UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FLOODS OF THE SUMMER OF 1971 IN SOUTH-CENTRAL ALASKA

By
Robert D. Lamke

Water Resources Division
Alaska District
Open-File Report
March 1972

CONTENTS

ILLUSTRATIONS

TABLES

SELECTED STATION DATA

FLOODS OF THE SUMMER OF 1971 IN SOUTH-CENTRAL ALASKA

Robert D. Lamke

ABSTRACT

Floods and high water occurred throughout the summer of 1971 in south-central Alaska. Snow cover, 150 percent of average, in the mountains on May 1 caused local snowmelt floods from mid-May to mid-July. The peak discharge of 265,000 cfs (cubic feet per second) on July 15 at Copper River near Chitina was the highest in 22 years of record.

However, the major flood period was August 8-11. Precipitation totals of 3 to 9 inches during August 5-11 were recorded in an area extending northeastward from Iliamna Lake to Palmer, Talkeetna, and Paxson Lake. The principal flood areas were the upper Copper, Matanuska, Susitna, Chakachatna, and Kvichak River basins. Flooding in the Anchorage area was not severe. Total damage caused by the August flood is estimated to be 8 to 10 million dollars of which 6 million dollars occurred in the Matanuska Valley.

Extreme floods occurred in the Matanuska Valley. A lake near Sutton on an unnamed tributary to Granite Creek breached its embankment, which released a peak discharge in Granite Creek on August 10 of 58,600 cfs, 23.4 times the probable 50-year flood. Other streams near Sutton,

tributary to the Matanuska River, had peak discharges 1.8 to 8.9 times the probable 50-year flood. The Matanuska River at Palmer had a peak discharge of 82,100 cfs, 1.2 times the probable 50-year flood. Downstream near Bodenburg Butte, an area was inundated when the Matanuska River overtopped a dike. Another extreme flood occurred at the Chakachatna River near Tyonek on August 11 where the peak discharge was estimated to be 470,000 cfs. The peak was caused by lateral erosion of a channel constriction formed by Barrier Glacier at the outlet of Chakachamna Lake.

Hydrologic data for planning, discussions of antecedent conditions, and meteorology along with a description of the floods and flood damage are included. Tables of storm precipitation, peak discharge data, sediment data, and discharge for the June-August period are also included.

INTRODUCTION

Floods and high water occurred throughout the summer of 1971 in much of south-central Alaska. High water at scattered sites from mid-May to mid-July was caused by snowmelt. The mid-July flood was exceptionally high in the Copper River basin. However, the major flood period was August 8-11 as the result of large amounts of precipitation that fell August 5-11 in an area extending northeast from Iliamna Lake to Palmer and Talkeetna and past Paxson Lake. Flooding also occurred August 10 and 11 in the large streams with headwaters along the west and south sides of the Alaska Range. About 6 million dollars of damage occurred in the Matanuska Valley around Palmer; flood damage in the flood area covered by this report is estimated to be 8 to 10 million dollars.

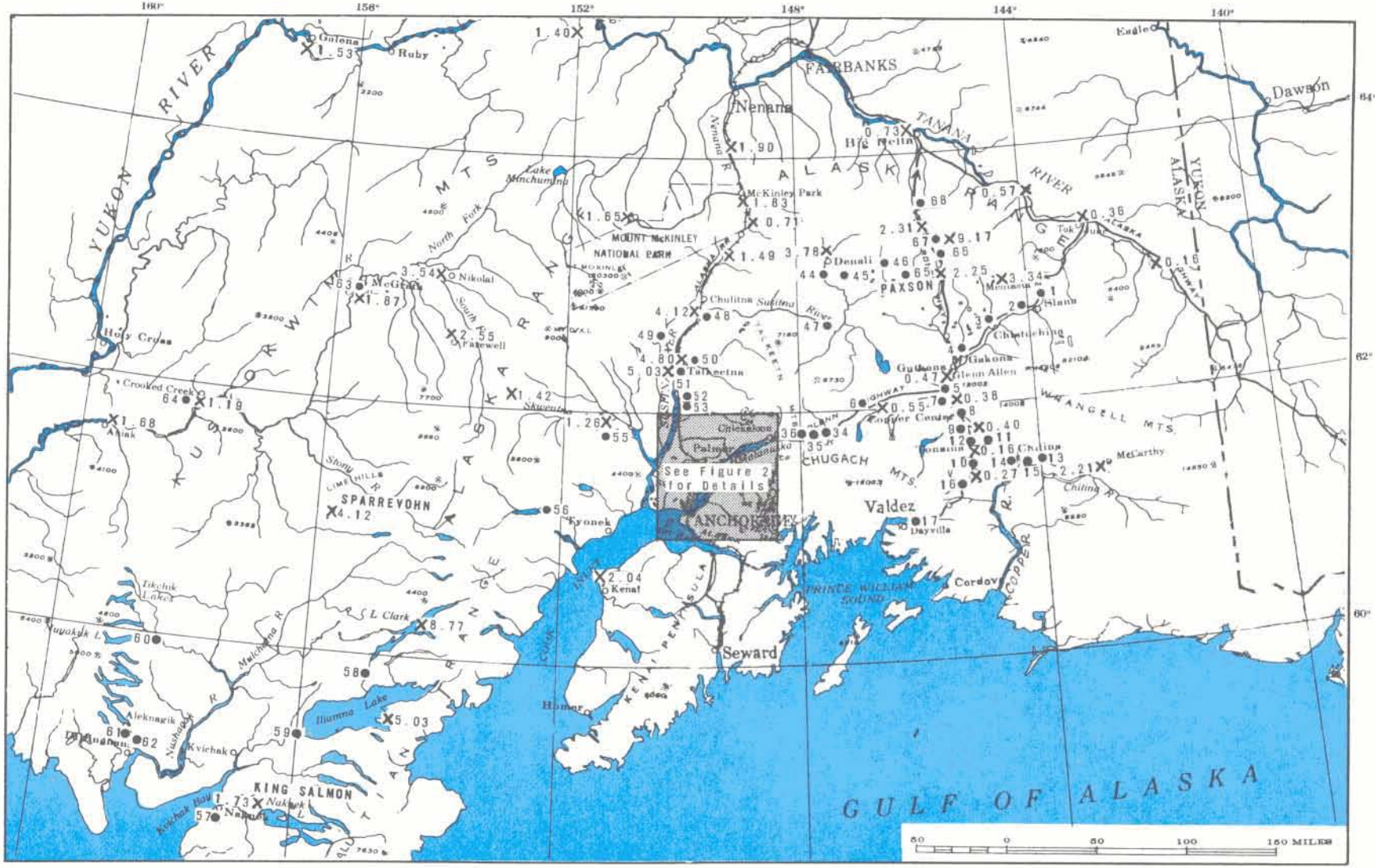
Purpose and Scope

The purpose of this report is to present a description of the floods and a summary of pertinent streamflow data. Data on the magnitude of the peak discharges and volume of floodflows are useful to agencies involved in planning and design. The area covered in this report is shown in figure 1.

The streamflow data are provisional and are presented in the downstream order used by the U.S. Geological Survey.

Acknowledgments

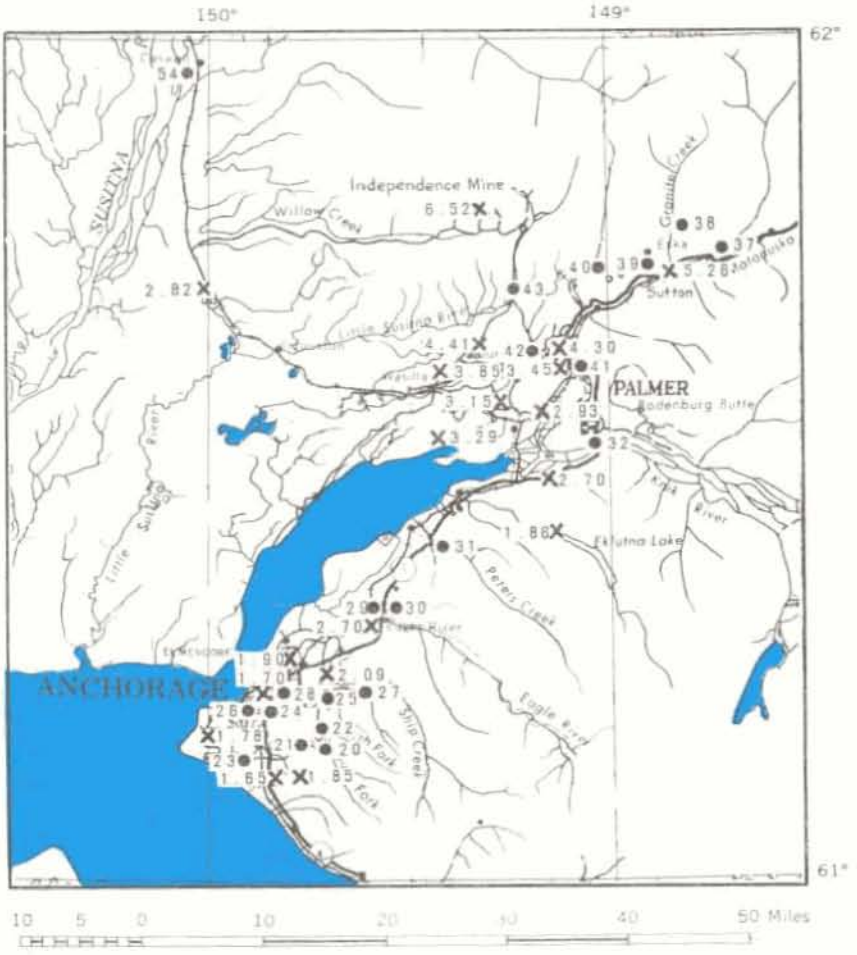
The data in this report were collected as part of the cooperative programs between the Geological Survey and other Federal agencies: State of Alaska, Department of Highways; Greater Anchorage Area Borough; and city of Anchorage. The report was prepared under the general direction of Harry Hulsing, district chief, in charge of water-resources investigations in Alaska.



EXPLANATION

● 36
Flood-determination point. Numbers correspond to those in table 2.

X 1.40
Site of rainfall determination and total precipitation in inches (Aug. 5–11, 1971)



EXPLANATION

● 20

Flood-determination point
Numbers correspond to those in table 2

X 2.83

Site of rainfall determination
and total precipitation in inches,
(Aug. 5-11, 1971)

Figure 2.--Location of flood-data sites near Anchorage and Palmer.

SNOWMELT FLOODS

Snow cover was about 150 percent of average along the Alaska Range on May 1 according to snow surveys of the Soil Conservation Service. Temperature was 5° below normal in May and about 3° below normal in June according to records of the National Weather Service. The conditions resulted in delayed and high snowmelt peaks in late May through mid-July and sustained above normal streamflows in the larger rivers with headwaters in the high altitudes of the Alaska Range. For example, Susitna River at Gold Creek (48, fig. 1 and table 2) had a discharge of 73,100 cfs on June 12, the fourth highest discharge during 22 years of record. Skwentna River near Skwentna (55) had a peak discharge of 50,000 cfs on June 25, which was the highest in 12 years of record. Kuskokwim River at McGrath (63) had a peak discharge of 67,300 cfs on May 24, the second highest discharge in 8 years of record.

The floods in mid-July along the lower Copper River, which drains the Wrangell and Chugach Mountains, as well as the Alaska Range, were caused by snowmelt during a period, July 7-21, of slightly warmer than normal weather. The peak discharge on July 15 at Copper River near Chitina (15) of 265,000 cfs was the highest in 22 years of record. Nearby crest-stage partial-record stations, such as O'Brien Creek near Chitina (14) and Boulder Creek near Tiekel (16), had high peaks during July. Lowe River near Valdez (17) was high on July 10. The second highest peak discharge of the year occurred during mid-July in streams near Anchorage and near Denali with headwaters at the higher elevations of the Chugach Mountains and Alaska Range, respectively. (See table 2 for additional data.)

Precipitation

The maximum daily rainfall and also total precipitation at selected stations for the August 5-11 storm are listed in table 1, and the locations are shown in figures 1 and 2. The storm moved toward the northeast. King Salmon (at the southwest corner of fig. 1) had a total of 1.73 inches, Intricate Bay on the south side of Iliamna Lake had 5.03 inches, Port Alsworth on Lake Clark had 8.77 inches. The total precipitation during the 7-day storm period at Port Alsworth was one and a half times the maximum total rainfall for the month of August during 12 years of record. The storm amounts were less to the north of Port Alsworth with 4.12 inches at Sparrevohn and 1.87 inches at McGrath.

Rainfall during the August 5-11 storm period in the Anchorage, Palmer, and Talkeetna areas increased in a northeasterly direction from 1.78 inches recorded at the Anchorage International Airport, to about 3.5 inches near Wasilla, to 4.30 inches near Palmer, and to 5.26 inches at Sutton. Total precipitation during this same 7-day storm period at Sutton was twice the maximum total for August during 8 years of record. Rainfall decreased east of Sutton. Rainfall totals in the lower Susitna Valley ranged from 3 to 5 inches, and 4.80 inches was recorded at Talkeetna. A rainfall total of 6.52 inches was recorded at Independence Mine, which is a precipitation station in the Talkeetna Mountains at an altitude of 3,500 feet. The largest daily rainfall amounts were slightly more than 2 inches on August 8 and occurred at Independence Mine and at stations near Palmer and Wasilla. Antecedent precipitation was a factor in the flooding on August 8-11. Areas near Anchorage, Palmer, and Talkeetna had rainfall amounts during the period from July 24 to August 2 ranging from 1.5 to 3.5 inches.

Table 1.--Precipitation, in inches, at selected stations during Aug. 5-11, 1971

(Data from the August 1971 Climatological Data report of the National Weather Service)

River basin and precipitation station	Latitude ° '	Longitude ° '	Altitude (feet)	Max. 1-day	Storm total
Copper River basin					
Ernestine	61 26	145 00	1,836	0.19	0.27
Glennallen	62 07	145 32	1,456	0.21	0.38
Gulkana WSO	62 09	145 27	1,572	0.19	0.47
Mankomen Lake	62 59	144 29	3,330	0.95	3.34
McCarthy	61 26	142 55	1,380	0.92	2.21
Old Edgerton	61 48	144 59	1,320	0.23	0.40
Paxson Lake	62 57	145 30	2,750	0.71	2.25
Slana	62 43	143 44	2,200	0.50	1.00
Snowshoe Lake	62 02	146 40	2,410	0.26	0.55
Tonsina Lodge	61 40	145 11	1,500	0.15	0.16
Anchorage area					
Alyeska	60 58	149 08	251	1.03	3.77
Anchorage Park Strip	61 13	149 52	85	0.95	1.70
Anchorage WSO	61 10	150 01	114	0.79	1.78
Beacon Park	61 07	149 51	160	0.77	1.65
Birch Road	61 08	149 46	460	0.84	1.85
Eagle River	61 19	149 30	750	1.80	2.70
Eklutna Lake	61 24	149 09	882	0.80	1.86
Eklutna Project	61 28	149 10	38	1.17	2.60
Elmendorf AFB	61 15	149 48	192	1.10	1.90
Oil Well Road	61 14	149 43	370	0.96	2.09
Matanuska River basin					
Alpine Inn (Sutton)	61 43	148 54	455	1.85	5.26
Anderson Lake	61 37	149 20	475	1.51	4.41
Ben's Farm Market	61 33	149 11	100	1.48	2.93
Matanuska Agr. Exp. Sta.	61 34	149 16	150	1.00	3.15
Palmer AAES	61 36	149 06	225	1.02	3.45
Palmer 1 N	61 37	149 06	220	2.04	4.30
Wasilla 3 S	61 32	149 26	50	1.73	3.29
Wasilla 2 NE	61 37	149 24	500	2.10	3.85

Table 1.--Precipitation, in inches, at selected stations during Aug. 5-11, 1971--Continued.

River basin and precipitation station	Latitude ° '	Longitude ° '	Altitude (feet)	Max. 1-day	Storm total
Susitna River basin					
Independence Mine	61 48	149 18	3,500	2.05	6.52
Puntilla	62 06	152 45	1,832	0.64	1.42
Skwentna	61 58	151 12	153	0.61	1.26
Susitna Meadows	62 45	149 42	750	1.15	4.12
Talkeetna WSO	62 18	150 06	345	1.58	4.80
The Gracious House (near Denali)	63 08	147 32	2,550	1.10	3.78
Trappers Creek Camp	62 24	150 15	500	1.76	5.03
White's Crossing	61 42	150 00	251	1.01	2.82
Chakachatna River basin					
Nikiski Terminal (across Cook Inlet)	60 41	151 23	110	0.94	2.04
Kvichak River basin					
Intricate Bay	59 34	154 28	170	1.54	5.03
King Salmon WSO	58 41	156 39	49	0.66	1.73
Port Alsworth	60 12	154 18	230	2.25	8.77
Kuskokwim River basin					
Aniak FAA Airport	61 35	159 32	81	0.91	1.68
Crooked Creek	61 52	158 06	125	0.66	1.19
Farewell WSO	62 32	153 54	1,499	0.81	2.55
McGrath	62 58	155 37	344	0.81	1.87
Nikolai	63 01	154 22	425	1.00	3.54
Sparrevohn	61 06	155 33	1,580	1.04	4.12
Tanana River basin					
Big Delta WSO	64 00	145 44	1,268	0.42	0.73
Clear Airport	64 18	149 11	580	1.03	1.9
Dot Lake	63 40	144 02	1,100	0.51	0.57
McKinley Park	63 43	148 58	2,070	0.56	1.83
Northway FAA Airport	62 57	141 56	1,713	0.06	0.16
Summit FAA Airport	63 20	149 09	2,401	0.41	1.49
The Harris's	63 37	148 47	2,070	0.19	0.71
Tok	63 21	143 02	1,620	0.36	0.36
Trim's Camp	63 26	145 46	2,408	1.02	2.31
Wonder Lake	63 29	150 52	2,100	1.00	1.65

North of Talkeetna, the August 5-11 rainfall was less than 2 inches on the north side of the Alaska Range; further east, it was 3.78 inches near Denali and 2.25 inches at Paxson Lake. Total rainfall was less than 1 inch at most of the precipitation stations in the Copper and Tanana River basins. However, total rainfall increased at higher altitudes on the south side of the Alaska Range; 3.34 inches was recorded at an altitude of 3,330 feet at Mankomen Lake and 9.17 inches was recorded at an altitude of 4,860 feet on Gulkana Glacier, north of Paxson. Figure 3 shows data collected during the storm period at the Geological Survey meteorological station on Gulkana Glacier. Precipitation on the glacier usually occurs as snowfall even during the summer at higher altitudes, but the air temperatures on the glacier were above freezing. No new snow was noted at 7,500 feet elevation. Also, it was noted that an unusual number of landslides occurred on the edges of the glacier.

Discharge

Copper River Basin

The large streams draining the high altitudes of the Alaska Range were the major contributors during the August floods in the upper Copper River basin. The headwaters of these streams are in the almost continuously glaciated crest of the Alaska Range; Chistochina and Gakona Glacier are the main glaciers. The small streams at lower altitudes did not flood. Peak discharges along the Glenn Highway at Slana River (1, table 2) and Chistochina River (3) were 5,440 cfs and about 40,000 cfs, respectively. Gakona River (4) had a peak discharge of 10,500 cfs on August 10; this discharge was the highest in the 22 years of record collected at the Glenn Highway at Gakona. The Chitina River, which drains the southern side of the Wrangell Mountains, also was high during

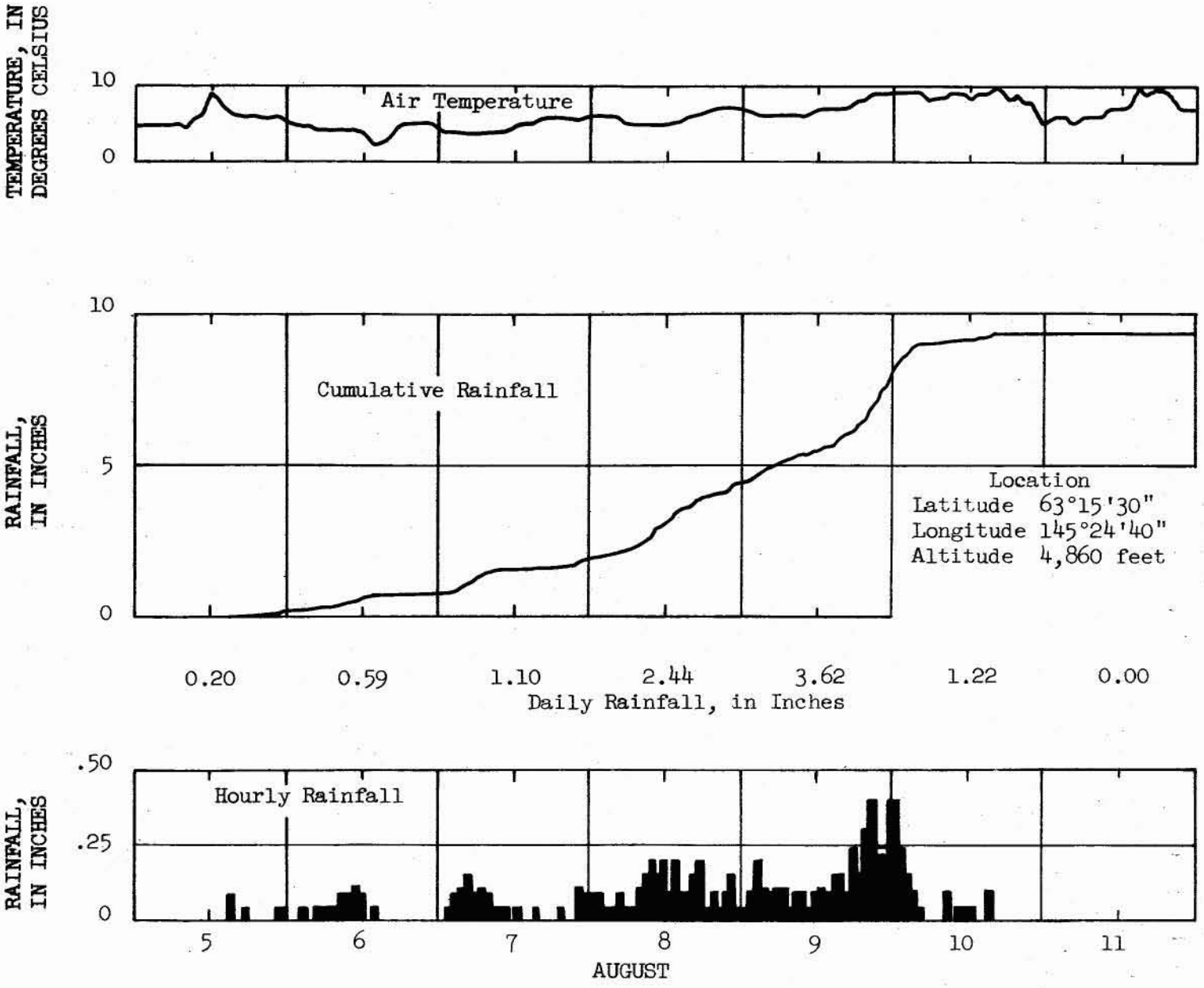


Figure 3.--Meteorological data recorded on Gulkana Glacier during Aug. 5-11, 1971.

August. Floodflow from these major tributaries resulted in a peak discharge at Copper River near Chitina (15) on August 11 of 234,000 cfs, the second highest in 22 years of record. The highest peak discharge recorded had occurred less than a month before on July 15.

Anchorage Area

Flooding occurred August 8 and 9 in the Anchorage area. The severity of flooding increased in a northeasterly direction. For example, southeast of town, on South Fork Campbell Creek (21), the peak discharge of 290 cfs was the sixth highest in 24 years of record. However, further north, at Ship Creek near Anchorage (27), the peak discharge of 1,580 cfs was the second highest flood in 25 years of record. Traffic on the Glenn Highway was detoured to bypass the Ship Creek bridge, which had its supports undermined by the high flow. Further east, local roads along Little Peters Creek and near Eklutna Lake were washed out. Discharge hydrographs for three streams in the Anchorage area during August 6-13 are shown in figure 4.

Matanuska River Basin

Peak discharges occurred the night of August 9 and on August 10 in the Palmer area. The Glenn Highway was washed out in four places east of Palmer on the afternoon of August 9, and it was closed until 11:00 p.m. on August 12. The Glenn Highway (at that time) was the only road connection from Anchorage to the Richardson Highway to Fairbanks and to the Alaska Highway. The washouts occurred near Sutton at Kings River, Granite, Eska, and Moose Creeks. Also, local roads were washed out and the flood damaged homes, businesses, and farms in the Sutton area. Several people and cars were stranded between the washed out parts of the highway.

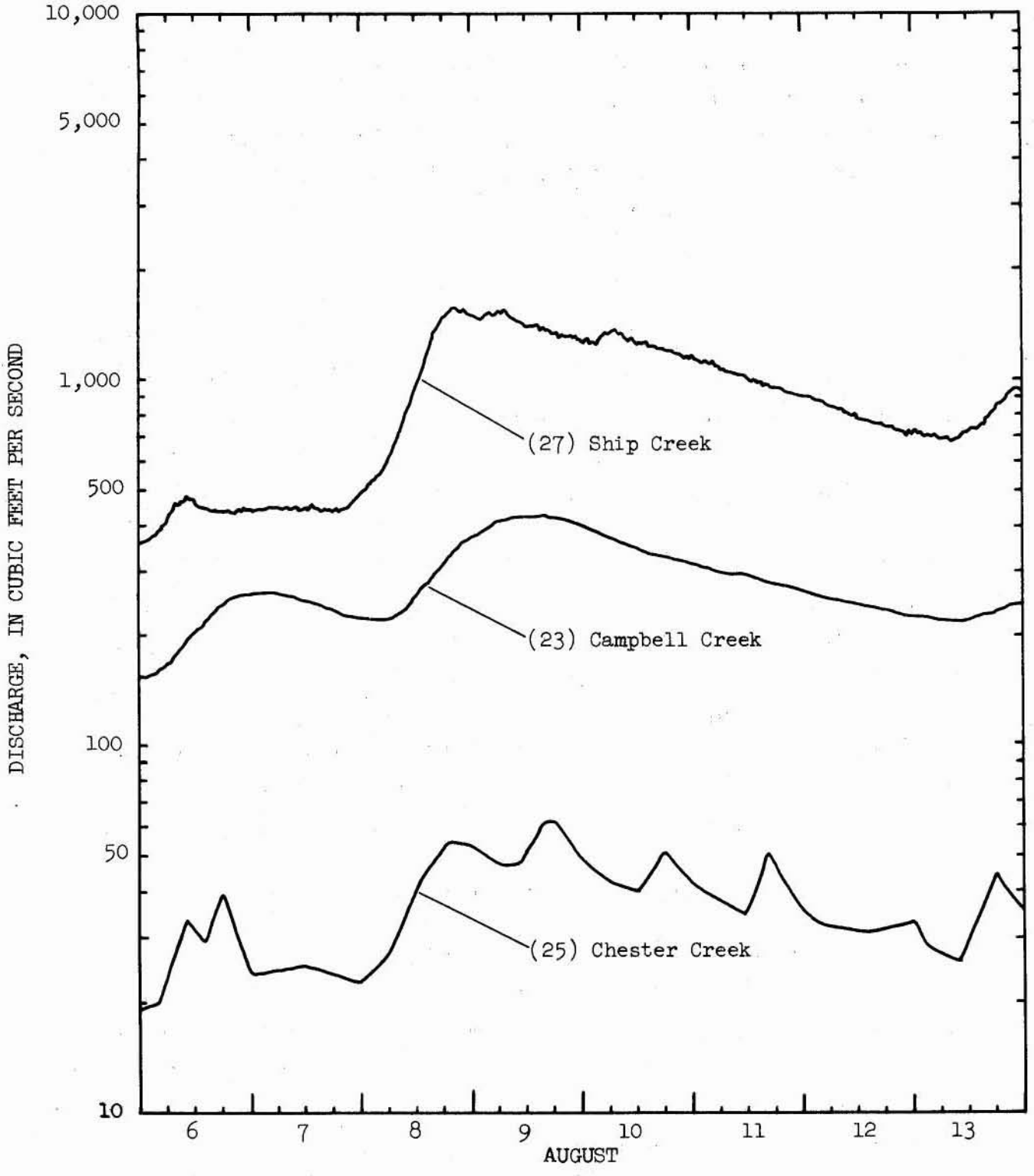


Figure 4.--Discharge hydrographs for selected streams in the Anchorage area, Aug. 6-13, 1971.

Kings River (37) was on the eastern edge of the extreme flooding and had a peak discharge of 9,800 cfs at the highway bridge. This discharge is 1.8 times as high as the discharge of a flood with a 50-year recurrence interval. (See page 34.) The bridge had a small washout at the east abutment.

High flows in Granite Creek were augmented by the sudden release of water into a tributary from an unnamed lake, 10 miles north of Sutton. Water was stored behind an embankment in the valley floor, which created the lake. Just prior to dumping, the lake was three-fourths of a mile long, half a mile wide, and nearly 85 feet deep (13 feet deeper than normal) according to the National Weather Service. The embankment or dike was probably the result of a landslide that had occurred some time ago because the material was angular and covered with mature vegetation. The sudden release of water, which almost completely drained the lake, was caused by the embankment being breached (figs. 5 and 6). There has been no history of periodic dumping of stored water. Consequently, a flood such as the 1971 flood is not likely to recur unless the narrow breach in the embankment is refilled. The peak flow in Granite Creek (fig. 7) was comparatively small upstream from the entrance of the tributary from the lake.

An indirect measurement of the peak discharge in Granite Creek (38) was made at a site 5 miles upstream from Sutton. The discharge of 58,600 cfs was 23.4 times as great as the discharge of a flood with a 50-year recurrence interval. Granite Creek is confined to a wide canyon except for the last few miles. Floodflows spread out onto an alluvial fan downstream from the canyon mouth. This resulted in deposition of sediment on the edges of the main channel, erosion of a steep high bank on the east side of the channel, formation of secondary flood channels,

Figure 5.--Remainder of lake and breach in embankment of unnamed lake on tributary to Granite Creek.

Figure 6.--Breach in embankment of unnamed lake on tributary to Granite Creek.

Figure 7.--Granite Creek channel. Tributary channel enters from the left.

and caused washouts at several places on the Glenn Highway. Deposition occurred above the Glenn Highway in the secondary channel (fig. 8), 0.4 mile east of the main bridge, averaging 3 to 4 feet in thickness and a maximum of 8 feet. The material ranged in size from sand to boulders 5 feet in diameter. The highway embankment on both sides of the bridge (fig. 9) was washed out. Also, the highway was washed out further west of the bridge at a secondary channel. Deposition west of the bridge upstream from the highway was about 1 foot thick and was mainly gravel and sand. Large trees, washed out in the channels where velocities were high, were deposited in overflow areas where velocities were low.

Eska Creek (39) had a peak discharge of 1,680 cfs at the Eska-Sutton road. This road was washed out in several places. The floodflow in Eska Creek was partly diverted from the main channel, and this diverted flow ran on and beside the road downstream toward the mouth at Sutton. A considerable amount of fine material was deposited upstream from the overtopped Glenn Highway by water in the overflow channel (fig. 10).

The peak discharge in Moose Creek was determined at a site (40) upstream from Buffalo Mine; the discharge of 18,000 cfs was 8.9 times the discharge of a flood with a 50-year recurrence interval. The gravel road extending northward from the Glenn Highway 5 miles upstream to Buffalo Mine and then eastward to Eska washed out in several places. About 100 feet of the west embankment of the Glenn Highway bridge over Moose Creek also washed out.

The discharge of the Matanuska River at Palmer (41) peaked at 47,500 cfs at 6:00 a.m. on August 10 and then started to decrease. However, the surge of water from the breakout of the lake on Granite Creek tributary resulted

Figure 8.--Mouth of Granite Creek with secondary channel in foreground.

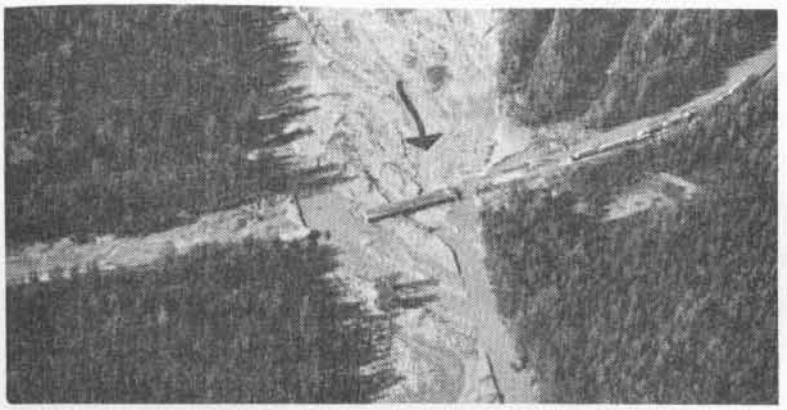


Figure 9.--Main channel of Granite Creek at Glenn Highway.

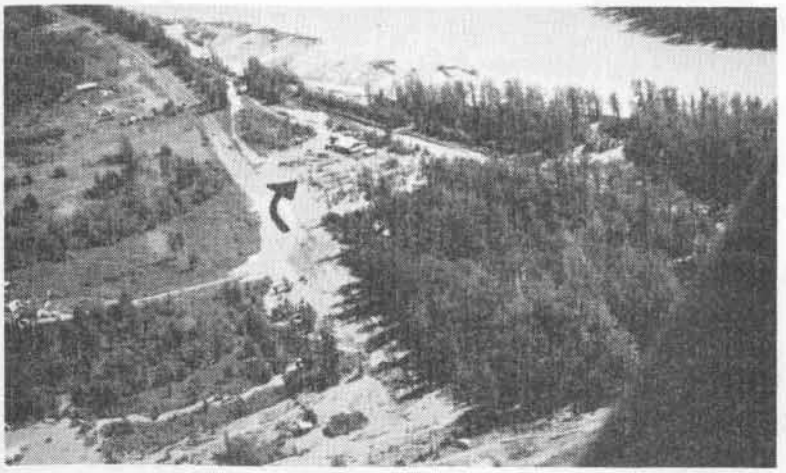


Figure 10.--Mouth of overflow channel of Eska Creek.

in a sudden rise of the Matanuska River to 82,100 cfs at 9:15 a.m. and then a sharp drop to 38,600 cfs at 11:30 a.m. (fig. 11). The discharge of 82,100 cfs at the bridge on the old Glenn Highway is 1.2 times the discharge of a 50-year flood.

The old Glenn Highway serves as a dike downstream from the bridge. This road embankment was overtopped by Matanuska River floodwaters near midnight of August 9 about 3.5 miles southeast of Palmer and then was washed out in a constricted area between two low bedrock outcrops. About 100 residences in the Bodenburg Butte area (fig. 12) were inundated by this overflow and about 200 people abandoned their homes. The floodwater entered Palmer Creek (locally called Bodenburg Creek) and flowed into Knik River. The amount of water entering the flooded area is unknown, but the outflow into Knik River was about 1,000 cfs (from observation and discharge measurement notes on Knik River).

A peak discharge on Wasilla Creek (42) of 700 cfs was determined at Fishhook Road (fig. 2). Three miles downstream, minor flooding occurred at the Wasilla-Palmer road at Four Corners as flow went over the road and into the fields.

Some of the refugees from various flood areas around Palmer took shelter in a Palmer school; others were housed in private residences and local motels. No flood-associated deaths or serious injuries were reported. However, several people had to wade floodwaters to reach safety. Several cars were destroyed or inundated.

Susitna River Basin

Little Susitna River near Palmer (43) had a peak discharge of 7,820 cfs on August 10; this discharge was the highest in 22 years of record. Hatcher Pass road was overtopped and washed out downstream from the bridge on

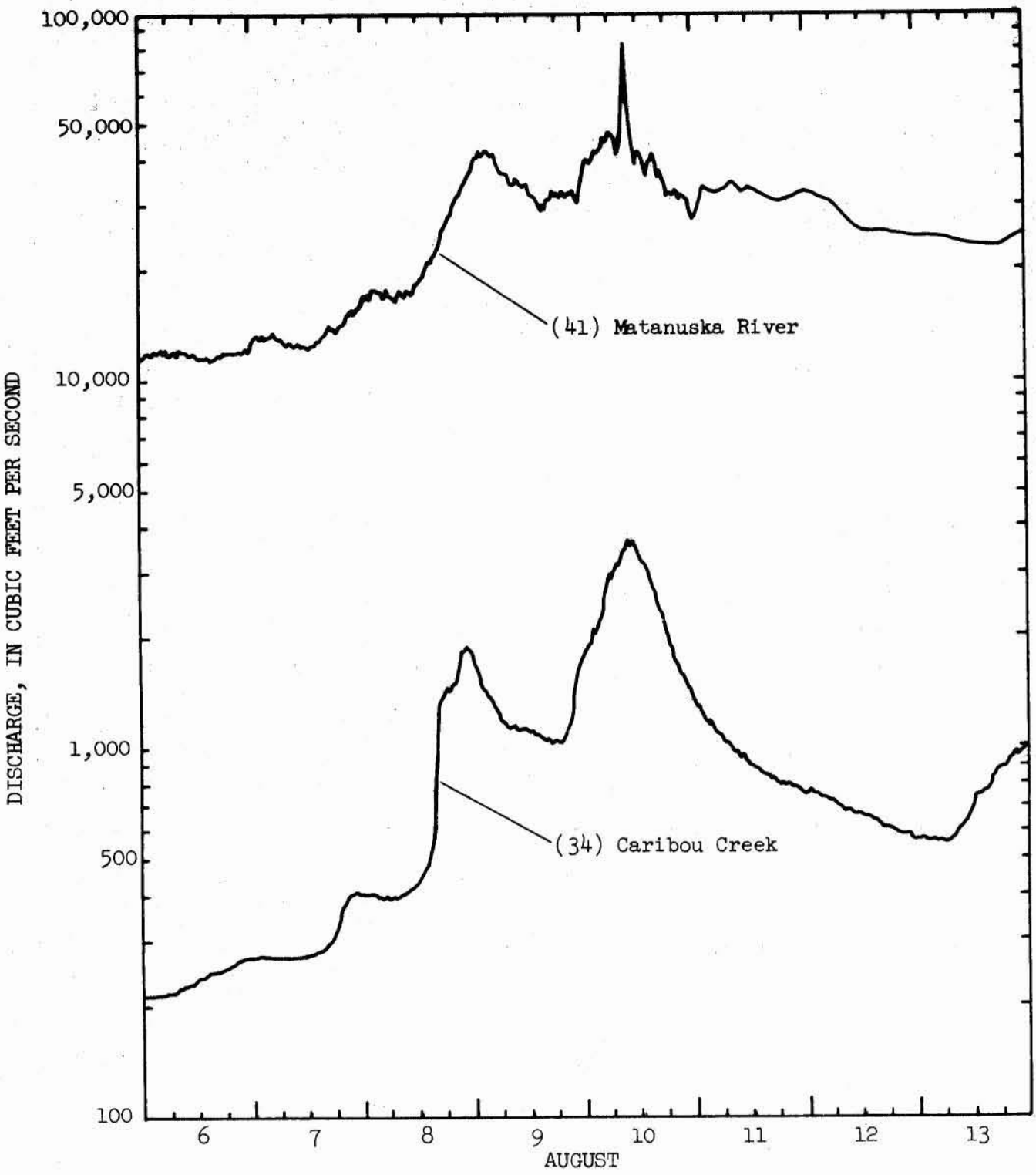


Figure 11.--Discharge hydrographs for recording stations on streams in the Matanuska River basin, Aug. 6-13, 1971.

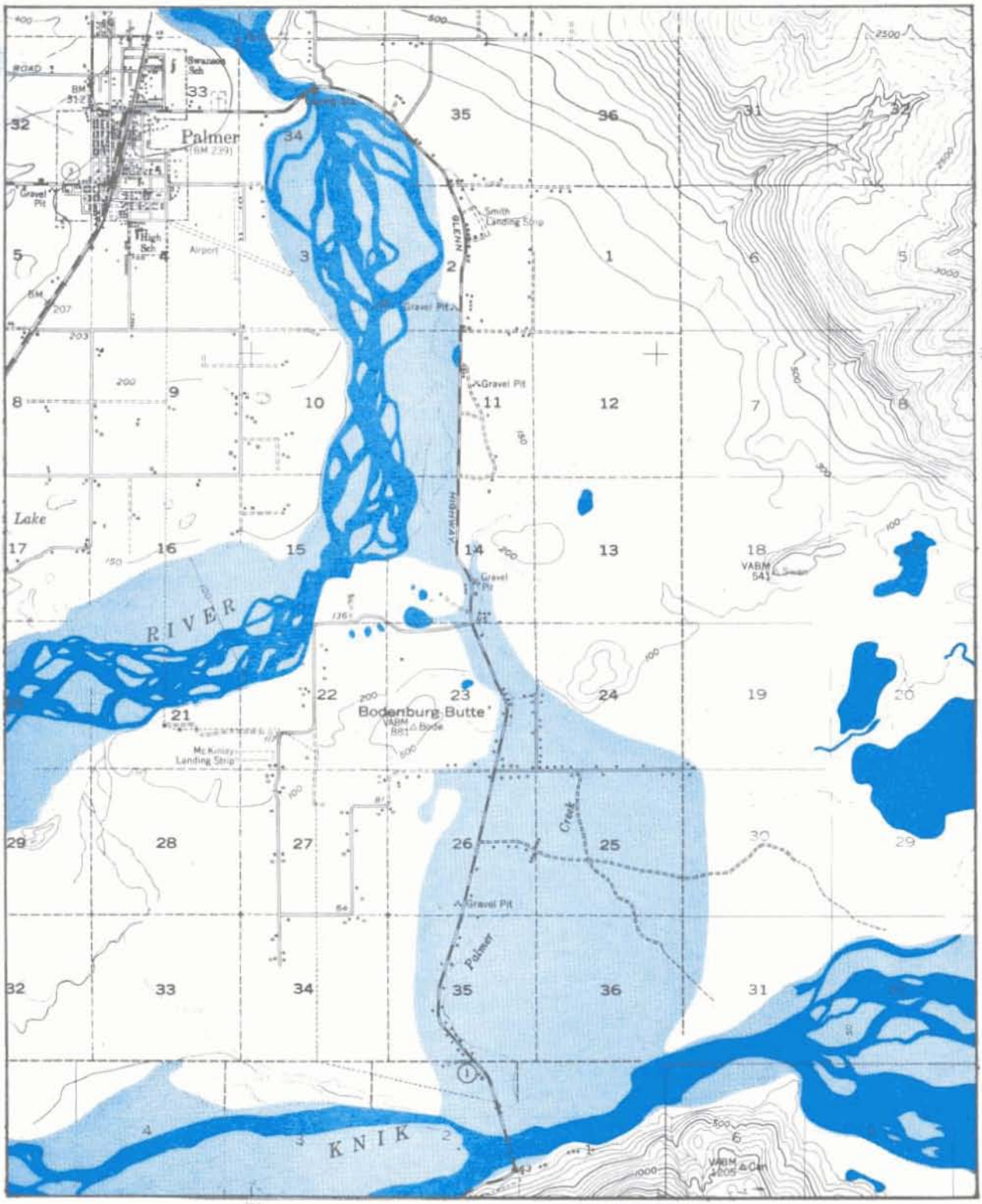


Figure 12.--Area inundated by Matanuska River near Bodenburg Butte, Aug. 10, 1971.

which the gage is located. Also, the west bridge approach washed out. Upstream from the bridge, the road washed out at several places in the canyon that it and the river share. About 20 miles downstream, the upstream shoulder of the Anchorage-Fairbanks Highway washed out near the bridge. Just downstream from the highway, an Alaska Railroad freight train was derailed (fig. 13) on August 9 near Houston.

The headwaters of the Susitna River are in the glaciated crest of the Alaska Range. Susitna River near Denali (44) and McClaren River near Paxson (46), both in the headwaters, had the highest peak discharges of 14 years of record, 38,200 cfs and 9,260 cfs, respectively. The peak discharge near Sunshine (51), the site furthest downstream on the Susitna River, was 200,000 cfs. The tributary streams that entered the Susitna River from the east and with headwaters in the Talkeetna Mountains had high peaks. Talkeetna River (50), Montana Creek (52), and Goose Creek (53) had peak discharges that were higher than any prior peaks during their 9 to 10 years of record. Flood damage was less severe in the drainages of the Susitna River than near Palmer partly because the region is not as densely settled. Discharge hydrographs for four streams in the Susitna River basin are shown in figure 14 for the period August 6 through 13.

Scour data were collected at the Anchorage-Fairbanks Highway bridge near Sunshine as part of a study in cooperation with the State of Alaska, Department of Highways. The bridge is supported by four narrow, pointed piers aligned with the flow and spaced 250 feet apart. Bed material is gravel and cobbles. Data were obtained at low-water conditions in the spring and fall and during flood conditions in July and August. As shown in figure 15, the measurements at the upstream side of the bridge during the August flood indicated an average scour of 7 feet between

Figure 13.--Derailed Alaska Railroad freight train near Houston. (Photo by Alice Puster of Anchorage Daily Times)

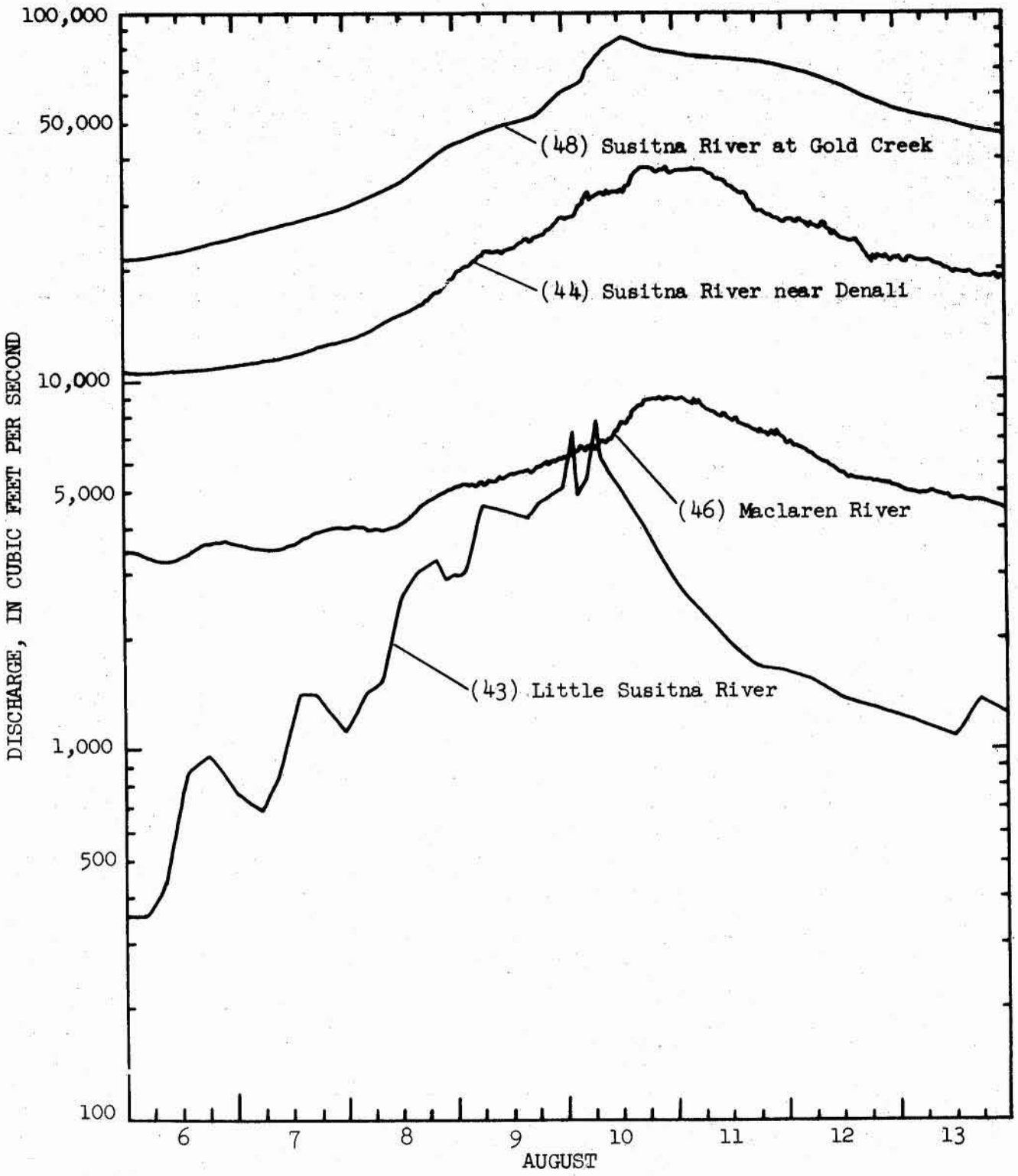


Figure 14.--Discharge hydrographs for selected streams in the Susitna River basin, Aug. 6-13, 1971.

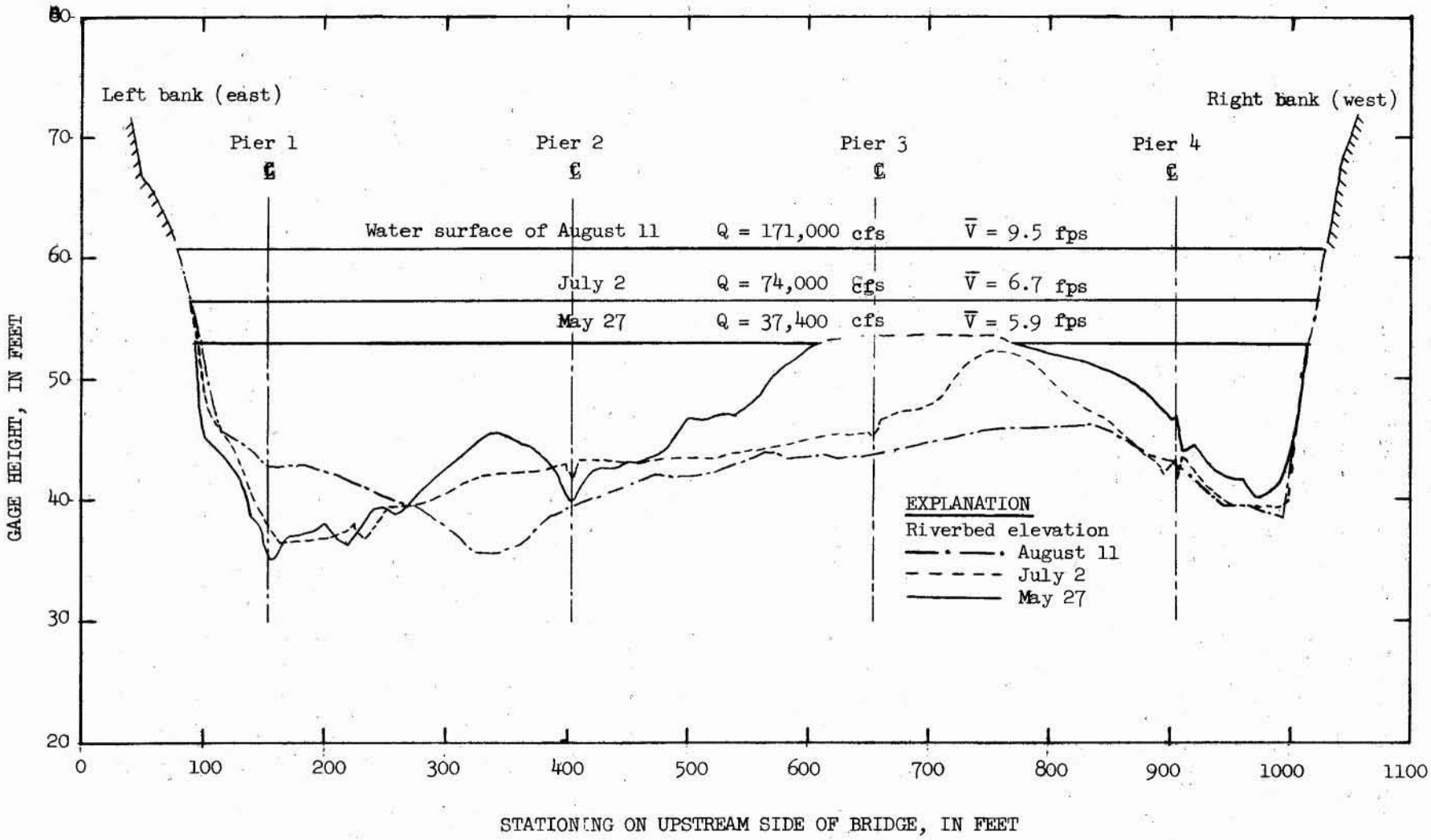


Figure 15.--Summary of scour data at Bridge No. 254 on Susitna River near Sunshine during summer of 1971.

the second and fourth piers. Maximum point scour in this section was 10 feet. Minimum bed elevation did not decrease, but only shifted laterally. Little or no local scour was measured at the piers. The low-water measurement in the fall (not shown in fig. 15) indicated a general fill of 1-2 feet compared to the August measurement.

Mean velocity distribution across the river on August 11 was fairly uniform and ranged from 9.1 fps (feet per second) to 11.2 fps. The average velocity ($\bar{V}$) for the entire cross section was 9.5 fps. Maximum mean velocity in the vertical of 11.2 fps was measured at stations 328 and 728.

The concentration of suspended sediment on August 11 at 171,000 cfs was 4,170 mg/l (milligrams per liter). (See table 3.) At the peak discharge, of 200,000 cfs, the suspended-sediment load probably exceeded 2 million tons per day.

Chakachatna River Basin

The Chakachatna River near Tyonek (56), about 100 miles west of Anchorage, had a peak discharge on August 11 estimated as 470,000 cfs. This peak was the result of the lateral erosion of a channel constriction at the outlet of Chakachamna Lake formed by the leading edge of Barrier Glacier (figs. 16 and 17). The terminus of the glacier is covered with small brush and scattered small trees. After the flood, the lake level at the outlet was 14 feet lower than before the flood, for comparable outlet discharges. The lake has a surface area of about 26 square miles. Therefore, storage in the lake decreased by about 120,000 cfs-days, which is equivalent to 4 inches of runoff over the entire basin. The lake is in a remote area, and the flood damage was small except for an excessive amount of channel erosion (fig. 18). There has been no

Figure 16.--Outlet of Chakachamna Lake.

Figure 17.--Outlet channel of Chakachamna Lake (Chakachatna River). Terminus of Barrier Glacier is on the right side.

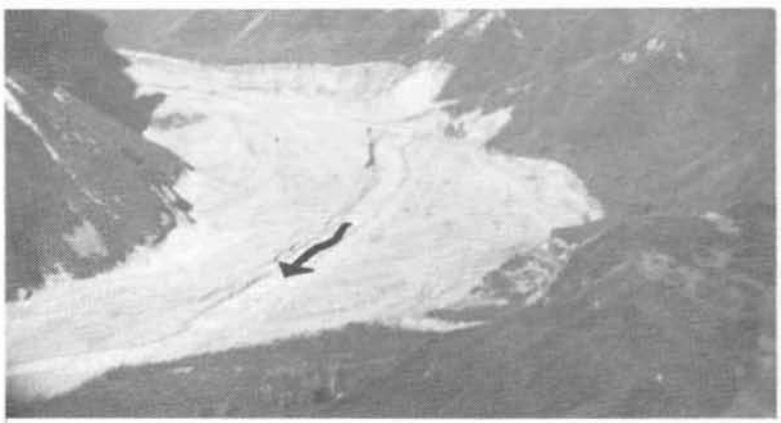


Figure 18.--Eroded channel of Chakachatna River 6 miles downstream from Chakachamna Lake.

dumping of stored water during the 13 years the gage has been operated. However, there are unsubstantiated reports and fragmentary evidence of breakouts prior to the installation of the gage.

Kvichak River Basin

Headwaters of the streams in the Kvichak River basin are in the Chigmit Mountains, about 50 miles southeast of the southwest end of the Alaska Range. These streams flow southwestward and their headwaters are immediately south of the eastward flowing Chakachatna River. The Newhalen River near Iliamna (58), downstream from the outlet of Lake Clark, had a peak discharge on August 16 of 44,200 cfs, the greatest in 20 years of record. During this period, cabins along Lake Clark were flooded. The Kvichak River at Igiugig (59), downstream from the outlet of Iliamna Lake, had an instantaneous peak discharge of 43,000 cfs on August 29. The previous maximum during the 5 years of record is a daily value of 43,000 cfs on September 21, 1967. Streams further west, such as Nuyakuk River (60) in the Nushagak River basin, were not unusually high during August.

Kuskokwim River Basin

Low-lying areas of the Kuskokwim River, whose east bank tributaries drain the west side of the Alaska Range, were inundated. The flood on the Kuskokwim River at McGrath (63) on August 14 was the third highest in 9 years of record. Stony River, a major tributary of the Kuskokwim River, which enters below McGrath, was reportedly high and isolated the village of Lime. The Kuskokwim River at Crooked Creek (64) had a discharge of 233,000 cfs on August 13; the greatest peak discharge in 20 years of record at the gaging station was 392,000 cfs on June 5, 1964.

Tanana River Basin

Peaks occurred on streams in the Tanana River basin, but generally the rises were not unusually high. However, two streams tributary to the Tanana River did flood. Phelan Creek (66) and its tributary, McCallum Creek (67) near Paxson, were high and caused some damage to the Richardson Highway. However, the peak discharges were less than the peaks of August 13, 1967. The peak discharge record for both stations began in 1967. Phelan Creek has its source in Gulkana Glacier and McCallum Creek heads in West Gulkana Glacier. Both of these streams are unique because they drain the south side of the Alaska Range and after combining, turn and enter the northward flowing Delta River.

Damage

The floods of August 1971 caused extensive damage in scattered areas throughout the flood area. The U.S. Army Corps of Engineers has estimated that almost 6 million dollars of physical damage occurred within the Matanuska Valley. A summarized version of their preliminary table of damages is presented:

Table of estimated flood damage in Matanuska Valley

Classification	Amount (dollars)
Highways (Federal Aid System)	2,000,000
Residences and contents	1,422,000
Erosion of land	1,000,000
Business buildings and contents	520,000
Local roads	388,000
Dikes and protective works	177,300
Utilities, wells and cesspools	161,000
Other public property	116,000
Miscellaneous	54,000
TOTAL	5,838,000

Of this amount, almost 2.5 million dollars in damage occurred in the Bodenburg Butte area. An evaluation of the intangible flood damages has not been made. Most of the damage in the flood area was in Matanuska Valley. The total physical flood damage in the flood area probably was 8 to 10 million dollars.

RECURRENCE INTERVAL

The recurrence interval is the average interval, in years, in which a flood of a given magnitude will be exceeded once by the annual maximum flood. A flood having a recurrence interval of 5 years can be expected to occur, on the average, once in 5 years, or it is one that has a 20-percent chance of occurring in any year. Because the occurrence of floods is erratic, the 10-year flood or the 25-year flood may not necessarily occur in any given 10- or 25-year period; floods of greater magnitude may occur several times during the 10- or 25-year period.

Recurrence intervals are based on past data collected at gaging stations. An open-file report, "Flood Frequency in Alaska," by Joseph M. Childers (1970) presents flood-frequency and magnitude relations that can be used to estimate the magnitude of floods of selected recurrence intervals up to 50 years. However, his report includes a statement that the magnitude of a 50-year flood at a gaged site can be estimated with a smaller standard error using a 10-year gaging station record than with the relations in the report. Consequently, flood-frequency and magnitude relations were developed and used in the present report for each individual site that had 5 or more years of peak discharge record. The peak discharge data were analyzed by computer in a log-Pearson Type III frequency analysis. Peak discharge data for 1971 were included in the analysis. The regional relations were used for sites with less than

5 years of peak discharge data. Also the regional relations were used for Montana Creek (52) because the estimated recurrence interval computed by Pearson Type III frequency analysis was about 12 times the length of record.

STREAMFLOW DATA

A summary of data on peak stages and estimated recurrence intervals is given in table 2 for the sites within the flood area. The data are provisional. Recurrence intervals of less than 2 years are not shown. Recurrence intervals of peak discharges exceeding the 50-year flood are not shown, but the ratio of the peak discharge to the 50-year flood is shown. Also, recurrence intervals computed using the regional frequency relations are specifically footnoted.

Suspended-sediment data for samples collected at eight sites within the flood area during the summer of 1971 are listed in table 3. Particle-size data for some samples are available at the Geological Survey, Water Resources Division, District Office in Anchorage.

Following table 3, additional data are presented for selected stations where streamflow information was collected during the summer floods of 1971. In general, the data presented may include: a description of the station, a tabulation of daily mean discharges during June through August 1971, and a tabulation of stages and discharges at indicated times for the highest 1971 peak during the time that most of the floodflow occurred.

Only the station description is presented for sites at which daily streamflow data is not collected. The daily mean discharge for the recording sites with graphical recorders can be computed from the tables of stage and discharge, at selected times, for the days listed. However, for the digital-punch recorders, the daily mean discharge is the average of the 48 discharges determined from each of the gage heights punched during the day.

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
		Copper River basin						
1		Slana River near Mentasta Lake	310		Aug. 11, 1971		a5,440	*15
2	15199000	Copper River tributary near Slana	4.32	1963-71	August 1971	10.68	a20	--
					July 1964	13.75	173	15
3		Chistochina River at Sinona Lodge	610		August 1971		a40,000	*b2.5
4	15200000	Gakona River at Gakona	620	1950-71	Aug. 10, 1971	8.10	10,500	25
					Aug. 1, 1956	7.92	10,300	20
5	15201000	Dry Creek near Glennallen	11.4	1963-71	August 1971	10.84	26	--
					May 1966	12.62	130	4
6	15201100	Little Nelchina River tributary near Eureka Lodge	7.81	1965-71	August 1971	9.76	26	2
					May 1967	11.84	115	15
7	15201900	Moose Creek tributary at Glennallen	7.12	1963-71	September 1971	11.66	8.4	--
					May 1966	15.11	140	10
8	15202000	Tazlina River near Glennallen	2,670	1949-71	Sept. 4, 1971	20.90	c39,700	6
					Aug. 14, 1962	d13.19	c60,700	20
9	15206000	Klutina River at Copper Center	880	1951-66, 1971	August 1971	8.60	6,800	2
					June 29, 1953	9.24	9,040	a50
10	15208000	Tonsina River at Tonsina	420	1950-71	July 16, 1971	4.14	4,750	2
					June 17, 1962	4.91	8,490	25

See footnotes at end of table

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska--Continued.

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
		Copper River basin--Continued						
11	15208100	Squirrel Creek at Tonsina	70.5	1963-71	June 11, 1971	3.07	300	2
					June 1964	d12.64	1,200	20
12	15208200	Rock Creek near Tonsina	14.3	1966-71	July 1971	9.58	34	--
					May 1968	10.22	95	*--
13	15211700	Strelna Creek near Chitina	23.8		July 1971	11.06	208	--
14	15211900	O'Brien Creek near Chitina	44.8	1970-71	July 1971	7.32	1,670	*25
					June 1970	4.02	310	--
15	15212000	Copper River near Chitina	20,600	1950-71	July 15, 1971	29.94	265,000	b1.02
					Aug. 11, 1971	27.5	234,000	25
					July 1951	28.3	220,000	20
16	15212500	Boulder Creek near Tiekel	9.80	1963-71	July 1971	10.58	408	10
					June 1964	12.28	450	20
		Lowe River basin						
17		Lowe River near Valdez	345		July 10, 1971		e12,000	(f)
		Anchorage area						
18	15272530	California Creek near Girdwood	6.96	1967-71	Aug. 8, 1971	17.30	350	3
					Oct. 6, 1969	20.20	600	5

See footnotes at end of table

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska--Continued.

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
					Anchorage area--Continued			
19	15272550	Glacier Creek near Girdwood	62.0	1965-71	Aug. 8, 1971	6.50	4,510	2
					Sept. 18, 1967	7.90	7,710	7
20	15273900	South Fork Campbell Creek at canyon mouth near Anchorage	25.2	1967-71	July 13, 1971	3.41	192	--
					Aug. 8, 1971	3.77	300	5
					Aug. 7, 1970	3.72	279	4
21	15274000	South Fork Campbell Creek near Anchorage	30.4	1947-71	July 13, 1971	2.36	168	--
					Aug. 9, 1971	(g)	275	4
					June 21, 1949	d3.30	891	b1.1
22	15274300	North Fork Campbell Creek near Anchorage	13.4	1967-71	Aug. 9, 1971	12.18	107	10
					Sept. 7, 1967	11.45	81	4
23	15274600	Campbell Creek near Spenard	69.7	1966-71	July 14, 1971	2.85	270	(h)
					Aug. 9, 1971	3.63	421	(h)
					Sept. 6, 1967	2.95	275	(h)
24	15274800	South Branch of South Fork Chester Creek near Anchorage	10.8	1967-71	Aug. 9, 1971	11.29	44	10
					Sept.18, 1967	10.94	34	4
25	15275000	Chester Creek at Anchorage	20.0	1958-71	Aug. 9, 1971	1.90	62	(h)
					Apr. 29, 1963	2.40	95	(h)
26	15275100	Chester Creek at Arctic Boulevard at Anchorage	29.3	1966-71	July 27, 1971	2.95	94	(h)
					Aug. 8, 1971	2.97	95	(h)
					Aug. 10, 1970	2.88	89	(h)

See footnotes at end of table

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska--Continued.

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
		Anchorage area--Continued						
27	15276000	Ship Creek near Anchorage	90.5	1947-71	June 26, 1971	3.96	1,070	4
					Aug. 8, 1971	4.58	1,580	25
					June 21, 1949	d3.44	1,860	50
28	15276500	Ship Creek at Elmendorf Air Force Base	113	1963-71	June 26, 1971	3.88	995	6
					Aug. 9, 1971	4.89	1,610	a25
					Sept. 18, 1967	4.74	875	4
29	15277100	Eagle River at Eagle River	192	1966-71	July 14, 1971	7.83	3,510	2
					Aug. 9, 1971	8.50	4,750	5
					Sept. 18, 1967	9.49	6,240	15
30	15277200	Meadow Creek at Eagle River	7.43	1966-71	Aug. 9, 1971	12.66	184	*3
					Aug. 7, 1970	9.20	16	--
31	15277400	Peters Creek near Chugiak	83.3		Aug. 9, 1971		1,990	*10
32	15281000	Knik River near Palmer	1,180	1949-71	Aug. 10, 1971	12.52	45,800	--
					July 26, 1961	24.3	c355,000	(g)
		Matanuska River basin						
33	15281500	Camp Creek near Sheep Mountain Lodge	1.09	1965-71	Aug. 10, 1971	10.54	a30	*a5
					May 20, 1968	9.70	12	--
34	15282000	Caribou Creek near Sutton	289	1955-71	June 9, 1971	6.59	5,060	3
					Aug. 10, 1971	5.82	3,770	--
					July 16, 1962	6.89	7,670	(g)

See footnotes at end of table

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska--Continued.

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
		Matanuska River basin--Continued						
35	15282300	Pinochle Creek near Sutton	7.99	1966-71	August 1971	8.90	20	(g)
					July 1969	8.80	17	(g)
36	15282400	Puritan Creek near Sutton	8.51	1963-71	Aug. 10, 1971	10.71	41	15
					July 1964	10.60	35	8
37		Kings River near Sutton	151		Aug. 10, 1971		9,800	*b1.8
38		Granite Creek near Sutton	52.5		Aug. 10, 1971		i58,600	*b23.4
39	15283500	Eska Creek near Sutton	13.4	1965-66, 1971	Aug. 10, 1971	(g)	1,680	*b1.9
					1966	10.46	86	--
40		Moose Creek near Sutton	40.7		Aug. 10, 1971		18,000	*b8.9
41	15284000	Matanuska River at Palmer	2,070	1949-71	June 22, 1971	10.99	31,600	5
					Aug. 10, 1971	13.60	82,100	b1.2
					June 8, 1964	11.45	40,100	10
42		Wasilla Creek near Palmer	19.3		Aug. 10, 1971		700	*25
		Susitna River basin						
43	15290000	Little Susitna River near Palmer	61.9	1949-71	Aug. 10, 1971	j10.30	7,820	b1.1
					Aug. 24, 1959	7.39	5,160	20
44	15291000	Susitna River near Denali	950	1958-71	July 15, 1971	12.48	25,000	10
					Aug. 10, 1971	13.32	38,200	30
					Aug. 14, 1967	12.7	28,200	15

See footnotes at end of table

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska--Continued.

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
		Susitna River basin--Continued						
45	15291100	Raft Creek near Denali	4.33	1963-71	June 1971	11.62	130	3
					August 1971	11.69	138	3
					1964	11.72	210	10
46	15291200	McClaren River near Paxson	280	1958-71	July 14, 1971	6.64	6,130	3
					Aug. 11, 1971	8.24	9,260	20
					Sept. 13, 1960	7.14	8,920	15
47	15291500	Susitna River near Cantwell	4,140	1961-71	Aug. 10, 1971	(k)	(k)	(k)
					June 8, 1964	8.35	51,200	(g)
48	15292000	Susitna River at Gold Creek	6,160	1950-71	June 12, 1971	15.39	73,100	8
					Aug. 10, 1971	16.36	87,400	20
					June 7, 1964	16.58	90,700	25
49	15292400	Chulitna River near Talkeetna	2,570	1958-71	June 30, 1971	15.41	47,600	5
					Aug. 11, 1971	10.21	50,800	7
					July 20, 1967	22.48	75,900	a50
50	15292700	Talkeetna River near Talkeetna	2,006	1964-71	June 24, 1971	12.53	40,700	4
					Aug. 10, 1971	16.35	67,400	15
					July 20, 1967	15.75	59,400	10
51	15292780	Susitna River near Sunshine	a1,500		Aug. 10, 1971	62.0	200,000	(g)
52	15292800	Montana Creek near Montana	164	1963-71	Aug. 10, 1971	12.96	6,970	*20
					July 19, 1967	12.23	4,600	*5

See footnotes at end of table

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska--Continued.

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
		Susitna River basin--Continued						
53	15292900	Goose Creek near Montana	14.5	1963-71	Aug. 10, 1971	19.69	3,270	(m)
					June 1964	11.94	530	(g)
54	15293000	Caswell Creek near Caswell	19.6	1963-71	Aug. 10, 1971	11.74	120	3
					Aug. 15, 1965	12.89	207	a25
55	15294300	Skwentna River near Skwentna	2,250	1960-71	June 25, 1971	14.74	50,000	30
					Aug. 11, 1971	11.78	32,000	--
					Aug. 8, 1966	12.55	42,400	10
		Chakachatna River basin						
56	15294500	Chakachatna River near Tyonek	1,120	1959-71	June 28, 1971	31.75	21,000	(g)
					Aug. 11, 1971	(g)	a470,000	(n)
					Aug. 18, 1967	29.30	23,400	(g)
		Kvichak River basin						
57	15297700	Eskimo Creek at King Salmon	16.1	1965-71	June 1971	10.70	168	5
					June 1967	11.2	227	7
58	15300000	Newhalen River near Iliamna	3,478	1952-71	Aug. 16, 1971	10.68	o44,200	50
					Aug. 30, 1959	9.19	o36,000	10
59	15300500	Kvichak River at Igiugig	6,500	1967-71	Aug. 29, 1971	23.17	p43,000	5
					Sept. 21, 1967		pq43,000	5

See footnotes at end of table

Table 2.--Flood stages and discharges, summer 1971 in south-central Alaska--Continued.

No.	Station number	Stream and place of determination	Drainage area (sq. mi.)	Period of Record	Maximum Floods			
					Date	Gage height (ft)	Discharge	
							Cfs	Recurrence interval (years)
		Nushagak River basin						
60	15302000	Nuyakuk River near Dillingham	1,490	1954-71	July 27, 1971	8.19	r21,700	4
					June 20, 1969	10.01	r30,000	30
61	15302900	Moody Creek at Aleknagik	1.28	1969-71	June 7, 1971	19.60	55	(g)
					1969 & 1970	18.20	22	(g)
62	15303010	Silver Salmon Creek near Aleknagik	10.2	1965-71	June 1971	10.30	170	4
					June 12, 1967	11.85	340	15
		Kuskokwim River basin						
63	15303600	Kuskokwim River at McGrath	11,700	1963-71	May 24, 1971	21.42	67,300	5
					Aug. 14, 1971	20.94	64,700	4
					June 6, 1964	(g)	q70,000	a7
64	15304000	Kuskokwim River at Crooked Creek	31,100	1952-71	May 27, 1971	18.76	247,000	5
					Aug. 13, 1971	18.20	233,000	4
					June 5, 1964	25.74	392,000	40
		Tanana River basin						
65	15478010	Rock Creek near Paxson	50.3	1963-71	June 1971	12.16	1,440	8
					June 1964	12.24	1,230	6
66	15478040	Phelan Creek near Paxson	12.2	1967-71	Aug. 9, 1971	11.50	a2,000	6
					Aug. 13, 1967	11.51	2,320	8
67	15478050	McCallum Creek near Paxson	15.5	1967-71	Aug. 10, 1971	13.17	988	6
					Aug. 13, 1967	12.12	1,010	7
68	15478090	Lower Susie Q Creek near Rapids	1.28	1963-71	Aug. 10, 1971	11.34	a4	--
					July 1965	13.38	(g)	(g)

See footnotes on next page

Footnotes for Table 2

* Determined using methods in Childers, J. M., 1970, Flood Frequency in Alaska: U.S. Geol. Survey open-file report.

-- Less than 2 years.

a Estimated.

b Ratio to 50-year flood.

c Caused by release of stored water behind ice dam upstream.

d At site and(or) datum then in use.

e From discharge measurements at mouth by Alaska Highway Department. Peak discharge may have been slightly greater. Peak discharges augmented by release of stored water behind numerous ice dams.

f Not determined because of lack of a comparable discharge record in a maritime and glacial environment and also because the effect of the release of water in the glacier dam lakes is unknown.

g Not determined.

h Not determined because of changes caused by gradual urbanization.

i Augmented by release of stored water from unnamed lake after embankment was breached.

j From needle peak on recorder chart trace.

k Gage destroyed by ice during ice breakup. No summer gage-height record. An attempt will be made later to estimate daily discharges and possibly peak discharge.

m Not determined because of possible inflow from Sheep Creek.

n Not determined because of release of water stored behind constriction by Barrier Glacier at outlet of Chakachamna Lake.

o Affected by natural storage in Lake Clark and several other smaller lakes.

p Affected by natural storage in Iliamna Lake and several other smaller lakes.

q Maximum daily.

r Affected by natural storage in Tikchik Lake and several other smaller lakes.

Table 3.--Suspended-sediment data collected during summer 1971 within the flood area of south-central Alaska.

No.	Station number	Stream and place of determination	Period of record [1]	Date	Time (hour)	Temp (°C)	Discharge (cfs)	Conc (mg/l)	Load (tons/day)
			Anchorage area						
29	15277100	Eagle River at Eagle River	1967-71	June 21	1330	6.5	726	145	284
				July 14	1130	6.0	3,510	1,460	13,800
				Aug. 14	1130	6.0	3,060	495	4,090
							(a)	(a)	(a)
			Susitna River basin						
43	15290000	Little Susitna River near Palmer	1968-71	June 25	1500	8.5	1,560	102	430
				July 26	1100	6.0	367	16	16
49	15292400	Chulitna River near Talkeetna	1967-71	July 3	1050	6.0	25,400	1,410	96,700
50	15292700	Talkeetna River near Talkeetna	1960, 66-71	July 2	1345	7.5	12,900	263	9,160
				Aug. 10	1600	8.5	67,900	3,530	647,000
				Aug. 11	1900	9.5	32,400	2,000	175,000
				Aug. 12	1230	7.5	25,600	2,150	149,000
				Aug. 14	1100	7.0	20,900	1,390	78,400
				Aug. 17	1100	7.0	11,400	466	14,300
51	15292780	Susitna River near Sunshine	1965, 71	July 2	1430	14.0	74,000	1,100	220,000
				Aug. 11	1640	9.0	171,000	4,170	1,920,000
52	15292800	Montana Creek near Montana	1970, 71	July 1	1530	7.0	2,280	205	1,260
				Aug. 9	1630	9.5	3,550	183	1,750
			Kuskokwim River basin						
63	15303600	Kuskokwim River at McGrath	1967, 68, 70, 71	July 9	1435	(b)	26,600	406	29,200
				Aug. 15	1900	13.0	65,200	1,020	180,000
64	15304000	Kuskokwim River at Crooked Creek	1966-71	July 8	2130	13.5	70,200	252	47,800
				Aug. 16	1545	12.5	160,000	880	380,000

[1] See Water Resources Data for Alaska, Part II for data obtained during prior water years.
a Daily values will be published for June 1 to July 30 in 1971 Water Resources Data for Alaska.
b Not determined.

SELECTED STATION DATA

(1) Slana River near Mentasta Lake

(Miscellaneous site)

Location.--Lat 62°51'30", long 143°41'35", in NE¼NE¼ sec.3, T.12 N., R.9 E., at bridge on Glenn Highway, 6 miles southeast of Mentasta Lake.

Drainage area.--310 sq mi, approximately.

Discharge record.--Discharge obtained by current-meter measurement, State of Alaska, Department of Highways personnel on Aug. 11, 1971.

Maximum.--Summer 1971: Discharge, 5,440 cfs Aug. 11.

Remarks.--Discharge includes 1,650 cfs in bypass bridge to the east.

(3) Chistochina River at Sinona Lodge

(Miscellaneous site)

Location.--Lat 62°36'10", long 144°38'15", in S½ sec.34, T.10 N., R.4 E., at bridge on Glenn Highway, 1 mile northeast of Sinona Lodge.

Drainage area.--610 sq mi, approximately.

Discharge record.--Field estimate of peak using velocity-area computation.

Maximum.--Summer 1971: Discharge, 40,000 cfs August.

(4) 15200000 Gakona River at Gakona

(Gaging station, discontinued 1970)

Location.--Lat 62°18'06", long 145°18'20", downstream side of bridge on Glenn Highway at Gakona.

Drainage area.--620 sq mi, approximately.

Gage-height record.--Floodmark. Datum of gage is 1,403.03 ft above mean sea level. Gage height obtained once daily by observer for National Weather Service.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 6,000 cfs and extended to peak stage.

Maxima.--Summer 1971: Discharge, 10,500 cfs evening Aug. 10 (gage height, 8.10 ft, from floodmarks).
1950 to summer 1971: Discharge, 10,300 cfs Aug. 1, 1956 (gage height, 7.92 ft, from graph based on gage readings).

(14) 15211900 O'Brien Creek near Chitina

(Crest-stage station)

Location.--Lat 61°27'59", long 144°27'23", on right bank 100 ft upstream from timber bridge on trail to Copper River gaging site, and 2.5 miles south of Chitina.

Drainage area.--44.8 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage discharge relation defined by current-meter measurements below 231 cfs and by indirect measurement at 1,670 cfs.

Maxima.--Summer 1971: Discharge, 1,670 cfs July (gage height, 7.32 ft, from floodmark).
1970 to summer 1971: Discharge, 310 cfs June 1970 (gage height, 4.02 ft).

(15) 15212000 Copper River near Chitina

Location.--Lat 61°27'56", long 144°27'21", on right bank at head of Woods Canyon, 0.5 mile downstream from Taral Creek and abandoned Indian village of Taral, 2.2 miles upstream from Tenas Creek, and 3.5 miles south of Chitina.

Drainage area.--20,600 sq mi, approximately.

Gage-height record.--Water-stage recorder graph except June 1 to 0930 hours June 3 and 1530 hours July 15 to Aug. 31. Altitude of gage is 400 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 130,000 cfs and extended to peak stage. Discharge June 1-3 and July 16 to Aug. 31 estimated on basis of staff gage readings (time unknown) by Alaska Department of Fish and Game and records for stations on nearby streams.

Maxima.--Summer 1971: Discharge, 265,000 cfs 1100 hours July 15 (gage height, 29.94 ft), 234,000 cfs Aug. 11 (gage height, 27.5 ft, observed).
1950 to summer 1971: Discharge, 220,000 cfs July 1951 (gage height, 28.3 ft from floodmarks).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	29,200	102,000	184,000	11-	71,400	137,000	226,000	21-	84,600	152,000	100,000
2--	29,000	94,000	190,000	12-	69,800	147,000	217,000	22-	89,100	148,000	95,000
3--	29,200	82,800	183,000	13-	67,400	158,000	204,000	23-	92,000	136,000	91,000
4--	27,600	77,800	163,000	14-	63,400	220,000	198,000	24-	113,000	122,000	88,200
5--	29,200	82,000	149,000	15-	65,000	260,000	174,000	25-	140,000	118,000	85,000
6--	36,700	92,000	140,000	16-	66,600	238,000	145,000	26-	120,000	133,000	85,000
7--	48,100	100,000	130,000	17-	69,800	208,000	131,000	27-	135,000	155,000	85,000
8--	56,800	104,000	125,000	18-	70,600	168,000	121,000	28-	132,000	167,000	85,000
9--	62,600	109,000	150,000	19-	71,400	147,000	113,000	29-	126,000	176,000	80,000
10-	69,800	121,000	191,000	20-	77,000	149,000	108,000	30-	116,000	170,000	80,000
								31-	-------	184,000	85,000
Monthly mean discharge, in cubic feet per second----------									75,280	143,800	135,500
Runoff, in inches----------									4.08	8.05	7.58

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Copper River near Chitina--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
July 9	0000	15.30	103,000	July 12	0600	19.35	144,000	July 14	1200	25.65	212,000
	1200	16.05	110,000		1200	19.95	150,000		1800	27.90	239,000
	2400	16.45	114,000		2400	19.90	149,000		2400	28.95	252,000
10	1200	17.20	122,000	13	0600	20.05	150,000	15	0600	29.70	262,000
	2400	17.70	127,000		1800	21.55	166,000		1100	29.94	265,000
					2400	21.75	168,000		1800	29.70	262,000
11	1200	18.95	140,000						2400	29.10	254,000
	2400	19.20	142,000	14	0600	22.90	181,000				

(16) 15212500 Boulder Creek near Tiekel

(Crest-stage station)

Location.--Lat 61°20'08", long 145°18'26", on right upstream wingwall at mile 51.4 Richardson Highway, and 0.7 mile north of Tiekel.

Drainage area.--9.80 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurement below 139 cfs and by indirect measurement at 408 cfs.

Maxima.--Summer 1971: Discharge, 408 cfs July (gage height, 10.58 ft).
1963 to summer 1971: Discharge, 450 cfs June 1964 (gage height, 12.28 ft).

(17) Lowe River near Valdez

(Miscellaneous site)

Location.--Lat 61°05'07", long 146°12'50", at bridges on Dayville Road, 5.6 miles southeast of Valdez and 1 mile above mouth at Port Valdez.

Drainage area.--345 sq mi.

Discharge record.--Discharge obtained by current-meter measurement by State of Alaska, Department of Highways personnel on July 10, 1971.

Maximum.--Summer 1971: Discharge, 12,000 cfs July 10.

Remarks.--Peak discharge possibly greater. Peak discharges augmented by release of stored water behind numerous ice dams.

(20) 15273900 South Fork Campbell Creek at canyon mouth near Anchorage

Location.--Lat 61°08'52", long 149°43'12", in NE¼ sec.12, T.12 N., R.3 W., on right bank, 1.9 miles upstream from ford on Campbell Airstrip road crossing, and 7.5 miles southeast of Anchorage.

Drainage area.--25.2 sq mi.

Gage-height record.--Digital recorder tape punched at half-hour intervals. Altitude of gage is 520 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 235 cfs and extended to peak stage.

Maxima.--Summer 1971: Discharge, 192 cfs 1830 hours July 13 (gage height, 3.41 ft), 300 cfs 2400 hours Aug. 8 (gage height, 3.77 ft).
1967 to summer 1971: Discharge, 279 cfs Aug. 7, 1970 (gage height, 3.72 ft), gage height, 5.90 ft 1970 water year (backwater from ice).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	22	92	113	11-	125	113	166	21-	100	80	80
2--	20	77	122	12-	89	123	145	22-	93	62	74
3--	23	73	101	13-	79	173	143	23-	101	58	70
4--	31	70	87	14-	91	153	142	24-	139	64	67
5--	40	84	83	15-	131	116	122	25-	144	86	71
6--	58	93	141	16-	105	98	109	26-	151	89	63
7--	93	101	142	17-	73	95	102	27-	153	119	59
8--	110	99	199	18-	60	90	96	28-	124	140	58
9--	129	101	249	19-	61	89	92	29-	108	108	56
10-	144	111	188	20-	73	93	85	30-	119	93	58
								31-	---	116	61
Monthly mean discharge, in cubic feet per second----------									93.0	98.7	108
Runoff, in inches----------									4.13	4.53	4.95

(21) 15274000 South Fork Campbell Creek near Anchorage

Location.--Lat 61°09'57", long 149°46'15", in NE¼ sec.3, T.12 N., R.3 W., on right bank, 0.2 mile downstream from ford on road leading to Campbell Airstrip, 2.0 miles upstream from confluence with North Fork Campbell Creek, and 5.5 miles southeast of Anchorage Post Office.

Drainage area.--30.4 sq mi.

Gage-height record.--Digital recorder tape punched at half-hour intervals except June 1 to 1130 hours June 9 and 2200 hours Aug. 8 to 1130 hours Aug. 9. Altitude of gage is 260 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 220 cfs. Discharge June 1-9 and Aug. 9 estimated from record for upstream station at canyon mouth.

Maxima.--Summer 1971: Discharge, 168 cfs 1900 hours July 13 (gage height, 2.36 ft), 275 cfs Aug. 9 (gage height and time unknown) from hydrographic comparison with upstream station.

1947 to summer 1971: Discharge, 891 cfs June 21, 1949 (gage height, 3.30 ft, datum then in use).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	22	91	88	11-	111	109	137	21-	95	71	62
2--	20	78	97	12-	91	111	109	22-	91	58	58
3--	21	73	86	13-	82	160	106	23-	95	54	57
4--	26	71	73	14-	91	137	104	24-	118	57	56
5--	38	84	69	15-	116	99	91	25-	123	74	57
6--	55	91	113	16-	99	87	80	26-	129	76	54
7--	80	97	116	17-	78	83	76	27-	131	99	50
8--	100	97	160	18-	67	78	71	28-	113	116	48
9--	110	97	220	19-	69	78	69	29-	101	91	46
10-	121	104	157	20-	76	80	65	30-	109	76	48
								31-	---	95	51
Monthly mean discharge, in cubic feet per second----------									85.9	89.4	86.3
Runoff, in inches----------									3.15	3.39	3.27

(22) 15274300 North Fork Campbell Creek near Anchorage

(Crest-stage station)

Location.--Lat 61°10'14", long 149°45'40", in SW¼ sec.35, T.13 N., R.3 W., at old Campbell Airstrip road crossing, 2.5 miles upstream from confluence with South Fork Campbell Creek, and 5.5 miles southeast of Anchorage post office.

Drainage area.--13.4 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements.

Maxima.--Summer 1971: Discharge, 107 cfs Aug. 9 (gage height, 12.18 ft).
1967 to summer 1971: Discharge, 81 cfs Sept. 7, 1967 (gage height, 11.45 ft).

(23) 15274600 Campbell Creek near Spenard

Location.--Lat 61°08'17", long 149°55'20", on line between sec.11 and 14, T.12 N., R.4 W., on upstream right bank wingwall of bridge at Dimond Boulevard crossing, 2.0 miles upstream from mouth, and 4.3 miles south of Spenard.

Drainage area.--69.7 sq mi.

Gage-height record.--Digital recorder tape punched at half-hour intervals. Datum of gage is 18.04 ft above mean sea level (from levels to USC&GS BM, adjusted 1966).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 350 cfs and extended above.

Maxima.--Summer 1971: Discharge, 270 cfs 0500 hours July 14 (gage height, 2.85 ft), 275 cfs 0430 hours July 28 (gage height, 2.77 ft), 421 cfs 1500 hours Aug. 9 (gage height, 3.63 ft).
June 1966 to summer 1971: Discharge, 275 cfs Sept. 6, 1967 (gage height, 2.95 ft), gage height, 4.90 ft Mar. 3, 1970 (backwater from ice).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	33	135	194	11-	161	154	287	21-	136	138	150
2--	31	117	200	12-	131	158	241	22-	137	116	142
3--	28	108	183	13-	113	215	225	23-	137	104	132
4--	43	99	161	14-	120	244	241	24-	172	105	129
5--	50	110	148	15-	159	175	207	25-	184	128	132
6--	74	123	207	16-	163	155	186	26-	194	142	128
7--	101	134	246	17-	129	146	176	27-	211	166	122
8--	126	135	270	18-	105	137	173	28-	173	256	116
9--	130	136	406	19-	104	137	165	29-	146	208	113
10-	169	146	347	20-	105	144	159	30-	151	173	112
								31-	---	189	118
Monthly mean discharge, in cubic feet per second----------									124	149	188
Runoff, in inches----------									1.98	2.47	3.10

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Campbell Creek near Spenard--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 6	0000	1.93	152	Aug. 8	2400	3.32	366	Aug. 10	2400	2.99	310
	0600	2.04	168								
	1200	2.31	205	9	0600	3.55	407	11	1200	2.85	288
	1800	2.58	245		1000	3.61	418		2400	2.69	262
	2400	2.68	261		1400	3.61	418				
					1500	3.63	421	12	1200	2.56	242
7	0500	2.68	261		1600	3.63	421		2400	2.44	224
	1200	2.60	248		2000	3.57	411				
	2400	2.43	222		2400	3.49	396	13	1200	2.40	218
									2400	2.58	245
8	0400	2.40	218	10	0600	3.33	367				
	1200	2.67	259		1200	3.19	342	14	0430	2.64	254
	1800	3.00	312		1800	3.08	325		2400	2.43	222

(24) 15274800 South Branch of South Fork Chester Creek near Anchorage

(Crest-stage station)

Location.--Lat 61°12'37", long 149°43'57", on line between sec.13 and 14 , T.13 N., R.3 W., at Muldoon road crossing, 5.4 miles east of Anchorage.

Drainage area.--10.8 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 31.5 cfs and extended to peak stage.

Maxima.--Summer 1971: Discharge, 44 cfs Aug. 9 (gage height, 11.29 ft).
1967 to summer 1971: Discharge, 34 cfs September 1967 (gage height, 10.94 ft).

(25) 15275000 Chester Creek at Anchorage

Location.--Lat 61°11'59", long 149°50'07", in SW¼ sec.21, T.13 N., R.3 W., on right bank 10 ft upstream from culverts on Lake Otis Road, 2.3 miles southeast of Anchorage Post Office, and 3.2 miles upstream from mouth.

Drainage area.--20.0 sq mi.

Gage-height record.--Water-stage recorder graph except June 1-7. Datum of gage is 88.8 ft above mean sea level.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 55 cfs and extended above. Discharge for June 1-7 estimated on basis of records for station at Arctic Boulevard.

Maxima.--Summer 1971: Discharge, 62 cfs 1600 hours Aug. 9 (gage height, 1.90 ft). July 1958 to summer 1971: Discharge, 95 cfs Apr. 29, 1963 (gage height, 2.40 ft, from graph based on once-daily gage readings), maximum gage height observed, 3.8 ft Nov. 29, 1961 (backwater from ice).

Remarks.--Peak discharge for 1971 may be affected by pumping from gravel pits into the stream. Additional lesser 1971 peaks are not listed because of pumping.

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	11	21	29	11-	12	10	41	21-	13	12	25
2--	10	16	30	12-	13	14	35	22-	12	16	29
3--	10	11	24	13-	14	12	33	23-	12	11	28
4--	10	11	25	14-	13	16	33	24-	12	13	23
5--	11	18	21	15-	14	14	31	25-	12	20	22
6--	12	16	29	16-	14	14	35	26-	13	19	22
7--	13	16	25	17-	13	9.7	32	27-	12	23	29
8--	12	12	41	18-	13	10	32	28-	18	28	22
9--	11	10	53	19-	13	10	30	29-	43	31	21
10-	12	8.9	45	20-	13	18	26	30-	28	24	28
								31-	---	21	23
Monthly mean discharge, in cubic feet per second----------									14.0	15.7	29.7
Runoff, in inches----------									0.78	0.90	1.71

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Chester Creek at Anchorage--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 6	0000	1.08	19	Aug. 9	0600	1.65	47	Aug. 12	0400	1.47	32
	0400	1.11	20		1000	1.66	48		1400	1.45	31
	1000	1.40	34		1600	1.89	62		1800	1.72	45
	1400	1.30	29		1800	1.90	62		2400	1.50	33
	1800	1.52	40		2400	1.68	49				
	2400	1.27	27					13	0200	1.47	28
				10	0600	1.57	43		1000	1.43	26
7	1200	1.23	25		1200	1.52	40		1700	1.77	44
	2400	1.18	23		1700	1.73	52		2400	1.60	35
					2400	1.62	42				
8	0600	1.27	27					14	0600	1.53	31
	1200	1.57	43	11	1100	1.54	34		1900	1.61	35
	1900	1.78	55		1600	1.85	51		2400	1.58	34
	2400	1.77	54		2400	1.57	35				
								15	1200	1.53	31
									2400	1.47	28

(26) 15275100 Chester Creek at Arctic Blvd. at Anchorage

Location.--Lat 61°12'19", long 149°53'43", on line between sec.19, R.3 W., and sec.23, T.13 N., R.4 W., on upstream right bank wingwall of bridge on Arctic Boulevard.

Drainage area.--29.3 sq mi.

Gage-height record.--Water-stage recorder graph except 0600 hours July 29 to 0400 hours Aug. 2 and 2000 hours Aug. 16 to 2400 hours Aug. 31. Datum of gage is 16.02 ft above mean sea level.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 50 cfs and by culvert computation at 80 cfs. Discharge for July 29 to Aug. 2 and Aug. 16 to Sept. 1 estimated on basis of records for station "at Anchorage."

Maxima.--Summer 1971: Discharge, 94 cfs 1500 hours July 27 (gage height, 2.95 ft), 95 cfs 1700 hours Aug. 8 (gage height, 2.97 ft).
June 1966 to summer 1971: Discharge, 89 cfs Aug. 10, 1970 (gage height, 2.88 ft).

Remarks.--Peak discharges may be affected by pumping from gravel pits into the stream.

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	14	24	33	11-	16	11	39	21-	18	14	29
2--	13	18	35	12-	17	15	34	22-	18	16	31
3--	13	13	26	13-	17	20	37	23-	16	14	30
4--	13	12	27	14-	18	18	35	24-	16	22	27
5--	14	17	24	15-	21	16	32	25-	16	27	25
6--	15	16	36	16-	19	16	36	26-	17	26	25
7--	16	16	31	17-	18	13	34	27-	17	42	31
8--	15	12	52	18-	19	13	34	28-	21	43	25
9--	14	11	60	19-	18	15	33	29-	43	41	24
10-	14	9.8	47	20-	18	23	30	30-	33	30	31
								31-	---	27	27
Monthly mean discharge, in cubic feet per second----------									17.9	19.7	32.9
Runoff, in inches----------									0.68	0.78	1.29

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Chester Creek at Arctic Blvd. at Anchorage--Continued.

Date	Hour	Gage height	Dis-charge	Date	Hour	Gage height	Dis-charge	Date	Hour	Gage height	Dis-charge
Aug. 7	0000	2.10	35	Aug. 8	1700	2.97	95	Aug. 10	2100	2.37	52
	0500	1.97	28		1800	2.67	74		2400	2.31	47
	0600	2.20	40		1930	2.79	82				
	0800	2.05	32		2130	2.55	65	11	0600	2.13	36
	2400	1.96	28		2400	2.54	64		1200	2.08	34
									1500	2.08	34
8	0600	1.99	29	9	0500	2.51	62		2000	2.28	46
	0700	2.10	35		1200	2.37	52		2400	2.20	40
	0800	2.09	34		1900	2.56	65				
	0900	2.33	49		2400	2.55	65	12	0500	2.05	32
	1100	2.35	50						1700	2.01	30
	1300	2.52	63	10	0600	2.29	46		2200	2.22	41
	1500	2.42	55		1200	2.21	41		2400	2.16	38
	1600	2.51	62		1500	2.20	40				

(27) 15276000 Ship Creek near Anchorage

Location.--Lat 61°13'25", long 149°37'55", in NE¼ sec.16, T.13 N., R.2 W., in Fort Richardson Military Reservation, at diversion dam and Fort Richardson water-supply intake building, 3.5 miles upstream from North Fork, and 8.5 miles east of Anchorage.

Drainage area.--90.5 sq mi.

Gage-height record.--Digital recorder tape punched at half-hour intervals except June 1-3 and 0400 to 1400 hours July 13. Partial record June 5-20. Daily readings on float tape by observer also obtained. Datum of gage is 530 ft above mean sea level (levels by Corps of Engineers).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 900 cfs and extended to peak stage. Discharge for June 1-3, 5-20, and July 1 estimated using once-daily gage readings, partial gage record, and discharge records for station at Elmendorf Air Force Base.

Maxima.--Summer 1971: Discharge, 1,070 cfs 2200 hours June 26 (gage height, 3.96 ft), 1,580 cfs 2030 hours Aug. 8 (gage height, 4.58 ft).
1947 to summer 1971: Discharge, 1,860 cfs June 21, 1949 (gage height, 3.44 ft, site and datum then in use).

Remarks.--Discharge data represent net flow remaining after diversion for water supply to Fort Richardson, Elmendorf Air Force Base, and City of Anchorage. Average diversion during June, July and August 1971 was 18.7 cfs.

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	60	418	391	11-	380	589	1,020	21-	418	331	346
2--	52	366	420	12-	338	559	801	22-	302	284	323
3--	50	340	380	13-	338	690	768	23-	473	255	296
4--	58	353	349	14-	420	687	798	24-	714	265	286
5--	105	414	342	15-	476	529	652	25-	845	305	283
6--	136	460	429	16-	439	429	555	26-	884	317	261
7--	198	494	446	17-	356	385	484	27-	856	389	245
8--	244	505	1,000	18-	312	363	438	28-	698	416	233
9--	380	536	1,420	19-	299	339	408	29-	562	367	224
10-	410	574	1,250	20-	344	358	374	30-	510	348	218
								31-	---	387	222
Monthly mean discharge, in cubic feet per second----------									389	421	505
Runoff, in inches----------									4.79	5.36	6.44

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Ship Creek near Anchorage--Continued.

Date	Hour	Gage height	Dis-charge	Date	Hour	Gage height	Dis-charge	Date	Hour	Gage height	Dis-charge
Aug. 6	0000	2.02	356	Aug. 8	1400	3.73	1,090	Aug. 11	0030	3.86	1,160
	0500	2.13	389		1600	4.19	1,340		0300	3.76	1,110
	0800	2.35	463		2030	4.58	1,580		1530	3.51	980
	0930	2.35	463		2400	4.45	1,500		2400	3.36	905
	1030	2.40	480								
	1500	2.30	445	9	0300	4.42	1,480	12	0900	3.21	830
	2400	2.30	445		0730	4.53	1,550		1200	3.16	807
					1500	4.28	1,400		2030	2.99	731
7	0630	2.31	449		1630	4.24	1,370		2400	2.94	708
	1330	2.33	456		2400	4.07	1,280				
	1600	2.29	442					13	0930	2.89	686
	2200	2.31	449	10	0200	4.01	1,250		1300	2.99	731
	2400	2.41	484		0330	4.02	1,250		1900	3.27	860
					0530	4.19	1,340		2230	3.44	945
8	0530	2.65	580		0730	4.22	1,360		2400	3.41	930
	0800	2.88	681		1100	4.07	1,280				
	1130	3.32	885		2400	3.82	1,140				

(28) 15276500 Ship Creek at Elmendorf Air Force Base

Location.--Lat 61°14'20", long 149°47'24", in NE¼ sec.10, T.13 N., R.3 W., near right bank on downstream side of bridge at Elmendorf Air Force Base, 3.7 miles northeast of Anchorage Post Office, and 4.9 miles above mouth.

Drainage area.--113 sq mi.

Gage-height record.--Digital recorder tape punched at half hour intervals. Datum of gage is 142.82 ft above mean sea level.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,300 cfs. Discharge during period of indefinite stage-discharge relationship, July 1 to Aug. 4 estimated on basis of concurrent discharge records from two stations on the same stream.

Maxima.--Summer 1971: Discharge, 995 cfs 2330 hours June 26 (gage height, 3.88 ft), 1610 cfs 0030 hours Aug. 9 (gage height, 4.89 ft).
1963 to summer 1971: Discharge, 875 cfs Sept. 18, 1967 (gage height, 4.74 ft).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	35	400	380	11-	384	550	866	21-	390	330	325
2--	32	380	400	12-	343	500	683	22-	373	300	307
3--	31	360	360	13-	352	630	618	23-	430	280	292
4--	47	360	330	14-	418	630	637	24-	553	280	280
5--	66	400	322	15-	450	510	534	25-	782	300	277
6--	97	420	404	16-	418	430	473	26-	827	320	254
7--	137	440	473	17-	363	380	429	27-	717	350	242
8--	201	450	732	18-	328	360	398	28-	607	420	231
9--	268	460	1,300	19-	313	330	366	29-	501	370	221
10-	387	500	1,020	20-	334	340	343	30-	446	350	218
								31-	---	370	221
Monthly mean discharge, in cubic feet per second----------									354	403	450
Runoff, in inches----------									3.50	4.11	4.59

(29) 15277100 Eagle River at Eagle River

Location.--Lat 61°18'28", long 149°33'32", in NW¼ sec.13, T.14 N., R.2 W., on right bank, 800 ft upstream from Eagle River campground, 0.6 mile upstream from Glenn Highway crossing, and 1.0 mile south of Eagle River.

Drainage area.--192 sq mi, approximately.

Gage-height record.--Water-stage recorder graph except July 22 to Aug. 13. Gage height for the August peak was obtained from recorded range in stage. Altitude of gage is 250 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,100 cfs and extended above. Discharge for July 22 to Aug. 13 estimated on basis of recorded range in stage, hydrographic comparison with records from Ship Creek near Anchorage, and weather records.

Maxima.--Summer 1971: Discharge, 3,510 cfs 0900 hours July 14 (gage height, 7.83 ft), 4,750 cfs about Aug. 9 (gage height, 8.50 ft).
1966 to summer 1971: Discharge, 6,240 cfs Sept. 18, 1967 (gage height, 9.49 ft).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	143	1,150	1,800	11-	680	2,180	3,500	21-	674	2,030	1,590
2--	139	1,010	1,900	12-	638	2,410	2,800	22-	686	1,700	1,650
3--	129	922	1,700	13-	674	2,950	2,800	23-	728	1,500	1,580
4--	143	901	1,400	14-	740	3,430	2,940	24-	971	1,150	1,450
5--	169	1,030	1,200	15-	838	2,940	2,560	25-	1,400	1,300	1,390
6--	243	1,210	1,500	16-	734	2,450	2,200	26-	1,640	1,500	1,350
7--	312	1,390	2,000	17-	626	2,090	1,990	27-	1,820	1,800	1,240
8--	382	1,500	3,000	18-	535	1,950	2,050	28-	1,670	2,100	1,070
9--	462	1,650	4,500	19-	520	1,780	1,870	29-	1,470	1,800	1,030
10-	656	1,920	4,000	20-	545	2,090	1,670	30-	1,370	1,500	1,110
								31-	-----	1,600	1,210
Monthly mean discharge, in cubic feet per second----------									725	1,800	2,000
Runoff, in inches----------									4.21	10.83	12.02

(30) 15277200 Meadow Creek at Eagle River

(Crest-stage station)

Location.--Lat 61°19'14", long 149°32'11", in NW¼ sec.7, T.14 N., R.1 W., on left bank of Eagle Loop road, and 1 mile east of Eagle River.

Drainage area.--7.43 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 124 cfs and by indirect measurement at 184 cfs.

Maxima.--Summer 1971: Discharge, 184 cfs Aug. 9 (gage height, 12.66 ft).
1966 to summer 1971: Discharge, 16 cfs Aug. 7, 1970 (gage height, 9.20 ft).

(31) 15277400 Peters Creek near Chugiak

(Miscellaneous site)

Location.--Lat 61°24'18", long 149°27'25", in SE¼ sec.9, T.15 N., R.1 W., at bridge on Glenn Highway, 1.3 miles northeast of Chugiak and 2.3 miles above mouth at Knik Arm.

Drainage area.--83.3 sq mi.

Discharge.--Discharge obtained by current-meter measurement by State of Alaska, Department of Highways personnel on Aug. 9, 1971.

Maximum.--Summer 1971: Discharge, 1,990 cfs Aug. 9.

(36) 15282400 Puritan Creek near Sutton

(Crest-stage station)

Location.--Lat 61°48'42", long 148°08'01", in NW¼ sec.23, T.20 N., R.7 E., on left bank at mile 89.3 Glenn Highway, and 25.2 miles northeast of Sutton.

Drainage area.--8.51 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 21.8 cfs and extended to peak stage.

Maxima.--Summer 1971: Discharge, 41 cfs Aug. 10 (gage height, 10.71 ft).
1963 to summer 1971: Discharge, 35 cfs July 1964 (gage height, 10.60 ft).

(37) Kings River near Sutton

(Miscellaneous site)

Location.--Lat 61°43'58", long 148°44'52", in SW¼ sec.16, T.19 N , R.4 E., at bridge at mile post 67 on Glenn Highway, and 5 miles east of Sutton.

Drainage area.--151 sq mi.

Discharge record.--Peak discharge determined by indirect measurement.

Maximum.--Summer 1971: Discharge, 9,800 cfs Aug. 10.

(38) Granite Creek near Sutton

(Miscellaneous site)

Location.--Lat 61°46'46", long 148°50'12", center sec.36 (projected), T.20 N., R.3 E., 5 miles above mouth at Matanuska River, and 5 miles north of Sutton.

Drainage area.--52.5 sq mi.

Discharge record.--Peak discharge determined by indirect measurement.

Maximum.--Summer 1971: Discharge, 58,600 cfs Aug. 10.

Remarks.--Peak discharge augmented by release of stored water from unnamed lake on tributary after embankment was breached.

(39) 15283500 Eska Creek near Sutton

(Crest-stage station, discontinued 1966)

Location.--Lat 61°43'44", long 148°54'31", on right bank in NE¼ sec.21, T.19 N., R.3 E., on Eska-Jonesville road, and 1.5 miles northeast of Sutton.

Drainage area.--13.4 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Peak discharge determined by indirect measurement.

Maximum.--Summer 1971: Discharge, 1,680 cfs Aug. 10.
1965 to September 1966: Discharge, 86 cfs (gage height, 10.46 ft).

(40) Moose Creek near Sutton

(Miscellaneous site)

Location.--Lat 61°43'32", long 149°03'00", in NW¼ sec.23, T.19 N., R.2 E., 0.3 mile above Buffalo Mine, 5 miles west of Sutton, 5.5 miles above mouth at Matanuska River and 9 miles northeast of Palmer.

Drainage area.--40.7 sq mi.

Discharge record.--Peak discharge determined by indirect measurement.

Maximum.--Summer 1971: Discharge, 18,000 cfs Aug. 10.

(41) 15284000 Matanuska River at Palmer

Location.--Lat 61°36'34", long 149°04'16", in N½ sec. 34, T.18 N., R.2 E., on left bank 100 ft downstream from bridge on old Glenn Highway, and 1 mile east of Palmer.

Drainage area.--2,070 sq mi, approximately.

Gage-height record.--Digital recorder tape punched at half-hour intervals except 1600 hours July 15 to 1330 hours July 26. Datum of gage is 170.92 ft above mean sea level (Alaska Road Commission bench mark).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 34,000 cfs and extended above on the basis of velocity-area analysis at peak stage. Discharge July 15-26 estimated on basis of records for stations on nearby streams.

Maxima.--Summer 1971: Discharge, 31,600 cfs 1700 hours June 22 (gage height, 10.99 ft) 82,100 cfs 0915 hours Aug. 10 (gage height, 13.60 ft, from high-water mark in well).

April 1949 to summer 1971: Discharge, 40,100 cfs June 8, 1964 (gage height, 11.45 ft), maximum gage height observed, 12.03 ft July 11, 1949.

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	1,370	11,500	12,500	11-	12,500	12,100	32,000	21-	13,300	9,500	11,500
2--	1,370	12,200	13,400	12-	13,500	11,000	27,400	22-	21,000	9,500	11,100
3--	1,500	12,800	13,000	13-	10,900	10,800	23,800	23-	21,400	9,000	10,500
4--	1,790	13,800	11,900	14-	11,200	10,200	21,300	24-	22,800	9,000	11,200
5--	3,330	18,700	11,100	15-	10,100	12,000	16,700	25-	20,200	9,000	13,700
6--	6,720	21,700	11,800	16-	9,200	13,000	13,900	26-	19,300	9,280	13,600
7--	10,100	18,400	13,400	17-	8,010	11,000	12,700	27-	14,900	10,100	11,800
8--	8,370	16,600	21,800	18-	7,150	10,000	11,700	28-	10,100	10,200	10,400
9--	6,750	12,600	34,900	19-	8,080	10,000	11,100	29-	9,190	9,900	9,700
10-	12,600	13,100	40,700	20-	14,700	9,500	11,200	30-	10,400	10,500	9,070
								31-	------	11,600	8,740
Monthly mean discharge, in cubic feet per second----------									10,730	11,890	15,730
Runoff, in inches----------									5.78	6.62	8.76

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Matanuska River at Palmer--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 7	0000	9.66	13,000	Aug. 9	1600	10.89	28,900	Aug. 10	1500	11.44	39,900
	0600	9.66	13,000		1800	11.08	31,400		1600	11.42	39,600
	1200	9.55	12,300		2000	11.19	33,000		1700	11.31	37,800
	1800	9.77	13,900		2200	11.17	32,800		1800	11.08	34,400
	2000	9.82	14,300		2400	11.39	36,000		2000	11.13	35,200
	2200	10.01	15,800						2200	10.90	31,700
	2400	10.05	16,100	10	0100	11.44	39,900		2400	10.59	27,700
					0200	11.41	39,400				
8	0200	9.96	16,600		0300	11.56	42,100	11	0200	10.57	33,500
	0400	10.04	17,400		0400	11.59	42,600		0400	10.48	32,200
	0600	10.03	17,300		0500	11.68	44,200		0600	10.53	32,900
	0800	10.01	17,100		0530	11.83	46,900		0800	10.64	34,600
	1000	10.07	17,700		0600	11.86	47,500		1000	10.48	32,200
	1200	10.14	18,400		0630	11.83	46,900		1200	10.55	33,200
	1400	10.33	20,300		0700	11.78	46,000		1800	10.38	30,600
	1600	10.51	22,100		0730	11.48	40,600		2400	10.50	32,400
	1800	10.85	26,000		0800	11.58	42,400				
	2000	11.13	29,400		0830	12.35	56,300	12	0600	10.38	30,600
	2200	11.44	33,800		0900	13.33	76,400		1200	9.97	25,600
	2400	11.63	36,600		0915	13.60	82,100		1800	9.94	25,300
					0930	13.21	73,900		2400	9.86	24,300
9	0200	11.76	42,100		1000	12.29	55,200				
	0400	11.72	41,400		1030	11.91	48,400	13	0600	9.85	24,400
	0600	11.52	38,000		1100	11.53	41,500		1200	9.74	23,100
	0800	11.42	36,500		1130	11.36	38,600		1800	9.74	23,100
	1000	11.36	35,600		1200	11.55	41,900		2400	9.97	25,900
	1200	11.29	34,600		1300	11.42	39,600				
	1400	11.06	31,100		1400	11.14	35,300				

(42) Wasilla Creek near Palmer

(Miscellaneous site)

Location.--Lat 61°38'47", long 149°11'45", in SW¼ sec.13, T.18 N., R.1 E., at culvert on Fishhook Road, and 4.1 miles northwest of Palmer.

Drainage area.--19.3 sq mi.

Discharge record.--Peak discharge determined by indirect measurement.

Maximum.--Summer 1971: Discharge, 700 cfs Aug. 10.

(43) 15290000 Little Susitna River near Palmer

Location.--Lat 61°42'32", long 149°13'36", in NW¼ sec.26, T.19 N., R.1 E., on left bank at highway bridge on Wasilla-Fishhook Road, 1.5 miles north of road junction, 1.8 miles downstream from unnamed tributary and 8 miles northwest of Palmer.

Drainage area.--61.9 sq mi.

Gage-height record.--Water-stage recorder graph. Datum of gage is 920.6 ft above mean sea level (river-profile survey).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,600 cfs and by slope-area measurement at 7,820 cfs.

Maxima.--Summer 1971: Discharge, 7,820 cfs 0700 hours Aug. 10.(gage height, 7.84 ft from recorder chart trace, 10.30 ft from needle peak on chart trace, and about 11 ft from floodmarks).
1948 to summer 1971: Discharge, 5,160 cfs Aug. 24, 1959 (gage height, 7.39 ft).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	90	605	530	11-	515	867	2,070	21-	860	410	400
2--	91	530	480	12-	510	760	1,410	22-	853	336	356
3--	109	530	423	13-	550	1,370	1,180	23-	1,150	311	328
4--	159	624	370	14-	575	1,250	978	24-	1,680	320	338
5--	246	760	346	15-	590	832	722	25-	1,600	370	359
6--	342	766	658	16-	585	682	615	26-	1,520	382	359
7--	390	760	1,060	17-	555	590	536	27-	1,390	370	304
8--	382	895	2,330	18-	500	515	482	28-	1,080	398	274
9--	414	853	4,550	19-	560	460	474	29-	909	370	256
10-	495	895	5,040	20-	736	485	444	30-	825	356	248
								31-	-----	640	245
Monthly mean discharge, in cubic feet per second----------									675	622	909
Runoff, in inches----------									12.17	11.59	16.92

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Little Susitna River near Palmer--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 6	0000	3.46	356	Aug. 8	1200	5.90	2,630	Aug. 10	0600	7.50	6,760
	0500	3.46	356		1600	6.18	3,090		0700	7.84	7,820
	0900	3.65	437		2000	6.30	3,310		0800	7.29	6,170
	1300	4.37	874		2200	6.10	2,950		1000	7.09	5,650
	1800	4.48	962		2400	6.18	3,090		1500	6.64	4,570
	2400	4.23	772						1800	6.36	3,950
				9	0200	6.18	3,090		2400	5.76	2,880
7	0500	4.09	682		0600	6.70	4,700				
	0900	4.32	839		1600	6.55	4,370	11	1200	5.06	1,920
	1400	4.96	1,420		1800	6.73	4,770		1800	4.81	1,690
	1700	4.96	1,420		2400	7.30	6,200		2400	4.77	1,640
	2400	4.65	1,110								
				10	0200	7.70	7,360	12	0600	4.67	1,530
8	0400	4.97	1,430		0300	6.75	4,820		1200	4.52	1,380
	0800	5.07	1,550		0500	7.00	5,420		1800	4.44	1,300
									2400	4.36	1,230

(44) 15291000 Susitna River near Denali

Location.--Lat 63°06'14", long 147°30'57", on left upstream wingwall of bridge on Denali Highway, 0.2 mile downstream from Windy Creek, and 5.3 miles southwest of Denali.

Drainage area.--950 sq mi, approximately.

Gage-height record.--Digital recorder tape punched at half-hour intervals except June 1 to 0930 hours June 5; 1000 hours Aug. 3 to 1700 hours Aug. 8; 1000 hours Aug. 21 to 2400 hours Aug. 31. Altitude of gage is 2,440 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 19,000 cfs and extended to peak stage. Backwater from ice occurred June 5-9. Discharge for June 5-9 and periods of no gage-height record estimated on basis of record for Maclaren River near Paxson.

Maxima.--Summer 1971: Discharge, 25,000 cfs 1830 hours July 15 (gage height, 12.48 ft), 38,200 cfs 1730 hours Aug. 10 (gage height, 13.32 ft).
May 1957 to summer 1971: Discharge, 28,200 cfs Aug. 14 or 15, 1967 (gage height, 12.7 ft, from floodmarks).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	2,400	9,100	12,600	11-	7,960	12,500	33,300	21-	7,310	10,100	9,200
2--	2,600	6,140	16,500	12-	9,550	12,300	24,600	22-	8,480	7,530	8,500
3--	3,000	5,220	15,000	13-	9,690	15,400	20,200	23-	9,530	6,040	8,500
4--	3,400	5,770	14,000	14-	6,510	20,500	14,900	24-	13,300	4,970	8,000
5--	4,000	6,030	12,000	15-	4,700	23,200	10,400	25-	14,500	6,530	8,000
6--	4,400	6,920	11,000	16-	4,640	22,000	8,430	26-	16,100	9,340	7,500
7--	5,000	7,520	12,000	17-	5,860	15,800	7,830	27-	17,600	9,540	7,500
8--	5,500	8,160	15,000	18-	5,920	11,100	7,650	28-	15,600	11,500	7,000
9--	6,500	10,000	23,200	19-	5,870	9,680	7,870	29-	14,600	11,200	6,500
10-	7,090	11,000	33,400	20-	6,760	8,860	10,300	30-	14,600	9,440	6,000
								31-	------	9,330	6,500
Monthly mean discharge, in cubic feet per second----------									8,099	10,410	12,690
Runoff, in inches----------									9.51	12.63	15.40

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Susitna River near Denali--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 8	1730	11.80	16,400	Aug. 10	1230	13.01	33,000	Aug. 12	0600	12.61	26,900
	2400	12.02	19,000		1300	12.97	32,300		0800	12.56	26,100
					1430	13.08	34,100		1100	12.51	25,400
9	0400	12.16	20,800		1500	13.19	35,900		1530	12.43	24,300
	0500	12.19	21,200		1730	13.32	38,200		1900	12.17	20,900
	0730	12.30	22,600		1830	13.32	38,200		2000	12.20	21,300
	1130	12.29	22,500		1900	13.32	38,200		2200	12.21	21,400
	1600	12.43	24,300		2400	13.27	37,300		2300	12.18	21,000
	1930	12.49	25,200						2400	12.22	21,600
	2330	12.68	27,900	11	0700	13.27	37,300				
	2400	12.66	27,600		1300	13.05	33,600	13	0430	12.20	21,300
					1600	12.99	32,600		1000	12.15	20,700
10	0300	12.77	29,300		1830	12.75	29,000		1300	12.06	19,500
	0400	12.79	29,600		2400	13.62	27,000		1700	12.06	19,500
	0500	12.90	31,200						2400	12.04	19,300
	0600	12.88	30,900	12	0200	12.65	27,500				
	0900	12.93	31,700		0400	12.64	27,300				

(46) 15291200 Maclaren River near Paxson

Location.--Lat 63°07'10", long 146°31'45", near left bank on downstream side of bridge on Denali Highway, 1.5 miles downstream from Boulder Creek, and 34 miles west of Paxson.

Drainage area.--280 sq mi, approximately.

Gage-height record.--Digital recorder tape punched at half-hour intervals except June to 1900 hours June 4. Datum of gage is 2,865.84 ft above mean sea level (Alaska Department of Public Works bench mark).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 5,300 cfs and extended to peak stage. Backwater from ice June 4-6. Dischar estimate for June 1-6 based on record for Susitna River at Gold Creek.

Maxima.--Summer 1971: Discharge, 6,130 cfs 0100 hours July 14 (gage height, 6.64 ft), 9,260 cfs 0130 hours Aug. 11 (gage height, 8.24 ft).
June 1958 to summer 1971: Discharge, 8,920 cfs Sept. 13, 1960 (gage height, 7.14 ft).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	1,000	3,340	4,530	11-	4,620	3,730	8,100	21-	3,650	3,390	2,860
2--	1,100	2,670	5,670	12-	5,110	3,870	5,930	22-	4,120	2,960	2,630
3--	1,200	2,400	4,880	13-	4,290	4,610	4,910	23-	4,440	2,540	2,540
4--	1,300	2,540	4,080	14-	3,460	5,830	4,060	24-	5,350	2,420	2,510
5--	1,500	2,650	3,580	15-	3,120	5,210	3,450	25-	5,520	3,440	2,370
6--	1,700	2,820	3,480	16-	3,050	4,520	3,020	26-	5,360	4,370	2,290
7--	1,980	3,050	3,730	17-	3,130	4,020	2,660	27-	5,000	3,870	2,300
8--	2,480	3,340	4,390	18-	2,900	3,620	2,540	28-	4,780	4,190	2,060
9--	3,080	3,430	5,660	19-	2,860	3,410	2,590	29-	4,940	3,760	1,930
10-	3,670	3,520	7,740	20-	3,270	3,140	3,150	30-	4,530	3,180	1,830
								31-	-----	3,250	1,970
Monthly mean discharge, in cubic feet per second----------									3,417	3,528	3,659
Runoff, in inches----------									13.61	14.52	15.06

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971 of Maclaren River near Paxson--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 6	0000	5.04	3,480	Aug. 9	0800	6.22	5,390	Aug. 11	0400	8.00	8,780
	1030	4.90	3,270		1000	6.29	5,510		0500	8.03	8,840
	1830	5.15	3,660		1600	6.49	5,860		0700	7.87	8,520
	2200	5.19	3,720		1900	6.56	5,990		1100	7.78	8,340
	2400	5.15	3,660		2130	6.68	6,200		1500	7.46	7,700
					2400	6.73	6,290		2000	7.28	7,340
7	1000	5.06	3,520						2200	7.22	7,220
	2230	5.39	4,040	10	0300	6.87	6,550		2400	7.14	7,070
	2400	5.40	4,060		0600	7.02	6,840				
					0800	7.11	7,010	12	0130	7.11	7,010
8	1000	5.38	4,030		1100	7.34	7,460		0230	6.98	6,760
	1300	5.53	4,270		1400	7.62	8,020		1400	6.29	5,510
	1730	5.86	4,800		1700	7.96	8,700		2400	6.16	5,290
	2300	6.13	5,240		1730	8.16	9,100				
	2400	6.11	5,210		2200	8.21	9,200	13	1000	5.98	4,990
					2400	8.20	9,180		1800	5.84	4,760
9	0100	6.10	5,190						2400	5.72	4,570
	0230	6.20	5,360	11	0130	8.24	9,260				
	0630	6.16	5,290		0230	8.12	9,020				

(48) 15292000 Susitna River at Gold Creek

Location.--Lat 62°46'04", long 149°41'28", in NW¼ sec.20, T.31 N., R.2 W., near left bank under Alaska Railroad bridge, 0.1 mile downstream from Gold Creek, 0.9 mile north of Gold Creek railroad station, and 2.0 miles downstream from Indian River.

Drainage area.--6,160 sq mi, approximately.

Gage-height record.--Water-stage recorder except June 1 to 1445 hours June 11. Datum of gage is 676.50 ft above mean sea level.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 65,000 cfs and extended above to peak stage. Discharge June 1-11 estimated on basis of weather records.

Maxima.--Summer 1971: Discharge, 73,100 cfs 1730 hours June 12 (gage height, 15.39 ft), 87,400 cfs 1300 hours Aug. 10 (gage height, 16.36 ft).
1949 to summer 1971: Discharge, 90,700 cfs June 7, 1964 (gage height, 16.58 ft), gage height, 24.48 ft May 10, 1954 (backwater from ice).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	10,000	38,300	21,900	11-	59,000	22,400	75,900	21-	29,800	21,800	31,800
2--	10,000	27,800	26,400	12-	66,300	24,000	64,600	22-	34,400	21,700	27,700
3--	10,000	22,700	30,500	13-	51,700	29,600	51,100	23-	36,600	18,700	22,900
4--	12,000	21,000	26,500	14-	41,000	34,500	46,500	24-	41,600	16,000	21,400
5--	16,000	20,700	23,100	15-	34,000	36,700	38,400	25-	42,000	14,500	22,300
6--	22,000	20,300	22,700	16-	28,300	36,100	30,800	26-	39,300	17,000	22,700
7--	30,000	20,500	27,100	17-	24,900	33,600	26,000	27-	38,200	21,400	22,300
8--	34,000	21,000	35,700	18-	24,800	27,800	22,600	28-	37,800	21,400	21,300
9--	36,000	20,700	51,000	19-	24,300	23,600	20,900	29-	36,400	22,500	18,900
10-	50,000	22,100	77,700	20-	25,800	21,300	24,700	30-	41,800	21,400	17,000
								31-	------	21,300	16,700
Monthly mean discharge, in cubic feet per second----------									32,930	23,950	31,900
Runoff, in inches----------									5.96	4.48	5.97

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Susitna River at Gold Creek--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 6	0000	10.14	21,300	Aug. 10	2400	15.79	78,800	Aug. 14	2400	12.96	43,600
	1200	10.35	22,600								
	2400	10.60	24,200	11	0600	15.64	76,600	15	0600	12.70	41,300
					1200	15.63	76,400		1200	12.37	38,300
7	1200	11.02	27,200		1800	15.54	75,100		1800	12.06	35,500
	2400	11.31	29,500		2400	15.34	72,400		2400	11.85	33,800
8	1200	11.97	34,800	12	0600	15.13	69,700	16	1200	11.47	30,800
	2400	13.00	44,000		1200	14.76	64,900		2400	11.07	27,600
					1800	14.36	59,700				
9	0600	13.34	47,700		2400	14.04	55,500	17	1200	10.89	26,200
	1200	13.59	50,500						2400	10.54	23,800
	1800	13.82	53,000	13	0600	13.82	53,000				
	2400	14.51	61,600		1200	13.65	51,200	18	1200	10.39	22,800
					1800	13.41	48,500		2400	10.07	20,900
10	0400	14.83	65,800		2400	13.34	47,700				
	0500	15.19	70,500					19	0600	10.11	21,200
	0900	15.94	81,100	14	0600	13.32	47,500		1200	10.14	21,300
	1300	16.36	87,400		1200	13.26	46,900		1800	9.99	20,400
	1900	15.90	80,500		1800	13.16	45,800		2400	9.99	20,400

(49) 15292400 Chulitna River near Talkeetna

Location.--Lat 62°33'31", long 150°14'02", in SE¼ sec.32, T.29 N., R.5 W., on right bank, 4.5 miles downstream from Troublesome Creek, 16 miles northwest of Talkeetna, and 18 miles upstream from mouth.

Drainage area.--2,570 sq mi, approximately.

Gage-height record.--Water-stage recorder graph except June 1 to 1545 hours June 11, 0730 hours July 24 to 1100 hours Aug. 11, and 1200 hours Aug. 28 to Aug. 31. Altitude of gage is 520 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge June 1-11, July 24 to Aug. 11, 28-31 estimated on basis of one discharge measurement and records for Susitna River at Gold Creek.

Maxima.--Summer 1971: Discharge, 47,600 cfs 0500 hours June 30 (gage height, 15.41 ft), 43,400 cfs 1730 hours July 14 (gage height, 14.34 ft), 50,800 cfs 1200 hours Aug. 11 (gage height, 16.21 ft).
1958 to summer 1971: Discharge, 75,900 cfs July 20, 1967 (gage height, 22.48 ft).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	10,000	35,700	20,000	11-	20,200	32,600	45,000	21-	18,900	26,800	20,200
2--	10,000	29,500	22,000	12-	21,900	31,600	37,800	22-	23,100	24,300	19,700
3--	10,000	26,100	24,000	13-	20,000	38,600	34,000	23-	24,000	21,400	19,400
4--	11,000	26,100	23,000	14-	18,900	42,600	29,700	24-	31,400	19,000	20,200
5--	12,000	25,800	22,000	15-	21,200	39,100	26,500	25-	35,200	18,000	19,400
6--	14,000	27,000	22,000	16-	20,600	35,100	23,400	26-	37,400	18,900	18,700
7--	16,000	28,800	26,000	17-	18,800	31,600	21,500	27-	38,900	17,000	17,200
8--	18,000	29,200	30,000	18-	17,700	27,600	20,300	28-	39,400	19,000	15,500
9--	17,000	29,400	36,000	19-	17,500	26,500	19,700	29-	41,000	21,000	15,000
10-	19,000	30,800	40,000	20-	17,800	26,600	20,900	30-	44,500	20,000	14,000
								31-	------	20,000	15,000
Monthly mean discharge, in cubic feet per second----------									22,180	27,280	23,810
Runoff, in inches----------									9.63	12.24	10.68

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Chulitna River near Talkeetna--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 11	1100	15.90	49,600	Aug. 13	0500	12.24	35,800	Aug. 16	1200	8.65	23,300
	1200	16.21	50,800		1600	11.59	33,600		1800	8.37	22,300
	1500	15.54	48,200		2400	10.50	29,800		2400	8.40	22,400
	1800	14.44	43,800								
	2000	13.96	41,900	14	1200	10.72	30,500	17	1200	8.13	21,500
	2400	13.59	40,600		1800	10.27	28,900		1800	7.93	20,800
					2400	10.22	28,800		2400	7.95	20,800
12	1200	12.72	37,500								
	1700	12.36	36,300	15	0300	10.17	28,600	18	1200	7.80	20,300
	2400	12.32	36,100		1600	9.18	25,100		1800	7.65	19,800
					2400	9.15	25,000		2400	7.73	20,100

(50) 15292700 Talkeetna River near Talkeetna

Location.--Lat 62°20'49", long 150°01'01", in NE¼ sec.16, T.26 N., R.4 W., on left bank, 1.7 miles downstream from Chunilna Creek, 3.5 miles northeast of Talkeetna, and about 5 miles above mouth.

Drainage area.--2,006 sq mi.

Gage-height record.--Water-stage recorder graph except 1800 hours July 2 to 1445 hours Aug. 10, Aug. 15-30. Altitude of gage is 400 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements. Discharge July 2 to Aug. 10 and Aug. 15-30 estimated on basis of records for stations on nearby streams and weather records.

Maxima.--Summer 1971: Discharge, 40,700 cfs 0700 hours June 24 (gage height, 12.53 ft), 67,400 cfs 1700 hours Aug. 10 (gage height, 16.35 ft).
June 1964 to summer 1971: Discharge, 59,400 cfs July 20, 1967 (gage height, 15.75 ft from floodmarks).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	4,980	18,600	10,000	11-	28,500	12,000	40,300	21-	19,400	11,000	14,000
2--	4,750	13,600	12,000	12-	31,700	12,000	27,200	22-	28,200	11,000	12,000
3--	4,920	11,000	15,000	13-	24,800	14,000	23,500	23-	26,200	10,000	10,000
4--	5,680	12,000	13,000	14-	21,200	17,000	20,800	24-	33,700	8,000	9,000
5--	7,940	12,000	11,000	15-	18,900	18,000	18,000	25-	30,800	7,000	9,000
6--	12,900	11,000	11,000	16-	16,900	17,000	15,000	26-	24,700	8,000	9,000
7--	18,000	11,000	18,000	17-	14,900	15,000	12,000	27-	22,300	9,500	9,000
8--	19,700	12,000	28,000	18-	13,800	13,000	10,000	28-	16,100	9,500	9,000
9--	20,000	11,000	48,000	19-	15,000	11,000	9,000	29-	19,400	9,500	8,000
10-	23,100	11,000	63,000	20-	18,800	10,000	11,000	30-	23,900	9,500	7,500
								31-	------	9,500	7,500
Monthly mean discharge, in cubic feet per second----------									19,040	11,760	16,770
Runoff, in inches----------									10.59	6.76	9.64

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Talkeetna River near Talkeetna--Continued.

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
Aug. 10	1500	16.28	67,000	Aug. 11	1600	11.65	34,900	Aug. 13	0700	9.85	24,100
	1700	16.35	67,400		2000	11.35	33,100		1600	9.65	22,900
	2000	15.65	62,600		2400	11.15	31,900		2400	9.70	23,200
	2400	14.65	55,600								
				12	0600	10.75	29,500	14	0200	9.75	23,500
11	0400	13.65	48,600		1200	10.35	27,100		1200	9.30	20,800
	0800	12.85	43,000		1800	9.90	24,400		2400	8.80	17,600
	1200	12.20	38,400		2400	9.80	23,800				

(51) 15292780 Susitna River near Sunshine

(Miscellaneous and scour site)

Location.--Lat 62°10'35", long 150°10'18", in NW¼ sec.15, T.24 N., R.5 W., near left one-quarter point on downstream side of bridge on Anchorage-Fairbanks Highway, 1.5 miles downstream from Sunshine Creek, and 3 miles west of Sunshine.

Drainage area.--11,500 sq mi, approximately.

Gage-height record.--Floodmarks. Datum of gage is 208.35 ft above mean sea level. Gage height obtained once-daily by observer for National Weather Service.

Discharge record.--Stage-discharge relation defined by four measurements below 171,000 cfs and extended above to peak stage.

Maximum.--Summer 1971: Discharge, 200,000 cfs Aug. 10 (gage height, 62.00 ft).

Remarks.--Measurements made in connection with study of scour at the bridge.

(52) 15292800 Montana Creek near Montana

(Crest-stage station)

Location.--Lat 62°06'32", long 150°03'12", in SW¼ sec.5, T.23 N., R.4 W., on right bank on route 35 (Willow-Summit road), and 2.1 miles north of Montana.

Drainage area.--164 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements.

Maxima.--Summer 1971: Discharge, 6,970 cfs Aug. 10 (gage height, 12.96 ft).
1963 to summer 1971: Discharge, 4,600 cfs July 19, 1967 (gage height, 12.23 ft).

(53) 15292900 Goose Creek near Montana

(Crest-stage station)

Location.--Lat 62°03'42", long 150°03'20", in NW¼ sec.29, T.23 N., R.4 W., on route 35 (Willow-Summit road), and 1.5 miles south of Montana.

Drainage area.--14.5 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 509 cfs and by indirect measurement at 3,270 cfs.

Maxima.--Summer 1971: Discharge, 3,270 cfs August (gage height, 19.69 ft).
1963 to summer 1971: Discharge, 530 cfs June 1964 (gage height, 11.94 ft).

Remarks.--Natural discharge affected by possible inflow from Sheep Creek.

(55) 15294300 Skwentna River near Skwentna

Location.--Lat 61°52'23", long 151°22'01", in NE¼ sec.31, T.21 N., R.11 W., on right bank 2 miles downstream from Shell Creek, 8 miles southwest of Skwentna, and 13 miles upstream from mouth.

Drainage area.--2,250 sq mi, approximately.

Gage-height record.--Water-stage recorder graph except 0430 Aug. 19 to 2400 Aug. 30. Altitude of gage is 250 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 27,000 cfs and extended above to peak stage. Discharge Aug. 19-30 estimated based on one discharge measurement and records from nearby streams.

Maxima.--Summer 1971: Discharge, 50,000 cfs 1300 hours June 25 (gage height, 14.74 ft), 32,000 cfs 1330 hours Aug. 11 (gage height, 11.78 ft).
1959 to summer 1971: Discharge, 42,400 cfs Aug. 8, 1966 (gage height, 12.55 ft).

Mean discharge, in cubic feet per second, 1971

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	14,600	36,900	13,100	11-	23,200	26,400	29,700	21-	19,500	19,000	14,000
2--	13,700	27,200	15,500	12-	23,500	28,400	25,900	22-	25,000	15,800	14,000
3--	13,100	22,800	16,400	13-	25,000	29,400	22,500	23-	28,600	14,000	13,000
4--	13,600	22,000	15,600	14-	26,800	29,900	19,000	24-	38,300	14,000	13,000
5--	16,700	23,000	15,800	15-	23,000	27,300	16,100	25-	47,000	15,000	13,000
6--	20,400	23,200	17,300	16-	20,400	22,400	14,200	26-	47,500	16,500	12,000
7--	22,500	23,500	16,100	17-	16,900	18,800	13,400	27-	45,800	15,800	11,000
8--	22,400	22,200	20,600	18-	14,200	16,800	14,400	28-	42,900	13,800	11,000
9--	20,400	22,400	22,400	19-	13,900	16,700	14,000	29-	41,500	11,800	10,000
10-	21,400	24,200	26,400	20-	15,800	17,800	15,000	30-	44,500	10,600	9,000
								31-	------	11,100	10,000
Monthly mean discharge, in cubic feet per second----------									25,400	20,600	15,920
Runoff, in inches----------									12.60	10.56	8.16

Gage height, in feet and discharge, in cubic feet per second, at indicated time, 1971, of Skwentna River near Skwentna--Continued

Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge	Date	Hour	Gage height	Discharge
June 17	2400	8.63	14,900	June 24	2200	13.44	41,200	June 29	0600	13.41	41,100
					2400	13.60	42,200		1200	13.75	43,100
18	1800	8.37	13,700						1800	13.50	41,600
	2400	8.44	13,900	25	0800	14.50	48,300		2400	13.50	41,600
					1100	14.67	49,500				
19	0600	8.48	14,100		1300	14.74	50,000	30	1300	14.35	47,200
	1800	8.37	13,700		1800	14.30	46,900		2400	13.58	42,100
	2400	8.46	14,000		2400	14.09	45,400				
								July 1	0700	13.27	40,200
20	2400	9.13	17,600	26	1000	14.72	49,800		1200	12.84	37,600
					1400	14.65	49,400		1900	11.91	32,600
21	1200	9.39	19,100		2100	14.02	44,900		2400	11.49	30,600
	2400	9.94	22,100		2400	14.09	45,400				
								2	2400	10.16	23,900
22	1200	10.57	25,600	27	1200	14.55	48,600				
	2400	10.80	26,800		2100	13.62	42,300	3	2400	9.73	21,800
					2400	13.60	42,200				
23	0500	10.80	26,800					4	1300	9.86	22,400
	2400	11.64	31,300	28	1100	13.99	44,700		1900	9.70	21,600
					1500	13.85	43,800		2400	9.78	22,000
24	0400	11.97	33,000		2400	13.12	39,300				
	1200	13.30	40,400					5	1300	10.16	23,900
	1500	13.50	41,600	29	0100	13.09	39,100		2200	9.86	22,400
									2400	9.90	22,600

(56) 15294500 Chakachatna River near Tyonek

Location.--Lat 61°12'44", long 152°21'26", in SE¼ sec.17, T.13 N., R.17 W., on right bank just downstream from outlet of Lake Chakachamna, opposite Barrier Glacier, 19 miles upstream from Straight Creek, and 38 miles northwest of Tyonek.

Drainage area.--1,120 sq mi, approximately (includes drainage from Barrier Glacier).

Gage-height record.--Water-stage recorder graph except June 1 to 1030 hours July 6 and 1900 hours Aug. 12 to Aug. 31. Datum of gage is 1,125.1 ft above mean sea level (river profile survey).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 13,000 cfs and extended above. Discharge for June 1 to July 6 and Aug. 17-31 estimated on basis of discharge measurements and weather records. Discharge Aug. 11-16 estimated by using the shape of previous recessions and adding change in lake storage.

Maxima.--Summer 1971: Discharge, 21,000 cfs about June 28 (gage height, 31.75 ft), 19,800 cfs 0900 hours July 15 (gage height, 31.18 ft), about 470,000 cfs Aug. 11 (time and gage height unknown) from field estimate made at a site 6 miles downstream.

June 1959 to summer 1971: Discharge, 23,400 cfs Aug. 18, 1967 (gage height, 29.30 ft).

Remarks.--The control for the gage and the outlet of Chakachamna Lake is a constriction caused by the terminus of Barrier Glacier. After the flood, the lake level for comparable discharges was 14 ft lower than prior to the flood. As a result of erosion of the control, storage in the lake decreased by about 120,000 cfs-days (equivalent to 4 inches of runoff).

Mean discharge, in cubic feet per second, 1971
of Chakachatna River near Tyonek--Continued.

Day	June	July	Aug	Day	June	July	Aug	Day	June	July	Aug
1--	5,500	17,000	8,120	11-	8,000	15,100	90,000	21-	12,000	15,500	14,000
2--	6,000	16,000	8,270	12-	8,500	16,300	50,000	22-	13,000	14,900	13,000
3--	6,500	15,000	8,430	13-	8,500	17,900	30,000	23-	14,000	13,900	12,000
4--	7,000	14,000	8,550	14-	9,000	19,200	25,000	24-	16,000	13,000	12,000
5--	7,000	14,000	8,680	15-	9,000	19,800	20,000	25-	17,000	12,200	11,000
6--	7,500	13,600	9,090	16-	9,000	19,300	18,000	26-	18,000	11,400	11,000
7--	7,500	13,600	9,780	17-	9,500	18,400	17,000	27-	19,000	10,800	10,000
8--	8,000	13,700	10,800	18-	9,500	17,300	16,000	28-	19,000	10,000	10,000
9--	8,000	13,900	13,300	19-	10,000	16,300	15,000	29-	19,000	9,400	9,500
10-	8,000	14,300	18,100	20-	11,000	15,700	14,000	30-	18,000	8,780	9,000
								31-	------	8,340	8,500
Monthly mean discharge, in cubic feet per second----------									10,930	14,470	16,710
Runoff, in inches----------									10.89	14.90	17.20

(58) 15300000 Newhalen River near Iliamna

(Crest-stage station)

Location.--Lat 59°51'34", long 154°52'24", in NW¼ sec.1, T.4 S., R.33 W., on left bank, 8 miles north of Iliamna, and 12 miles downstream from Lake Clark.

Drainage area.--3,478 sq mi.

Gage-height record.--High-water mark in gage well. Datum of gage is 210 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 29,000 cfs and extended to peak stage.

Maxima.--Summer 1971: Discharge, 44,200 cfs about Aug. 16 (gage height, 10.68 ft). 1951 to summer 1971: Discharge, 36,000 cfs Aug. 30, 1959 (gage height, 9.19 ft).

Remarks.--The flow is affected by natural storage in Lake Clark and several other smaller lakes.

(63) 15303600 Kuskokwim River at McGrath

Location.--Lat 62°57'10", long 155°35'11", NW¼ sec.17, T.33 N., R.33 W., on left bank at McGrath, 0.9 mile upstream from Takotna River.

Drainage area.--11,700 sq mi, approximately.

Gage-height record.--Twice-daily gage readings. Altitude of gage is 300 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements.

Maxima.--Summer 1971: Maximum discharge observed, 67,300 cfs 0830 hours May 24 (gage height, 21.42 ft); 64,700 cfs 0800 hours Aug. 14 (gage height, 20.94 ft).
July 1963 to summer 1971: Maximum daily discharge, 70,000 cfs June 6, 1964; maximum gage height, 26.02 ft June 6, 1964, from floodmarks (backwater from ice).

Mean discharge, in cubic feet per second, 1971

Day	May	June	July	Aug	Day	May	June	July	Aug
1--	------	50,000	43,500	18,400	16-	------	31,700	47,500	59,500
2--	------	46,500	43,500	19,000	17-	------	30,500	42,500	49,500
3--	------	42,000	42,000	22,500	18-	------	28,100	36,300	41,500
4--	------	34,100	35,000	26,500	19-	------	24,900	31,700	36,300
5--	------	28,900	29,700	27,300	20-	------	22,500	28,500	32,900
6--	------	27,700	26,900	25,700	21-	56,800	21,400	26,500	32,500
7--	------	27,300	26,100	24,500	22-	63,900	22,500	24,900	34,500
8--	------	28,500	26,100	31,700	23-	66,600	26,500	25,700	33,700
9--	------	28,500	26,500	41,500	24-	67,200	30,500	24,100	31,300
10-	------	27,300	26,900	50,000	25-	65,000	32,500	21,800	28,900
11-	------	26,900	26,900	56,800	26-	63,400	35,000	20,400	38,100
12-	------	27,300	28,500	60,600	27-	62,800	38,600	20,000	27,700
13-	------	28,900	30,900	62,800	28-	61,700	40,500	20,000	27,300
14-	------	31,300	37,600	64,400	29-	58,400	43,000	20,000	25,700
15-	------	32,100	45,500	64,400	30-	55,100	44,000	19,700	24,900
					31-	52,500	------	19,000	23,300
Monthly mean discharge, in cubic feet per second--------							31,980	29,810	36,570
Runoff, in inches----------							3.05	2.94	3.61

(65) 15478010, Rock Creek near Paxson

(Crest-stage station)

Location.--Lat 63°04'16", long 146°06'17", on right bank, at mile 24.8 Denali Highway, and 18 miles west of Paxson.

Drainage area.--50.3 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 400 cfs and by indirect measurement at 1,440 cfs.

Maxima.--Summer 1971: Discharge, 1,440 cfs June (gage height, 12.16 ft).
1963 to summer 1971: Discharge, 1,230 cfs June 1964 (gage height, 12.24 ft).

(66) 15478040 Phelan Creek near Paxson

Location.--Lat 63°14'27", long 145°28'03", in SW¼ sec.28, T.19 S., R.12 E., on left bank approximately one mile downstream from terminus of Gulkana Glacier, and 14.5 miles north of Paxson.

Drainage area.--12.2 sq mi.

Gage-height record.--Water-stage recorder graph for entire period lost because gage was destroyed during flood. Altitude of gage is 3,700 ft (from topographic map).

Discharge record.--Stage-discharge relation defined by current-meter measurements below 900 cfs and extended to peak stage.

Maxima.--Summer 1971: Discharge, about 2,000 cfs Aug. 9 (gage height, 11.50 ft, from floodmarks).
1966 to summer 1971: Discharge, 2,320 cfs Aug. 13, 1967 (gage height, 11.51 ft).

(67) 15478050 McCallum Creek near Paxson

(Crest-stage station)

Location.--Lat 63°13'27", long 145°38'56", in SW¼ sec.33, T.19 S., R.11 E., on right bank upstream wingwall, 8 ft upstream from bridge, at mile 202.4 on Richardson Highway, 0.5 mile upstream from Phelan Creek, and 4.5 miles northwest of Paxson.

Drainage area.--15.5 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 273 cfs and by indirect measurements at 988 cfs and 1,010 cfs.

Maxima.--Summer 1971: Discharge, 988 cfs August (gage height, 13.17 ft, from floodmarks).
1966 to summer 1971: Discharge, 1,010 cfs Aug. 13, 1967 (gage height, 12.12 ft).