

## Annual Peak-Flow Frequency Analysis

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

### Streamgauge number and name:

05083500 Red River of the North at Oslo, Minn.

### Peak-flow information:

Number of systematic peak flows in record	49
Systematic period begins	1936
Systematic period ends	2011
Length of systematic record	76
Years without information	27
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	
4.4016	0.3415	-0.374	

#### Outlier criteria and number of peak flows exceeding:

Low	2877.3	0
High	220944.7	0

**Expected moments algorithm (EMA) Final analysis results:**

**Moments of the common logarithms of the peak flows:**

	Standard	
Mean	deviation	Skewness
4.4016	0.3415	-0.374

**Annual frequency curve at selected exceedance probabilities:**

Exceedance probability	Peak estimate	Lower-95 level	Upper-95 level
0.9950	2,530	393	4,480
0.9900	3,270	671	5,380
0.9500	6,400	2,650	9,030
0.9000	8,960	5,170	12,000
0.8000	13,200	9,350	17,200
0.6667	18,700	14,200	24,000
0.5000	26,500	20,700	33,900
0.4292	30,400	23,900	38,800
0.2000	49,400	39,000	63,400
0.1000	66,600	52,400	91,700
0.0400	89,800	69,000	144,000
0.0200	108,000	78,900	191,000
0.0100	126,000	86,400	247,000
0.0050	145,000	92,000	314,000
0.0020	170,000	97,000	426,000

**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
1936	15,000	--	Gap in systematic record		
1937	4,070	--	1985	17,800	K
Gap in systematic record			1986	30,000	K
1942	11,900	K	1987	18,500	K
1943	31,500	K	1988	11,500	K
Gap in systematic record			1989	33,500	K
1945	24,000	K	1990	4,900	K
Gap in systematic record			1991	5,200	K
1947	33,800	K	1992	8,200	K
1948	41,400	K	1993	28,100	K
1949	18,700	K	1994	26,600	K
1950	63,000	K	1995	35,000	K
1951	24,800	K	1996	59,200	K
1952	24,800	K	1997	120,000	K
1953	14,900	K	1998	29,000	K
1954	9,790	K	1999	53,000	K
1955	16,400	K	2000	31,000	K
1956	22,500	K	2001	51,000	K
1957	14,900	K	2002	34,000	K
1958	7,890	K	2003	16,500	K
1959	7,200	K	2004	36,000	K
1960	17,100	K	2005	36,100	K
Gap in systematic record			2006	77,600	K
1966	59,000	K	2007	37,200	K
Gap in systematic record			2008	18,000	K
1969	56,500	K	2009	80,600	K
Gap in systematic record			2010	66,000	K
1978	56,200	K	2011	81,400	K