

Annual Peak-Flow Frequency Analysis

For more information on the contents of this documentation, see Kessler and others (2013).

Streamgauge number and name:

05345000 Vermillion River near Empire, Minn.

Peak-flow information:

Number of systematic peak flows in record	42
Systematic period begins	1942
Systematic period ends	2011
Length of systematic record	70
Years without information	28
Number of historical peak flows in record	0

Frequency analysis options:

Method	Bulletin 17B
Skew option	Weighted
Generalized skew	-0.19
Standard error of generalized skew	0.426
Low-outlier method	Bulletin 17B Grubbs-Beck test

Bulletin 17B systematic record analysis results:

Moments of the common logarithms of the peak flows:

	Mean	Standard deviation	Skewness
	2.8373	0.3791	0.039

Outlier criteria and number of peak flows exceeding:

Low	65.1	0
High	7257.6	0

Bulletin 17B Final analysis results:

Moments of the common logarithms of the peak flows:

	Standard	
Mean	deviation	Skewness
2.8373	0.3791	-0.054

Annual frequency curve at selected exceedance probabilities:

[WIE, Weighted independent estimate; --, not computed]

Exceedance probability	Peak estimate	Lower-95 level	Upper 95 level	WIE estimate	Lower-95 WIE level	Upper 95 WIE level
0.9950	69.5	39.5	104	--	--	--
0.9900	87.2	51.9	127	--	--	--
0.9500	162.0	108.0	219	--	--	--
0.9000	224.0	158.0	293	--	--	--
0.8000	331.0	248.0	420	--	--	--
0.6667	475.0	371.0	594	--	--	--
0.5000	693.0	553.0	868	708	544	923
0.4292	810.0	648.0	1,020	--	--	--
0.2000	1,440.0	1,130.0	1,920	1,480	1,110	1,970
0.1000	2,090.0	1,600.0	2,960	2,170	1,580	3,000
0.0400	3,120.0	2,280.0	4,720	3,260	2,220	4,800
0.0200	4,020.0	2,860.0	6,390	4,220	2,710	6,570
0.0100	5,060.0	3,500.0	8,390	5,330	3,240	8,780
0.0050	6,230.0	4,190.0	10,800	--	--	--
0.0020	8,010.0	5,210.0	14,600	8,400	4,440	15,900

Peak-flow data used in the analysis:

Explanation of symbols and codes

-- none

Water	Peak	Peak-flow	Water	Peak	Peak-flow
year	flow	code	year	flow	code
1942	2,030	--	1991	256	--
1943	509	--	1992	6,570	--
1944	1,220	--	1993	1,780	--
1945	1,480	--	1994	941	--
Gap in systematic record					
1974	236	--	1995	398	--
1975	1,390	--	1996	210	--
1976	664	--	1997	1,290	--
1977	224	--	1998	3,492	--
1978	670	--	1999	691	--
1979	1,010	--	2000	949	--
1980	1,170	--	2001	681	--
1981	111	--	2002	795	--
1982	523	--	2003	857	--
1983	562	--	2004	427	--
1984	860	--	2005	289	--
1985	500	--	2006	615	--
1986	1,660	--	2007	814	--
1987	358	--	2008	298	--
1988	241	--	2009	104	--
1989	1,650	--	2010	1,230	--
1990	401	--	2011	2,020	--