

Appendix A. Annual Peak Flow Frequency Analysis for Fisher and Yaak Rivers, Montana

Fisher River, Montana

[Discharge is in cubic feet per second]

1

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Program PeakFq      U. S. GEOLOGICAL SURVEY      Seq.000.000
Ver. 5.2            Annual peak flow frequency analysis  Run Date / Time
11/01/2007          following Bulletin 17-B Guidelines 01/23/2009 16:02

      --- PROCESSING OPTIONS ---

Plot option          = None
Basin char output    = WATSTORE
Print option         = Yes
Debug print          = No
Input peaks listing  = Long
Input peaks format   = WATSTORE peak file

Input files used:
  peaks (ascii)      - D:\PROJECTWORK\KOOTENAI\DATA\PEAK_FLOW_EST\WATSTORE\USGS 12302055 FISHER RIVER N
  specifications     - PKFQWPSF.TMP
Output file(s):
  main - D:\PROJECTWORK\KOOTENAI\DATA\PEAK_FLOW_EST\WATSTORE\USGS 12302055 FISHER RIVER N
  bcd - (NONE)

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1

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Program PeakFq      U. S. GEOLOGICAL SURVEY      Seq.001.001
Ver. 5.2            Annual peak flow frequency analysis  Run Date / Time
11/01/2007          following Bulletin 17-B Guidelines 01/23/2009 16:02

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Station - 12302055 Fisher River near Libby MT

I N P U T D A T A S U M M A R Y

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Number of peaks in record      =      40
Peaks not used in analysis     =      0
Systematic peaks in analysis   =     40
Historic peaks in analysis     =      0
Years of historic record       =      0
Generalized skew               =    -0.087
Standard error                 =     0.550
Mean Square error              =     0.303
Skew option                    =    WEIGHTED
Gage base discharge            =     0.0
User supplied high outlier threshold =  --
User supplied low outlier criterion =  --
Plotting position parameter    =     0.00

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***** NOTICE -- Preliminary machine computations. *****
***** User responsible for assessment and interpretation. *****

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WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.          0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.     595.0
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 13639.4

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28 Sediment Characteristics and Transport in the Kootenai River White Sturgeon Critical Habitat near Bonners Ferry, Idaho

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.002
 Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
 11/01/2007 following Bulletin 17-B Guidelines 01/23/2009 16:02

Station - 12302055 Fisher River near Libby MT

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.4547	0.2536	0.292
BULL.17B ESTIMATE	0.0	1.0000	3.4547	0.2536	0.167
ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES					
ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES	
				LOWER	UPPER
0.9950	693.8	743.1	638.6	482.1	902.2
0.9900	787.1	831.1	736.8	561.0	1007.0
0.9500	1122.0	1147.0	1086.0	855.8	1375.0
0.9000	1363.0	1376.0	1335.0	1076.0	1638.0
0.8000	1736.0	1732.0	1717.0	1421.0	2045.0
0.6667	2187.0	2167.0	2177.0	1841.0	2549.0
0.5000	2803.0	2769.0	2803.0	2400.0	3270.0
0.4292	3112.0	3074.0	3117.0	2672.0	3647.0
0.2000	4632.0	4610.0	4688.0	3934.0	5648.0
0.1000	6079.0	6117.0	6227.0	5050.0	7729.0
0.0400	8182.0	8377.0	8556.0	6581.0	10970.0
0.0200	9952.0	10340.0	10610.0	7815.0	13870.0
0.0100	11900.0	12550.0	12970.0	9132.0	17190.0
0.0050	14050.0	15040.0	15710.0	10540.0	21000.0
0.0020	17220.0	18830.0	20010.0	12560.0	26870.0

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
 Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
 11/01/2007 following Bulletin 17-B Guidelines 01/23/2009 16:02

Station - 12302055 Fisher River near Libby MT

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1948	6560.0		1988	2230.0	
1969	4730.0		1989	2960.0	
1970	2880.0		1990	3170.0	
1971	4620.0		1991	5380.0	
1972	4980.0		1992	1140.0	
1973	1410.0		1993	1710.0	
1974	8720.0		1994	1560.0	
1975	3590.0		1995	2350.0	
1976	4240.0		1996	12000.0	
1977	829.0		1997	7010.0	
1978	2660.0		1998	2530.0	
1979	2930.0		1999	2700.0	
1980	2510.0		2000	2640.0	
1981	3820.0		2001	1490.0	
1982	3450.0		2002	6910.0	
1983	2110.0		2003	1350.0	
1984	1500.0		2004	1360.0	
1985	2570.0		2005	1520.0	
1986	3120.0		2006	2510.0	
1987	2450.0		2007	3410.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

30 Sediment Characteristics and Transport in the Kootenai River White Sturgeon Critical Habitat near Bonners Ferry, Idaho

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.004
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 01/23/2009 16:02

Station - 12302055 Fisher River near Libby MT

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE
1996	12000.0	0.0244	0.0244
1974	8720.0	0.0488	0.0488
1997	7010.0	0.0732	0.0732
2002	6910.0	0.0976	0.0976
1948	6560.0	0.1220	0.1220
1991	5380.0	0.1463	0.1463
1972	4980.0	0.1707	0.1707
1969	4730.0	0.1951	0.1951
1971	4620.0	0.2195	0.2195
1976	4240.0	0.2439	0.2439
1981	3820.0	0.2683	0.2683
1975	3590.0	0.2927	0.2927
1982	3450.0	0.3171	0.3171
2007	3410.0	0.3415	0.3415
1990	3170.0	0.3659	0.3659
1986	3120.0	0.3902	0.3902
1989	2960.0	0.4146	0.4146
1979	2930.0	0.4390	0.4390
1970	2880.0	0.4634	0.4634
1999	2700.0	0.4878	0.4878
1978	2660.0	0.5122	0.5122
2000	2640.0	0.5366	0.5366
1985	2570.0	0.5610	0.5610
1998	2530.0	0.5854	0.5854
1980	2510.0	0.6098	0.6098
2006	2510.0	0.6341	0.6341
1987	2450.0	0.6585	0.6585
1995	2350.0	0.6829	0.6829
1988	2230.0	0.7073	0.7073
1983	2110.0	0.7317	0.7317
1993	1710.0	0.7561	0.7561
1994	1560.0	0.7805	0.7805
2005	1520.0	0.8049	0.8049
1984	1500.0	0.8293	0.8293
2001	1490.0	0.8537	0.8537
1973	1410.0	0.8780	0.8780
2004	1360.0	0.9024	0.9024
2003	1350.0	0.9268	0.9268
1992	1140.0	0.9512	0.9512
1977	829.0	0.9756	0.9756

1

End PeakFQ analysis.

Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 40

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 12302055 USGS Fisher River near Libby MT

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Yaak River, Montana

[Discharge is in cubic feet per second]

1

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Program PeakFq      U. S. GEOLOGICAL SURVEY      Seq.000.000
Ver. 5.2            Annual peak flow frequency analysis  Run Date / Time
11/01/2007          following Bulletin 17-B Guidelines  12/16/2008 11:34

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--- PROCESSING OPTIONS ---

```

Plot option          = Graphics device
Basin char output    = WATSTORE
Print option         = Yes
Debug print          = No
Input peaks listing  = Long
Input peaks format   = WATSTORE peak file

```

Input files used:

```

peaks (ascii) - D:\PROJECTWORK\KOOTENAI\DATA\PEAK_FLOW_EST\WATSTORE\USGS 12304500 YAAK RIVER NEA
specifications - PKFQWPSF.TMP

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Output file(s):

```

main - D:\PROJECTWORK\KOOTENAI\DATA\PEAK_FLOW_EST\WATSTORE\USGS 12304500 YAAK RIVER NEA
bcd - YAAK_PEAK.BCD

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1

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Program PeakFq      U. S. GEOLOGICAL SURVEY      Seq.001.001
Ver. 5.2            Annual peak flow frequency analysis  Run Date / Time
11/01/2007          following Bulletin 17-B Guidelines  12/16/2008 11:34

```

Station - 12304500 Yaak River near Troy MT

INPUT DATA SUMMARY

```

Number of peaks in record      =      54
Peaks not used in analysis     =       0
Systematic peaks in analysis   =      54
Historic peaks in analysis     =       0
Years of historic record       =       0
Generalized skew               =    -0.179
Standard error                 =     0.550
Mean Square error              =     0.303
Skew option                    =    WEIGHTED
Gage base discharge            =       0.0
User supplied high outlier threshold =  --
User supplied low outlier criterion =  --
Plotting position parameter    =     0.00

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***** NOTICE -- Preliminary machine computations. *****
***** User responsible for assessment and interpretation. *****

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```

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.          0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.     1901.2
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 20920.0

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32 Sediment Characteristics and Transport in the Kootenai River White Sturgeon Critical Habitat near Bonners Ferry, Idaho

1

Program PeakFq	U. S. GEOLOGICAL SURVEY	Seq.001.002
Ver. 5.2	Annual peak flow frequency analysis	Run Date / Time
11/01/2007	following Bulletin 17-B Guidelines	12/16/2008 11:34

Station - 12304500 Yaak River near Troy MT

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	EXCEEDANCE			STANDARD	
	DISCHARGE	PROBABILITY	MEAN	DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.7998	0.1861	-0.571
BULL.17B ESTIMATE	0.0	1.0000	3.7998	0.1861	-0.449

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES	
				LOWER	UPPER
0.9950	1748.0	1666.0	1625.0	1341.0	2131.0
0.9900	2026.0	1953.0	1916.0	1594.0	2426.0
0.9500	2964.0	2928.0	2893.0	2482.0	3401.0
0.9000	3582.0	3571.0	3531.0	3086.0	4037.0
0.8000	4452.0	4472.0	4421.0	3941.0	4938.0
0.6667	5391.0	5435.0	5377.0	4856.0	5937.0
0.5000	6512.0	6568.0	6512.0	5913.0	7183.0
0.4292	7017.0	7072.0	7023.0	6375.0	7767.0
0.2000	9101.0	9106.0	9150.0	8197.0	10300.0
0.1000	10660.0	10570.0	10760.0	9489.0	12300.0
0.0400	12450.0	12200.0	12650.0	10930.0	14700.0
0.0200	13680.0	13280.0	13970.0	11890.0	16380.0
0.0100	14820.0	14250.0	15220.0	12780.0	17970.0
0.0050	15890.0	15140.0	16410.0	13590.0	19480.0
0.0020	17210.0	16210.0	17920.0	14590.0	21390.0

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
 Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
 11/01/2007 following Bulletin 17-B Guidelines 12/16/2008 11:34

Station - 12304500 Yaak River near Troy MT

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1948	12500.0		1981	5710.0	
1954	13400.0		1982	7280.0	
1956	12100.0		1983	6350.0	
1957	7930.0		1984	4260.0	
1958	6270.0		1985	5130.0	
1959	6810.0		1986	4550.0	
1960	7680.0		1987	6490.0	
1961	9780.0		1988	6490.0	
1962	5230.0		1989	6060.0	
1963	4750.0		1990	5010.0	
1964	8400.0		1991	8800.0	
1965	6750.0		1992	2660.0	
1966	7440.0		1993	5060.0	
1967	10200.0		1994	4850.0	
1968	5080.0		1995	4180.0	
1969	8130.0		1996	7970.0	
1970	5760.0		1997	12600.0	
1971	9220.0		1998	7490.0	
1972	8840.0		1999	8900.0	
1973	5900.0		2000	4780.0	
1974	9640.0		2001	2460.0	
1975	7080.0		2002	12100.0	
1976	10200.0		2003	3440.0	
1977	2060.0		2004	2990.0	
1978	6010.0		2005	2550.0	
1979	4600.0		2006	6600.0	
1980	6990.0		2007	6660.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
 -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

34 Sediment Characteristics and Transport in the Kootenai River White Sturgeon Critical Habitat near Bonners Ferry, Idaho

1

Program PeakFq	U. S. GEOLOGICAL SURVEY	Seq.001.004
Ver. 5.2	Annual peak flow frequency analysis	Run Date / Time
11/01/2007	following Bulletin 17-B Guidelines	12/16/2008 11:34

Station - 12304500 Yaak River near Troy MT

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE
1954	13400.0	0.0182	0.0182
1997	12600.0	0.0364	0.0364
1948	12500.0	0.0545	0.0545
1956	12100.0	0.0727	0.0727
2002	12100.0	0.0909	0.0909
1967	10200.0	0.1091	0.1091
1976	10200.0	0.1273	0.1273
1961	9780.0	0.1455	0.1455
1974	9640.0	0.1636	0.1636
1971	9220.0	0.1818	0.1818
1999	8900.0	0.2000	0.2000
1972	8840.0	0.2182	0.2182
1991	8800.0	0.2364	0.2364
1964	8400.0	0.2545	0.2545
1969	8130.0	0.2727	0.2727
1996	7970.0	0.2909	0.2909
1957	7930.0	0.3091	0.3091
1960	7680.0	0.3273	0.3273
1998	7490.0	0.3455	0.3455
1966	7440.0	0.3636	0.3636
1982	7280.0	0.3818	0.3818
1975	7080.0	0.4000	0.4000
1980	6990.0	0.4182	0.4182
1959	6810.0	0.4364	0.4364
1965	6750.0	0.4545	0.4545
2007	6660.0	0.4727	0.4727
2006	6600.0	0.4909	0.4909
1987	6490.0	0.5091	0.5091
1988	6490.0	0.5273	0.5273
1983	6350.0	0.5455	0.5455
1958	6270.0	0.5636	0.5636
1989	6060.0	0.5818	0.5818
1978	6010.0	0.6000	0.6000
1973	5900.0	0.6182	0.6182
1970	5760.0	0.6364	0.6364
1981	5710.0	0.6545	0.6545
1962	5230.0	0.6727	0.6727
1985	5130.0	0.6909	0.6909
1968	5080.0	0.7091	0.7091
1993	5060.0	0.7273	0.7273
1990	5010.0	0.7455	0.7455
1994	4850.0	0.7636	0.7636
2000	4780.0	0.7818	0.7818
1963	4750.0	0.8000	0.8000
1979	4600.0	0.8182	0.8182
1986	4550.0	0.8364	0.8364
1984	4260.0	0.8545	0.8545
1995	4180.0	0.8727	0.8727
2003	3440.0	0.8909	0.8909
2004	2990.0	0.9091	0.9091
1992	2660.0	0.9273	0.9273
2005	2550.0	0.9455	0.9455
2001	2460.0	0.9636	0.9636
1977	2060.0	0.9818	0.9818

1

End PeakFQ analysis.

Stations processed :	1
Number of errors :	0
Stations skipped :	0
Station years :	54

Data records may have been ignored for the stations listed below.

(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)

(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 12304500 USGS Yaak River near Troy MT

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: