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

Streamgage number and name:

05374000 Zumbro River at Zumbro Falls, Minn.

Peak-flow information:

Number of systematic peak flows in record	85
Systematic period begins	1910
Systematic period ends	2011
Length of systematic record	102
Years without information	17
Number of historical peak flows in record	0

Frequency analysis options:

Method	Bulletin 17B
Skew option	Weighted
Generalized skew	-0.229
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
4.0059	0.2832	-0.499

Outlier criteria and number of peak flows exceeding:

Low	1470.4	0
High	69880.9	0

Bulletin 17B Final analysis results:

Moments of the common logarithms of the peak flows:

Mean	Standard deviation	Skewness
4.0059	0.2832	-0.409

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	1,080	1,880	––	––	––
0.9900	1,830	1,390	2,290	––	––	––
0.9500	3,230	2,630	3,830	––	––	––
0.9000	4,290	3,600	4,980	––	––	––
0.8000	5,960	5,150	6,760	––	––	––
0.6667	7,950	7,020	8,940	––	––	––
0.5000	10,600	9,430	11,900	10,500	9,110	12,200
0.4292	11,900	10,600	13,400	––	––	––
0.2000	17,700	15,600	20,500	17,600	15,300	20,200
0.1000	22,600	19,600	26,800	22,500	19,400	26,100
0.0400	28,800	24,500	35,000	28,900	24,100	34,600
0.0200	33,400	28,100	41,300	33,700	27,300	41,500
0.0100	37,900	31,500	47,600	38,600	30,100	49,300
0.0050	42,300	34,800	53,900	––	––	––
0.0020	48,100	39,100	62,300	50,200	35,900	70,100

Peak-flow data used in the analysis:

Explanation of symbols and codes

−− none

Water year	Peak flow	Peak-flow code	Water year	Peak flow	Peak-flow code
1910	4,500	−−	1959	9,110	−−
1911	2,250	−−	1960	15,500	−−
1912	9,200	−−	1961	15,400	−−
1913	4,730	−−	1962	29,100	−−
1914	7,950	−−	1963	5,130	−−
1915	8,570	−−	1964	1,580	−−
1916	8,470	−−	1965	29,600	−−
1917	13,100	−−	1966	15,000	−−
Gap in systematic record			1967	16,600	−−
1930	6,250	−−	1968	5,320	−−
1931	2,950	−−	1969	12,900	−−
1932	5,880	−−	1970	13,800	−−
1933	18,500	−−	1971	10,800	−−
1934	21,800	−−	1972	5,020	−−
1935	11,700	−−	1973	22,200	−−
1936	13,300	−−	1974	10,200	−−
1937	13,300	−−	1975	8,220	−−
1938	14,000	−−	1976	8,810	−−
1939	11,900	−−	1977	2,920	−−
1940	9,690	−−	1978	20,800	−−
1941	4,130	−−	1979	10,100	−−
1942	12,000	−−	1980	15,300	−−
1943	14,900	−−	Gap in systematic record		
1944	7,520	−−	1985	8,250	−−
1945	18,500	−−	1986	24,400	−−
1946	7,000	−−	1987	10,400	−−
1947	7,430	−−	1988	1,860	−−
1948	17,900	−−	Gap in systematic record		
1949	9,170	−−	1990	10,700	−−
1950	21,200	−−	1991	7,000	−−
1951	35,900	−−	1992	7,090	−−
1952	19,000	−−	1993	15,700	−−
1953	12,900	−−	1994	4,790	−−
1954	12,100	−−	1995	3,670	−−
1955	6,050	−−	1996	6,770	−−
1956	12,700	−−	1997	9,690	−−
1957	11,300	−−	1998	18,700	−−
1958	14,100	−−	1999	10,100	−−

Water year	Peak flow	Peak-flow code
2000	7,900	−−
2001	19,700	−−
2002	14,200	−−
2003	7,630	−−
2004	19,900	−−
2005	11,200	−−
2006	5,280	−−
2007	17,600	−−
2008	15,000	−−
2009	3,000	−−
2010	53,000	−−
2011	15,300	−−