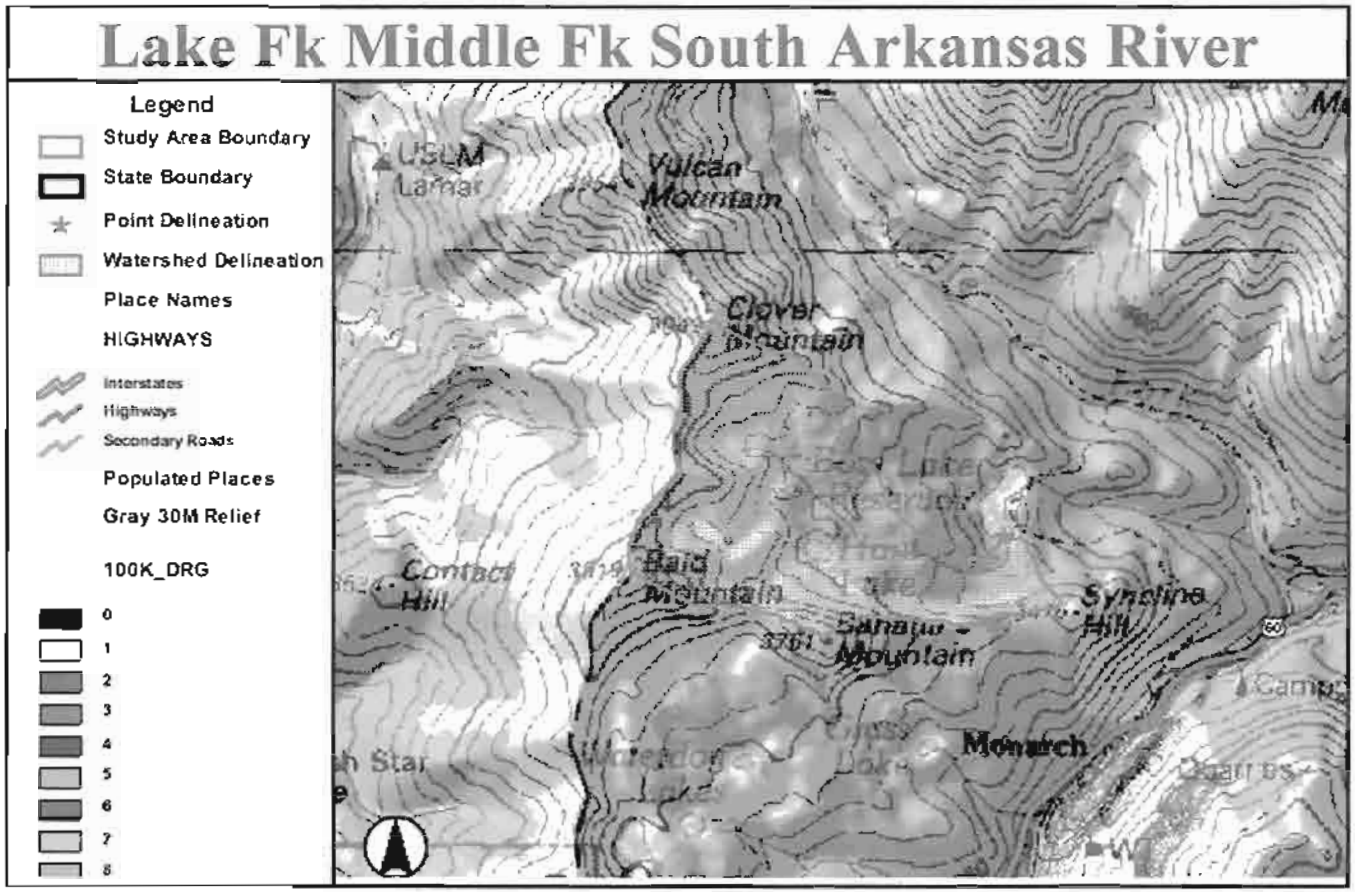
Q_m = 1.74 Aug 10 $Q_{P_{AUG}}$ = 2.1

O	N	D	J	F	M	A	M	J	J	A	S
.74	.42	.30	.24	.21	.21	.48	4.2	17.	8.1	2.1	1.1
.75	.2					.2	1.75			> 1.75	.75
							max			Aug 15	

$1.75(5/1 - 8/15)$

$.75(2/16 - 10/15)$

$0.25(10/16 - 4/30)$


Lake Fk Middle Fk South Arkansas River
Legend
Study Area Boundary
State Boundary
Point Delineation
Watershed Delineation
Place Names
HIGHWAYS
Interstates
Highways
Secondary Roads
Populated Places
Gray 30M Relief
100K_DRG
0
1
2
3
4
5
6
7
8
USGM
Lamar
Vulcan
Mountain
Clover
Mountain
Contact
Hill
Bald
Mountain
Sangre
Mountain
Syncline
Hill
Monarch
60

Monthly Climatic Data for ST ELMO for years 1950 - 1953
Station - 57345 Latitude - 3842 Longitude - 10622 Elevation - 10010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total monthly precipitation.													
1950	M	M	M	M	M	M	M	M	M	M	188	99	
1951	178	144	129	246	85	36	61	134	43	98	163	549	18.66
1952	244	62	212	78	85	38	177	316	156	0	150	95	16.13
1953	100	108	193	201	237	106	M	M	M	M	M	M	
Ave	1.74	1.05	1.78	1.75	1.36	0.60	1.19	2.25	0.99	0.49	1.67	2.48	17.39
Max	2.44	1.44	2.12	2.46	2.37	1.06	1.77	3.16	1.56	0.98	1.88	5.49	18.66
Year	1952	1951	1952	1951	1953	1953	1952	1952	1952	1951	1950	1951	1951
Min	1.00	0.62	1.29	0.78	0.85	0.36	0.61	1.34	0.43	0.00	1.50	0.95	16.13
Year	1953	1952	1951	1952	1952+	1951	1951	1951	1951	1952	1952	1952	1952
Count	3	3	3	3	3	3	2	2	2	2	3	3	2

Monthly Climatic Data for SARGENTS for years 1958 - 1999
Station - 57460 Latitude - 3824 Longitude - 10626 Elevation - 8470

Total monthly precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1958	M	M	M	M	M	M	M	M	50	30	21	90	
1959	51	114	51	74	123	49	101	206	204	105	4	18	11.00
1960	36	141	84	69	54	63	31	14	19	79	33	111	7.34
1961	30	61	70	88	91	54	173	123	251	192	52	50	12.35
1962	126	129	9	57	32	76	72	44	157	119	73	37	9.31
1963	178	61	34	33	44	159	80	370	146	103	62	84	13.54
1964	63	60	150	32	98	57	238	158	115	18	59	238	12.86
1965	104	75	157	66	60	134	255	422	116	112	87	60	16.48
1966	45	35	10	52	87	122	61	167	18	37	38	114	7.86
1967	43	24	31	35	74	162	197	286	126	54	65	108	12.05
1968	42	93	34	66	46	0	264	270	128	75	47	63	11.28
1969	106	35	31	10	63	360	248	119	191	374	34	156	17.27
1970	63	36	82	54	36	202	257	326	159	197	71	42	15.25
1971	14	88	49	54	32	0	215	440	67	101	54	81	11.95
1972	52	13	107	23	45	179	86	57	231	167	103	90	11.53
1973	55	20	64	61	168	98	207	198	47	16	10	273	12.17
1974	120	119	32	35	0	34	245	122	60	141	82	110	11.00
1975	167	111	117	42	7	68	99	135	45	51	118	0I	9.60
1976	68	89	40	149	181	86	109	302	355	18	0	0	13.97
1977	42	87	10	87	21	73	234	191	165	118	95	143	12.66
1978	M	M	M	M	M	66	90	111	17	125	124	345	
1979	632	76	238	191	151	73	69	195	132	139	313	24	22.33
1980	330	197	127	160	104	18	60	105	95	65	40	37	13.38
1981	80	86	127	33	206	99	272	220	148	166	24	417	18.78
1982	248	51	120	73	152	35	91	305	250	159	54	67	16.05
1983	12	135	225	179	158I	175	248	248	81	71	327	557	24.16
1984	39I	180	284	271	51	152	120	306	M	305	57	59	
1985	148	70	151	99	163	73	247	21	262	57	137	106	15.34
1986	29	247	99	135	37	237	118	152I	204	119	178	44	15.99
1987	106	160	123	106	M	120	71	126	51	75	151	54	
1988	212	56	49	70	138	153	95	162	66	12	128	113	12.54
1989	155	325	80	164	66	62	158	89	197	137	8	95	15.36
1990	77	65	193	344	178	22	237	124	156	76	174	104	17.50
1991	226I	51	364	105	M	184	280	197	108	67	156	37	
1992	38	66I	349	91	327	134	135	286	65	93I	M	42	
1993	M	420	M	M	M	M	M	M	M	M	M	M	
1994	23	M	14	44	163	51	36	396	240	57	47	5I	
1995	92	107	235	197	M	229	75	96	114	63	78	133	
1996	336	178	82	118	19	122	24	82	190	99	70	209	15.29
1997	140	106	30	135	265	78	231	168	192	129	120	83	16.77
1998	89	53	157	274	6	2	236	143	188	254	44	45	14.91

1999	138	64	65	213	117	80	261	239	107	28	3	70	13.85
Ave	1.17	1.05	1.10	1.05	0.99	1.04	1.58	1.93	1.38	1.07	0.84	1.10	13.99
Max	6.32	4.20	3.64	3.44	3.27	3.60	2.80	4.40	3.55	3.74	3.27	5.57	24.16
Year	1979	1993	1991	1990	1992	1969	1991	1971	1976	1969	1983	1983	1983
Min	0.12	0.13	0.09	0.10	0.00	0.00	0.24	0.14	0.17	0.12	0.00	0.00	7.34
Year	1983	1972	1962	1969	1974	1971+	1996	1960	1978	1988	1976	1976+	1960
Count	39	39	39	39	36	40	40	40	40	41	40	41	33

Monthly Climatic Data for SALIDA 3W for years 1970 - 1984
Station - 57371 Latitude - 3832 Longitude - 10603 Elevation - 7490

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total monthly precipitation.													
1970	M	M	M	M	M	M	M	M	M	M	M	0	
1971	62	47	0	33	46	37	248	173	68	196	33	91	10.34
1972	52	11	27	3	107	33	79	42	41	204	64	18	6.81
1973	7	0	95	48	88	18	320	50	21	17	0	25	6.89
1974	13	M	44	4	7	64	86	54	24	193	56	109	
1975	19	51	90	28	37	73	198	53	44	5	23	0	6.21
1976	3	2	47	116	125	14	97	159	215	66	2	1	8.47
1977	10	42	0	171	33	9	191	133	79	M	22	15	
1978	35	0	0	55	26	91	38	99	0	207	98	181	8.30
1979	18	0	261	0	65	84	34	64	12	80	63	45	7.26
1980	35	50	51	166	102	0	4	100	125	49	40	0	7.22
1981	18	0	30	0	82	31	148I	31	72	100	3	17	5.32
1982	9	7	M	M	M	M	M	M	M	M	M	M	
1984	M	M	M	M	4	M	M	M	M	M	M	M	
Ave	0.23	0.19	0.59	0.57	0.60	0.41	1.31	0.87	0.64	1.12	0.37	0.42	7.42
Max	0.62	0.51	2.61	1.71	1.25	0.91	3.20	1.73	2.15	2.07	0.98	1.81	10.34
Year	1971	1975	1979	1977	1976	1978	1973	1971	1976	1978	1978	1978	1971
Min	0.03	0.00	0.00	0.00	0.04	0.00	0.04	0.31	0.00	0.05	0.00	0.00	5.32
Year	1976	1981+	1978+	1981+	1984	1980	1980	1981	1978	1975	1973	1980+	1981
Count	12	11	11	11	12	11	11	11	11	10	11	12	9

Monthly Climatic Data for SALIDA for years 1900 - 1999
Station - 57370 Latitude - 3832 Longitude - 10600 Elevation - 7050

Total monthly precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1900	5	66	10	546	50	154	46	T	T	14	17	12	9.20
1901	1	7	94	134	149	122	99	201	10	32	0	127	9.76
1902	14	8	27	4	160	21	58	90	134	65	80	40	7.01
1903	T	306	57	70	T	247	99	90	38	102	0	5	10.14
1904	3	36	151	169	128	178	157	250	272	40	2	50	14.36
1905	206	39	182	406	47	10	87	118	62	20	90	15	12.82
1906	47	T	231	341	14	T	185	128	237	391	165	35	17.74
1907	100	60	10	236	281	15	131	181	74	99	75	30	12.92
1908	20	87	57	25	115	30	70	211	34	200	150	20	10.19
1909	50	65	72	62	68	42	105	280	274	56	313	159	15.46
1910	77	200	80	148	79	54	190	185	47	90	35	45	12.30
1911	5	405	145	49	11	170	368	114	84	149	50	95	16.45
1912	T	130	71	40	126	279	314	67	110	87	15	32	12.71
1913	80	114	8	101	15	448	175	119	87	84	15	293	15.39
1914	14	28	110	124	162	180	305	76	56	123	0	171	13.49
1915	57	116	44	255	129	79	250	242	176	43	100	135	16.26
1916	M	M	M	235	60	T	285	243	87	78	74	104	
1917	35	26	24	112	92	0	214	124	40	7	20	T	6.94
1918	81	81	30	47	0	157	183	164	189	41	72	124	11.69
1919	5	54	149	97	33	40	242	198	214	T	190	24	12.46
1920	M	13	T	128	143	0	187	174	0	M	130	M	
1921	M	M	M	M	M	M	M	M	M	M	T	20	
1922	42	105	82	80	42	121	81	M	M	M	187	34	
1923	T	60	111	20	M	M	M	M	M	M	M	M	
1931	M	T	M	16	34	58	216	98	129	66	102	M	
1932	21	15	32	288	3	50	92	366	13	133	6	35	10.54
1933	T	81	13	169	97	165	148	99	113	24	121	75	11.05
1934	1	41	30	211	54	57	133	176	73	0	16	0	7.92
1935	21	28	29	121	289	2	185	116	185	62	27	T	10.65
1936	3	14	2	27	150	111	233	265	186	31	0	24	10.46
1937	32	27	58	79	123	75	93	177	34	6	1	27	7.32
1938	98	98	168	165	266	112	115	53	276	220	38	79	16.88
1939	57	45	109	29	22	28	21	108	52	33	0	28	5.32
1940	65	73	33	12	116	11	145	154	72	T	81	177	9.39
1941	52	4	154	89	217	138	109	239	198	265	2	31	14.98
1942	16	129	75	374	19	75	69	M	M	47	M	M	
1943	T	70	82	74	56	117	32	33	40	M	M	77	
1944	90	35	320	282	130	18	87	43	M	M	M	20	
1945	35	28	49	365	55	48	345	241	36	56	T	11	12.69
1946	49	48	90	102	67	41	137	131	16	204	199	7	10.91
1947	30	29	46	105	203	214	112	169	72	174	32	86	12.72

1948	M	M	M	M	M	M	M	112	46	55	34	65	
1949	131	27	121	68	324	363	363	131	62	184	0	0	17.74
1950	12	10	38	46	67	97	164	94	67	41	57	12	7.05
1951	86	48	145	80	115	56	38	148	11	93	49	41	9.10
1952	9	3	62	178	97	15	247	110	80	0	90	33	9.24
1953	2	53	150	69	192	9	347	50	21	300	133	75	14.01
1954	8	15	26	26	223	17	188	101	78	40	67	64	8.53
1955	8	221	58	61	150	28	43	595	47	6	21	27	12.65
1956	79	46	68	206	95	63	78	97	9	56	131	28	9.56
1957	92	6	54	313	376	60	198	151	10	111	285	0	16.56
1958	46	5	52	114	56	54	99	131	23	74	29	28	7.11
1959	30	62	55	108	90	81	87	86	183	432	11	9	12.34
1960	25	32	33	79	129	70	177	39	58	188	39	148	10.17
1961	10	52	164	64	196	84	269	239	149	401	89	72	17.89
1962	27	7	13	58	4	49	24	41	60	112	46	50	4.91
1963	14	28	71	3	26	12	198	239	148	81	23	47	8.90
1964	1	61	103	55	89	38	182	239	141	0	168	16	10.93
1965	6	139	93	123	63	183	165	302	225	95	3	74	14.71
1966	0	92	0	44	99	238	103	116	30	16	2	52	7.92
1967	2	10	25	43	191	165	174	208	106	40	52	254	12.70
1968	0	48	55	179	58	5	320	90	31	21	31	70	9.08
1969	3	24	59	20	295	98	382	21	73	400	0	73	14.48
1970	1	0	191	52	13	0	129	219	199I	13	16	M	
1984	M	M	M	M	M	76	250	426	42	413	0	75	
1985	9	9	122	154	57	2	211	15	134	37	43	20	8.13
1986	0	12	46	13	89	138	88	183	67	200	95I	0	9.31
1987	56	195	85	7I	79	184	28	107	26	17	43	36I	8.63
1988	83	16	2I	M	M	M	M	M	221	26	12I	M	
1989	52	20I	0I	15	34	134	155	155	125	43	1	35	7.69
1990	24	5	64	97I	114	19	158	173	164	129I	84	0I	10.31
1991	0	5	24	36	127	116	134	101	88	80	67I	13	7.91
1992	4	5I	187	28	84	52	112	368	48	61	46	10	10.05
1993	16	46	22	0I	80	29	32	300	42	44	38	3	6.52
1994	68	2	0I	257	144	20	30	280	100	193	39	0	11.33
1995	1	20I	144	129	253	79	120	142	67	7	9	2	9.73
1996	0	5	27	9I	37	134	75	54	100	57	38	13	5.49
1997	22	98	14	148	48	169	175	267	215	140	42	22	13.60
1998	0	25	109	65	3	5	222	115	68	171	30	34	8.47
1999	10	0	16	264	204I	59	236	122	39	31	3	32	10.16
Ave	0.32	0.56	0.74	1.20	1.08	0.88	1.59	1.61	0.95	1.01	0.58	0.51	11.06
Max	2.06	4.05	3.20	5.46	3.76	4.48	3.82	5.95	2.76	4.32	3.13	2.93	17.89
Year	1905	1911	1944	1900	1957	1913	1969	1955	1938	1959	1909	1913	1961
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	4.91
Year	1998+	1999+	1994+	1993	1918+	1970+	1939	1900	1920+	1964+	1984+	1994+	1962
Count	74	76	75	76	75	76	76	75	75	74	76	74	67

Monthly Climatic Data for MARSHALL PASS for years 1947 - 1952
Station - 55394 Latitude - 3824 Longitude - 10615 Elevation - 10850

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total monthly precipitation.													
1947	M	M	M	M	M	M	127	309	225	341	202	150	
1948	M	M	M	M	M	M	M	147	37	91	376	608	
1949	274	342	319	192	240	407	406	148	67	106	24	172	26.97
1950	405	246	518	182	145	120	254	36	193	63	274	530	29.66
1951	523	349	401	422	114	35	99	282	28	136	420	595	34.04
1952	480	361	459	160	149	451	373	236	146	M	M	M	
Ave	4.21	3.25	4.24	2.39	1.62	1.52	2.52	1.93	1.16	1.47	2.59	4.11	30.22
Max	5.23	3.61	5.18	4.22	2.40	4.07	4.06	3.09	2.25	3.41	4.20	6.08	34.04
Year	1951	1952	1950	1951	1949	1949	1949	1947	1947	1947	1951	1948	1951
Min	2.74	2.46	3.19	1.60	1.14	0.35	0.99	0.36	0.28	0.63	0.24	1.50	26.97
Year	1949	1950	1949	1952	1951	1951	1951	1950	1951	1950	1949	1947	1949
Count	4	4	4	4	4	4	5	6	6	5	5	5	3

Monthly Climatic Data for SARGENTS for years 1958 - 1999
Station - 57460 Latitude - 3824 Longitude - 10626 Elevation - 8470

Total monthly precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1958	M	M	M	M	M	M	M	M	50	30	21	90	
1959	51	114	51	74	123	49	101	206	204	105	4	18	11.00
1960	36	141	84	69	54	63	31	14	19	79	33	111	7.34
1961	30	61	70	88	91	54	173	123	251	192	52	50	12.35
1962	126	129	9	57	32	76	72	44	157	119	73	37	9.31
1963	178	61	34	33	44	159	80	370	146	103	62	84	13.54
1964	63	60	150	32	98	57	238	158	115	18	59	238	12.86
1965	104	75	157	66	60	134	255	422	116	112	87	60	16.48
1966	45	35	10	52	87	122	61	167	18	37	38	114	7.86
1967	43	24	31	35	74	162	197	286	126	54	65	108	12.05
1968	42	93	34	66	46	0	264	270	128	75	47	63	11.28
1969	106	35	31	10	63	360	248	119	191	374	34	156	17.27
1970	63	36	82	54	36	202	257	326	159	197	71	42	15.25
1971	14	88	49	54	32	0	215	440	67	101	54	81	11.95
1972	52	13	107	23	45	179	86	57	231	167	103	90	11.53
1973	55	20	64	61	168	98	207	198	47	16	10	273	12.17
1974	120	119	32	35	0	34	245	122	60	141	82	110	11.00
1975	167	111	117	42	7	68	99	135	45	51	118	0I	9.60
1976	68	89	40	149	181	86	109	302	355	18	0	0	13.97
1977	42	87	10	87	21	73	234	191	165	118	95	143	12.66
1978	M	M	M	M	M	66	90	111	17	125	124	345	
1979	632	76	238	191	151	73	69	195	132	139	313	24	22.33
1980	330	197	127	160	104	18	60	105	95	65	40	37	13.38
1981	80	86	127	33	206	99	272	220	148	166	24	417	18.78
1982	248	51	120	73	152	35	91	305	250	159	54	67	16.05
1983	12	135	225	179	158I	175	248	248	81	71	327	557	24.16
1984	39I	180	284	271	51	152	120	306	M	305	57	59	
1985	148	70	151	99	163	73	247	21	262	57	137	106	15.34
1986	29	247	99	135	37	237	118	152I	204	119	178	44	15.99
1987	106	160	123	106	M	120	71	126	51	75	151	54	
1988	212	56	49	70	138	153	95	162	66	12	128	113	12.54
1989	155	325	80	164	66	62	158	89	197	137	8	95	15.36
1990	77	65	193	344	178	22	237	124	156	76	174	104	17.50
1991	226I	51	364	105	M	184	280	197	108	67	156	37	
1992	38	66I	349	91	327	134	135	286	65	93I	M	42	
1993	M	420	M	M	M	M	M	M	M	M	M	M	
1994	23	M	14	44	163	51	36	396	240	57	47	5I	
1995	92	107	235	197	M	229	75	96	114	63	78	133	
1996	336	178	82	118	19	122	24	82	190	99	70	209	15.29
1997	140	106	30	135	265	78	231	168	192	129	120	83	16.77

1998	89	53	157	274	6	2	236	143	188	254	44	45	14.91
1999	138	64	65	213	117	80	261	239	107	28	3	70	13.85
Ave	1.17	1.05	1.10	1.05	0.99	1.04	1.58	1.93	1.38	1.07	0.84	1.10	13.99
Max	6.32	4.20	3.64	3.44	3.27	3.60	2.80	4.40	3.55	3.74	3.27	5.57	24.16
Year	1979	1993	1991	1990	1992	1969	1991	1971	1976	1969	1983	1983	1983
Min	0.12	0.13	0.09	0.10	0.00	0.00	0.24	0.14	0.17	0.12	0.00	0.00	7.34
Year	1983	1972	1962	1969	1974	1971+	1996	1960	1978	1988	1976	1976+	1960
Count	39	39	39	39	36	40	40	40	40	41	40	41	33

Monthly Climatic Data for SALIDA 3W for years 1970 - 1984
Station - 57371 Latitude - 3832 Longitude - 10603 Elevation - 7490

Total monthly precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1970	M	M	M	M	M	M	M	M	M	M	M	0	
1971	62	47	0	33	46	37	248	173	68	196	33	91	10.34
1972	52	11	27	3	107	33	79	42	41	204	64	18	6.81
1973	7	0	95	48	88	18	320	50	21	17	0	25	6.89
1974	13	M	44	4	7	64	86	54	24	193	56	109	
1975	19	51	90	28	37	73	198	53	44	5	23	0	6.21
1976	3	2	47	116	125	14	97	159	215	66	2	1	8.47
1977	10	42	0	171	33	9	191	133	79	M	22	15	
1978	35	0	0	55	26	91	38	99	0	207	98	181	8.30
1979	18	0	261	0	65	84	34	64	12	80	63	45	7.26
1980	35	50	51	166	102	0	4	100	125	49	40	0	7.22
1981	18	0	30	0	82	31	148I	31	72	100	3	17	5.32
1982	9	7	M	M	M	M	M	M	M	M	M	M	
1984	M	M	M	M	4	M	M	M	M	M	M	M	
Ave	0.23	0.19	0.59	0.57	0.60	0.41	1.31	0.87	0.64	1.12	0.37	0.42	7.42
Max	0.62	0.51	2.61	1.71	1.25	0.91	3.20	1.73	2.15	2.07	0.98	1.81	10.34
Year	1971	1975	1979	1977	1976	1978	1973	1971	1976	1978	1978	1978	1971
Min	0.03	0.00	0.00	0.00	0.04	0.00	0.04	0.31	0.00	0.05	0.00	0.00	5.32
Year	1976	1981+	1978+	1981+	1984	1980	1980	1981	1978	1975	1973	1980+	1981
Count	12	11	11	11	12	11	11	11	11	10	11	12	9

Monthly Climatic Data for SALIDA for years 1900 - 1999
Station - 57370 Latitude - 3832 Longitude - 10600 Elevation - 7050

Total monthly precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1900	5	66	10	546	50	154	46	T	T	14	17	12	9.20
1901	1	7	94	134	149	122	99	201	10	32	0	127	9.76
1902	14	8	27	4	160	21	58	90	134	65	80	40	7.01
1903	T	306	57	70	T	247	99	90	38	102	0	5	10.14
1904	3	36	151	169	128	178	157	250	272	40	2	50	14.36
1905	206	39	182	406	47	10	87	118	62	20	90	15	12.82
1906	47	T	231	341	14	T	185	128	237	391	165	35	17.74
1907	100	60	10	236	281	15	131	181	74	99	75	30	12.92
1908	20	87	57	25	115	30	70	211	34	200	150	20	10.19
1909	50	65	72	62	68	42	105	280	274	56	313	159	15.46
1910	77	200	80	148	79	54	190	185	47	90	35	45	12.30
1911	5	405	145	49	11	170	368	114	84	149	50	95	16.45
1912	T	130	71	40	126	279	314	67	110	87	15	32	12.71
1913	80	114	8	101	15	448	175	119	87	84	15	293	15.39
1914	14	28	110	124	162	180	305	76	56	123	0	171	13.49
1915	57	116	44	255	129	79	250	242	176	43	100	135	16.26
1916	M	M	M	235	60	T	285	243	87	78	74	104	
1917	35	26	24	112	92	0	214	124	40	7	20	T	6.94
1918	81	81	30	47	0	157	183	164	189	41	72	124	11.69
1919	5	54	149	97	33	40	242	198	214	T	190	24	12.46
1920	M	13	T	128	143	0	187	174	0	M	130	M	
1921	M	M	M	M	M	M	M	M	M	M	T	20	
1922	42	105	82	80	42	121	81	M	M	M	187	34	
1923	T	60	111	20	M	M	M	M	M	M	M	M	
1931	M	T	M	16	34	58	216	98	129	66	102	M	
1932	21	15	32	288	3	50	92	366	13	133	6	35	10.54
1933	T	81	13	169	97	165	148	99	113	24	121	75	11.05
1934	1	41	30	211	54	57	133	176	73	0	16	0	7.92
1935	21	28	29	121	289	2	185	116	185	62	27	T	10.65
1936	3	14	2	27	150	111	233	265	186	31	0	24	10.46
1937	32	27	58	79	123	75	93	177	34	6	1	27	7.32
1938	98	98	168	165	266	112	115	53	276	220	38	79	16.88
1939	57	45	109	29	22	28	21	108	52	33	0	28	5.32
1940	65	73	33	12	116	11	145	154	72	T	81	177	9.39
1941	52	4	154	89	217	138	109	239	198	265	2	31	14.98
1942	16	129	75	374	19	75	69	M	M	47	M	M	
1943	T	70	82	74	56	117	32	33	40	M	M	77	
1944	90	35	320	282	130	18	87	43	M	M	M	20	
1945	35	28	49	365	55	48	345	241	36	56	T	11	12.69
1946	49	48	90	102	67	41	137	131	16	204	199	7	10.91
1947	30	29	46	105	203	214	112	169	72	174	32	86	12.72

M = Missing T = Trace

1948	M	M	M	M	M	M	M	112	46	55	34	65	
1949	131	27	121	68	324	363	363	131	62	184	0	0	17.74
1950	12	10	38	46	67	97	164	94	67	41	57	12	7.05
1951	86	48	145	80	115	56	38	148	11	93	49	41	9.10
1952	9	3	62	178	97	15	247	110	80	0	90	33	9.24
1953	2	53	150	69	192	9	347	50	21	300	133	75	14.01
1954	8	15	26	26	223	17	188	101	78	40	67	64	8.53
1955	8	221	58	61	150	28	43	595	47	6	21	27	12.65
1956	79	46	68	206	95	63	78	97	9	56	131	28	9.56
1957	92	6	54	313	376	60	198	151	10	11	285	0	16.56
1958	46	5	52	114	56	54	99	131	23	74	29	28	7.11
1959	30	62	55	108	90	81	87	86	183	432	11	9	12.34
1960	25	32	33	79	129	70	177	39	58	188	39	148	10.17
1961	10	52	164	64	196	84	269	239	149	401	89	72	17.89
1962	27	7	13	58	4	49	24	41	60	112	46	50	4.91
1963	14	28	71	3	26	12	198	239	148	81	23	47	8.90
1964	1	61	103	55	89	38	182	239	141	0	168	16	10.93
1965	6	139	93	123	63	183	165	302	225	95	3	74	14.71
1966	0	92	0	44	99	238	103	116	30	16	2	52	7.92
1967	2	10	25	43	191	165	174	208	106	40	52	254	12.70
1968	0	48	55	179	58	5	320	90	31	21	31	70	9.08
1969	3	24	59	20	295	98	382	21	73	400	0	73	14.48
1970	1	0	191	52	13	0	129	219	199I	13	16	M	
1984	M	M	M	M	M	76	250	426	42	413	0	75	
1985	9	9	122	154	57	2	211	15	134	37	43	20	8.13
1986	0	12	46	13	89	138	88	183	67	200	95I	0	9.31
1987	56	195	85	7I	79	184	28	107	26	17	43	36I	8.63
1988	83	16	2I	M	M	M	M	M	221	26	12I	M	
1989	52	20I	0I	15	34	134	155	155	125	43	1	35	7.69
1990	24	5	64	97I	114	19	158	173	164	129I	84	0I	10.31
1991	0	5	24	36	127	116	134	101	88	80	67I	13	7.91
1992	4	5I	187	28	84	52	112	368	48	61	46	10	10.05
1993	16	46	22	0I	80	29	32	300	42	44	38	3	6.52
1994	68	2	0I	257	144	20	30	280	100	193	39	0	11.33
1995	1	20I	144	129	253	79	120	142	67	7	9	2	9.73
1996	0	5	27	9I	37	134	75	54	100	57	38	13	5.49
1997	22	98	14	148	48	169	175	267	215	140	42	22	13.60
1998	0	25	109	65	3	5	222	115	68	171	30	34	8.47
1999	10	0	16	264	204I	59	236	122	39	31	3	32	10.16
Ave	0.32	0.56	0.74	1.20	1.08	0.88	1.59	1.61	0.95	1.01	0.58	0.51	11.06
Max	2.06	4.05	3.20	5.46	3.76	4.48	3.82	5.95	2.76	4.32	3.13	2.93	17.89
Year	1905	1911	1944	1900	1957	1913	1969	1955	1938	1959	1909	1913	1961
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	4.91
Year	1998+	1999+	1994+	1993	1918+	1970+	1939	1900	1920+	1964+	1984+	1994+	1962
Count	74	76	75	76	75	76	76	75	75	74	76	74	67