STATISTICAL SUMMARIES OF STREAMFLOW DATA FOR SELECTED GAGING STATIONS ON AND NEAR THE IDAHO NATIONAL ENGINEERING LABORATORY, IDAHO, THROUGH SEPTEMBER 1990

By M.A.J. Stone, Larry J. Mann, and L.C. Kjelstrom

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ILLUSTRATIONS

CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATIONS

Multiply	By	To obtain
acre	4,047	square meter
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviations: ID, Idaho
INEL, Idaho National Engineering Laboratory
N-day, number of consecutive days within a 1-year period
USGS, U.S. Geological Survey
WSP, Water-Supply Paper

Note: Because of the inconsistent nomenclature in the various computer programs used to generate this report, the terms "flow" and "discharge" are used interchangeably.

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ABSTRACT

Statistical summaries and graphs of streamflow data were prepared for 13 gaging stations with 5 or more years of continuous record on and near the Idaho National Engineering Laboratory. Statistical summaries of streamflow data for the Big and Little Lost Rivers and Birch Creek were analyzed as a requisite for a comprehensive evaluation of the potential for flooding of facilities at the Idaho National Engineering Laboratory.

The type of statistical analyses performed depended on the length of streamflow record for a gaging station. Streamflow statistics generated for stations with 5 to 9 years of record were: (1) magnitudes of monthly and annual flows; (2) duration of daily mean flows; and (3) maximum, median, and minimum daily mean flows. Streamflow statistics generated for stations with 10 or more years of record were: (1) magnitudes of monthly and annual flows; (2) magnitudes and frequencies of daily low, high, instantaneous peak (flood frequency), and annual mean flows; (3) duration of daily mean flows; (4) exceedance probabilities of annual low, high, instantaneous peak, and mean annual flows; (5) maximum, median, and minimum daily mean flows; and (6) annual mean and mean annual flows.

INTRODUCTION

The Idaho National Engineering Laboratory (INEL) includes about 890 mi^2 of the eastern Snake River Plain in southeastern Idaho (fig. 1). The Big Lost River is the principal stream that flows onto and terminates on the INEL. The Little Lost River and Birch Creek drain intermontane valleys west and north of the INEL and terminate in the northern part. The Big and Little Lost Rivers and Birch Creek terminate in a series of playas or sinks on and adjacent to the INEL, as shown in figure 1.

Streamflow records have been collected at many gaging stations on the Big and Little Lost Rivers and Birch Creek. Statistical data based on the streamflow records provide information about the areal and spatial quantity of water. This information is useful for studies of streamflow seepage losses, ground-water recharge, and flood-control analysis.

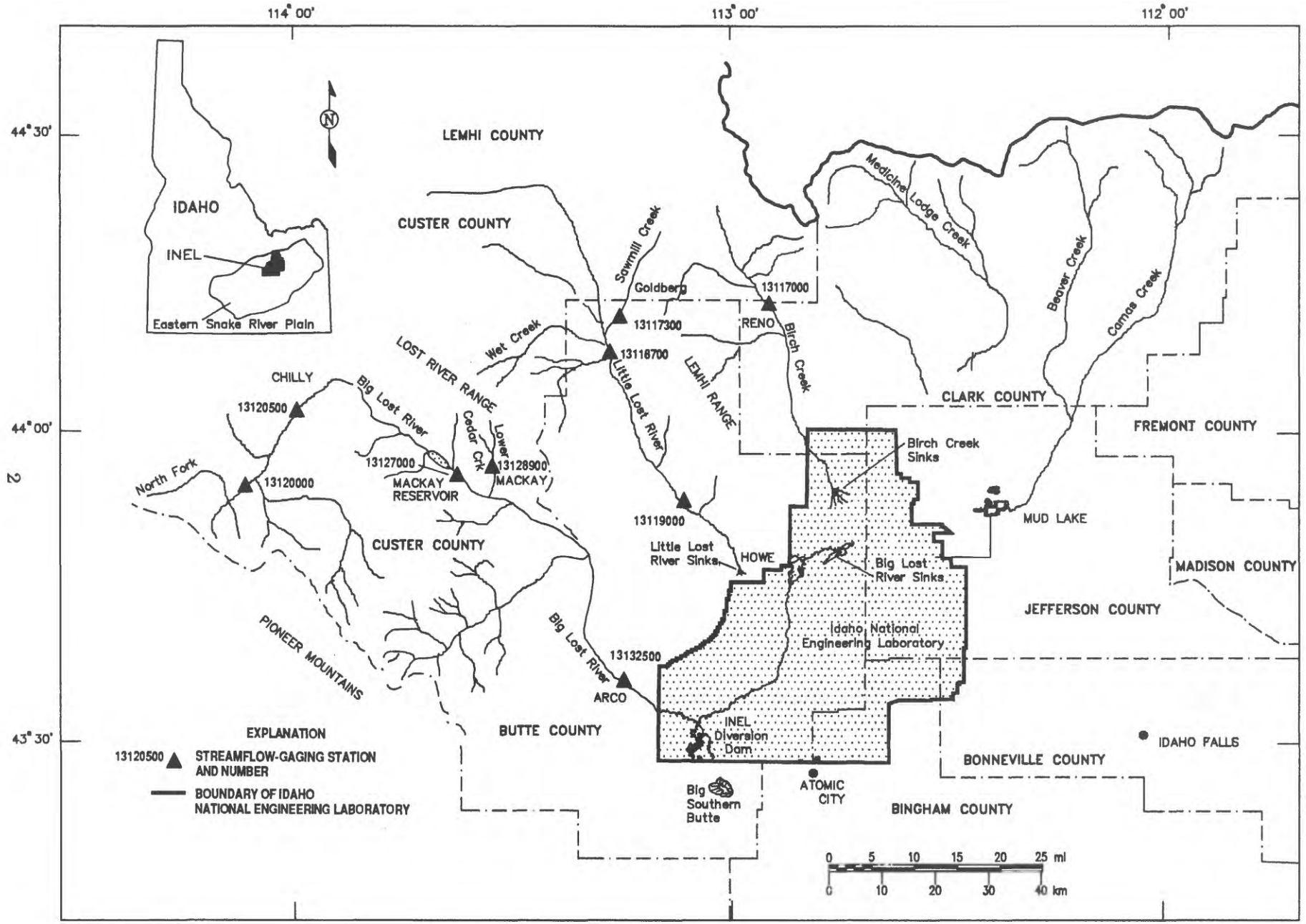

Figure 1.--Locations of streamflow-gaging stations near the Idaho National Engineering Laboratory.

The need for flood control at the INEL was recognized in the early 1950's when the Test Reactors Area and the Idaho Chemical Processing Plant were threatened by flooding in the Big Lost River. A small diversion dam was constructed across the Big Lost River in 1958 to divert water from the river through a diversion channel into a spreading area (fig. 2). Repeated threats of flooding in the late 1960's, early 1970's, and early 1980's occurred when the Big Lost River filled Playas 1 and 2 and overflowed into Playa 3 near an INEL facility (fig. 2). Discharges of a few hundred cubic feet per second and air temperatures as cold as -47°F (-44°C) during the winter of 1983–84 caused ice jams that imposed a danger of localized flooding. The diversion channel was enlarged in 1984 to provide additional flood control; the dam across the Big Lost River and the containment dikes along the diversion channel and spreading areas were raised several feet. The capacity of the diversion channel and two low swales near the channel is 9,300 ft^3/s (Bennett, 1986).

Statistical summaries of streamflow data were prepared for gaging stations on the Big and Little Lost Rivers and Birch Creek in cooperation with the U.S. Department of Energy.

Purpose and Scope

This report presents statistical summaries of streamflow data for 13 gaging stations with 5 or more years of continuous record. Records through September 30, 1990, or September 30 of the last year of record, if gaging stations were discontinued prior to 1990, were used in computing monthly and mean annual flows, high-flow frequency, and flow-duration data. Low-flow frequency data were computed on the basis of the 1991 climatic year, which ends March 31, 1991. Flood-frequency data were computed using records through the 1990 water year (ending September 30, 1990).

For the four gaging stations with 5 to 9 years of continuous record, the following information is provided: (1) magnitudes of monthly and annual flows; (2) duration of daily mean flows; and (3) maximum, median, and minimum daily mean flows. For the nine gaging stations with 10 or more years of record, the following information is provided: (1) magnitudes of monthly and annual flows; (2) magnitudes and frequencies of daily low, high, instantaneous peak (flood frequency), and annual mean flows; (3) duration of daily mean flows; (4) exceedance probabilities of annual low, high, instantaneous peak, and mean annual flows; (5) maximum, median, and minimum daily mean flows; and (6) annual mean and mean annual flows.

Previous Investigations

Several investigations have been conducted to evaluate flow characteristics of streams at the INEL, particularly the Big Lost River and INEL diversion. Lamke (1969) described stage-discharge relations for the Big Lost River. Carrigan (1972) described the probability of a flood exceeding the capacity of the INEL

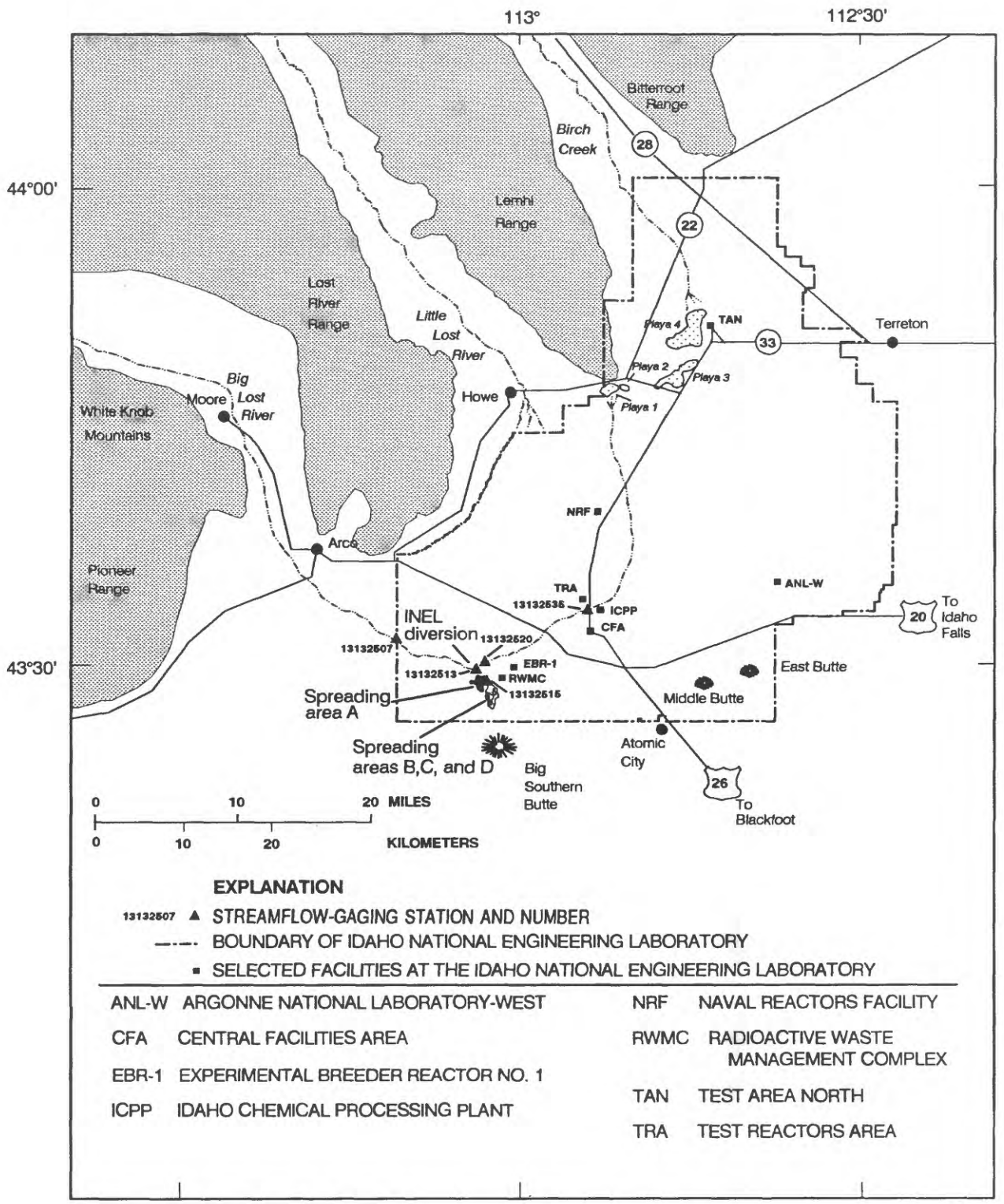

Figure 2.--Locations of selected facilities and streamflow-gaging stations at the Idaho National Engineering Laboratory.

diversion. The capacity of the INEL diversion channel was evaluated by Bennett (1986), who also described streamflow losses along the Big Lost River at the INEL (1990). Koslow and Vanhaaften (1986) described the area that would be inundated by the probable maximum flood on the Big Lost River.

EXPLANATION OF STATISTICAL SUMMARIES

Statistical summaries of streamflow data are presented (back of report) for 13 gaging stations shown on figures 1 and 2. The description of each gaging station includes the location of the gage, drainage area, period of record, description of the gage, remarks pertinent to the quality of streamflow records and to conditions that affect the flow, and extremes for the period of record.

Water is diverted upstream from many gaging stations. The amount of water diverted and the time of diversion are variable, depending on the demand and availability of water. The Big Lost River is regulated by Mackay Reservoir. The statistical summaries are based on recorded streamflow at the gaging station.

Tabulations for each gaging station (back of report) include the magnitudes of monthly and annual flows, magnitudes and frequencies of annual low and high flows, magnitudes and frequencies of instantaneous peak flows, and duration of daily mean flows. Monthly and annual data were processed using USGS computer program W4422 (Price and Meeks, 1977); low-flow, high-flow, and flow-duration data were processed using USGS computer program A969 (Dempster, 1984); and flood-frequency data were processed using USGS computer program J407 (Kirby, 1981).

Monthly and Annual Flow

The monthly and annual flow tabulations for the period of record include the maximum, minimum, and mean monthly and mean annual flow, the standard deviation of the means, the coefficient of variation (ratio of the standard deviation to the mean), and the percentage of average annual runoff for each month.

Low-Flow Frequency

The low-flow tabulations show the data necessary to plot standard low-flow frequency curves, which are based on the log-Pearson Type III frequency distribution. The tabulations show annual minimum mean flows for periods of 1, 3, 7, 14, 30, 60, 90, 120, and 183 consecutive days for recurrence intervals of 2, 5, 10, 20, 50, and 100 years; the associated annual nonexceedance probabilities are 50, 20, 10, 5, 2, and 1 percent, respectively. The annual minimum mean flows are based on the climatic year. Recurrence intervals for low flows represent the average length of time between occurrences of annual minimum mean flows that

are less than the stated flow magnitude. Nonexceedance probability is the probability or chance, expressed as a percentage, that the annual minimum mean flow will be less than the stated magnitude in any given year. Recurrence intervals generally were reported only to twice the period of record. Tabulations based on records of more than 40 years were extended to the 100-year (1-percent) interval. If the period of record is not longer than one-half of the minimum reported recurrence interval for frequency calculations, the computer program FLOWSTAT (Rogers and Werley, 1992) automatically flags (#) the frequency column to indicate that the values shown may be unreliable.

High-Flow Frequency

The high-flow frequency tabulations show the data necessary to plot standard high-flow frequency curves, which are based on the log-Pearson Type III frequency distribution. The tabulations show the annual maximum mean flows for periods of 1, 3, 7, 15, 30, 60, and 90 consecutive days for recurrence intervals of 2, 5, 10, 25, 50, and 100 years; the associated annual exceedance probabilities are 50, 20, 10, 4, 2, and 1 percent, respectively. The annual maximum mean flows are based on the water year. Recurrence intervals for high flows represent the average length of time between occurrences of annual maximum mean flows equal to or greater than the stated flow magnitude. Exceedance probability is the probability or chance, expressed as a percentage, that the annual maximum mean flow will equal or exceed the stated magnitude in any given year. The criteria for extending frequency curves for high-flow data were the same as for the low-flow data. If the period of record did not meet USGS criteria for frequency calculations, the frequency column is flagged (#) to indicate that the values shown may be unreliable.

Flood Frequency

The flood-frequency tabulations show the data necessary to plot standard flood-frequency curves, which are based on log-Pearson Type III frequency distribution. These data are magnitudes of instantaneous peak flows at selected recurrence intervals (annual exceedance probabilities). The log-Pearson Type III frequency distribution was fitted to recorded data for stations with 10 or more years of record using procedures recommended by the U.S. Advisory Committee on Water Data (1981). A log-Pearson Type III frequency distribution incorporates three factors—mean, standard deviation, and skew coefficient—which affect position, slope, and curvature of the distribution graph, respectively. Generalized skew coefficients are weighted with gaging station skew coefficients (determined from peak flow analysis) to obtain a more reliable flood-frequency distribution curve than could be obtained using either generalized or station skew coefficients. Generalized skew coefficients were determined by reference to a report by Kjelstrom and Moffatt (1981).

The flood-frequency tabulations list the magnitudes of annual instantaneous peak flows for recurrence intervals of 2, 5, 10, 25, 50, and 100 years; the associated annual exceedance probabilities are 50, 20, 10, 4, 2, and 1 percent, respectively.

Flow Duration

The flow-duration tabulations show the data necessary to plot a standard flow-duration curve, which is a cumulative frequency curve that shows the percentage of time that specified daily flows were equaled or exceeded during the period of record. The tabulations show the flows, in cubic feet per second, that were equaled or exceeded for a given percentage of time.

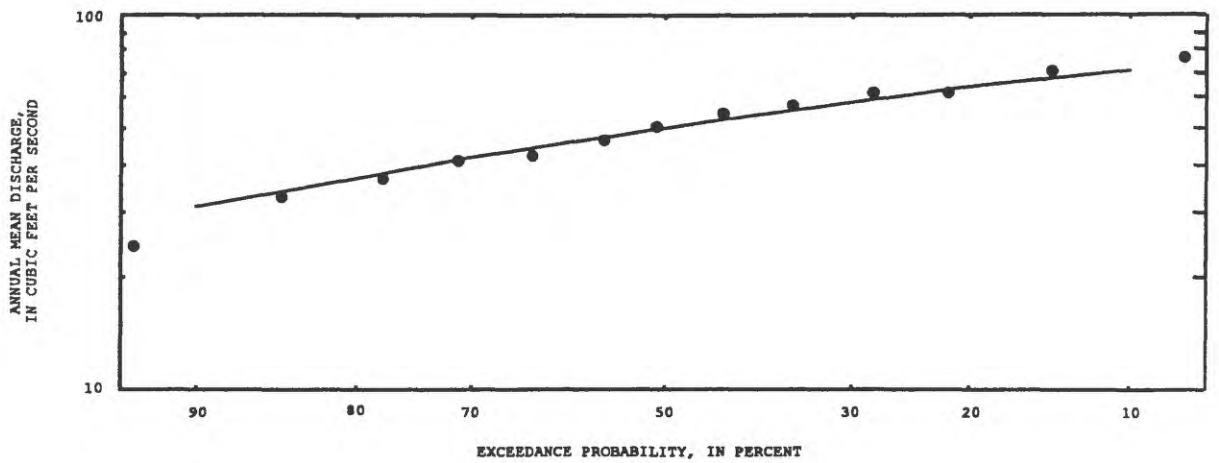

Figure 3.--Annual mean discharge frequency for a selected streamflow-gaging station.

The annual mean discharge frequency graph (fig. 3) shows the relation between annual mean flows and their associated exceedance probabilities at a specified gaging station. The annual mean flows were calculated from a 365 N-day analysis of daily values using ANNIE, a USGS hydrologic analysis and data management program (Lumb and others, 1990). The resulting values were fitted with a log-Pearson Type III frequency distribution to derive the exceedance probabilities.

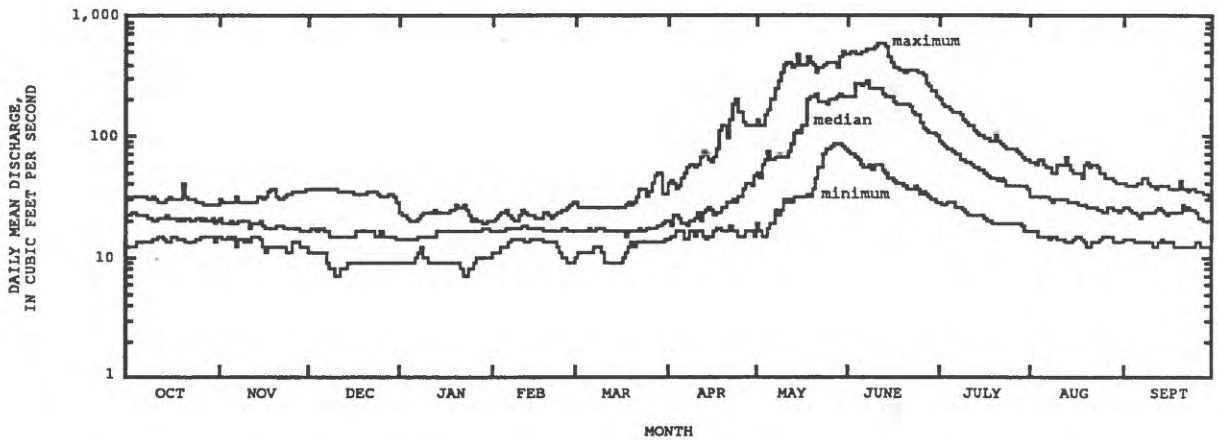

Figure 4.--Maximum-median-minimum discharge for a selected streamflow-gaging station.

The maximum-median-minimum discharge graph (fig. 4) shows the highest, median, and lowest flow past the gaging station during the period of record for each day of the year. A minimum of 1 ft^3/s, or four logarithmic cycles below the maximum flow, was the minimum discharge graphed. Maximum, median, and minimum flows were computed using WATSTORE program K609 (Bergmann, 1981) and were plotted using ANNIE.

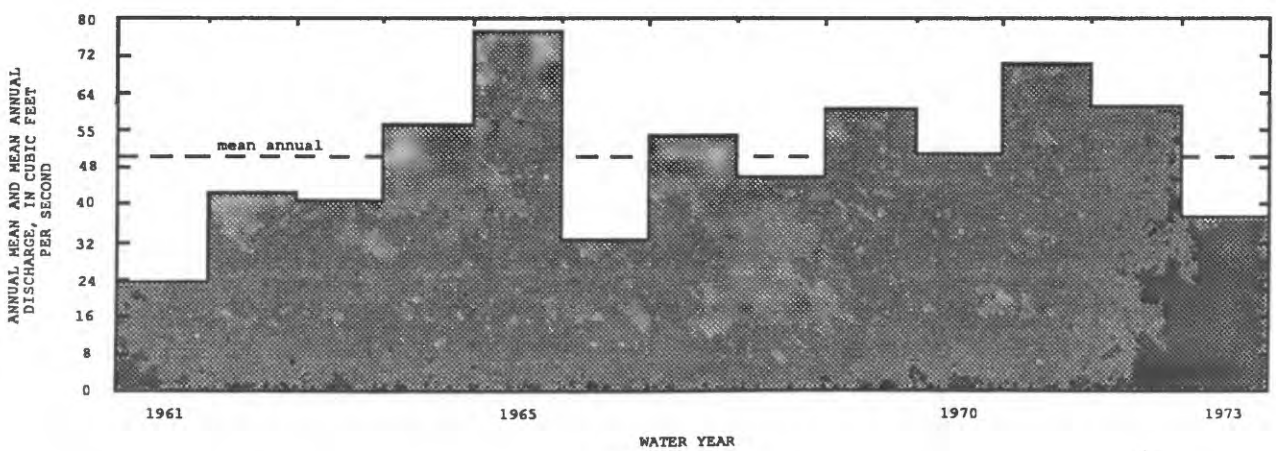

Figure 5.--Annual mean and mean annual discharge for a selected streamflow-gaging station.

The annual mean and mean annual discharge graph (fig. 5) shows how annual mean flow differs from the long-term mean annual flow for the gaging station. All values were computed and plotted using ANNIE. The annual mean is displayed with a solid line and the mean annual with a dashed line. For periods when partial records or no records were available, only the mean annual is shown.

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Appendix 1

LIST OF STREAMFLOW-GAGING STATIONS, IN DOWNSTREAM ORDER

(PAGE 13 FOLLOWS)

Appendix 2

DESCRIPTIONS OF STREAMFLOW-GAGING STATIONS AND TABLES OF FLOW STATISTICS

13117000 BIRCH CREEK NEAR RENO, ID

LOCATION.--Lat 44°12', long 112°57', in sec.13, T.10 N., R.29 E., Clark County, Hydrologic Unit 17040216, on left bank 200 ft west of State Highway 28, 2 mi south of the Lemhi-Clark County line, 5 mi southeast of former Reno Post Office, and 35 mi west of Dubois.

DRAINAGE AREA.--320 mi², approximately.

PERIOD OF RECORD.--September 1910 to June 1912 (published as "near Kaufman"), April 1921 to January 1923, October 1950 to September 1963.

GAGE.--Water-stage recorder. Altitude of gage is 6,240 ft above sea level (by barometer). Prior to Oct. 1, 1950, nonrecording gage at site 0.5 mi downstream at different datum.

REMARKS.--Small diversions for stock ranches and hay meadows above station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 220 ft³/s Apr. 1, 1962 (gage height, 2.19 ft); maximum gage height observed, 3.11 ft Jan. 25, 1962 (backwater from ice); minimum daily mean discharge, 50 ft³/s, Jan. 12, 1963; minimum gage height, 1.33 ft, Jan. 23, 1963.

Summary of monthly and annual discharges, 1911, 1922, 1951-63

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	94	73	79	6.2	0.08	8.3
November	88	68	78	5.1	0.06	8.3
December	88	67	78	4.8	0.06	8.3
January	93	63	78	6.5	0.08	8.3
February	90	69	79	5.4	0.07	8.3
March	92	72	79	5.8	0.07	8.4
April	89	73	81	5.1	0.06	8.6
May	90	74	81	4.5	0.06	8.6
June	89	73	79	4.8	0.06	8.4
July	83	68	76	3.9	0.05	8.1
August	86	70	77	5.3	0.07	8.1
September	87	72	78	5.9	0.08	8.3
Annual	89	70	79	4.5	0.06	100

Magnitude and frequency of annual low flow, based on period of record 1912, 1922, 1952-63

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent					
	2 50%	5 20%	10 10%	20 5%	50# 2%	100# 1%
1	72	64	59	55	50	46
3	72	65	61	57	52	48
7	72	67	63	60	56	53
14	73	68	65	62	58	56
30	73	69	67	65	64	62
60	74	71	69	67	65	64
90	75	72	70	68	66	65
120	76	72	70	68	66	65
183	77	73	71	70	68	67

Magnitude and frequency of instantaneous peak flow, based on period of record 1911, 1922, 1951-63

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
95	113	134	171	209	257

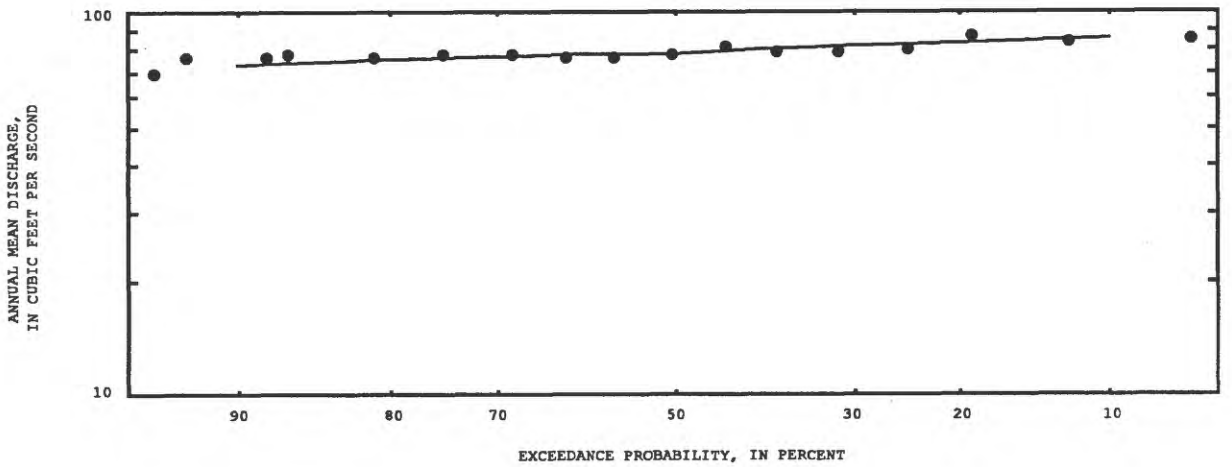
Magnitude and frequency of annual high flow, based on period of record 1911, 1922, 1951-63

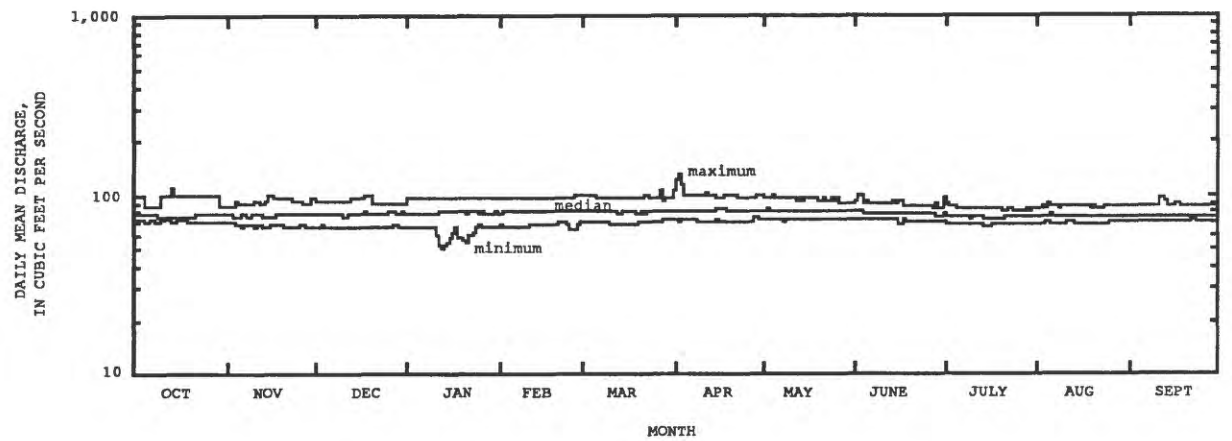
Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
	2 50%	5 20%	10 10%	25 4%	50# 2%	100# 1%
1	88	98	107	120	131	142
3	87	96	103	114	123	132
7	86	94	99	105	110	115
15	85	91	95	100	103	106
30	84	89	91	94	96	97
60	82	87	89	92	93	95
90	81	86	88	91	93	95

Duration table of daily mean flow for period of record 1961-73

Discharge, in ft³/s, which was exceeded for indicated percentage of time															
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
94	89	87	85	54	82	80	79	77	76	75	73	71	68	67	66	57

Length of record used in calculation may yield unreliable values for this column.


100
10
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
90
80
70
50
30
20
10
EXCEEDANCE PROBABILITY, IN PERCENT


1,000
100
10
DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
median
minimum
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MAR
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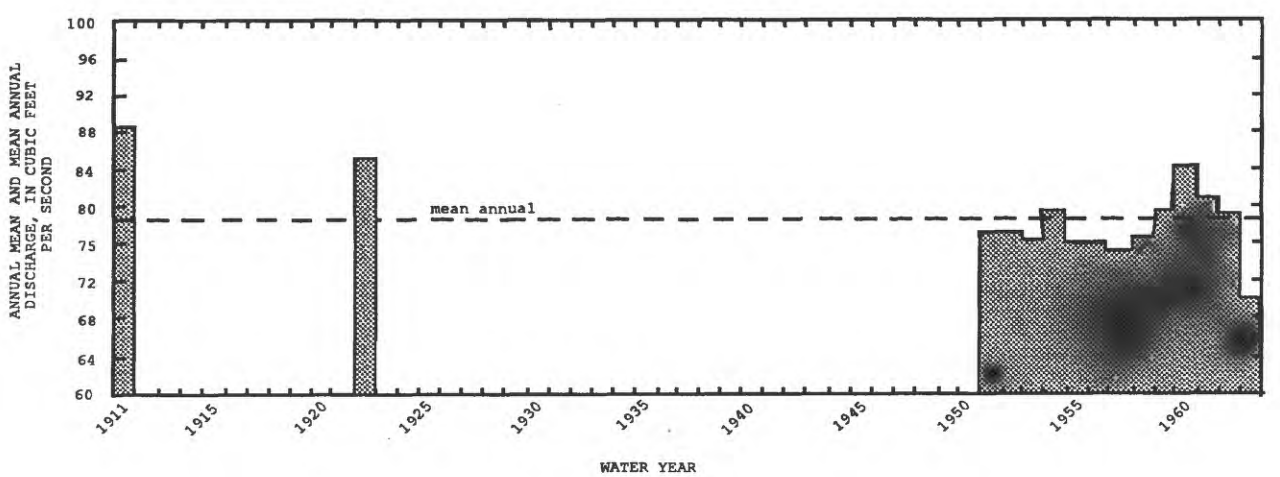
JUNE
JULY
AUG
SEPT
MONTH


100
96
92
88
84
80
75
72
68
64
60
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1911
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
WATER YEAR

13117300 SAWMILL CREEK NEAR GOLDBERG, ID

LOCATION.--Lat 44°18'40", long 113°20'20", in NE¼SE¼ sec.3, T.11 N., R.26 E., Lemhi County, Hydrologic Unit 17040217, U.S. Bureau of Land Management lands on left bank 25 ft downstream from bridge, 0.4 mi upstream from Warm Creek, 2 mi southeast of Fairview guard station, and 16 mi east of Goldberg.

DRAINAGE AREA.--74.3 mi².

PERIOD OF RECORD.--July 1960 to September 1973.

GAGE.--Water-stage recorder. Altitude of gage is 6,600 ft above sea level, from topographic map.

REMARKS.--No regulation or diversion above station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 651 ft³/s June 12, 1965 (gage height, 4.45 ft); minimum, 3.9 ft³/s Apr. 2, 1967 (gage height, 1.68 ft).

Summary of monthly and annual discharges, 1961-73

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	30	14	21	5.4	0.25	3.5
November	31	14	19	4.5	0.23	3.2
December	34	9.1	17	6.0	0.36	2.8
January	22	9.2	16	3.3	0.21	2.6
February	22	13	17	2.6	0.16	2.8
March	27	13	18	4.6	0.26	3.0
April	80	17	34	19	0.55	5.7
May	317	54	149	70	0.47	24.7
June	400	47	200	103	0.52	33.1
July	112	22	59	25	0.43	9.7
August	52	15	29	9.5	0.32	4.9
September	37	16	24	6.4	0.27	4.0
Annual	77	24	50	15	0.30	100

Magnitude and frequency of annual low flow, based on period of record 1962-73

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent					
	2 50%	5 20%	10 10%	20 5%	50# 2%	100# 1%
1	13	11	9.1	8.0	6.7	5.9
3	13	11	9.4	8.3	7.0	6.2
7	14	11	9.9	8.7	7.4	6.6
14	14	12	11	9.4	8.1	7.2
30	15	13	11	9.8	8.4	7.6
60	16	13	12	10	8.9	7.9
90	16	13	12	11	9.6	8.8
120	17	14	13	12	11	10
183	18	15	13	12	11	11

Magnitude and frequency of instantaneous peak flow, based on period of record 1961-73

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
377	523	615	728	809	887

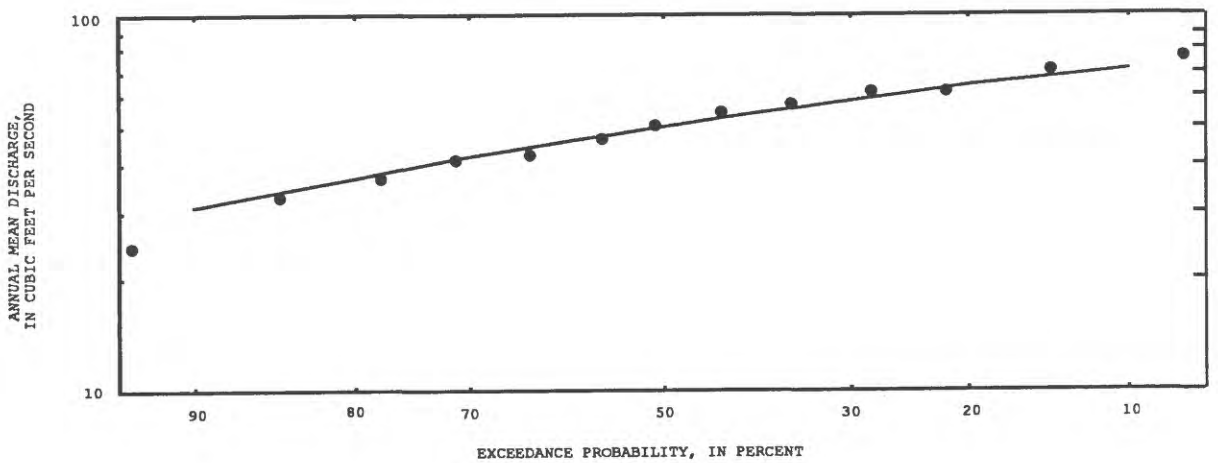
Magnitude and frequency of annual high flow, based on period of record 1961-73

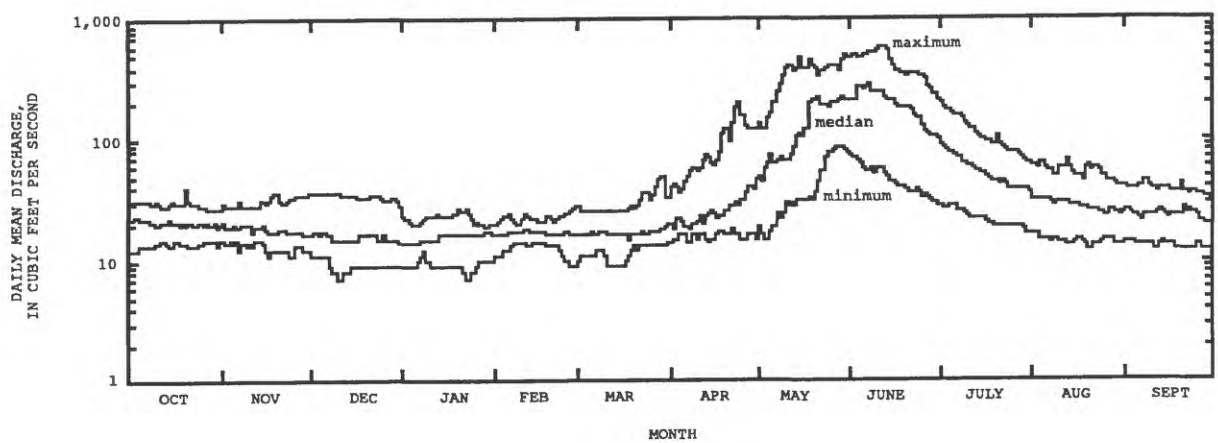
Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
	2 50%	5 20%	10 10%	25# 4%	50# 2%	100# 1%
1	341	479	554	633	683	725
3	321	452	524	600	647	688
7	301	427	495	568	612	651
15	274	390	453	516	555	588
30	238	338	391	445	477	504
60	176	252	292	335	360	382
90	137	191	221	251	269	285

Duration table of daily mean flow for period of record 1961-73

Discharge, in ft³/s, which was exceeded for indicated percentage of time																
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
395	225	127	76	54	33	27	23	19	18	16	14	13	12	9.0	8.5	8.0

Length of record used in calculation may yield unreliable values for this column.


100
10
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
90
80
70
50
30
20
10
EXCEEDANCE PROBABILITY, IN PERCENT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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
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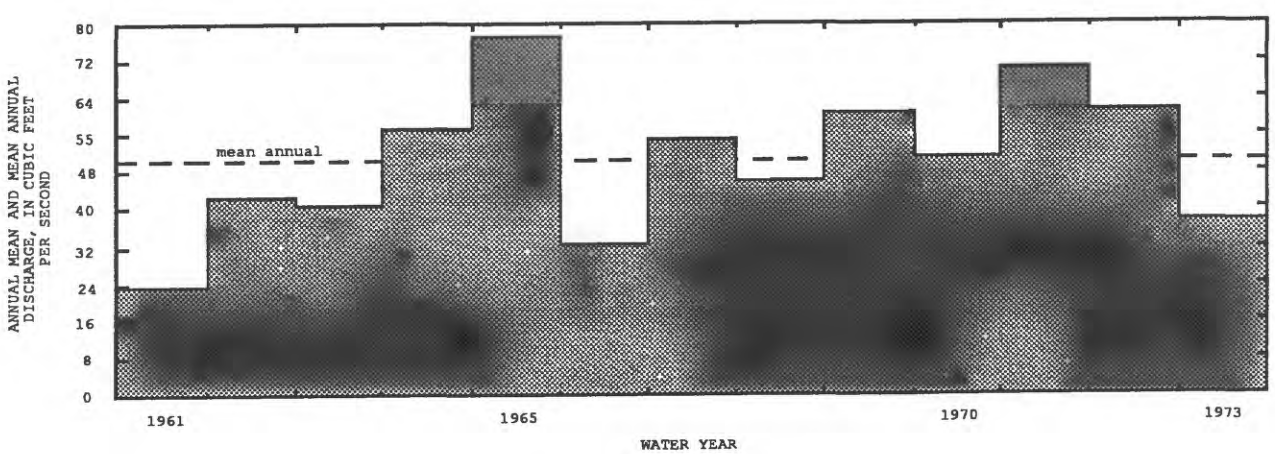
MONTH


80
72
64
55
48
40
32
24
16
8
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ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1961
1965
1970
1973
WATER YEAR

13118700 LITTLE LOST RIVER BELOW WET CREEK, NEAR HOWE, ID

LOCATION.--Lat 44°08'19", long 113°14'39", in NW¼SE¼ sec.4, T.9 N., R.27 E. Butte County, Hydrologic Unit 17050217, U.S. Bureau of Land Management lands, on right bank at Clyde School, 0.6 mi downstream from Wet Creek, and 27 mi northwest of Howe.

DRAINAGE AREA.--440 mi², approximately.

PERIOD OF RECORD.--January 1958 to September 1990.

GAGE.--Water-stage recorder. Elevation of gage is 5,880 ft above sea level, from topographic map.

REMARKS.--Diversions above station for irrigation of about 3,800 acres, of which about 2,000 acres are irrigated by withdrawals from ground water.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 509 ft³/s June 16, 1975, gage height, 3.19 ft, but may have been more during period of doubtful gage-height record in 1958; maximum gage height recorded, 5.99 ft, Feb. 8, 1979 (ice jam); minimum discharge recorded, 2.8 ft³/s Dec. 13, 1962.

Summary of monthly and annual discharges, 1959-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	101	33	60	17	0.29	7.2
November	70	17	40	13	0.32	4.9
December	47	8.0	22	7.2	0.32	2.7
January	53	3.5	23	9.4	0.41	2.7
February	45	9.0	25	8.8	0.35	3.1
March	58	18	37	12	0.32	4.4
April	162	24	66	26	0.40	7.9
May	261	53	139	48	0.34	16.7
June	354	81	196	76	0.39	23.5
July	208	34	100	46	0.46	12.1
August	141	26	63	24	0.38	7.6
September	128	27	60	21	0.35	7.2
Annual	115	32	69	18	0.26	100

Magnitude and frequency of annual low flow, based on period of record 1959-91

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent					
	2 50%	5 20%	10 10%	20 5%	50 2%	100# 1%
1	16	10	7.6	5.8	4.0	3.1
3	17	11	8.0	6.0	4.1	3.2
7	18	12	8.7	6.5	4.5	3.4
14	20	13	9.3	6.9	4.7	3.5
30	21	13	9.8	7.2	4.9	3.6
60	22	15	11	9.0	6.7	5.4
90	23	16	13	10	8.1	6.8
120	24	18	15	13	11	9.2
183	34	26	23	20	18	16

Magnitude and frequency of instantaneous peak flow, based on period of record 1959-90

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
309	409	464	524	562	596

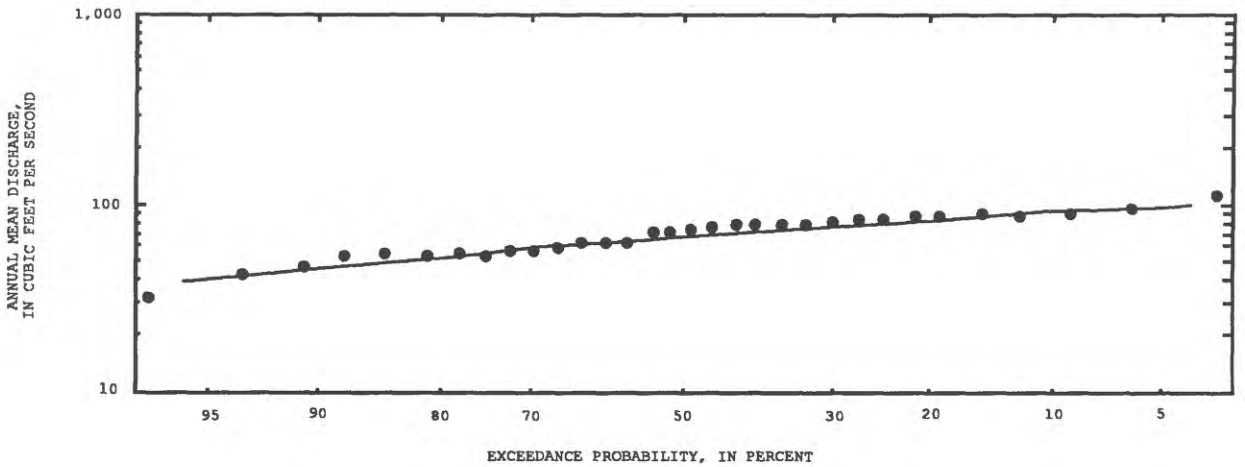
Magnitude and frequency of annual high flow, based on period of record 1959-90

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
	2 50%	5 20%	10 10%	25 4%	50 2%	100# 1%
1	279	371	421	476	511	542
3	266	357	408	464	501	534
7	250	335	381	432	465	494
15	231	310	354	401	432	460
30	206	277	317	362	392	419
60	171	229	262	299	324	346
90	145	192	219	249	268	285

Duration table of daily mean flow for period of record 1959-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time															
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
322	212	151	117	96	74	60	50	41	32	26	20	16	12	8.6	6.4	3.7

Length of record used in calculation may yield unreliable values for this column.


1,000
100
10
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
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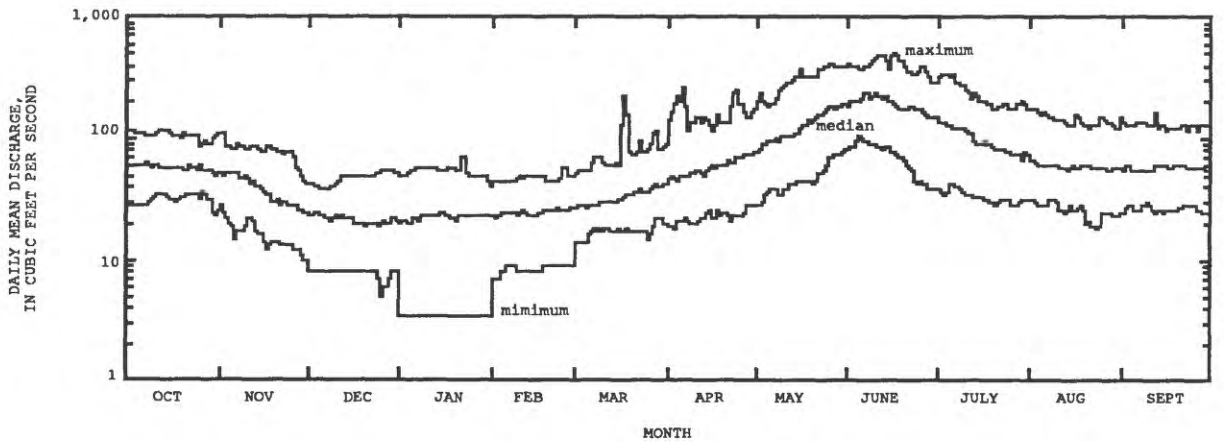
90
80
70
50
30
20
10
5
EXCEEDANCE PROBABILITY, IN PERCENT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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
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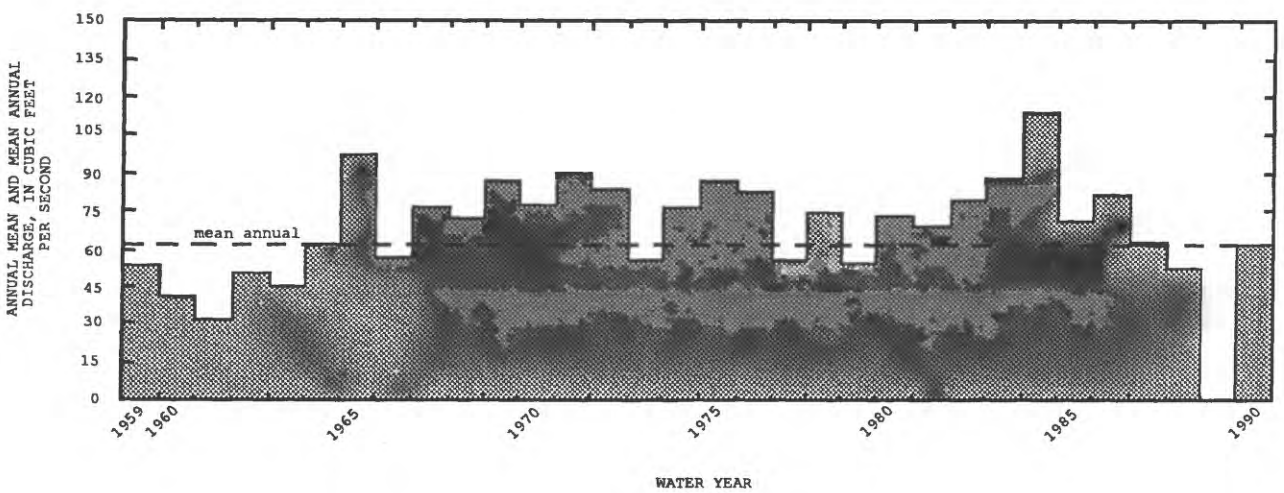

150
135
120
105
90
75
60
45
30
15
0
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1959
1960
1965
1970
1975
1980
1985
1990
WATER YEAR

13119000 LITTLE LOST RIVER NEAR HOWE, ID

LOCATION.--Lat 43° 53'10", long 113° 06'00", in NW¼NE¼ NW¼ sec.11, T.6N., R.28 E., Butte County, Hydrologic Unit 17040217, U.S. Bureau of Land Management lands on left bank 0.2 mi upstream from diversion dam of Blaine County Investment Co., and 7 mi northwest of Howe.

DRAINAGE AREA.--703 mi².

PERIOD OF RECORD.--April 1921 to September 1981. May 1985 to September 1990 (no winter records prior to October 1940). Monthly discharges only for some periods, published in WSP 1317.

GAGE.--Water-stage recorder. Elevation of gage is 5,020 ft above sea level, by barometer. Prior to Sept. 2, 1938, nonrecording gage at site 120 ft downstream at datum 1.39 ft higher.

REMARKS.--Diversions above station for irrigation of about 11,500 acres, of which about 7,600 acres are irrigated by withdrawals from ground water (1966 determination). Diversions 1 mi upstream since Dec. 1984, for winter flood control. Graph of maximum-median-minimum discharge is based on records from 1941-81.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 450 ft³/s Aug. 11, 1936, during cloudburst, gage height, 5.4 ft, present site and datum from rating curve extended above 220 ft³/s; maximum gage height observed, 6.63 ft, Jan. 23, 1957 (backwater from ice); minimum discharge observed before construction of bypass, 4.1 ft³/s Dec. 12, 1940.

Summary of monthly and annual discharges, 1941-81, 1986-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	116	46	75	18	0.23	8.2
November	107	30	58	17	0.29	6.3
December	57	0.00	31	12	0.39	3.4
January	49	0.00	27	13	0.48	2.9
February	80	0.00	35	15	0.43	3.7
March	112	17	55	22	0.40	6.0
April	174	40	84	25	0.30	9.2
May	218	73	135	33	0.25	14.7
June	239	94	164	39	0.24	17.9
July	195	50	107	33	0.31	11.6
August	114	44	75	18	0.24	8.2
September	111	48	72	16	0.23	7.9
Annual	106	49	77	15	0.20	100

Magnitude and frequency of annual low flow, based on period of record 1941-81

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent: 2 50%	5 20%	10 10%	20 5%	50 2%	100# 1%
1	24	16	12	8.7	6.0	4.6
3	24	16	12	8.8	6.1	4.6
7	26	17	12	9.1	6.2	4.6
14	26	18	14	11	8.3	6.7
30	28	20	16	11	10	8.5
60	33	22	16	12	12	10
90	34	23	17	14	13	11
120	36	24	17	16	15	14
183	46	36	31	27	24	21

Magnitude and frequency of instantaneous peak flow, based on period of record 1941-81, 1986-90

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent: 2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
190	229	262	302	332	361

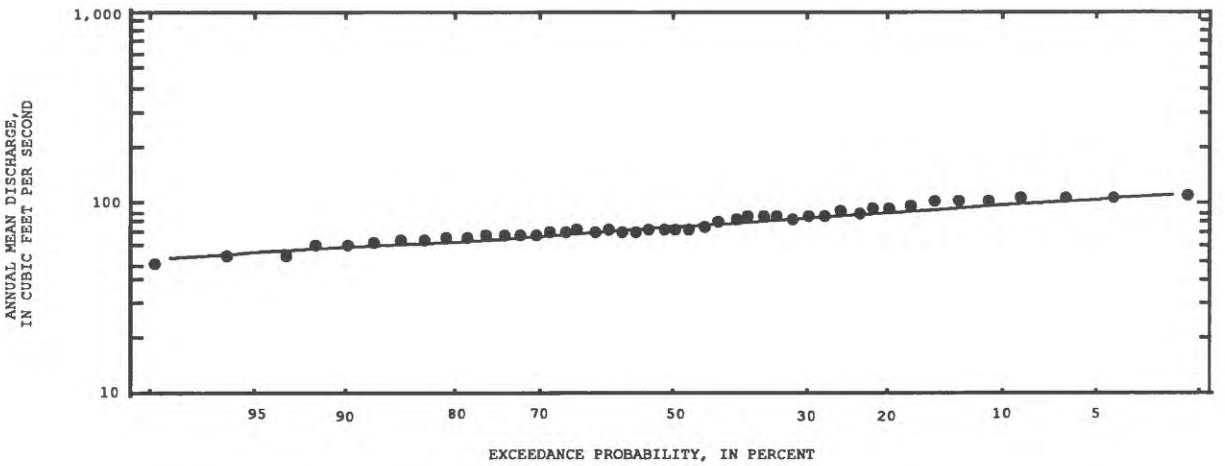
Magnitude and frequency of annual high flow, based on period of record 1941-81, 1986-90

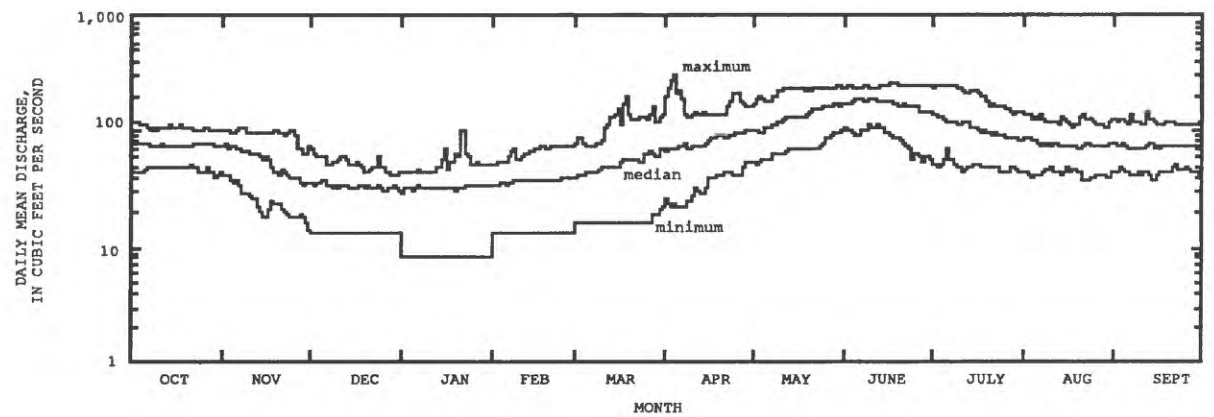
Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent: 2 50%	5 20%	10 10%	25 4%	50 2%	100# 1%
1	189	226	249	275	294	311
3	187	222	243	267	283	299
7	183	218	238	260	276	291
15	178	212	233	256	272	287
30	169	204	225	248	265	281
60	152	185	204	226	241	255
90	136	165	181	200	212	224

Duration table of daily mean flow for period of record 1941-81, 1986-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time: 1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
229	180	146	124	110	92	79	68	57	47	37	28	20	0.90	0.45	0.22	0.04

Length of record used in calculation may yield unreliable values for this column.


1,000
100
10
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
95
90
80
70
50
30
20
10
5
EXCEEDANCE PROBABILITY, IN PERCENT


1,000
100
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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
median
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DEC
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MAY
JUNE
JULY
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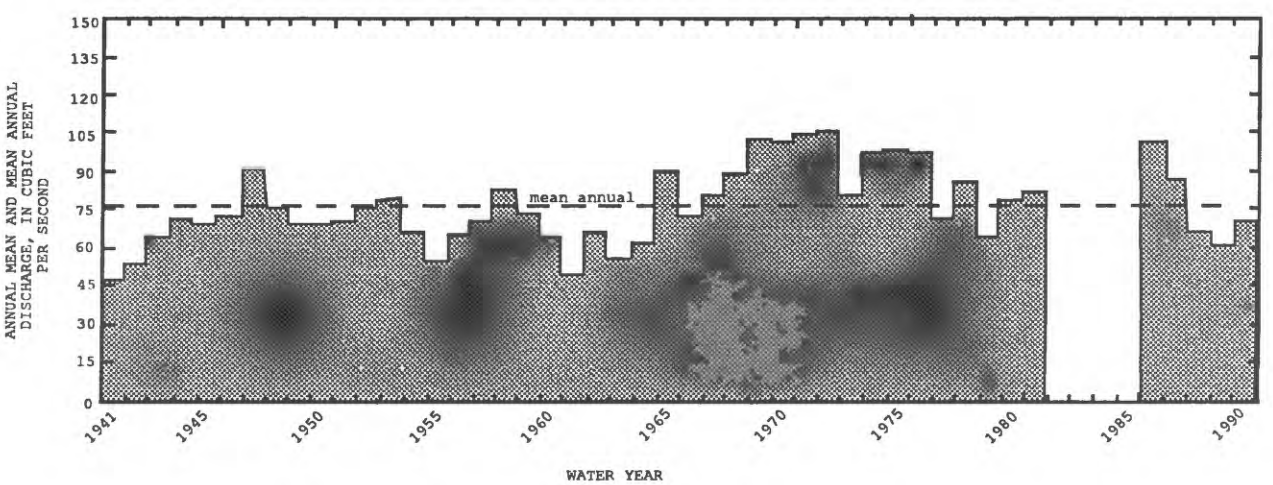
SEPT
MONTH


150
135
120
105
90
75
60
45
30
15
0
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1941
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
WATER YEAR

13120000 NORTH FORK BIG LOST RIVER AT WILD HORSE, NEAR CHILLY, ID

LOCATION.--Lat 43°55'59", long 114°06'47", in NE¼SE¼ sec.17, T.7 N., R.20 E., Custer County, Hydrologic Unit 17040218, in Challis National Forest, on right bank 0.2 mi upstream from East Fork, 2 mi downstream from Wild Horse damsite, and 16 mi southwest of Chilly.

DRAINAGE AREA.--114 mi².

PERIOD OF RECORD.--March 1944 to September 1990. Prior to October 1967, published as "Big Lost River at Wild Horse, near Chilly."

GAGE.--Water-stage recorder. Elevation of gage is 6,820 ft above sea level, from topographic map.

REMARKS.--There are several small ranch diversions upstream for local irrigation.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,440 ft³/s May 30, June 1, 1986, gage height, 5.85 ft; minimum, 4.9 ft³/s Feb. 17, 1988, gage height, 0.92 ft, result of freezeup.

Summary of monthly and annual discharges, 1945-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	64	22	40	11	0.27	3.2
November	117	19	33	14	0.44	2.6
December	88	17	27	11	0.40	2.1
January	80	15	25	9.8	0.40	2.0
February	71	15	22	8.1	0.37	1.8
March	62	14	23	8.4	0.37	1.8
April	153	17	65	35	0.54	5.2
May	584	66	284	121	0.43	22.7
June	848	156	415	162	0.39	33.2
July	506	57	196	101	0.51	15.7
August	178	30	72	29	0.41	5.8
September	122	22	48	20	0.42	3.9
Annual	184	52	104	32	0.31	100

Magnitude and frequency of annual low flow, based on period of record 1945-91

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent: 2 / 50%	5 / 20%	10 / 10%	20 / 5%	50 / 2%	100# / 1%
1	16	14	13	12	11	9.9
3	17	15	13	12	11	11
7	17	15	14	13	12	12
14	18	16	15	14	13	13
30	19	16	15	15	14	14
60	19	18	17	17	17	17
90	20	18	18	18	18	18
120	21	19	18	18	18	18
183	25	22	21	20	20	20

Magnitude and frequency of instantaneous peak flow, based on period of record 1945-90

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent: 2 / 50%	5 / 20%	10 / 10%	25 / 4%	50 / 2%	100 / 1%
732	1,020	1,210	1,440	1,610	1,780

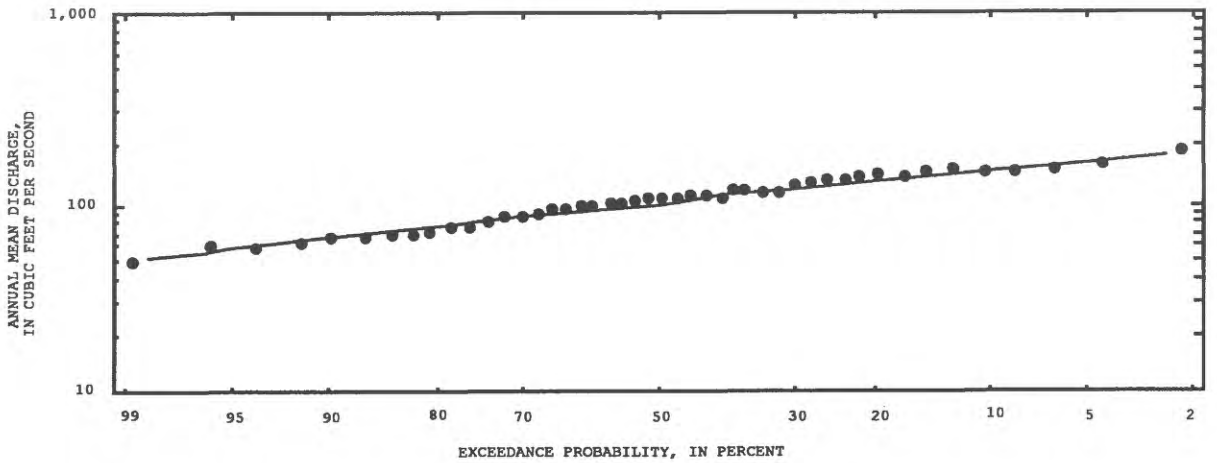
Magnitude and frequency of annual high flow, based on period of record 1945-90

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent: 2 / 50%	5 / 20%	10 / 10%	25 / 4%	50 / 2%	100# / 1%
1	670	937	1,120	1,340	1,510	1,690
3	628	881	1,050	1,270	1,440	1,610
7	574	809	968	1,170	1,320	1,480
15	511	719	857	1,030	1,160	1,290
30	441	608	715	847	942	1,040
60	358	490	573	673	744	812
90	291	396	459	534	586	636

Duration table of daily mean flow for period of record 1945-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time: 1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
760	435	305	212	148	75	50	38	31	26	23	20	18	17	15	14	13

Length of record used in calculation may yield unreliable values for this column.


1,000
100
10
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
99
95
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70
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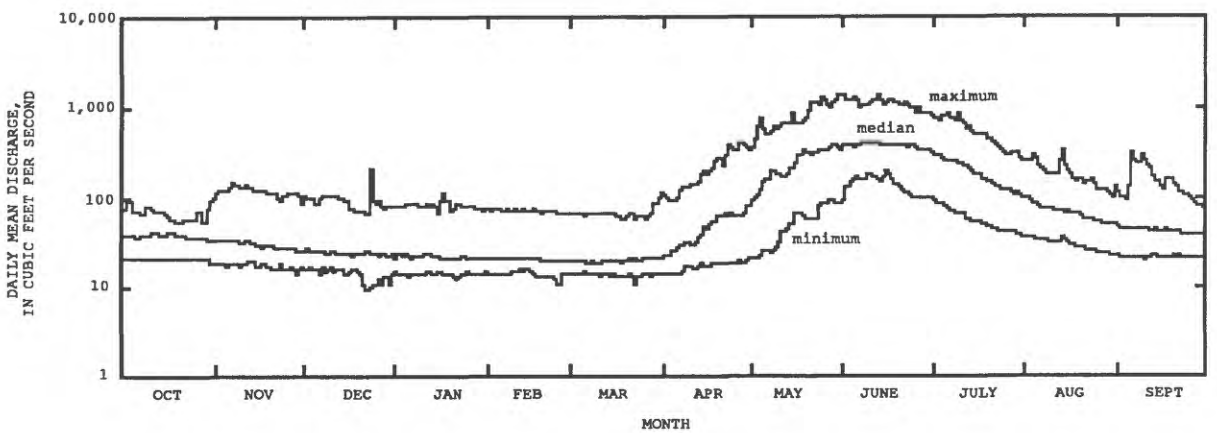
2
EXCEEDANCE PROBABILITY, IN PERCENT


10,000
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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
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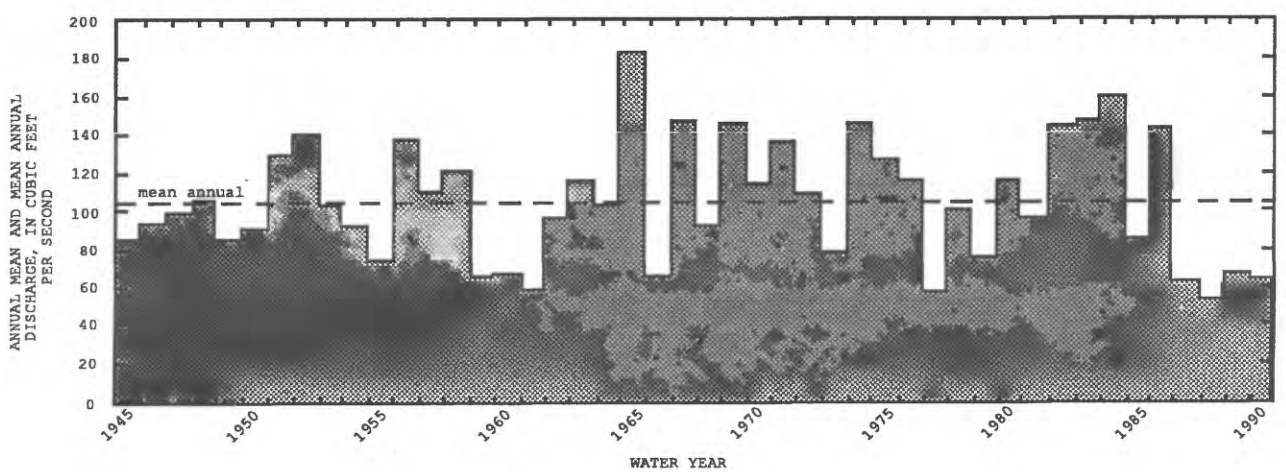
200
180
160
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0
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
WATER YEAR

13120500 BIG LOST RIVER AT HOWELL RANCH, NEAR CHILLY, ID

LOCATION.--Lat 43°59'54", long 114°01'12", in NE¼ NW¼ sec.30, T.8 N., R.21 E., Custer County, Hydrologic Unit 17040218, on left bank at Howell Ranch, 2.1 mi downstream from Burnt Creek, 7.7 mi downstream from East Fork, 9 mi southwest of Chilly, and 21 mi northwest of Mackay.

DRAINAGE AREA.--450 mi².

PERIOD OF RECORD.--April 1904 to November 1914, May 1920 to September 1990 (no winter records 1904, 1906-14, 1920-48).

GAGE.--Water-stage recorder. Datum of gage is 6,621.95 ft above sea level, from topographic map. See WSP 1737 for history of changes prior to June 11, 1920.

REMARKS.--No regulation. Diversions above station for irrigation of about 3,000 acres (1966 determination).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,420 ft³/s May 25, 1967, gage height, 6.02 ft; minimum observed, 19 ft³/s Dec. 12, 1939 (discharge measurement).

Summary of monthly and annual discharges, 1905, 1949-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	223	66	129	38	0.30	3.3
November	373	61	111	48	0.43	2.9
December	278	57	92	35	0.38	2.4
January	245	51	86	31	0.36	2.3
February	218	49	80	26	0.33	2.1
March	194	47	82	25	0.30	2.1
April	448	64	191	92	0.48	4.9
May	1,880	200	814	373	0.46	21.0
June	2,350	487	1,290	515	0.40	33.2
July	1,470	153	616	351	0.57	15.9
August	586	84	230	110	0.48	5.9
September	378	67	156	67	0.43	4.0
Annual	538	168	323	105	0.33	100

Magnitude and frequency of annual low flow, based on period of record 1949-90

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent					
	2 50%	5 20%	10 10%	20 5%	50 2%	100# 1%
1	58	48	44	40	36	34
3	60	52	48	45	42	40
7	63	54	50	47	44	42
14	65	55	51	48	45	44
30	69	58	54	51	47	45
60	70	61	58	56	55	55
90	73	64	61	59	58	58
120	76	66	64	62	61	61
183	89	75	70	68	65	64

Magnitude and frequency of instantaneous peak flow, based on period of record 1905, 1949-90

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
2,150	2,960	3,450	3,990	4,360	4,690

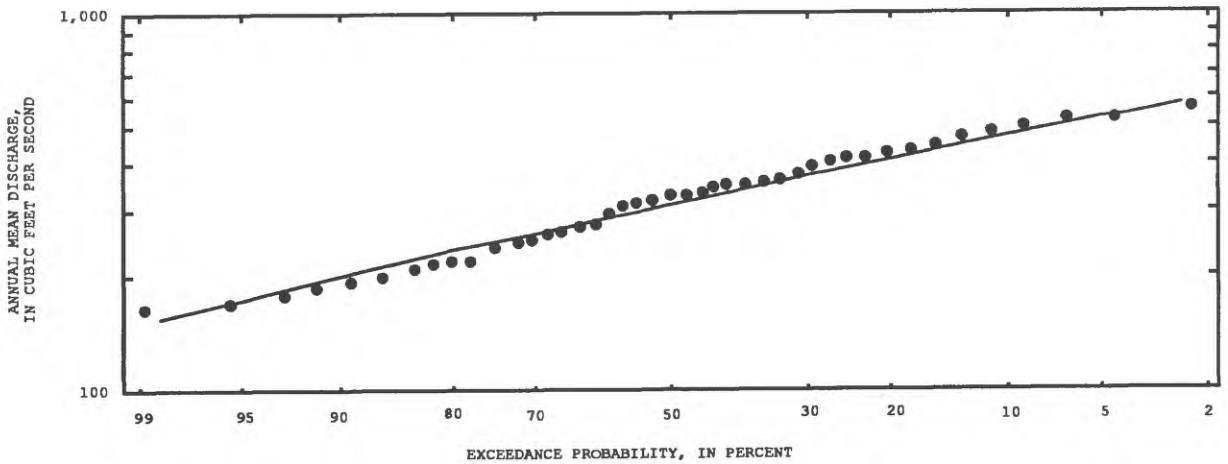
Magnitude and frequency of annual high flow, based on period of record 1905, 1949-90

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
	2 50%	5 20%	10 10%	25 4%	50 2%	100# 1%
1	2,130	2,860	3,330	3,900	4,310	4,650
3	1,980	2,680	3,130	3,690	4,110	4,520
7	1,780	2,450	2,890	3,440	3,840	4,250
15	1,580	2,200	2,600	3,100	3,470	3,840
30	1,360	1,880	2,210	2,630	2,930	3,230
60	1,070	1,500	1,790	2,130	2,390	2,640
90	867	1,210	1,440	1,710	1,900	2,100

Duration table of daily mean flow for period of record 1905, 1949-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time															
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
2,350	1,370	911	617	435	228	158	125	105	89	79	68	60	54	50	48	43

Length of record used in calculation may yield unreliable values for this column.


1,000
100
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
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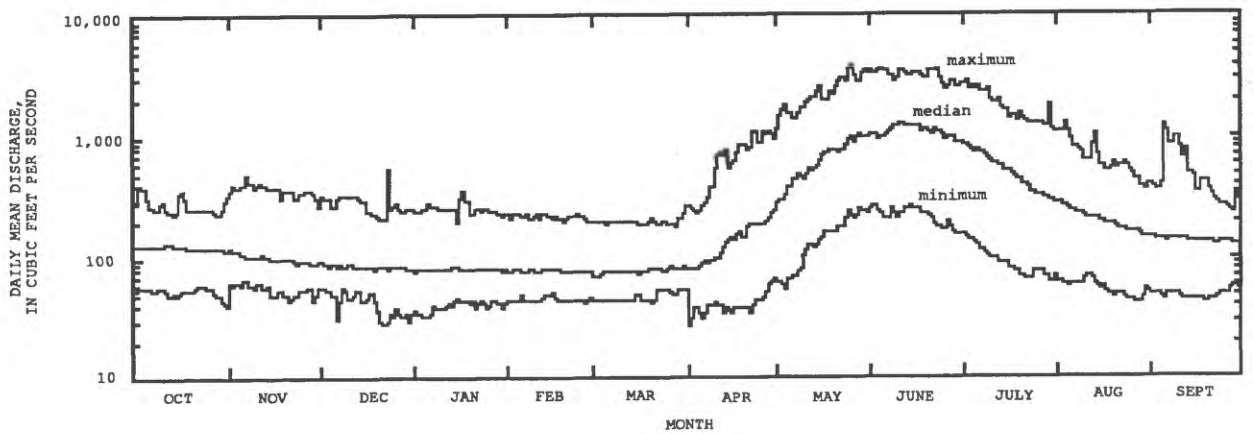
EXCEEDANCE PROBABILITY, IN PERCENT


10,000
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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
median
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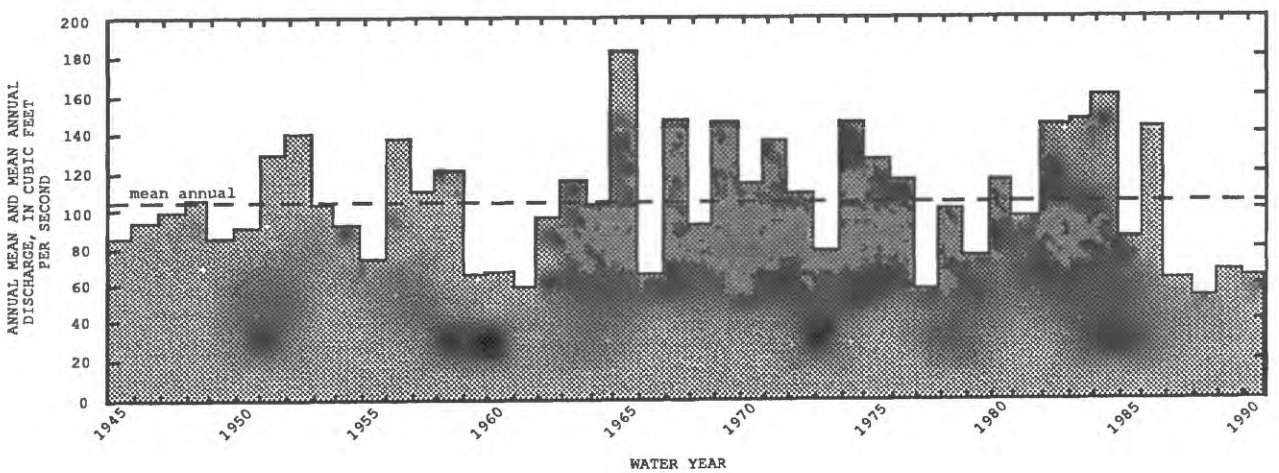
SEPT
MONTH


200
180
160
140
120
100
80
60
40
20
0
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
WATER YEAR

13127000 BIG LOST RIVER BELOW MACKAY RESERVOIR, NEAR MACKAY, ID

LOCATION.--Lat 43°56'20", long 113°38'50", in SW¼NE¼ sec.18, T.7 N., R.24 E., Custer County, Hydrologic Unit 17040218, on left bank 1.4 mi downstream from head of Sharp Ditch, 1.6 mi downstream from Mackay Reservoir, and 2.5 mi northwest of Mackay.

DRAINAGE AREA.--813 mi².

PERIOD OF RECORD.--December 1903 to August 1906, and May 1912 to March 1915 (published as "near Mackay"), January 1919 to September 1990.

GAGE.--Water-stage recorder. Datum of gage is 5,946.39 ft above sea level, from topographic map. Nonrecording gage prior to May 12, 1912, and June 5, 1912, to Apr. 28, 1913, at sites within 1 mi upstream at different datums, May 12 to June 4, 1912, at site 1.5 mi upstream (above Sharp Ditch) at different datum, Apr. 29, 1913, to Mar. 15, 1915, at site 1 mi downstream (below Streeter Ditch) at different datum.

REMARKS.--Flow completely regulated by Mackay Reservoir. Sharp Ditch is only diversion between station and reservoir; about 12,700 acres of land are irrigated by diversions from river and tributaries above reservoir by surface diversions, and 10,200 acres irrigated by subirrigation.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,990 ft³/s June 10, 1921, June 6, 1986; maximum gage height, 6.08 ft, June 6, 1986; minimum, 16 ft³/s Oct. 27, 1967, gage height, 1.11 ft.

Summary of monthly and annual discharges, 1905, 1913-14, 1920-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	487	60	166	75	0.45	4.5
November	660	45	104	83	0.79	2.8
December	476	59	112	63	0.56	3.0
January	292	75	123	42	0.34	3.3
February	304	82	130	39	0.30	3.5
March	544	94	148	70	0.47	4.0
April	516	93	164	87	0.53	4.4
May	1,190	116	494	252	0.51	13.3
June	2,010	203	955	405	0.42	25.7
July	1,470	127	678	274	0.40	18.2
August	895	113	417	183	0.44	11.2
September	635	100	225	96	0.43	6.1
Annual	658	128	311	102	0.33	100

Magnitude and frequency of annual low flow, based on period of record 1905-06, 1914, 1920-91

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent					
	2 50%	5 20%	10 10%	20 5%	50 2%	100 1%
1	55	38	31	26	22	20
3	58	40	33	28	24	21
7	61	43	36	31	26	23
14	64	47	40	35	31	28
30	69	53	48	45	42	40
60	77	62	58	55	52	51
90	87	71	65	62	59	58
120	93	77	72	70	67	67
183	115	97	92	88	86	85

Magnitude and frequency of instantaneous peak flow, based on period of record 1905, 1913-14, 1920-90

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
1,440	2,030	2,400	2,840	3,160	3,460

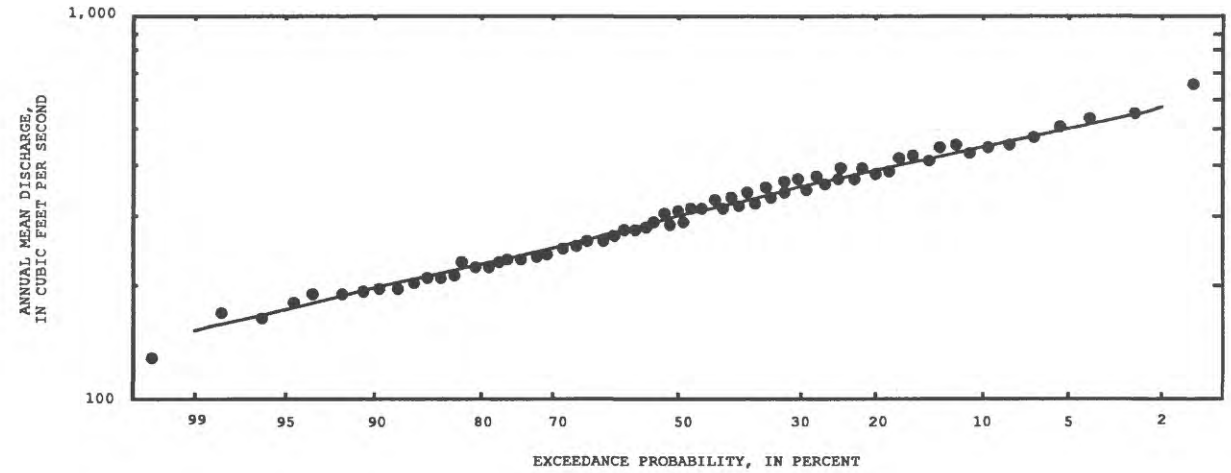
Magnitude and frequency of annual high flow, based on period of record 1905, 1913-14, 1920-90

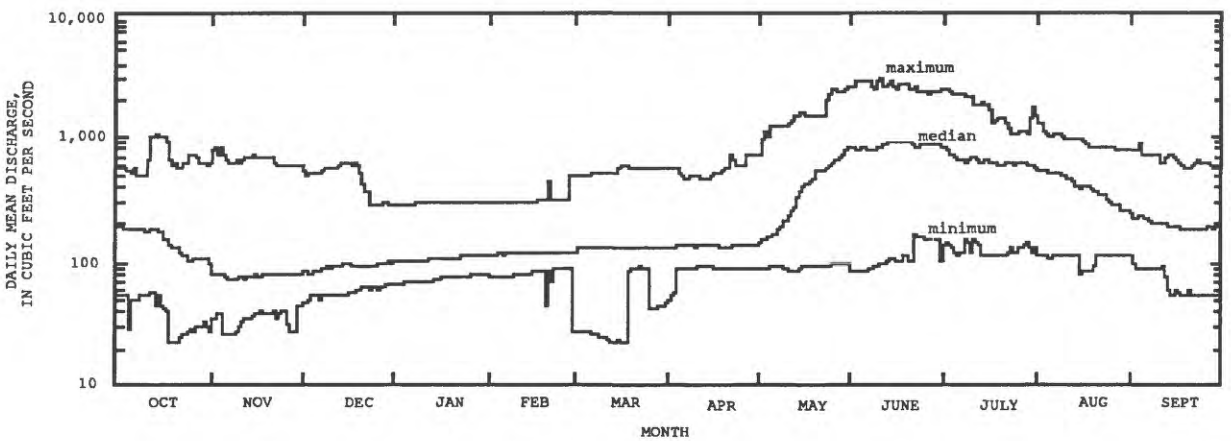
Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
	2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
1	1,370	1,970	2,370	2,870	3,230	3,590
3	1,330	1,920	2,300	2,780	3,130	3,480
7	1,250	1,810	2,180	2,650	3,000	3,360
15	1,130	1,630	1,940	2,330	2,600	2,870
30	994	1,390	1,640	1,940	2,150	2,350
60	833	1,150	1,340	1,560	1,710	1,850
90	725	989	1,140	1,320	1,430	1,540

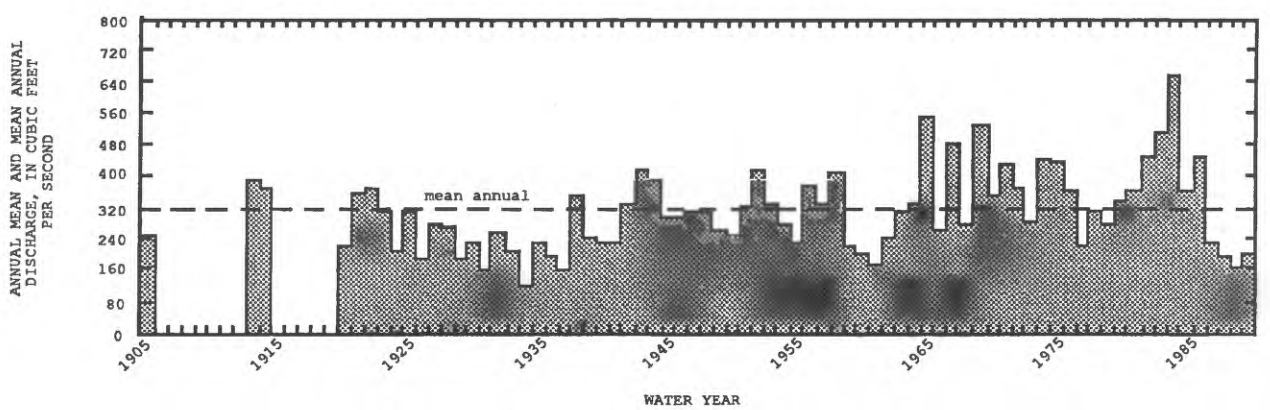
Duration table of daily mean flow for period of record 1905, 1913-14, 1920-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time																
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
1,780	990	763	628	513	294	195	160	130	115	101	82	67	55	48	42	29

Length of record used in calculation may yield unreliable values for this column.


1,000
100
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
99
95
90
80
70
50
30
20
10
5
2
EXCEEDANCE PROBABILITY, IN PERCENT


10,000
1,000
100
10
DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
median
minimum
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
MONTH


800
720
640
560
480
400
320
240
160
80
0
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1905
1915
1925
1935
1945
1955
1965
1975
1985
WATER YEAR

13128900 LOWER CEDAR CREEK ABOVE DIVERSION 3, NEAR MACKAY, ID

LOCATION.--Lat 43°57'57", long 113°34'40", in NW¼SW¼ sec.2, T.7 N., R.24 E., Custer County, Hydrologic Unit 17040218, Challis National Forest, on right bank at abandoned powerplant site, approximately 1,000 ft upstream from the heading of Nielson diversion, and 3.9 mi northeast of Mackay.

DRAINAGE AREA.--8.26 mi².

PERIOD OF RECORD.--Water years 1963, 1964-66, August 1966 to September 1973, October 1979 to September 1990. Combination of discharge records for Clark Ditch near Mackay and Cedar Creek (below powerplant) near Mackay for May 1920 to September 1922 (seasonal records only) is equivalent to this record.

GAGE.--Water-stage recorder. Altitude of gage is 6,800 ft above sea level, from topographic map. May 1, 1920, to Oct. 21, 1922, nonrecording gage at present site at different datums. Sept. 26, 1963, to Aug. 13, 1966, crest-stage gage at site 20 ft downstream at datum 9.32 ft lower.

REMARKS.--No regulation or diversion above station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 310 ft³/s June 22, 1982, gage height, 3.10 ft. Minimum discharge observed, 0.4 ft³/s Nov. 21 to Dec. 1, 1921, gage height, 0.18 ft, site and datum then in use.

Summary of monthly and annual discharges, 1967-73, 1980-84

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	27	6.8	12	5.4	0.44	4.7
November	25	4.9	9.8	5.3	0.54	3.7
December	19	3.9	7.6	3.9	0.51	2.9
January	17	3.2	6.6	3.6	0.55	2.5
February	14	2.7	5.8	3.0	0.52	2.1
March	8.1	2.6	4.4	1.6	0.36	1.7
April	15	2.4	6.1	3.7	0.61	2.3
May	53	17	36	10	0.29	13.5
June	117	49	83	22	0.27	31.5
July	75	31	53	16	0.31	20.0
August	34	15	23	6.4	0.27	8.9
September	25	11	16	4.9	0.30	6.2
Annual	33	17	22	5.1	0.23	100

Magnitude and frequency of annual low flow, based on period of record 1968-73, 1981-84

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent					
	2 50%	5 20%	10 10%	20 5%	50# 2%	100# 1%
1	2.7	2.0	1.6	1.4	1.1	0.99
3	2.7	2.0	1.6	1.4	1.1	0.99
7	2.8	2.0	1.7	1.4	1.2	0.99
14	3.0	2.2	1.9	1.6	1.3	1.2
30	3.7	3.0	2.6	2.3	2.0	1.9
60	4.7	3.8	3.4	3.2	3.1	3.0
90	5.0	4.0	3.7	3.6	3.5	3.4
120	5.4	4.4	4.1	3.9	3.8	3.8
183	7.0	5.7	5.4	5.3	5.1	5.1

Magnitude and frequency of instantaneous peak flow, based on period of record 1967-73, 1980-84

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
182	228	256	290	314	338

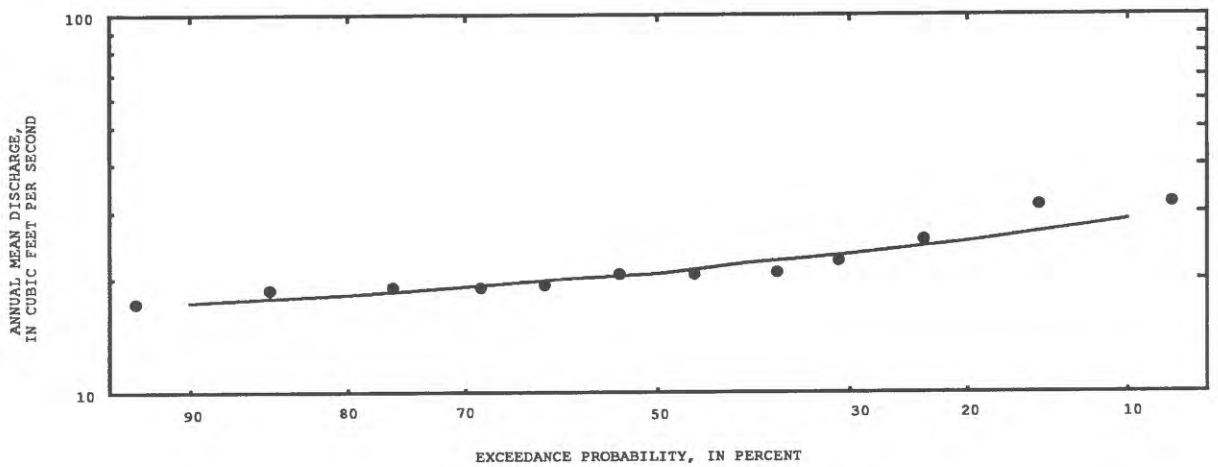
Magnitude and frequency of annual high flow, based on period of record 1967-73, 1980-84

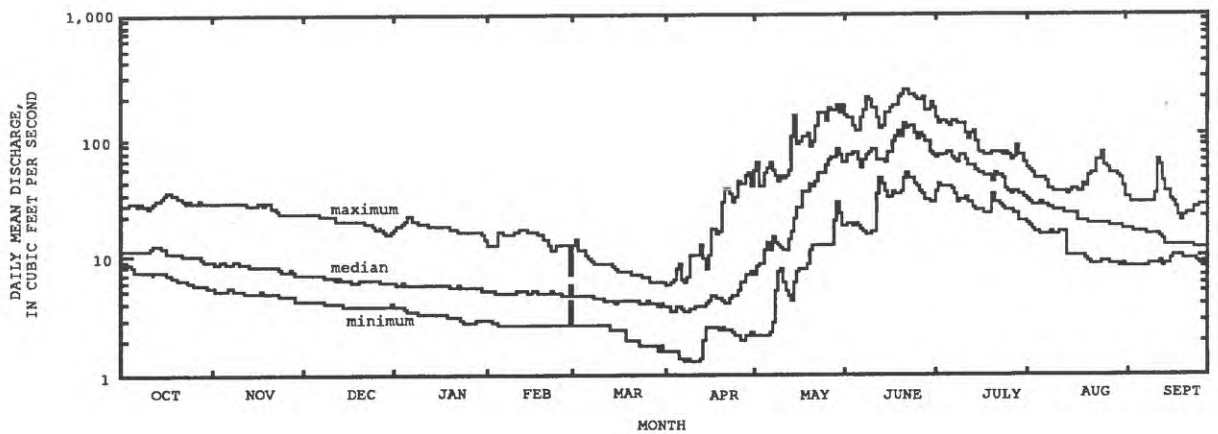
Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
	2 50%	5 20%	10 10%	25# 4%	50# 2%	100# 1%
1	149	187	211	240	262	283
3	139	175	198	227	247	268
7	122	156	178	205	225	245
15	105	139	161	190	211	233
30	88	112	128	148	162	177
60	71	90	101	115	126	136
90	58	71	80	92	101	110

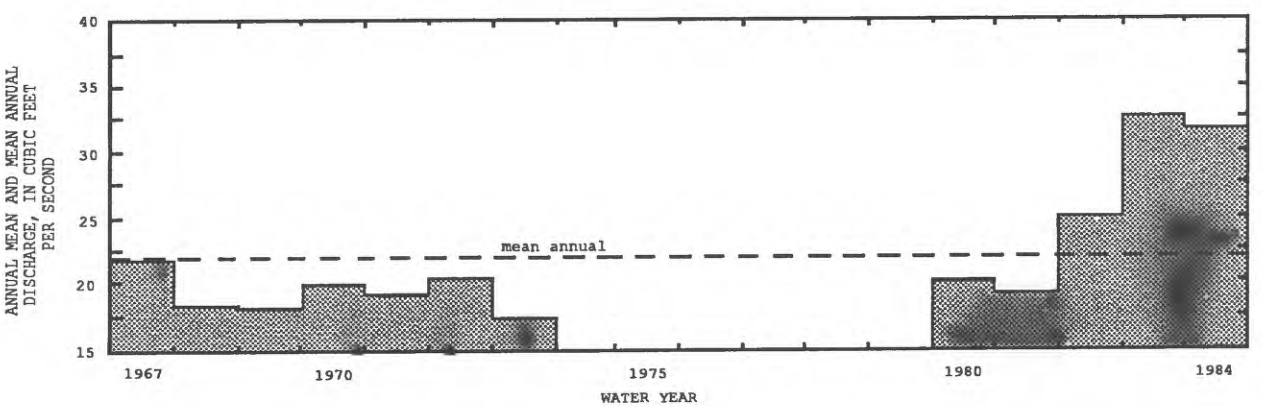
Duration table of daily mean flow for period of record 1967-73, 1980-84

Discharge, in ft³/s, which was exceeded for indicated percentage of time																
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
149	86	58	43	32	20	15	11	7.8	6.2	4.9	3.9	3.0	2.6	2.4	1.9	1.4

Length of record used in calculation may yield unreliable values for this column.


100
10
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
90
80
70
50
30
20
10
EXCEEDANCE PROBABILITY, IN PERCENT


1,000
100
10
1
DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
median
minimum
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
MONTH


40
35
30
25
20
15
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1967
1970
1975
1980
1984
WATER YEAR

MUD LAKE-LOST RIVER BASIN

13132500 BIG LOST RIVER NEAR ARCO, ID

LOCATION.--Lat 43°35'00", long 113°16'10", in SW¼, sec.17, T.3 N., R.27 E., Butte County, Hydrologic Unit 17040218, on right bank 0.4 mi downstream from slough entering from left bank, and 4 mi southeast of Arco.

DRAINAGE AREA.--1,410 mi², approximately.

PERIOD OF RECORD.--August 1946 to September 1980, March to September 1981, May 1982 to September 1990.

GAGE.--Water-stage recorder. Elevation of gage is 5,240 ft above sea level, by barometer. Prior to Oct. 14, 1952, at site 800 ft upstream at datum 3.08 ft higher.

REMARKS.--Flow regulated by Mackay Reservoir. Station is below all large diversions for irrigation in Big Lost River Valley. About 57,500 acres of land irrigated by diversions from river and tributaries and by ground-water withdrawals above station. About 10,200 acres irrigated by subirrigation above Mackay Reservoir.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,890 ft³/s July 5, 1967, gage height, 7.68 ft; no flow on many days.

Summary of monthly and annual discharges, 1947-61, 1967-80, 1983-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	371	0.00	97	100	1.0	7.4
November	759	0.00	102	137	1.3	7.7
December	614	0.00	88	111	1.3	6.7
January	347	0.00	70	73	1.0	5.3
February	314	0.00	72	69	0.96	5.5
March	390	0.00	94	98	1.0	7.2
April	653	0.00	112	155	1.4	8.5
May	841	0.00	140	211	1.5	10.6
June	1,120	0.00	246	332	1.3	18.8
July	918	0.00	145	243	1.7	11.0
August	502	0.00	60	95	1.6	4.6
September	395	0.00	88	105	1.2	6.7
Annual	546	0.00	109	118	1.1	100

Magnitude and frequency of annual low flow, based on period of record 1948-61, 1968-80, 1984-91

Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and nonexceedance probability, in percent					
	2 50%	5 20%	10 10%	20 5%	50 2%	100# 1%
1	6.6	0.00	0.00	0.00	0.00	0.00
3	7.1	0.1	0.00	0.00	0.00	0.00
7	8.2	0.2	0.00	0.00	0.00	0.00
14	9.9	1.1	0.00	0.00	0.00	0.00
30	14	2.3	0.00	0.00	0.00	0.00
60	17	4.4	0.00	0.00	0.00	0.00
90	26	5.9	0.00	0.00	0.00	0.00
120	29	7.0	0.00	0.00	0.00	0.00
183	58	8.4	0.00	0.00	0.00	0.00

Magnitude and frequency of instantaneous peak flow, based on period of record 1947-61, 1967-80, 1983-90

Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
2 50%	5 20%	10 10%	25 4%	50 2%	100 1%
420	1,100	1,530	2,350	3,010	3,700

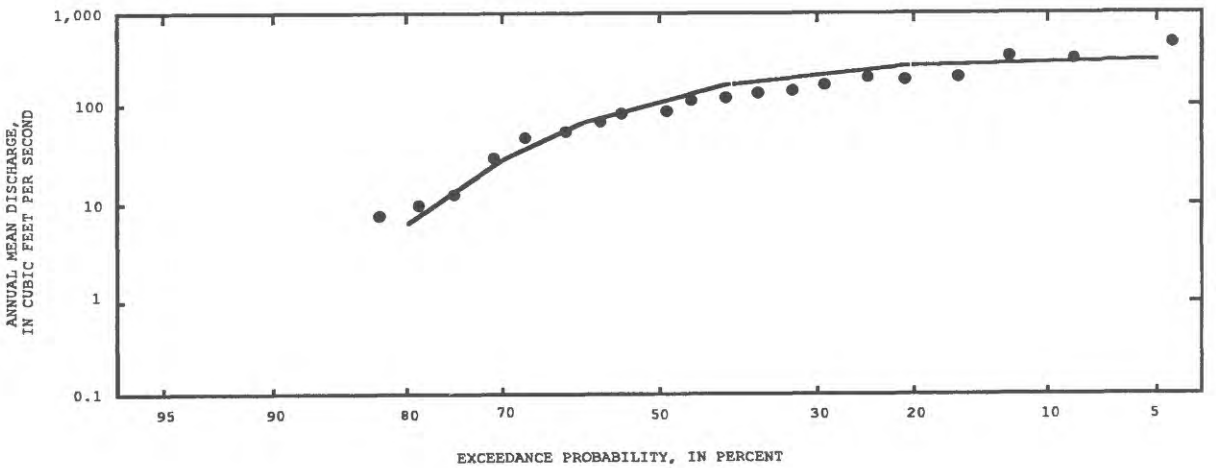
Magnitude and frequency of annual high flow, based on period of record 1947-61, 1967-80, 1983-90

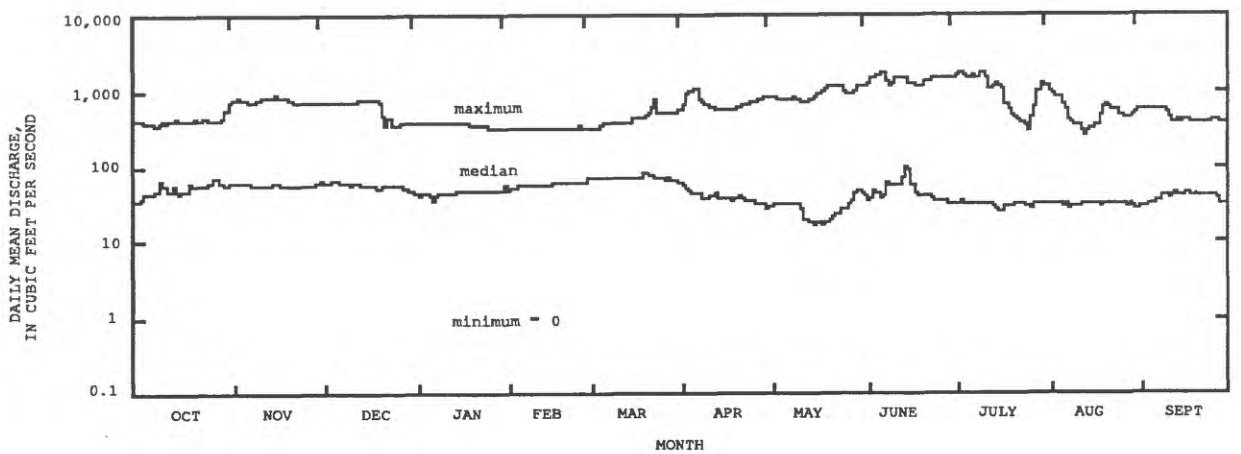
Period (consecutive days)	Discharge, in ft³/s, for indicated recurrence interval, in years, and exceedance probability, in percent					
	2 50%	5 20%	10 10%	25 4%	50 2%	100# 1%
1	411	1,010	1,270	1,450	1,520	1,560
3	392	970	1,230	1,410	1,470	1,510
7	360	894	1,130	1,300	1,360	1,400
15	318	784	986	1,120	1,170	1,200
30	278	634	757	826	845	854
60	233	479	542	568	574	576
90	206	395	434	448	450	451

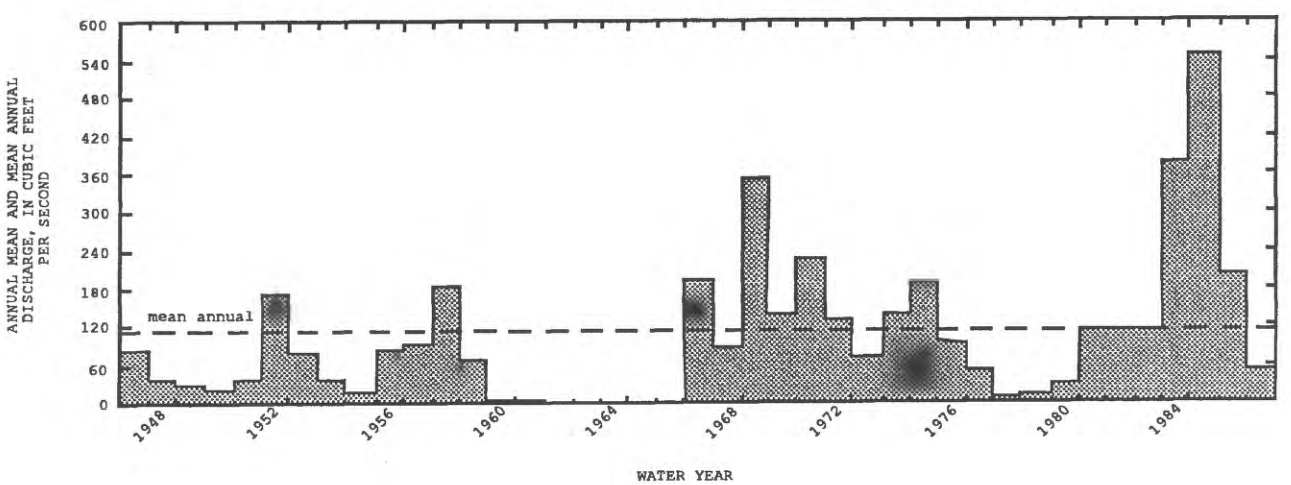
Duration table of daily mean flow for period of record 1947-61, 1967-80, 1983-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time																
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
993	456	285	192	144	108	72	43	28	17	8.3	0.10	0.00	0.00	0.00	0.00	0.00

Length of record used in calculation may yield unreliable values for this column.


1,000
100
10
1
0.1
ANNUAL MEAN DISCHARGE, IN CUBIC FEET PER SECOND
95
90
80
70
50
30
20
10
5
EXCEEDANCE PROBABILITY, IN PERCENT


10,000
1,000
100
10
1
0.1
DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
maximum
median
minimum = 0
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
MONTH


600
540
480
420
360
300
240
180
120
60
0
ANNUAL MEAN AND MEAN ANNUAL DISCHARGE, IN CUBIC FEET PER SECOND
mean annual
1948
1952
1956
1960
1964
1968
1972
1976
1980
1984
WATER YEAR

MUD LAKE-LOST RIVER BASIN

13132513 INEL DIVERSION AT HEAD NEAR ARCO, ID

LOCATION.--Lat 42°30'50", long 113°05'00" in NE¼SE¼ sec. 11, T.2 N., R.28 E., Butte County, Hydrologic Unit 17040218, on left bank 0.05 mi south of head of INEL diversion, 0.4 mi north of intersection of gravel road from Highway 20-26 and road on top of dike, and 13.2 mi southwest of Arco.

PERIOD OF RECORD.--1965-68 (discharge measurements only); July 1984 to September 1990.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 5,000.00 ft above sea level (levels by USGS).

REMARKS.--Flow is regulated by Mackay Reservoir and is diverted from the Big Lost River for flood control at INEL facilities. Graph of maximum-median-minimum discharge is based on entire period of record.

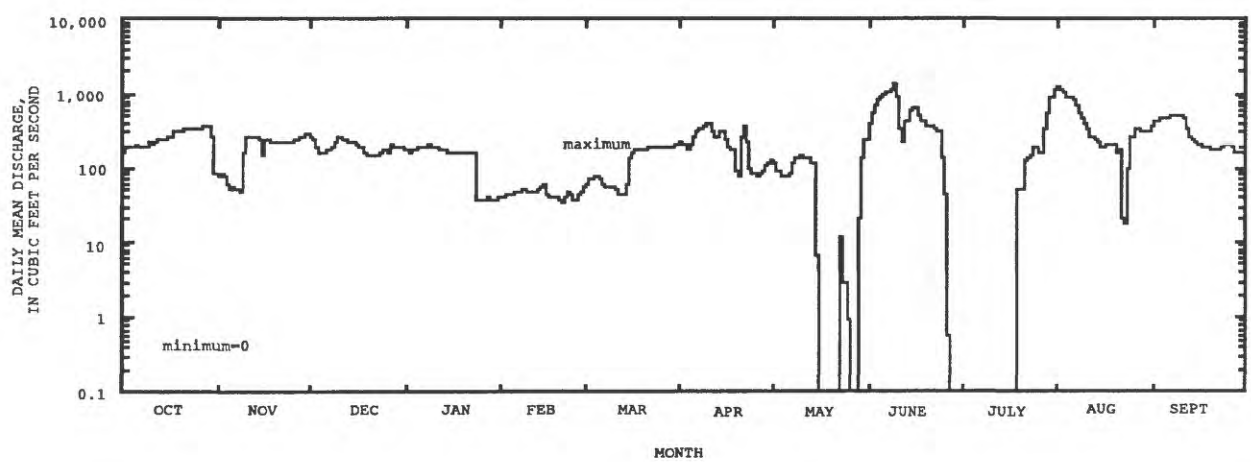
EXTREMES FOR PERIOD OF RECORD.--Maximum daily diacharge, 1,290 ft³/s June 9, 1986; no flow on many days.

Summary of monthly and annual discharges, 1985-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	255	0.00	43	104	2.4	13.1
November	194	0.00	40	78	2.0	12.2
December	199	0.00	45	81	1.8	13.7
January	138	0.00	31	56	1.8	9.3
February	46	0.00	7.9	19	2.4	2.4
March	110	0.00	24	44	1.8	7.4
April	206	0.00	39	83	2.1	11.8
May	63	0.00	11	25	2.4	3.3
June	482	0.00	80	197	2.4	24.6
July	0.00	0.00	0.00	0.00		0.0
August	0.00	0.00	0.00	0.00		0.0
September	29	0.00	7.1	12	1.7	2.2
Annual	94	0.00	27	38	1.4	100

Duration table of daily mean flow for period of record 1985-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time																
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
350	199	76	42	1.3	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00



13132515 INEL DIVERSION AT OUTLET OF SPREADING AREA A NEAR ARCO, ID

LOCATION.--Lat 43°29'45", long 113°04'19", in NE¼SW¼ sec.13, T.2 N., R.28 E., Butte County, Hydrologic Unit 17040218, on left bank 1.4 mi south of head of INEL diversion, 0.05 mi south of outlet of spreading area A, and 14.5 mi south of Arco.

PERIOD OF RECORD.--1965-68 (discharge measurements only); June 1984 to September 1990.

GAGE.--Water-stage recorder. Datum of gage is 5,000.00 ft above sea level (levels by USGS).

REMARKS.--Flow is regulated by Mackay Reservoir and is diverted from the Big Lost River for flood control at INEL facilities. Graph of maximum-median-minimum discharge is based on entire period of record.

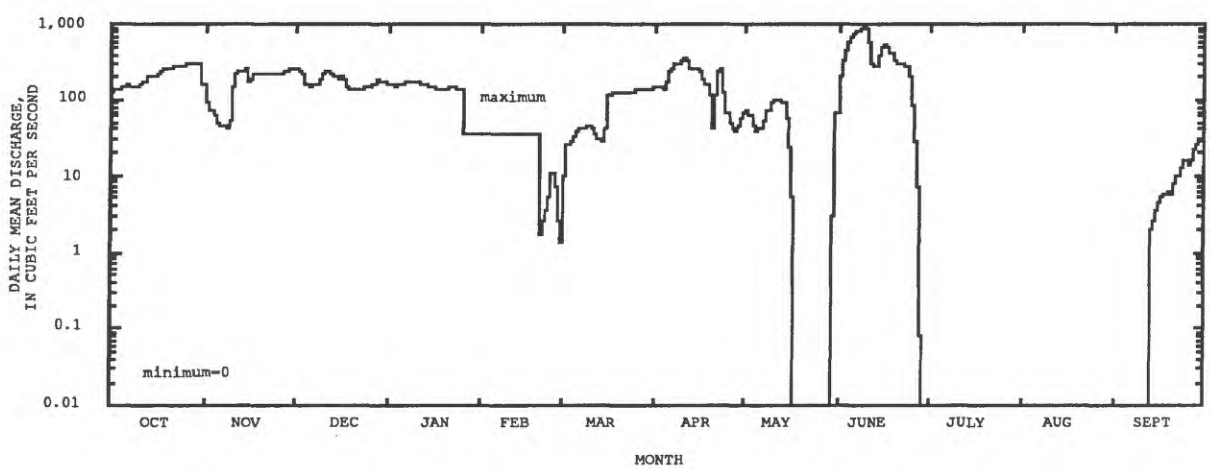
EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 989 ft³/s June 9, 1986; no flow on many days.

Summary of monthly and annual discharges, 1985-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	220	0.00	37	90	2.4	14.8
November	174	0.00	32	70	2.2	12.7
December	180	0.00	36	72	2.0	14.5
January	129	0.00	23	52	2.2	9.4
February	4.1	0.00	0.69	1.7	2.4	0.3
March	74	0.00	15	30	1.9	6.1
April	178	0.00	31	72	2.3	12.4
May	34	0.00	5.8	14	2.4	2.3
June	403	0.00	67	165	2.4	27.0
July	0.00	0.00	0.00	0.00		0.0
August	0.00	0.00	0.00	0.00		0.0
September	5.5	0.00	1.1	2.2	1.9	0.5
Annual	80	0.00	21	33	1.6	100

Duration table of daily mean flow for period of record 1985-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time																
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
342	166	39	3.9	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00



13132520 BIG LOST RIVER BELOW INEL DIVERSION NEAR ARCO, ID

LOCATION.--Lat 43°30'57", long 113°04'52", in SE ¼SW ¼NE ¼ sec.11, T.2 N., R.28 E., Butte County, Hydrologic Unit 17040218, on right bank 0.2 mi north of the head of the INEL diversion, 4.5 mi south of State Highway 20-26 bridge over the Big Lost Rivsr, and 13.2 mi southeast of Arco.

PERIOD OF RECORD.--1965-68 (discharge measurements only); June 1984 to September 1990.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 5,000.00 ft above sea level (levels by USGS).

REMARKS.--Flow regulated by Mackay Reservoir and INEL diversion. Station is below all diversions for irrigation in the Big Lost River Valley and is below the INEL diversion for flood control. Graph of maximum-median-minimum discharge is based on entire period of record.

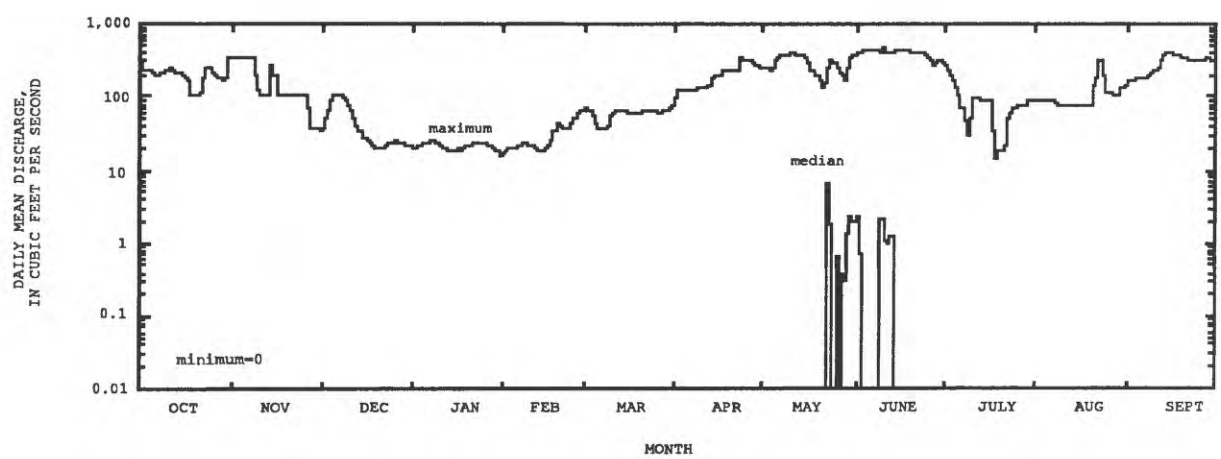
EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 460 ft³/s June 10, 1986; no flow on many days.

Summary of monthly and annual flows, 1985-90

Month	Maximum (ft^3/s)	Minimum (ft^3/s)	Mean (ft^3/s)	Standard deviation (ft^3/s)	Coefficient of variation	Percentage of annual runoff
October	193	0.00	73	84	1.2	16.8
November	166	0.00	37	65	1.7	8.5
December	45	0.00	9.2	18	1.9	2.1
January	21	0.00	4.7	8.4	1.8	1.1
February	23	0.00	8.0	9.6	1.2	1.8
March	59	0.00	15	24	1.6	3.5
April	183	0.00	58	80	1.4	13.3
May	281	0.00	68	115	1.7	15.6
June	392	0.00	67	159	2.4	15.3
July	58	0.00	11	23	2.2	2.4
August	38	0.00	6.5	15	2.3	1.5
September	270	0.00	79	124	1.6	18.1
Annual	127	0.00	36	52	1.4	100

Duration table of daily mean flow for period of record 1985-90

Discharge, in ft^3/s, which was exceeded for indicated percentage of time															
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
398	251	130	71	32	8.5	0.04	0.03	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00



MUD LAKE-LOST RIVER BASIN

13132535 BIG LOST RIVER AT LINCOLN BOULEVARD BRIDGE NEAR ATOMIC CITY, ID

LOCATION.--Lat 43°34'26", long 112°56'33", in SE¼SW¼NE¼ sec.24, T.3 N., R.29 E., Butte City, Hydrologic Unit 17040218, on left bank 2.6 mi north of Lincoln Boulevard-Portland Avenue intersection, and 18.5 mi southeast of Arco.

PERIOD OF RECORD.--1951-53, 1957, 1965-68 (discharge measurements only); July 1984 to September 1990.

GAGE.--Water-stage recorder. Datum of gage is 4,900.00 ft above sea level (levels by USGS).

REMARKS.--Flow regulated by Mackay Reservoir and INEL diversion. Station is below all diversions for irrigation in the Big Lost River Valley and is below the INEL diversion for flood control. Graph of maximum-median-minimum discharge is based on entire period of record.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 393 ft³/s June 10, 1986, gage height, 15.91 ft; no flow on many days.

Summary of monthly and annual discharges, 1985-90

Month	Maximum (ft³/s)	Minimum (ft³/s)	Mean (ft³/s)	Standard deviation (ft³/s)	Coefficient of variation	Percentage of annual runoff
October	174	0.00	68	78	1.2	19.5
November	146	0.00	31	57	1.8	9.0
December	35	0.00	5.8	14	2.4	1.7
January	0.05	0.00	0.01	0.02	2.4	0.0
February	1.7	0.00	0.29	0.70	2.4	0.1
March	8.7	0.00	2.9	4.5	1.5	0.8
April	141	0.00	45	67	1.5	13.0
May	241	0.00	58	99	1.7	16.6
June	341	0.00	57	139	2.4	16.4
July	47	0.00	7.9	19	2.4	2.3
August	17	0.00	2.8	6.7	2.4	0.8
September	248	0.00	69	110	1.6	19.8
Annual	103	0.00	29	42	1.5	100

Duration table of daily mean flow for period of record 1985-90

Discharge, in ft³/s, which was exceeded for indicated percentage of time																
1%	5%	10%	15%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	99%	99.5%	99.9%
343	233	111	50	6.8	0.18	0.16	0.13	0.10	0.08	0.05	0.03	0.01	0.00	0.00	0.00	0.00