Annual Peak-Flow Frequency Analysis
For more information on the contents of this documentation, see Kessler and others (2013).

Streamgage number and name:
    05336700 Kettle River below Sandstone, Minn.

Peak-flow information:

Number of systematic peak flows in record	44
Systematic period begins	1965
Systematic period ends	2011
Length of systematic record	47
Years without information	3
Number of historical peak flows in record	1 1965

Frequency analysis options:

Method	Expected moments algorithm (EMA)
Skew option	Weighted
Generalized skew	-0.25
Standard error of generalized skew	0.4266
Low-outlier method	Multiple Grubbs-Beck test

EMA systematic record analysis results:

    Moments of the common logarithms of the peak flows:

Mean	Standard deviation	Skewness
3.7761	0.2208	-0.132

    Low-outlier information:

Number of low outliers	0
Low-outlier threshold	Not determined

Final analysis results:

Moments of the common logarithms of the peak flows:

Mean	Standard deviation	Skewness
3.7764	0.2211	-0.186

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	1,470	671	2,060	−−	−−	−−
0.9900	1,710	880	2,300	−−	−−	−−
0.9500	2,520	1,700	3,140	−−	−−	−−
0.9000	3,080	2,300	3,730	−−	−−	−−
0.8000	3,910	3,150	4,640	−−	−−	−−
0.6667	4,860	4,060	5,690	−−	−−	−−
0.5000	6,070	5,160	7,070	5,990	5,140	6,970
0.4292	6,640	5,670	7,730	−−	−−	−−
0.2000	9,210	7,880	10,800	9,100	7,740	10,700
0.1000	11,400	9,640	13,700	11,200	9,350	13,500
0.0400	14,100	11,800	18,300	13,900	11,100	17,400
0.0200	16,200	13,200	22,300	15,900	12,300	20,600
0.0100	18,200	14,500	26,800	17,900	13,300	24,100
0.0050	20,300	15,700	31,900	−−	−−	−−
0.0020	23,100	17,100	39,700	22,500	15,200	33,400

Peak-flow data used in the analysis:

Explanation of symbols and codes

−− none

H   Historic, outside of systematic record

Water year	Peak flow	Peak-flow code	Water year	Peak flow	Peak-flow code
1965	13,400	H	1989	4,840	−−
Gap in systematic record			1990	5,390	−−
1968	5,180	−−	1991	6,480	−−
1969	11,300	−−	1992	4,750	−−
1970	5,510	−−	1993	8,510	−−
1971	12,100	−−	1994	5,990	−−
1972	17,200	−−	1995	5,440	−−
1973	4,810	−−	1996	9,290	−−
1974	6,170	−−	1997	10,900	−−
1975	11,600	−−	1998	2,930	−−
1976	7,010	−−	1999	3,950	−−
1977	2,920	−−	2000	2,730	−−
1978	3,650	−−	2001	14,800	−−
1979	13,700	−−	2002	5,620	−−
1980	2,970	−−	2003	6,300	−−
1981	5,590	−−	2004	4,640	−−
1982	12,000	−−	2005	5,040	−−
1983	5,320	−−	2006	3,980	−−
1984	6,830	−−	2007	3,890	−−
1985	8,800	−−	2008	7,140	−−
1986	9,380	−−	2009	7,680	−−
1987	1,640	−−	2010	3,490	−−
1988	2,900	−−	2011	9,170	−−