

FLOODS OF MAY-JULY 1975 ALONG THE  
CONTINENTAL DIVIDE IN MONTANA

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U.S. GEOLOGICAL SURVEY

Open-File Report 76-424



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By M. V. Johnson and R. J. Omang

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## CONVERSION TABLE

For use of those readers who may prefer to use metric units rather than English units, the conversion factors for the terms used in this report are listed below:

<u>Multiply English units</u>	<u>By</u>	<u>To obtain SI units</u>
Inches (in)	25.4	millimetres (mm)
Feet (ft)	.3048	metres (m)
Square miles (mi <sup>2</sup> )	2.590	square kilometres (km <sup>2</sup> )
Cubic feet per second (ft <sup>3</sup> /s)	.02832	cubic metres per second (m <sup>3</sup> /s)
Cubic feet per second per square mile [(ft <sup>3</sup> /s)/mi <sup>2</sup> ]	.01093	cubic metres per second per square kilometre [(m <sup>3</sup> /s)/km <sup>2</sup> ]
Acre-feet (acre-ft)	1,233	cubic metres (m <sup>3</sup> )

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ABSTRACT

Extensive flooding occurred along both sides of the Continental Divide in Montana from May through July 1975. Runoff from above average snowpack at low altitudes combined with runoff from rainfall to cause floods in May. Snowmelt from high altitudes and above average rain in June caused flooding and sustained high flows into July. Federal and State agencies estimated flood damage at about \$53,000,000. Peak stages, flow rates, and estimated frequencies were determined for 124 sites.

INTRODUCTION

Severe flooding from combined rain and snowmelt runoff occurred from May through July along the Continental Divide in Montana. In general, the most destructive flooding occurred in May on small streams at low altitudes, and in June on both small streams at higher altitudes and on the larger streams. Flooding during July was caused by rainfall on areas that were already saturated by previous precipitation. The extreme flood area included both sides of the Continental Divide (fig. 1), affecting much of the same area as the extreme flood of June 1964

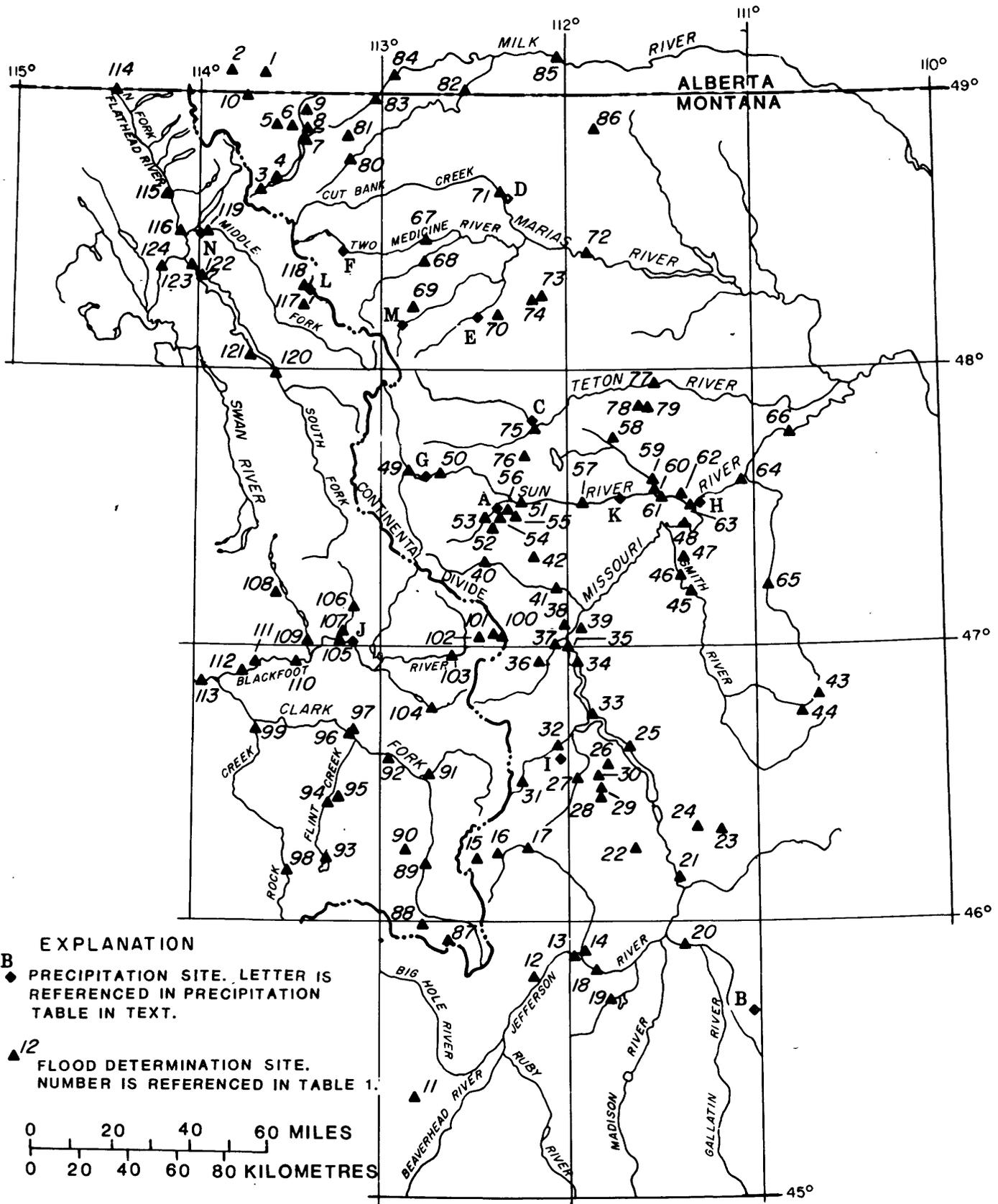


FIGURE 1.-LOCATION OF FLOOD DETERMINATION SITES AND SELECTED PRECIPITATION SITES.

which was documented by Boner and Stermitz (1967).

Other areas of lesser but substantial flooding include the upper Yellowstone River basin, Musselshell River basin, Lewistown and Winett area, and the Boxelder Creek drainage in southeastern Montana. Because the peaks recorded at gaging stations in these areas will be published in the annual report of 1975 basic data, they are not included herein.

#### HYDROLOGIC AND HYDRAULIC CONDITIONS

Monthly precipitation was above average from April through July at nearly all of the precipitation stations (National Oceanic and Atmospheric Administration, 1975) in the flood area. Cool temperatures during April kept streamflow well below normal by slowing the snowmelt. Thus, the snowpack on May 1 was a record at low and medium altitudes. During May snow continued to accumulate at the higher altitudes while rain occurred at lower altitudes. Generally heavy rainfall May 5-9, combined with snowmelt runoff from low and medium altitudes, caused high peak flows in streams at the lower altitudes.

Above-normal precipitation continued through June; heavy precipitation fell in most areas June 17-20. Runoff from the June 17-20 precipitation and the snowmelt runoff from high altitudes combined with above-normal streamflow to cause peak flows in June. Total precipitation (in inches) May 5-9 and June 17-20 for the following sites (fig. 1) was furnished by the National Weather Service:

Sites	Name	May 5-9	June 17-20
A	Augusta	2.82	4.59
B	Bozeman	2.14	2.29
C	Choteau	2.31	3.02
D	Cut Bank	3.41	3.43
E	Dupuyer	2.44	5.04
F	East Glacier	2.73	8.74
G	Gibson Dam	3.62	5.30
H	Great Falls	2.32	2.03
I	Helena	.84	1.98
J	Ovando	.63	1.00
K	Sun River	1.88	3.17
L	Summit	3.20	7.46
M	Swift Dam	4.58	6.95
N	West Glacier	.30	.76

The precipitation and runoff patterns indicate that heavy rain in June occurred only in small areas on the west side of the Continental Divide. Runoff from the North Fork Flathead River and the Swan River drainages shows little effect from June rains. Streams that head along the divide and are tributary to the Middle Fork Flathead River had extreme peak flows caused by rain at the higher altitudes. Also, the Clark Fork and Blackfoot River had high unit runoff in tributaries heading along the divide and smaller yields from the lower altitudes.

Streams that had maximum peaks in July are listed in table 1 because the peaks are partly the result of high sustained streamflow from antecedent precipitation. Saturated soil conditions reduced irrigation demand and increased streamflow. Therefore, smaller amounts of precipitation and snowmelt at high altitudes resulted in maximum flows in July.

High volumes of runoff, which were characteristic of the May-July, 1975 floods, equaled or exceeded the volume runoff from floods of 1964. For comparison May through July monthly discharges, in acre-feet, for the Marias River near Shelby for 1964 and 1975 are listed below:

	May	June	July
1964	169,200	573,100	88,970
1975	206,500	575,000	195,000

The peak flow in 1964 was 241,000 ft<sup>3</sup>/s (6,830 m<sup>3</sup>/s) as compared to 75,700 ft<sup>3</sup>/s (2,140 m<sup>3</sup>/s) in 1975. Figure 2 is a hydrograph showing daily mean flows for the Marias River near Shelby and for Muddy Creek at Vaughn. Muddy Creek typifies low altitude streams where the highest peaks occurred in May. The Marias River hydrograph typifies streams that head at high altitudes where the highest peaks occurred in June.

#### FLOOD DAMAGE

Although no lives were lost, flood damage to roads, bridges, irrigation structures, homes, and businesses was severe. Basements flooded in many areas that were not affected by over-the-ground flow. In the mountains, stream erosion and channel damage was extensive. The Burlington Northern Railroad suffered damage and closure

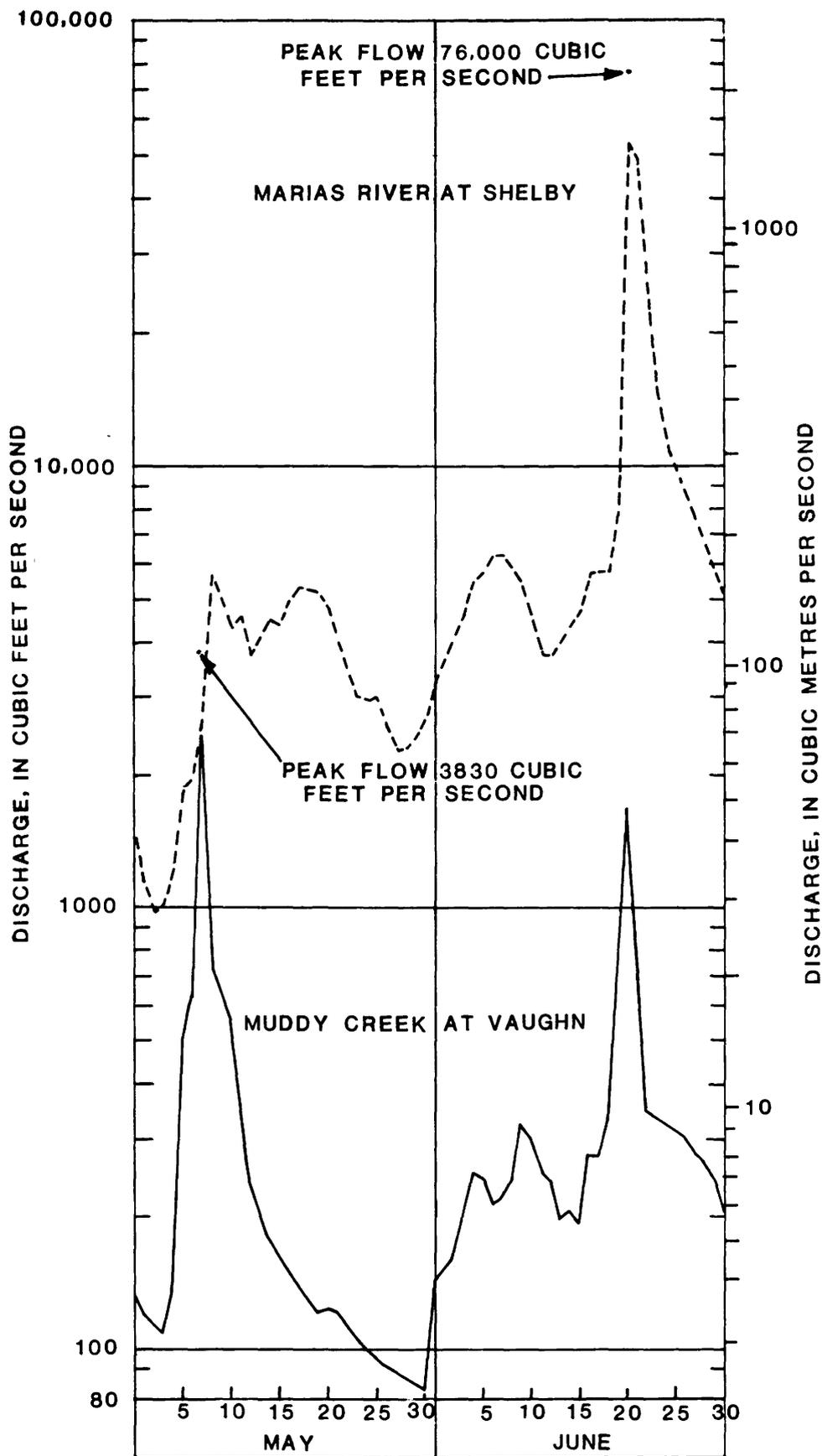


FIGURE 2.-DISCHARGE OF MUDDY CREEK AT VAUGHN AND MARIAS RIVER NEAR SHELBY, MAY AND JUNE, 1975

along the Middle Fork Flathead River where flood depths of about 25 feet (7.6 metres) were experienced. Continued high flows delayed road and bridge repair.

In general, flood inundation of urban areas was less in 1975 than in 1964. One exception was the town of Augusta where 1975 flooding exceeded that of 1964. Channel erosion in the higher mountain streams appeared to equal that of the 1964 flood. It is probable that the stream channels were not fully stabilized from the devastating effects of the 1964 flood, thus smaller flood magnitudes were sufficient to start new erosion.

Flood damage in 1975 reflects increased values when compared to the estimated 1964 damage of \$55,000,000 (Boner and Stermitz, 1967). Although smaller areas were inundated in 1975 than in 1964, the 1975 damage costs are large because of additional development on flood plains since 1964.

Flood damage costs listed below are preliminary estimates released to the public (oral commun., August 1975) and may be subject to change by the agencies that made the estimates.

National forest roads, bridges, trails, camp-grounds, and other (U.S. Forest Service)	\$11,000,000
U.S. highways and bridges (Federal Highway Administration)	3,000,000
Land (use and erosion), crops, livestock, and irrigation (Soil Conservation Service)	35,000,000
National Park roads and facilities (National Park Service)	545,000
Indian Reservation property (U.S. Bureau of Indian Affairs)	1,200,000
Business and residential damage in disaster areas (Montana Civil Defense Agency)	<u>2,200,000</u>
Total	\$52,945,000

## PEAK DISCHARGE AND FREQUENCY

A summary of peak stages and discharges for selected sites in the flood area is shown in table 1. At most active and discontinued gages, maximum flows were determined from existing stage-discharge relationship curves; logarithmic extensions were used where needed. Indirect measurements of peak flow were made at 25 miscellaneous or otherwise unrated sites.

Recurrence intervals of flood magnitudes for all sites except highly regulated ones are shown in table 1. A recurrence interval may be defined as the average interval, in years, in which a flood of a given magnitude will be equaled or exceeded once. When the recurrence interval exceeds 100 years, it is expressed as a ratio of the flood magnitude to the 100-year flood. The recurrence intervals shown in table 1 were obtained from a frequency study by Johnson and Omang (1976).

## SUMMARY

Peak flows in the flood area were generally higher in 1964 than in 1975 but the volume of runoff in 1975 equaled or exceeded that in 1964. Small tributaries of the upper Clark Fork and Missouri River, however, had peak-of-record flows at many sites. The 1975 floods are hydrologically significant because many of the flood peaks approximate the 100-year flood magnitude.

#### REFERENCES

- Boner, F. C., and Stermitz, Frank, 1967, Floods of June 1964 in northwestern Montana: U.S. Geol. Survey Water-Supply Paper 1840-B, 242 p.
- Johnson, M. V., and Omang, R. J., 1976, A method for estimating magnitude and frequency of floods in Montana: U.S. Geol. Survey Open-File Report 75-650, 35 p.
- National Oceanic and Atmospheric Administration, 1975, Climatological data, Montana: National Oceanic and Atmospheric Administration, v. 78, nos. 4-7.

Table 1.--Flood stages and discharges, May through July 1975, along Continental Divide in Montana. (Footnotes are at end of table.)

No.	Station number	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum previously known			Maximum May-July 1975				
					Year	Gage height (feet)	Discharge (ft <sup>3</sup> /s)	Date	Gage height (feet)	Discharge		Recurrence interval (years)
										ft <sup>3</sup> /s	ft <sup>3</sup> /s/mi <sup>2</sup>	
Saskatchewan River basin												
1	05011000	Belly River near Mountain View, Alberta	121	1911-75	1964	11.40	16,400	6-20	10.10	17,000	140	a2.8
2	05013000	Waterton River near Waterton Park, Alberta	238	1908-33, 1948-75	1964	9.22	25,700	6-20	7.95	18,000	75.6	a1.2
3	05014000	Grinnell Creek near Many Glacier	3.47	1949-75	1964	4.88	536	6-19	4.85	530	153	a1.2
4	05014500	Swiftcurrent Creek at Many Glacier	31.4	1912-75	1964	10.00	6,700	6-19	7.9	3,290	105	a1.2
5	05015500	Lake Sherburne at Sherburne	63.7	1915-75	1972	4,788.34	b66,700	7- 7	4,788.08	b66,340	- -	- -
6	05016000	Swiftcurrent Creek at Sherburne	64.3	1912-75	1969	7.63	2,430	6-19 to 22	7.80	2,300	35.8	- -
7		Divide Creek at St. Mary	13.4	- -	- -	- -	- -	6-19	- -	3,760	281	a2.0
8	05017500	St. Mary River near Babb	278	1901-02, 1910-25, 1950-75	1964	12.96	16,500	6-21	11.65	13,600	48.9	- -
9	05020000	Kennedy Creek near Babb	60.6	1905, 1964	1964	- -	15,000	6-20	- -	5,400	89.1	85
10	05020500	St. Mary River at international boundary	469	1902-75	1908	c12.75	40,000	6-21	13.46	23,300	49.7	- -
Missouri River basin												
11	06026000	Birch Creek near Glen	36.0	1946-53, 1955-75	1963, 1967	5.49	362	7- 5	5.21	419	11.6	60
12	06027700	Fish Creek near Silver Star	39.5	1959-75	1967	1.78	228	6-19	1.91	240	6.08	25
13	06030200	Jefferson River tributary near Whitehall	1.85	1960-75	1965	1.21	22	7-31	3.09	107	57.8	100
14	06030300	Jefferson River tributary No.2 near Whitehall	4.50	1958-75	1958	4.45	169	7-31	2.03	132	29.3	32
15	06030500	Boulder River above Rock Creek, near Basin	19.4	1936, 1946-53, 1955-57	1948	3.72	582	6-19	3.45	400	20.6	9
16	06031950	Cataract Creek near Basin	30.6	1973-75	1974	2.42	300	6-19	4.10	623	20.4	100
17	06033000	Boulder River near Boulder	381	1929-32, 1934-72	1964	10.90	3,490	6-19	10.90	3,500	9.19	100
18	06034500	Jefferson River at Sappington	9,277	1895-1905, 1938-69	1899	c9.65	21,000	6-21	10.12	15,000	1.62	10
19	06035000	Willow Creek near Harrison	83.8	1938-75	1963	4.24	813	6-19	3.47	566	6.75	21
20	06052500	Gallatin River at Logan	1,795	1893-1905, 1928-75	1899	c6.25	9,840	7- 4	8.44	7,770	4.33	12

Table 1.--Flood stages and discharges, May through July 1975, along Continental Divide in Montana--continued.

No.	Station number	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum previously known		Maximum May-July 1975					
					Year	Gage height (feet)	Discharge (ft <sup>3</sup> /s)	Date	Gage height (feet)	Discharge		Recurrence interval (years)
										ft <sup>3</sup> /s	ft <sup>3</sup> /s/mi <sup>2</sup>	
Missouri River basin cont.												
21	06054500	Missouri River at Toston	14,669	1890-91, 1910-16, 1941-75	1948	11.77	32,000	6-26	10.52	25,100	1.71	4
22	06055500	Crow Creek near Radersburg	76.6	1901, 1919-29, 1966-72	1920	c5	d1,000	5-11	5.97	1,300	16.97	a1.7
23	06056300	Cabin Creek near Townsend	12.6	1960-75	1970	1.42	40	5-17	1.66	50	3.97	5
24	06056600	Deep Creek below North Fork Deep Creek, near Townsend	87.7	1959-73	1970	4.88	445	5-17	3.65	415	4.73	22
25	06058500	Canyon Ferry Reservoir near Helena	15,904	1953-75	1955-56, 1962, 1964	3,800.00	b2,043,000	7-9	3,799.96	b2,041,000	---	---
26	06058700	Mitchell Gulch near East Helena	8.09	1959-75	1973	.51	139	5-7	-.25	40	4.94	4
27	06061500	Prickly Pear Creek near Clancy	192	1908-16, 1921-33, 1945-69b	1927	-	d900	6-19	6.56	1,200	6.25	a1.4
28	06061700	Jackson Creek near East Helena	3.44	1960-75	1967 1974	2.73	20	6-19	2.98	25	7.27	18
29	06061800	Crystal Creek near East Helena	3.77	1960-75	1969	1.75	30	6-19	3.33	80	21.2	25
30	06061900	McClellan Creek at city diversion dam, near East Helena	33.2	1960-75	1964	2.59	390	6-19	2.33	340	10.2	16
31	06062500	Tenmile Creek near Rimini	32.7	1914-75	1917	c4.98	781	6-19	4.88	995	30.4	a1.4
32	06063000	Tenmile Creek near Helena	102	1908-54	1917	-	995	6-19	-	1,360	13.3	a1.1
33	06065000	Hauser Lake near Helena	16,876	1945-75	(e)	3,635.60	b53,630	(e)	3,635.30	b52,520	---	---
34	06066000	Holter Lake near Wolf Creek	17,149	1936-75	1970	3,564.70	b85,250	5-10	3,564.10	b82,390	---	---
35	06066500	Missouri River below Holter Dam, near Wolf Creek	17,149	1945-75	1948	11.70	34,800	7-6	9.13	23,300	1.34	---
36	06071200	Lyons Creek near Wolf Creek	29.4	1959-73	1964	3.80	490	5-7	4.16	580	19.7	65
37	06071300	Little Prickly Pear Creek at Wolf Creek	381	1962-67	1964	c7.65	3,110	5-7	7.45	4,500	11.8	a1.4
38	06071400	Dog Creek near Craig	15.9	1960-75	1961	4.40	1,160	5-7	3.68	437	27.5	10

Table 1.--Flood stages and discharges, May through July 1975, along Continental Divide in Montana--continued.

No.	Station number	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum previously known			Maximum May-July 1975				
					Year	Gage height (feet)	Discharge (ft <sup>3</sup> /s)	Date	Gage height (feet)	Discharge		Recurrence interval (years)
										ft <sup>3</sup> /s	ft <sup>3</sup> /s/mi <sup>2</sup>	
Missouri River basin, cont.												
39	06071600	Wegner Creek at Craig	35.0	1960-75	1966	4.64	1,020	5- 7	3.15	640	18.3	25
40	06073000	Dearborn River near Clemons	123	1921-23, 1929-53, 1964	1953 1964	6.20 9.15	8,200 17,400	6-19	- -	d17,000	138	a2.0
41	06073500	Dearborn River near Craig	325	1945-69	1964	13.5	15,400	6-19	9.19	7,300	22.5	19
42	06073600	Black Rock Creek near Augusta	5.54	1974-75	1974	6.36	327	5- 7	7.46	428	77.3	10
43	06076700	Sheep Creek near Neihart	5.30	1960-75	1965	2.40	138	6-11	1.74	98	18.5	5
44	06077000	Sheep Creek near White Sulphur Springs	54.4	1941-72	1953	5.80	460	6- 8	4.60	344	6.32	8
45	06077500	Smith River near Eden	1,594	1951-69	1953	10.46	12,300	6-20	4.74	2,930	1.84	3
46	06077700	Smith River tributary near Eden	1.44	1960-75	1966	.91	d15	5- 7	- -	d80	49.1	50
47	06077800	Goodman Coulee near Eden	21.8	1959-75	1966	6.73	437	5- 7	7.43	1,340	61.5	a1.5
48	06078200	Missouri River near Ulm	20,941	1948, 1953, 1957-75	1953 1964	d17 14.44	35,000 27,500	6-22	14.64	27,400	1.30	8
49	06079500	Gibson Reservoir near Augusta	575	1930-74	1964	4,732.23	b116,400	6-18	4,720.3	b99,810	- -	- -
50	06080900	Sun River below diversion dam, near Augusta	609	1964, 1967-74	1964 1972	24.8 11.38	59,700 8,910	6-19	19.00	32,000	52.5	- -
51	06082200	Sun River below Willow Creek, near Augusta	827	1964, 1967-74	1964 1972	16.16 7.33	46,700 10,000	6-19	11.50	34,000	41.1	- -
52		Elk Creek above Smith Creek, near Augusta	53.9	- -	- -	- -	- -	6-19	- -	5,680	105	a1.4
53	06084000	Smith Creek below Ford Creek, near Augusta	74.0	1945-52, 1964	1948 1964	5.70 13.4	1,830 6,140	6-19	10.43	4,400	59.5	100
54		Elk Creek near Augusta	145	1964	1964	- -	12,000	6-19	- -	9,980	68.8	a1.5
55		Hogan Slough at Highway 287 near Augusta	- -	- -	- -	- -	- -	6-19	- -	1,480	- -	- -
56	06084500	Elk Creek at Augusta	157	1904-24	1908	c6.8	4,300	6-19	- -	8,500	54.1	a1.2
57	06085800	Sun River at Simms	1,320	1953, 1964, 1966-75	1964	d13.7	f50,000	6-20	12.48	38,300	34.1	100

Table 1.--Flood stages and discharges, May through July 1975, along Continental Divide in Montana--continued.

No.	Station number	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum previously known			Maximum May-July 1975				
					Year	Gage height (feet)	Discharge (ft <sup>3</sup> /s)	Date	Gage height (feet)	Discharge		Recurrence interval (years)
										ft <sup>3</sup> /s	ft <sup>3</sup> /s/mi <sup>2</sup>	
Missouri River basin, cont.												
58	06087900	Muddy Creek tributary near Power	3.15	1963-75	1968	2.77	620	6-20	2.39	350	111	8
59	06088300	Muddy Creek near Vaughn	282	1968-75	1969	- -	d1,400	5- 7	13.46	3,110	11.0	65
60	06088500	Muddy Creek at Vaughn	314	1908,1932, 1925-26, 1934-68, 1971-75	1908 1953	d24 17.7	- - 7,600	5- 7	11.88	3,830	12.2	93
61	06089000	Sun River near Vaughn	1,854	1908, 1934-75	1908 1964	20.4 23.4	- - 53,500	6-20	22.28	32,600	15.6	50
62	06089300	Sun River tributary near Great Falls	21.1	1956-73	1964	5.46	470	5- 7	5.77	530	25.1	21
63		Sun River at Great Falls	1,937	1908, 1953	1908 1953	d3,328 3,319.1	- - - -	6-20	3,322.1	31,000	16.0	50
64	06090300	Missouri River near Great Falls	23,292	1953, 1956-75	1964	- -	72,000	6-21	- -	60,200	2.58	- -
65	06090500	Belt Creek near Monarch	368	1951-75	1953	10.12	11,000	6-20	6.20	2,940	7.98	8
66	06090800	Missouri River at Fort Benton	24,749	1890- 1975	1908	18.5	d140,000	6-21	11.85	62,000	2.51	25
67	06092000	Two Medicine River near Browning	317	1907-24, 1951-75	1964	15.5	100,000	6-19	14.1	74,500	235	a2.8
68	06092500	Badger Creek near Browning	133	1951-73	1964	10.37	49,700	6-19	9.1	20,800	156	100
69	06097100	Blacktail Creek near Heart Butte	16.4	- -	- -	- -	- -	6-19	5.93	1,390	84.8	25
70		Sheep Creek at U.S. Highway 89, near Dupuyer	47.0	- -	- -	- -	- -	6-19	- -	1,650	35.1	15
71	06099000	Cut Bank Creek at Cut Bank	1,065	1905-19, 1920, 1922-24, 1951-73	1964	13.93	16,600	6-20	8.2	5,200	4.88	10
72	06099500	Marias River near Shelby	3,242	1902-08, 1911-75	1964	23.64	g241,000	6-20	18.21	75,700	23.3	a1.5
73	06100200	Heines Coulee tributary near Valier	.6	1960-75	1964	10.57	64	6-30	15.02	249	415	a1.7
74	06100300	Lone Man Coulee near Valier	14.1	1960-75	1964	2.38	1,740	6-30	6.02	5,440	386	a1.8

Table 1.--Flood stages and discharges, May through July 1975, along Continental Divide in Montana--continued.

No.	Station number	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum previously known			Maximum May-July 1975				
					Year	Gage height (feet)	Discharge (ft <sup>3</sup> /s)	Date	Gage height (feet)	Discharge		Recurrence interval (years)
										ft <sup>3</sup> /s	ft <sup>3</sup> /s/mi <sup>2</sup>	
Missouri River basin, cont.												
75	06104500	Teton River near Choteau	221	1906, 1915-19	1916	8.7	4,500	6-19	- -	h8,380	37.9	65
76	06105800	Bruce Coulee tributary near Choteau	1.70	1963-75	1972	5.06	390	6-19	2.00	120	70.6	3
77	06108000	Teton River near Dutton	1,307	1954-75	1964	c20.48	71,300	6-21	14.80	16,000	12.2	50
78	06108200	Kinley Coulee near Dutton	9.67	1963-75	1966	10.72	2,070	5- 7	4.96	205	21.1	5
79	06108300	Kinley Coulee tributary near Dutton	2.65	1963-75	1966	14.77	465	5- 7	4.83	153	57.7	9
80	06132200	South Fork Milk River near Babb	68.6	1961-75	1964	6.61	12,000	6-20	6.78	d10,000	146	a2.2
81	06132400	Dry Fork Milk River near Babb	17.4	1961-75	1964	5.20	1,880	6-20	5.55	2,200	126	44
82	06133000	Milk River at western crossing of international boundary	397	1931-75	1964	9.77	7,930	6-20	9.41	6,880	17.3	50
83	06133500	North Fork Milk River above St. Mary Canal, near Browning	61.8	1911-12, 1918, 1919-75	1967	7.95	3,090	6-20	6.66	1,070	17.3	7
84	06134000	North Milk River near international boundary	91.8	1909-12, 1913-22, 1923-75	1948	6.47	2,950	6-20	6.28	2,030	22.1	
85	06134500	Milk River at Milk River, Alberta	1,036	1909-75	1927	11.41	8,730	6-21	10.62	9,700	9.36	100
86	06134800	Van Cleeve Coulee tributary near Sunburst	10.8	1963-75	1965	4.00	239	6-19	2.08	34	3.15	2
Pend Oreille River basin												
87	12323300	Smith Gulch near Silver Bow	4.85	1959-75	1965	5.75	123	6- 9	4.54	62	12.8	10
88	12323500	German Gulch near Ramsay	40.6	1955-69	1965	3.67	450	6-19	4.04	692	17.0	a1.8
89	12323750	Silver Bow Creek at Warm Springs	483	1972-75	1974	13.64	d1,000	6-20	7.47	1,320	2.73	6
90	12324100	Racetrack Creek below Granite Creek, near Anaconda	39.5	1914-17, 1957-73	1965	5.74	537	6-19	5.66	580	14.7	17
91	12324590	Little Blackfoot River near Garrison	398	1972-75	1974	6.90	2,700	6-19	7.50	3,550	8.92	a1.3
92	12324700	Clark Fork tributary near Drummond	4.61	1958-75	1958	1.64	133	6-19	.85	26	5.64	1

Table 1.--Flood stages and discharges, May through July 1975, along Continental Divide in Montana--continued.

No.	Station number	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum previously known			Maximum May-July 1975				
					Year	Gage height (feet)	Discharge (ft <sup>3</sup> /s)	Date	Gage height (feet)	Discharge		Recurrence interval (years)
										ft <sup>3</sup> /s	ft <sup>3</sup> /s/mi <sup>2</sup>	
Pend Oreille River basin, cont.												
93	12325500	Flint Creek near Southern Cross	52.6	1940-75	1942	1.86	174	7-18	2.40	j171	3.25	- -
94	12329500	Flint Creek at Maxville	208	1941-75	1943	6.79	1,680	5-16	5.67	745	3.58	- -
95	12330000	Boulder Creek at Maxville	71.3	1939-75	1953	- -	764	6-19	4.80	1,460	20.5	a1.7
96	12331600	Clark Fork at Drummond	2,378	1972-75	1974	19.70	d5,200	6-20	10.60	8,490	3.57	55
97	12331700	Edwards Gulch at Drummond	4.69	1960-62, 1974-75	1974	4.28	318	7-18	1.15	7	1.49	1
98	12332000	Middle Fork Rock Creek near Philipsburg	123	1937-75	1974	5.58	1,680	7- 5	4.88	1,170	9.51	4
99	12334510	Rock Creek near Clinton	885	1927, 1972-75	1927 1972	d9.5 8.5	- - 6,500	6-20	7.49	5,520	6.24	67
100	12334600	Blackfoot River near Lincoln	15.1	1968-70	1970	5.92	294	6-19	9.10	900	59.6	22
101	12334650	Blackfoot River below Alice Creek, near Lincoln	96.9	1964, 1970-75	1964 1972	8.89 7.18	3,500 910	6-19	10.15	3,890	40.1	22
102		Landers Fork near Lincoln	130	- -	- -	- -	- -	6-19	- -	4,890	37.6	53
103		Blackfoot River below Seven-Up Pete Creek, near Lincoln	255	- -	- -	- -	- -	6-19	- -	7,370	28.9	92
104	12335500	Nevada Creek above reservoir, near Finn	116	1939-75	1953	c6.00	1,800	6-20	4.46	1,150	9.91	10
105	12338500	Blackfoot River near Ovando	1,274	1940-64	1964	10.06	17,600	6-20	9.10	15,500	12.2	100
106	12338600	Monture Creek at forest service boundary, near Ovando	105	1964, 1974-75	1964	4.71	2,400	6- 7	3.20	1,200	11.4	14
107	12338690	Monture Creek near Ovando	140	1974-75	1974	4.18	2,120	6- 7	3.90	1,640	11.7	23
108	12339300	Deer Creek near Seeley Lake	19.8	1974-75	- -	- -	- -	5-16	3.15	425	21.5	a1.1
109	12339450	Clearwater River near Clearwater	345	1948	1948	- -	k3,220	5-17	7.85	2,900	8.41	4
110	12339800	Blackfoot River near Potomac	2,046	1956-65	1964	11.33	17,500	6-20	10.35	15,100	7.38	44
111	12339900	Wast Twin Creek near Bonner	7.47	1959-74	1975	12.55	d300	6- 7	.89	90	12.0	2
112	12340000	Blackfoot River near Bonner	2,290	1899- 1901, 1903-05, 1940-74	1964	10.89	19,200	6-20	10.74	18,100	7.90	22

Table 1.--Flood stages and discharges, May through July 1975, along Continental Divide in Montana--continued.

No.	Station number	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum previously known			Maximum May-July 1975				
					Year	Gage height (feet)	Discharge (ft <sup>3</sup> /s)	Date	Gage height (feet)	Discharge		Recurrence interval (years)
										ft <sup>3</sup> /s	ft <sup>3</sup> /s/mi <sup>2</sup>	
Pend Oreille River basin, cont.												
113	12340500	Clark Fork above Missoula	5,999	1908, 1929-74	1908, 1964	13.35	48,000, 31,700	6-21	13.75	32,300	5.38	32
114	12355000	Flathead River at Flathead, B. C.	427	1929-74	1964	8.00	16,300	6-20	7.52	12,800	30.0	10
115	12355350	Big Creek at Big Creek ranger station, near Columbia Falls	82.1	1964, 1973-75	1964	6.60	2,130	6-20	4.57	1,150	14.0	6
116	12355500	North Fork Flathead River near Columbia Falls	1,548	1910-17, 1929-35, 1935-75	1964	18.60	69,100	6-20	11.97	30,900	20.0	10
117	12356000	Skyland Creek near Essex	8.09	1946-52, 1954, 1959-75	1964	9.55	3,580	6-19	8.40	3,820	472	a3.2
118	12356500	Bear Creek near Essex	20.7	1946-52, 1964	1964	7.2	8,380	6-19	- -	1,840	88.9	6
119	12358500	Middle Fork Flathead River near West Glacier	1,128	1939-75	1964	36.46	d140,000	6-20	19.42	63,600	56.4	85
120	12359800	South Fork Flathead River above Twin Creek, near Hungry Horse	1,160	1964, 1964-75	1964, 1974	20.87, 15.20	50,900, 30,200	6-20	13.10	19,700	17.0	2
121	12361000	Sullivan Creek near Hungry Horse	71.3	1948-56, 1959-75	1964	7.21	5,020	6- 3	5.16	2,160	30.3	3
122	12362000	Hungry Horse Reservoir near Hungry Horse	1,654	1951-75	1955, 1956	3,651.40	b3,461,000	7-27	3,560.40	b3,438,000	- -	- -
123	12362500	South Fork Flathead River near Columbia Falls	1,663	1910-75	1916	c16.6	46,200	5-12	10.73	m11,100	6.67	- -
124	12363000	Flathead River at Columbia Falls	4,464	1894, 1922-75	1894, 1964	22.7, 25.58	142,000, 176,000	6-20	16.85	m79,000	17.7	10

a Ratio of maximum discharge to that of 100-year flood.

b Contents, in acre-feet.

c Site and datum then in use.

d About.

e Occurred several times.

f Revised.

g Affected by dam failure.

h Includes 1,710 ft<sup>3</sup>/s bypass flow.

i Backwater from ice.

j Maximum daily.

k At site 3 miles downstream.

m Affected by reservoir storage.