

Annual Peak-Flow Frequency Analysis

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

Streamgauge number and name:

05082500 Red River of the North at Grand Forks, N. Dak.

Peak-flow information:

Number of systematic peak flows in record	130
Systematic period begins	1882
Systematic period ends	2011
Length of systematic record	130
Years without information	0
Number of historical peak flows in record	0

Frequency analysis options:

Method	Expected moments algorithm (EMA)
Skew option	STATION SKEW
Low-outlier method	Bulletin 17B Grubbs-Beck test

Bulletin 17B systematic record analysis results:

Moments of the common logarithms of the peak flows:

	Standard		
Mean	deviation	Skewness	
4.2157	0.3937	-0.290	

Outlier criteria and number of peak flows exceeding:

Low	986.8	0
High	273611.8	0

Expected moments algorithm (EMA) Final analysis results:

Moments of the common logarithms of the peak flows:

	Standard	
Mean	deviation	Skewness
4.2157	0.3937	-0.290

Annual frequency curve at selected exceedance probabilities:

Exceedance probability	Peak estimate	Lower-95 level	Upper-95 level
0.9950	1,240	490	1,940
0.9900	1,650	766	2,420
0.9500	3,450	2,270	4,460
0.9000	5,020	3,730	6,230
0.8000	7,780	6,270	9,370
0.6667	11,500	9,600	13,700
0.5000	17,200	14,500	20,400
0.4292	20,100	17,000	23,900
0.2000	35,600	30,100	42,400
0.1000	50,900	42,700	62,800
0.0400	73,100	59,400	98,100
0.0200	91,600	71,500	132,000
0.0100	111,000	82,700	172,000
0.0050	133,000	93,100	220,000
0.0020	163,000	106,000	299,000

Peak-flow data used in the analysis:

Explanation of symbols and codes

-- none

K Peak affected by regulation

Water	Peak	Peak-flow	Water	Peak	Peak-flow
year	flow	code	year	flow	code
1882	75,000	--	1919	13,600	--
1883	38,600	--	1920	30,300	--
1884	20,600	--	1921	11,500	--
1885	13,040	--	1922	19,000	--
1886	10,800	--	1923	16,200	--
1887	7,300	--	1924	2,530	--
1888	19,000	--	1925	9,690	--
1889	3,000	--	1926	7,720	--
1890	3,470	--	1927	10,600	--
1891	6,000	--	1928	12,200	--
1892	23,000	--	1929	17,100	--
1893	53,300	--	1930	9,610	--
1894	16,450	--	1931	1,630	--
1895	2,000	--	1932	10,400	--
1896	21,600	--	1933	4,380	--
1897	85,000	--	1934	3,210	--
1898	4,500	--	1935	2,920	--
1899	9,000	--	1936	14,500	--
1900	4,000	--	1937	4,180	--
1901	14,000	--	1938	6,660	--
1902	15,000	--	1939	6,720	--
1903	18,800	--	1940	10,000	--
1904	33,000	--	1941	13,400	K
1905	16,800	--	1942	11,000	K
1906	27,600	--	1943	28,200	K
1907	30,400	--	1944	10,400	K
1908	20,500	--	1945	21,300	K
1909	9,260	--	1946	22,000	K
1910	18,500	--	1947	35,000	K
1911	3,520	--	1948	34,200	K
1912	4,730	--	1949	15,200	K
1913	17,200	--	1950	54,000	K
1914	8,240	--	1951	23,600	K
1915	21,500	--	1952	23,900	K
1916	29,000	--	1953	14,600	K
1917	19,800	--	1954	9,620	K
1918	4,480	--	1955	15,400	K

Water year	Peak flow	Peak-flow code	Water year	Peak flow	Peak-flow code
1956	21,400	K	1993	26,200	K
1957	14,700	K	1994	26,800	K
1958	7,500	K	1995	34,800	K
1959	6,300	K	1996	58,400	K
1960	17,200	K	1997	137,000	K
1961	3,400	K	1998	29,700	K
1962	26,600	K	1999	50,000	K
1963	10,800	K	2000	31,500	K
1964	13,200	K	2001	57,800	K
1965	52,000	K	2002	38,000	K
1966	55,000	K	2003	17,000	K
1967	28,200	K	2004	34,300	K
1968	9,420	K	2005	38,300	K
1969	53,500	K	2006	72,800	K
1970	23,700	K	2007	35,300	K
1971	15,800	K	2008	17,700	K
1972	31,400	K	2009	76,700	K
1973	11,300	K	2010	62,900	K
1974	34,300	K	2011	87,500	K
1975	42,800	K			
1976	23,600	K			
1977	2,190	K			
1978	54,200	K			
1979	82,000	K			
1980	22,000	K			
1981	6,710	K			
1982	23,900	K			
1983	14,300	K			
1984	32,300	K			
1985	17,800	K			
1986	31,900	K			
1987	17,500	K			
1988	8,500	K			
1989	39,600	K			
1990	5,040	K			
1991	4,870	K			
1992	8,000	K			