# Quantity and Quality of Surface Waters of Alaska, 1960

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*Prepared in cooperation with the State of Alaska*

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## PREFACE

This report was prepared by the Geological Survey in the Water Resources Division, L. B. Leopold, chief. The streamflow records were prepared in cooperation with the State of Alaska and with other agencies under the general direction of E. L. Hendricks, chief, Surface Water Branch, and F. J. Flynn, chief, Basic Records Section, the data being collected and computed under supervision of R. E. Marsh, district engineer, Surface Water Branch, Juneau, Alaska. The quality-of-water records were prepared under the general direction of S. K. Love, chief, Quality of Water Branch, and S. G. Heidel, chief, Reports Section, the data being collected and computed under supervision of F. B. Walling, district chemist, Quality of Water Branch, Palmer, Alaska.

## CALENDAR FOR WATER YEAR 1960

### OCTOBER 1959

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

### NOVEMBER 1959

| S | M | T | W | T | F | S |
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| 29 | 30 | | | | | |

### DECEMBER 1959

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| 27 | 28 | 29 | 30 | 31 | | |

### JANUARY 1960

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| 31 | | | | | | |

### FEBRUARY 1960

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### MARCH 1960

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| 27 | 28 | 29 | 30 | 31 | | |

### APRIL 1960

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### MAY 1960

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| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

### JUNE 1960

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| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
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### JULY 1960

| S | M | T | W | T | F | S |
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| 31 | | | | | | |

### AUGUST 1960

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| | 1 | 2 | 3 | 4 | 5 | 6 |
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| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | | | |

### SEPTEMBER 1960

| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
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| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | |

CONTENTS

# QUANTITY AND QUALITY OF SURFACE WATERS OF ALASKA, 1960

## SCOPE OF WORK

This volume contains results of measurements of the flow and the chemical and physical quality of streams in the State of Alaska during the water year ending September 30, 1960. Since the beginning of stream-gaging work in Alaska in 1906, records of flow of streams and ditches have been obtained at about 340 gaging stations for periods ranging from a few months to 40 years. On September 30, 1960, the Geological Survey was maintaining 75 gaging stations. Discharge measurements only were made at many other points in the 1960 water year; these are published near the end of the report.

Prior to 1948, records of chemical and physical composition of surface waters in Alaska consisted of a few turbidity measurements of the Copper River near Copper Center, in 1913, and chemical analyses of some surface waters of the Seward Peninsula, in 1914, of Yukon River basin, in 1915, and of the Yukon River at Anvik, 1915 to 1916. In 1948 a continuing chemical-quality program was started by the Geological Survey. Several miscellaneous samples were collected and analyzed that year, and regular sampling stations were established in 1949. During the 1960 water year records of chemical composition of surface waters were obtained at about 63 sites including 10 sites at which daily samples were collected during the open-water period. Sediment records were obtained at 16 sites during the same period.

## COOPERATION

Assistance in the form of funds or services was given by the Corps of Engineers, Department of Army, in collecting streamflow records published herein for nine gaging stations.

Assistance was also furnished by the Bureau of Reclamation of the United States Department of the Interior in the operation of three gaging stations.

The Alaska Department of Fish and Game cooperated in financing the operation of four gaging stations.

The Alaska Department of Natural Resources cooperated in financing the operation of one gaging station.

The Chugach Electric Association financed the operation of two gaging stations.

The Alaska Department of Health and Welfare cooperated in financing the operation of three gaging stations.

## DIVISION OF WORK

The stream-gaging work was done by the Water Resources Division of the Geolcgical Survey under the direction of the personnel shown in the preface. The streamflow data were collected and prepared for publication in the Surface Water Branch district office, the address of which is 311 Fifth Street School Building, Juneau.

The collection of samples for chemical and suspended sediment analyses and water-temperature measurements was under the direction of personnel of Quality of Water Branch assisted by the Surface Water Branch. Chemical and sediment analyses, computation of data, and preparation of records was done by the Quality of Water district office, Palmer, Alaska.

Information of a more detailed nature than that published for most of the gaging stations or sampling stations given in this report is on file in the district offices. Provisional records of discharge prior to publication and other unpublished data concerning the records may usually be obtained from the district offices.

## DEFINITION OF TERMS AND ABBREVIATIONS

The terms of streamflow and other hydrologic data, as used in this report, are defined as follows:

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of gage height or discharge are obtained. When used in connection with a discharge record, the term is applied herein only to those gaging stations where a continuous record of discharge is obtained.

Cubic foot per second (cfs) is the rate of discharge of a stream whose channel is 1 square foot in cross-sectional area and whose average velocity is 1 foot per second.

Cubic feet per second per square mile (cfsm) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Runoff in inches (in.) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Acre-foot (ac-ft) is the quantity of water required to cover an acre to the depth of 1 foot and is equivalent to 43,560 cubic feet.

Cfs-day is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.983471 acre-feet, or 646,317 gallons, and represents a runoff of 0.0372 inch from 1 square mile.

Stage-discharge relation is the relation between gage height and the amount of water flowing in a channel, expressed as volume per unit of time.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, a long reach of the channel, or an artificial structure.

The drainage area of a stream at a specified location is that area, measured in a horizontal plane, which is so enclosed by a topographic divide that direct surface runoff from precipitation normally would drain by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise noted.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

Part per million (ppm) is a unit weight of constituent in a million unit weights of solution. The unit has a slightly different meaning when applied to sediment concentrations. A part per million of sediment is computed as one million times the ratio of the weight of sediment to the weight of water-sediment mixture.

Hardness as $CaCO_3$ is the calcium and magnesium expressed as an equivalent amount of calcium carbonate.

Carbonate hardness is the hardness caused by calcium and magnesium equivalent to the carbonate and bicarbonate.

Noncarbonate hardness is the hardness caused by calcium and magnesium in excess of the carbonate hardness.

Particle-size analyses are expressed in percentages finer than indicated sizes in millimeters. The size classification used in this report is that recommended by the American Geophysical Union Subcommittee on sediment terminology.[1]

Specific conductance (micromhos per centimeter at 25°C) is one million times the reciprocal of specific resistance, at 25°C. Specific resistance is the resistance in ohms of a column of water 1 cm long and 1 square cm in cross section.

Suspended sediment or suspended load is sediment that moves in suspension in water and is maintained in suspension by the upward components of turbulent currents or as a colloid. Daily sediment loads are expressed in tons per day, and except for subdivided days are usually obtained by multiplying daily mean sediment concentration in parts per million by the daily mean discharge, and the appropriate conversion factor, normally 0.0027.

pH is the negative logarithm of the hydrogen-ion concentration expressed in grams-moles per liter. However, when determined with a pH meter, which is the procedure normally used in Geological Survey laboratories, pH is an expression of the hydrogen-ion activity or the effective hydrogen-ion concentration.

## DOWNSTREAM ORDER AND STATION NUMBERS

Gaging and sampling stations in this report are listed in a downstream direction along the main stem. All stations on a tributary entering above a main-stem station are listed before that station. If a tributary enters between two main-stem stations, it is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. To indicate the rank of any tributary on which a gaging or sampling station is situated and the stream to which it is immediately tributary, each indention in the listing of stations in the table of contents of this report represents one rank. This downstream order and system of indention show which gaging or sampling stations are on tributaries between any two stations on a main stem and the rank of the tributary on which each station is situated.

As an added means of identification, each gaging station and sampling station has been assigned a station number. The numbers have been assigned in the same downstream order used in this report. Gaps are left in the numbers to allow for new stations that may be established; hence the numbers are not consecutive. In this report the station number is shown just to the left of the station name.

## EXPLANATION OF DATA

### SURFACE WATER

The base data collected at gaging stations consist of records of stage and measurements of discharge. In addition, observations of factors affecting the stage-discharge relation, weather records, and other information are used to supplement base data in determining the daily flow. The records of stage are obtained either from direct readings on a nonrecording gage or from a water-stage recorder that gives a continuous record of fluctuations. Measurements of discharge are made with a current meter by the general methods adopted by the Geological Survey on the basis of experience in stream gaging since 1888. These methods are described in Water-Supply Paper 888 and are also outlined in standard textbooks on the measurement of stream discharge.

[1]Lane, E. W., et al., 1947, Report of the Subcommittee on Terminology: Am. Geophys. Union Trans., V. 28, p. 937.

Rating tables giving the discharge for any stage are prepared from stage-discharge-relation curves defined by discharge measurements. If extensions to the rating curves are necessary to define the extremes of discharge, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs, and by other methods), velocity-area studies, and logarithmic plotting. The application of the daily mean gage height to those rating tables gives the daily mean discharge, from which the monthly and the yearly mean discharge are computed. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is determined by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is essentially the shifting-control method.

At many gaging stations in Alaska the stage-discharge relation is affected by ice during the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements, consideration being given to the available information on temperature and precipitation, notes by gage observers and engineers, and comparable records of discharge for other stations in the same or nearby basins. If the stage-discharge relation is affected by ice, this information is given in a note to the table. No mention is made of occasional days of ice effect if the degree of accuracy of daily records is not changed.

The streamflow data presented herein comprise a description of the station and a table showing the daily discharge and the monthly and yearly discharge of the stream. Records are published on basis of the water year which begins on October 1 and ends on September 30.

The description of the station gives the location, drainage area, records available, type and history of gages, average discharge, extremes of discharge, general remarks, and notations of revisions of the previously published record. The location of the gaging station and the drainage area are obtained from the most accurate maps available. Under "Records available" are given the periods for which there are published records generally equivalent to those at the present site. Under "Gage" are given the type of gage currently in use and the datum of the present gage above mean sea level, and a condensed history of the types, locations, and datums of previous gages used during the period of records available. Under "Average discharge" is given the average discharge for the number of years indicated. It is not given for stations having fewer than five complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "Extremes" are given the maximum discharge and gage height; the minimum discharge if there is little or no regulation; the minimum daily discharge if there is extensive regulation (also the minimum discharge if useful); and the minimum gage height (unless it is of no importance). In the first paragraph the data given are for the complete current year unless otherwise specified. In the second paragraph the data given are for the periods of record within the calendar year dates in the heading (not necessarily those for the complete years indicated by the heading dates). Reliable information concerning major floods that have occurred outside the period

of record is given in the third or last paragraph under "Extremes." Unless otherwise qualified, the maximum discharge corresponds to the crest stage obtained by use of a water-stage recorder, a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur at the same time as the maximum discharge, it is given separately. Information pertaining to the accuracy of the records and conditions which affect the natural flow at the gaging station is given under "Remarks."

Previously published records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published in a subsequent report. In order to make it easier to find such revised records, a paragraph headed "Revisions (water years)" has been added to the description of all stations for which revised records have been published. In this paragraph are listed the reports in which revisions of daily discharge have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1933 stands for the water year October 1, 1932, to September 30, 1933. If no daily, monthly, or annual figures of discharge are concerned in the revision, that fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. For stations in Alaska, however, monthly discharge for all stations prior to October 1950, were published in Water-Supply Paper 1372. Revisions of many monthly discharges as well as of previously published daily discharges were included in that report. The periods for which monthly discharge only is available and published in Water-Supply Paper 1372, are noted in the "Records available" paragraph. Therefore, the years for which revisions of monthly discharge only were made are not indicated under the "Revisions (water years)" paragraph. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published.

For stations equipped with water-stage recorders, except those on streams subject to sudden or rapid fluctuation, the daily table gives the discharge corresponding to the daily mean gage height. For stations subject to such fluctuation the daily mean gage height may not indicate the true daily mean discharge, which must be obtained by averaging the discharge for parts of the day. For stations equipped with nonrecording gages, the table of daily discharge gives the discharge corresponding to once-daily readings of the gage, or to the mean of twice-daily readings, or to the mean gage height determined from gage-height graphs based on gage readings. For periods of rapidly changing stage, the daily mean discharge is determined from gage-height graphs based on gage readings, the frequency of which is stated in the station description.

In the table of daily discharge, the figures for the maximum day and the mirimum day for each month are underlined. If the figure is repeated, it is underlined only on the first day of its occurrence.

In the monthly summary below the daily table, the line headed "Total" gives the sum of the daily figures; it is the total cfs-days for the month. The line headed "Mean" gives the average flow in cubic feet per second during the month. Discharge for the month may be

expressed in cubic feet per second per square mile (line headed "Cfsm"), or in inches (line headed "In."), or in acre-feet (line headed "Ac-ft"). Figures of cubic feet per second per square mile and runoff in inches are omitted if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches.

In the yearly summary below the monthly summary, the figures of maximum are the maximum daily discharges, not the momentary discharges when the water was at crest stage. Likewise, the minimums in this summary are the minimum daily discharges.

Peak discharges and the times of their occurrence and corresponding gage heights of most stations are listed below the table of daily and monthly discharge. All independent peaks above the selected base are given. The base discharge, which is given in parentheses, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man.

Footnotes to the table of daily discharge indicate periods when discharge was computed or estimated by unusual or special methods during periods of no gage-height record and ice effect, or by other effects that reduce the degree of accuracy of the records. Days on which discharge measurements were made are indicated by asterisk and footnote unless they were made at frequent regular intervals, in which instance the general frequency of discharge measurements is given under "Remarks" in the station description.

## QUALITY OF WATER

In general, samples for chemical analysis were collected daily at ten of the regular sampling stations during the open-water period, and periodically during the period of ice cover. For the daily stations analyses were made of 10-day composites of daily samples. Three composites were prepared each month by combining equal volumes of daily samples collected from the 1st to the 10th, from the 11th to the 20th, and for the remainder of the month. Samples were collected less frequently at many other stations in Alaska.

Samples collected for chemical analysis were analyzed according to methods regularly used by the Geological Survey. The methods are essentially the same as or are modifications of methods described in authoritative publications, for mineral analysis of water.[1, 2]

The values reported for dissolved solids are either calculated from determined constituents or are determined by evaporation of a clear sample of water to dryness and drying the residue for 1 hour at 180°C. Specific conductance is given for most of the analyses and was determined by means of a conductance bridge using a standard potassium chloride solution as reference.

The streamflow data are reported in two ways: For regular daily stations the daily mean discharge is reported, whereas values given for discharge in the tables of miscellaneous analyses are normally the discharge at the time the sample was collected.

Suspended-sediment samples were collected daily during the open-water season at five stations, and periodically at eight stations. Samples were collected periodically during periods of ice cover at all stations. Daily samples were collected with a US D-49 depth-integrating sampler from a fixed point at one vertical in the cross section.

[1] American Public Health Assoc., Standard methods for the examination of water and sewage, 10th ed. p. 1-217, 1955.

[2] Methods for collection and analyses of water samples; U. S. Geological Survey Water-Supply Paper 1454, 1960.

Depth-integrated samples at three or more verticals in the cross section were collected periodically at all sediment stations. Occasionally point-integrated samples were taken with a US P-46 sampler.

Sediment concentrations were determined by weighing the solid residue after filtration or evaporation of the samples. For stations where samples were collected periodically, the concentrations reported are instantaneous concentrations or concentration of composites of several samples. For regular daily stations, daily mean concentrations were obtained for the periods during which samples were taken by plotting the instantaneous concentration on a copy of the gage-height-recorder chart. The plotted concentrations were connected by a continuous curve. Daily mean concentrations were estimated from the graph. Footnotes to daily values in the tables are used to indicate methods of computation.

In addition to sediment concentrations and loads, records of particle size are reported also for most of the sediment stations. Generally particle size was determined by a combination of sieve analysis and bottom-withdrawal tube analysis (U. S. Inter-agency, 1943). Sizes larger than 0.062 mm (sand-size) were determined by sieve analysis and those smaller than 0.062 mm were determined by bottom-withdrawal tube or pipette analysis. Native or distilled water, as noted in the tables of analyses, was used as the settling medium. Usually distilled water with a dispersing agent was used. Results obtained with distilled water and a dispersing agent as a settling medium approximate the ultimate particle size of the finer fractions, whereas results obtained with native water as the settling medium more nearly simulate the particle size existing in the stream.

For most daily stations, water temperatures were obtained at the time the samples for chemical quality were collected. Where practicable, the water temperatures at a station were determined at about the same time each day in order to minimize diurnal variation of temperature. The thermometer used for temperature determinations was accurate to plus or minus 0.5°F.

The description of the station includes a statement giving the periods for which there are published records of water quality.

## ACCURACY OF FIELD DATA AND COMPUTED RESULTS

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description states the degree of accuracy of the discharge records. "Excellent" indicates that, in general, the error in the daily records is believed to be less than 5 percent; "good," less than 10 percent; "fair," less than 15 percent; and "poor," probably more than 15 percent. The records of monthly and yearly mean discharge and runoff are, in general, more nearly accurate than the daily records.

Figures of cubic feet per second per square mile and runoff in inches are published only for stations in southeastern Alaska; they are not published for stations in the rest of the State, because the annual precipitation is generally less than 20 inches. Discharge at some stations varies widely due to great differences in precipitation not only between sections of the State, but also at different elevations in the same areas. Generally speaking, annual precipitation is much greater in southeastern Alaska and along

the coast to Seward than in the rest of the State. Even in southeastern Alaska annual precipitation may range from about 25 inches in the vicinity of Skagway in the northern part to about 150 inches near Ketchikan in the southern part, and may be as high as 180 inches at the southern tip of Baranof Island, all measured at or near sea level. However, precipitation increases with altitude, reaching a maximum at about 4,000 feet elevation. Consequently, runoff in inches as measured at low elevations on streams draining mountainous areas often totals nearly twice the precipitation measured at or near sea level in the same drainage basin. At nearly every gaging station in southeastern Alaska the measured annual runoff in inches exceeds the annual precipitation as measured at the nearest Weather Bureau station.

## PUBLICATIONS

A compilation of records of streamflow in Alaska through September 1950 has been published as WSP 1372. Records prior to 1946 were published in Geological Survey bulletins or water-supply papers or in reports of other agencies. Summary tables in WSP 1372 indicate the reports in which this data was originally published. In some cases the earlier reports contain more detailed information than is published in WSP 1372. That report contains a summary of monthly and annual discharges through September 1945 for all previously published records as well as records of daily and monthly discharge for the years 1946-50, which had not been published previously. All records prior to 1946 were reexamined and revised where warranted. Estimates of discharge were made to fill short gaps whenever practical.

Records of daily discharge and records of chemical quality, water temperatures, and suspended sediment from 1946 to date have been published in water-supply papers as shown in the following list. The data for any particular gaging station or sampling station will, in general, be found in the reports covering the years during which the station was maintained.

| Water year | WSP |
|---|---|
| 1946-50 | 1372 |
| 1951-53 | 1466 |
| 1954-56 | 1486 |
| 1957 | 1500 |
| 1958 | 1570 |
| 1959 | 1640 |
| 1960 | 1720 |

The reports referred to above contain, in addition to records of daily discharge at gaging stations, the results of discharge measurements at many points other than regular gaging stations.

Geological Survey reports containing data on quality of surface waters in Alaska prior to 1948 include the following:

Professional Paper 135, Composition of river and lake waters of the United States, 1924.

Bulletin 770, The data of geochemistry, 1924.

Water-Supply Paper 372, A water-power reconnaissance in south-central Alaska, 1915.

Water-Supply Paper 418, Mineral springs of Alaska, 1917.

Records of chemical quality and water temperature obtained from 1948 to September 1950 are presented in WSP 1372.

## SOUTHEASTERN ALASKA

### 120. Winstanley Creek near Ketchikan

Location.--Lat 55°25'00", long 130°52'05", on right bank 0.3 mile downstream from Lower Winstanley Lake, 1.1 miles upstream from mouth, and 31 miles east of Ketchikan.

Drainage area.--15.5 sq mi.

Records available.--August 1936 to September 1938 (monthly discharge only, published in WSP 1372), August 1947 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 290 ft (by barometer).

Average discharge.--15 years, 157 cfs (113,700 acre-ft per year).

Extremes.--Maximum discharge during year, 1,790 cfs Dec. 6 (gage height, 4.94 ft); minimum recorded, 18 cfs Mar. 11 (gage height, 0.93 ft).
1936-38, 1947-60: Maximum discharge, 1,900 cfs Feb. 7 or 8, 1954 (gage height, 5.1 ft); minimum, 6.0 cfs Jan. 12, 1956 (gage height, 0.58 ft).
Flood sometime during period October 1938 to July 1947 reached a stage of 4.85 ft, from high-water mark in gage well (discharge, about 1,800 cfs).

Remarks.--Records good except those for periods of no gage-height record, which are poor. Upper and Lower Winstanley Lakes above gage have areas of 465 and 175 acres, respectively.

Revisions.--WSP 1640: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 124 | 403 | | 102 | | 37 | | 238 | 241 | 188 | 75 | 106 |
| 2 | 142 | 492 | | 86 | | 33 | | 248 | 315 | 174 | 70 | 86 |
| 3 | 150 | 323 | a710 | 72 | | 30 | | 252 | 296 | 185 | 65 | 88 |
| 4 | 148 | 214 | | 66 | | 28 | | 262 | 255 | 188 | 60 | 124 |
| 5 | 126 | 201 | | 102 | a140 | 26 | | 274 | 204 | 188 | 56 | 182 |
| 6 | 102 | 234 | 1,480 | 148 | | 23 | | 304 | 177 | 267 | 52 | 248 |
| 7 | 86 | 319 | *720 | 140 | | 20 | | 312 | 160 | 634 | 48 | 230 |
| 8 | 71 | 1,150 | 469 | 119 | | 20 | | 300 | 155 | 572 | 46 | 185 |
| 9 | 59 | | 335 | 102 | *104 | 20 | | 292 | 142 | 385 | 46 | 204 |
| 10 | 50 | | 352 | 91 | 86 | 19 | | 262 | 148 | 281 | 44 | 194 |
| 11 | 42 | | 292 | 78 | 77 | 18 | | 274 | 177 | 214 | 42 | 155 |
| 12 | 79 | | 262 | 68 | 83 | | | 285 | 171 | 210 | 40 | 124 |
| 13 | 404 | | 230 | 66 | 83 | | | 281 | 163 | 207 | 39 | 104 |
| 14 | 693 | | 248 | 66 | 88 | | | 277 | *174 | 182 | 37 | 97 |
| 15 | 577 | | 244 | 61 | 89 | | a230 | 259 | 214 | 163 | 59 | 83 |
| 16 | 394 | | 194 | 55 | 83 | | | 255 | 281 | *198 | 262 | 72 |
| 17 | 556 | | 152 | 51 | 75 | | | 252 | 292 | 402 | 420 | 91 |
| 18 | 710 | | 130 | 47 | 67 | | | 227 | 281 | 420 | 394 | 185 |
| 19 | 516 | a270 | 148 | 44 | 63 | | (*) | 227 | 248 | 296 | 356 | 207 |
| 20 | 389 | | 155 | 40 | 130 | | | 248 | 224 | 210 | 304 | *174 |
| 21 | 312 | | 140 | 36 | 140 | a210 | | 241 | 204 | 166 | 248 | 171 |
| 22 | 424 | | 142 | 34 | 121 | | | 230 | 220 | 177 | 180 | 288 |
| 23 | 645 | | 126 | 31 | 97 | | | 230 | 274 | 180 | 138 | 372 |
| 24 | 666 | | 106 | 28 | 81 | | | 220 | 270 | 166 | 110 | 406 |
| 25 | 492 | | 88 | 26 | 70 | | | 214 | 230 | 145 | 89 | 381 |
| 26 | 327 | | 104 | 25 | 59 | | | 238 | 204 | 124 | 77 | 292 |
| 27 | 238 | | 204 | 23 | 52 | | | 259 | 191 | 110 | 74 | 207 |
| 28 | 198 | | 214 | | 46 | | | 266 | 194 | 97 | 110 | 155 |
| 29 | 198 | | 204 | | 41 | | 227 | 274 | 234 | 91 | 160 | 119 |
| 30 | 244 | | 163 | a160 | ---- | | 234 | 248 | 227 | 86 | 158 | 95 |
| 31 | 292 | ------ | 128 | | ------ | | ------ | 217 | ------ | 81 | 130 | ------ |
| Total | 9,454 | 9,276 | 10,580 | 2,447 | 2,855 | 4,474 | 6,901 | 7,966 | 6,566 | 6,987 | 3,989 | 5,425 |
| Mean | 305 | 309 | 341 | 78.9 | 98.4 | 144 | 230 | 257 | 219 | 225 | 129 | 181 |
| Cfsm | 19.7 | 19.9 | 22.0 | 5.09 | 6.35 | 9.29 | 14.8 | 16.6 | 14.1 | 14.5 | 8.32 | 11.7 |
| In. | 22.68 | 22.26 | 25.39 | 5.87 | 6.85 | 10.73 | 16.56 | 19.11 | 15.75 | 16.76 | 9.57 | 13.02 |
| Ac-ft | 18,750 | 18,400 | 20,990 | 4,850 | 5,660 | 8,870 | 13,690 | 15,800 | 13,020 | 13,860 | 7,910 | 10,760 |

Calendar year 1959: Max 1,480 Min 21 Mean 198 Cfsm 12.8 In. 173.69 Ac-ft 143,600
Water year 1959-60: Max 1,480 Min 18 Mean 210 Cfsm 13.5 In. 184.55 Ac-ft 152,600

Peak discharge (base, 650 cfs).--Oct. 14 (9 a.m.) 732 cfs (3.33 ft); Oct. 18 (2 a.m.) 808 cfs (3.47 ft); Oct. 23 (11 p.m.) 737 cfs (3.34 ft); Nov. 8 (8 p.m.) 1,550 cfs (4.60 ft); Dec. 2 or 3 (time and discharge unknown); Dec. 6 (2 a.m.) 1,790 cfs (4.94 ft); July 7 (6 p.m.) 715 cfs (3.30 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 1 discharge measurement, weather records, and records for stations on nearby streams.

## 220. Harding River near Wrangell

Location.--Lat 56°13', long 131°38', on right bank 1 mile upstream from mouth on north shore of Bradfield Canal, 4 miles downstream from Fall Lake, and 34 miles southeast of Wrangell.

Drainage area.--67.4 sq mi.

Records available.--August 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 20 ft (by barometer).

Average discharge.--9 years, 725 cfs (524,900 acre-ft per year).

Extremes.--Maximum discharge during year, 10,400 cfs Dec. 6 (gage height, 14.26 ft), from rating curve extended above 4,500 cfs; minimum, 94 cfs Mar. 9 (gage height, 4.62 ft). 1951-60: Maximum discharge, that of Dec. 6, 1959; minimum not determined.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair. Fall Lake, at elevation 182 ft, has an area of 170 acres.

Revisions.--WSP 1640: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *1,270 | 712 | 1,660 | 220 | 731 | b121 | 183 | 840 | 1,120 | 1,300 | 1,300 | 460 |
| 2 | 2,090 | 580 | 1,330 | 204 | 481 | b120 | 245 | 875 | 1,690 | 1,240 | 1,180 | 420 |
| 3 | 1,030 | 420 | 628 | b200 | 356 | b118 | 430 | 889 | 1,020 | 1,350 | 1,710 | 1,030 |
| 4 | 854 | 338 | 530 | b220 | 269 | b116 | 1,240 | 959 | 812 | 1,450 | 1,600 | 959 |
| 5 | 569 | 338 | *4,920 | 325 | 231 | b115 | a1,160 | 980 | 770 | 1,600 | 1,180 | 931 |
| 6 | 435 | 356 | 4,350 | 375 | *249 | 114 | a500 | 1,160 | 770 | 3,160 | 952 | 812 |
| 7 | 356 | 705 | 1,210 | 273 | 317 | 118 | a400 | 1,240 | 966 | 3,260 | 966 | 738 |
| 8 | 317 | 2,540 | 854 | 234 | 261 | 112 | a600 | 861 | 980 | 2,440 | 1,230 | 1,170 |
| 9 | 285 | 1,460 | 640 | b220 | 217 | 106 | a860 | 672 | 910 | 1,570 | 1,420 | 3,110 |
| 10 | 261 | 679 | 580 | 207 | 189 | 108 | a540 | 660 | 1,270 | 1,220 | 1,420 | 1,360 |
| 11 | 242 | 450 | 476 | 195 | 175 | 108 | a450 | 980 | *1,620 | 1,230 | 1,320 | 1,100 |
| 12 | 448 | 334 | 486 | 189 | 195 | 110 | a400 | 917 | 1,170 | 1,580 | 1,060 | 966 |
| 13 | 2,380 | 297 | 405 | 186 | 198 | 108 | a350 | 882 | 875 | 1,750 | 826 | 1,100 |
| 14 | 4,460 | 261 | 440 | 189 | 183 | 106 | a330 | 854 | 868 | *1,420 | 744 | 973 |
| 15 | 1,340 | b250 | 370 | 183 | 198 | 104 | a310 | 805 | 1,180 | 1,290 | 2,090 | 640 |
| 16 | 861 | b245 | 305 | b185 | 198 | 114 | a290 | 868 | 1,350 | 1,840 | 3,110 | 503 |
| 17 | 4,640 | b240 | 265 | b188 | 168 | 178 | *277 | 833 | 1,540 | 3,450 | 3,150 | 1,010 |
| 18 | 1,880 | b230 | 273 | 189 | 158 | 503 | 265 | 705 | 1,420 | 1,870 | 3,240 | 1,250 |
| 19 | 952 | 228 | 400 | 195 | 152 | 672 | 289 | 660 | 1,200 | 1,180 | 2,140 | *889 |
| 20 | 1,580 | 348 | 410 | b190 | 175 | 445 | 297 | 724 | 1,160 | 952 | 1,530 | 628 |
| 21 | 1,430 | 370 | 317 | b180 | 172 | 508 | 305 | 770 | 1,200 | 1,020 | 1,100 | 1,110 |
| 22 | 1,680 | 395 | 301 | b175 | 165 | 390 | 330 | 1,040 | 1,500 | 994 | 861 | 2,780 |
| 23 | 3,500 | 366 | 257 | b172 | 158 | 330 | 366 | 1,210 | 1,970 | 1,100 | 861 | 1,850 |
| 24 | 1,870 | 338 | 238 | b170 | 152 | 313 | 450 | 1,150 | 1,620 | 1,160 | 744 | 2,200 |
| 25 | 1,050 | 261 | 220 | b165 | 142 | 390 | 492 | 1,060 | 1,540 | 1,000 | 640 | 1,680 |
| 26 | 653 | 228 | 289 | b161 | 135 | 366 | 552 | 1,110 | 1,500 | 1,310 | 574 | 994 |
| 27 | 616 | 234 | 840 | b160 | b133 | 277 | 622 | 1,060 | 1,570 | 1,280 | 662 | 672 |
| 28 | 592 | 317 | 460 | b160 | 132 | 231 | 679 | 1,070 | 1,740 | 1,470 | 1,550 | 530 |
| 29 | 910 | 435 | 334 | b500 | 122 | 201 | 764 | 1,030 | 2,130 | 1,500 | 1,080 | 460 |
| 30 | 1,450 | 445 | 273 | 672 | ------ | 183 | 777 | 833 | 1,810 | 1,460 | 672 | 476 |
| 31 | 1,000 | ------ | 228 | 1,100 | ------ | 180 | ------ | 712 | ------ | 1,460 | 530 | ------ |
| Total | 41,001 | 14,400 | 24,289 | 7,982 | 6,412 | 6,965 | 14,753 | 28,409 | 39,271 | 48,919 | 41,442 | 32,801 |
| Mean | 1,323 | 480 | 784 | 257 | 221 | 225 | 492 | 916 | 1,309 | 1,578 | 1,337 | 1,093 |
| Cfsm | 19.6 | 7.12 | 11.6 | 3.81 | 3.28 | 3.34 | 7.30 | 13.6 | 19.4 | 23.4 | 19.8 | 16.2 |
| In. | 22.62 | 7.95 | 13.40 | 4.40 | 3.54 | 3.84 | 8.14 | 15.67 | 21.67 | 26.99 | 22.87 | 18.10 |
| Ac-ft | 81,320 | 28,560 | 48,180 | 15,830 | 12,720 | 13,810 | 29,260 | 56,350 | 77,890 | 97,020 | 82,200 | 65,060 |

Calendar year 1959: Max 4,920 Min - Mean 813 Cfsm 12.1 In. 163.72 Ac-ft 588,600
Water year 1959-60: Max 4,920 Min 104 Mean 838 Cfsm 12.4 In. 169.19 Ac-ft 608,200

Peak discharge (base, 3,500 cfs).--Oct. 14 (6 a.m.) 6,930 cfs (11.84 ft); Oct. 17 (11:30 a.m.) 6,450 cfs (11.50 ft); Oct. 23 (2 p.m.) 6,310 cfs (11.40 ft); Nov. 8 (4 p.m.) 3,590 cfs (9.22 ft); Dec. 6 (12 a.m.) 10,400 cfs (14.26 ft); July 6 (7:30 p.m.) 4,440 cfs (9.95 ft); July 17 (10:30 a.m.) 4,280 cfs (9.82 ft); Aug. 16 (10 p.m.) 4,810 cfs (10.26 ft); Sept. 9 (2:30 a.m.) 5,210 cfs (10.58 ft); Sept. 22 (3 a.m.) 4,140 cfs (9.70 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of recorded range in stage and records for station on Cascade Creek near Petersburg.
b Stage-discharge relation affected by ice.

## 260. Cascade Creek near Petersburg

Location.--Lat 57°01', long 132°47', on right bank 0.25 mile upstream from mouth on east shore of south arm of Thomas Bay, 2¾ miles downstream from Swan Lake, and 15 miles northeast of Petersburg.

Drainage area.--23.0 sq mi.

Records available.--October 1917 to November 1928, October 1946 to September 1960. Monthly discharge only for some periods, published in WSP 1372. Prior to October 1920, published as "at Thomas Bay, near Petersburg."

Gage.--Water-stage recorder. Altitude of gage is 120 ft (by barometer). Prior to October 1946, at different datum.

Average discharge.--25 years, 245 cfs (177,400 acre-ft per year).

Extremes.--Maximum discharge during year, 1,370 cfs Oct. 17 (gage height, 6.88 ft); minimum, 28 cfs Mar. 5-15 (gage height, 1.81 ft).
1917-28, 1946-60: Maximum discharge, 3,280 cfs Sept. 11, 1947 (gage height, 10.0 ft, from floodmarks), from rating curve extended above 1,000 cfs; minimum, 11 cfs Mar. 27, 1948, Mar. 27, 1954, and Mar. 20, 21, 1956, caused by temporary storage behind ice jam upstream; minimum gage height, 0.68 ft Mar. 27, 1948.

Remarks.--Records good. Swan Lake, at elevation about 1,500 ft, has an area of 614 acres and a drainage area of 18.9 sq mi.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 410 | 162 | 315 | 65 | 67 | 30 | 61 | 206 | 344 | 682 | 502 | 175 |
| 2 | 656 | 138 | 312 | 63 | 78 | b30 | 62 | 232 | 439 | 541 | 535 | 163 |
| 3 | 497 | 122 | 234 | 62 | 68 | b29 | 78 | 255 | 362 | 514 | 869 | 232 |
| 4 | 365 | 108 | *194 | 66 | 63 | b29 | 129 | 267 | 313 | 608 | 724 | 247 |
| 5 | 268 | 112 | 654 | 105 | *65 | b28 | 89 | 299 | 299 | 668 | 623 | 244 |
| 6 | 194 | 113 | 1,030 | 83 | 66 | b28 | 90 | 328 | 301 | 780 | 487 | 231 |
| 7 | 145 | 220 | 590 | 81 | 65 | 28 | 106 | 340 | 320 | 897 | 436 | 213 |
| 8 | 129 | 532 | 390 | 80 | 61 | 28 | 200 | 305 | 340 | 728 | 469 | 485 |
| 9 | 114 | 431 | 288 | 78 | 58 | 28 | 297 | 265 | 332 | 559 | 493 | 917 |
| 10 | 102 | 292 | 220 | 76 | 56 | 28 | 246 | 269 | *410 | 454 | 511 | 714 |
| 11 | 92 | 206 | 164 | 72 | 53 | 28 | 198 | 291 | 433 | 412 | 505 | 780 |
| 12 | 98 | 148 | 147 | 70 | 53 | 28 | 162 | 291 | 382 | 454 | 448 | 609 |
| 13 | 325 | 127 | 134 | 67 | 51 | 28 | 144 | 299 | 325 | *511 | 375 | 682 |
| 14 | 1,110 | 112 | 132 | 65 | 51 | 28 | 129 | 301 | 311 | 496 | 332 | 616 |
| 15 | 706 | 98 | 114 | 63 | 53 | 28 | 118 | 295 | 325 | 454 | 656 | 436 |
| 16 | 540 | 88 | 102 | 62 | 49 | 30 | *110 | 311 | 368 | 538 | 889 | 330 |
| 17 | 1,240 | 85 | 93 | 89 | 46 | 47 | 101 | 322 | 511 | 906 | 925 | 345 |
| 18 | 770 | 88 | 88 | 78 | 44 | 87 | 97 | 291 | 475 | 853 | 973 | *385 |
| 19 | 497 | 90 | 93 | 71 | 43 | 116 | 96 | 275 | 478 | 626 | 861 | 328 |
| 20 | 579 | 112 | 88 | 68 | 50 | 73 | 92 | 269 | 439 | 472 | 665 | 263 |
| 21 | 434 | 110 | 82 | 66 | 44 | 83 | 92 | 275 | 514 | 388 | 472 | 335 |
| 22 | 449 | 110 | 80 | 63 | 43 | 69 | 92 | 328 | 550 | 355 | 372 | 544 |
| 23 | 670 | 105 | 77 | 62 | 42 | 70 | 93 | 365 | 544 | 338 | 328 | 665 |
| 24 | 503 | 94 | 71 | 60 | 40 | 70 | 100 | 380 | 508 | 330 | 265 | 746 |
| 25 | 340 | 84 | 68 | 56 | 37 | 83 | 109 | 385 | 487 | 395 | 227 | 612 |
| 26 | 250 | 83 | 72 | 52 | 34 | 76 | 125 | 385 | 487 | 568 | 204 | 439 |
| 27 | 240 | 97 | 87 | 51 | b33 | 72 | 138 | 375 | 505 | 550 | 260 | 322 |
| 28 | 186 | 101 | 78 | 50 | 32 | 69 | 156 | 380 | 571 | 665 | 378 | 242 |
| 29 | 247 | 110 | 76 | 67 | 30 | 67 | 172 | 402 | 752 | 640 | 342 | 199 |
| 30 | 246 | 112 | 71 | 73 | ------ | 65 | 177 | 350 | 714 | 571 | 265 | 188 |
| 31 | 218 | ------ | 68 | 78 | ------ | 64 | ------ | 303 | ------ | 547 | 210 | ------ |
| Total | 12,620 | 4,390 | 6,212 | 2,142 | 1,475 | 1,567 | 3,859 | 9,639 | 13,139 | 17,500 | 15,601 | 12,687 |
| Mean | 407 | 146 | 200 | 69.1 | 50.9 | 50.5 | 129 | 311 | 438 | 565 | 503 | 423 |
| Cfsm | 17.7 | 6.35 | 8.70 | 3.00 | 2.21 | 2.20 | 5.61 | 13.5 | 19.0 | 24.6 | 21.9 | 18.4 |
| In. | 20.41 | 7.10 | 10.04 | 3.46 | 2.39 | 2.53 | 6.24 | 15.59 | 21.25 | 28.30 | 25.23 | 20.51 |
| Ac-ft | 25,030 | 8,710 | 12,320 | 4,250 | 2,930 | 3,110 | 7,650 | 19,120 | 26,060 | 34,710 | 30,940 | 25,160 |

Calendar year 1959: Max 1,240 Min 30 Mean 264 Cfsm 11.5 In. 156.03 Ac-ft 191,400
Water year 1959-60: Max 1,240 Min 28 Mean 275 Cfsm 12.0 In. 163.05 Ac-ft 200,000

Peak discharge (base, 1,100 cfs).--Oct. 14 (4 a.m.) 1,300 cfs (6.74 ft); Oct. 17 (7 a.m.) 1,370 cfs (6.88 ft); Dec. 5 (9 p.m.) 1,280 cfs (6.71 ft); July 17 (8 a.m.) 1,180 cfs (6.50 ft); Aug. 18 (1 p.m.) 1,100 cfs (6.33 ft).

* Discharge measurement made on this day.
b Stage-discharge relation affected by ice.

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## 340. Long River near Juneau

Location.--Lat 58°10'00", long 133°41'50", on right bank three-eighths of a mile upstream from Indian Lake, 1 mile downstream from Long Lake, and 27 miles southeast of Juneau.

Drainage area.--32.5 sq mi.

Records available.--October 1915 to September 1924, October to December 1926, June 1927 to May 1933, October 1951 to September 1960. Monthly discharge only for some periods, published in WSP 1372. Prior to January 1921 published as "below Second Lake, at Port Snettisham."

Gage.--Water-stage recorder. Altitude of gage is 183 ft (from topographic map). Prior to Oct. 1, 1929, at site 600 ft upstream at different datum.

Average discharge.--23 years (1915-24, 1927-32, 1951-60), 457 cfs (330,900 acre-ft per year).

Extremes.--Maximum discharge during year, 2,980 cfs Sept. 8 (gage height, 7.74 ft); minimum, 35 cfs Mar. 12, but may have been less during period of ice effect.
1915-24, 1927-33, 1951-60: Maximum discharge, 6,000 cfs Sept. 10, 1927 (gage height, 10.2 ft, site and datum then in use), from rating curve extended above 1,700 cfs by logarithmic plotting; minimum recorded, 22 cfs Mar. 22, 1933.

Remarks.--Records good except those for period of no gage-height record, which are fair.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 987 | 450 | 496 | 90 | | 43 | 69 | 258 | *484 | 1,170 | 1,310 | 418 |
| 2 | 1,280 | 339 | 471 | 83 | | 42 | 70 | 276 | 535 | 935 | 1,470 | 421 |
| 3 | 1,020 | 271 | 359 | 80 | | 42 | 96 | 304 | 508 | 1,030 | 1,950 | 754 |
| 4 | 746 | 227 | 295 | 88 | | 38 | 118 | 323 | 484 | 1,520 | 1,510 | 889 |
| 5 | 552 | 218 | 262 | 145 | | 41 | 166 | 364 | 484 | 1,660 | 1,280 | 746 |
| 6 | 405 | 244 | 237 | 133 | | 41 | 105 | 397 | 504 | *1,340 | 1,070 | 758 |
| 7 | 312 | 368 | 218 | 118 | | 39 | 134 | 430 | 550 | 1,090 | 912 | 812 |
| 8 | 257 | 750 | 206 | 106 | | 38 | 170 | 433 | 582 | 900 | 912 | 2,200 |
| 9 | 218 | 590 | 214 | 107 | | 38 | 196 | 421 | 578 | 862 | 939 | 2,320 |
| 10 | 192 | 414 | 225 | 103 | | 38 | 199 | 391 | 557 | 750 | *995 | 1,870 |
| 11 | 168 | 285 | 206 | 73 | | 37 | 180 | 406 | 596 | 726 | 985 | 2,140 |
| 12 | 166 | 240 | 179 | 93 | | 37 | 172 | 415 | 629 | 862 | 916 | 1,620 |
| 13 | 354 | 206 | 183 | 101 | | 47 | 162 | 430 | 589 | 975 | 778 | 1,580 |
| 14 | 866 | 175 | 222 | 113 | | 47 | 136 | 424 | 571 | 925 | 714 | 1,340 |
| 15 | 770 | 148 | 214 | 110 | 55 | 44 | 139 | 421 | 607 | 817 | 1,420 | 925 |
| 16 | 625 | 132 | 192 | 100 | | 62 | 138 | 421 | 650 | 804 | 1,680 | 661 |
| 17 | 538 | 130 | 164 | 97 | | 110 | 128 | 443 | 710 | 1,210 | 1,510 | 658 |
| 18 | 389 | 128 | 150 | 93 | | 126 | 126 | 456 | 706 | 1,290 | 1,180 | 676 |
| 19 | 307 | 148 | 169 | 90 | | 156 | 121 | 424 | 683 | 1,000 | 1,100 | 575 |
| 20 | 305 | 212 | 169 | | | 128 | 124 | 456 | 650 | 778 | 939 | 532 |
| 21 | 402 | 276 | 164 | | | 115 | 120 | 521 | 650 | 672 | 754 | 683 |
| 22 | 569 | 266 | 153 | | | 105 | 121 | 632 | 770 | 593 | 643 | 1,220 |
| 23 | 1,220 | 266 | 138 | | | 105 | 120 | 676 | 925 | 589 | 546 | 1,260 |
| 24 | 1,020 | 227 | 122 | | | 107 | 124 | 676 | 948 | 672 | 475 | 1,180 |
| 25 | 688 | 198 | 108 | | 75 | 102 | 148 | 668 | 925 | 822 | 430 | 871 |
| 26 | *530 | 183 | 113 | | | 99 | 170 | 643 | 898 | 1,190 | 403 | 676 |
| 27 | 398 | 222 | 132 | | | 90 | 190 | 629 | 889 | 1,320 | 475 | 514 |
| 28 | 348 | 285 | 135 | | | 82 | 207 | 618 | 961 | 1,610 | 916 | 406 |
| 29 | 564 | 315 | 124 | | *43 | 80 | 221 | 618 | 1,280 | 1,420 | 812 | *340 |
| 30 | 750 | 307 | 108 | | ------ | 74 | 232 | 586 | 1,250 | 1,260 | 632 | 337 |
| 31 | 611 | ------ | 96 | | ------ | 72 | ------ | 521 | ------ | 1,470 | 501 | ------ |
| Total | 17,557 | 8,220 | 6,224 | 2,823 | 1,583 | 2,225 | 4,402 | 14,641 | 21,153 | 32,352 | 30,157 | 29,382 |
| Mean | 566 | 274 | 201 | 91.1 | 54.6 | 71.8 | 147 | 472 | 705 | 1,044 | 973 | 979 |
| Cfsm | 17.4 | 8.43 | 6.18 | 2.80 | 1.68 | 2.21 | 4.52 | 14.5 | 21.7 | 32.1 | 29.9 | 30.1 |
| In. | 20.09 | 9.41 | 7.12 | 3.23 | 1.81 | 2.55 | 5.04 | 16.75 | 24.21 | 37.02 | 34.51 | 33.62 |
| Ac-ft | 34,820 | 16,300 | 12,350 | 5,600 | 3,140 | 4,410 | 8,730 | 29,040 | 41,960 | 64,170 | 59,820 | 58,280 |

Calendar year 1959: Max - Min - Mean 450 Cfsm 13.8 In. 187.77 Ac-ft 325,500
Water year 1959-60: Max 2,320 Min 37 Mean 466 Cfsm 14.3 In. 195.36 Ac-ft 338,600

Peak discharge (base, 2,000 cfs).--Aug. 3 (6 a.m.) 2,100 cfs (6.47 ft); Sept. 8 (8 p.m.) 2,980 cfs (7.74 ft); Sept. 11 (6:30 a.m.) 2,250 cfs (6.71 ft).

* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Jan. 19 to Mar. 2 (no gage-height record Jan. 20 to Feb. 28; discharge estimated on basis of 1 discharge measurement, weather records, and records for stations on nearby streams).

## 360. SPEEL RIVER NEAR JUNEAU

LOCATION.--Three-fourths mile downstream from Long River, 8 miles upstream from mouth, and 30 miles southeast of Juneau.
DRAINAGE AREA.--226 square miles.
RECORDS AVAILABLE.--Chemical analyses: May to September 1960.
Water temperatures: May to September 1960.
Sediment records: May to September 1960.
EXTREMES, 1959-60.--Maximum water temperatures, 46°F June 6. Maximum daily sediment concentration, 2,250 ppm Sept. 13. Maximum daily sediment load, 76,600 tons, Sept. 7.
REMARKS.--Records of specific conductance of daily samples available in district office, Branch of Quality of Water, Palmer, Alaska.

Chemical analyses, in parts per million, May to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| May 26-31, 1960 | 3,960 | 3.2 | 0.07 | 4.8 | 1.0 | 0.9 | 1.1 | 12 | 6.0 | 3.0 | 0.2 | 0.2 | 26 | 16 | 6 | 34 | 7.0 | 5 |
| June 1-10 | 3,120 | 2.5 | .03 | 3.6 | 1.7 | 1.1 | 1.2 | 13 | 5.0 | 3.0 | .0 | .2 | 24 | 16 | 6 | 40 | 6.8 | 5 |
| June 11-21 | 3,760 | 2.2 | .03 | 3.2 | 2.6 | 1.0 | 1.0 | 12 | 6.0 | 3.5 | .1 | .2 | 26 | 18 | 8 | 28 | 7.0 | 5 |
| June 22-30 | 5,470 | 3.1 | .00 | 3.2 | 1.2 | .8 | .9 | 8.0 | 5.0 | 3.0 | .0 | .4 | 22 | 13 | 6 | 28 | 6.3 | 5 |
| July 1-10 | 5,940 | 3.3 | .00 | 4.0 | .5 | .7 | .8 | 8.0 | 5.0 | 2.5 | .0 | .4 | 21 | 12 | 6 | 25 | 6.4 | 0 |
| July 11-20 | 6,270 | 3.1 | .00 | 2.8 | 1.4 | .7 | .8 | 8.0 | 5.0 | 2.5 | .0 | .3 | 21 | 13 | 6 | 23 | 6.3 | 0 |
| July 21-31 | 7,110 | 3.3 | .00 | 2.8 | .7 | .7 | .8 | 9.0 | 4.0 | 1.5 | .0 | .2 | 18 | 10 | 2 | 22 | 6.3 | 0 |
| Aug. 1-10 | 8,610 | 3.8 | .02 | 3.2 | .2 | .7 | 1.0 | 9.0 | 1.0 | 2.0 | .0 | .2 | 16 | 9 | 2 | 24 | 7.1 | 5 |
| Aug. 11-20 | 7,180 | 3.7 | .02 | 2.8 | .2 | .7 | 1.0 | 8.0 | 1.0 | 1.5 | .0 | .2 | 15 | 8 | 2 | 20 | 7.1 | 10 |
| Aug. 21-31 | 3,860 | 2.8 | .02 | 3.6 | .2 | 1.7 | 1.0 | 12 | 2.0 | 2.0 | .0 | .2 | 20 | 10 | 0 | 29 | 7.1 | 15 |
| Sept. 1-6, 8-10 | 7,360 | 3.4 | .03 | 4.0 | .0 | 2.3 | 1.6 | 13 | 3.0 | 2.0 | .0 | .8 | 23 | 10 | 0 | 31 | 7.0 | 15 |
| Sept. 11-20 | 5,260 | 3.6 | .02 | 4.0 | .0 | 1.8 | 1.6 | 14 | 3.0 | 1.5 | .0 | .3 | 23 | 10 | 0 | 29 | 7.0 | 25 |
| Sept. 21-28 | 4,040 | 3.6 | .02 | 4.0 | .0 | 1.6 | 1.2 | 13 | 3.0 | 1.5 | .0 | .2 | 21 | 10 | 0 | 31 | 7.1 | 10 |

## 360. SPEEL RIVER NEAR JUNEAU--Continued

Temperature (°F) of water, May to September 1960
(Once-daily measurement at 12:30 p. m.)

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | -- | 41 | 38 | 40 | 40 |
| 2 | | | | | | | | -- | 42 | 40 | 40 | 40 |
| 3 | | | | | | | | -- | 41 | 40 | 42 | 40 |
| 4 | | | | | | | | -- | 42 | 40 | 40 | 40 |
| 5 | | | | | | | | -- | 44 | 40 | 40 | 40 |
| 6 | | | | | | | | -- | 46 | 40 | 40 | 40 |
| 7 | | | | | | | | -- | 42 | 42 | 40 | -- |
| 8 | | | | | | | | -- | 42 | 42 | 40 | 42 |
| 9 | | | | | | | | -- | 42 | 42 | 40 | 40 |
| 10 | | | | | | | | -- | 42 | 42 | 42 | 40 |
| 11 | | | | | | | | -- | 42 | 44 | 40 | 39 |
| 12 | | | | | | | | -- | 42 | 42 | 40 | 39 |
| 13 | | | | | | | | -- | 42 | 40 | 42 | 39 |
| 14 | | | | | | | | -- | 44 | 39 | 42 | 38 |
| 15 | | | | | | | | -- | 43 | 42 | 40 | 38 |
| 16 | | | | | | | | -- | 42 | 40 | 40 | 39 |
| 17 | | | | | | | | -- | 41 | 40 | 40 | 39 |
| 18 | | | | | | | | -- | 42 | 40 | 40 | 39 |
| 19 | | | | | | | | -- | 42 | 40 | 40 | 38 |
| 20 | | | | | | | | -- | 42 | 42 | 42 | 39 |
| 21 | | | | | | | | -- | 42 | 39 | 40 | 38 |
| 22 | | | | | | | | -- | 40 | 40 | 40 | 38 |
| 23 | | | | | | | | -- | 40 | 40 | 40 | 38 |
| 24 | | | | | | | | -- | -- | 40 | 40 | 39 |
| 25 | | | | | | | | -- | 40 | 40 | 40 | 39 |
| 26 | | | | | | | | 38 | 40 | 40 | 40 | 37 |
| 27 | | | | | | | | 38 | 38 | 40 | 40 | 38 |
| 28 | | | | | | | | 42 | 38 | 39 | 39 | 38 |
| 29 | | | | | | | | 42 | 38 | 40 | 40 | -- |
| 30 | | | | | | | | 42 | 38 | 40 | 40 | -- |
| 31 | | | | | | | | 41 | -- | 40 | 39 | -- |
| Average | -- | | | | | | | -- | 41 | 40 | 40 | 39 |

Suspended sediment, May to September 1960

| Day | April | | | May | | | June | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | |
| | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day |
| 1 | | | | -- | -- | -- | 2,990 | 59 | 476 |
| 2 | | | | -- | -- | -- | 3,400 | 56 | 514 |
| 3 | | | | -- | -- | -- | 3,150 | 43 | 366 |
| 4 | | | | -- | -- | -- | 2,900 | 40 | 313 |
| 5 | | | | -- | -- | -- | 2,810 | 33 | 250 |
| 6 | | | | -- | -- | -- | 3,040 | 33 | 271 |
| 7 | | | | -- | -- | -- | 3,320 | 46 | 412 |
| 8 | | | | -- | -- | -- | 3,350 | 42 | 380 |
| 9 | | | | -- | -- | -- | 3,150 | 34 | 289 |
| 10 | | | | -- | -- | -- | 3,130 | 33 | 279 |
| 11 | | | | -- | -- | -- | 3,340 | 35 | 316 |
| 12 | | | | -- | -- | -- | 3,350 | 34 | 308 |
| 13 | | | | -- | -- | -- | 3,120 | 32 | 270 |
| 14 | | | | -- | -- | -- | 3,280 | 34 | 301 |
| 15 | | | | -- | -- | -- | 3,530 | 53 | 505 |
| 16 | | | | -- | -- | -- | 3,960 | 69 | 738 |
| 17 | | | | -- | -- | -- | 4,370 | 53 | 625 |
| 18 | | | | -- | -- | -- | 4,270 | 74 | 853 |
| 19 | | | | -- | -- | -- | 4,140 | 70 | 782 |
| 20 | | | | -- | -- | -- | 4,010 | 67 | 725 |
| 21 | | | | -- | -- | -- | 4,040 | 82 | 894 |
| 22 | | | | -- | -- | -- | 4,420 | 87 | 1,040 |
| 23 | | | | -- | -- | -- | 4,660 | 100 | 1,260 |
| 24 | | | | -- | -- | -- | 5,010 | 114 | 1,540 |
| 25 | | | | -- | -- | -- | 5,310 | 107 | 1,530 |
| 26 | | | | 3,980 | 362 | 3,890 | 5,130 | 121 | 1,680 |
| 27 | | | | 3,900 | 128 | 1,350 | 5,460 | 128 | 1,890 |
| 28 | | | | 4,100 | 115 | 1,270 | 6,060 | 172 | 2,810 |
| 29 | | | | 4,490 | 142 | 1,720 | 7,460 | 122 | 2,460 |
| 30 | | | | 3,990 | 110 | 1,180 | 5,710 | 104 | 1,600 |
| 31 | | | | 3,290 | 75 | 666 | -- | -- | -- |
| Total | | | | 23,750 | -- | 10,078 | 121,870 | -- | 25,677 |

## 360. SPEEL RIVER NEAR JUNEAU--Continued

Suspended sediment, May to September 1960--Continued

| Day | July | | | August | | | September | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | |
| | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day |
| 1..... | 5,550 | 150 | 2,250 | 8,170 | 923 | 20,400 | 3,200 | 82 | 708 |
| 2..... | 4,760 | 160 | 2,060 | 9,670 | 825 | 21,500 | 5,620 | 513 | 7,780 |
| 3..... | 5,240 | 173 | 2,450 | 15,200 | 771 | 31,600 | 4,900 | 138 | 1,820 |
| 4..... | 9,340 | 391 | 9,860 | 9,300 | 871 | 21,900 | 4,040 | 85 | 927 |
| 5..... | 8,090 | 298 | 6,510 | 7,760 | 250 | 5,240 | 4,150 | 74 | 829 |
| 6..... | 6,390 | 146 | 2,520 | 5,990 | 138 | 2,230 | 4,320 | 131 | 1,530 |
| 7..... | 5,640 | 295 | 4,490 | 5,950 | 178 | 2,860 | 16,700 | 1,700 | a76,600 |
| 8..... | 5,240 | 580 | 8,200 | 7,200 | 218 | 4,240 | 11,400 | 1,660 | 51,100 |
| 9..... | 4,760 | 660 | 8,480 | 8,130 | 504 | 11,100 | 11,200 | 675 | 20,400 |
| 10..... | 4,340 | 414 | 4,850 | 8,750 | 236 | 5,580 | 17,400 | 1,740 | 81,700 |
| 11..... | 5,080 | 136 | 1,860 | 6,540 | 96 | 1,700 | 9,960 | 1,760 | 47,300 |
| 12..... | 7,220 | 419 | 8,170 | 5,220 | 128 | 1,800 | 11,100 | 1,830 | 54,800 |
| 13..... | 7,820 | 343 | 7,240 | 5,420 | 290 | 4,240 | 7,780 | 2,250 | 47,300 |
| 14..... | 6,200 | 545 | 9,120 | 10,600 | 2,050 | 58,700 | 4,370 | 1,150 | 13,600 |
| 15..... | 5,280 | 451 | 6,430 | 10,500 | 505 | 14,300 | 3,120 | 215 | 1,810 |
| 16..... | 5,440 | 765 | 11,200 | 9,850 | 431 | 11,500 | 3,540 | 310 | 2,960 |
| 17..... | 8,640 | 1,110 | 25,900 | 6,770 | 158 | 2,890 | 3,520 | 163 | 1,580 |
| 18..... | 7,340 | 636 | 12,600 | 6,560 | 128 | 2,270 | 2,900 | 124 | 971 |
| 19..... | 5,040 | 590 | 8,030 | 5,560 | 86 | 1,290 | 2,850 | 213 | 1,640 |
| 20..... | 4,640 | 522 | 6,540 | 4,730 | 97 | 1,240 | 3,500 | 251 | 2,360 |
| 21..... | 3,940 | 575 | 6,120 | 4,040 | 152 | 1,660 | 6,270 | 164 | 2,780 |
| 22..... | 3,740 | 520 | 5,250 | 3,420 | 86 | 794 | 6,710 | 127 | 2,210 |
| 23..... | 4,270 | 468 | 5,400 | 3,220 | 139 | 1,210 | 5,420 | 107 | 1,560 |
| 24..... | 5,010 | 154 | 2,080 | 3,640 | 70 | 688 | 3,880 | 269 | 3,040 |
| 25..... | 5,910 | 154 | 2,460 | 3,670 | 46 | 456 | 2,840 | 574 | 4,400 |
| 26..... | 7,780 | 513 | 10,800 | 4,370 | 84 | 991 | 2,580 | 382 | 2,660 |
| 27..... | 8,490 | 659 | 15,100 | 6,480 | 382 | 6,680 | 2,400 | 70 | 454 |
| 28..... | 10,000 | 612 | 16,500 | 4,710 | 130 | 1,650 | 2,230 | 196 | 1,180 |
| 29..... | 9,470 | 566 | 14,500 | 3,010 | 203 | 1,650 | 2,050 | 120 | a664 |
| 30..... | 9,160 | 706 | 17,500 | 3,020 | 164 | 1,340 | 1,930 | 120 | a625 |
| 31..... | 10,400 | 676 | 19,000 | 2,850 | 130 | 1,000 | -- | -- | -- |
| Total. | 200,220 | -- | 263,470 | 200,300 | -- | 244,699 | 171,880 | -- | 437,288 |

Total discharge for period May to September (cfs-days) ..... 718,020
Total load for period May to September (tons) ..... 981,210

a Computed from estimated concentration graph.

Particle-size analysis of suspended sediment, May 1960
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Percent finer than indicated size, in millimeters | | | | | |
| | | | | | 0.062 | 0.125 | 0.250 | 0.500 | 1.000 | |
| May 26, 1960 | 11:00 a.m. | 3,980 | 38 | 270 | 20 | 24 | 40 | 71 | 98 | S |

## 400. Dorothy Creek near Juneau

Location.--Lat 58°13'40", long 134°02'25", on left bank 0.7 mile downstream from Lake Bart, 0.8 mile upstream from mouth, 3 miles downstream from Lake Dorothy, and 14 miles southeast of Juneau.

Drainage area.--15.2 sq mi.

Records available.--October 1929 to October 1941, September 1942 to December 1943, June 1944 to September 1960. Monthly discharge only prior to October 1945, published in WSP 1372.

Gage.--Water-stage recorder. Altitude of gage is 350 ft (from topographic map). Prior to Sept. 14, 1937, at site 100 ft upstream from mouth at different datum.

Average discharge.--29 years (1929-41, 1942-43, 1944-60), 143 cfs (103,500 acre-ft per year).

Extremes.--Maximum discharge during year, 560 cfs Sept. 14 (gage height, 3.97 ft); minimum, 13 cfs Mar. 8-16.
1929-41, 1942-60: Maximum discharge, 1,780 cfs Nov. 3, 1949 (gage height, 5.85 ft), from rating curve extended above 560 cfs; minimum recorded, 6 cfs Mar. 23, 25, 28, 1933.

Remarks.--Records good. Dorothy Lake (area, 952 acres) lies at an altitude of 2,423 ft, less than 4 miles from mouth of Dorothy Creek; Lieuy Lake (area, 80 acres) lies at an altitude of 1,711 ft; and Bart Lake (area, 250 acres) lies at an altitude of 986 ft.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 179 | 135 | 60 | 33 | 20 | 16 | 18 | 47 | 154 | 370 | 454 | 173 |
| 2 | 201 | 125 | 60 | 32 | 20 | 15 | 18 | 51 | 152 | 366 | 446 | 165 |
| 3 | 224 | 119 | 59 | 31 | 21 | 15 | 19 | 54 | 154 | 362 | 496 | 165 |
| 4 | 224 | 111 | 58 | 31 | 20 | 16 | 22 | 59 | 154 | 415 | 482 | 176 |
| 5 | 214 | 103 | 58 | 38 | 20 | 15 | 22 | 66 | 152 | 477 | 436 | 185 |
| 6 | 192 | 98 | 57 | *34 | 20 | 14 | 21 | *71 | 149 | 468 | 390 | 201 |
| 7 | 173 | 96 | 56 | 32 | 20 | 14 | 23 | 75 | 149 | 419 | 346 | 214 |
| 8 | 154 | 96 | 55 | 31 | 20 | 13 | 29 | 78 | 152 | 386 | 323 | 279 |
| 9 | 142 | 94 | 55 | 31 | 20 | 13 | 30 | 80 | 154 | 354 | 311 | 382 |
| 10 | 130 | 91 | 54 | 30 | 19 | 13 | 32 | 81 | 157 | 319 | 304 | 436 |
| 11 | 119 | 86 | 52 | 29 | 19 | 13 | 32 | 84 | 165 | 293 | 300 | 459 |
| 12 | 111 | 81 | 50 | 29 | 19 | 13 | 33 | 89 | 165 | 286 | 297 | 468 |
| 13 | 109 | 75 | 49 | 28 | 18 | 13 | 32 | 91 | 162 | 293 | 289 | 511 |
| 14 | *121 | 69 | 49 | 28 | 18 | 13 | 31 | 92 | 162 | 297 | 272 | 545 |
| 15 | 127 | 63 | 47 | 28 | 18 | 13 | 31 | 94 | 165 | 293 | 286 | 472 |
| 16 | 130 | 58 | 44 | 27 | 18 | 13 | 30 | 96 | 171 | 289 | 327 | 382 |
| 17 | 132 | 54 | 43 | 26 | 18 | 14 | 29 | 103 | 182 | 319 | 374 | 330 |
| 18 | 130 | 51 | 41 | 26 | 18 | 16 | 28 | 103 | 188 | 382 | 378 | 311 |
| 19 | 125 | 48 | 41 | 26 | 17 | 17 | 28 | 103 | 195 | 396 | 374 | 282 |
| 20 | 121 | 49 | 42 | 25 | 18 | 17 | 28 | 107 | 195 | 350 | 346 | 250 |
| 21 | 125 | 49 | 41 | 24 | 17 | 17 | 28 | 115 | 198 | 311 | 311 | 247 |
| 22 | 132 | 49 | 41 | 24 | 17 | 17 | 28 | 121 | *207 | 282 | 279 | 261 |
| 23 | 144 | 47 | 39 | 22 | 17 | 17 | 27 | 127 | 227 | 258 | *247 | 282 |
| 24 | 154 | *45 | 39 | 22 | 17 | 17 | 28 | 137 | 244 | 250 | 224 | 300 |
| 25 | 157 | 44 | 38 | 21 | 17 | 18 | 32 | 142 | 261 | 258 | 204 | 297 |
| 26 | 152 | 44 | 36 | 20 | 17 | 18 | 34 | 144 | 264 | 232 | 182 | 282 |
| 27 | 147 | 50 | 36 | 20 | 16 | 19 | 37 | 149 | 272 | 311 | 173 | 250 |
| 28 | 139 | 52 | 36 | 19 | 16 | 19 | 39 | 152 | 286 | 328 | 176 | 227 |
| 29 | 142 | 51 | 36 | 19 | 16 | 18 | 41 | 157 | 327 | 459 | 185 | 201 |
| 30 | 142 | 50 | 35 | 19 | ------ | *18 | 45 | 160 | 358 | 454 | 188 | 185 |
| 31 | 139 | ------ | 34 | 21 | ------ | 18 | ------ | 157 | ------ | 454 | 182 | ------ |
| Total | 4,631 | 2,183 | 1,441 | 826 | 531 | 482 | 875 | 3,185 | 5,921 | 10,811 | 9,582 | 8,918 |
| Mean | 149 | 72.8 | 46.5 | 26.6 | 18.3 | 15.5 | 29.2 | 103 | 197 | 350 | 309 | 297 |
| Cfsm | 9.80 | 4.79 | 3.06 | 1.75 | 1.20 | 1.02 | 1.92 | 6.78 | 13.0 | 23.0 | 20.3 | 19.5 |
| In. | 11.33 | 5.34 | 3.53 | 2.02 | 1.30 | 1.18 | 2.14 | 7.79 | 14.49 | 26.52 | 23.44 | 21.82 |
| Ac-ft | 9,190 | 4,330 | 2,860 | 1,640 | 1,050 | 956 | 1,740 | 6,320 | 11,740 | 21,500 | 19,010 | 17,690 |

Calendar year 1959: Max 758 Min 16 Mean 129 Cfsm 8.49 In. 115.47 Ac-ft 93,630
Water year 1959-60: Max 545 Min 13 Mean 135 Cfsm 8.88 In. 120.90 Ac-ft 98,030

Peak discharge (base, 400 cfs).--July 5 (12 m.) 491 cfs (3.83 ft); July 29 (4 p.m.) 468 cfs (3.78 ft); Aug. 3 (9 p.m.) 501 cfs (3.85 ft); Sept. 14 (2 a.m.) 560 cfs (3.97 ft).

* Discharge measurement made on this day.

## 440. Carlson Creek near Juneau

Location.--Lat 58°19'00", long 134°10'15", on left bank between two unnamed tributaries, 1½ miles upstream from mouth, 1¾ miles downstream from Sheep Fork, and 8¾ miles east of Juneau.

Drainage area.--24.3 sq mi.

Records available.--July 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 130 ft (from topographic map).

Average discharge.--9 years, 325 cfs (235,300 acre-ft per year).

Extremes.--Maximum discharge during year, 4,110 cfs Sept. 8 (gage height, 9.0 ft), from rating curve extended above 2,000 cfs; minimum not determined.
1951-60: Maximum discharge, 4,500 cfs Sept. 30, 1957 (gage height, 9.55 ft); minimum not determined.

Remarks.--Records good except those for periods of no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,180 | 247 | 493 | 37 | | | a32 | 275 | 442 | 789 | 870 | 190 |
| 2 | 698 | 183 | 297 | 33 | | | a40 | 316 | 596 | 616 | 1,500 | 441 |
| 3 | 380 | 146 | 175 | 34 | | | 51 | 358 | 557 | 1,160 | 1,270 | 925 |
| 4 | 259 | 125 | 140 | 38 | | | 133 | 388 | 546 | 1,850 | 794 | 550 |
| 5 | 193 | 166 | 124 | 177 | | | 90 | 439 | 554 | 1,330 | 753 | 403 |
| 6 | 154 | 212 | 98 | *148 | | | 64 | *433 | 578 | 802 | 571 | 557 |
| 7 | 116 | 560 | 92 | 92 | | | 59 | 427 | 663 | 655 | 536 | 518 |
| 8 | 99 | 1,060 | 82 | | | | 86 | 382 | 634 | 723 | 532 | 2,930 |
| 9 | 90 | 365 | 120 | | | a15 | 78 | 345 | 536 | 599 | 532 | |
| 10 | 82 | 215 | 160 | | | | 119 | 335 | 627 | 515 | 529 | |
| 11 | 75 | 148 | 138 | | | | 96 | 459 | 735 | 838 | 462 | |
| 12 | 99 | a130 | 92 | | | | 90 | 529 | 735 | 1,150 | 388 | |
| 13 | 634 | a110 | 86 | | | | 89 | 487 | 571 | 861 | 330 | |
| 14 | *809 | a98 | 174 | | | | 85 | 439 | 582 | 592 | 355 | |
| 15 | 311 | a90 | 113 | | a25 | | 75 | 433 | 644 | 522 | 2,070 | |
| 16 | 338 | a84 | 79 | | | | 65 | 427 | 671 | 675 | a1,000 | |
| 17 | 253 | a76 | 64 | | | 50 | 61 | 439 | 723 | 1,340 | a620 | |
| 18 | 172 | 70 | 58 | | | 92 | 60 | 409 | 641 | 679 | a520 | |
| 19 | 146 | 136 | 66 | | | 158 | 60 | 403 | 613 | 452 | a535 | |
| 20 | 136 | 309 | 70 | a45 | | 152 | 64 | 487 | 599 | 409 | 578 | a570 |
| 21 | 154 | 302 | 61 | | | 99 | 67 | 671 | 744 | 391 | *360 | |
| 22 | 451 | 217 | 53 | | | 64 | 74 | 776 | *1,160 | 394 | 302 | |
| 23 | 1,160 | 203 | 49 | | | 51 | 80 | 735 | 1,040 | 560 | 247 | |
| 24 | 504 | *140 | 45 | | | 44 | 99 | 699 | 856 | 812 | 219 | |
| 25 | 318 | 110 | 44 | | | 40 | 134 | 723 | 780 | 920 | 214 | |
| 26 | 239 | 105 | 42 | (*) | (*) | 35 | 169 | 644 | 671 | 1,200 | 195 | |
| 27 | 228 | 322 | 49 | | | 32 | 210 | 616 | 748 | 1,050 | 811 | |
| 28 | 232 | 368 | 58 | | | 30 | 232 | 630 | 940 | 1,120 | 661 | |
| 29 | 962 | 321 | 51 | | | 31 | 238 | 627 | 1,200 | 816 | 365 | |
| 30 | 713 | 202 | 44 | | | *a30 | 245 | 518 | 820 | 715 | 255 | |
| 31 | 380 | ------ | 40 | | ------ | a28 | ------ | 442 | ------ | 1,100 | 208 | ------ |
| Total | 11,565 | 6,822 | 3,257 | 1,639 | 725 | 1,176 | 3,045 | 15,291 | 21,206 | 25,635 | 18,582 | 19,054 |
| Mean | 373 | 227 | 105 | 52.9 | 25.0 | 37.9 | 102 | 493 | 707 | 827 | 599 | 635 |
| Cfsm | 15.3 | 9.34 | 4.32 | 2.18 | 1.03 | 1.56 | 4.20 | 20.3 | 29.1 | 34.0 | 24.7 | 26.1 |
| In. | 17.70 | 10.44 | 4.98 | 2.51 | 1.11 | 1.80 | 4.66 | 23.40 | 32.45 | 39.23 | 28.44 | 29.16 |
| Ac-ft | 22,940 | 13,530 | 6,460 | 3,250 | 1,440 | 2,330 | 6,040 | 30,330 | 42,060 | 50,850 | 36,860 | 37,790 |

Calendar year 1959: Max - Min - Mean 322 Cfsm 13.3 In. 179.70 Ac-ft 232,900
Water year 1959-60: Max 2,930 Min - Mean 350 Cfsm 14.4 In. 195.88 Ac-ft 253,900

Peak discharge (base, 2,500 cfs).--Aug. 15 (8:30 a.m.) 2,970 cfs (7.34 ft); Sept. 8 (12:30 p.m.) 4,110 cfs (9.0 ft); Sept. 21 (10:30 p.m.) 2,530 cfs (6.60 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 2 discharge measurements, weather records, and records for stations on nearby streams.

## 480. Sheep Creek near Juneau

Location.--Lat 58°16'30", long 134°18'50", on right bank 0.3 mile upstream from diversion dam of Alaska-Juneau Gold Mining Co. Sheep Creek powerplant, 1 mile northeast of Thane, 1½ miles upstream from mouth, and 4 miles southeast of Juneau.

Drainage area.--4.30 sq mi.

Records available.--January 1911 to December 1913, August 1916 to December 1920, October 1946 to September 1960. Monthly discharge only for some periods, published in WSP 1372. Prior to 1946, published as "near Thane."

Gage.--Water-stage recorder and wooden control. Datum of gage is 643.5 ft above mean sea level (levels by Conservation Division, U.S. Geological Survey). Prior to August 1916, staff gage at same site and datum.

Average discharge.--20 years, 46.3 cfs (33,520 acre-ft per year).

Extremes.--Maximum discharge during year, 675 cfs Sept. 8 (gage height, 3.13 ft); minimum not determined.
1911-13, 1916-20, 1946-60: Maximum discharge, 840 cfs Sept. 8, 1948 (gage height, 3.60 ft); no flow at times at gage site but probably some flow at all times at diversion dam 0.3 mile downstream (records for period 1916-20 based on measurements at diversion dam).

Remarks.--Records good except those for periods of no gage-height record, which are fair.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *161 | 46 | 60 | 13 | a7.8 | 4.5 | 8.1 | 62 | 64 | 102 | 132 | 36 |
| 2 | 112 | 36 | 54 | 13 | 8.1 | 4.2 | 8.1 | 60 | 69 | 88 | 172 | 44 |
| 3 | 88 | 31 | 44 | 12 | 9.2 | 4.0 | 8.1 | 64 | 69 | 118 | 181 | 64 |
| 4 | 71 | *26 | 38 | 12 | 10 | 4.0 | 9.2 | 73 | 71 | 213 | 145 | 49 |
| 5 | 58 | 34 | 34 | 20 | 10 | | 11 | 79 | 73 | 190 | 138 | 54 |
| 6 | 48 | 35 | 29 | 20 | a9.5 | | 11 | 77 | 77 | 130 | 125 | *73 |
| 7 | 39 | 71 | 26 | 18 | a9.2 | | 12 | 75 | 79 | 110 | 105 | 60 |
| 8 | 34 | 108 | 25 | 17 | a9.0 | | 15 | 69 | 75 | 98 | 95 | 479 |
| 9 | 31 | 71 | 28 | 17 | a8.7 | | 16 | 64 | 71 | 88 | 88 | 216 |
| 10 | 28 | 54 | 30 | 16 | a8.4 | | 19 | 56 | 93 | 82 | 82 | 164 |
| 11 | 27 | 41 | 29 | 15 | a8.1 | a3.8 | 20 | 64 | 98 | 98 | 71 | 190 |
| 12 | 25 | 34 | 25 | 14 | a7.7 | | 21 | 64 | 88 | 125 | 60 | 122 |
| 13 | 56 | 31 | 25 | 13 | a7.5 | | 21 | 66 | 79 | 105 | 49 | 108 |
| 14 | 71 | 26 | *26 | 13 | a7.3 | | 21 | 64 | 79 | 79 | 53 | 79 |
| 15 | 44 | 24 | 25 | *12 | a7.2 | | 20 | 64 | 84 | 71 | 312 | 60 |
| 16 | 53 | 22 | 23 | 11 | a7.0 | | 19 | 62 | 91 | 82 | 145 | 49 |
| 17 | 51 | 20 | 21 | 11 | *6.7 | | 18 | 64 | 102 | 110 | 132 | 64 |
| 18 | 38 | 20 | 20 | 10 | 6.7 | | 18 | 62 | 88 | 77 | 112 | 69 |
| 19 | 34 | 27 | 20 | 10 | 6.7 | | 17 | 60 | 79 | 58 | 120 | 66 |
| 20 | 37 | 41 | 20 | 10 | 6.4 | 6.0 | 17 | 64 | 73 | 51 | 115 | 62 |
| 21 | 48 | 41 | 20 | 9.5 | 6.0 | 10 | 17 | 75 | 88 | 49 | 88 | 100 |
| 22 | 62 | 42 | 19 | 8.8 | 5.8 | 11 | 17 | 88 | 112 | 48 | 73 | 115 |
| 23 | 86 | 37 | 18 | 8.4 | 5.8 | 11 | 18 | 93 | 108 | 54 | 62 | 153 |
| 24 | 62 | 31 | 17 | 8.1 | 5.5 | 11 | 21 | 95 | 91 | 79 | 53 | 120 |
| 25 | 49 | 28 | 16 | 7.8 | 5.5 | 12 | 27 | 88 | 86 | 132 | 49 | 100 |
| 26 | 42 | 28 | 15 | a7.6 | 5.2 | 12 | 34 | 82 | 82 | 184 | 42 | 91 |
| 27 | 42 | 41 | 15 | a7.4 | 5.0 | 11 | 41 | 79 | 91 | 172 | 98 | 66 |
| 28 | 41 | 44 | 15 | a7.4 | 4.8 | *11 | *51 | 82 | 108 | 170 | 84 | 54 |
| 29 | 71 | 42 | 15 | a7.3 | 4.8 | 10 | 56 | *84 | *125 | *102 | 54 | 49 |
| 30 | 79 | 41 | 15 | a7.2 | ------ | 9.2 | 60 | 75 | 105 | 93 | 46 | 54 |
| 31 | 58 | ------ | 14 | a7.6 | ------ | 8.8 | ------ | 66 | ------ | 132 | 38 | ------ |
| Total | 1,746 | 1,173 | 781 | 364.1 | 209.6 | 196.7 | 651.5 | 2,220 | 2,598 | 3,230 | 3,119 | 3,010 |
| Mean | 56.3 | 39.1 | 25.2 | 11.7 | 7.23 | 6.35 | 21.7 | 71.6 | 86.6 | 106 | 101 | 100 |
| Cfsm | 13.1 | 9.09 | 5.86 | 2.72 | 1.68 | 1.48 | 5.05 | 16.7 | 20.1 | 24.7 | 23.5 | 23.3 |
| In. | 15.10 | 10.15 | 6.75 | 3.15 | 1.81 | 1.70 | 5.63 | 19.20 | 22.47 | 28.45 | 26.98 | 26.03 |
| Ac-ft | 3,460 | 2,330 | 1,550 | 722 | 416 | 390 | 1,290 | 4,400 | 5,150 | 6,530 | 6,190 | 5,970 |

Calendar year 1959: Max 369 Min 3.5 Mean 47.2 Cfsm 11.0 In. 148.93 Ac-ft 34,160
Water year 1959-60: Max 479 Min - Mean 52.9 Cfsm 12.3 In. 167.42 Ac-ft 38,400

Peak discharge (base, 460 cfs).--Aug. 15 (9 a.m.) 476 cfs (2.55 ft); Sept. 8 (11:15 a.m.) 675 cfs (3.13 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of weather records and records for stations on nearby streams.

## 500. Gold Creek at Juneau

Location.--Lat 58°18'25", long 134°24'05", on left bank 10 ft downstream from highway bridge, 150 ft upstream from Alaska Electric Light and Power Co. dam and diversion, half a mile northeast of Juneau, and 1 mile upstream from mouth.

Drainage area.--9.76 sq mi.

Records available.--July 1916 to December 1920, October 1946 to September 1948, October 1949 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 245 ft (from topographic map). July 20, 1916, to Dec. 31, 1920, water-stage recorder at site 50 ft upstream at different datum. Sept. 11, 1946, to Sept. 30, 1948, staff gage at site 0.7 mile downstream at different datum.

Average discharge.--17 years (1916-20, 1946-48, 1949-60), 105 cfs (76,020 acre-ft per year).

Extremes.--Maximum discharge during year, 1,300 cfs Sept. 8 (gage height, 5.60 ft); minimum not determined, occurred during period of no gage-height record in March.
1916-20, 1946-48, 1949-60: Maximum discharge, 2,600 cfs Sept. 26, 1918 (gage height, 6.8 ft, site and datum then in use), from rating curve extended above 520 cfs; no flow at times during winters of 1951 and 1956.

Remarks.--Records good except those for period of no gage-height record, which are poor. One small diversion above station for domestic water supply.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 385 | 119 | 149 | 15 | 17 | 3.9 | 7.8 | 109 | 131 | 260 | 315 | *61 |
| 2 | 264 | 89 | 117 | 14 | 18 | 3.9 | 8.8 | 112 | 149 | 221 | 379 | 99 |
| 3 | 182 | *67 | 78 | 13 | *17 | 3.4 | 10 | 125 | 143 | 308 | 363 | 182 |
| 4 | 128 | 55 | 63 | 15 | 15 | 3.4 | 19 | 155 | 155 | 516 | 267 | 143 |
| 5 | 101 | 63 | 53 | 45 | 15 | 3.4 | 17 | 176 | 164 | 423 | 244 | 143 |
| 6 | 78 | 63 | 42 | 40 | 14 | | 15 | 167 | 173 | 290 | 214 | 176 |
| 7 | 58 | 137 | 38 | 27 | 15 | (*) | 17 | 164 | 185 | 244 | 182 | 152 |
| 8 | *49 | 264 | 35 | 22 | 14 | | *31 | 146 | 185 | 234 | 176 | 893 |
| 9 | 43 | 152 | 41 | 20 | 12 | | 27 | 131 | 173 | 204 | 185 | 350 |
| 10 | 39 | 101 | 48 | 18 | 11 | | 31 | 119 | 221 | 179 | 185 | 265 |
| 11 | 35 | 69 | 43 | 17 | 10 | a3.5 | 29 | 146 | 250 | 257 | 158 | 342 |
| 12 | 45 | 58 | 35 | 16 | 10 | | 29 | 167 | 240 | 351 | 134 | *212 |
| 13 | 173 | 53 | 34 | 15 | 10 | | 26 | 155 | 198 | 290 | 101 | *220 |
| 14 | 230 | 40 | *38 | 15 | 9.4 | | 23 | 140 | 204 | 214 | 117 | 145 |
| 15 | 112 | 38 | 31 | *13 | 8.8 | | 21 | 140 | 227 | 192 | *545 | 103 |
| 16 | 119 | 36 | 27 | 13 | 7.8 | | 20 | 134 | 230 | 254 | 240 | 82 |
| 17 | 114 | 34 | 24 | 14 | 7.3 | 5.7 | 19 | 137 | 240 | 351 | 224 | 142 |
| 18 | 72 | 36 | 24 | 14 | *7.0 | 18 | 18 | *122 | 214 | 217 | 173 | 142 |
| 19 | 63 | 74 | 31 | 13 | 7.0 | 22 | 18 | 122 | 192 | 155 | 176 | 119 |
| 20 | 104 | 114 | 27 | 12 | 7.3 | 21 | 18 | 137 | 182 | 131 | 167 | 113 |
| 21 | 125 | 104 | 24 | 11 | 6.5 | 17 | 19 | 176 | 221 | 125 | 114 | 256 |
| 22 | 179 | 94 | 22 | 11 | 6.0 | 15 | 20 | 201 | 319 | 122 | 96 | 292 |
| 23 | 267 | 81 | 19 | 11 | 6.5 | 16 | 23 | 221 | 308 | 158 | 83 | 332 |
| 24 | 182 | 61 | 18 | 10 | 6.0 | 15 | 29 | 227 | *254 | 237 | 72 | 247 |
| 25 | 131 | 49 | 17 | 10 | 5.2 | 14 | *40 | 217 | 230 | 312 | 67 | 208 |
| 26 | 101 | 55 | 17 | 10 | 4.8 | 12 | 52 | 198 | 211 | 435 | 61 | 159 |
| 27 | 94 | 92 | 20 | 10 | 4.3 | 10 | 74 | 192 | 250 | 391 | 155 | *113 |
| 28 | 89 | 104 | 19 | 10 | 4.5 | *9.7 | 92 | 201 | 312 | 399 | 137 | 90 |
| 29 | 254 | 94 | 17 | 9.7 | 4.3 | 8.8 | 99 | *201 | 363 | 298 | 83 | 86 |
| 30 | 250 | 69 | 16 | 13 | ------ | 8.1 | 104 | 164 | 273 | 240 | 70 | 113 |
| 31 | 167 | ------ | *15 | 20 | ------ | 7.8 | ------ | 140 | ------ | 335 | 65 | ------ |
| Total | 4,233 | 2,467 | 1,182 | 496.7 | 280.7 | 256.6 | 956.6 | 4,942 | 6,597 | 8,343 | 5,548 | 5,980 |
| Mean | 137 | 82.2 | 38.1 | 16.0 | 9.68 | 8.28 | 31.9 | 159 | 220 | 269 | 179 | 199 |
| Cfsm | 14.0 | 8.42 | 3.90 | 1.64 | 0.992 | 0.848 | 3.27 | 16.3 | 22.5 | 27.6 | 18.3 | 20.4 |
| In. | 16.13 | 9.40 | 4.50 | 1.89 | 1.07 | 0.98 | 3.65 | 18.83 | 25.14 | 31.79 | 21.14 | 22.79 |
| Ac-ft | 8,400 | 4,890 | 2,340 | 985 | 557 | 509 | 1,900 | 9,800 | 13,080 | 16,550 | 11,000 | 11,860 |

Calendar year 1959: Max 860 Min 3.9 Mean 114 Cfsm 11.7 In. 158.23 Ac-ft 82,380
Water year 1959-60: Max 893 Min - Mean 113 Cfsm 11.6 In. 157.31 Ac-ft 81,870

Peak discharge (base, 600 cfs).--July 4 (6:30 p.m.) 685 cfs (4.40 ft); Aug. 15 (6:30 a.m.) 1,240 cfs (5.05 ft); Sept. 8 (11:00 a.m.) 1,300 cfs (5.60 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 1 discharge measurement, weather records, and records for stations on nearby streams.

## 520. Lemon Creek near Juneau

Location.--Lat 58°23'30", long 134°25'15", on left bank a quarter of a mile upstream from Canyon Creek, 4½ miles upstream from mouth, and 6 miles north of Juneau.

Drainage area.--12.1 sq mi.

Records available.--August 1951 to November 1953, July 1954 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 650 ft (from topographic map).

Average discharge.--8 years, 152 cfs (110,000 acre-ft per year).

Extremes.--Maximum discharge recorded during year, 1,420 cfs Sept. 8 (gage height, 3.57 ft); minimum observed, 4.2 cfs Mar. 2.
1951-60: Maximum discharge, 2,080 cfs Sept. 14, 1952 (gage height, 4.08 ft), from rating curve extended above 650 cfs by logarithmic plotting; minimum not determined.

Remarks.--Records good except those for periods of no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 803 | 49 | 48 | | | | | 54 | 103 | *332 | 722 | 173 |
| 2 | 728 | 39 | 29 | | | (*) | | 54 | 111 | 351 | 722 | 226 |
| 3 | 404 | 32 | 21 | | | | | 65 | 103 | 432 | 847 | 440 |
| 4 | 224 | *29 | 19 | | | | | 80 | 109 | 600 | 622 | 360 |
| 5 | 126 | 31 | 18 | | | | | 90 | 116 | 535 | *545 | 331 |
| 6 | 91 | 34 | 16 | | | | | 93 | 123 | 427 | 427 | 319 |
| 7 | *67 | 48 | 16 | | | | | 90 | 153 | 354 | 422 | *327 |
| 8 | 57 | 136 | 16 | | | | | 75 | 150 | 335 | 450 | 1,140 |
| 9 | 50 | 70 | 16 | | | | | 65 | 134 | 319 | 525 | 764 |
| 10 | 42 | 50 | 16 | | | | 13 | 65 | 178 | 237 | 560 | 698 |
| 11 | 35 | 39 | 14 | | | | | 79 | 190 | 470 | 465 | 1,020 |
| 12 | 52 | | | | | | | 80 | 175 | 639 | 364 | 634 |
| 13 | 134 | | | | | | | 79 | 144 | 535 | 308 | 746 |
| 14 | 331 | | | | | | | 77 | 150 | 400 | 331 | 422 |
| 15 | 146 | | | | | | | 81 | 185 | 398 | 840 | 350 |
| 16 | 109 | | | 6 | 5 | 5 | | 80 | 205 | 520 | 868 | 300 |
| 17 | 86 | | | | | | | 84 | 233 | 734 | 752 | 350 |
| 18 | 70 | | | | | | | 74 | 218 | 495 | 455 | 400 |
| 19 | 67 | | | | | | | 73 | 205 | 339 | 400 | 330 |
| 20 | 97 | 30 | | | | | *15 | 98 | 218 | 267 | 347 | 510 |
| 21 | 89 | | 10 | | | | 16 | 138 | 251 | 242 | 280 | 570 |
| 22 | 114 | | | | | | 18 | 166 | 347 | 233 | 251 | 640 |
| 23 | 185 | | | | | | 20 | 170 | 373 | 368 | 202 | 710 |
| 24 | 114 | | | | | | 27 | 166 | 360 | 606 | 185 | 600 |
| 25 | 91 | | | | | | 33 | 175 | 339 | 570 | 190 | 510 |
| 26 | 70 | | | | | | 39 | 161 | 331 | 634 | 173 | 400 |
| 27 | 63 | 55 | | | | | 49 | 144 | 368 | 680 | 296 | 330 |
| 28 | 59 | 39 | | | | | 52 | 150 | 460 | 868 | 347 | 295 |
| 29 | 144 | 30 | | | | | 51 | 150 | 530 | 692 | 261 | 270 |
| 30 | 103 | 24 | | | ------ | | 54 | 126 | 427 | 590 | 195 | 315 |
| 31 | 65 | ------ | | | ------ | | ------ | *104 | ------ | 833 | 180 | ------ |
| Total | 4,816 | 1,155 | 429 | 186 | 145 | 155 | 621 | 3,186 | 6,989 | 15,175 | 13,532 | 14,480 |
| Mean | 155 | 38.5 | 13.8 | 6.0 | 5.0 | 5.0 | 20.7 | 103 | 233 | 490 | 437 | 483 |
| Cfsm | 12.8 | 3.18 | 1.14 | 0.500 | 0.413 | 0.413 | 1.71 | 8.51 | 19.3 | 40.5 | 36.1 | 39.9 |
| In. | 14.80 | 3.55 | 1.32 | 0.57 | 0.45 | 0.48 | 1.91 | 9.79 | 21.48 | 46.64 | 41.59 | 44.51 |
| Ac-ft | 9,550 | 2,290 | 851 | 369 | 288 | 307 | 1,230 | 6,320 | 13,860 | 30,100 | 26,840 | 28,720 |

Calendar year 1959: Max 1,200 Min - Mean 150 Cfsm 12.4 In. 167.72 Ac-ft 108,200
Water year 1959-60: Max 1,140 Min - Mean 166 Cfsm 13.7 In. 187.09 Ac-ft 120,700

Peak discharge (base, 1,200 cfs).--Sept. 8 (1 p.m.) 1,420 cfs (3.57 ft).

* Discharge measurement made on this day.
Note.--No gage-height record Nov. 12-26, Dec. 12 to Apr. 19, Sept. 15-30; discharge estimated on basis of 2 discharge measurements, weather records, and records for stations on nearby streams.

## 565. Chilkat River near Klukwan

Location.--Lat 59°24'55", long 135°55'45", in sec.29, T.28 S., R.56 E., near left bank on downstream side of bridge on Haines Highway, a quarter of a mile upstream from Klehini River, and 2 miles northwest of Klukwan.

Drainage area.--760 sq mi, approximately.

Records available.--Discharge: July 1959 to September 1960.
Chemical analyses: May to August 1960.
Water temperatures: May to September 1960.
Sediment records: May to September 1960.

Gage.--Wire-weight gage read once daily. Altitude of gage is 100 ft (from topographic map).

Extremes.--1959: Maximum discharge during period July to September, 11,200 cfs July 3, 11 (gage height, 25.67 ft); minimum, 1,640 cfs Sept. 8 (gage height, 20.3 ft).
1959-60: Maximum discharge observed during water year, 14,200 cfs June 30 (gage height, 26.45 ft); minimum not determined.
1959-60: Maximum water temperature, 56°F Aug. 13. Maximum daily sediment concentration, 582 ppm July 18. Maximum daily sediment load, 20,900 tons June 30.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, 1959

| Day | July | Aug. | Sept. | Day | July | Aug. | Sept. | Day | July | Aug. | Sept. | Day | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8,380 | a6,600 | 3,620 | 9 | 10,200 | 6,490 | 1,760 | 17 | 9,410 | 6,320 | 3,340 | 25 | 5,340 | 4,580 | 2,410 |
| 2 | 11,000 | a6,100 | 3,620 | 10 | 10,600 | 5,500 | 2,020 | 18 | 9,140 | 5,980 | 3,340 | 26 | a4,500 | 4,870 | 2,410 |
| 3 | 11,200 | a5,600 | 2,940 | 11 | 11,200 | 5,820 | 2,020 | 19 | 8,200 | 5,500 | 3,340 | 27 | 4,440 | 4,580 | 2,020 |
| 4 | a8,100 | a6,100 | 2,540 | 12 | a9,000 | 6,490 | 2,280 | 20 | 7,580 | 5,500 | a3,000 | 28 | 4,580 | 4,580 | 1,890 |
| 5 | a8,300 | a7,000 | 2,410 | 13 | a9,800 | 6,840 | 3,210 | 21 | 7,580 | 5,660 | *2,670 | 29 | 5,180 | 4,020 | 1,760 |
| 6 | 8,660 | a7,800 | 1,890 | 14 | a8,400 | 6,840 | 2,940 | 22 | 7,390 | 5,660 | 2,280 | 30 | 7,580 | a3,650 | 1,890 |
| 7 | 9,140 | a6,300 | a1,750 | 15 | 7,480 | 7,020 | 4,020 | 23 | 7,580 | a5,000 | 2,150 | 31 | a6,000 | 3,340 | - |
| 8 | 9,680 | 6,660 | 1,640 | 16 | 8,490 | 6,320 | 3,620 | 24 | 6,490 | 4,440 | 2,150 | | | | |
| Total | | | | | | | | | | | | | 250,620 | 177,160 | 76,930 |
| Mean | | | | | | | | | | | | | 8,085 | 5,715 | 2,564 |
| Runoff in acre-feet | | | | | | | | | | | | | 497,100 | 351,400 | 152,600 |

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of weather records.
Note.--Result of discharge measurement, 13,800 cfs June 17, 1959.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,670 | a1,340 | 1,440 | | | | | a3,180 | 5,290 | 12,200 | *10,400 | a3,050 |
| 2 | 5,020 | 1,140 | 1,340 | | | | | a3,220 | 4,840 | a10,500 | 8,880 | 2,940 |
| 3 | 3,880 | 1,020 | 1,220 | 710 | | | | a3,250 | 4,810 | a9,900 | 9,790 | 3,290 |
| 4 | a3,290 | 770 | 842 | | | | | a3,300 | 5,080 | a9,600 | 9,730 | 3,600 |
| 5 | 2,670 | | 343 | | | | | 3,280 | 6,680 | 8,000 | 7,800 | a4,050 |
| 6 | 2,150 | | 277 | | | | 345 | a3,250 | 7,880 | 6,840 | 6,840 | 3,510 |
| 7 | 1,760 | | 387 | | | | | 3,210 | 8,130 | 6,340 | 6,930 | 2,930 |
| 8 | 1,390 | | 940 | 530 | | | | 3,390 | 7,820 | 6,030 | 8,090 | 3,340 |
| 9 | 1,140 | | 990 | | | | | 3,180 | 7,150 | 6,420 | 9,040 | 3,900 |
| 10 | 1,140 | | 1,200 | | | 270 | | *3,430 | 6,950 | a6,700 | 10,000 | 3,480 |
| 11 | 1,140 | a495 | 818 | | | | | 3,440 | 7,070 | 7,020 | 11,500 | 5,370 |
| 12 | 1,020 | | 722 | | | | 420 | 3,450 | 5,900 | 8,330 | 11,400 | 7,840 |
| 13 | 1,140 | | 806 | 425 | | | a465 | 3,570 | 6,170 | 9,000 | 11,300 | 7,980 |
| 14 | 1,640 | | 806 | | | | a520 | 3,900 | 5,980 | 9,680 | a10,000 | 7,350 |
| 15 | 1,140 | | 842 | | | | a590 | a3,900 | 6,840 | 9,360 | 8,490 | a6,000 |
| 16 | 1,020 | | 854 | | 290 | | 650 | 3,880 | 7,580 | a10,800 | 9,900 | a4,250 |
| 17 | 890 | | 878 | | | (*) | a690 | 4,300 | 9,000 | a13,000 | 7,600 | 3,470 |
| 18 | 650 | | 1,050 | 360 | | | 734 | 4,030 | 8,830 | a13,300 | 6,120 | 3,050 |
| 19 | a470 | *602 | 1,090 | | | | a770 | 4,050 | a8,900 | a9,900 | 5,520 | a2,700 |
| 20 | a520 | 698 | 928 | | | | a815 | 4,240 | 9,020 | 7,880 | 5,390 | 2,400 |
| 21 | a610 | 1,030 | 854 | | | | a880 | 4,660 | *9,090 | 8,310 | a5,000 | 2,320 |
| 22 | a750 | 1,090 | 818 | | | | a940 | a5,000 | 8,880 | 9,070 | a4,400 | 3,470 |
| 23 | a910 | 1,090 | 770 | 330 | | | 1,030 | 5,290 | 8,800 | 9,120 | 4,030 | 3,180 |
| 24 | a1,140 | 1,280 | 794 | | | 285 | a1,200 | 7,640 | 9,680 | 8,640 | 3,760 | 2,940 |
| 25 | a1,090 | 1,540 | 830 | | | | 1,400 | 8,200 | 10,700 | 8,200 | a4,050 | 2,370 |
| 26 | 1,020 | 1,970 | 806 | | | | a1,600 | 7,920 | 10,000 | 8,090 | 4,610 | 2,020 |
| 27 | 1,020 | 2,140 | 758 | (*) | | | 1,860 | 7,880 | 9,600 | 8,440 | 3,870 | 1,790 |
| 28 | 890 | 2,290 | 830 | 310 | | | a2,300 | 7,470 | 10,700 | 8,830 | a4,600 | a1,650 |
| 29 | 1,520 | 1,300 | 854 | | | | a2,650 | a6,600 | 12,600 | 8,800 | 3,870 | 1,520 |
| 30 | 1,520 | 1,400 | 835 | | ------- | | a3,100 | a6,800 | 14,200 | 9,600 | 3,400 | 1,390 |
| 31 | 1,520 | ------- | 815 | | ------- | | ------- | 5,920 | ------- | a11,700 | *3,140 | ------- |
| Total | 46,730 | 27,630 | 26,737 | 13,635 | 8,410 | 8,580 | 26,409 | 144,830 | 244,170 | 279,600 | 219,450 | 107,150 |
| Mean | 1,507 | 921 | 862 | 440 | 290 | 277 | 880 | 4,672 | 8,139 | 9,019 | 7,079 | 3,572 |
| Ac-ft | 92,690 | 54,800 | 53,030 | 27,040 | 16,680 | 17,020 | 52,380 | 287,300 | 484,300 | 554,600 | 435,300 | 212,500 |

Calendar year 1959: Max - Min - Mean - Ac-ft -
Water year 1959-60: Max 14,200 Min - Mean 3,151 Ac-ft 2,288,000

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 1 discharge measurement and weather records.
Note.--Stage-discharge relation affected by ice Nov. 19 to Dec. 6, Dec. 20-27, Dec. 30 to Apr. 1 (no gage-height record Mar. 18 to Apr. 1; discharge computed on basis of 1 discharge measurement and weather records).

## 565. CHILKAT RIVER NEAR KLUKWAN--Continued

Chemical analyses, in parts per million, May to August 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| May 31-June 4, 1960.. | 5,190 | 4.8 | 0.03 | 12 | 3.8 | 1.5 | 1.7 | 41 | 11 | 3.5 | 0.0 | 1.0 | 59 | 50 | 17 | 88 | 7.5 | 20 |
| June 5-15 ..... | 6,690 | 3.8 | .03 | 11 | 2.1 | 1.2 | 1.5 | 32 | 10 | 2.5 | .2 | .5 | 49 | 36 | 10 | 76 | 7.5 | 10 |
| June 16-18, 20-23 ..... | 8,740 | 2.8 | .03 | 8.3 | 3.3 | .8 | 1.5 | 29 | 9.0 | 2.5 | .1 | .4 | 43 | 34 | 10 | 60 | 7.0 | 20 |
| June 24-30 ..... | 11,100 | 3.2 | .03 | 8.3 | 1.7 | .8 | 1.5 | 28 | 5.0 | 3.0 | .2 | .2 | 38 | 28 | 4 | 57 | 7.0 | 16 |
| July 8, 10 ..... | 6,360 | 3.8 | .07 | 8.3 | .7 | .7 | 1.4 | 25 | 5.0 | 1.0 | .2 | .2 | 33 | 24 | 3 | 56 | 7.4 | 15 |
| July 12-15, 20..... | 8,850 | 3.4 | .07 | 7.5 | .7 | .7 | 1.6 | 25 | 4.0 | 1.0 | .2 | .1 | 31 | 22 | 1 | 50 | 7.4 | 15 |
| July 21-31 ..... | 8,710 | 3.2 | .03 | 7.9 | .5 | .7 | 1.6 | 24 | 4.0 | 1.0 | .0 | .3 | 31 | 22 | 2 | 49 | 7.4 | 10 |
| Aug. 1-10..... | 8,750 | 3.2 | .02 | 7.1 | .7 | .5 | 1.5 | 23 | 3.0 | 1.0 | .0 | .2 | 28 | 20 | 2 | 47 | 7.0 | 10 |
| Aug. 11-13, 15-20.... | 8,580 | 2.6 | .03 | 8.3 | .7 | .7 | 1.7 | 26 | 4.0 | 1.0 | .0 | .3 | 32 | 24 | 2 | 53 | 7.0 | 10 |
| Aug. 21-23 ..... | 4,480 | 4.0 | .02 | 12 | 1.4 | .8 | 1.6 | 36 | 8.0 | 1.0 | .0 | .3 | 47 | 36 | 6 | 81 | 7.6 | 0 |

Temperature (°F) of water, May to August 1960
(Once-daily measurement between 8 a.m. and 12 m.)

| Day | May | June | July | Aug. | Sept. | Day | May | June | July | Aug. | Sept. | Day | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -- | 43 | -- | 48 | | 11 | -- | 46 | -- | 53 | | 21 | 48 | -- | 50 | 49 | |
| 2 | 53 | 45 | -- | 46 | | 12 | 50 | 52 | 50 | 48 | | 22 | -- | -- | 48 | -- | |
| 3 | -- | 46 | 46 | 44 | | 13 | 42 | 47 | 49 | 56 | | 23 | 45 | 52 | 48 | 51 | |
| 4 | -- | 46 | -- | 45 | | 14 | 44 | 46 | 50 | -- | | 24 | 46 | 52 | 50 | -- | |
| 5 | -- | 52 | 52 | 45 | | 15 | -- | -- | 48 | 45 | | 25 | 45 | 50 | 48 | -- | |
| 6 | -- | 49 | -- | 46 | | 16 | 48 | 50 | -- | 45 | | 26 | 44 | 48 | 48 | -- | |
| 7 | -- | 49 | 50 | 47 | | 17 | 42 | 45 | -- | 52 | | 27 | 44 | 48 | 47 | -- | |
| 8 | -- | 51 | 48 | 47 | | 18 | 41 | 51 | -- | 51 | | 28 | 44 | 48 | 45 | -- | 42 |
| 9 | 50 | 50 | -- | 46 | | 19 | 43 | -- | -- | 50 | | 29 | -- | 48 | 46 | -- | |
| 10 | 45 | 48 | 52 | 47 | | 20 | 47 | 53 | 49 | 46 | | 30 | -- | 47 | 45 | -- | |
| | | | | | | | | | | | | 31 | 44 | -- | -- | -- | |
| Average | | | | | | | | | | | | | -- | 48 | -- | -- | -- |

## 565. CHILKAT RIVER NEAR KLUKWAN--Continued

Suspended sediment, May to August 1960

| Day | May | | | June | | | July | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | |
| | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day |
| 1..... | 3,180 | 120 | a1,030 | 5,290 | 259 | 3,700 | 12,200 | 464 | a15,300 |
| 2..... | 3,220 | 120 | 1,040 | 4,840 | 319 | 4,170 | 10,500 | 340 | 9,640 |
| 3..... | 3,250 | 120 | a1,050 | 4,810 | 266 | 3,450 | 9,900 | 306 | 8,180 |
| 4..... | 3,300 | 130 | a1,160 | 5,080 | 287 | 3,940 | 9,600 | 348 | a9,020 |
| 5..... | 3,280 | 130 | a1,150 | 6,680 | 306 | 5,520 | 8,000 | 321 | a6,930 |
| 6..... | 3,250 | 140 | a1,230 | 7,880 | 320 | 6,810 | 6,840 | 353 | 6,520 |
| 7..... | 3,210 | 140 | a1,210 | 8,130 | 292 | 6,410 | 6,340 | 285 | 4,880 |
| 8..... | 3,390 | 150 | a1,370 | 7,820 | 212 | 4,480 | 6,030 | 325 | 5,290 |
| 9..... | 3,180 | 152 | 1,300 | 7,150 | 184 | 3,550 | 6,420 | 254 | 4,400 |
| 10..... | 3,430 | 149 | 1,380 | 6,950 | 210 | a3,940 | 6,700 | 318 | a5,750 |
| 11..... | 3,440 | 141 | 1,310 | 7,070 | 236 | 4,500 | 7,020 | 438 | 8,300 |
| 12..... | 3,450 | 154 | 1,430 | 5,900 | 207 | 3,300 | 8,330 | 431 | 9,690 |
| 13..... | 3,570 | 162 | 1,560 | 6,170 | 258 | 4,300 | 9,000 | 262 | 6,370 |
| 14..... | 3,900 | 180 | 1,900 | 5,980 | 207 | 3,340 | 9,680 | 339 | 8,860 |
| 15..... | 3,900 | 178 | a1,870 | 6,840 | 203 | 3,750 | 9,360 | 501 | a12,700 |
| 16..... | 3,880 | 154 | 1,610 | 7,580 | 299 | 6,120 | 10,800 | 448 | a13,100 |
| 17..... | 4,300 | 184 | 2,140 | 9,000 | 308 | 7,480 | 13,000 | 475 | a16,700 |
| 18..... | 4,030 | 171 | 1,860 | 8,830 | 292 | 6,960 | 13,300 | 582 | a20,900 |
| 19..... | 4,050 | 160 | 1,750 | 8,900 | 295 | a7,090 | 9,900 | 438 | a11,700 |
| 20..... | 4,240 | 173 | 1,980 | 9,020 | 311 | 7,570 | 7,880 | 338 | 7,190 |
| 21..... | 4,660 | 182 | 2,290 | 9,090 | 342 | 8,390 | 8,310 | 450 | 10,100 |
| 22..... | 5,000 | 237 | a3,200 | 8,880 | 382 | a9,160 | 9,070 | 421 | 10,300 |
| 23..... | 5,290 | 346 | 4,940 | 8,800 | 378 | a8,980 | 9,120 | 322 | 7,930 |
| 24..... | 7,640 | 376 | 7,760 | 9,680 | 350 | a9,150 | 8,640 | 316 | 7,370 |
| 25..... | 8,200 | 394 | 8,720 | 10,700 | 413 | a11,900 | 8,200 | 394 | 6,440 |
| 26..... | 7,920 | 376 | 8,040 | 10,000 | 410 | a11,100 | 8,090 | 304 | 6,640 |
| 27..... | 7,880 | 392 | 8,340 | 9,600 | 373 | a9,670 | 8,440 | 299 | 6,810 |
| 28..... | 7,470 | 329 | 6,640 | 10,700 | 402 | a11,600 | 8,830 | 334 | 7,960 |
| 29..... | 6,600 | 296 | a5,270 | 12,600 | 436 | a14,800 | 8,800 | 325 | 7,720 |
| 30..... | 6,800 | 293 | a5,380 | 14,200 | 476 | a18,200 | 9,600 | 388 | 10,000 |
| 31..... | 5,920 | 244 | 3,900 | -- | -- | -- | 11,700 | 421 | a13,300 |
| Total. | 144,830 | -- | 93,810 | 244,170 | -- | 213,330 | 279,600 | -- | 285,990 |
| | August | | | | | | | | |
| 1..... | 10,400 | 339 | 9,520 | | | | | | |
| 2..... | 8,880 | 354 | 8,490 | | | | | | |
| 3..... | 9,790 | 407 | 10,800 | | | | | | |
| 4..... | 9,730 | 290 | 7,620 | | | | | | |
| 5..... | 7,800 | 294 | 6,190 | | | | | | |
| 6..... | 6,840 | 269 | 4,970 | | | | | | |
| 7..... | 6,930 | 336 | 6,290 | | | | | | |
| 8..... | 8,090 | 464 | 10,100 | | | | | | |
| 9..... | 9,040 | 486 | 10,900 | | | | | | |
| 10..... | 10,000 | 424 | 11,400 | | | | | | |
| 11..... | 11,500 | 377 | 11,700 | | | | | | |
| 12..... | 11,400 | 446 | 13,700 | | | | | | |
| 13..... | 11,300 | 571 | a17,400 | | | | | | |
| 14..... | 10,000 | 522 | a14,100 | | | | | | |
| 15..... | 8,490 | 395 | 9,050 | | | | | | |
| 16..... | 9,900 | 463 | 12,400 | | | | | | |
| 17..... | 7,800 | 383 | 7,860 | | | | | | |
| 18..... | 6,120 | 320 | 5,290 | | | | | | |
| 19..... | 5,520 | 289 | 4,310 | | | | | | |
| 20..... | 5,390 | 298 | a4,340 | | | | | | |
| 21..... | 5,000 | 440 | 5,940 | | | | | | |
| 22..... | 4,400 | 300 | a3,560 | | | | | | |
| 23..... | 4,030 | 300 | a3,260 | | | | | | |
| 24..... | 3,760 | 300 | a3,040 | | | | | | |
| 25..... | 4,050 | 300 | a3,280 | | | | | | |
| 26..... | 4,610 | 300 | a3,730 | | | | | | |
| 27..... | 3,870 | 300 | a3,130 | | | | | | |
| 28..... | 4,600 | 300 | a3,730 | | | | | | |
| 29..... | 3,870 | 300 | a3,130 | | | | | | |
| 30..... | 3,400 | 300 | a2,750 | | | | | | |
| 31..... | 3,140 | 300 | a2,540 | | | | | | |
| Total. | 219,450 | -- | 225,520 | | | | | | |

Total discharge for period, May to August (cfs-days)..... 888,050
Total load for period, May to August (tons)..... 818,650

a Estimated from discharge-concentration graph.

## 565. CHILKAT RIVER NEAR KLUKWAN--Continued

Particle-size analyses of suspended sediment, July and September 1960
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Concentration of suspension analyzed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | | | |
| | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.350 | 0.500 | 1.000 | |
| July 3, 1960.... | 11:00 a.m. | 8,570 | 46 | 297 | 1,650 | 11 | 13 | 22 | 29 | 36 | 51 | 66 | 83 | | 97 | 100 | SBWCM |
| July 27 ..... | 5:00 p.m. | 9,440 | 47 | 288 | 1,870 | 11 | 16 | 22 | 30 | 38 | 51 | 62 | 85 | | 97 | 100 | SBWCM |
| Sept. 28 ..... | 2:00 p.m. | 2,250 | 42 | 262 | -- | -- | -- | -- | -- | -- | 22 | 30 | 40 | | 62 | 94 | S |

## 600. Perseverance Creek near Wacker

Location.--Lat 55°24'40", long 131°40'05", on Revillagigedo Island, on right bank 500 ft downstream from Perseverance Lake, half a mile upstream from Connell Lake, 2 miles east of Wacker, and 4 miles north of Ketchikan.

Drainage area.--2.81 sq mi.

Records available.--October 1931 to September 1938, November 1938, June to September 1939, October 1946 to September 1960. Monthly discharge only for some periods, published in WSP 1372.

Gage.--Water-stage recorder and wooden control. Altitude of gage is 600 ft (from topographic map). Prior to October 1946, at site 100 ft upstream at different datum.

Average discharge.--21 years (1931-38, 1946-60), 36.7 cfs (26,570 acre-ft per year).

Extremes.--Maximum discharge during year, 451 cfs Dec. 5 (gage height, 4.77 ft), from rating curve extended above 190 cfs; minimum, 1.0 cfs Aug. 13, 14 (gage height, 1.01 ft).
1931-39, 1946-60: Maximum discharge, 543 cfs Oct. 30, 1949 (gage height, 5.26 ft), from rating curve extended above 190 cfs; minimum daily, 0.4 cfs Sept. 26, 1957.

Remarks.--Records good.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14 | 82 | 296 | 15 | 76 | 2.3 | 24 | 30 | 55 | 15 | 1.8 | 11 |
| 2 | 12 | 78 | 141 | 10 | 58 | 1.9 | 52 | 30 | 48 | 18 | 1.6 | 8.3 |
| 3 | *9.1 | 35 | 60 | 7.5 | 38 | 1.7 | 98 | 30 | 42 | 30 | 1.5 | 126 |
| 4 | 7.9 | 19 | 91 | 7.5 | 23 | 1.6 | 265 | 30 | 34 | 26 | 1.5 | 183 |
| 5 | 6.5 | 82 | 335 | 65 | 20 | 1.4 | 114 | 33 | 26 | 23 | 1.4 | 89 |
| 6 | 5.2 | 69 | 212 | 60 | 21 | 1.6 | 44 | 57 | 25 | 243 | 1.3 | 46 |
| 7 | 4.0 | 132 | 69 | 34 | *26 | 2.8 | 27 | 58 | 25 | 122 | 1.2 | 26 |
| 8 | 3.8 | 176 | 46 | 20 | 21 | 3.4 | 44 | 50 | 21 | 59 | 1.2 | 18 |
| 9 | 2.9 | 88 | 54 | 16 | 15 | 3.6 | 88 | 37 | 19 | 30 | 1.2 | 18 |
| 10 | 2.3 | 40 | *76 | 14 | 11 | 4.8 | 78 | 34 | 32 | 20 | 1.1 | 15 |
| 11 | 1.7 | 22 | 64 | 10 | 10 | 6.0 | 48 | 46 | 37 | 14 | 1.1 | 12 |
| 12 | 22 | 13 | 59 | 8.7 | 20 | 7.0 | 39 | 42 | *32 | 18 | 1.1 | 8.3 |
| 13 | 191 | 9.9 | 53 | 14 | 18 | 6.8 | 30 | 35 | 33 | 24 | 1.0 | 7.0 |
| 14 | 186 | 7.0 | 80 | 16 | 26 | 9.1 | 22 | 31 | 44 | 21 | 1.0 | 6.5 |
| 15 | 65 | 5.2 | 52 | 12 | 28 | 9.5 | 18 | 39 | 69 | *33 | 9.3 | 5.0 |
| 16 | 45 | 4.2 | 29 | 9.1 | 20 | 21 | 16 | 48 | 104 | 186 | 27 | 3.8 |
| 17 | 192 | 4.8 | 18 | 9.5 | 13 | 88 | 19 | 38 | 62 | 276 | 29 | 15 |
| 18 | 122 | 11 | 21 | 11 | 9.9 | 276 | *24 | 26 | 54 | 88 | 42 | 42 |
| 19 | 81 | 56 | 44 | 9.9 | 12 | 341 | 26 | 32 | 35 | 38 | 30 | 29 |
| 20 | 84 | 108 | 37 | 7.9 | 64 | 144 | 24 | 30 | 26 | 22 | 36 | 20 |
| 21 | 112 | 86 | 28 | 6.5 | 41 | 140 | 26 | 26 | 31 | 18 | 28 | 78 |
| 22 | 150 | 90 | 27 | 5.2 | 23 | 71 | 22 | 29 | 52 | 30 | 18 | *177 |
| 23 | 117 | 63 | 19 | 4.6 | 15 | 54 | 20 | 30 | 63 | 28 | 12 | 77 |
| 24 | 119 | 41 | 14 | 3.6 | 11 | 44 | 21 | 26 | 41 | 18 | 8.7 | 95 |
| 25 | 77 | 24 | 11 | 2.8 | 7.9 | 150 | 21 | 26 | 28 | 13 | 6.5 | 52 |
| 26 | 35 | 15 | 23 | 2.3 | 6.0 | 95 | 23 | 30 | 23 | 9.5 | 4.8 | 28 |
| 27 | 24 | 20 | 68 | 2.2 | 4.8 | 44 | 23 | 42 | 20 | 6.8 | 14 | 17 |
| 28 | 18 | 60 | 134 | 8.2 | 4.0 | 26 | 25 | 80 | 17 | 5.5 | 35 | 13 |
| 29 | 55 | 84 | 82 | 74 | 3.0 | 23 | 29 | 66 | 20 | 4.4 | 28 | 9.1 |
| 30 | 66 | 121 | 38 | 66 | ------ | 20 | 29 | 40 | 18 | 3.2 | 19 | 7.2 |
| 31 | 56 | ------ | 21 | 117 | ------ | 23 | ------ | 27 | ------ | 2.5 | 15 | ------ |
| Total | 1,886.4 | 1,646.1 | 2,302 | 649.5 | 645.6 | 1,623.5 | 1,339 | 1,178 | 1,136 | 1,444.9 | 380.3 | 1,242.2 |
| Mean | 60.9 | 54.9 | 74.3 | 21.0 | 22.3 | 52.4 | 44.6 | 38.0 | 37.9 | 46.6 | 12.3 | 41.4 |
| Cfsm | 21.7 | 19.5 | 26.4 | 7.47 | 7.94 | 18.6 | 15.9 | 13.5 | 13.5 | 16.6 | 4.38 | 14.7 |
| In. | 24.97 | 21.79 | 30.47 | 8.60 | 8.54 | 21.49 | 17.72 | 15.59 | 15.03 | 19.12 | 5.03 | 16.44 |
| Ac-ft | 3,740 | 3,260 | 4,570 | 1,290 | 1,280 | 3,220 | 2,660 | 2,340 | 2,250 | 2,870 | 754 | 2,460 |

Calendar year 1959: Max 335 Min 1.7 Mean 39.9 Cfsm 14.2 In. 192.63 Ac-ft 28,870
Water year 1959-60: Max 341 Min 1.0 Mean 42.3 Cfsm 15.1 In. 204.79 Ac-ft 30,690

Peak discharge (base, 250 cfs).--Oct. 13 (8 p.m.) 314 cfs (3.97 ft); Dec. 1 (12:30 a.m.) 446 cfs (4.74 ft); Dec. 5 (6:30 p.m.) 451 cfs (4.77 ft); Mar. 19 (3 a.m.) 442 cfs (4.7 ft); Apr. 4 (11 a.m.) 305 cfs (3.9 ft); July 17 (5 a.m.) 387 cfs (4.38 ft); Sept. 3 (10 p.m.) 270 cfs (3.68 ft); Sept. 22 (1 a.m.) 252 cfs (3.57 ft).

* Discharge measurement made on this day.

## 720. Fish Creek near Ketchikan

Location.--Lat 55°23'30", long 131°11'40", on Revillagigedo Island, on right bank 50 ft upstream from outlet of Low Lake, 600 ft upstream from mouth at head of Thorne Arm, and 18 miles east of Ketchikan.

Drainage area.--32.1 sq mi, excludes that of Granite Lake drainage basin.

Records available.--May 1915 to October 1935, October 1938 to September 1960. Monthly discharge only for some periods, published in WSP 1372. Prior to January 1921, published as "near sea level, Revillagigedo Island."

Gage.--Water-stage recorder. Altitude of gage is 20 ft (by barometer). May 1915 to November 1935, at same site at different datum.

Average discharge.--42 years, 419 cfs (303,300 acre-ft per year).

Extremes.--Maximum discharge during year, 4,140 cfs Dec. 6 (gage height, 4.90 ft); minimum, 56 cfs Mar. 6 (gage height, 0.76 ft).
1915-35, 1938-60: Maximum discharge, 4,600 cfs Nov. 1, 1917 (gage height, 5.33 ft, datum then in use), from rating curve extended above 1,400 cfs; minimum daily, 20 cfs Sept. 9, 10, 1928.

Remarks.--Records good except those for periods of no gage-height record, which are fair. Lakes in the basin are as follows: Basin Lake (240 acres), Mirror Lake (1,350 acres), Third Lake (180 acres), Big Lake (358 acres), and Low Lake (55 acres).

Revisions (water years).--WSP 1372: 1918.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 290 | 960 | 1,610 | 264 | | 80 | | 441 | 621 | 476 | 190 | 246 |
| 2 | *275 | 1,200 | 1,700 | 206 | | 76 | | 462 | 980 | 420 | 177 | 200 |
| 3 | 264 | 820 | 1,220 | 164 | | 68 | | 483 | 838 | 476 | 169 | 205 |
| 4 | 258 | 533 | 920 | 149 | | 64 | | 490 | 621 | 490 | 161 | 331 |
| 5 | 216 | 478 | 2,700 | 198 | 280 | 59 | | 512 | 483 | 469 | 152 | 589 |
| 6 | 175 | 654 | 3,420 | 340 | | 59 | | 550 | 420 | 645 | 141 | 589 |
| 7 | 153 | 820 | 1,830 | 389 | | 64 | | 621 | 394 | 1,190 | 130 | 498 |
| 8 | 142 | 1,820 | 1,280 | 314 | | 62 | | 637 | 388 | 1,020 | 120 | 400 |
| 9 | 126 | 1,990 | *970 | 253 | *282 | 62 | | 558 | 355 | 748 | 113 | 434 |
| 10 | 113 | 1,190 | 1,070 | 220 | 226 | 64 | 670 | 462 | 355 | 550 | 110 | 407 |
| 11 | 100 | 713 | 960 | 184 | 216 | 74 | | 483 | 476 | 441 | 108 | 331 |
| 12 | 200 | 462 | 856 | 168 | 340 | 82 | | 558 | 498 | 420 | 106 | 268 |
| 13 | 744 | 320 | 713 | 198 | 301 | 90 | | 542 | *469 | 420 | 100 | 225 |
| 14 | 1,730 | 231 | 730 | 188 | 361 | 107 | | 528 | 469 | 388 | 96 | 195 |
| 15 | 1,310 | 180 | 662 | 171 | 327 | 119 | | 490 | 535 | 349 | 103 | 173 |
| 16 | 838 | 153 | 485 | 149 | 264 | 171 | | 520 | 696 | *621 | 230 | 152 |
| 17 | 1,310 | 135 | 354 | 135 | 216 | 334 | | 512 | 793 | 1,420 | 455 | 152 |
| 18 | 1,670 | 132 | 308 | 126 | 175 | 748 | | 448 | 679 | 1,290 | 605 | 246 |
| 19 | 1,330 | 231 | 403 | 113 | 160 | 1,450 | | 434 | 565 | 820 | 621 | 313 |
| 20 | 1,090 | 549 | 448 | | 264 | 1,260 | *355 | 476 | 469 | 550 | 874 | 295 |
| 21 | 1,070 | 920 | 525 | | 308 | 1,090 | 374 | 469 | 434 | 427 | 829 | *337 |
| 22 | 1,200 | 980 | 541 | | 275 | | 343 | 434 | 483 | 414 | 573 | 874 |
| 23 | 1,230 | 775 | 389 | | 226 | | 325 | 441 | 645 | 394 | 420 | 1,100 |
| 24 | 1,420 | 605 | 294 | | 180 | | 337 | 420 | 662 | 362 | 343 | 1,220 |
| 25 | 1,220 | 440 | 236 | 170 | 149 | | 355 | 400 | 573 | 313 | 295 | 1,090 |
| 26 | 802 | 320 | 437 | | 132 | 700 | 368 | 420 | 505 | 273 | 246 | 730 |
| 27 | 597 | 253 | 883 | | 113 | | 388 | 476 | 462 | 240 | 215 | 490 |
| 28 | 501 | 282 | 829 | | 100 | | 400 | 581 | 462 | 220 | 325 | 355 |
| 29 | 485 | 493 | 730 | | 87 | | 434 | 662 | 542 | 210 | 441 | 268 |
| 30 | 793 | 637 | 509 | | ------ | | 448 | 605 | 565 | 205 | 400 | 215 |
| 31 | 892 | ------ | 361 | | ------ | | ------ | 490 | ------ | 200 | 313 | ------ |
| Total | 22,544 | 19,276 | 28,373 | 5,969 | 6,942 | 13,183 | 16,857 | 15,605 | 16,437 | 16,461 | 9,161 | 12,928 |
| Mean | 727 | 643 | 915 | 193 | 239 | 425 | 562 | 503 | 548 | 531 | 296 | 431 |
| Cfsm | 22.6 | 20.0 | 28.5 | 6.01 | 7.45 | 13.2 | 17.5 | 15.7 | 17.1 | 16.5 | 9.22 | 13.4 |
| In. | 26.12 | 22.33 | 32.87 | 6.92 | 8.04 | 15.27 | 19.53 | 18.08 | 19.04 | 18.07 | 10.61 | 14.98 |
| Ac-ft | 44,720 | 38,230 | 56,280 | 11,840 | 13,770 | 26,150 | 33,440 | 30,950 | 32,600 | 32,650 | 18,170 | 25,640 |

Calendar year 1959: Max 3,420 Min 59 Mean 502 Cfsm 15.6 In. 212.23 Ac-ft 363,300
Water year 1959-60: Max 3,420 Min 59 Mean 502 Cfsm 15.6 In. 212.83 Ac-ft 364,400

Peak discharge (base, 1,800 cfs).--Oct. 14 (12 m.) 1,830 cfs (3.07 ft); Oct. 18 (3 a.m.) 1,820 cfs (3.06 ft); Nov. 8 (11 p.m.) 2,360 cfs (3.52 ft); Dec. 1 (7 p.m.) 1,850 cfs (3.09 ft); Dec. 6 (1 a.m.) 4,140 cfs (4.90 ft); Apr. 4 (time unknown) 2,440 cfs (3.58 ft).

* Discharge measurement made on this day.
Note.--No gage-height record Oct. 1, Jan. 20 to Feb. 8, Mar. 22 to Apr. 19; discharge estimated on basis of recorded range in stage, weather records, and records for stations on nearby streams.

## 760. Manzanita Creek near Ketchikan

Location.--Lat 55°36', long 130°59', on Revillagigedo Island, on right bank a quarter of a mile upstream from mouth at Manzanita Bay, East Behm Canal, 2 miles downstream from Manzanita Lake, and 31 miles northeast of Ketchikan.

Drainage area.--33.9 sq mi.

Records available.--October 1927 to September 1937, August 1947 to September 1960. Monthly discharge only for some periods, published in WSP 1372.

Gage.--Water-stage recorder. Altitude of gage is 140 ft (by barometer).

Average discharge.--23 years, 469 cfs (339,500 acre-ft per year).

Extremes.--Maximum discharge during year, 4,360 cfs Dec. 5 (gage height, 9.36 ft, from floodmarks), from rating curve extended above 1,700 cfs by logarithmic plotting; minimum, 130 cfs Mar. 10-11 (gage height, 1.89 ft).
1927-37, 1947-60: Maximum discharge, that of Dec. 5, 1959; minimum discharge not determined.
A discharge of 4,480 cfs occurred sometime during period 1938-47 (gage height, 8.7 ft, from floodmark in well).

Remarks.--Records good except those for period of no gage-height record, which are fair. There are two lakes above gage, Manzanita Lake (1,610 acres) and January Lake on North Fork Manzanita Creek.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 355 | 1,190 | a1,600 | 402 | 413 | 166 | 431 | 602 | 988 | 536 | 332 | 290 |
| 2 | 350 | 916 | a1,400 | 372 | 405 | 160 | 575 | 608 | 840 | 572 | 315 | 272 |
| 3 | 325 | 773 | a1,250 | 342 | 372 | 154 | 791 | 623 | 756 | 581 | 302 | 443 |
| 4 | *310 | 677 | a2,200 | 330 | 330 | 148 | 1,760 | 632 | 695 | 578 | 290 | 449 |
| 5 | 282 | 812 | a2,900 | 482 | 330 | 143 | 1,110 | 638 | 659 | 551 | 272 | 485 |
| 6 | 255 | 759 | a2,200 | 419 | 345 | 141 | 932 | 704 | 632 | 954 | 258 | 464 |
| 7 | 238 | 1,080 | a1,900 | 380 | 419 | 141 | 843 | 689 | 623 | 854 | 245 | 402 |
| 8 | 225 | 1,560 | *1,570 | 348 | *355 | 137 | 857 | 683 | 578 | 724 | 235 | 395 |
| 9 | 211 | 1,130 | 1,360 | 328 | 318 | 135 | 960 | 629 | 548 | 674 | 225 | 446 |
| 10 | 199 | 932 | 1,380 | 312 | 292 | 131 | 868 | 653 | 605 | 626 | 215 | 372 |
| 11 | 185 | 790 | 1,180 | 292 | 282 | 131 | 773 | 734 | 617 | 587 | 209 | 342 |
| 12 | 410 | 686 | 1,070 | 275 | 342 | 132 | 710 | 689 | 587 | 611 | 201 | 322 |
| 13 | 884 | 611 | 940 | 272 | 300 | 132 | 704 | 668 | *575 | 569 | 193 | 310 |
| 14 | 707 | 539 | 1,000 | 265 | 342 | 137 | 644 | 647 | 599 | 530 | 185 | 295 |
| 15 | 554 | 479 | 864 | 248 | 320 | 138 | 593 | 659 | 659 | 549 | 253 | 272 |
| 16 | 620 | 434 | 748 | 233 | 285 | 166 | 548 | 671 | 784 | 766 | 328 | 255 |
| 17 | 1,080 | 398 | 662 | 225 | 260 | 360 | 512 | 626 | 674 | 1,090 | 325 | 362 |
| 18 | 846 | 382 | 626 | 215 | 240 | 657 | 509 | 593 | 641 | 773 | 425 | 385 |
| 19 | 944 | 518 | 707 | 205 | 238 | 748 | *539 | 644 | 596 | 689 | 413 | 332 |
| 20 | 892 | 752 | 632 | 195 | 355 | 575 | 512 | 647 | 569 | 626 | 461 | *300 |
| 21 | 928 | 680 | 620 | 189 | 280 | 665 | 515 | 626 | 584 | 593 | 405 | 592 |
| 22 | 1,090 | 668 | 605 | 179 | 255 | 581 | 506 | 629 | 653 | 623 | 365 | 844 |
| 23 | 1,380 | 650 | 518 | 170 | 238 | 554 | 530 | 608 | 695 | 563 | 348 | 854 |
| 24 | 1,200 | 560 | 470 | 163 | 225 | 518 | 536 | 593 | 620 | 524 | 335 | 948 |
| 25 | 1,010 | 491 | 425 | 160 | 211 | 720 | 545 | 590 | 599 | 482 | 318 | 773 |
| 26 | 850 | 440 | 500 | 154 | 201 | 590 | 554 | 614 | 569 | 455 | 298 | 668 |
| 27 | 815 | 410 | 748 | 150 | 191 | 524 | 557 | 602 | 563 | 428 | 372 | 596 |
| 28 | 731 | a450 | 635 | 150 | 185 | 479 | 578 | 671 | 620 | 405 | 425 | 539 |
| 29 | 948 | a580 | 569 | 446 | 175 | 464 | 581 | 644 | 644 | 388 | 375 | 485 |
| 30 | 874 | a970 | 494 | 300 | ------ | 455 | 569 | 605 | 578 | 372 | 338 | 446 |
| 31 | 868 | ------ | 443 | 518 | ------ | 443 | ------ | 587 | ------ | 350 | 312 | ------ |
| Total | 20,566 | 21,317 | 32,216 | 8,719 | 8,504 | 10,625 | 20,642 | 19,808 | 19,350 | 18,623 | 9,573 | 13,938 |
| Mean | 663 | 711 | 1,039 | 281 | 293 | 343 | 688 | 639 | 645 | 601 | 309 | 465 |
| Cfsm | 19.6 | 21.0 | 30.6 | 8.29 | 8.64 | 10.1 | 20.3 | 18.8 | 19.0 | 17.7 | 9.12 | 13.7 |
| In. | 22.56 | 23.39 | 35.34 | 9.57 | 9.33 | 11.66 | 22.65 | 21.73 | 21.23 | 20.43 | 10.50 | 15.29 |
| Ac-ft | 40,790 | 42,280 | 63,900 | 17,290 | 16,870 | 21,070 | 40,940 | 39,290 | 38,380 | 36,940 | 18,990 | 27,650 |

Calendar year 1959: Max 2,900 Min 144 Mean 550 Cfsm 16.2 In. 220.11 Ac-ft 398,000
Water year 1959-60: Max 2,900 Min 131 Mean 557 Cfsm 16.4 In. 223.68 Ac-ft 404,400

Peak discharge (base, 1,700 cfs).--Oct. 23 (8 a.m.) 2,210 cfs (7.08 ft); Oct. 29 (2 p.m.) 1,830 cfs (6.57 ft); Nov. 1 (4 p.m.) 2,410 cfs (7.32 ft); Nov. 8 (3 p.m.) 1,790 cfs (6.51 ft); Dec. 1 (time and discharge unknown); Dec. 5 (time unknown) 4,360 cfs (9.36 ft); Apr. 4 (4:30 a.m.) 2,380 cfs (7.29 ft); July 17 (3 a.m.) 1,740 cfs (6.44 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of floodmarks, weather records, and records for stations on nearby streams.

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## 865. Neck Creek near Point Baker

Location.--Lat 56°05'55", long 133°08'20", on Prince of Wales Island, on right bank a quarter of a mile downstream from Neck Lake, a quarter of a mile upstream from mouth at Whale Passage, and about 25 miles southeast of Point Baker.

Drainage area.--17.0 sq mi.

Records available.--April to September 1960.

Gage.--Water-stage recorder. Altitude of gage is about 4 ft above mean sea level.

Extremes.--Maximum discharge during period, 370 cfs Sept. 24 (gage height, 2.12 ft); minimum, 32 cfs Aug. 13-15.

Remarks.--Records good except those for period of backwater from aquatic vegetation, which are fair.

Discharge, in cubic feet per second, April to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | - | 64 | 90 | 72 | 42 | 60 |
| 2 | | | | | | | - | 61 | 121 | 84 | 41 | 55 |
| 3 | | | | | | | - | 58 | 108 | 100 | 40 | 94 |
| 4 | | | | | | | - | 57 | 95 | 100 | 40 | 113 |
| 5 | | | | | | | - | 55 | 84 | 92 | 40 | 106 |
| 6 | | | | | | | - | 53 | 77 | 98 | 40 | 92 |
| 7 | | | | | | | - | 55 | 70 | 100 | 40 | 78 |
| 8 | | | | | | | - | 57 | 63 | 90 | 38 | 97 |
| 9 | | | | | | | - | 57 | 59 | 79 | 38 | 246 |
| 10 | | | | | | | - | 56 | 63 | 71 | 38 | 226 |
| 11 | | | | | | | - | 58 | 68 | 64 | 35 | 157 |
| 12 | | | | | | | - | 61 | 73 | 65 | 34 | 119 |
| 13 | | | | | | | - | 59 | 75 | 67 | 34 | 106 |
| 14 | | | | | | | - | 56 | 90 | 63 | 32 | 95 |
| 15 | | | | | | | - | 57 | 106 | 60 | 41 | 83 |
| 16 | | | | | | | - | 64 | *129 | 70 | 54 | 74 |
| 17 | | | | | | | - | 64 | 157 | 80 | 62 | 78 |
| 18 | | | | | | | - | 62 | 157 | 78 | 80 | 92 |
| 19 | | | | | | | - | 66 | 131 | *69 | 108 | 100 |
| 20 | | | | | | | - | 78 | 107 | 62 | 97 | 94 |
| 21 | | | | | | | - | 79 | 113 | 59 | 86 | 124 |
| 22 | | | | | | | - | 75 | 131 | 58 | 75 | 298 |
| 23 | | | | | | | - | 70 | 149 | 54 | 67 | *315 |
| 24 | | | | | | | *85 | 64 | 125 | 51 | 67 | 335 |
| 25 | | | | | | | 80 | 59 | 101 | 48 | 63 | 278 |
| 26 | | | | | | | 75 | 57 | 86 | 51 | 58 | 187 |
| 27 | | | | | | | 71 | 54 | 79 | 50 | 58 | 136 |
| 28 | | | | | | | 68 | 58 | 79 | 49 | 79 | 106 |
| 29 | | | | | | | 66 | 71 | 81 | 47 | 85 | 89 |
| 30 | | | | | ------ | | 63 | 70 | 77 | 45 | 78 | 79 |
| 31 | | ------ | | | ------ | | ------ | 66 | ------ | 43 | 67 | ------ |
| Total | | | | | | | - | 1,921 | 2,944 | 2,119 | 1,757 | 4,112 |
| Mean | | | | | | | - | 62.0 | 98.1 | 63.4 | 56.7 | 137 |
| Cfsm | | | | | | | - | 3.65 | 5.77 | 4.02 | 3.34 | 8.06 |
| In. | | | | | | | - | 4.20 | 6.44 | 4.64 | 3.84 | 9.00 |
| Ac-ft | | | | | | | - | 3,810 | 5,840 | 4,200 | 3,480 | 8,160 |

| | | | | | |
|---|---|---|---|---|---|
| Calendar year | : Max | Min | Mean | Cfsm | In. | Ac-ft |
| Water year | : Max | Min | Mean | Cfsm | In. | Ac-ft |

Peak discharge (base, 500 cfs).--No peak above base.

* Discharge measurement made on this day.

Note.--Backwater from aquatic vegetation June 17 to Sept. 8.

## 940. Deer Lake Outlet near Port Alexander

Location.--Lat 56°31'10", long 134°40'10", on Baranof Island, on right bank at tidewater at Mist Cove, an eighth of a mile downstream from Deer Lake and 19 miles north of Port Alexander.

Drainage area.--7.41 sq mi.

Records available.--June 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is about 1 ft above mean sea level.

Average discharge.--9 years, 156 cfs (112,900 acre-ft per year).

Extremes.--Maximum discharge recorded during year, 374 cfs July 17 (gage height, 3.04 ft); minimum, 40 cfs Mar. 10 (gage height, 1.72 ft).
1951-60: Maximum discharge, 642 cfs Oct. 22, 1953 (gage height, 3.47 ft); minimum, 9.4 cfs Mar. 23, 1956 (gage height, 0.73 ft), caused by temporary storage behind ice jam upstream.

Remarks.--Records good except those for period of no gage-height record, which are fair. There are two lakes above gage, Deer Lake (968 acres), and Deer Upper Lake (139 acres).

Revisions.--WSP 1640: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 109 | 206 | a250 | 168 | 117 | 62 | 90 | 117 | 264 | 206 | 157 | 88 |
| 2 | 108 | 188 | a300 | 157 | 129 | 59 | 91 | 118 | 264 | 230 | 151 | 93 |
| 3 | 104 | 171 | a315 | 145 | 127 | 54 | 94 | 120 | 250 | 250 | 148 | 127 |
| 4 | 90 | 157 | a350 | 138 | *124 | 52 | 101 | 122 | 234 | 250 | 145 | 165 |
| 5 | 84 | 154 | a370 | 145 | 122 | 48 | 101 | 124 | 222 | 242 | 140 | 178 |
| 6 | 83 | 151 | a350 | 151 | 131 | 48 | 98 | 140 | 210 | 234 | 134 | 174 |
| 7 | *80 | 178 | a340 | 145 | 138 | 48 | 98 | 165 | 203 | 222 | 129 | 168 |
| 8 | 75 | 199 | a305 | 140 | 140 | 46 | 98 | 174 | 199 | 210 | 127 | 199 |
| 9 | 71 | 196 | a280 | 134 | 134 | 43 | 98 | 174 | *192 | 203 | 124 | 234 |
| 10 | 64 | 185 | a250 | 124 | 129 | 40 | 98 | 174 | 206 | 192 | 122 | 226 |
| 11 | 58 | 171 | a225 | 118 | 124 | 43 | 104 | 174 | 210 | 185 | 118 | 222 |
| 12 | 55 | 154 | 210 | 117 | 134 | 49 | 109 | 171 | 206 | 185 | 117 | 210 |
| 13 | 58 | 143 | 218 | 120 | 138 | 48 | 115 | 168 | 210 | 192 | 111 | 196 |
| 14 | 71 | 131 | 214 | 113 | 148 | 47 | 115 | 165 | 210 | 203 | 108 | 181 |
| 15 | 72 | 120 | 203 | 109 | 145 | 45 | *111 | 165 | 230 | 214 | 113 | 165 |
| 16 | 80 | 115 | 188 | 102 | 138 | 48 | 109 | 162 | 259 | 278 | 113 | 154 |
| 17 | 120 | 115 | 178 | 104 | 131 | 51 | 106 | 160 | 259 | 362 | 117 | 145 |
| 18 | 122 | 134 | 174 | 99 | 122 | 55 | 109 | 157 | 246 | 350 | 124 | 138 |
| 19 | 120 | 162 | 185 | 91 | 117 | 61 | 111 | 154 | 234 | 318 | 124 | 129 |
| 20 | 120 | 174 | 196 | 88 | 115 | 71 | 113 | 154 | 226 | *282 | 122 | 122 |
| 21 | 122 | 185 | 199 | 82 | 109 | 83 | 113 | 151 | 234 | 255 | 122 | 136 |
| 22 | 145 | 222 | 196 | 83 | 104 | 90 | 109 | 154 | 250 | 238 | 117 | 157 |
| 23 | 154 | 222 | 185 | 73 | 96 | 102 | 106 | 160 | 250 | 218 | 113 | 171 |
| 24 | 151 | 210 | 178 | 68 | 91 | 104 | 104 | 162 | 242 | 203 | 109 | *210 |
| 25 | 140 | 196 | 171 | 64 | 85 | 104 | 104 | 162 | 234 | 192 | 104 | 210 |
| 26 | 143 | 192 | 188 | 60 | 82 | 102 | 104 | 162 | 226 | 185 | 99 | 199 |
| 27 | 165 | 192 | 222 | 58 | 76 | 99 | 104 | 188 | 214 | 178 | 99 | 181 |
| 28 | 162 | 199 | 226 | 59 | 72 | 98 | 106 | 250 | 210 | 174 | 102 | 168 |
| 29 | 199 | 206 | 210 | 64 | 67 | 93 | 109 | 268 | 206 | 171 | 101 | 154 |
| 30 | 234 | 210 | 196 | 82 | ------ | 91 | 113 | 259 | 210 | 168 | 98 | 143 |
| 31 | 222 | ------ | 181 | 104 | ------ | 90 | ------ | 250 | ------ | 162 | 93 | ------ |
| Total | 3,581 | 5,238 | 7,253 | 3,305 | 3,385 | 2,074 | 3,141 | 5,224 | 6,810 | 6,952 | 3,701 | 5,043 |
| Mean | 116 | 175 | 234 | 107 | 117 | 66.9 | 105 | 169 | 227 | 224 | 119 | 168 |
| Cfsm | 15.7 | 23.6 | 31.6 | 14.4 | 15.8 | 9.03 | 14.2 | 22.8 | 30.6 | 30.2 | 16.1 | 22.7 |
| In. | 17.97 | 26.29 | 36.40 | 16.59 | 16.99 | 10.41 | 15.76 | 26.22 | 34.18 | 34.89 | 18.57 | 25.31 |
| Ac-ft | 7,100 | 10,390 | 14,390 | 6,560 | 6,710 | 4,110 | 6,230 | 10,360 | 13,510 | 13,790 | 7,340 | 10,000 |

Calendar year 1959: Max 380 Min 48 Mean 149 Cfsm 20.1 In. 272.06 Ac-ft 107,500
Water year 1959-60: Max 370 Min 40 Mean 152 Cfsm 20.5 In. 279.58 Ac-ft 110,500

Peak discharge (base, 350 cfs).--Dec. 5 (time and discharge unknown); July 17 (5 p.m.) 374 cfs (3.04 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of weather records and records for stations on nearby streams.

## 980. Baranof River at Baranof

Location.--Lat 57°05'15", long 134°50'30", on Baranof Island, on left bank at outlet of Baranof Lake, 1,500 ft upstream from mouth and town of Baranof.

Drainage area.--32.0 sq mi.

Records available.--July 1915 to January 1928, October 1957 to September 1960. Monthly discharge only for some periods, published in WSP 1372.

Gage.--Water-stage recorder. Altitude of gage is 140 ft (from topographic map). Prior to Oct. 1, 1957, at site 700 ft downstream at different datum.

Average discharge.--15 years (1915-27, 1957-60), 432 cfs (312,800 acre-ft per year).

Extremes.--Maximum discharge during year not determined, occurred Sept. 8 during period of no gage-height record; minimum not determined.
1915-28, 1957-60: Maximum discharge recorded, 4,170 cfs Sept. 24, 1922 (gage height, 5.8 ft, site and datum then in use), from rating curve extended above 1,800 cfs; minimum daily, 27 cfs Feb. 13, 14, 1916, Jan. 31, 1923.

Remarks.--Records fair except those for periods of no gage-height record, which are poor. Baranof Lake has an area of 698 acres.

Revisions (water years).--WSP 1372: 1918. WSP 1570: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 780 | | | | 307 | 60 | | 522 | | 720 | 688 | 281 |
| 2 | 904 | | | | 352 | 60 | | 572 | | 804 | 624 | |
| 3 | 744 | | | | *284 | 61 | | 568 | | 884 | 664 | |
| 4 | 580 | | | | 220 | 62 | | 592 | | 776 | 584 | |
| 5 | 418 | | | | 178 | 55 | | 664 | a685 | 724 | 544 | |
| 6 | 304 | | | | 179 | 56 | | 982 | | 668 | 533 | |
| 7 | *234 | | a240 | | 251 | 64 | | 1,180 | | 672 | | |
| 8 | 196 | | | | 230 | 65 | a140 | 940 | *684 | 704 | | |
| 9 | 162 | | | | 178 | 64 | | 740 | 608 | 648 | a740 | a1,150 |
| 10 | 137 | | | | 146 | 60 | | 624 | 748 | 592 | | |
| 11 | 122 | | | | 134 | 59 | | 608 | 792 | 640 | | |
| 12 | 122 | | | | 156 | 70 | | 608 | 652 | 632 | 584 | |
| 13 | 199 | | 240 | | 164 | 70 | | 608 | 620 | 1,070 | 498 | |
| 14 | 575 | | 244 | | 162 | 67 | *320 | 608 | 624 | 1,000 | 463 | |
| 15 | 592 | a352 | 228 | a83 | 158 | 63 | 274 | 604 | 824 | 812 | 625 | |
| 16 | | | 188 | | 141 | | 228 | 604 | 960 | 1,140 | 768 | 337 |
| 17 | | | 162 | | 122 | | 226 | 600 | 840 | 1,410 | 828 | *340 |
| 18 | | | 162 | | 105 | | 244 | 572 | 744 | 1,070 | 800 | 364 |
| 19 | | | 205 | | 99 | | 262 | 560 | 716 | 776 | 724 | 323 |
| 20 | | | 218 | | 94 | | 242 | | 720 | *576 | 644 | 296 |
| 21 | | | 216 | | 88 | | 228 | | 832 | 530 | 560 | 493 |
| 22 | | | 187 | | 82 | | 214 | | 1,000 | 512 | 474 | 980 |
| 23 | | | 156 | | 78 | | 196 | | 912 | 572 | 410 | 868 |
| 24 | a600 | | 141 | | 76 | a117 | 194 | | 876 | 624 | 376 | 1,180 |
| 25 | | | | | 71 | | 216 | a885 | 916 | 636 | 340 | 836 |
| 26 | | | | | 69 | | 267 | | 868 | 696 | 326 | 580 |
| 27 | | | | | 67 | | 332 | | 820 | 724 | 372 | 424 |
| 28 | | | a155 | | 66 | | 407 | | 808 | 872 | 620 | a300 |
| 29 | | | | | 64 | | 466 | | 840 | 904 | 564 | a265 |
| 30 | | | | | ------ | | 480 | | 764 | 876 | 435 | a250 |
| 31 | | ------ | | 267 | ------ | | ------ | | ------ | 800 | 343 | ------ |
| Total | 15,669 | 10,560 | 6,312 | 2,757 | 4,321 | 2,808 | 6,616 | 23,136 | 22,963 | 24,394 | 18,091 | 24,217 |
| Mean | 505 | 352 | 204 | 88.9 | 149 | 90.6 | 221 | 746 | 765 | 786 | 584 | 807 |
| Cfsm | 15.8 | 11.0 | 6.38 | 2.78 | 4.66 | 2.83 | 6.91 | 23.3 | 23.9 | 24.6 | 18.2 | 25.2 |
| In. | 18.21 | 12.27 | 7.34 | 3.20 | 5.02 | 3.26 | 7.69 | 26.89 | 26.69 | 28.32 | 21.03 | 28.14 |
| Ac-ft | 31,080 | 20,950 | 12,520 | 5,470 | 8,570 | 5,570 | 13,120 | 45,890 | 45,550 | 48,330 | 35,880 | 48,030 |

Calendar year 1959: Max 1,890 Min - Mean 431 Cfsm 13.5 In. 182.92 Ac-ft 312,200
Water year 1959-60: Max - Min - Mean 442 Cfsm 13.8 In. 188.06 Ac-ft 321,000

Peak discharge (base, 2,000 cfs).--Sept. 8 (time and discharge unknown).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of weather records and records for stations on nearby streams.

## 1000. Takatz Creek near Baranof

Location.--Lat 57°08'35", long 134°51'50", on Baranof Island, on left bank at tidewater at Takatz Bay, 2 miles downstream from Takatz Lake and 4 miles north of Baranof.

Drainage area.--17.5 sq mi.

Records available.--July 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is about 4 ft above mean sea level.

Average discharge.--9 years, 262 cfs (189,700 acre-ft per year).

Extremes.--Maximum discharge during year, 4,540 cfs Sept. 8 (gage height, 5.67 ft), from rating curve extended above 660 cfs by logarithmic plotting; minimum, 20 cfs Mar. 5, 6. 1951-60: Maximum discharge, 4,820 cfs Sept. 14, 1952 (gage height, 5.79 ft), from rating curve extended above 660 cfs by logarithmic plotting; minimum not determined.

Remarks.--Records excellent except those above 800 cfs, which are good. Takatz Lake has an area of 425 acres.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 480 | 216 | 245 | 54 | 135 | 25 | 54 | 179 | 480 | 520 | 465 | 179 |
| 2 | 520 | 156 | 208 | 50 | 145 | 23 | 62 | 194 | 435 | 704 | 420 | 210 |
| 3 | 334 | 117 | 153 | 46 | *90 | 23 | 68 | 208 | 353 | 688 | 442 | 602 |
| 4 | 250 | 98 | 135 | 45 | 71 | 22 | 69 | 230 | 316 | 560 | 346 | 851 |
| 5 | 190 | 107 | 115 | 69 | 65 | 20 | 58 | 240 | 322 | 504 | 340 | 520 |
| 6 | 140 | 123 | 98 | 68 | 90 | 20 | 56 | 420 | 372 | 442 | 334 | 310 |
| 7 | 107 | 303 | 90 | 60 | 135 | 27 | 65 | 586 | 435 | 450 | 442 | 302 |
| 8 | 93 | 645 | 86 | 51 | 90 | 29 | 79 | 496 | *420 | 472 | 577 | 2,950 |
| 9 | *82 | 353 | 119 | 49 | 70 | 28 | 74 | 360 | 360 | 405 | 560 | 1,480 |
| 10 | 72 | 221 | 153 | 46 | 60 | 27 | 82 | 286 | 577 | 379 | 552 | 536 |
| 11 | 65 | 159 | 115 | 43 | 58 | 27 | 92 | 275 | 544 | 465 | 504 | 730 |
| 12 | 79 | 117 | 90 | 46 | 84 | 39 | 111 | 270 | 379 | 628 | 392 | 472 |
| 13 | 181 | 97 | *109 | 51 | 76 | 39 | 153 | 275 | 392 | 830 | 316 | 353 |
| 14 | 270 | 82 | 104 | 47 | 83 | 37 | *100 | 270 | 405 | 722 | 310 | 304 |
| 15 | 235 | 71 | 87 | 43 | 71 | 33 | 82 | 280 | 750 | 679 | 496 | 226 |
| 16 | 230 | 68 | 76 | 40 | 58 | 38 | 77 | 286 | 730 | 1,590 | 586 | *194 |
| 17 | 379 | 71 | 74 | 41 | 51 | 40 | 87 | 270 | 568 | 1,850 | 577 | 198 |
| 18 | 235 | 150 | 86 | 43 | 45 | 57 | 107 | 265 | 480 | 730 | 528 | 208 |
| 19 | 182 | 280 | 144 | 38 | 42 | 61 | 93 | 280 | 472 | 442 | 405 | 179 |
| 20 | 194 | 240 | 113 | 35 | 44 | 92 | 93 | 280 | 496 | 353 | 346 | 194 |
| 21 | 203 | 286 | 117 | 32 | 43 | 119 | 87 | 372 | 688 | *346 | 316 | 353 |
| 22 | 536 | 275 | 89 | 30 | 39 | 90 | 84 | 544 | 830 | 340 | 275 | 568 |
| 23 | 594 | 226 | 75 | 28 | 38 | 111 | 80 | 586 | 611 | 420 | 245 | 480 |
| 24 | 340 | 156 | 71 | 26 | 36 | 80 | 87 | 536 | 568 | 480 | 230 | 730 |
| 25 | 230 | 121 | 68 | 26 | 33 | 70 | 107 | 480 | 586 | 465 | 230 | 353 |
| 26 | 235 | 132 | 124 | 25 | 31 | 62 | 123 | 435 | 568 | 520 | 230 | 240 |
| 27 | 292 | 172 | 115 | 24 | 29 | 56 | 145 | 512 | 560 | 544 | 270 | 194 |
| 28 | 226 | 194 | 97 | 27 | 28 | 52 | 159 | 790 | 602 | 688 | 392 | 156 |
| 29 | 590 | 182 | 79 | 33 | 27 | 46 | 166 | 594 | 611 | 688 | 304 | 140 |
| 30 | 504 | 185 | 65 | 127 | ------ | 42 | 156 | 398 | 560 | 636 | 230 | 140 |
| 31 | 280 | ------ | 57 | 190 | ------ | 47 | ------ | 328 | ------ | 602 | 198 | ------ |
| Total | 8,348 | 5,603 | 3,357 | 1,533 | 1,867 | 1,482 | 2,856 | 11,525 | 15,470 | 19,142 | 11,858 | 14,352 |
| Mean | 269 | 187 | 108 | 49.5 | 64.4 | 47.8 | 95.2 | 372 | 516 | 617 | 383 | 478 |
| Cfsm | 15.4 | 10.7 | 6.17 | 2.83 | 3.68 | 2.73 | 5.44 | 21.3 | 29.5 | 35.3 | 21.9 | 27.3 |
| In. | 17.74 | 11.91 | 7.13 | 3.26 | 3.97 | 3.15 | 6.07 | 24.49 | 32.88 | 40.68 | 25.20 | 30.50 |
| Ac-ft | 16,560 | 11,110 | 6,660 | 3,040 | 3,700 | 2,940 | 5,660 | 22,860 | 30,680 | 37,970 | 23,520 | 28,470 |

Calendar year 1959: Max 2,290 Min 26 Mean 257 Cfsm 14.7 In. 199.42 Ac-ft 186,100
Water year 1959-60: Max 2,950 Min 20 Mean 266 Cfsm 15.2 In. 206.98 Ac-ft 193,200

Peak discharge (base, 2,300 cfs).--July 17 (1:30 a.m.) 2,510 cfs (4.70 ft); Sept. 8 (1:30 p.m.) 4,540 cfs (5.67 ft).

* Discharge measurement made on this day.

## 1020. Hasselborg Creek near Angoon

Location.--Lat 57°39'40", long 134°14'55", on Admiralty Island, on right bank at outlet of Hasselborg Lake, 16 miles northeast of Angoon.

Drainage area.--56.2 sq mi.

Records available.--June 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 295 ft (from topographic map).

Average discharge.--9 years, 314 cfs (227,300 acre-ft per year).

Extremes.--Maximum discharge during year, 1,120 cfs Sept. 9 (gage height, 2.89 ft); minimum daily, 68 cfs Mar. 10.
1951-60: Maximum discharge, 2,400 cfs Oct. 23, 1953 (gage height, 3.78 ft), from rating curve extended above 780 cfs; minimum not determined.

Remarks.--Records good except those for period of no gage-height record, which are fair. Hasselborg Lake has an area of 3,500 acres.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 354 | 395 | 515 | 276 | 288 | 99 | 196 | 599 | *416 | 465 | 282 | 180 |
| 2 | 381 | 348 | 591 | 252 | 324 | 92 | 207 | 607 | 430 | 465 | 288 | 170 |
| 3 | 388 | 300 | 545 | 218 | 336 | 89 | 218 | 615 | 437 | 472 | 318 | 218 |
| 4 | 388 | 270 | 479 | 202 | 312 | 83 | 276 | 631 | 430 | 515 | 306 | 264 |
| 5 | 348 | 258 | 437 | 212 | 288 | 77 | 282 | 664 | 423 | *345 | 294 | 264 |
| 6 | 306 | 252 | 409 | 240 | 276 | 74 | 276 | 698 | 409 | 545 | 282 | 264 |
| 7 | 264 | 318 | 381 | 229 | 300 | 74 | 288 | 689 | 416 | 545 | 264 | 282 |
| 8 | 224 | 437 | 348 | 207 | 300 | 71 | 348 | 631 | 402 | 522 | 246 | 730 |
| 9 | 180 | 472 | 342 | 202 | 276 | 71 | 367 | 575 | 388 | 486 | *234 | 1,090 |
| 10 | 160 | 430 | 381 | 185 | 246 | 68 | 374 | 530 | 395 | 430 | 212 | 911 |
| 11 | 140 | 374 | 388 | 175 | 234 | 71 | 367 | 522 | 437 | 395 | 196 | 776 |
| 12 | 140 | 306 | 360 | 175 | 234 | 86 | 367 | 508 | 430 | 374 | 185 | 631 |
| 13 | 175 | 270 | 354 | 175 | 234 | 89 | 374 | 486 | 402 | 367 | 170 | 552 |
| 14 | 324 | 246 | 360 | 165 | 234 | 83 | 354 | 465 | 388 | 342 | 160 | 479 |
| 15 | 395 | 196 | 348 | 155 | 229 | 86 | 324 | 472 | 395 | 312 | 207 | 409 |
| 16 | 409 | 180 | 318 | 140 | 212 | 92 | 306 | 493 | 395 | 324 | 246 | 342 |
| 17 | 538 | 175 | 282 | 145 | 196 | 107 | 300 | a530 | 395 | 409 | 270 | 330 |
| 18 | 508 | 175 | 270 | 145 | 180 | 165 | 330 | a500 | 381 | 409 | 288 | 360 |
| 19 | 437 | 234 | 342 | 140 | 170 | 234 | 360 | a460 | 367 | 360 | 306 | 360 |
| 20 | 479 | 348 | 430 | 131 | 170 | 276 | 360 | a450 | 348 | 324 | 294 | 348 |
| 21 | 530 | 451 | 423 | 123 | 160 | 312 | 360 | a435 | 367 | 294 | 270 | 395 |
| 22 | 568 | 545 | 388 | 115 | 155 | 324 | 348 | a410 | 472 | 270 | 240 | 575 |
| 23 | 647 | 560 | 342 | 107 | 150 | 367 | 342 | a390 | 607 | 252 | 218 | 615 |
| 24 | 623 | 515 | 306 | 99 | 145 | 367 | 360 | a380 | 615 | 246 | 196 | 664 |
| 25 | 538 | 458 | 282 | 95 | 135 | 354 | 388 | a380 | 575 | 264 | 175 | 623 |
| 26 | 458 | 416 | 288 | 92 | 127 | 330 | 430 | a380 | 515 | 330 | 160 | 538 |
| 27 | 423 | 409 | 395 | 83 | 119 | 288 | 472 | a375 | 479 | 348 | 165 | 465 |
| 28 | *395 | 437 | 409 | 89 | 115 | 264 | 508 | a450 | 472 | 360 | 224 | 395 |
| 29 | 402 | 437 | 381 | 95 | 107 | 229 | 538 | a440 | 479 | 354 | 240 | 330 |
| 30 | 451 | 451 | 342 | 131 | ------ | 207 | 575 | a420 | 465 | 330 | 229 | 288 |
| 31 | 444 | ------ | 300 | 240 | ------ | 202 | ------ | a410 | ------ | 306 | 207 | ------ |
| Total | 12,017 | 10,663 | 11,736 | 5,038 | 6,252 | 5,331 | 10,595 | 15,595 | 13,130 | 11,960 | 7,372 | 13,848 |
| Mean | 388 | 355 | 379 | 163 | 216 | 172 | 353 | 503 | 438 | 386 | 238 | 462 |
| Cfsm | 6.90 | 6.32 | 6.74 | 2.90 | 3.84 | 3.06 | 6.28 | 8.95 | 7.79 | 6.87 | 4.23 | 8.22 |
| In. | 7.95 | 7.06 | 7.77 | 3.33 | 4.14 | 3.53 | 7.01 | 10.32 | 8.69 | 7.91 | 4.88 | 9.16 |
| Ac-ft | 23,840 | 21,150 | 23,280 | 9,990 | 12,400 | 10,570 | 21,010 | 30,930 | 26,040 | 23,720 | 14,620 | 27,470 |

Calendar year 1959: Max 740 Min 71 Mean 328 Cfsm 5.84 In. 79.29 Ac-ft 237,700
Water year 1959-60: Max 1,090 Min 68 Mean 338 Cfsm 6.01 In. 81.75 Ac-ft 245,000

Peak discharge (base, 1,000 cfs).--Sept. 9 (4 a.m.) 1,120 cfs (2.89 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 1 discharge measurement, weather records, and records for stations on nearby streams.

## 1080. Pavlof River near Tenakee

Location.--Lat 57°50'30", long 135°02'10", on Chichagof Island, on left bank 140 ft upstream from falls at outlet of Pavlof Lake and 8 miles northeast of Tenakee.

Drainage area.--24.3 sq mi.

Records available.--June 1957 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is about 15 ft.

Extremes.--Maximum discharge during year, 1,640 cfs Sept. 8 (gage height, 7.29 ft), from rating curve extended above 710 cfs by logarithmic plotting; minimum, 28 cfs Mar. 4 (gage height, 3.93 ft).
1957-60: Maximum discharge, that of Sept. 8, 1960; minimum, 22 cfs Aug. 16-18, 1957 (gage height, 3.97 ft).

Remarks.--Records good except those below 60 cfs, which are poor.

Revisions (water years).--WSP 1640: 1957-58.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 202 | 237 | 604 | 72 | 242 | 41 | 65 | 298 | 173 | 162 | 69 | 45 |
| 2 | 280 | 153 | 403 | 60 | 260 | 38 | 98 | 320 | 234 | 166 | 96 | 45 |
| 3 | 197 | 112 | 246 | 58 | 153 | 40 | 214 | 298 | 188 | 159 | 218 | 196 |
| 4 | 145 | 98 | 206 | 65 | 92 | 31 | 330 | 320 | 166 | 238 | 152 | 155 |
| 5 | 103 | 247 | 206 | 176 | 78 | 31 | 176 | 343 | 159 | 195 | 128 | 112 |
| 6 | 85 | 343 | 168 | 172 | 88 | 35 | 121 | 370 | 162 | 145 | 103 | 89 |
| 7 | 72 | 584 | 193 | 100 | 224 | 36 | 164 | 356 | 169 | 159 | 86 | 107 |
| 8 | 65 | 713 | 141 | 70 | 149 | 35 | 246 | 259 | *152 | 128 | 75 | 1,300 |
| 9 | 58 | 355 | 275 | 70 | 85 | 32 | 219 | 215 | 131 | 103 | 64 | 530 |
| 10 | *55 | 185 | 427 | 63 | 70 | 31 | 181 | 211 | 173 | 89 | 57 | 226 |
| 11 | 52 | 124 | 305 | 54 | 65 | 32 | 168 | 276 | 173 | 86 | 50 | 422 |
| 12 | 57 | 92 | 176 | 55 | 63 | 37 | 181 | 272 | 138 | 97 | 45 | 199 |
| 13 | 124 | 88 | 295 | 72 | 72 | 41 | 242 | 234 | 138 | 119 | 42 | 159 |
| 14 | 210 | 68 | 431 | 61 | 100 | 36 | *162 | 215 | 135 | 91 | 37 | 125 |
| 15 | 130 | 55 | 228 | 53 | 98 | 31 | 122 | 218 | 145 | 75 | 171 | 94 |
| 16 | 198 | 65 | 130 | 50 | 72 | 57 | 103 | 238 | 131 | 77 | 138 | *80 |
| 17 | 355 | 66 | 109 | 72 | 60 | 141 | 100 | 251 | 135 | 207 | 122 | 142 |
| 18 | 130 | 157 | 112 | 112 | 54 | 246 | 155 | 218 | 125 | 159 | 91 | 169 |
| 19 | 98 | 614 | 247 | 72 | 54 | 242 | 238 | 238 | 112 | 89 | 91 | 109 |
| 20 | 280 | 579 | 228 | 58 | 88 | 206 | 169 | 226 | 109 | 69 | 69 | 97 |
| 21 | 176 | 455 | 164 | 45 | 80 | 228 | 152 | 294 | 222 | *59 | 55 | 212 |
| 22 | 344 | 509 | 121 | 44 | 75 | 160 | 145 | 330 | 403 | 52 | 45 | 365 |
| 23 | 634 | 408 | 92 | 44 | 73 | 361 | 135 | 298 | 294 | 55 | 42 | 272 |
| 24 | 350 | 260 | 82 | 41 | 75 | 210 | 159 | 267 | 188 | 69 | 40 | 316 |
| 25 | 185 | 172 | 70 | 42 | 58 | 124 | 226 | 234 | 155 | 77 | 35 | 180 |
| 26 | 138 | 310 | 199 | 41 | 52 | 109 | 259 | 199 | 128 | 116 | 32 | 135 |
| 27 | 237 | 408 | 340 | 42 | 48 | 85 | 267 | 192 | 138 | 103 | 56 | 100 |
| 28 | 185 | 366 | 237 | 43 | 45 | 72 | 280 | 180 | 142 | 135 | 226 | 80 |
| 29 | 519 | 389 | 160 | 44 | 45 | 61 | 284 | 169 | 162 | 103 | 128 | 69 |
| 30 | 767 | 352 | 103 | 187 | ------ | 57 | 272 | 145 | 135 | 83 | 83 | 59 |
| 31 | 450 | ------ | 80 | 539 | ------ | 54 | ------ | 131 | ------ | 77 | 59 | ------ |
| Total | 6,881 | 8,564 | 6,778 | 2,677 | 2,708 | 2,940 | 5,633 | 7,815 | 5,015 | 3,542 | 2,705 | 6,189 |
| Mean | 222 | 285 | 219 | 86.4 | 93.4 | 94.8 | 188 | 252 | 167 | 114 | 87.3 | 206 |
| Cfsm | 9.14 | 11.7 | 9.01 | 3.56 | 3.84 | 3.90 | 7.74 | 10.4 | 6.87 | 4.69 | 3.59 | 8.48 |
| In. | 10.53 | 13.11 | 10.37 | 4.10 | 4.14 | 4.50 | 8.62 | 11.96 | 7.68 | 5.42 | 4.14 | 9.47 |
| Ac-ft | 13,650 | 16,990 | 13,440 | 5,310 | 5,370 | 5,830 | 11,170 | 15,500 | 9,950 | 7,030 | 5,370 | 12,280 |

Calendar year 1959: Max 767 Min 29 Mean 176 Cfsm 7.24 In. 98.53 Ac-ft 127,700
Water year 1959-60: Max 1,300 Min 31 Mean 168 Cfsm 6.91 In. 94.04 Ac-ft 121,900

Peak discharge (base, 800 cfs).--Oct. 30 (6 p.m.) 843 cfs (6.03 ft); Nov. 19 (5:30 a.m.) 871 cfs (6.08 ft); Sept. 8 (12:30 p.m.) 1,640 cfs (7.29 ft).

* Discharge measurement made on this day.

## 1090. Fish Creek near Auke Bay

Location.--Lat 58°19'50", long 134°35'20", on Douglas Island, on right bank 400 ft upstream from bridge on North Douglas highway and 4½ miles southeast of Auke Bay.

Drainage area.-- 13.6 sq mi.

Records available.--October 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 17 ft above mean sea level. Prior to Oct. 14, 1958, staff gage at same site and datum.

Extremes.--Maximum discharge observed during year, 2,100 cfs Sept. 8 (gage height, 4.70 ft); minimum observed, 6.6 cfs Mar. 7 (discharge measurement).
1958-60: Maximum discharge, that of Sept. 8, 1960; minimum observed, 6.1 cfs Jan. 28, 1959 (discharge measurement).

Remarks.--Records good except those for periods of ice effect, which are fair.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 184 | 63 | 184 | 18 | 67 | | 15 | 128 | 108 | 126 | 108 | *20 |
| 2 | 114 | 45 | 122 | 21 | 61 | | 21 | 138 | 130 | 98 | 167 | 28 |
| 3 | 95 | *34 | 63 | 29 | *47 | | 49 | 146 | 120 | 136 | 280 | 74 |
| 4 | 60 | 29 | 51 | 33 | 37 | | 140 | 154 | 126 | 264 | 158 | 40 |
| 5 | 41 | 59 | 54 | 171 | 28 | | 63 | 175 | 116 | 142 | 132 | 58 |
| 6 | *33 | 74 | 46 | 74 | 23 | | 39 | 164 | 122 | 118 | 89 | 76 |
| 7 | 28 | 166 | 43 | 39 | 28 | (*) | 63 | 152 | 134 | 100 | 61 | 90 |
| 8 | 24 | 252 | 37 | 29 | 28 | | 114 | 118 | 114 | 84 | 48 | 1,170 |
| 9 | 22 | 102 | 89 | | 24 | | 74 | 100 | 106 | 72 | 41 | 150 |
| 10 | 21 | 54 | 100 | | 31 | b10 | 98 | 114 | 180 | 60 | 36 | 85 |
| 11 | 20 | 37 | 76 | | 24 | | 67 | 162 | 187 | 81 | 32 | 135 |
| 12 | 22 | | 41 | | 19 | | 64 | 148 | 166 | 88 | 30 | *63 |
| 13 | 72 | | 43 | b20 | 21 | | 59 | 122 | 120 | 69 | 28 | *141 |
| 14 | 158 | | 76 | | 17 | | 46 | 124 | 126 | 54 | 28 | 79 |
| 15 | 67 | b30 | 49 | (*) | 17 | | 38 | 130 | 132 | 48 | 368 | 51 |
| 16 | 106 | | 31 | | 16 | | 32 | 124 | 142 | 61 | *104 | 42 |
| 17 | 114 | | 26 | | 15 | | 30 | 154 | 152 | 84 | 132 | 153 |
| 18 | 51 | | 26 | 27 | 14 | | *28 | *118 | 134 | 51 | 108 | 153 |
| 19 | 38 | 148 | 89 | 21 | 14 | | 37 | 120 | 102 | 39 | 122 | 83 |
| 20 | 134 | 140 | 60 | 18 | 16 | 72 | 37 | 128 | 100 | 33 | 79 | 70 |
| 21 | 114 | 108 | 34 | | 16 | 41 | 36 | 164 | 190 | 32 | 48 | 130 |
| 22 | 156 | 138 | 29 | | 17 | 31 | 40 | 175 | 225 | 31 | 38 | 178 |
| 23 | 232 | 112 | 25 | | 18 | 57 | 42 | 164 | 192 | 37 | 33 | 127 |
| 24 | 136 | 61 | 22 | | *18 | 40 | 61 | 162 | *128 | 72 | 28 | 112 |
| 25 | 76 | 45 | 20 | b15 | 18 | 29 | 91 | 154 | 106 | 140 | 25 | 85 |
| 26 | 54 | 64 | 22 | | b15 | 28 | 106 | 134 | 102 | 171 | 22 | 66 |
| 27 | 63 | 116 | 82 | | b13 | 24 | 118 | 152 | 126 | 140 | 62 | *51 |
| 28 | 69 | 106 | 43 | | b11 | 19 | 120 | 156 | 136 | *140 | 53 | 42 |
| 29 | 166 | 106 | 32 | 98 | b10 | *17 | 122 | *138 | 146 | 76 | 37 | 39 |
| 30 | 225 | *74 | 24 | 162 | [illegible] | 16 | 130 | 102 | 108 | 54 | 27 | 45 |
| 31 | 110 | ------ | *19 | 175 | ------ | 15 | ------ | 98 | ------ | 136 | 23 | ------ |
| Total | 2,805 | 2,343 | 1,658 | 1,215 | 683 | 579 | 1,980 | 4,318 | 4,076 | 2,837 | 2,547 | 3,626 |
| Mean | 90.5 | 78.1 | 53.5 | 39.2 | 23.6 | 18.7 | 66.0 | 139 | 136 | 91.5 | 82.2 | 121 |
| Cfsm | 6.65 | 5.74 | 3.93 | 2.88 | 1.74 | 1.37 | 4.85 | 10.2 | 10.0 | 6.73 | 6.04 | 8.90 |
| In. | 7.67 | 6.41 | 4.53 | 3.32 | 1.87 | 1.58 | 5.41 | 11.81 | 11.15 | 7.73 | 6.96 | 9.92 |
| Ac-ft | 5,560 | 4,650 | 3,290 | 2,410 | 1,350 | 1,150 | 3,930 | 8,560 | 8,080 | 5,630 | 5,050 | 7,190 |

Calendar year 1959: Max 357 Min - Mean 70.9 Cfsm 5.21 In. 70.76 Ac-ft 51,320
Water year 1959-60: Max 1,170 Min - Mean 78.3 Cfsm 5.76 In. 78.39 Ac-ft 56,850

Peak discharge (base, 500 cfs).-Nov. 8 (12 m.) 574 cfs (3.64 ft); July 4 (5 p.m.) 516 cfs (3.53 ft); Aug 2 (9:30 p.m.) 608 cfs (3.68 ft); Aug. 15 (10:00 a.m.) 1,050 cfs (4.18 ft); Sept. 8 (11 a.m.) 2,100 cfs (4.70 ft); Sept. 21 (10 p.m.) 551 cfs (3.58 ft).

* Discharge measurement made on this day.
b Stage-discharge relation affected by ice (no gage-height record Mar. 9-16).

## 2000. Gakona River at Gakona

Location.--Lat 62°18'05", long 145°18'20", near center of span on downstream side of bridge on Glenn Highway at Gakona, 500 ft upstream from mouth and 1.9 miles northeast of junction of Richardson and Glenn Highways.

Drainage area.--620 sq mi, approximately.

Records available.--August to September 1948, October 1949 to September 1960.

Gage.--Wire-weight gage read twice daily. Datum of gage is 1,403.03 ft above mean sea level. Aug. 8 to Sept. 13, 1948, staff gage at same site and datum.

Average discharge.--11 years, 920 cfs (666,100 acre-ft per year).

Extremes.--Maximum discharge during year, 4,510 cfs July 25 (gage height, 5.70 ft, from graph based on gage readings); minimum not determined.
1948, 1949-60: Maximum discharge, 10,300 cfs Aug. 1, 1956 (gage height, 7.92 ft, from graph based on gage readings), from rating curve extended above 5,700 cfs by logarithmic plotting; no flow for part of Mar. 25, 1953, caused by temporary storage behind ice jam upstream.

Remarks.--Records fair except those for period of ice effect, which are poor. Some diurnal fluctuation caused by glacier melt at the source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 820 | (*) | | | | | | 1,100 | 1,610 | 2,090 | 3,750 | 1,520 |
| 2 | 1,060 | | | | | | | 1,300 | 1,620 | 2,150 | 2,940 | 1,580 |
| 3 | 1,060 | | | | | | | 1,500 | 1,620 | 2,260 | 2,320 | 1,660 |
| 4 | 860 | | | | | | (*) | 1,800 | 1,610 | 2,240 | 2,020 | 1,780 |
| 5 | 700 | | | | | | | 2,100 | 1,550 | 2,060 | 1,770 | 1,620 |
| 6 | 600 | | | | | | | 2,500 | 1,460 | 1,940 | 1,650 | 1,590 |
| 7 | 540 | | | | | | | 2,800 | 1,250 | 1,800 | 2,120 | 1,430 |
| 8 | *500 | 250 | 240 | 220 | 140 | 130 | 270 | 2,500 | 1,250 | 1,770 | 2,120 | 1,390 |
| 9 | 470 | | | | | | | 2,100 | *1,210 | 1,710 | 2,140 | 1,470 |
| 10 | 440 | | | | | | | 1,900 | 1,210 | 1,640 | 2,240 | 1,370 |
| 11 | 420 | | | | | | | 1,700 | 1,090 | 1,640 | 2,290 | 1,320 |
| 12 | 400 | | | | | | | 1,660 | 1,100 | 1,740 | 2,490 | 1,520 |
| 13 | 390 | | | | | | | 1,570 | 1,110 | 1,850 | 2,540 | *2,700 |
| 14 | 380 | | (*) | | | | | 1,720 | 1,100 | 1,990 | 2,560 | 2,850 |
| 15 | 370 | | | | | | | 1,800 | 1,030 | 2,120 | 2,880 | 2,490 |
| 16 | 360 | | | | | | | 1,740 | 970 | 2,150 | 2,600 | 1,860 |
| 17 | 360 | | | | | | | *1,800 | 1,090 | 2,460 | 2,610 | 1,500 |
| 18 | 350 | | | | | | | 1,830 | 1,230 | 2,480 | 2,790 | 1,380 |
| 19 | 350 | | | | | | | 1,800 | 1,110 | 2,270 | 2,880 | 1,200 |
| 20 | 350 | | | | | | | 1,660 | 1,340 | 2,310 | 2,760 | 1,130 |
| 21 | 350 | | | | | | | 1,570 | 1,210 | 2,430 | 2,770 | 1,000 |
| 22 | 370 | | | | | | | 1,300 | 1,230 | 2,440 | 2,150 | 970 |
| 23 | 390 | 240 | 200 | 190 | 150 | 160 | 480 | 1,300 | 1,200 | 2,480 | 1,800 | 980 |
| 24 | 400 | | | (*) | | | | 1,650 | 1,320 | 2,320 | 1,940 | 940 |
| 25 | 410 | | | | | | | 2,040 | 1,280 | *2,880 | 1,860 | 920 |
| 26 | 400 | | | | | | | 2,380 | 1,330 | 4,150 | 2,040 | 860 |
| 27 | 380 | | | | | | | 1,780 | 1,340 | 4,050 | 1,940 | 850 |
| 28 | 360 | | | | | | | 1,500 | 1,420 | 3,770 | 2,100 | 900 |
| 29 | 350 | | | | (*) | | | 1,590 | 1,440 | 3,790 | 1,930 | 1,500 |
| 30 | 330 | | | | | | | 1,620 | 1,590 | 3,690 | 1,570 | 2,040 |
| 31 | 320 | | | | | | | 1,650 | | 3,880 | 1,460 | |
| Total | 14,840 | 7,350 | 6,800 | 6,340 | 4,200 | 4,510 | 11,250 | 55,260 | 38,920 | 76,550 | 71,030 | 44,320 |
| Mean | 479 | 245 | 219 | 205 | 145 | 145 | 375 | 1,783 | 1,297 | 2,469 | 2,291 | 1,477 |
| Ac-ft | 29,430 | 14,580 | 13,490 | 12,580 | 8,330 | 8,950 | 22,310 | 109,600 | 77,200 | 151,800 | 140,900 | 87,910 |

Calendar year 1959: Max 3,680 Min - Mean 873 Ac-ft 632,300
Water year 1959-60: Max 4,150 Min - Mean 933 Ac-ft 677,100

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 5 to May 11 (no gage-height record Nov. 12 to Apr. 26, except occasional readings; discharge estimated on basis of 4 discharge measurements and weather records).

## 2020. Tazlina River near Glennallen

Location.--Lat 62°03'20", long 145°25'35", in W½ sec.9, T.3 N., R.1 W., near center of span on downstream side of bridge on Richardson Highway, 2 miles upstream from mouth, 4 miles downstream from Moose Creek, and 5 miles southeast of Glennallen.

Drainage area.--2,670 sq mi, approximately.

Records available.--Discharge: August 1949 to September 1950, October 1951 to September 1960. Discharge measurements only in 1951.
Chemical analyses: February 1952 to August 1953, December 1953 to September 1954, May to August 1956, October 1957 to September 1958.
Sediment records: May 1953 to September 1960 (periodic); summer months only 1956-60.

Gage.--Wire-weight gage read once daily. Datum of gage is 1,109.13 ft above mean sea level, adjustment of 1952.

Average discharge.--10 years, 4,256 cfs (3,081,000 acre-ft per year).

Extremes.--Maximum discharge during year, 21,800 cfs Oct. 1 (gage height, 9.03 ft, from graph based on gage readings); minimum not determined.
1949-50, 1951-60: Maximum discharge, 47,000 cfs Aug. 31, 1955 (gage height, 12.25 ft, from graph based on gage readings); mininum not determined.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 21,100 | 2,480 | | | | | | 945 | 5,060 | 9,720 | 17,500 | 9,920 |
| 2 | 19,100 | 2,350 | | | | | | 1,560 | 5,160 | 10,000 | 16,900 | 9,880 |
| 3 | 15,800 | 2,310 | | | | | | 2,260 | 5,260 | 10,300 | 16,600 | 9,720 |
| 4 | 13,500 | 2,180 | | | | | | 2,880 | 5,430 | 10,600 | 15,900 | 9,560 |
| 5 | 11,900 | 2,080 | | | | | | 3,140 | 5,480 | 11,000 | 14,800 | 9,400 |
| 6 | 10,400 | 1,960 | | | | (*) | | 3,280 | 5,360 | 10,600 | 14,000 | 9,300 |
| 7 | 9,120 | *1,820 | | | | | | 3,410 | 5,230 | 10,000 | 14,600 | 9,300 |
| 8 | 8,070 | 1,720 | 860 | 650 | 460 | 400 | (*) | 3,390 | 5,330 | 10,100 | 14,600 | 9,190 |
| 9 | 7,280 | 1,590 | | | | | | 3,350 | 5,400 | 9,760 | 14,400 | 8,910 |
| 10 | 6,850 | 1,450 | | | | | | 3,060 | 5,460 | 9,600 | 13,600 | 8,660 |
| 11 | 6,430 | 1,330 | | | | | | 3,100 | *5,400 | 9,440 | 13,100 | 8,240 |
| 12 | 5,790 | 1,200 | | | | | 340 | 3,020 | 5,510 | 9,400 | 13,100 | 8,000 |
| 13 | *5,460 | 1,200 | | | | | | 2,980 | 5,510 | 9,400 | 13,500 | *8,100 |
| 14 | 5,260 | 1,200 | | | | | | 2,920 | 5,530 | 9,480 | 13,500 | 8,180 |
| 15 | 4,910 | 1,200 | | | | | | 2,860 | 5,580 | 9,720 | 13,100 | 8,320 |
| 16 | 5,130 | 1,200 | | | | | | 2,860 | 5,510 | 10,200 | 12,600 | 8,560 |
| 17 | 5,080 | 1,200 | | | | | | 2,840 | 5,530 | 10,400 | 12,600 | 8,840 |
| 18 | 5,360 | 1,200 | | | | | | 2,900 | 5,580 | 11,200 | 12,800 | 8,600 |
| 19 | 5,180 | 1,100 | | | | | | *3,220 | 5,900 | 11,900 | 13,100 | 8,420 |
| 20 | 4,690 | 1,100 | | | | | | 3,280 | 6,490 | 12,000 | 12,900 | 8,280 |
| 21 | 4,430 | 1,000 | | | | | | 3,310 | 6,740 | 12,700 | 12,200 | 7,970 |
| 22 | 4,160 | 1,100 | | | | | | 3,120 | 7,040 | 13,100 | 11,800 | 7,880 |
| 23 | 3,930 | 1,200 | | 600 | | | 320 | 3,310 | 7,340 | 13,500 | 11,600 | 8,000 |
| 24 | 3,690 | 1,200 | 780 | (*) | 420 | 380 | 332 | 3,450 | 7,640 | 13,900 | 11,000 | 7,850 |
| 25 | 3,520 | 1,300 | | | | | 344 | 3,690 | 7,940 | 14,200 | 10,400 | 7,160 |
| 26 | 3,410 | 1,300 | | | | | 425 | 4,040 | 8,210 | 14,600 | 9,800 | 6,600 |
| 27 | 3,240 | 1,300 | | | | | 460 | 4,450 | 8,490 | 15,400 | 9,840 | 6,350 |
| 28 | 3,000 | 1,200 | | | | | 460 | 4,640 | 8,910 | *16,000 | 10,000 | 6,050 |
| 29 | 2,900 | 1,200 | | | | | 575 | 4,740 | 9,330 | 16,400 | 10,100 | 5,820 |
| 30 | 2,740 | 1,100 | | | ------- | | 781 | 4,860 | 9,680 | 17,400 | 10,100 | 5,820 |
| 31 | 2,590 | ------- | | | ------- | | ------- | 4,980 | ------- | 18,100 | 10,000 | ------- |
| Total | 214,020 | 43,770 | 25,380 | 19,350 | 12,780 | 12,080 | 11,177 | 101,845 | 191,030 | 370,120 | 400,040 | 246,880 |
| Mean | 6,904 | 1,459 | 819 | 624 | 441 | 390 | 373 | 3,285 | 6,368 | 11,940 | 12,900 | 8,229 |
| Ac-ft | 424,500 | 86,820 | 50,340 | 38,380 | 25,350 | 23,960 | 22,170 | 202,000 | 378,900 | 734,100 | 793,500 | 489,700 |

Calendar year 1959: Max 22,600 Min - Mean 4,426 Ac-ft 3,204,000
Water year 1959-60: Max 21,100 Min - Mean 4,504 Ac-ft 3,270,000

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Nov. 12 to Apr. 23 (no gage-height record Dec. 20 to Apr. 22, except occasional days; discharge estimated on basis of 3 discharge measurements and weather records).

## 2020. TAZLINA RIVER NEAR GLENNALLEN--Continued

Periodic determinations of suspended-sediment discharge, April to August 1960

| Date | Discharge (cfs) | Suspended sediment | |
|---|---|---|---|
| | | Mean concentration (ppm) | Discharge (tons per day) |
| Apr. 20, 1960 | a340 | 13 | 12 |
| June 1 | 4,980 | 218 | 2,930 |
| July 6 | a10,600 | 88 | 2,520 |
| Aug. 22 | a11,800 | 78 | 2,480 |

a Daily mean discharge.

## 2060. Klutina River at Copper Center

Location.--Lat 61°57'10", long 145°18'20", in SW¼ sec.18, T.2 N., R.1 E., near left bank on downstream side of bridge on Richardson Highway, 0.7 mile south of Copper Center, three-quarters of a mile upstream from mouth, and 24 miles downstream from Klutina Lake.

Drainage area.--880 sq mi, approximately.

Records available.--Discharge: May to August 1908 (gage heights only), June to October 1913, August 1949 to September 1960.
Chemical analyses: March 1952 to September 1954, May to August 1956, October 1957 to September 1958.
Water temperatures: October 1952 to September 1953.
Sediment records: May 1953 to September 1958 (periodic); summer months only 1956-58.

Gage.--Wire-weight gage read once daily. Datum of gage is 1,011.26 ft above mean sea level. May 19 to Aug. 31, 1908, June 17 to Oct. 31, 1913, staff gages at sites a quarter of a mile downstream at different datums.

Average discharge.--11 years (1949-60), 1,732 cfs (1,254,000 acre-ft per year).

Extremes.--Maximum discharge during year, 6,170 cfs July 29 (gage height, 8.20 ft, from graph based on gage readings); minimum not determined.
1913, 1949-60: Maximum discharge observed, 9,040 cfs June 29, 1953 (gage height, 9.24 ft); maximum gage height observed, 15.55 ft May 9, 1953 (backwater from ice); minimum discharge not determined.

Remarks.--Records fair except those for period of ice effect, which are poor.

Revisions.--WSP 1372: Drainage area.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,589 | | | | | | | 310 | 3,770 | 4,410 | 5,880 | 3,850 |
| 2 | 1,630 | | | | | | | 340 | 3,770 | 4,230 | 5,550 | 3,710 |
| 3 | 1,690 | | | | | | | 370 | 3,770 | 4,280 | 5,490 | 3,490 |
| 4 | 1,710 | | | | | | | 410 | 3,770 | 4,300 | 5,080 | 3,340 |
| 5 | 1,890 | | | | | | | 470 | 3,730 | 4,300 | 4,870 | 3,250 |
| 6 | 1,750 | | | | | (*) | | 550 | 3,630 | 4,120 | 4,790 | 3,210 |
| 7 | 1,520 | (*) | | | | | | 720 | 3,630 | 4,040 | 4,940 | 3,230 |
| 8 | 1,460 | 660 | 480 | 330 | | 230 | | 839 | 3,650 | 3,870 | 5,080 | 3,440 |
| 9 | 1,410 | | | | | | | 874 | 3,670 | 3,850 | 5,210 | 3,590 |
| 10 | 1,390 | | | | | | (*) | 881 | 3,650 | 3,830 | 5,160 | 3,890 |
| 11 | 1,320 | | | | | | | 910 | *3,630 | 3,790 | 5,130 | 4,210 |
| 12 | 1,290 | | | | | | | 918 | 3,490 | 3,770 | 5,030 | 4,300 |
| 13 | *1,270 | | | | | | | 925 | 3,420 | 3,870 | 4,990 | 4,300 |
| 14 | 1,180 | | | | | | | 1,000 | 3,340 | 3,770 | 4,910 | 4,320 |
| 15 | 1,180 | | | | 240 | | 240 | 1,040 | 3,250 | 4,080 | 4,940 | *4,390 |
| 16 | 1,190 | | | | | | | 1,110 | 3,280 | 4,430 | 4,960 | 4,630 |
| 17 | 1,190 | | | | | | | *1,240 | 3,460 | 4,770 | 4,960 | 4,700 |
| 18 | 1,100 | | | | | | | *1,350 | 3,670 | 5,030 | 5,010 | 4,460 |
| 19 | 1,030 | | | | | | | 1,420 | 3,710 | 4,990 | 4,940 | 4,390 |
| 20 | 986 | | | | | | | 1,480 | 3,690 | 4,720 | 4,700 | 4,080 |
| 21 | 994 | | | | | | | 1,490 | 3,690 | 4,720 | 4,460 | 3,790 |
| 22 | 930 | | | | | | | 1,560 | 3,710 | 4,670 | 4,390 | 3,380 |
| 23 | 900 | 630 | | 280 | | | | 1,800 | 3,730 | 4,990 | 4,230 | 3,400 |
| 24 | 880 | | 430 | (*) | | 240 | | 2,080 | 3,870 | 5,130 | 3,930 | 3,400 |
| 25 | 850 | | | | | | | 2,630 | 4,040 | 5,160 | 3,990 | 3,270 |
| 26 | 830 | | | | | | | 2,960 | 4,100 | 5,470 | 4,010 | 3,100 |
| 27 | 800 | | | | | | | 3,380 | 4,120 | 5,830 | 3,930 | 2,940 |
| 28 | 780 | | | | | | | 3,750 | 4,280 | *6,010 | 3,970 | 2,850 |
| 29 | 760 | | | | | | | 3,770 | 4,550 | 6,040 | 4,010 | 2,740 |
| 30 | 740 | | | | ------- | | | 3,770 | 4,650 | 6,120 | 4,060 | 2,680 |
| 31 | 730 | ------- | | | ------- | | ------- | 3,770 | ------- | 6,090 | 4,010 | ------- |
| Total | 36,960 | 19,350 | 14,080 | 9,430 | 6,960 | 7,290 | 7,200 | 48,117 | 112,720 | 144,680 | 146,610 | 110,330 |
| Mean | 1,192 | 645 | 454 | 304 | 240 | 235 | 240 | 1,552 | 3,757 | 4,667 | 4,729 | 3,678 |
| Ac-ft | 73,310 | 38,380 | 27,930 | 18,700 | 13,800 | 14,460 | 14,280 | 95,440 | 223,600 | 287,000 | 290,800 | 218,800 |

Calendar year 1959: Max 7,520 Min - Mean 1,706 Ac-ft 1,235,000
Water year 1959-60: Max 6,120 Min - Mean 1,813 Ac-ft 1,316,000

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 22 to May 7 (no gage-height record Nov. 21 to Apr. 9 except occasional days; discharge estimated on basis of 3 discharge measurements, weather records, and records for other streams in Copper River basin).

## 2080. Tonsina River at Tonsina

Location.--Lat 61°39'50", long 145°10'50", near left bank on downstream side of bridge on Richardson Highway at Tonsina, 0.4 mile upstream from Bernard Creek and 0.6 mile upstream from Squirrel Creek.

Drainage area.--420 sq mi, approximately.

Records available.--Discharge: May 1950 to December 1954, January to September 1955 (fragmentary), October 1955 to September 1960.
Chemical analyses: February 1952 to September 1953, January to September 1954, May to August 1956, October 1957 to September 1960.
Water temperatures: October 1952 to September 1953, November 1958 to September 1960.
Sediment records: May 1953 to September 1960 (periodic); summer months only 1956-60.

Gage.--Wire-weight gage read once daily. Altitude of gage is 1,500 ft (from topographic map). Prior to Oct. 16, 1957, at site 200 ft upstream at same datum.

Average discharge.--9 years (1950-54, 1955-60), 932 cfs (674,700 acre-ft per year).

Extremes.--Maximum discharge observed during year, 5,380 cfs Sept. 13 (gage height, 4.15 ft); minimum not determined.
1950-54, 1955-60: Maximum discharge, 7,910 cfs June 8, 1957 (gage height, 7.00 ft, from graph based on gage readings, site then in use); minimum not determined.
1959-60: Maximum water temperature, 54°F July 14, 21, 22.
1958-60: Maximum water temperature, that of July 14, 21, 22, 1960.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 880 | | | | | | | 110 | 2,720 | 3,700 | 2,420 | 1,600 |
| 2 | 1,060 | | | | | | | 120 | 2,720 | 3,300 | 2,380 | 1,500 |
| 3 | 1,060 | | | | | | | 140 | 2,520 | 3,100 | 2,140 | 1,440 |
| 4 | 1,000 | | | | | | | 160 | 2,220 | 3,000 | 1,940 | 1,390 |
| 5 | 890 | | | | | | | 190 | 2,140 | 2,900 | 1,800 | 1,290 |
| 6 | 790 | | | | | | | 240 | 2,340 | 2,700 | 1,830 | 1,280 |
| 7 | 772 | (*) | | | | 93 | | 310 | 2,850 | 2,320 | 2,140 | 1,230 |
| 8 | 660 | 280 | 190 | 130 | 92 | (*) | 83 | 400 | 2,980 | 2,100 | 2,480 | 1,130 |
| 9 | 644 | | | | | | (*) | 540 | 2,650 | 1,850 | 2,540 | 1,100 |
| 10 | 591 | | | | | | | 600 | *2,340 | 1,690 | 2,580 | 1,100 |
| 11 | 528 | | | | | | | 600 | *2,160 | 1,900 | 2,610 | 1,150 |
| 12 | 516 | | | | | | | 598 | 2,100 | 2,300 | 2,890 | 3,050 |
| 13 | *516 | | | | | | | 584 | 2,020 | 2,540 | 3,090 | 5,270 |
| 14 | 502 | | (*) | | | | | 644 | 1,940 | 2,560 | 3,050 | 4,800 |
| 15 | 483 | | | | | | | 700 | 1,920 | 2,480 | 2,980 | *3,660 |
| 16 | 471 | | | | | | | 763 | 1,960 | 2,630 | 2,830 | 2,100 |
| 17 | 471 | | | | | | | 830 | 2,360 | 2,800 | 2,980 | 1,900 |
| 18 | 483 | | | | | | | 901 | 2,850 | 3,090 | 2,460 | 1,700 |
| 19 | 460 | | | | | | | *945 | 2,980 | 2,940 | 1,960 | 1,620 |
| 20 | 440 | | | | | | | 945 | 3,050 | 2,420 | 1,620 | 1,580 |
| 21 | 430 | | | | | | | 923 | 3,000 | 2,360 | 1,580 | 1,500 |
| 22 | 410 | | | | | | | 945 | 2,940 | 2,360 | 1,470 | 1,340 |
| 23 | 400 | 260 | 170 | 110 | 88 | 84 | 79 | 956 | 3,090 | 2,760 | 1,420 | 1,190 |
| 24 | 386 | | | | | | | 2,110 | 3,320 | 2,850 | 1,290 | 1,060 |
| 25 | 380 | | | | | | | 3,460 | 3,440 | 2,740 | 1,260 | 1,000 |
| 26 | 370 | | | (*) | | | | 4,360 | 3,750 | 2,690 | 1,320 | 945 |
| 27 | 360 | | | | | | | 4,670 | 3,900 | 2,520 | 1,470 | 890 |
| 28 | 350 | | | | | | | 4,730 | 4,000 | *2,870 | 1,710 | 840 |
| 29 | 340 | | | | | | | 4,340 | 4,100 | 3,220 | 1,710 | 790 |
| 30 | 330 | | | | ------- | | | 3,560 | 4,800 | 2,980 | 1,690 | 745 |
| 31 | 320 | ------- | | | ------- | | ------- | 2,870 | ------- | 2,630 | 1,650 | ------- |
| Total | 17,293 | 8,100 | 5,570 | 3,710 | 2,612 | 2,739 | 2,430 | 43,244 | 85,160 | 82,300 | 65,290 | 50,190 |
| Mean | 558 | 270 | 180 | 120 | 90.1 | 88.4 | 81.0 | 1,395 | 2,839 | 2,655 | 2,106 | 1,673 |
| Ac-ft | 34,300 | 16,070 | 11,050 | 7,360 | 5,180 | 5,430 | 4,820 | 85,770 | 168,900 | 163,200 | 129,500 | 99,550 |

Calendar year 1959: Max 5,800 Min - Mean 924 Ac-ft 669,200
Water year 1959-60: Max 5,270 Min - Mean 1,007 Ac-ft 731,100

* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Oct. 19-23, Oct. 25 to May 11 (no gage-height record Nov. 15 to Apr. 8, except occasional days; discharge estimated on basis of 4 discharge measurements, weather records, and records for Klutina River at Copper Center and Tazlina River near Glennallen). No gage-height record June 27 to July 6, Sept. 16-18; discharge estimated or basis of 1 discharge measurement, weather records, and records for Klutina River at Copper Certer and Tazlina River near Glennallen.

## 2080. TONSINA RIVER AT TONSINA--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Oct. 2-16, 1959 | 699 | 5.7 | 0.03 | 12 | 0.7 | 1.6 | 0.6 | 37 | 5.0 | 1.0 | 0.0 | 0.1 | 45 | 33 | 2 | 70 | 7.1 | 5 |
| Nov. 3 | a 280 | 6.0 | .20 | 12 | 1.9 | 1.5 | .3 | 44 | 4.0 | 2.0 | .0 | .4 | 50 | 38 | 2 | 86 | 7.3 | 10 |
| Nov. 5-20 | 273 | 6.4 | .05 | 14 | 1.4 | 2.2 | .8 | 47 | 6.0 | 1.0 | .1 | .0 | 55 | 41 | 2 | 90 | 7.2 | 5 |
| Dec. 3 | -- | 6.9 | .07 | 14 | 2.4 | 2.4 | .5 | 51 | 6.0 | 2.5 | .1 | .2 | 60 | 45 | 3 | 98 | 7.5 | 0 |
| Dec. 14 | b 178 | 8.1 | .00 | 15 | 2.1 | 3.7 | 1.3 | 53 | 8.0 | 3.0 | .0 | 2.0 | 69 | 46 | 2 | 116 | 6.9 | 0 |
| Mar, 8, 1960 | b 94.8 | 9.3 | .17 | 18 | 4.0 | 3.8 | .9 | 73 | 10 | 1.5 | .1 | 1.6 | 86 | 62 | 2 | 135 | 7.2 | 10 |
| Apr. 9 | b 87.7 | 8.2 | .00 | 17 | 2.6 | 3.4 | .8 | 60 | 5.0 | 5.5 | .0 | .4 | 73 | 53 | 4 | 123 | 7.3 | 0 |
| Apr. 20 | c 79.0 | 9.0 | .10 | 17 | 3.3 | 3.0 | .5 | 68 | 7.0 | 1.5 | .1 | .2 | 75 | 56 | 0 | 122 | 7.5 | 20 |
| Apr. 21-30 | c 79.0 | 7.4 | .03 | 16 | 4.0 | 3.0 | .9 | 64 | 7.0 | 2.5 | .0 | .2 | 73 | 56 | 4 | 112 | 7.6 | 20 |
| May 1-9 | 246 | 5.7 | .14 | 10 | 3.1 | 1.4 | 1.4 | 41 | 5.0 | 2.5 | .0 | .4 | 50 | 38 | 4 | 72 | 7.0 | 60 |
| May 10-19 | 716 | 6.4 | .12 | 11 | 4.0 | 1.8 | .7 | 22 | 7.0 | 3.0 | .0 | .5 | 56 | 44 | 8 | 79 | 7.3 | 40 |
| May 20-31 | 2,820 | 5.0 | .10 | 10 | 2.1 | 1.3 | .6 | 34 | 8.0 | 2.0 | .0 | .3 | 46 | 34 | 6 | 66 | 7.5 | 30 |
| June 1-10 | 2,550 | 5.0 | .05 | 10 | 3.8 | 1.4 | .6 | 36 | 9.0 | 3.0 | .0 | .5 | 51 | 40 | 11 | 66 | 7.3 | 10 |
| June 11-20 | 2,330 | 5.0 | .05 | 9.9 | 3.1 | 1.4 | .6 | 34 | 8.0 | 3.0 | .0 | .5 | 48 | 37 | 9 | 68 | 7.0 | 10 |
| June 21-25 | 3,160 | 5.2 | .02 | 9.1 | 1.4 | 1.0 | .3 | 30 | 6.0 | 1.0 | .0 | .2 | 39 | 28 | 4 | 62 | 7.2 | 5 |
| July 7-9 | 2,090 | 4.7 | .03 | 9.9 | 3.1 | 1.2 | .5 | 33 | 7.0 | 3.0 | .1 | .1 | 46 | 37 | 10 | 65 | 7.1 | 5 |
| July 10-19 | 2,490 | 4.8 | .03 | 9.5 | 2.8 | 1.4 | .5 | 33 | 7.0 | 3.0 | .1 | .0 | 45 | 35 | 8 | 64 | 7.2 | 5 |
| July 20-24, 26-30 | 2,550 | 4.7 | .30 | 10 | 2.8 | 1.2 | .4 | 32 | 7.0 | 4.0 | .1 | .1 | 46 | 36 | 10 | 62 | 7.0 | 5 |
| Aug. 1-7 | 2,090 | 4.6 | .03 | 10 | 1.9 | 1.2 | .3 | 33 | 7.0 | 1.0 | .1 | .2 | 42 | 33 | 6 | 63 | 7.3 | 5 |
| Aug. 22, 24, 25, 27, 28 | 1,440 | 4.6 | .03 | 10 | 1.9 | 1.2 | .3 | 32 | 7.0 | 1.5 | .1 | .0 | 43 | 33 | 7 | 65 | 7.2 | 5 |
| Sept. 1, 2, 5, 7-10 | 1,280 | 4.9 | .03 | 11 | 2.4 | 1.6 | .3 | 36 | 7.0 | 2.5 | .1 | .1 | 48 | 38 | 8 | 69 | 7.0 | 5 |
| Sept. 11-15, 19, 20 | 3,020 | 4.6 | .03 | 10 | 2.4 | 1.0 | .3 | 33 | 5.0 | 3.0 | .1 | .2 | 43 | 35 | 8 | 64 | 7.5 | 5 |
| Sept. 21, 22, 24-30 | 1,010 | 5.9 | .05 | 12 | 3.1 | 1.2 | .3 | 39 | 9.0 | 2.0 | .1 | .1 | 53 | 42 | 10 | 71 | 7.3 | 5 |

a Mean discharge for period Nov. 1-15.
b Discharge at time of sampling.
c Mean discharge for period Apr. 16-30.

## 2080. TONSINA RIVER AT TONSINA--Continued

Temperature (°F) of water, water year October 1959 to September 1960
(Once-daily measurement between 8 a.m. and 12 m)

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 44 | -- | | | | | -- | 33 | 44 | -- | 52 | 45 |
| 2 | 43 | -- | | | | | -- | 33 | 45 | -- | 51 | 44 |
| 3 | 42 | 33 | 32 | | | | -- | 33 | 45 | -- | 49 | -- |
| 4 | 42 | -- | | | | | -- | 33 | 45 | -- | 48 | -- |
| 5 | 42 | 31 | | | | | -- | 34 | 45 | -- | 50 | 43 |
| 6 | 39 | 32 | | | | | -- | 34 | 46 | -- | 49 | -- |
| 7 | 35 | 32 | | | | | -- | 34 | 46 | 50 | 48 | 44 |
| 8 | 34 | 32 | | | | | -- | 36 | 46 | 50 | -- | 45 |
| 9 | 34 | 32 | | | | | -- | 36 | 46 | 50 | -- | 45 |
| 10 | 34 | 31 | | | | | -- | 37 | 46 | 50 | -- | 47 |
| 11 | 32 | 31 | | | | | -- | 39 | 46 | 50 | -- | 48 |
| 12 | 35 | 31 | | | | | -- | 39 | 46 | 50 | -- | 45 |
| 13 | 35 | 31 | | | | | -- | 41 | 46 | 50 | -- | 43 |
| 14 | 34 | 32 | | | | | -- | 42 | 47 | 54 | -- | 45 |
| 15 | 32 | 32 | | | | | -- | 43 | 47 | 49 | -- | 46 |
| 16 | 32 | 31 | | | | | -- | 44 | 47 | 50 | -- | -- |
| 17 | -- | 31 | | | | | -- | 43 | 48 | 50 | -- | -- |
| 18 | -- | 31 | | | | | -- | 42 | 46 | 51 | -- | -- |
| 19 | -- | -- | | | | | -- | 42 | 46 | 51 | -- | 44 |
| 20 | -- | 31 | | | | | -- | 43 | 48 | 52 | -- | 45 |
| 21 | -- | -- | | | | | 32 | 43 | 48 | 54 | -- | 46 |
| 22 | -- | -- | | | | | 32 | 44 | 50 | 54 | 50 | 46 |
| 23 | -- | -- | | | | | 32 | 44 | 49 | 50 | -- | -- |
| 24 | -- | -- | | | | | 32 | 45 | 50 | 48 | 48 | 43 |
| 25 | -- | -- | | | | | 33 | 45 | 49 | 50 | 48 | 42 |
| 26 | -- | -- | | | | | 32 | 45 | -- | 51 | -- | 42 |
| 27 | -- | -- | | | | | 32 | 42 | -- | -- | -- | 42 |
| 28 | -- | -- | | | | | 32 | 42 | -- | 52 | 48 | 42 |
| 29 | -- | -- | | | | | 32 | 41 | -- | 50 | -- | 42 |
| 30 | -- | -- | | | | | 32 | 41 | -- | 48 | -- | 41 |
| 31 | -- | -- | | | | | -- | -- | -- | -- | -- | -- |
| Average | -- | -- | | | | | -- | 40 | 47 | -- | -- | -- |

Periodic determinations of suspended-sediment discharge, November 1959 to August 1960

| Date | Discharge (cfs) | Suspended sediment | |
|---|---|---|---|
| | | Mean concentration (ppm) | Discharge (tons per day) |
| Nov. 4, 1959 | 346 | 24 | 22 |
| Dec. 3 | a130 | 12 | 4 |
| Apr. 20, 1960 | a408 | 3 | 3 |
| June 1 | 2,910 | 33 | 25 |
| July 6 | 2,360 | 26 | 16 |
| Aug. 22 | 1,470 | 34 | 13 |

a Daily mean discharge.

## 2120. Copper River near Chitina

Location (revised).--Lat 61°28'00", long 144°27'20", on right bank at head of Woods Canyon, half a mile downstream from Taral Creek and abandoned Indian village of Taral, 2¼ miles upstream from Tenas Creek, and 3½ miles south of Chitina.

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

Records available.--Discharge: July to September 1950, May to November 1952, October 1955 to September 1960.
Chemical analyses: June to November 1950, January 1954 to September 1957.
Water temperatures: June to September 1957.
Sediment records: January 1954 to September 1956 (periodic); June to September 1957 (daily); summer months only 1955-57.

Gage.--Water-stage recorder and bubble gage. Altitude of gage is 400 ft (from topographic map). Prior to June 2, 1952, staff gage at site a quarter of a mile upstream at datum 1.4 ft higher. June 2 to Nov. 30, 1952, water-stage recorder at same site and datum.

Average discharge.--5 years, 38,250 cfs (27,690,000 acre-ft per year).

Extremes.--Maximum discharge during year, 169,000 cfs July 27 (gage height, 22.62 ft); minimum not determined.
1950, 1952, 1955-60: Maximum discharge recorded, 172,000 cfs June 10, 1958 (gage height, 22.52 ft); maximum gage height recorded, that of July 27, 1960; minimum not determined.
Maximum stage known since 1950, 28.3 ft, in July 1951, at present datum, from floodmarks (discharge, 220,000 cfs).

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Some diurnal fluctuation caused by glacier melt at the source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56,000 | | | | | | | 14,000 | 56,900 | 104,000 | 129,000 | 61,000 |
| 2 | 57,100 | | | | | | | 18,000 | 58,700 | 94,100 | 112,000 | 59,000 |
| 3 | 62,300 | | | | | | | 25,000 | 55,000 | 90,100 | 100,000 | 57,000 |
| 4 | 54,100 | | | | | | | 28,000 | 52,400 | 85,600 | 92,500 | 56,000 |
| 5 | 47,200 | | | | | | | 31,000 | 56,300 | 83,900 | 89,400 | 54,000 |
| 6 | 42,000 | | | | | | | 34,000 | 55,200 | 78,600 | 86,300 | 52,000 |
| 7 | 38,400 | (*) | | | | (*) | | 37,000 | 56,300 | 73,400 | 95,600 | 51,000 |
| 8 | 35,400 | 10,000 | 7,300 | 5,900 | 4,900 | 4,000 | 5,100 | 39,000 | 56,900 | 72,200 | 106,000 | 51,000 |
| 9 | 31,000 | | | | | | (*) | 37,000 | 56,400 | 71,000 | 106,000 | 50,000 |
| 10 | 28,000 | | | | | | | 35,000 | *55,500 | 70,300 | 112,000 | 51,000 |
| 11 | 25,000 | | | | | | | 33,000 | 59,100 | 73,400 | 119,000 | 58,000 |
| 12 | *23,000 | | | | | | | 33,000 | 56,500 | 79,400 | 132,000 | 84,000 |
| 13 | 22,000 | | | | | | | 33,000 | 52,000 | 87,900 | 153,000 | 130,000 |
| 14 | 20,000 | | | | | | | 34,000 | 52,200 | 98,100 | 153,000 | *118,000 |
| 15 | 20,000 | | | | | | | 35,000 | 49,200 | 106,000 | 143,000 | 97,100 |
| 16 | 21,000 | | | | | | | 36,000 | 50,200 | 97,900 | 134,000 | 84,500 |
| 17 | 21,000 | | | | | | | 37,000 | 53,900 | 94,100 | 120,000 | 75,000 |
| 18 | 20,000 | | | | | | | *37,600 | 64,300 | 95,100 | 107,000 | 68,700 |
| 19 | 19,000 | | | | | | | 37,500 | 69,400 | 88,300 | 100,000 | 61,900 |
| 20 | 19,000 | | | | | | | 35,800 | 71,200 | 83,800 | 91,700 | 56,500 |
| 21 | 18,000 | | | | | | | 34,900 | 91,600 | 89,700 | 85,100 | 53,000 |
| 22 | 18,000 | | | | | | | 35,600 | 81,400 | 102,000 | 81,000 | 50,000 |
| 23 | 17,000 | 8,400 | 6,900 | 6,400 | 4,200 | 4,100 | 6,800 | 40,300 | 81,400 | 114,000 | 76,000 | 48,000 |
| 24 | 17,000 | | | | | | | 51,400 | 85,300 | 119,000 | 71,000 | 46,000 |
| 25 | 16,000 | | | (*) | | | | 66,100 | 89,700 | 133,000 | 67,000 | 44,000 |
| 26 | 16,000 | | | | | | | 80,800 | 109,000 | 156,000 | 65,000 | 40,000 |
| 27 | 15,000 | | | | | | | 76,400 | 106,000 | 164,000 | 64,000 | 38,000 |
| 28 | 15,000 | | | | | | | 68,000 | 111,000 | 143,000 | 64,000 | 36,000 |
| 29 | 14,000 | | | | | | | 62,700 | 117,000 | *140,000 | 65,000 | 37,000 |
| 30 | 14,000 | | | | ------- | | | 59,400 | 115,000 | 150,000 | 65,000 | 39,000 |
| 31 | 13,000 | ------- | | | ------- | | ------- | 54,000 | ------- | 138,000 | 63,000 | ------- |
| Total | 834,500 | 276,000 | 219,900 | 190,900 | 132,300 | 125,600 | 178,500 | ‡1,279.5 | ‡2,125 | ‡3,175.9 | ‡3,047.6 | ‡1,806.7 |
| Mean | 26,920 | 9,200 | 7,094 | 6,158 | 4,562 | 4,052 | 5,950 | 41,270 | 70,830 | 102,400 | 98,310 | 60,220 |
| Ac-ft | ‡1,655 | 547,400 | 436,200 | 378,600 | 262,400 | 249,100 | 354,000 | ‡2,538 | ‡4,215 | ‡6,299 | ‡6,045 | ‡3,584 |

Calendar year 1959: Max 160,000 Min - Mean 36,910 Ac-ft 26,720,000
Water year 1959-60: Max 164,000 Min - Mean 36,590 Ac-ft 26,560,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
Note.--No gage-height record Aug. 22 to Sept. 15, Sept. 21-30; discharge estimated on basis of 1 discharge measurement, recorded range in stage, weather records, and records for stations on tributary streams. Stage-discharge relation affected by ice Oct. 9 to about May 17 (no gage-height record Nov. 3-6, Nov. 15 to May 17, except occasional days; discharge estimated on basis of 5 discharge measurements, weather records, and records for stations on tributary streams)

## 2160. Power Creek near Cordova

Location.--Lat 60°35'15", long 145°37'05", on right bank at old bridge site, 1 mile upstream from Eyak Lake and 5½ miles northeast of Cordova. Prior to Mar. 31, on left bank.

Drainage area.--20.5 sq mi.

Records available.--July to November 1913 (fragmentary), August 1947 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 33.5 ft above mean sea level (river-profile survey). July to November 1913, staff gage half a mile upstream at different datum.

Average discharge.--13 years, 256 cfs (185,300 acre-ft per year).

Extremes.--Maximum discharge during year, 2,880 cfs Oct. 23 (gage height, 6.00 ft), from rating curve extended above 1,450 cfs by logarithmic plotting; minimum, 21 cfs Mar. 18 (gage height, 1.31 ft), caused by temporary storage behind snowslide upstream.
1947-60: Maximum discharge recorded, 5,540 cfs Sept. 25, 1949 (gage height, 7.65 ft), from rating curve extended above 1,450 cfs by logarithmic plotting; minimum recorded, 13 cfs Apr. 29, 1950 (gage height, 1.50 ft), but may have been less during periods of no gage-height record.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,200 | 354 | 134 | 55 | 96 | 43 | 32 | 62 | 368 | 470 | 1,100 | 206 |
| 2 | 584 | 232 | 118 | 62 | 82 | 42 | 31 | *73 | 388 | 447 | 1,060 | 531 |
| 3 | 358 | *180 | 103 | 124 | 75 | 41 | 32 | 104 | 380 | 447 | 856 | 544 |
| 4 | 267 | 178 | 97 | 156 | 70 | 40 | 32 | 203 | 388 | 491 | 944 | 351 |
| 5 | 204 | 284 | 90 | 317 | 66 | b38 | 31 | 283 | 437 | 539 | 808 | 433 |
| 6 | 176 | 271 | 86 | 178 | 64 | b37 | 33 | 221 | 480 | 491 | 1,240 | 406 |
| 7 | 151 | 423 | 80 | 118 | 62 | b35 | 39 | 269 | 480 | 466 | 898 | 320 |
| 8 | 134 | 220 | 78 | 97 | *67 | b34 | 42 | 227 | 437 | 419 | 630 | 916 |
| 9 | 118 | 158 | 79 | 90 | 63 | b33 | 36 | 206 | 424 | 406 | 591 | 533 |
| 10 | 109 | 132 | 86 | 85 | 59 | b32 | 34 | 201 | 433 | 466 | 643 | 706 |
| 11 | 100 | 117 | 88 | a80 | 58 | b31 | 33 | 190 | 461 | 573 | 579 | 1,060 |
| 12 | 202 | 104 | 79 | a75 | 57 | b30 | 32 | 179 | 406 | 617 | 485 | 713 |
| 13 | 201 | 97 | 91 | a70 | 55 | b29 | 32 | 179 | 384 | 643 | 428 | 706 |
| 14 | 130 | 94 | 91 | a65 | 53 | b29 | 32 | 190 | 452 | 728 | 433 | 491 |
| 15 | 109 | 88 | 80 | a60 | 51 | b28 | 32 | 209 | 433 | 706 | 475 | 372 |
| 16 | 99 | 84 | 78 | a60 | 50 | b28 | 32 | 230 | 480 | 511 | 466 | 347 |
| 17 | 91 | 80 | 79 | a62 | 49 | b29 | 31 | 233 | 511 | 527 | 397 | 320 |
| 18 | 85 | 77 | 73 | a66 | 49 | 29 | 31 | 233 | 496 | 470 | 364 | 286 |
| 19 | 80 | 75 | 65 | 62 | 48 | 30 | 31 | 230 | 475 | 437 | 368 | 239 |
| 20 | 76 | 75 | 64 | 58 | 47 | 29 | 30 | 243 | 433 | 442 | 332 | *230 |
| 21 | 77 | 70 | 76 | 57 | 48 | 29 | 30 | 294 | 419 | *466 | 316 | 399 |
| 22 | 305 | 99 | 62 | 57 | 36 | 30 | 30 | 351 | *452 | 470 | 301 | 585 |
| 23 | 1,700 | 254 | 71 | 57 | 100 | 32 | 31 | 437 | 485 | 511 | 294 | 380 |
| 24 | 690 | 153 | 63 | 57 | 58 | 35 | 32 | 480 | 501 | 684 | 287 | 316 |
| 25 | 339 | 130 | 58 | 57 | 51 | 36 | 35 | 480 | 496 | 800 | 287 | 283 |
| 26 | 260 | 206 | 58 | 57 | 49 | 34 | 42 | 424 | 585 | 916 | 313 | 332 |
| 27 | 295 | 220 | 55 | 55 | 48 | 36 | 44 | 428 | 544 | 1,070 | 544 | 339 |
| 28 | 389 | 188 | 58 | 55 | 48 | 39 | 45 | 415 | 630 | 1,260 | 380 | 637 |
| 29 | 530 | 169 | 58 | 51 | 43 | 34 | 50 | 376 | 591 | 1,440 | 294 | 649 |
| 30 | 596 | 130 | 55 | 53 | ------ | a33 | 53 | 380 | 506 | 832 | 259 | 517 |
| 31 | 518 | ------ | *53 | 117 | ------ | *32 | ------ | 380 | ------ | 736 | 239 | ------ |
| Total | 10,173 | 4,942 | 2,406 | 2,613 | 1,702 | 1,037 | 1,050 | 8,410 | 13,955 | 19,481 | 16,611 | 14,127 |
| Mean | 328 | 165 | 77.6 | 84.3 | 58.7 | 33.5 | 35.0 | 271 | 465 | 628 | 536 | 471 |
| Cfsm | 16.0 | 8.05 | 3.79 | 4.11 | 2.86 | 1.63 | 1.71 | 13.2 | 22.7 | 30.6 | 26.1 | 23.0 |
| In. | 18.46 | 8.97 | 4.36 | 4.74 | 3.09 | 1.88 | 1.90 | 15.26 | 25.32 | 35.34 | 30.13 | 25.63 |
| Ac-ft | 20,180 | 9,800 | 4,770 | 5,180 | 3,380 | 2,060 | 2,080 | 16,680 | 27,680 | 38,640 | 32,950 | 28,020 |

Calendar year 1959: Max 2,260 Min 20 Mean 218 Cfsm 10.6 In. 144.12 Ac-ft 157,600
Water year 1959-60: Max 1,700 Min 28 Mean 264 Cfsm 12.9 In. 175.08 Ac-ft 191,400

Peak discharge (base, 2,000 cfs).--Oct. 1 (3 p.m.) 2,540 cfs (5.75 ft); Oct. 23 (11:30 a.m.) 2,880 cfs (6.00 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge interpolated or estimated on basis of recorded range in stage and weather records.
b Stage-discharge relation affected by ice.

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## 2390. Bradley River near Homer

Location.--Lat 59°45'25", long 150°51'00", on right bank about 800 ft downstream from Bradley Lake Outlet, 3½ miles upstream from unnamed tributary, and 26 miles northeast of Homer.

Drainage area.--54.0 sq mi.

Records available.--July to August 1955, October 1957 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,050 ft (from topographic map). July 13-22, 1955, staff gage at site 1 mile upstream, and July 23 to Aug. 5, 1955, staff gage at site 3 miles upstream at different datum.

Extremes.--Maximum discharge during year, 1,770 cfs Aug. 2 (gage height, 6.00 ft); minimum not determined.
1955, 1957-60: Maximum discharge, 3,470 cfs Aug. 13, 1958 (gage height, 8.20 ft); minimum not determined.

Remarks.--Records poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | 100 | 730 | 950 | 1,310 | |
| 2 | | | | | | (*) | | 120 | 680 | 860 | 1,730 | |
| 3 | | | | | | | | 150 | 650 | 800 | 1,560 | |
| 4 | | | | | | | | 180 | 640 | 770 | 1,400 | |
| 5 | | | | | | | | 220 | 650 | 760 | 1,340 | |
| 6 | | | | | | | | 271 | 670 | 730 | 1,420 | |
| 7 | | | | | | | | 319 | 690 | 700 | 1,380 | |
| 8 | | | | | | | | 359 | *700 | 660 | 1,160 | 560 |
| 9 | | | | | | | | 407 | 736 | 650 | 980 | |
| 10 | | | | | (*) | | | 462 | 758 | 660 | 905 | |
| 11 | | | | | | | | 507 | 732 | 700 | 850 | |
| 12 | | | | | | | | 546 | 686 | 770 | 830 | |
| 13 | | | | | | | (*) | 565 | 638 | 830 | 790 | |
| 14 | | | | | | | | 610 | 585 | 900 | 781 | |
| 15 | | | | | | | | 668 | 554 | 870 | 800 | |
| | 160 | 94 | 60 | 39 | 35 | 24 | 33 | | | | | |
| 16 | | | | | | | | 704 | 543 | 840 | 772 | |
| 17 | | | | | | | | 722 | 580 | 810 | 714 | |
| 18 | | | | | | | | 740 | 620 | 840 | 647 | |
| 19 | | | | | | | | 727 | 670 | 830 | 602 | |
| 20 | | | | | | | | 714 | 700 | 810 | 558 | |
| 21 | | | | | | | | 704 | 690 | 860 | 539 | |
| 22 | | | | | | | | 700 | 700 | 930 | 510 | |
| 23 | | | | | | | | 720 | 730 | 990 | 524 | 350 |
| 24 | | | | | | | | 820 | 770 | 1,100 | 546 | |
| 25 | | | | | | | | 950 | 810 | 1,100 | 573 | |
| 26 | | | | | | | | 1,000 | 850 | 1,200 | 598 | |
| 27 | | | | | | | | 980 | 890 | *1,250 | 626 | |
| 28 | | | | | | | | 920 | 930 | 1,290 | 598 | |
| 29 | | | | | | | | 880 | 980 | 1,370 | 543 | |
| 30 | | | | | | | | 830 | 1,000 | 1,220 | 528 | |
| 31 | | ------ | | | ------ | | ------ | 790 | ------ | 1,040 | 510 | ------ |
| Total | 4,960 | 2,820 | 1,860 | 1,209 | 1,015 | 744 | 990 | 18,385 | 21,562 | 28,090 | 26,624 | 13,650 |
| Mean | 160 | 94 | 60 | 39 | 35 | 24 | 33 | 593 | 719 | 906 | 859 | 455 |
| Cfsm | 2.96 | 1.74 | 1.11 | 0.722 | 0.648 | 0.444 | 0.611 | 11.0 | 13.3 | 16.8 | 15.9 | 8.43 |
| In. | 3.42 | 1.94 | 1.28 | 0.83 | 0.70 | 0.51 | 0.68 | 12.66 | 14.85 | 19.35 | 18.34 | 9.40 |
| Ac-ft | 9,840 | 5,590 | 3,690 | 2,400 | 2,010 | 1,480 | 1,960 | 36,470 | 42,770 | 55,720 | 52,810 | 27,070 |

Calendar year 1959: Max 1,230 Min - Mean 287 Cfsm 5.31 In. 72.11 Ac-ft 207,700
Water year 1959-60: Max 1,730 Min - Mean 333 Cfsm 6.17 In. 83.96 Ac-ft 241,800

* Discharge measurement made on this day.

Note.--No gage-height record Oct. 1 to May 5, except occasional days (stage-discharge relation affected by ice during most of period), May 23 to June 7, June 17 to July 26, Aug. 31 to Sept. 30; discharge estimated on basis of 6 discharge measurements, weather records, recorded range in stage, and records for Trail River near Lawing.

## 2400. Anchor River at Anchor Point

Location.--Lat 59°46'10", long 151°50'00", in SE¼ sec.4, T.5 S., R.15 W., near right bank on downstream side of Sterling Highway Bridge at Anchor Point, 0.1 mile downstream from North Fork and 1 mile upstream from mouth.

Drainage area.--226 sq mi.

Records available.--Discharge: July 1953 to September 1960.
Chemical analyses: May 1953 to September 1954, October 1957 to September 1960.
Water temperatures: May 1953 to September 1954, December 1958 to September 1960.
Sediment records: July 1953 to August 1954 (periodic).

Gage.--Wire-weight gage read once daily. Datum of gage is 24 ft above mean sea level (river-profile survey).

Average discharge.--7 years, 280 cfs (202,700 acre-ft per year).

Extremes.--Maximum discharge during year, 1,750 cfs May 23 (gage height, 4.38 ft, from graph based on gage readings); maximum gage height observed, 6.58 ft Apr. 30 (ice jam); minimum discharge, 63 cfs July 22 (gage height, 1.62 ft, from graph based on gage readings).
1953-60: Maximum discharge, 2,320 cfs May 7, 1954 (gage height, 4.95 ft, from graph based on gage readings); maximum gage height observed, 6.95 ft Apr. 24, 1959 (ice jam); minimum discharge observed, 28 cfs July 28, 1953 (gage height, 1.81 ft), but may have been less during periods of no gage-height record.
1959-60: Maximum water temperature, 61°F Aug. 9.
1958-60: Maximum water temparature, 61°F Aug. 10, 16, 1959, Aug. 9, 1960.

Remarks.--Records fair except those for period of ice effect, which are poor. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 546 | 960 | | | | (*) | | 980 | 340 | 249 | 504 | 158 |
| 2 | 409 | 460 | | | | | | 880 | 274 | 241 | 326 | 430 |
| 3 | 335 | *270 | | | (*) | | | 1,000 | 238 | 219 | 326 | 498 |
| 4 | 295 | 240 | | | | | | 1,200 | 223 | 188 | 565 | 441 |
| 5 | 257 | 240 | | | | | | 1,300 | 219 | 177 | 540 | 304 |
| 6 | 188 | 210 | | | | | | 1,400 | 219 | 162 | 703 | 198 |
| 7 | 170 | 190 | | | | | | 1,490 | 219 | 152 | 578 | 158 |
| 8 | 150 | 180 | 160 | 150 | 190 | 98 | 100 | 1,550 | *219 | 152 | 388 | 286 |
| 9 | 140 | 170 | | | | | | 1,540 | 198 | 155 | 245 | 257 |
| 10 | 130 | 160 | | | | | | *1,450 | 171 | 146 | 212 | 223 |
| 11 | 120 | 160 | | | | | | *1,250 | 165 | 113 | 101 | 257 |
| 12 | 120 | 150 | | | | | | 1,040 | 158 | 103 | 103 | 226 |
| 13 | 120 | 150 | | | | | (*) | 1,010 | 158 | 91 | 108 | 208 |
| 14 | 120 | 140 | | | | | | 852 | 158 | 91 | 132 | 181 |
| 15 | 110 | 140 | | | | | | 845 | 162 | 103 | 245 | 165 |
| 16 | 110 | 140 | | | | | | 815 | 162 | 101 | 257 | 165 |
| 17 | 110 | 130 | | | | | | 787 | 162 | 98 | 212 | 158 |
| 18 | 110 | 130 | | | | | | 780 | 149 | 96 | 198 | 149 |
| 19 | 110 | 130 | (*) | | | | | 745 | 143 | 105 | 177 | 143 |
| 20 | 110 | 130 | | | | | | 710 | 135 | 89 | 162 | 135 |
| 21 | 120 | 130 | | | | | | 724 | 137 | 85 | 158 | 208 |
| 22 | 130 | 130 | | | | | | 997 | 123 | 68 | 158 | 469 |
| 23 | 140 | 130 | 150 | 170 | 130 | 110 | 270 | 1,520 | 118 | *110 | 158 | 295 |
| 24 | 170 | 130 | | | | | | 965 | 113 | 299 | 113 | 245 |
| 25 | 220 | 130 | | | | | | 787 | 101 | 441 | 98 | 245 |
| 26 | 260 | 140 | | | | | | 766 | 101 | 469 | 165 | 270 |
| 27 | 290 | 140 | | | | | | 689 | 91 | 578 | 208 | 724 |
| 28 | 680 | 150 | | | | | | 675 | 93 | 616 | 198 | 1,070 |
| 29 | 1,200 | 170 | | | | | | 559 | 174 | 534 | 168 | 815 |
| 30 | 810 | 180 | | | ------- | | | 452 | 238 | 534 | 158 | 591 |
| 31 | 1,200 | ------- | | | ------- | | ------- | 378 | ------- | 534 | *152 | ------- |
| Total | 8,980 | 5,910 | 4,800 | 4,970 | 4,670 | 3,230 | 5,550 | 30,136 | 5,161 | 7,099 | 7,816 | 9,672 |
| Mean | 290 | 197 | 155 | 160 | 161 | 104 | 185 | 972 | 172 | 229 | 252 | 322 |
| Cfsm | 1.28 | 0.872 | 0.686 | 0.708 | 0.712 | 0.460 | 0.819 | 4.30 | 0.761 | 1.01 | 1.12 | 1.42 |
| In. | 1.48 | 0.97 | 0.79 | 0.82 | 0.77 | 0.53 | 0.91 | 4.96 | 0.85 | 1.17 | 1.29 | 1.59 |
| Ac-ft | 17,810 | 11,720 | 9,520 | 9,860 | 9,260 | 6,410 | 11,010 | 59,770 | 10,240 | 14,080 | 15,500 | 19,180 |

Calendar year 1959: Max 2,230 Min 77 Mean 258 Cfsm 1.14 In. 15.51 Ac-ft 187,100
Water year 1959-60: Max 1,550 Min 68 Mean 268 Cfsm 1.19 In. 16.13 Ac-ft 194,400

* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice Oct. 7 to May 6 (no gage-height record Dec. 10 to Apr. 26, except occasional days; discharge estimated on basis of 4 discharge measurements and weather records).

## 2400. ANCHOR RIVER AT ANCHOR POINT--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Oct. 3-7, 1959 | 251 | 30 | 0.62 | 7.1 | 3.3 | 5.6 | 1.8 | 43 | 3.0 | 6.0 | 0.0 | 0.6 | 79 | 31 | 0 | 89 | 7.0 | 25 |
| Oct. 8-20 | 126 | 33 | .64 | 8.3 | 4.0 | 6.3 | 2.1 | 50 | 3.0 | 5.0 | .0 | 1.0 | 88 | 37 | 0 | 101 | 7.2 | 20 |
| Oct. 21-27 | 190 | 32 | .51 | 7.1 | 3.6 | 5.6 | 2.0 | 43 | 2.0 | 5.0 | .0 | 1.1 | 80 | 32 | 0 | 91 | 7.1 | 20 |
| Oct. 28, 30, 31, Nov. 1 | 1,010 | 23 | .27 | 4.8 | 2.1 | 4.2 | 1.4 | 25 | 2.0 | 5.5 | .0 | .6 | 56 | 20 | 0 | 61 | 7.0 | 35 |
| Oct. 29 | 1,200 | 25 | .57 | 4.0 | 3.8 | 4.3 | 1.8 | 23 | 6.0 | 7.5 | .1 | .6 | 65 | 26 | 6 | 58 | 6.8 | 40 |
| Nov. 2-7 | 268 | 29 | .53 | 6.4 | 2.4 | 4.9 | 1.4 | 35 | 2.0 | 5.0 | .0 | .6 | 69 | 26 | 0 | 76 | 7.2 | 25 |
| Nov. 8-15 | 156 | 34 | .62 | 7.1 | 3.6 | 5.6 | 1.8 | 44 | 3.0 | 5.0 | .0 | .7 | 84 | 32 | 0 | 89 | 7.1 | 20 |
| Nov. 16-23 | 131 | 35 | .53 | 7.9 | 3.1 | 6.0 | 1.9 | 47 | 2.0 | 5.0 | .0 | .8 | 85 | 32 | 0 | 94 | 7.2 | 15 |
| Dec. 9-13 | 160 | 44 | .23 | 7.5 | 6.0 | 6.5 | 1.8 | 51 | 6.0 | 7.5 | .1 | .9 | 106 | 43 | 1 | 101 | 7.2 | 40 |
| Apr. 7, 1960 | 100 | 31 | 1.3 | 8.7 | 3.8 | 7.5 | 1.9 | 54 | .0 | 7.0 | .2 | .4 | 89 | 37 | 0 | 103 | 7.0 | 10 |
| Apr. 8-10 | 100 | 36 | .17 | 7.9 | 4.8 | 6.9 | 2.0 | 59 | 2.0 | 4.0 | .2 | 1.4 | 94 | 39 | 0 | 109 | 7.5 | 10 |
| Apr. 11-20 | 185 | 32 | .20 | 7.9 | 4.0 | 6.9 | 2.0 | 57 | 1.0 | 4.0 | .1 | 1.1 | 87 | 36 | 0 | 102 | 7.2 | 10 |
| Apr. 21-30 | 270 | 24 | .28 | 6.0 | 3.3 | 5.5 | 1.7 | 40 | 2.0 | 5.0 | .2 | .7 | 69 | 28 | 0 | 78 | 7.3 | 30 |
| May 1-6 | 1,130 | 18 | .14 | 4.4 | 3.1 | 3.7 | 1.8 | 25 | 2.0 | 6.0 | .0 | 1.1 | 52 | 24 | 3 | 56 | 7.3 | 30 |
| May 7, 8, 10-18 | 1,080 | 20 | .25 | 3.2 | 5.2 | 3.7 | 1.5 | 26 | 8.0 | 5.5 | .2 | .8 | 62 | 30 | 8 | 50 | 7.0 | 40 |
| May 9 | 1,540 | -- | -- | -- | -- | -- | -- | 28 | -- | -- | -- | -- | -- | 20 | 0 | 68 | 6.7 | -- |

## 2400. ANCHOR RIVER AT ANCHOR POINT--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| May 10, 1960 | 1,450 | 22 | 0.57 | 3.6 | 2.8 | 3.6 | 1.2 | 21 | 5.0 | 5.0 | 0.1 | 0.5 | 54 | 20 | 4 | 44 | 6.7 | 30 |
| May 19-28 | 858 | 22 | .23 | 3.6 | 5.0 | 3.8 | 1.2 | 27 | 7.0 | 6.0 | .1 | .5 | 63 | 30 | 8 | 52 | 7.2 | 40 |
| May 29-31, June 1-7 | 305 | 30 | .27 | 4.8 | 5.7 | 4.7 | 1.4 | 36 | 5.0 | 7.0 | .2 | .6 | 78 | 36 | 0 | 64 | 7.4 | 30 |
| June 8-16, 18 | 170 | 31 | .27 | 6.4 | 5.0 | 5.5 | 1.9 | 46 | 4.0 | 5.5 | .2 | .4 | 83 | 36 | 0 | 82 | 7.2 | 20 |
| June 17 | 162 | 30 | .18 | 7.5 | 4.0 | 6.3 | 2.0 | 49 | 2.0 | 5.0 | .1 | .4 | 82 | 35 | 0 | 95 | 6.6 | 20 |
| June 19, 20 | 139 | 39 | .10 | 6.4 | 5.0 | 6.3 | 2.0 | 50 | 5.0 | 5.0 | .2 | .3 | 94 | 36 | 0 | 89 | 7.3 | 20 |
| June 26-30, July 1, 2 | 170 | 39 | .14 | 6.7 | 5.7 | 6.0 | 1.9 | 49 | 6.0 | 5.0 | .1 | .2 | 95 | 40 | 0 | 85 | 7.3 | 20 |
| July 9 | 155 | 32 | .77 | 7.1 | 5.2 | 5.8 | 1.8 | 56 | 2.0 | 4.0 | .2 | .0 | 87 | 39 | 0 | 89 | 7.6 | 30 |
| Aug. 6-12 | 333 | 39 | .16 | 6.0 | 6.4 | 5.8 | 1.4 | 50 | 6.0 | 4.5 | .2 | .6 | 95 | 42 | 0 | 76 | 7.0 | 20 |
| Aug. 13-20 | 186 | 39 | .21 | 6.4 | 6.2 | 5.8 | 1.4 | 49 | 7.0 | 4.0 | .2 | .5 | 95 | 42 | 2 | 86 | 7.3 | 20 |
| Aug. 21-31 | 158 | 39 | .05 | 7.9 | 4.3 | 6.6 | 2.6 | 50 | 3.0 | 6.0 | .0 | .2 | 95 | 37 | 0 | 87 | 7.5 | 30 |
| Sept. 1-10 | 295 | 37 | .07 | 7.1 | 4.3 | 5.6 | 2.0 | 44 | 3.0 | 6.0 | .0 | .4 | 88 | 35 | 0 | 82 | 7.2 | 30 |
| Sept. 11-20 | 179 | 36 | .07 | 7.5 | 4.3 | 6.3 | 2.1 | 48 | 3.0 | 5.5 | .0 | .2 | 89 | 36 | 0 | 87 | 7.3 | 30 |
| Sept. 21-24, 27 | 388 | 36 | .05 | 6.4 | 4.0 | 5.7 | 2.1 | 42 | 4.0 | 6.0 | .0 | .3 | 86 | 32 | 0 | 83 | 7.5 | 30 |

## 2400. ANCHOR RIVER AT ANCHOR POINT--Continued

Temperature (°F) of water, water year October 1959 to September 1960
[Once-daily measurement at approximately 6 p. m.]

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 47 | 33 | 32 | | | | -- | 34 | -- | 51 | -- | 49 |
| 2 | 45 | 33 | 32 | | | | -- | 32 | -- | 51 | -- | 50 |
| 3 | 43 | 32 | 32 | | | | -- | 34 | -- | -- | -- | 54 |
| 4 | 43 | 33 | 32 | | | | -- | 34 | -- | -- | -- | 50 |
| 5 | 42 | 33 | 32 | | | | -- | 34 | -- | -- | -- | 40 |
| 6 | 39 | 33 | 32 | | | | -- | 38 | -- | -- | 54 | 45 |
| 7 | 37 | 33 | 32 | | | | 32 | 41 | -- | -- | 57 | 45 |
| 8 | 36 | 32 | 32 | | | | 32 | 41 | -- | -- | 59 | 50 |
| 9 | 34 | 32 | 32 | | | | 33 | 42 | -- | 52 | 61 | 45 |
| 10 | 34 | 32 | 32 | | | | 33 | 42 | -- | -- | 58 | 47 |
| 11 | 34 | 32 | 32 | | | | 33 | 42 | -- | -- | -- | 47 |
| 12 | 40 | 32 | 32 | | | | 34 | 42 | -- | -- | 58 | 48 |
| 13 | 38 | 33 | 32 | | | | 32 | 42 | -- | -- | 54 | 49 |
| 14 | 36 | 32 | -- | | | | 32 | 39 | -- | -- | 54 | 46 |
| 15 | 34 | 32 | -- | | | | 32 | 41 | -- | -- | 55 | 45 |
| 16 | 33 | 32 | -- | | | | 32 | 41 | -- | -- | 54 | 47 |
| 17 | 33 | 32 | -- | | | | 32 | 41 | -- | -- | 54 | 48 |
| 18 | 33 | 32 | -- | | | | 35 | 40 | -- | -- | 55 | 40 |
| 19 | 33 | 32 | -- | | | | 32 | 41 | 42 | -- | 55 | 45 |
| 20 | 32 | 32 | -- | | | | 32 | 43 | 45 | -- | 60 | 46 |
| 21 | 35 | 32 | -- | | | | 32 | 41 | 42 | -- | 51 | 46 |
| 22 | 33 | 32 | -- | | | | 32 | 40 | 45 | -- | 60 | 50 |
| 23 | 35 | 32 | -- | | | | 32 | 40 | 43 | -- | 58 | 44 |
| 24 | 35 | 32 | -- | | | | 35 | 39 | 54 | -- | 58 | 44 |
| 25 | 34 | 32 | -- | | | | 34 | 38 | 51 | -- | 56 | 40 |
| 26 | 34 | 34 | -- | | | | 32 | 39 | 53 | -- | 51 | 45 |
| 27 | 37 | 32 | -- | | | | 32 | 39 | 53 | -- | 54 | 43 |
| 28 | 34 | 32 | -- | | | | 34 | 39 | 53 | -- | 54 | 46 |
| 29 | 34 | 32 | -- | | | | 34 | 40 | 52 | -- | 54 | 42 |
| 30 | -- | 32 | -- | | | | 34 | 41 | 53 | -- | 59 | 46 |
| 31 | 34 | -- | -- | | | | -- | 40 | -- | -- | 50 | -- |
| Average | 36 | 32 | -- | | | | 33 | 39 | -- | -- | 56 | 46 |

## 2420. Kasilof River near Kasilof

Location.--Lat 60°19'05", long 151°15'35", in SW¼ sec.30, T.3 N., R.11 W., near center of span on downstream side of bridge on Sterling Highway, 0.9 mile upstream from Crooked Creek, 4 miles downstream from Moosehead Rapids, 5 miles south of Kasilof, and 10 miles downstream from Tustumena Lake.

Drainage area.--738 sq mi.

Records available.--Discharge: July 1949 to September 1960.
Chemical analyses: March to September 1952, October 1957 to August 1958.
Sediment records: June 1953 to August 1954 (periodic).

Gage.--Wire-weight gage read once daily. Datum of gage is 23.37 ft above mean sea level (Corps of Engineers bench mark).

Average discharge.--11 years, 2,384 cfs (1,726,000 acre-ft per year).

Extremes.--Maximum discharge during year, 7,600 cfs Aug. 14 (gage height, 5.99 ft); minimum daily, 359 cfs Apr. 22.
1949-60: Maximum discharge, 12,300 cfs Sept. 14, 1957 (gage height, 7.90 ft, from graph based on gage readings); maximum gage height observed, 8.62 ft Nov. 25, 1955 (backwater from ice); minimum discharge not determined.

Remarks.--Records good except those for period of ice effect, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4,420 | 2,870 | 1,380 | | | (*) | 410 | 448 | 1,040 | 2,500 | 6,350 | 6,330 |
| 2 | 4,460 | 2,770 | 1,370 | | | | 400 | 444 | 1,070 | 2,590 | 6,550 | 6,370 |
| 3 | 4,480 | 2,660 | 1,360 | | | | 400 | 430 | 1,080 | 2,700 | 6,680 | 6,370 |
| 4 | 4,380 | *2,590 | 1,400 | | (*) | | 390 | 421 | 1,100 | 2,790 | 6,840 | 6,240 |
| 5 | 4,300 | 2,580 | 1,480 | | | | 390 | 421 | 1,110 | 2,870 | 7,090 | 6,080 |
| 6 | 4,250 | 2,580 | 1,460 | | | | 400 | 426 | 1,140 | 2,950 | 7,210 | 6,020 |
| 7 | 4,170 | 2,470 | 1,380 | | | | 410 | 439 | *1,230 | 3,080 | 7,180 | 5,890 |
| 8 | 4,040 | 2,430 | 1,360 | 760 | 510 | 490 | 440 | 453 | 1,280 | 3,100 | 7,250 | 5,860 |
| 9 | 3,920 | 2,360 | 1,300 | | | | 460 | 462 | 1,320 | 3,150 | 7,320 | 5,800 |
| 10 | 4,020 | 2,320 | 1,280 | | | | 470 | *467 | 1,370 | 3,220 | 7,340 | 5,740 |
| 11 | 4,190 | 2,250 | | | | | 470 | 462 | 1,420 | 3,250 | 7,280 | 5,720 |
| 12 | 4,150 | 2,110 | | | | | *470 | 481 | 1,400 | 3,340 | 7,340 | 5,820 |
| 13 | 4,300 | 2,150 | | | | | 450 | 486 | 1,420 | 3,470 | 7,530 | 5,840 |
| 14 | 4,420 | 2,100 | | | | | 420 | 491 | 1,460 | 3,540 | 7,600 | 5,820 |
| 15 | 4,340 | 2,020 | | | | | 390 | 476 | 1,460 | 3,680 | 7,570 | 5,760 |
| 16 | 4,170 | 1,940 | | | | | 380 | 481 | 1,490 | 3,760 | 7,550 | 5,670 |
| 17 | 4,000 | 1,890 | | | | | 380 | 491 | 1,540 | 3,810 | 7,480 | 5,570 |
| 18 | 3,830 | 1,830 | | | | | 375 | 506 | 1,590 | 3,900 | 7,390 | 5,460 |
| 19 | 3,630 | 1,790 | | | | | 383 | 532 | 1,650 | 3,980 | 7,230 | 5,250 |
| 20 | 3,560 | 1,750 | | | | | 371 | 543 | 1,740 | 4,080 | 7,280 | 5,230 |
| 21 | 3,470 | 1,700 | 1,000 | | | | 367 | 543 | 1,790 | 4,150 | 7,110 | 5,190 |
| 22 | 3,400 | 1,690 | | | | | 359 | 560 | 1,820 | 4,280 | 7,000 | 5,150 |
| 23 | 3,320 | 1,670 | | | 540 | | 363 | 595 | 1,830 | *4,400 | 6,930 | 5,020 |
| 24 | 3,250 | 1,620 | | 570 | | 450 | 367 | 653 | 1,880 | 4,680 | 6,750 | 4,880 |
| 25 | 3,180 | 1,570 | | | | | 379 | 696 | 1,970 | 5,020 | 6,790 | 4,780 |
| 26 | 3,050 | 1,570 | | | | | 383 | 750 | 2,030 | 5,210 | 6,680 | 4,720 |
| 27 | 3,070 | 1,520 | | | | | 387 | 814 | 2,150 | 5,500 | 6,610 | 4,720 |
| 28 | 3,200 | 1,460 | | | | | 387 | 864 | 2,220 | 5,690 | 6,570 | 4,640 |
| 29 | 3,080 | 1,430 | | | | | 408 | 898 | 2,290 | 5,840 | 6,610 | 4,480 |
| 30 | 3,000 | 1,420 | | | ------ | | 426 | 952 | 2,390 | 6,020 | 6,550 | 4,500 |
| 31 | 2,900 | ------ | | | ------ | | ------ | 988 | ------ | 6,170 | *6,240 | ------ |
| Total | 117,950 | 61,110 | 34,770 | 20,520 | 15,210 | 14,550 | 12,085 | 17,673 | 47,280 | 122,720 | 217,900 | 164,920 |
| Mean | 3,805 | 2,037 | 1,122 | 662 | 524 | 469 | 403 | 570 | 1,576 | 3,959 | 7,029 | 5,497 |
| Cfsm | 5.16 | 2.76 | 1.52 | 0.897 | 0.710 | 0.636 | 0.546 | 0.772 | 2.14 | 5.36 | 9.52 | 7.45 |
| In. | 5.94 | 3.08 | 1.75 | 1.03 | 0.77 | 0.73 | 0.61 | 0.89 | 2.38 | 6.18 | 10.98 | 8.31 |
| Ac-ft | 234,000 | 121,200 | 68,970 | 40,700 | 30,170 | 28,860 | 23,970 | 35,050 | 93,780 | 243,400 | 432,200 | 327,100 |

Calendar year 1959: Max 8,100 Min 270 Mean 2,269 Cfsm 3.07 In. 41.73 Ac-ft 1,643,000
Water year 1959-60: Max 7,600 Min 359 Mean 2,313 Cfsm 3.13 In. 42.65 Ac-ft 1,679,000

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Dec. 11 to Apr. 17 (no gage-height record Dec. 17 to Apr. 17, except occasional days; discharge estimated on basis of 3 discharge measurements and weather records).

## 2480. Trail River near Lawing

Location.--Lat 60°26'00", long 149°22'20", near center of stream on downstream end of pier at bridge site on old Seward-Anchorage highway, 0.2 mile upstream from Falls Creek, 0.2 mile downstream from Lower Trail Lake, 1.9 miles upstream from mouth, and 2.1 miles north of Lawing.

Drainage area.--181 sq mi (revised).

Records available.--Discharge: May 1947 to September 1960.
Chemical analyses: November 1951 to September 1952, October 1957 to September 1960.
Water temperatures: December 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 460 ft (from topographic map). Prior to Sept. 13, 1952, staff gage at same site and datum.

Average discharge.--13 years, 785 cfs (568,300 acre-ft per year).

Extremes.--Maximum discharge during year, 2,780 cfs July 26 (gage height, 8.01 ft); minimum daily, 84 cfs Apr. 5.
1947-60: Maximum discharge, 5,860 cfs June 28, 1953 (gage height, 10.16 ft); minimum daily, 48 cfs Feb. 9, 10, 1949.
1959-60: Maximum water temperature, 54°F July 11, 12.
1958-60: Maximum water temperature, 54°F June 16-18, 1959, July 11, 12, 1960.

Remarks.--Records good except those for periods of ice effect or when shifting-control method was used, which are fair, and those for periods of no gage-height record, which are poor. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 940 | 840 | 316 | 164 | *147 | 107 | 87 | 441 | 1,870 | 2,440 | 2,150 | 1,200 |
| 2 | 915 | 722 | 300 | 160 | 149 | 104 | 87 | 655 | 1,710 | 2,160 | 2,210 | 1,200 |
| 3 | 790 | 619 | 281 | 160 | 147 | 102 | 86 | 845 | 1,620 | 2,040 | 2,260 | 1,200 |
| 4 | 678 | 558 | 271 | 160 | 143 | 101 | 85 | 972 | 1,620 | 2,040 | 2,110 | 1,100 |
| 5 | 580 | *511 | 265 | b164 | 140 | 98 | 84 | 1,050 | 1,660 | 2,040 | 2,100 | 1,100 |
| 6 | 502 | 485 | 259 | b170 | 136 | 94 | 86 | 1,150 | 1,740 | 1,920 | 2,230 | 1,000 |
| 7 | 445 | 485 | 245 | b170 | 136 | 93 | 93 | 1,240 | 1,810 | 1,800 | 2,550 | 980 |
| 8 | 405 | 461 | 226 | b166 | 141 | 92 | 106 | 1,330 | 1,860 | 1,750 | 2,370 | 980 |
| 9 | 369 | 409 | 211 | b158 | 141 | 90 | 107 | *1,360 | *1,860 | 1,710 | 2,070 | 1,000 |
| 10 | 342 | 365 | 204 | b152 | 140 | 88 | 106 | 1,340 | 1,880 | 1,720 | 1,910 | 1,000 |
| 11 | 321 | 331 | 204 | b147 | 138 | 90 | *102 | 1,310 | 1,850 | 1,840 | 1,950 | 1,100 |
| 12 | 297 | 310 | 201 | b143 | 136 | 92 | 103 | 1,240 | 1,810 | 2,010 | 2,000 | 1,200 |
| 13 | 281 | 297 | 204 | b141 | 134 | 93 | 102 | 1,180 | 1,660 | 2,200 | 1,920 | 1,300 |
| 14 | 265 | 287 | 208 | b138 | 131 | 93 | 103 | 1,160 | 1,530 | 2,370 | 1,800 | 1,400 |
| 15 | 248 | 281 | *206 | b138 | 128 | 93 | 104 | 1,200 | 1,490 | 2,340 | 1,710 | 1,500 |
| 16 | 234 | 281 | 206 | b140 | 126 | 92 | 106 | 1,230 | 1,480 | 2,120 | 1,650 | 1,300 |
| 17 | 221 | 265 | 214 | 147 | 124 | 92 | 108 | 1,260 | 1,530 | 2,050 | 1,550 | 1,100 |
| 18 | 204 | 256 | 208 | 147 | 120 | 93 | 110 | 1,280 | 1,680 | 2,150 | 1,440 | 1,000 |
| 19 | 192 | 242 | 201 | 143 | 117 | 93 | 111 | 1,270 | 1,800 | 2,120 | 1,370 | 930 |
| 20 | 183 | 224 | 206 | 140 | 116 | 93 | 116 | 1,240 | 1,870 | *2,040 | 1,320 | 890 |
| 21 | 188 | 211 | 231 | 136 | 118 | 91 | 117 | 1,260 | 1,810 | 2,000 | 1,240 | 850 |
| 22 | 218 | 239 | 221 | 133 | 122 | 93 | 118 | 1,350 | 1,810 | 2,200 | 1,160 | 900 |
| 23 | 401 | 262 | 221 | 131 | 120 | 97 | 126 | 1,650 | 1,930 | 2,260 | 1,110 | 820 |
| 24 | 624 | 275 | 221 | 128 | 118 | 99 | 136 | 2,130 | 2,070 | 2,310 | 1,090 | 770 |
| 25 | 650 | 275 | 214 | 126 | 117 | 99 | 149 | 2,500 | 2,190 | 2,550 | 1,090 | 720 |
| 26 | 650 | 268 | 201 | 122 | 116 | 97 | 166 | 2,690 | 2,290 | 2,750 | 1,140 | 670 |
| 27 | 765 | 265 | 194 | 120 | 112 | 96 | 192 | 2,570 | 2,390 | 2,680 | 1,390 | 630 |
| 28 | 890 | 293 | 194 | 118 | 111 | 94 | 221 | 2,400 | 2,480 | 2,620 | 1,640 | 600 |
| 29 | 1,130 | 328 | 190 | 117 | *110 | 93 | 253 | 2,290 | 2,660 | 2,670 | 1,480 | 580 |
| 30 | 1,120 | 331 | 179 | 118 | ------ | 91 | 324 | 2,160 | 2,660 | 2,620 | *1,300 | 570 |
| 31 | 978 | ------ | 172 | 131 | ------ | 90 | ------ | 2,050 | ------ | 2,320 | 1,160 | ------ |
| Total | 16,026 | 10,976 | 6,874 | 4,428 | 3,734 | 2,933 | 3,794 | 45,803 | 56,620 | 67,840 | 52,470 | 29,590 |
| Mean | 517 | 366 | 222 | 143 | 129 | 94.6 | 126 | 1,478 | 1,887 | 2,188 | 1,693 | 986 |
| Cfsm | 2.86 | 2.02 | 1.23 | 0.790 | 0.713 | 0.523 | 0.696 | 8.17 | 10.4 | 12.1 | 9.35 | 5.45 |
| In. | 3.29 | 2.26 | 1.41 | 0.91 | 0.77 | 0.60 | 0.78 | 9.41 | 11.63 | 13.94 | 10.78 | 6.08 |
| Ac-ft | 31,790 | 21,770 | 13,630 | 8,780 | 7,410 | 5,820 | 7,530 | 90,850 | 112,300 | 134,600 | 104,100 | 58,690 |

Calendar year 1959: Max 2,990 Min 64 Mean 725 Cfsm 4.01 In. 50.99 Ac-ft 525,000
Water year 1959-60: Max 2,750 Min 84 Mean 823 Cfsm 4.55 In. 61.86 Ac-ft 597,300

* Discharge measurement made on this day.
b Stage-discharge relation affected by ice.
Note.--No gage-height record Sept. 1-30; discharge estimated on basis of 1 discharge measurement, recorded range in stage, weather records, and records for Kenai River at Cooper Landing. Shifting-control method used Jan. 17 to May 5.

## 2480. TRAIL RIVER NEAR LAWING--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Oct. 1-10, 1959 | 597 | 3.6 | 0.05 | 12 | 1.0 | 0.9 | 0.6 | 30 | 10 | 1.0 | 0.0 | 0.7 | 45 | 34 | 10 | 76 | 7.2 | 0 |
| Oct. 29 | 1,130 | 3.6 | .20 | 13 | 1.4 | 1.5 | .6 | 33 | 12 | 3.0 | .0 | .8 | 52 | 38 | 12 | 77 | 7.0 | 0 |
| Oct. 29-Nov. 10 | 668 | 3.8 | .05 | 13 | 1.0 | .9 | .6 | 32 | 10 | 1.0 | .0 | .9 | 47 | 36 | 10 | 79 | 7.2 | 0 |
| Nov. 11-20 | 277 | 4.2 | .05 | 13 | 1.0 | 1.1 | .7 | 33 | 11 | 1.0 | .0 | 1.2 | 49 | 36 | 10 | 82 | 7.3 | 0 |
| Nov. 21-30 | 275 | 5.3 | .07 | 13 | 1.7 | 1.2 | .5 | 35 | 11 | 2.5 | .1 | 1.1 | 53 | 40 | 11 | 84 | 7.1 | 0 |
| Dec. 1-10 | 258 | 5.6 | .00 | 15 | 1.7 | 1.3 | .5 | 37 | 14 | 2.5 | .1 | 1.1 | 60 | 44 | 14 | 89 | 7.2 | 10 |
| Dec. 11-20 | 206 | 5.8 | .00 | 16 | .7 | 1.3 | .5 | 39 | 10 | 2.5 | .2 | 1.1 | 57 | 43 | 11 | 95 | 7.2 | 5 |
| Dec. 21-26, 30, 31 | 208 | 6.7 | .00 | 17 | .7 | 1.2 | .5 | 40 | 13 | 2.0 | .1 | 1.0 | 62 | 46 | 12 | 99 | 7.3 | 8 |
| Jan. 1-10, 1960 | 163 | 6.0 | .00 | 17 | 1.9 | 1.7 | .8 | 41 | 14 | 2.5 | .1 | 1.1 | 65 | 50 | 17 | 88 | 7.2 | 5 |
| Jan. 11-20 | 142 | 6.5 | .02 | 15 | 1.0 | 1.8 | .8 | 41 | 10 | 1.5 | .0 | 1.2 | 58 | 42 | 8 | 93 | 7.4 | 0 |
| Jan. 21-31 | 125 | 5.8 | .02 | 16 | 1.0 | 1.5 | .6 | 42 | 10 | 1.5 | .0 | 1.4 | 59 | 44 | 10 | 97 | 7.4 | 5 |
| Feb. 1-12 | 141 | 6.1 | .02 | 17 | 1.0 | 1.6 | .7 | 44 | 10 | 2.0 | .0 | 1.3 | 62 | 46 | 10 | 98 | 7.4 | 5 |
| Feb. 15-20 | 122 | 6.7 | .05 | 17 | .7 | 1.8 | .6 | 44 | 11 | 1.5 | .0 | 1.4 | 63 | 46 | 10 | 102 | 7.6 | 5 |
| Feb. 21-29 | 116 | 8.3 | .05 | 17 | 1.0 | 1.6 | .5 | 44 | 11 | 1.5 | .0 | 1.4 | 64 | 46 | 10 | 102 | 7.5 | 5 |
| Mar. 1-10 | 97 | 7.1 | .07 | 17 | .7 | 1.9 | .6 | 44 | 11 | 1.5 | .0 | 1.4 | 63 | 46 | 10 | 107 | 7.5 | 5 |
| Mar. 11-20 | 92 | 6.1 | .05 | 17 | 1.0 | 1.6 | .5 | 45 | 11 | 1.5 | .0 | 1.5 | 62 | 46 | 10 | 107 | 7.5 | 5 |
| Mar. 21-29 | 95 | 5.5 | .07 | 17 | 1.7 | 1.8 | .5 | 46 | 14 | 2.5 | .0 | 1.2 | 67 | 50 | 12 | 102 | 7.2 | 0 |
| Apr. 6 | 86 | 5.5 | .24 | 17 | 1.4 | 1.6 | .4 | 45 | 11 | 3.5 | .0 | 1.3 | 64 | 48 | 12 | 102 | 7.4 | 5 |
| Apr. 7-10 | 100 | 5.5 | .07 | 17 | 1.9 | 1.8 | .5 | 45 | 13 | 2.5 | .0 | 1.2 | 65 | 50 | 14 | 102 | 7.4 | 0 |
| Apr. 11-20 | 106 | 5.5 | .07 | 16 | 1.9 | 1.8 | .5 | 46 | 12 | 2.0 | .1 | 1.2 | 64 | 48 | 10 | 101 | 7.2 | 0 |
| Apr. 21-30 | 180 | 6.0 | .07 | 16 | 2.1 | 2.2 | .6 | 44 | 13 | 2.5 | .0 | 1.2 | 66 | 48 | 12 | 100 | 7.4 | 0 |

## 2480. TRAIL RIVER NEAR LAWING--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| May 1-6, 1960 | 852 | 5.8 | 0.07 | 16 | 2.8 | 1.7 | 0.5 | 44 | 12 | 3.0 | 0.1 | 1.2 | 65 | 52 | 16 | 96 | 7.6 | 5 |
| May 7-9 | 1,320 | 5.8 | .02 | 15 | 1.4 | 1.4 | .5 | 41 | 8.0 | 2.0 | .0 | 1.8 | 56 | 44 | 10 | 90 | 7.3 | 10 |
| May 10 | 1,340 | 5.5 | .10 | 14 | 1.4 | 1.5 | .5 | 38 | 5.0 | 3.0 | .0 | 1.8 | 52 | 41 | 10 | 87 | 7.3 | 10 |
| May 11-20 | 1,240 | 5.5 | .05 | 14 | 1.7 | 1.6 | .9 | 41 | 8.0 | 3.0 | .1 | 2.3 | 57 | 42 | 8 | 86 | 7.3 | 0 |
| May 21-31 | 2,100 | 5.2 | .03 | 13 | 3.8 | 1.2 | .5 | 36 | 14 | 3.0 | .0 | 2.3 | 61 | 48 | 18 | 82 | 7.3 | 0 |
| June 1-10 | 1,760 | 5.0 | .03 | 13 | 2.4 | 1.3 | .8 | 36 | 10 | 2.5 | .0 | 2.0 | 55 | 42 | 13 | 79 | 7.2 | 0 |
| June 11-20 | 1,670 | 5.0 | .03 | 13 | 2.6 | 1.2 | .6 | 35 | 11 | 3.0 | .0 | 1.5 | 55 | 43 | 14 | 79 | 7.2 | 0 |
| June 21-30 | 2,230 | 4.4 | .03 | 12 | 3.1 | 1.2 | .6 | 35 | 11 | 2.0 | .0 | 1.9 | 53 | 42 | 14 | 74 | 7.2 | 0 |
| July 1-5, 8-10 | 1,990 | 4.2 | .02 | 13 | .5 | .8 | .4 | 32 | 9.0 | 1.5 | .1 | 1.2 | 47 | 34 | 8 | 74 | 7.1 | 0 |
| July 11-20 | 2,120 | 4.2 | .02 | 12 | 1.0 | 1.0 | .4 | 32 | 9.0 | 1.0 | .1 | .9 | 46 | 34 | 8 | 71 | 7.2 | 0 |
| July 21-31 | 2,450 | 3.6 | .03 | 11 | 1.0 | .7 | .5 | 30 | 8.0 | 1.0 | .1 | .7 | 42 | 32 | 7 | 67 | 7.2 | 0 |
| Aug. 1-6 | 2,180 | 3.8 | .03 | 11 | 1.4 | .9 | .6 | 29 | 9.0 | 2.0 | .0 | .4 | 43 | 34 | 10 | 65 | 7.5 | 0 |
| Aug. 24-31 | 1,290 | 3.5 | .03 | 11 | 1.4 | 1.1 | .7 | 29 | 9.0 | 2.0 | .0 | .5 | 43 | 34 | 10 | 66 | 7.3 | 0 |
| Sept. 1-10 | 1,080 | 3.4 | .00 | 11 | 1.4 | 1.2 | .8 | 29 | 10 | 2.0 | .0 | .4 | 44 | 34 | 10 | 66 | 7.4 | 0 |
| Sept. 11-20 | 1,170 | 3.4 | .00 | 12 | 1.2 | 1.1 | .6 | 30 | 11 | 2.0 | .0 | .5 | 47 | 35 | 10 | 68 | 7.6 | 0 |
| Sept. 21-30 | 711 | 3.5 | .00 | 12 | 1.2 | 1.1 | .7 | 31 | 10 | 2.0 | .0 | .5 | 46 | 35 | 10 | 70 | 7.7 | 0 |

## 2480. TRAIL RIVER NEAR LAWING--Continued

Temperature (°F) of water, water year October 1959 to September 1960
/Once-daily measurement at approximately 12 m./

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 47 | 39 | 34 | 33 | 32 | 33 | -- | 34 | 44 | 50 | 48 | 49 |
| 2 | 46 | 39 | 34 | 33 | 32 | 33 | -- | 35 | 43 | 50 | 48 | 48 |
| 3 | 46 | 38 | 33 | 34 | 32 | 33 | -- | 36 | 45 | 49 | 48 | 49 |
| 4 | 46 | 38 | 33 | 35 | 34 | 33 | -- | 36 | 46 | 49 | 48 | 49 |
| 5 | 46 | 37 | 33 | 35 | 35 | 33 | -- | 36 | 46 | 48 | 48 | 48 |
| 6 | 45 | 37 | 32 | 35 | 34 | 33 | 33 | 36 | 46 | -- | 49 | 48 |
| 7 | 43 | 37 | 32 | 36 | 35 | 33 | 33 | 36 | 46 | -- | -- | 48 |
| 8 | 42 | 36 | 32 | 36 | 35 | 33 | 33 | 37 | 47 | 48 | -- | 48 |
| 9 | 42 | 35 | 32 | 35 | 35 | 33 | 33 | 37 | 48 | 49 | -- | 48 |
| 10 | 42 | 35 | 32 | 33 | 34 | 32 | 34 | 38 | 48 | 53 | -- | 48 |
| 11 | 42 | 35 | 32 | 32 | 34 | 32 | 33 | 38 | 48 | 54 | -- | 48 |
| 12 | 42 | 35 | 32 | 32 | 32 | 32 | 33 | 38 | 47 | 54 | -- | 48 |
| 13 | 40 | 35 | 32 | 32 | -- | 32 | 34 | 38 | 46 | 53 | -- | 47 |
| 14 | 41 | 35 | 33 | 32 | -- | 32 | 33 | 39 | 47 | 51 | -- | 47 |
| 15 | 40 | 35 | 32 | 32 | 34 | 32 | 33 | 38 | 48 | 50 | -- | 47 |
| 16 | 39 | 35 | 32 | 32 | 33 | 32 | 34 | 39 | 48 | 51 | -- | 47 |
| 17 | 39 | 35 | 32 | 33 | 33 | 32 | 34 | 39 | 49 | 52 | -- | 46 |
| 18 | 34 | 34 | 32 | 34 | 32 | 32 | 34 | 40 | 50 | 51 | -- | 46 |
| 19 | 33 | 34 | 33 | 32 | 32 | 32 | 34 | 40 | 49 | 53 | -- | 46 |
| 20 | -- | 33 | 33 | 32 | 32 | 32 | 34 | 40 | 50 | 51 | -- | 46 |
| 21 | -- | 34 | 34 | 33 | 33 | 32 | 34 | 41 | 50 | 51 | -- | 46 |
| 22 | -- | 34 | 34 | 34 | 34 | 32 | 34 | 42 | 49 | 52 | -- | 46 |
| 23 | -- | 34 | 33 | 33 | 34 | 32 | 35 | 43 | 50 | 51 | -- | 46 |
| 24 | -- | 34 | 33 | 32 | 34 | 32 | 35 | 44 | 49 | 51 | 52 | 46 |
| 25 | -- | 34 | 32 | 32 | 34 | 33 | 35 | 44 | 50 | 50 | 50 | 45 |
| 26 | -- | 34 | -- | 32 | 35 | 33 | 35 | 43 | 49 | 50 | 50 | 44 |
| 27 | -- | 34 | -- | 32 | 34 | 33 | 35 | 42 | 48 | 50 | 50 | 45 |
| 28 | -- | 35 | -- | 32 | 34 | 33 | -- | 43 | 50 | 49 | 49 | 44 |
| 29 | 39 | 35 | -- | 32 | 33 | 33 | 35 | 44 | 49 | 49 | 49 | 44 |
| 30 | 39 | 34 | 33 | 32 | -- | -- | 36 | 44 | 49 | 48 | 49 | 44 |
| 31 | 39 | -- | 33 | 32 | -- | -- | -- | 44 | -- | 49 | 50 | -- |
| Average | 41 | 35 | 33 | 33 | 34 | 32 | 34 | 39 | 48 | 51 | -- | 47 |

## 2530. Crescent Creek near Moose Pass

Location.--Lat 60°28'45", long 149°34'25", on left bank 90 ft downstream from Crescent Lake Outlet and 7 miles west of Moose Pass.

Drainage area.--21.4 sq mi.

Records available.--May 1957 to September 1960 (discontinued).

Gage.--Water-stage recorder. Datum of gage is 1,452.5 ft above mean sea level (river-profile survey).

Extremes.--Maximum discharge during year, 262 cfs May 25 (gage height, 2.81 ft); minimum not determined.
1957-60: Maximum discharge, that of May 25, 1960; maximum gage height, 2.85 ft Sept. 15, 1957; minimum discharge not determined.

Remarks.--Records good except those for period May 24 to June 6, which are fair, and those for periods of no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 41 | 59 | 38 | | 15 | 16 | | 25 | 163 | 127 | 131 | 77 |
| 2 | 42 | 58 | *37 | | 16 | 16 | | 28 | 155 | 119 | 125 | 88 |
| 3 | 42 | 56 | 35 | | 17 | *15 | | 35 | 149 | 117 | 123 | *88 |
| 4 | 42 | 55 | 34 | | *18 | 15 | | 43 | 144 | 113 | 125 | 91 |
| 5 | 42 | 53 | 34 | | 18 | 14 | | 52 | 146 | 111 | 123 | 93 |
| 6 | 41 | 51 | | | | | | 58 | 149 | 107 | 125 | 90 |
| 7 | 40 | 50 | | | | | 13 | 64 | *149 | 104 | 119 | 90 |
| 8 | 39 | 47 | | 19 | | | | 70 | 146 | 104 | 117 | 90 |
| 9 | 37 | 46 | | | | | | 79 | 146 | 100 | 113 | 90 |
| 10 | 36 | 44 | | | | | | 84 | 144 | 100 | 111 | 87 |
| | | | 30 | | 16 | | | | | | | |
| 11 | 35 | 42 | | | | | | 84 | 144 | 102 | 107 | 82 |
| 12 | 34 | 41 | | | | | | 85 | 140 | 102 | 106 | 83 |
| 13 | 34 | 40 | | | | | | 89 | 129 | 106 | 100 | 83 |
| 14 | 33 | 39 | | | | | *14 | 95 | 123 | 111 | 95 | 83 |
| 15 | 32 | 38 | | | | | | 100 | 117 | 111 | 91 | 80 |
| 16 | 32 | 37 | | | | | | 100 | 115 | 106 | 90 | 79 |
| 17 | 32 | 36 | | | | | | 110 | 115 | 106 | 88 | 73 |
| 18 | 31 | 35 | | | | | | 110 | 121 | 106 | 87 | 71 |
| 19 | 31 | 34 | | | | 14 | | 100 | 131 | 104 | 83 | 70 |
| 20 | 31 | 34 | | | | | | 100 | 131 | 100 | 79 | 64 |
| 21 | 29 | 33 | | | | | | 120 | 129 | *100 | 77 | 64 |
| 22 | 34 | 33 | | | | | 17 | 190 | 131 | 106 | 74 | 63 |
| 23 | 40 | 33 | | | 15 | | | 220 | 138 | 106 | 71 | 63 |
| 24 | 41 | 33 | 23 | 17 | | | | 223 | 142 | 113 | 70 | 62 |
| 25 | 42 | 33 | | | | | | 245 | 142 | 117 | 70 | 62 |
| 26 | 42 | 34 | | | | | | 234 | 140 | 121 | 71 | 60 |
| 27 | 43 | 35 | | | | | | 223 | 140 | 123 | 74 | 62 |
| 28 | 50 | 37 | | | | | | 206 | 138 | 121 | 79 | 62 |
| 29 | 60 | 38 | | | | | | 198 | 138 | 121 | 79 | 60 |
| 30 | 60 | 39 | | | ------ | | | 187 | 133 | 119 | 74 | 60 |
| 31 | 60 | ------ | | | ------ | | ------ | 175 | ------ | 119 | 74 | ------ |
| Total | 1,228 | 1,243 | 846 | 557 | 454 | 440 | 455 | 3,732 | 4,128 | 3,422 | 2,951 | 2,270 |
| Mean | 39.6 | 41.4 | 27.3 | 18.0 | 15.7 | 14.2 | 15.2 | 120 | 138 | 110 | 95.2 | 75.7 |
| Cfsm | 1.85 | 1.93 | 1.28 | 0.841 | 0.734 | 0.664 | 0.710 | 5.61 | 6.45 | 5.14 | 4.45 | 3.54 |
| In. | 2.13 | 2.16 | 1.47 | 0.97 | 0.79 | 0.76 | 0.79 | 6.49 | 7.17 | 5.95 | 5.13 | 3.94 |
| Ac-ft | 2,440 | 2,470 | 1,680 | 1,100 | 900 | 873 | 902 | 7,400 | 8,190 | 6,790 | 5,850 | 4,500 |

Calendar year 1959: Max 185 Min - Mean 50.0 Cfsm 2.34 In. 31.73 Ac-ft 36,240
Water year 1959-60: Max 245 Min - Mean 59.4 Cfsm 2.78 In. 37.75 Ac-ft 43,100

* Discharge measurement made on this day.
Note.--No gage-height record Nov. 9 to May 23, except occasional days; discharge estimated on basis of 4 discharge measurements, weather records, and records for nearby stations.

## 2540. Crescent Creek near Cooper Landing

Location.--Lat 60°29'50", long 149°40'40", on left bank at bridge on old Seward-Kenai highway, 0.3 mile upstream from mouth and 5.3 miles east of Cooper Landing.

Drainage area.--31.7 sq mi.

Records available.--Discharge: July 1949 to September 1960.
Chemical analyses: April to September 1952, October 1957 to August 1958.

Gage.--Water-stage recorder. Altitude of gage is 550 ft (from topographic map). Prior to Aug. 19, 1949, staff gage at same site and datum.

Average discharge.--11 years, 73.1 cfs (52,920 acre-ft per year).

Extremes.--Maximum discharge recorded during year, 395 cfs May 25 (gage height, 1.71 ft); maximum gage height observed, 2.94 ft Dec. 17 (backwater from ice); minimum discharge not determined.
1949-60: Maximum discharge, 820 cfs June 28, 1953; maximum gage height observed, 3.09 ft Dec. 18, 1957 (backwater from ice); minimum discharge observed, 2.7 cfs Mar. 8, 1954 (discharge measurement) caused by storage behind ice jam upstream.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 62 | b83 | 41 | | | | | 34 | 210 | 184 | 190 | 130 |
| 2 | 62 | 81 | b40 | | (*) | | | 44 | 206 | 175 | 175 | 166 |
| 3 | 61 | 80 | b38 | | | | | 58 | 193 | 166 | 169 | 154 |
| 4 | 60 | b77 | b36 | | | | | 58 | 190 | 160 | 169 | 149 |
| 5 | 58 | *74 | 35 | | | | | 67 | 200 | 154 | 172 | 140 |
| 6 | 56 | b71 | | | | | | 76 | *203 | 154 | 178 | 138 |
| 7 | 54 | b67 | | | | | | 87 | 190 | 149 | 172 | 138 |
| 8 | 52 | 62 | | 22 | | | 17 | 98 | 187 | 143 | 163 | 132 |
| 9 | 50 | b59 | | | | | | *103 | 190 | 138 | 160 | 127 |
| 10 | 48 | b56 | b32 | | | | | 105 | 193 | 135 | 157 | 124 |
| 11 | 47 | b53 | | | | | (*) | 110 | 193 | 138 | 157 | 124 |
| 12 | 46 | 52 | | | | | | 105 | 190 | 140 | 154 | 132 |
| 13 | 45 | 50 | | | | | | 110 | 181 | 143 | 149 | 124 |
| 14 | 42 | 48 | | | | | | 122 | 172 | 149 | 143 | 120 |
| 15 | 41 | 48 | | | 18 | 16 | | 132 | 166 | 149 | 135 | 114 |
| 16 | 41 | 45 | | | | | | 135 | 169 | 146 | 135 | 117 |
| 17 | 40 | 44 | | | | | | 138 | 172 | 146 | 132 | 110 |
| 18 | b39 | 41 | | | | | | 140 | 178 | 146 | 130 | 107 |
| 19 | b39 | b40 | | | | | | 132 | 178 | 140 | 127 | 105 |
| 20 | b39 | b38 | | | | | | 135 | 178 | *135 | 122 | 100 |
| 21 | b39 | b37 | | | | | | 163 | 175 | 140 | 117 | 107 |
| 22 | b46 | b36 | | | | | | 234 | 184 | 146 | 112 | 103 |
| 23 | b53 | b35 | 26 | 20 | | | 22 | 320 | 190 | 149 | 110 | 98 |
| 24 | b56 | b35 | | | | | | 324 | 190 | 166 | 107 | 94 |
| 25 | b58 | b35 | | | | | | 326 | 193 | 178 | 107 | 96 |
| 26 | b60 | b36 | | | | | | 308 | 193 | 178 | 110 | 92 |
| 27 | b66 | 38 | | | | | | 300 | 193 | 172 | 117 | 98 |
| 28 | b80 | b40 | | | | | | 272 | 193 | 169 | 124 | 110 |
| 29 | b84 | b41 | | | (*) | | | 260 | 193 | 178 | *122 | 107 |
| 30 | b86 | 42 | | | | | | 253 | 187 | 169 | 114 | 107 |
| 31 | b86 | ------ | | | ------ | | ------ | 223 | ------ | 169 | 114 | ------ |
| Total | 1,696 | 1,544 | 926 | 650 | 522 | 496 | 585 | 4,972 | 5,630 | 4,804 | 4,343 | 3,563 |
| Mean | 54.7 | 51.5 | 29.9 | 21.0 | 18 | 16 | 19.5 | 160 | 188 | 155 | 140 | 119 |
| Cfsm | 1.73 | 1.62 | 0.943 | 0.662 | 0.568 | 0.505 | 0.615 | 5.05 | 5.93 | 4.89 | 4.42 | 3.75 |
| In. | 1.99 | 1.81 | 1.09 | 0.76 | 0.61 | 0.58 | 0.69 | 5.83 | 6.61 | 5.64 | 5.10 | 4.18 |
| Ac-ft | 3,360 | 3,060 | 1,840 | 1,290 | 1,040 | 984 | 1,160 | 9,860 | 11,170 | 9,530 | 8,610 | 7,070 |

Calendar year 1959: Max - Min - Mean 70.5 Cfsm 2.22 In. 30.18 Ac-ft 51,020
Water year 1959-60: Max 326 Min - Mean 81.2 Cfsm 2.56 In. 34.89 Ac-ft 58,970

* Discharge measurement made on this day.
b Stage-discharge relation affected by ice.
Note.--No gage-height record Dec. 15 to May 2, except occasional days (stage-discharge relation affected by ice during most of period); discharge estimated on basis of 3 discharge measurements, weather records, and records for stations on nearby streams.

## 2580. Kenai River at Cooper Landing

Location.--Lat 60°29'35", long 149°48'25", near center of span on downstream side of bridge on Sterling Highway, 0.9 mile east of Cooper Landing, 0.9 mile upstream from Bean Creek, and 1.2 miles downstream from Snug Harbor.

Drainage area.--634 sq mi.

Records available.--Discharge: May 1947 to September 1960.
Chemical analyses: July to September 1950, April to September 1952, October 1957 to August 1958.
Sediment records: July to September 1959 (periodic).

Gage.--Wire-weight gage read once daily. Datum of gage is 429.27 ft above mean sea level (river-profile survey). May 11, 1947, to Mar. 10, 1949, staff gage and Mar. 11, 1949, to Apr. 13, 1950, wire-weight gage, at bridge 0.9 mile downstream at different datum.

Average discharge.--13 years, 2,698 cfs (1,953,000 acre-ft per year).

Extremes.--Maximum discharge during year, 9,300 cfs July 29 ( gage height, 8.84 ft, from graph based on gage readings); minimum daily, 260 cfs Apr. 4-6.
1947-60: Maximum discharge, 20,600 cfs June 29, 1953 (gage height, 12.36 ft, from graph based on gage readings), from rating curve extended above 10,000 cfs by logarithmic plotting; minimum daily, 190 cfs Mar. 15-24, 1951.

Remarks.--Records good except those for periods of ice effect, which are fair.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,630 | 2,690 | 1,060 | b640 | 427 | *394 | b280 | 515 | 6,660 | 7,540 | 9,080 | 4,400 |
| 2 | 2,650 | 2,610 | 1,050 | b620 | *530 | 394 | b270 | 580 | 6,360 | 7,470 | 8,980 | 4,380 |
| 3 | 2,870 | 2,480 | 1,020 | b600 | 542 | 387 | b270 | 698 | 5,940 | 7,130 | 8,960 | 4,380 |
| 4 | 2,810 | 2,240 | 972 | b600 | 507 | 369 | b260 | 854 | 5,720 | 6,860 | 8,910 | 4,270 |
| 5 | 2,650 | *2,250 | b910 | b620 | 481 | 352 | b260 | 992 | 5,660 | 6,620 | 8,380 | 4,210 |
| 6 | 2,470 | 2,040 | b820 | b630 | 430 | 352 | b260 | 1,170 | 5,560 | 6,510 | 8,410 | 4,050 |
| 7 | 2,350 | 2,000 | b750 | b620 | 470 | 359 | 263 | 1,380 | *5,640 | 6,400 | 8,620 | 3,940 |
| 8 | 2,170 | 1,980 | 718 | b590 | 459 | 338 | 311 | 1,640 | 5,780 | 5,840 | 8,430 | 3,680 |
| 9 | 2,120 | 1,850 | b700 | b560 | 473 | 325 | 311 | 1,910 | 5,780 | 5,700 | 7,830 | 3,700 |
| 10 | 2,100 | 1,750 | b690 | b530 | 477 | 321 | 304 | *2,170 | 5,760 | 5,700 | 7,520 | 3,760 |
| 11 | 1,880 | 1,670 | b690 | b510 | b460 | 304 | 295 | 2,380 | 5,520 | 5,620 | 7,400 | 4,080 |
| 12 | 1,660 | 1,580 | b690 | b490 | b450 | 325 | *304 | 2,580 | 5,560 | 5,540 | 7,280 | 4,290 |
| 13 | 1,500 | 1,490 | b700 | b470 | 437 | 318 | 298 | 2,690 | 5,290 | 6,140 | 6,730 | 4,320 |
| 14 | 1,500 | 1,430 | 710 | b450 | b430 | 315 | 304 | 2,830 | 5,150 | 6,330 | 6,620 | 4,380 |
| 15 | 1,440 | 1,330 | 728 | b440 | b420 | 318 | 298 | 2,900 | 5,020 | 6,470 | 6,730 | 4,420 |
| 16 | 1,370 | 1,330 | 741 | b430 | b420 | 318 | 308 | 3,010 | 5,020 | 6,440 | 6,180 | 4,190 |
| 17 | 1,320 | 1,300 | *759 | b440 | b420 | 318 | 298 | 3,120 | 5,020 | 6,510 | 5,840 | 4,020 |
| 18 | 1,270 | 1,230 | 772 | b450 | b410 | 298 | 315 | 3,260 | 5,110 | 6,470 | 5,640 | 3,600 |
| 19 | 1,220 | 1,120 | 754 | b440 | b410 | 304 | 315 | 3,370 | 5,150 | 6,510 | 5,290 | 3,540 |
| 20 | 1,180 | 1,120 | 746 | 419 | b410 | 304 | 308 | 3,390 | 5,340 | *6,440 | 5,110 | 3,470 |
| 21 | 1,130 | 1,070 | 804 | b410 | b410 | 318 | 321 | 3,500 | 5,340 | 6,620 | 4,980 | 3,260 |
| 22 | 1,180 | 1,090 | 782 | b400 | 416 | 318 | 332 | 3,780 | 5,310 | 6,510 | 4,750 | 3,330 |
| 23 | 1,370 | 1,160 | 710 | b400 | b430 | 328 | 335 | 4,110 | 5,310 | 7,060 | 4,480 | 3,300 |
| 24 | 1,500 | 1,110 | 706 | b390 | b420 | 311 | 352 | 4,660 | 5,600 | 7,210 | 4,300 | 3,270 |
| 25 | 1,560 | 1,080 | 677 | b390 | 416 | 301 | 352 | 5,540 | 6,080 | 7,860 | 4,180 | 3,040 |
| 26 | 1,610 | 1,070 | 648 | b390 | 412 | b300 | 362 | 6,120 | 6,100 | 8,620 | 4,000 | 3,050 |
| 27 | 2,220 | 1,060 | 673 | b390 | 412 | b300 | 328 | 6,470 | 6,530 | 8,720 | 4,730 | 2,890 |
| 28 | 2,280 | 1,140 | 728 | b390 | 405 | b290 | 405 | 6,930 | 6,580 | 8,580 | 5,200 | 2,860 |
| 29 | 2,580 | 1,110 | 710 | b390 | 391 | 288 | 445 | 7,150 | 7,040 | 9,200 | 4,840 | 2,760 |
| 30 | 2,720 | 1,060 | 710 | b400 | ------ | 285 | 473 | 7,150 | 7,520 | 9,200 | *4,570 | 2,750 |
| 31 | 2,740 | ------ | 665 | b410 | ------ | b280 | ------ | 6,880 | ------ | 8,860 | 4,400 | ------ |
| Total | 60,050 | 46,440 | 23,793 | 14,909 | 12,775 | 10,032 | 9,537 | 103,729 | 172,450 | 218,180 | 198,370 | 111,590 |
| Mean | 1,937 | 1,548 | 768 | 481 | 441 | 324 | 318 | 3,346 | 5,748 | 7,038 | 6,399 | 3,720 |
| Cfsm | 3.06 | 2.44 | 1.21 | 0.759 | 0.696 | 0.511 | 0.502 | 5.28 | 9.07 | 11.1 | 10.1 | 5.87 |
| In. | 3.52 | 2.72 | 1.40 | 0.87 | 0.75 | 0.59 | 0.56 | 6.08 | 10.12 | 12.80 | 11.64 | 6.55 |
| Ac-ft | 119,100 | 92,110 | 47,190 | 29,570 | 25,340 | 19,900 | 18,920 | 205,700 | 342,000 | 432,800 | 393,500 | 221,300 |

Calendar year 1959: Max 8,890 Min 265 Mean 2,449 Cfsm 3.86 In. 52.44 Ac-ft 1,773,000
Water year 1959-60: Max 9,200 Min 260 Mean 2,683 Cfsm 4.23 In. 57.60 Ac-ft 1,947,000

* Discharge measurement made on this day.
b Stage-discharge relation affected by ice.

## 2605. Stetson Creek near Cooper Landing

Location.--Lat 60°26'30", long 149°51'05", on left bank 0.3 mile upstream from mouth and 3.4 miles southwest of Cooper Landing.

Drainage area.--8.6 sq mi.

Records available.--May 1958 to September 1960.

Gage.--Water-stage recorder and bubble gage. Altitude of gage is 1,100 ft (from topographic map).

Extremes.--Maximum discharge during year, 197 cfs May 23 (gage height, 2.99 ft), from rating curve extended above 70 cfs by logarithmic plotting; minimum daily, 3 cfs Apr. 11, 12.
1958-60: Maximum discharge, that of May 23, 1960; minimum daily, that of Apr. 11, 12, 1960.

Remarks.--Records good except those for periods of ice effect, no gage-height record, and those above 70 cfs, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 23 | 23 | 11 | 9 | 6 | 5 | 6 | 10 | 66 | 53 | 50 | 46 |
| 2 | 22 | 22 | 11 | 9 | 6 | 6 | 4 | 11 | 65 | 53 | 49 | 59 |
| 3 | 20 | 21 | 10 | 9 | 6 | *6 | 4 | 12 | 65 | 49 | 46 | *59 |
| 4 | 19 | 18 | 10 | 9 | 6 | 4 | 4 | 12 | 66 | 49 | 46 | 54 |
| 5 | 19 | 17 | 9 | 8 | *6 | 4 | 4 | 13 | 72 | 50 | 48 | 52 |
| 6 | 18 | *16 | 9 | 8 | 6 | 4 | 4 | 15 | 79 | 50 | 53 | 48 |
| 7 | 16 | 15 | 9 | 8 | 6 | 4 | 4 | 17 | *71 | 49 | 52 | 46 |
| 8 | 15 | 15 | 8 | 8 | 6 | 4 | 4 | 20 | 72 | 49 | 46 | 44 |
| 9 | 15 | 14 | 8 | 7 | 6 | 4 | 4 | 21 | 72 | 50 | 43 | 42 |
| 10 | 14 | 14 | 8 | 7 | 6 | 4 | 4 | 21 | 71 | 52 | 43 | 44 |
| 11 | 14 | 13 | 8 | 7 | 6 | 4 | 3 | 21 | 67 | 54 | 41 | 46 |
| 12 | 14 | 12 | 8 | 7 | 6 | 4 | 3 | *21 | 64 | 55 | 39 | 46 |
| 13 | 13 | 12 | 8 | 7 | 5 | 4 | 4 | 23 | 58 | 56 | 38 | 41 |
| 14 | 13 | 12 | 8 | 6 | 5 | 4 | *4 | 24 | 55 | 55 | 37 | 38 |
| 15 | 13 | 11 | 8 | 6 | 5 | 4 | 4 | 25 | 55 | 51 | 36 | 36 |
| 16 | 13 | 11 | *8 | 6 | 5 | 4 | 4 | 27 | 60 | 46 | 36 | 36 |
| 17 | 12 | 10 | 9 | 6 | 5 | 4 | 4 | 28 | 65 | 48 | 36 | 34 |
| 18 | 12 | 10 | 8 | 7 | 6 | 4 | 4 | 30 | 66 | 48 | 40 | 33 |
| 19 | 12 | 10 | 9 | 7 | 6 | 4 | 4 | 28 | 65 | 46 | 37 | 30 |
| 20 | 12 | 9 | 9 | 7 | 6 | 4 | 4 | 31 | 64 | 44 | 36 | 29 |
| 21 | 13 | 9 | 9 | 7 | 6 | 4 | 6 | 36 | 59 | *46 | 35 | 32 |
| 22 | 14 | 9 | 9 | 7 | 6 | 4 | 6 | 66 | 61 | 46 | 35 | 30 |
| 23 | 15 | 9 | 8 | 7 | 5 | 4 | 5 | 146 | 69 | 46 | 34 | 29 |
| 24 | 15 | 9 | 8 | 6 | 5 | 4 | 5 | 131 | 67 | 50 | 33 | 28 |
| 25 | 15 | 9 | 8 | 6 | 5 | 4 | 5 | 123 | 74 | 53 | 34 | 28 |
| 26 | 16 | 9 | 8 | 6 | 5 | 4 | 5 | 115 | 75 | 52 | 35 | 27 |
| 27 | 17 | 9 | 8 | 6 | 5 | 5 | 5 | 99 | 61 | 50 | 47 | 26 |
| 28 | 20 | 9 | 9 | 6 | 5 | 5 | 6 | 93 | 60 | 48 | 49 | 29 |
| 29 | 22 | 10 | 9 | 6 | 5 | 5 | 10 | 87 | 59 | 48 | 46 | 29 |
| 30 | 23 | 11 | 9 | 6 | ------ | 5 | 11 | 75 | 55 | 44 | 46 | 29 |
| 31 | 23 | ------ | 9 | 6 | ------ | 5 | ------ | 70 | ------ | 42 | 43 | ------ |
| Total | 502 | 378 | 270 | 217 | 162 | 134 | 144 | 1,451 | 1,958 | 1,532 | 1,289 | 1,150 |
| Mean | 16.2 | 12.6 | 8.7 | 7.0 | 5.6 | 4.3 | 4.8 | 46.8 | 65.3 | 49.4 | 41.6 | 38.3 |
| Cfsm | 1.88 | 1.47 | 1.01 | 0.814 | 0.651 | 0.500 | 0.558 | 5.44 | 7.59 | 5.74 | 4.84 | 4.45 |
| In. | 2.17 | 1.63 | 1.17 | 0.94 | 0.70 | 0.58 | 0.62 | 6.27 | 8.47 | 6.63 | 5.57 | 4.97 |
| Ac-ft | 996 | 750 | 536 | 430 | 321 | 266 | 286 | 2,880 | 3,880 | 3,040 | 2,560 | 2,280 |

Calendar year 1959: Max 131 Min 5 Mean 23.3 Cfsm 2.71 In. 36.81 Ac-ft 16,880
Water year 1959-60: Max 146 Min 3 Mean 25.1 Cfsm 2.92 In. 39.72 Ac-ft 18,220

Peak discharge (base, 100 cfs).--May 23 (7:30 p.m.) 197 cfs (2.99 ft).

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 8-25, Nov. 7-27, Dec. 22, Jan. 4-6, Feb. 5-28, Mar. 5-17, Mar. 29 to Apr. 1. No gage-height record Oct. 19, 20, Oct. 30 to Nov. 5, Dec. 1-15, Jan. 7 to Feb. 4; discharge estimated on basis of 3 discharge measurements, weather records, and records for nearby stations.

## 2610. Cooper Creek at mouth, near Cooper Landing

Location.--Lat 60°28'30", long 149°52'30", on right bank 0.7 mile upstream from mouth, 0.9 mile downstream from unnamed tributary, 1.6 miles west of Cooper Landing, and 4½ miles downstream from Cooper Lake Outlet.

Drainage area.--48.0 sq mi, of which 31.8 sq mi above Cooper Lake Outlet has not contributed since July 1959.

Records available.--Discharge: October 1957 to September 1960.
Chemical analyses: October 1957 to August 1958.

Gage.--Water-stage recorder. Altitude of gage is 450 ft (from topographic map).

Extremes.--Maximum discharge during year, 259 cfs May 23 (gage height, 1.69 ft); minimum discharge observed, 3.1 cfs Mar. 1 (discharge measurement) caused by temporary storage behind ice dam upstream.
1957-60: Maximum discharge, 608 cfs June 22, 1958 (gage height, 2.91 ft); maximum gage height recorded, 3.75 ft Dec. 9, 1958 (ice jam); minimum discharge observed, that of Mar. 1, 1960.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Since July 1959, entire flow from 31.8 sq mi of drainage area has been controlled by dam at Cooper Lake Outlet; no release or spill during year.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 39 | 36 | | | | (*) | | 18 | 94 | 69 | 76 | 58 |
| 2 | 37 | 35 | | | (*) | | | 18 | 91 | 65 | 72 | 99 |
| 3 | 36 | 34 | | | | | | 20 | 91 | 65 | 62 | 94 |
| 4 | 35 | *34 | | | | | | 21 | 89 | 65 | 64 | 86 |
| 5 | 34 | 32 | | | | | | 24 | 98 | 65 | 66 | 76 |
| 6 | 33 | 32 | | | | | | 27 | *102 | 65 | 83 | 68 |
| 7 | 32 | 31 | | | | | | 32 | 95 | 65 | 77 | 65 |
| 8 | 31 | 29 | 16 | 11 | 8 | | 7 | 39 | 96 | 66 | 64 | 64 |
| 9 | 30 | 27 | | | | | | 45 | 98 | 66 | 58 | 62 |
| 10 | 28 | 26 | | | | | | *72 | 95 | 69 | 56 | 65 |
| 11 | 28 | 25 | | | | | | 70 | 88 | 74 | 55 | 68 |
| 12 | 27 | 24 | | | | | (*) | 69 | 78 | 77 | 52 | 66 |
| 13 | 26 | 23 | | | | | | 74 | 70 | 78 | 50 | 62 |
| 14 | 25 | 22 | | | | | | 77 | 68 | 81 | 48 | 56 |
| 15 | 24 | 21 | (*) | | | 7 | | 80 | 70 | 69 | 48 | 53 |
| 16 | 24 | 21 | | | | | | 81 | 77 | 63 | 47 | 51 |
| 17 | 23 | 20 | | | | | | 81 | 88 | 64 | 48 | 49 |
| 18 | 23 | 19 | | | | | | 80 | 92 | 64 | 50 | 46 |
| 19 | 22 | 19 | | | | | | 75 | 88 | 60 | 45 | 44 |
| 20 | 22 | 18 | | | | | | 76 | 86 | *59 | 43 | 43 |
| 21 | 22 | 18 | | | | | | 87 | 80 | 62 | 41 | 47 |
| 22 | 24 | 17 | | | | | | 152 | 83 | 66 | 41 | 46 |
| 23 | 26 | 17 | 13 | 10 | 7 | | 11 | 230 | 91 | 67 | 39 | 46 |
| 24 | 27 | 17 | | | | | | 212 | 89 | 76 | 39 | 44 |
| 25 | 28 | 17 | | | | | | 202 | 96 | 81 | 37 | 44 |
| 26 | 29 | 17 | | | | | | 184 | 101 | 78 | 39 | 44 |
| 27 | 32 | 18 | | | | | | 145 | 84 | 68 | 60 | 45 |
| 28 | 34 | 18 | | | | | | 138 | 82 | 72 | 62 | 52 |
| 29 | 35 | 19 | | | | | | 134 | 81 | 70 | 57 | 52 |
| 30 | 36 | 20 | | | ------- | | | 122 | 75 | 63 | *54 | 51 |
| 31 | 36 | ------- | | | ------- | | ------- | 107 | ------- | 58 | 51 | ------- |
| Total | 908 | 706 | 448 | 325 | 218 | 217 | 270 | 2,792 | 2,616 | 2,110 | 1,684 | 1,746 |
| Mean | 29.3 | 23.5 | 14.5 | 10.5 | 7.5 | 7 | 9.0 | 90.1 | 87.2 | 68.1 | 54.3 | 58.2 |
| Ac-ft | 1,800 | 1,400 | 889 | 645 | 432 | 430 | 536 | 5,540 | 5,190 | 4,190 | 3,340 | 3,460 |

Calendar year 1959: Max 448 Min - Mean 85.9 Ac-ft 62,190
Water year 1959-60: Max 230 Min - Mean 38.4 Ac-ft 27,850

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 8, 9, 11-16, Oct. 29 to Nov. 1, Nov. 3, 8-20. No gage-height record Oct. 17-25, Nov. 21 to May 7, except occasional days (stage-discharge relation affected by ice during most of period); discharge estimated on basis of 4 discharge measurements, weather records, and records for stations on nearby streams.

## 2740. South Fork Campbell Creek near Anchorage

Location.--Lat 61°10'00", long 149°46'30", in NE¼ sec.3, T.12 N., R.3 W., on right bank a quarter of a mile downstream from bridge on road leading to Campbell Airstrip, 2.0 miles upstream from confluence with North Fork Campbell Creek, and 5½ miles southeast of Anchorage Post Office.

Drainage area.--29.4 sq mi.

Records available.--Discharge: July 1947 to September 1960.
Chemical analyses: October 1958 to September 1959.

Gage.--Water-stage recorder. Altitude of gage is 260 ft (from topographic map). Prior to Aug. 20, 1952, at site a quarter of a mile upstream at different datum. Aug. 20, 1952, to July 15, 1958, at site 70 ft downstream from previous site at different datum.

Average discharge.--13 years, 38.9 cfs (28,160 acre-ft per year).

Extremes.--Maximum discharge during year, 228 cfs May 23 (gage height, 2.68 ft); maximum gage height, 4.78 ft Oct. 23 (backwater from ice); minimum discharge not determined.
1947-60: Maximum discharge, 891 cfs June 21, 1949 (gage height, 3.30 ft, site and datum then in use), from rating curve extended above 110 cfs by logarithmic plotting; maximum gage height observed, 5.30 ft Nov. 18, 1958 (backwater from ice); no flow part of Oct. 12, 1958, caused by temporary storage behind snowslide upstream.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 66 | 31 | | | | | | 17 | 90 | 83 | 138 | 108 |
| 2 | 60 | *29 | | | | | | 19 | 102 | 72 | 115 | 168 |
| 3 | 53 | b29 | | | | | | 21 | 97 | 66 | 97 | 154 |
| 4 | 51 | b29 | | | | | | 21 | 93 | 59 | 91 | 147 |
| 5 | 47 | b29 | | | | | | 24 | 97 | 61 | 86 | 133 |
| | | | 18 | | | | | | | | | |
| 6 | 44 | 29 | | | | | | 29 | 99 | *62 | 160 | 117 |
| 7 | 42 | 28 | | | | | | 31 | 93 | 64 | 154 | 111 |
| 8 | 41 | 26 | | 13 | 12 | 9 | 6 | 30 | 99 | 67 | 126 | 124 |
| 9 | 41 | 22 | | | (*) | | | 30 | 95 | 67 | 108 | 106 |
| 10 | 39 | 22 | | | | (*) | | 31 | 88 | 62 | 97 | 102 |
| 11 | 42 | 27 | | (*) | | | | *29 | 80 | 62 | 90 | 141 |
| 12 | *42 | 30 | | | | | (*) | 29 | 72 | 62 | *84 | 198 |
| 13 | 40 | 31 | | | | | | 32 | 70 | 63 | 83 | 176 |
| 14 | 39 | 31 | (*) | | | | | 34 | *66 | 63 | 82 | 157 |
| 15 | 36 | 31 | | | | | | 37 | 68 | 62 | 80 | 142 |
| | | | 17 | | | | | | | | | |
| 16 | 34 | *30 | | | | | | 40 | 74 | 55 | 86 | 131 |
| 17 | 32 | 28 | | | | | | *40 | 76 | 52 | 76 | 122 |
| 18 | 34 | 28 | | | (*) | | | 46 | 80 | 54 | 76 | 113 |
| 19 | 36 | 23 | | | | | (*) | 44 | 77 | 50 | *68 | 104 |
| 20 | 37 | 20 | | | | | | 46 | 78 | 48 | 61 | *99 |
| 21 | *b36 | 18 | | | | | | 51 | 76 | 47 | 57 | 99 |
| 22 | b35 | 21 | (*) | | | (*) | 8 | 96 | *76 | 49 | 56 | 97 |
| 23 | b36 | 23 | | | 11 | 10 | | 190 | 80 | 57 | 55 | *97 |
| 24 | 37 | 24 | | 14 | | | | 187 | 80 | 82 | 51 | 88 |
| 25 | 36 | 24 | | | | | (*) | 147 | 86 | *72 | 50 | 84 |
| | | | 15 | | | | | | | | | |
| 26 | 35 | 24 | | | (*) | | | 135 | 97 | 78 | 52 | 83 |
| 27 | 36 | 24 | | | | | | 111 | 86 | 95 | 135 | 91 |
| 28 | 37 | 23 | | (*) | | | | 102 | 78 | 88 | 133 | 126 |
| 29 | 38 | 22 | | | | | 13 | 117 | 76 | 113 | 104 | 140 |
| 30 | 35 | *20 | | | ------- | | 13 | 99 | 74 | 117 | 100 | 115 |
| 31 | 33 | ------- | (*) | | ------- | (*) | ------- | *83 | ------- | 117 | 99 | ------- |
| Total | 1,350 | 776 | 515 | 419 | 334 | 295 | 220 | 1,948 | 2,503 | 2,129 | 2,850 | 3,673 |
| Mean | 40.3 | 25.9 | 16.6 | 13.5 | 11.5 | 9.5 | 7.3 | 62.8 | 83.4 | 68.7 | 91.9 | 122 |
| Ac-ft | 2,480 | 1,540 | 1,020 | 831 | 662 | 585 | 436 | 3,860 | 4,960 | 4,220 | 5,650 | 7,290 |

Calendar year 1959: Max 146 Min 6 Mean 40.2 Ac-ft 29,130
Water year 1959-60: Max 198 Min - Mean 46.2 Ac-ft 33,530

Peak discharge (base, 150 cfs).--May 23 (3:30 p.m.) 228 cfs (2.68 ft); Aug. 6 (1:30 p.m.) 190 cfs (2.47 ft); Aug. 27 (5 p.m.) 179 cfs (2.51 ft); Sept. 2 (2 a.m.) 203 cfs (2.60 ft); Sept. 12 (1:30 a.m.) 212 cfs (2.78 ft); Sept. 29 (3 a.m.) 173 cfs (2.34 ft).

* Discharge measurement made on this day.
b Stage-discharge relation affected by ice.
Note.--No gage-height record Oct. 15-20, Nov. 9 to Apr. 28, except occasional days (stage-discharge relation affected by ice during most of period); discharge estimated on basis of 17 discharge measurements, weather records, and records for Ship Creek near Anchorage and Chester Creek at Anchorage.

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## 2750. Chester Creek at Anchorage

Location.--Lat 61°12'00", long 149°50'10", 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 post office in Anchorage, and 3.2 miles upstream from mouth. Prior to July 12 at site 40 ft upstream at same datum.

Drainage area.--21.3 sq mi.

Records available.--Discharge: July 1958 to September 1960.
Chemical analyses: October 1958 to September 1959.

Gage.--Staff gage read twice daily. Altitude of gage is 100 ft (from topographic map). Prior to July 12, 1960, at site 40 ft upstream at same datum.

Extremes.--Maximum discharge during year, 72 cfs Sept. 13; maximum gage height, 2.22 ft Apr. 28, from graph based on gage readings; minimum daily discharge, 11 cfs Mar. 12-14.
1958-60: Maximum discharge, 94 cfs Apr. 27, 1959 (gage height, 2.75 ft, from graph based on gage readings); minimum daily, 10 cfs Mar. 17-22, 1959.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are fair.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 32 | 29 | a19 | 20 | 18 | a16 | b14 | 44 | 30 | 26 | a30 | 35 |
| 2 | 34 | *29 | a21 | 20 | 18 | b16 | b14 | 40 | 30 | 23 | a30 | 47 |
| 3 | 33 | 28 | b23 | 20 | 17 | b16 | b13 | 38 | 28 | 22 | a29 | 48 |
| 4 | 32 | 28 | b24 | b22 | 17 | b17 | b13 | 36 | 27 | 23 | a28 | 46 |
| 5 | 31 | 28 | b23 | b21 | 17 | a17 | b13 | 33 | 26 | 23 | a26 | 44 |
| 6 | 31 | 28 | b21 | b20 | 16 | a16 | b13 | 33 | 27 | *21 | a28 | 44 |
| 7 | 31 | 28 | b19 | b19 | b15 | a15 | b14 | 31 | 25 | 22 | a30 | 39 |
| 8 | 31 | 23 | a17 | b17 | b16 | a14 | b14 | 31 | 26 | 23 | a31 | 43 |
| 9 | 31 | 20 | a17 | b16 | *b16 | a13 | b14 | 31 | 25 | 27 | a30 | 43 |
| 10 | 31 | 20 | 19 | b15 | b16 | *b12 | b14 | 29 | 25 | 25 | a28 | 39 |
| 11 | 31 | 20 | b21 | *b15 | 16 | a12 | b15 | *28 | 25 | 22 | a26 | 43 |
| 12 | *30 | a25 | b23 | a14 | 16 | a11 | *b16 | 28 | 25 | 23 | *24 | 61 |
| 13 | 29 | a27 | 22 | a14 | 16 | a11 | b17 | 28 | 27 | a24 | 22 | 71 |
| 14 | 28 | 27 | *22 | a14 | 16 | a11 | b23 | 28 | *25 | a24 | 23 | 63 |
| 15 | 28 | 26 | 21 | a14 | 16 | b12 | b25 | 28 | 23 | a24 | 28 | 57 |
| 16 | 27 | *27 | b20 | a16 | a16 | b12 | b23 | 28 | 23 | a23 | 32 | 54 |
| 17 | 26 | 25 | b18 | a17 | a16 | b12 | b22 | *27 | 23 | a23 | 31 | 48 |
| 18 | 25 | 26 | b17 | a18 | *16 | b13 | b28 | 28 | 23 | a22 | 30 | 44 |
| 19 | 26 | a24 | b18 | 19 | 16 | b13 | *b27 | 30 | 23 | a22 | *26 | 43 |
| 20 | 27 | a21 | b20 | 20 | 16 | b13 | 29 | 29 | 22 | a21 | 25 | *42 |
| 21 | *27 | 19 | 21 | 19 | 17 | b14 | 26 | 28 | 22 | a21 | 25 | 43 |
| 22 | 28 | a23 | *21 | b19 | 17 | *b15 | 27 | 28 | *22 | a21 | 25 | 44 |
| 23 | 29 | a25 | 21 | b18 | 17 | b16 | 31 | 28 | 22 | a22 | 24 | *48 |
| 24 | 30 | 25 | b20 | b18 | 17 | b16 | 42 | 29 | 22 | a22 | 24 | 50 |
| 25 | 31 | 26 | b18 | b17 | 17 | 16 | 48 | 29 | 22 | *a23 | 22 | 47 |
| 26 | 31 | b25 | a17 | b17 | *16 | 16 | *50 | 29 | 23 | a24 | 22 | 44 |
| 27 | 31 | b25 | a17 | a17 | b16 | b15 | 56 | 29 | 22 | a25 | 24 | 44 |
| 28 | 31 | b24 | a19 | *18 | b16 | b15 | 56 | 28 | 22 | a26 | 28 | 48 |
| 29 | 31 | b24 | 20 | 19 | a16 | b15 | 48 | 31 | 23 | a27 | 47 | 56 |
| 30 | 30 | *b21 | 20 | 19 | ------- | b14 | 44 | 31 | 22 | a28 | 42 | 61 |
| 31 | 30 | ------- | *20 | 18 | ------- | *b14 | ------- | *30 | ------- | a29 | 36 | ------- |
| Total | 923 | 746 | 619 | 550 | 475 | 438 | 789 | 948 | 730 | 731 | 876 | 1,439 |
| Mean | 29.8 | 24.9 | 20.0 | 17.7 | 16.4 | 14.1 | 26.3 | 30.6 | 24.3 | 23.6 | 28.3 | 48.0 |
| Ac-ft | 1,830 | 1,480 | 1,230 | 1,090 | 942 | 869 | 1,560 | 1,880 | 1,450 | 1,450 | 1,740 | 2,850 |

Calendar year 1959: Max 86 Min 10 Mean 24.5 Ac-ft 17,770
Water year 1959-60: Max 71 Min 11 Mean 25.3 Ac-ft 18,370

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of discharge measurements, weather records, and records for nearby stations.
b Stage-discharge relation affected by ice.

## 2760. Ship Creek near Anchorage

Location.--Lat 61°13'25", long 149°38'00", in Fort Richardson Military Reservation, at new diversion dam and Fort Richardson water-supply intake building, 0.2 mile upstream from abandoned dam and water-supply intake building, 3.5 miles upstream from North Fork Ship Creek, and 8½ miles east of Anchorage.

Drainage area.--91.2 sq mi.

Records available.--Discharge: October 1946 to September 1960.
Chemical analyses: April 1949 to July 1951, October 1958 to August 1959.
Water temperatures: May 1949 to September 1950.

Gage.--Water-stage recorder and masonry dam. Datum of gage is 530 ft above mean sea level (levels by Corps of Engineers). Oct. 1, 1946, to Apr. 30, 1947, staff gage and May 1, 1947, to Apr. 19, 1954, water-stage recorder, at site 0.2 mile downstream at different datum. June 18, 1953, to Sept. 30, 1954, supplementary water-stage recorder at site 2.7 miles downstream at different datum.

Extremes.--Maximum discharge during year, 966 cfs May 25 (gage height, 3.58 ft); no flow Mar. 7, 15.
1946-60: Maximum discharge, 1,860 cfs June 21, 1949 (gage height, 3.44 ft, site and datum then in use); no flow at times.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. Discharge data represent net flow remaining after diversion for water supply of Fort Richardson, Elmendorf Air Force Base, and city of Anchorage. Average diversion, 15.6 cfs.

Cooperation.--Gage inspected and records of diversion furnished by Office of Post Engineers, Fort Richardson.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 136 | 97 | 50 | 44 | 33 | 12 | 19 | 71 | 514 | 361 | 379 | 289 |
| 2 | 131 | *82 | 53 | 45 | 30 | 13 | 18 | 70 | 510 | 325 | 337 | 391 |
| 3 | 120 | 78 | 56 | 45 | 27 | 13 | 17 | 76 | 486 | 303 | 300 | 361 |
| 4 | 116 | 78 | 58 | 49 | 23 | 12 | 17 | 82 | 492 | 281 | 287 | 370 |
| 5 | 113 | 78 | 55 | 45 | 22 | 10 | 16 | 108 | 510 | 281 | 265 | 361 |
| 6 | 106 | 77 | 50 | 37 | 20 | 5 | 16 | 127 | 506 | *265 | 394 | 334 |
| 7 | 102 | 76 | 46 | 35 | 20 | 0 | 16 | 138 | 503 | 262 | 400 | 316 |
| 8 | 98 | 50 | 42 | 33 | 25 | 5 | 16 | 138 | 514 | 270 | 355 | 334 |
| 9 | 95 | 50 | 44 | 31 | *26 | 7 | 15 | 144 | 496 | 265 | 308 | 295 |
| 10 | 97 | 53 | 48 | 30 | 24 | 12 | 15 | 157 | 458 | 262 | 281 | 295 |
| 11 | 95 | 70 | 51 | *29 | 25 | 15 | 15 | *179 | 419 | 268 | 260 | 358 |
| 12 | *98 | 74 | 54 | 27 | 23 | 6 | 16 | 172 | 397 | 278 | *249 | 534 |
| 13 | 90 | 77 | 54 | 27 | 22 | 2 | *16 | 176 | 379 | 289 | 236 | 506 |
| 14 | 73 | 80 | 53 | 27 | 21 | 3 | 18 | 183 | *352 | 300 | 230 | 465 |
| 15 | 70 | 80 | *51 | 29 | 21 | 0 | 20 | 190 | 346 | 284 | 220 | 419 |
| 16 | 66 | *80 | 45 | 32 | 21 | 2 | 21 | 203 | 358 | 252 | 228 | 382 |
| 17 | 62 | 76 | 42 | 35 | 21 | 4 | 22 | *216 | 394 | 246 | 213 | 358 |
| 18 | 73 | 76 | 38 | 38 | *21 | 8 | 21 | 252 | 416 | 233 | 210 | 334 |
| 19 | 92 | 54 | 42 | 40 | 21 | 11 | *22 | 249 | 416 | 216 | *200 | 308 |
| 20 | 106 | 48 | 45 | 41 | 19 | 15 | 22 | 273 | 409 | 206 | 186 | *287 |
| 21 | *102 | 56 | 48 | 41 | 19 | 18 | 21 | 300 | 394 | 210 | 176 | 278 |
| 22 | 100 | 64 | *48 | 39 | 18 | *20 | 22 | 412 | *403 | 226 | 172 | 268 |
| 23 | 111 | 69 | 48 | 37 | 17 | 20 | 29 | 698 | 439 | 238 | 161 | 268 |
| 24 | 115 | 71 | 42 | 35 | 16 | 21 | 31 | 870 | 439 | 236 | 154 | 252 |
| 25 | 102 | 73 | 37 | 34 | 15 | 21 | 31 | 874 | 432 | *246 | 148 | 236 |
| 26 | 98 | 73 | 37 | 33 | *14 | 21 | *36 | 870 | 442 | 252 | 152 | 226 |
| 27 | 105 | 71 | 38 | 33 | 13 | 20 | 39 | 774 | 416 | 276 | 323 | 246 |
| 28 | 111 | 69 | 40 | *34 | 13 | 19 | 44 | 694 | 385 | 276 | 316 | 358 |
| 29 | 115 | 64 | 43 | 36 | 13 | 19 | 54 | 710 | 370 | 319 | 268 | 409 |
| 30 | 105 | *56 | 40 | 36 | ------- | 20 | 63 | 612 | 361 | 346 | 265 | 358 |
| 31 | 102 | ------- | *43 | 35 | ------- | *21 | ------- | *542 | ------- | 331 | 262 | ------- |
| Total | 3,105 | 2,100 | 1,441 | 1,112 | 603 | 375 | 728 | 10,560 | 12,956 | 8,403 | 7,935 | 10,196 |
| Mean | 100 | 70.0 | 46.5 | 35.9 | 20.8 | 12.1 | 24.3 | 341 | 432 | 271 | 256 | 340 |
| Ac-ft | 6,160 | 4,170 | 2,860 | 2,210 | 1,200 | 744 | 1,440 | 20,950 | 25,700 | 16,670 | 15,740 | 20,220 |

Calendar year 1959: Max 643 Min 7 Mean 144 Ac-ft 104,200
Water year 1959-60: Max 874 Min 0 Mean 163 Ac-ft 118,100

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 15-17, Nov. 3 to Mar. 6, Mar. 8-14, Mar. 16 to Apr. 21 (no gage-height record Feb. 10-17, Apr. 7-11; discharge estimated on basis of 3 discharge measurements, weather records, and records for nearby stations).

## 2776. East Fork Eklutna Creek near Palmer

Location.--Lat 61°19', long 148°57', on left bank 1½ miles upstream from confluence with West Fork, 3½ miles upstream from Eklutna Lake, and 21 miles south of Palmer.

Drainage area.--38 sq mi, approximately.

Records available.--June to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,000 ft (from topographic map).

Extremes.--Maximum discharge during period, 770 cfs Sept. 11 (gage height, 3.22 ft), from rating curve extended above 270 cfs by logarithmic plotting; minimum, 92 cfs Sept. 26 (gage height, 1.38 ft).

Remarks.--Records good except those above 400 cfs, which are fair.

Discharge, in cubic feet per second, June to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | 310 | 353 | 489 | 165 |
| 2 | | | | | | | | | 290 | 335 | 372 | 163 |
| 3 | | | | | | | | | *266 | 313 | 324 | 171 |
| 4 | | | | | | | | | 282 | 302 | 338 | 160 |
| 5 | | | | | | | | | 288 | 313 | 331 | 137 |
| 6 | | | | | | | | | 278 | 299 | 561 | 120 |
| 7 | | | | | | | | | 285 | 292 | 444 | 123 |
| 8 | | | | | | | | | 299 | 302 | 335 | 142 |
| 9 | | | | | | | | | 278 | 299 | 331 | 145 |
| 10 | | | | | | | | | 256 | 338 | 392 | 176 |
| 11 | | | | | | | | | 230 | 392 | 428 | 435 |
| 12 | | | | | | | | | 221 | 444 | 412 | 456 |
| 13 | | | | | | | | | 207 | 472 | 372 | 320 |
| 14 | | | | | | | | | 221 | 444 | 364 | 224 |
| 15 | | | | | | | | | 230 | 412 | 335 | 193 |
| 16 | | | | | | | | | 259 | 400 | 331 | 163 |
| 17 | | | | | | | | | 306 | 436 | 299 | 145 |
| 18 | | | | | | | | | 324 | 412 | 288 | 132 |
| 19 | | | | | | | | | 328 | 356 | 262 | 120 |
| 20 | | | | | | | | | 342 | 408 | 253 | 118 |
| 21 | | | | | | | | | 342 | 468 | 234 | 158 |
| 22 | | | | | | | | | 400 | 464 | 218 | 123 |
| 23 | | | | | | | | | 404 | 448 | 224 | 118 |
| 24 | | | | | | | | | 396 | 468 | 243 | 110 |
| 25 | | | | | | | | | 420 | 516 | 218 | 100 |
| 26 | | | | | | | | | 432 | 464 | 342 | *94 |
| 27 | | | | | | | | | 412 | 494 | 412 | 96 |
| 28 | | | | | | | | | 412 | 498 | 240 | 135 |
| 29 | | | | | | | | | 404 | 525 | 199 | 137 |
| 30 | | | | | ------- | | | | 360 | 416 | 190 | 111 |
| 31 | | ------- | | | ------- | | ------- | | ------- | 380 | 171 | ------- |
| Total | | | | | | | | | 9,482 | 12,463 | 9,952 | 4,990 |
| Mean | | | | | | | | | 316 | 402 | 321 | 166 |
| Ac-ft | | | | | | | | | 18,810 | 24,720 | 19,740 | 9,900 |

| | | | | |
|---|---|---|---|---|
| Calendar year | : Max | Min | Mean | Ac-ft |
| Water year | : Max | Min | Mean | Ac-ft |

* Discharge measurement made on this day.

## 2778. West Fork Eklutna Creek near Palmer

Location.--Lat 61°18', long 148°58', on right bank 1 mile upstream from confluence with East Fork, 3 miles upstream from Eklutna Lake, and 22 miles south of Palmer.

Drainage area.--26 sq mi, approximately.

Records available.--June to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 950 ft (from topographic map).

Extremes.--Maximum discharge during period, 850 cfs July 24 (gage height, 3.08 ft); maximum gage height, 3.12 ft Aug. 6 (backwater from trees); minimum discharge, 28 cfs Sept. 27.

Remarks.--Records good except those for period of backwater from trees, which are fair.

Discharge, in cubic feet per second, June to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | 140 | 432 | 488 | 232 |
| 2 | | | | | | | | | 128 | 383 | 346 | 210 |
| 3 | | | | | | | | | *121 | 346 | 248 | 192 |
| 4 | | | | | | | | | 118 | 308 | 308 | 160 |
| 5 | | | | | | | | | 132 | 314 | 327 | 121 |
| 6 | | | | | | | | | 148 | 289 | 658 | 92 |
| 7 | | | | | | | | | 168 | 276 | 698 | 92 |
| 8 | | | | | | | | | 187 | 276 | 560 | 102 |
| 9 | | | | | | | | | 187 | 275 | 495 | 125 |
| 10 | | | | | | | | | 177 | 308 | *567 | 187 |
| 11 | | | | | | | | | 152 | 358 | 596 | 308 |
| 12 | | | | | | | | | 156 | 428 | 626 | 658 |
| 13 | | | | | | | | | 164 | 481 | 610 | 531 |
| 14 | | | | | | | | | 182 | 481 | 626 | 410 |
| 15 | | | | | | | | | 187 | 474 | 574 | 320 |
| 16 | | | | | | | | | 196 | 474 | 610 | 283 |
| 17 | | | | | | | | | 242 | 538 | 524 | 248 |
| 18 | | | | | | | | | 259 | 545 | 467 | 215 |
| 19 | | | | | | | | | 264 | 467 | 410 | 177 |
| 20 | | | | | | | | | 283 | 538 | 371 | 156 |
| 21 | | | | | | | | | 314 | 642 | 371 | 160 |
| 22 | | | | | | | | | *352 | 674 | 346 | 152 |
| 23 | | | | | | | | | 383 | 706 | 358 | 118 |
| 24 | | | | | | | | | 417 | 778 | 383 | 79 |
| 25 | | | | | | | | | 495 | 816 | 383 | 53 |
| 26 | | | | | | | | | 510 | 740 | 560 | *35 |
| 27 | | | | | | | | | 552 | 722 | 610 | 29 |
| 28 | | | | | | | | | 567 | 706 | 453 | 39 |
| 29 | | | | | | | | | 517 | 730 | 371 | 60 |
| 30 | | | | | ------ | | | | 446 | 524 | *339 | 44 |
| 31 | | ------ | | | ------ | | ------ | | ------ | 417 | 259 | ------ |
| Total | | | | | | | | | 8,144 | 15,446 | 14,542 | 5,588 |
| Mean | | | | | | | | | 271 | 498 | 469 | 186 |
| Ac-ft | | | | | | | | | 16,150 | 30,640 | 28,840 | 11,080 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Calendar year | : Max | Min | Mean | Cfsm | In. | Ac-ft |
| Water year | : Max | Min | Mean | Cfsm | In. | Ac-ft |

* Discharge measurement made on this day.
Note.--Backwater from trees June 28 to Aug. 24.

## 2780. Eklutna Lake near Palmer

Location.--Lat 61°24'05", long 149°09'00", 100 ft upstream from dam at outlet of Eklutna Lake, 8 miles upstream from abandoned Eklutna power diversion dam, 11 miles upstream from mouth of Eklutna Creek, and 14 miles south of Palmer.

Drainage area.--119 sq mi.

Records available.--November 1946 to September 1960 (fragmentary since January 1955).

Gage.--Staff gage. Datum of gage is 859.8 ft above mean sea level (Corps of Engineers bench mark). Prior to May 5, 1947, reference point at same site and datum.

Extremes.--Maximum gage height observed during year, 7.41 ft Oct. 2; minimum observed, -32.31 ft May 20.
1946-60: Maximum gage height observed, 12.00 ft Sept. 18, 1951; minimum observed, that of May 20, 1960.

Remarks.--Outflow from lake controlled by stoplogs and sluice gates in dam at outlet. Gates fully open during flood season each year. No spilling this year. Prior to December 1954, stored water released during winter period for power purposes. Since December 1954, direct withdrawals from Eklutna Lake for power purposes; flow then diverted into Knik River basin.

Gage height, in feet, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | | | | -22.10 | - | - | -22.57 | - | 3.24 |
| 2 | 7.41 | - | - | | | | - | - | - | - | - | - |
| 3 | - | - | - | | | | - | - | -29.32 | - | - | - |
| 4 | - | - | -0.22 | | | | - | - | - | - | - | - |
| 5 | - | - | - | | | | - | - | - | - | -4.77 | - |
| 6 | - | 3.81 | - | | | | - | -30.92 | - | - | - | - |
| 7 | - | - | - | | | | - | - | - | - | - | - |
| 8 | - | - | - | | | | -23.89 | - | - | -19.72 | - | - |
| 9 | 6.92 | - | - | | | | - | - | - | - | - | 4.59 |
| 10 | - | - | - | | | | - | - | -28.29 | - | - | - |
| 11 | - | - | -1.36 | | | | - | - | - | - | - | - |
| 12 | - | - | - | | | | - | - | - | - | -1.36 | - |
| 13 | - | 2.86 | - | | | | - | -31.62 | - | - | - | - |
| 14 | - | - | - | | | | - | - | - | - | - | - |
| 15 | - | - | - | | | | -25.81 | - | - | -16.22 | - | - |
| 16 | 6.15 | - | - | | | | - | - | - | - | - | 5.44 |
| 17 | - | - | - | | | | - | - | -27.78 | - | - | - |
| 18 | - | - | -2.62 | | | | - | - | - | - | - | - |
| 19 | - | - | - | | | | - | - | - | - | 0.90 | - |
| 20 | - | 1.83 | - | | | | - | -32.31 | - | - | - | - |
| 21 | - | - | - | | | | - | - | - | - | - | - |
| 22 | - | - | - | | | | -27.78 | - | - | -12.41 | - | - |
| 23 | 5.56 | - | - | | | | - | - | - | - | - | 5.91 |
| 24 | - | - | - | | | | - | - | -25.74 | - | - | - |
| 25 | - | - | - | | | -20.70 | - | - | - | - | - | - |
| 26 | - | - | - | | -15.44 | | - | - | - | - | 1.98 | - |
| 27 | - | 0.82 | - | | | | - | -30.81 | - | - | - | - |
| 28 | - | - | -4.27 | | | | - | - | - | - | - | - |
| 29 | - | - | - | -10.20 | | | -29.57 | - | - | -7.71 | - | - |
| 30 | 4.67 | - | - | | | | - | - | - | - | - | 5.96 |
| 31 | - | | - | | | | | - | | - | - | |

## 2800. Eklutna Creek near Palmer

Location.--Lat 61°24'05", long 149°09'00", on right bank 200 ft downstream from dam at outlet of Eklutna Lake, 8 miles upstream from abandoned Eklutna power diversion dam, 11 miles upstream from mouth, and 14 miles south of Palmer.

Drainage area.--119 sq mi.

Records available.--Discharge: October 1946 to September 1960.
Chemical analyses: April 1949 to September 1950, December 1950 to August 1952.
Water temperatures: May 1949 to September 1950, December 1950 to July 1951.

Gage.--Water-stage recorder. Datum of gage is 856.53 ft above mean sea level (Corps of Engineers bench mark). Prior to Aug. 31, 1948, staff gage at site 100 ft upstream at datum 1.96 ft higher. Aug. 31, 1948, to Sept. 30, 1953, at datum 1.96 ft higher.

Average discharge.--8 years (1946-54), 346 cfs (250,000 acre-ft per year), unadjusted.

Extremes.--No flow during year.
1946-60: Maximum discharge, 2,530 cfs Sept. 18, 1951 (gage height, 8.06 ft in gage well, present datum); no flow for long periods since December 1954.

Remarks.--Flow regulated by Eklutna Lake (usable capacity, 160,000 acre-ft). Since December 1954, entire flow, except for periods of spilling, diverted from Eklutna Lake into Knik River basin by Eklutna powerplant. No spilling during the water year. Maximum during calendar year, 156 cfs; minimum, 0 cfs; mean, 2.09 cfs; runoff, 1,510 acre-ft. Observation of no flow made Sept. 29. Diversion, in acre-feet, for Eklutna powerplant during water year 1960, is given herewith:

| Month | Diversion | Month | Diversion |
|---|---|---|---|
| October | 18,030 | March | 19,140 |
| November | 18,180 | April | 24,760 |
| December | 20,940 | May | 24,300 |
| - - - - - | | June | 23,430 |
| Calendar year 1960 | 231,400 | July | 19,830 |
| - - - - - | | August | 24,830 |
| January | 19,770 | September | 18,070 |
| February | 18,690 | Water year 1959-60 | 250,000 |

Note.--Records of diversion furnished by Bureau of Reclamation.

## 2810. Knik River near Palmer

Location.--Lat 61°30'15", long 149°01'50", in SE¼ sec.2, T.16 N., R.2 E., near center of span on downstream side of bridge on Glenn Highway, 7 miles south of Palmer.

Drainage area.--1,180 sq mi, approximately.

Records available.--Discharge: October 1959 to September 1960.
Chemical analyses: October 1957 to August 1958.
Sediment records: June to September 1959 (periodic).

Gage.--Water-stage recorder. Datum of gage is 30.0 ft above mean sea level. Prior to June 27, 1960, wire-weight gage at same site and datum.

Extremes.--Maximum discharge during year, 328,000 cfs July 17 (gage height, 24.35 ft); minimum not determined.
Maximum stage known, 25.30 ft July 18, 1958 (discharge, 359,000 cfs).

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. Extreme high flow in July caused by release of stored water (Lake George) behind Knik Glacier, about 17 miles upstream.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | a3,300 | | | | | | a1,000 | 4,200 | 6,810 | 29,700 | 11,000 |
| 2 | | 3,250 | | | | | | 1,140 | 4,170 | 5,830 | 29,300 | 10,600 |
| 3 | | | | | | | | 1,160 | a4,100 | 5,870 | 27,000 | 10,100 |
| 4 | | | | | | | | *1,330 | a4,100 | 5,830 | 25,800 | a9,400 |
| 5 | | | | | | | | a1,400 | a4,200 | 6,370 | 25,600 | a8,600 |
| 6 | a5,100 | | | | | | | a1,400 | 4,360 | 6,190 | 27,200 | a7,600 |
| 7 | | | | | | | | a1,400 | a4,600 | 6,010 | 30,400 | a7,000 |
| 8 | | | 1,200 | 610 | 390 | 300 | | a1,600 | a4,700 | 6,010 | 28,000 | a7,000 |
| 9 | | 2,400 | | | | | a520 | 1,710 | a4,900 | 5,800 | 23,800 | a8,000 |
| 10 | | | | | | | | 1,660 | a5,100 | 6,510 | 24,100 | a10,000 |
| 11 | | | | | | | | 1,760 | 5,080 | 7,500 | *25,000 | a13,000 |
| 12 | 3,490 | | | | | | | 1,730 | a4,700 | 8,770 | 25,200 | a18,000 |
| 13 | | | | | | | | 1,780 | a4,500 | 9,990 | 25,200 | a19,000 |
| 14 | | | | | | | | a1,800 | *4,260 | *27,600 | 24,600 | a17,000 |
| 15 | | | | | | | | 1,850 | a4,500 | *96,100 | 22,700 | a14,000 |
| 16 | | | | | | | | a1,900 | 4,740 | *192,000 | 21,200 | a13,000 |
| 17 | | | | | | | | 1,970 | a5,000 | *256,000 | 19,600 | a11,000 |
| 18 | | | (*) | | | | | a2,000 | a5,100 | *94,400 | 18,700 | a10,000 |
| 19 | | | | | | | 622 | 2,070 | a5,000 | *44,200 | 18,000 | a9,100 |
| 20 | | | | | | | *550 | a2,200 | a5,200 | 34,100 | 16,700 | a8,500 |
| 21 | | | | | | | a520 | a2,600 | *5,760 | 31,200 | 15,600 | *8,350 |
| 22 | a3,100 | | | | 330 | | a500 | a3,300 | 6,770 | 31,100 | 14,800 | 9,150 |
| 23 | | 1,900 | 770 | 450 | (*) | 360 | a490 | 3,900 | 7,150 | 30,500 | 13,800 | 9,420 |
| 24 | | | | | | (*) | a490 | 4,260 | 7,460 | 28,500 | 13,800 | 9,110 |
| 25 | | | | | | | a500 | a4,500 | a7,400 | 28,300 | 14,000 | 7,460 |
| 26 | | | | | | | 533 | *4,680 | a7,200 | 28,700 | 15,200 | 6,220 |
| 27 | | | | | | | a600 | a4,700 | 7,080 | 29,900 | 17,600 | 5,830 |
| 28 | | | | | | | a710 | a4,700 | 7,110 | 30,000 | 16,400 | 6,220 |
| 29 | | | | (*) | | | a830 | a4,600 | *6,960 | 30,400 | 14,200 | 7,040 |
| 30 | | | | | | | a1,000 | a4,500 | 6,510 | 29,900 | 12,800 | 6,770 |
| 31 | | | | | | | | 4,450 | | 30,700 | 11,900 | |
| Total | 118,490 | 66,250 | 30,320 | 16,350 | 10,470 | 10,260 | 16,705 | 79,050 | 161,890 | 1,161,060 | 647,900 | 297,470 |
| Mean | 3,822 | 2,208 | 978 | 527 | 361 | 331 | 557 | 2,550 | 5,396 | 37,450 | 20,900 | 9,916 |
| Ac-ft | 235,000 | 131,400 | 60,140 | 32,430 | 20,770 | 20,350 | 33,130 | 156,800 | 321,100 | 2,303,000 | 1,285,000 | 590,000 |

Calendar year 1959: Max - Min - Mean - Ac-ft -
Water year 1959-60: Max 256,000 Min - Mean 7,148 Ac-ft 5,189,000

* Discharge measurement made on this day.
a No gage-height record; discharge interpolated or estimated on basis of 6 discharge measurements, weather records, recorded range in stage, and records for Matanuska River at Palmer and East and West Fork Eklutna Creek near Palmer.
Note.--Stage-discharge relation affected by ice Oct. 21, Nov. 3 to about Apr. 30 (no gage-height record during most of period; discharge estimated on basis of 5 discharge measurements, weatner records, and records for Matanuska River at Palmer.

## 2820. Caribou Creek near Sutton

Location.--Lat 61°48'10", long 147°41'00", on downstream side of left pier of bridge on Glenn Highway, 1.4 miles downstream from Dan Creek, 1¾ miles upstream from mouth, and 40 miles east of Sutton.

Drainage area.--289 sq mi.

Records available.--Discharge: May 1955 to September 1960.
Chemical analyses: October 1957 to August 1958.
Sediment records: June 1959 to September 1960 (periodic).

Gage.--Water-stage recorder. Datum of gage is 1,767 ft above mean sea level.

Average discharge.--5 years, 324 cfs (234,600 acre-ft per year).

Extremes.--Maximum daily discharge during year, 5,000 cfs May 25; minimum not determined. 1955-60: Maximum discharge recorded, 5,060 cfs June 18, 1955 (gage height, 5.92 ft); minimum observed, 0.23 cfs Mar. 9, 1956, (discharge measurement), caused by temporary storage upstream.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 275 | (*) | | | | | | 130 | a700 | 2,150 | 576 | 778 |
| 2 | 265 | | | | | | | 220 | a660 | 1,680 | 501 | 826 |
| 3 | 247 | | | | | | | 400 | a740 | 1,230 | 446 | 886 |
| 4 | 253 | | | | | | (*) | *850 | a800 | 967 | 420 | 1,010 |
| 5 | 218 | | | | | | | *850 | a900 | 794 | 398 | 1,200 |
| 6 | 201 | | | | | | | a1,000 | a1,000 | 634 | 461 | 1,090 |
| 7 | 158 | | (*) | | | | | a1,200 | a950 | 563 | 451 | *931 |
| 8 | 144 | | 58 | 47 | 31 | 26 | 25 | a1,300 | a890 | 535 | 381 | 802 |
| 9 | 130 | | | | | | | *1,030 | *826 | 523 | 358 | 738 |
| 10 | 132 | | | | | | | 739 | a700 | 551 | 335 | 706 |
| 11 | 130 | | | | | | | 456 | 601 | 588 | 325 | 698 |
| 12 | 120 | | | | | | | 402 | a580 | 662 | 311 | 818 |
| 13 | 110 | | | | | | | 378 | a540 | 614 | 301 | 904 |
| 14 | 100 | | | | | | | 546 | a510 | 595 | 311 | 786 |
| 15 | 99 | 66 | | | | | | 614 | 507 | 913 | 314 | 714 |
| 16 | 92 | | | | | | | 507 | 651 | 818 | 373 | 662 |
| 17 | 90 | | | | | | | 588 | 1,680 | 996 | 548 | 607 |
| 18 | 92 | | | (*) | | | | 1,080 | 3,100 | 1,240 | 529 | 551 |
| 19 | 96 | | | | | | | 1,060 | 2,410 | 786 | 496 | 512 |
| 20 | 99 | | | | | | | a1,300 | 2,320 | 690 | 442 | 507 |
| 21 | 103 | | | | | | | a2,000 | 1,640 | 669 | 410 | 481 |
| 22 | 105 | | | | 30 | | | a3,000 | 1,720 | 614 | 398 | 461 |
| 23 | 103 | | | | | | 37 | a4,000 | 1,730 | 557 | 381 | 420 |
| 24 | 99 | | 49 | 36 | | 24 | | a4,700 | 1,360 | 540 | 361 | 402 |
| 25 | 95 | | | | | | | a5,000 | 1,120 | 595 | 354 | 365 |
| 26 | 92 | | | | | | | a3,500 | 1,040 | 669 | 354 | 354 |
| 27 | 89 | | | | | | | a3,000 | 868 | 546 | 662 | 354 |
| 28 | 86 | | | | | | | a4,000 | 802 | 486 | 1,070 | 354 |
| 29 | 84 | | | | (*) | | | 3,640 | 1,040 | *438 | 1,200 | 377 |
| 30 | 81 | | | | ------- | | | 2,120 | 1,180 | 563 | 1,120 | 358 |
| 31 | 78 | ------- | | | ------- | | ------- | a1,200 | ------- | 676 | 913 | ------- |
| Total | 4,066 | 1,980 | 1,654 | 1,281 | 885 | 774 | 930 | 50,810 | 33,765 | 23,882 | 15,498 | 19,652 |
| Mean | 131 | 66.0 | 53.4 | 41.3 | 30.5 | 25.0 | 31.0 | 1,639 | 1,126 | 770 | 500 | 655 |
| Ac-ft | 8,060 | 3,930 | 3,280 | 2,540 | 1,760 | 1,540 | 1,840 | 100,800 | 66,970 | 47,370 | 30,740 | 38,980 |

Calendar year 1959: Max 2,680 Min - Mean 360 Ac-ft 261,000
Water year 1959-60: Max 5,000 Min - Mean 424 Ac-ft 307,800

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 3 discharge measurements, weather records, and records for Little Susitna River near Palmer.
Note.--Stage-discharge relation affected by ice Oct. 11 to May 5 (no gage-height record Nov. 10 to May 3, except occasional days; discharge estimated on basis of 5 discharge measurements and weather records).

## 2820. CARIBOU CREEK NEAR SUTTON--Continued

Periodic determinations of partical-size and discharge of suspended sediment, November 1959 to August 1960
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Discharge (tons per day) | Concentration of suspension analyzed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | | |
| | | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.500 | 1.000 | |
| Nov. 4, 1959 | -- | 466 | -- | 13 | 16 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dec. 2..... | -- | a58 | -- | 16 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| June 1, 1960. | 9:30 a.m. | 662 | 39 | 435 | 778 | 839 | 36 | 45 | 52 | 64 | 77 | 84 | 87 | 91 | 96 | 100 | SBWCM |
| June 7..... | 10:15 a.m. | 523 | 38 | 218 | 308 | -- | -- | -- | -- | -- | -- | 92 | 94 | 97 | 99 | 100 | S |
| July 1..... | 10:30 a.m. | 1,650 | 42 | 1,900 | 8,460 | 2,580 | 18 | 22 | 26 | 27 | 28 | 73 | 81 | 92 | 98 | 100 | SBWCM |
| Aug. 22..... | -- | 406 | -- | 88 | 96 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

a Daily mean discharge.

## 2840. Matanuska River at Palmer

Location.--Lat 61°36'35", long 149°04'15", in N½ sec.34, T.18 N., R.2 E., on left bank 100 ft downstream from bridge on Glenn Highway and 1 mile east of Palmer.

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

Records available.--Discharge: April 1949 to September 1960.
Chemical analyses: May 1949 to October 1950, April to June 1951, October 1951 to July 1953, October 1957 to September 1960.
Water temperatures: March to August 1952, April to September 1953, December 1958 to September 1960.
Sediment records: April 1953 to September 1954, April 1959 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 170.92 ft above mean sea level (Alaska Road Commission bench mark). Prior to Nov. 2, 1950, wire-weight gage at bridge 120 ft upstream at same datum. Nov. 2, 1950, to Apr. 30, 1952, wire-weight gage at bridge 100 ft upstream at same datum.

Average discharge.--11 years, 4,036 cfs (2,922,000 acre-ft per year).

Extremes.--Maximum discharge during year, 22,600 cfs May 26 (gage height, 10.05 ft); minimum daily, 408 cfs Apr. 11.
1949-60: Maximum discharge, 37,300 cfs Aug. 24, 1959 (gage height, 10.82 ft); maximum gage height observed, 12.03 ft July 11, 1949; minimum daily discharge, 234 cfs Apr. 25, 1956.
1959-60: Maximum water temperature, 54°F June 22, July 11. Maximum daily sediment concentration, 6,900 ppm May 26. Maximum daily sediment load, 348,000 tons May 26.
1958-60: Maximum water temperature, 56°F June 16, 25, 1959. Maximum daily sediment concentration, 16,100 ppm Aug. 25, 1959. Maximum sediment load, 1,300,000 tons Aug. 25, 1959.

Remarks.--Records fair except those for period of ice effect, which are poor. Large diurnal fluctuation caused by glacier melt at the source. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,710 | 1,290 | | | | | 552 | 1,760 | 8,980 | 13,500 | 9,920 | 6,510 |
| 2 | 2,720 | 1,150 | | | | | 580 | 1,980 | 8,270 | 12,000 | 8,870 | 6,450 |
| 3 | 2,550 | 1,100 | (*) | | | | 560 | 2,010 | 7,970 | 11,000 | 8,520 | 6,250 |
| 4 | 2,470 | 1,100 | | (*) | | | 530 | *2,310 | 7,940 | 10,400 | 8,440 | 6,200 |
| 5 | 2,390 | 1,000 | | | | | 510 | 2,080 | 8,070 | 10,200 | 8,410 | 6,570 |
| 6 | 2,310 | 1,000 | | | | | 489 | 2,260 | 7,840 | 9,050 | 8,980 | 6,170 |
| 7 | 2,180 | 1,100 | | | | | 488 | 2,600 | 8,000 | *8,690 | 10,000 | 5,740 |
| 8 | *1,960 | 1,000 | 700 | 700 | | 610 | 525 | 2,690 | 7,940 | 8,800 | 9,240 | 5,520 |
| 9 | 1,850 | 1,000 | | | | | 471 | 3,140 | 7,670 | 8,690 | 8,870 | 5,230 |
| 10 | 1,830 | 950 | | | | | 417 | 2,960 | 7,040 | 8,830 | 8,270 | 5,070 |
| 11 | 1,760 | 950 | | | | (*) | 408 | 2,580 | 6,710 | 9,610 | *8,520 | 5,250 |
| 12 | 1,850 | 980 | | | | | 417 | 2,300 | 5,770 | 10,800 | 9,270 | 6,980 |
| 13 | 1,860 | 980 | | | | | 525 | 2,100 | 5,390 | 11,800 | 9,650 | 7,320 |
| 14 | 1,750 | 1,000 | | | | | *590 | 2,310 | *5,160 | 11,800 | 9,880 | 7,350 |
| 15 | 1,680 | 1,000 | | | 580 | | 650 | 2,560 | 5,030 | 12,200 | 9,460 | 7,160 |
| 16 | 1,620 | 1,000 | | | | | 680 | 2,450 | 5,640 | 12,800 | 9,960 | 6,740 |
| 17 | 1,600 | 1,000 | | | | | 670 | 2,360 | 7,260 | 13,200 | 10,500 | 6,420 |
| 18 | 1,500 | 1,000 | | | | | 660 | 3,160 | 9,880 | 14,600 | *10,600 | 6,090 |
| 19 | 1,440 | 960 | | | (*) | | 680 | 3,210 | 9,920 | 12,300 | 10,100 | 5,640 |
| 20 | 1,500 | 920 | | | | | 700 | 3,410 | 10,600 | 11,800 | 9,720 | 5,180 |
| 21 | 1,580 | 890 | | | | | 670 | 3,480 | *11,000 | 13,800 | 9,460 | *4,870 |
| 22 | 1,470 | 880 | | | | 530 | 710 | 4,620 | 11,500 | 15,400 | 8,940 | 4,700 |
| 23 | 1,510 | 880 | 730 | 640 | | | 760 | 12,200 | 12,300 | 15,100 | 8,520 | 4,490 |
| 24 | 1,550 | 900 | | | | | 840 | 13,800 | 11,800 | 13,500 | 8,200 | 4,220 |
| 25 | 1,540 | 920 | | | | | 925 | 16,000 | 11,200 | 14,700 | 8,030 | 3,920 |
| 26 | 1,500 | 920 | | | | | 969 | *18,700 | 10,800 | 13,700 | 8,240 | 3,730 |
| 27 | 1,440 | 900 | | | | | 1,080 | 15,900 | 11,000 | 13,200 | 9,350 | 3,770 |
| 28 | 1,390 | 870 | | (*) | | | 1,210 | 13,500 | 10,900 | 11,800 | 9,050 | 4,000 |
| 29 | 1,420 | 840 | | | | 453 | 1,370 | 14,600 | 12,200 | 11,500 | 7,930 | 4,470 |
| 30 | *1,340 | 800 | (*) | | ------ | *471 | 1,430 | 13,000 | 12,800 | 11,500 | 7,640 | 4,100 |
| 31 | 1,310 | ------ | | | ------ | 498 | ------ | 10,600 | ------ | 10,800 | 7,070 | ------ |
| Total | 55,580 | 29,260 | 22,180 | 20,740 | 16,820 | 17,462 | 21,067 | 186,590 | 266,580 | 367,070 | 279,610 | 166,110 |
| Mean | 1,793 | 975 | 715 | 669 | 580 | 563 | 702 | 6,019 | 8,886 | 11,840 | 9,020 | 5,537 |
| Ac-ft | 110,200 | 58,040 | 43,990 | 41,140 | 33,360 | 34,640 | 41,790 | 370,100 | 528,800 | 728,100 | 554,600 | 329,500 |

Calendar year 1959: Max 30,000 Min - Mean 3,840 Ac-ft 2,780,000
Water year 1959-60: Max 18,700 Min 408 Mean 3,959 Ac-ft 2,874,000

Peak discharge (base, 16,500 cfs).--May 26 (4 a.m.) 22,600 cfs (10.05 ft).

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice about Nov. 6 to about Apr. 30 (no gage-height record during most of period; discharge estimated on basis of 7 discharge measurements, weather records, and records for other stations).

## 2840. MATANUSKA RIVER AT PALMER.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, Magnesium | Noncarbonate | | | |
| Oct. 1, 3, 5-9, 1959.. | 2,280 | 7.2 | 0.02 | 36 | 5.0 | 7.1 | 0.8 | 84 | 54 | 3.5 | 0.0 | 1.0 | 156 | 110 | 42 | 248 | 7.8 | 0 |
| Oct. 11, 12, 16 ..... | 1,740 | 7.2 | .02 | 38 | 5.7 | 7.2 | .7 | 88 | 56 | 3.5 | .0 | 1.1 | 162 | 118 | 46 | 260 | 7.6 | 0 |
| Oct. 20-22, 27, 28.... | 1,480 | 8.0 | .02 | 39 | 6.0 | 7.6 | .8 | 92 | 56 | 4.5 | .1 | 1.3 | 168 | 122 | 46 | 268 | 7.7 | 0 |
| Nov. 2, 5, 6, 9..... | 1,040 | 7.5 | .02 | 40 | 5.7 | 7.8 | .8 | 95 | 55 | 5.0 | .0 | 1.2 | 170 | 124 | 46 | 275 | 7.8 | 0 |
| Nov. 16..... | 1,000 | 7.4 | .02 | 41 | 5.7 | 8.0 | .8 | 98 | 54 | 6.0 | .1 | 1.2 | 172 | 126 | 45 | 280 | 8.2 | 0 |
| Nov. 30..... | 800 | 6.7 | .02 | 41 | 5.7 | 8.0 | .9 | 98 | 53 | 6.5 | .0 | 1.2 | 171 | 126 | 45 | 282 | 7.6 | 0 |
| Jan. 4, 1960 ..... | a820 | 6.6 | .02 | 40 | 5.5 | 7.6 | .8 | 96 | 54 | 8.0 | .0 | 1.5 | 171 | 122 | 44 | 275 | 7.7 | 0 |
| Jan. 15..... | b700 | 7.0 | .00 | 38 | 9.8 | 8.1 | .8 | 98 | 50 | 8.5 | .0 | 1.7 | 172 | 135 | 54 | 285 | 8.0 | 0 |
| May 22, 24-31..... | 13,400 | 7.0 | .25 | 23 | 4.5 | 5.8 | 1.4 | 68 | 27 | 3.5 | .0 | .8 | 106 | 76 | 20 | 168 | 7.8 | 40 |
| June 1, 2, 3, 5..... | 8,320 | 7.0 | .07 | 28 | 4.8 | 6.6 | .8 | 73 | 38 | 4.0 | .1 | .8 | 126 | 90 | 30 | 201 | 8.0 | 10 |
| June 6, 8, 9 ..... | 7,820 | 6.6 | .05 | 28 | 4.3 | 6.0 | .7 | 73 | 35 | 3.0 | .1 | .6 | 120 | 88 | 28 | 191 | 7.9 | 10 |
| June 13, 15, 21, 22... | 8,230 | 6.5 | .07 | 26 | 5.5 | 5.4 | .9 | 72 | 33 | 3.0 | .1 | .5 | 116 | 88 | 28 | 183 | 7.8 | 5 |
| June 23, 27-30 ..... | 11,840 | 5.5 | .07 | 24 | 5.5 | 4.0 | .8 | 72 | 28 | 2.5 | .1 | .4 | 106 | 82 | 24 | 162 | 7.7 | 5 |
| July 5-8 ..... | 9,180 | 6.0 | .03 | 26 | 2.8 | 3.4 | .6 | 68 | 28 | 2.0 | .0 | .4 | 102 | 76 | 21 | 171 | 7.8 | 0 |
| July 11-15, 18, 20 | 11,800 | 5.8 | .00 | 25 | 2.8 | 3.1 | .6 | 68 | 27 | 1.5 | .0 | .2 | 99 | 74 | 18 | 164 | 7.9 | 0 |
| July 22, 23, 26-31.... | 12,880 | 5.6 | .02 | 24 | 2.6 | 3.4 | .6 | 65 | 26 | 1.5 | .0 | .2 | 96 | 70 | 18 | 159 | 7.8 | 0 |
| Aug. 1-10..... | 8,950 | 5.5 | .07 | 24 | 3.1 | 3.7 | .6 | 64 | 27 | 1.5 | .0 | .2 | 98 | 72 | 20 | 161 | 7.9 | 0 |
| Aug. 11, 12, 14-19 ... | 9,790 | 4.7 | .00 | 26 | 2.4 | 3.1 | .6 | 66 | 26 | 2.0 | .0 | .2 | 97 | 75 | 21 | 159 | 7.6 | 0 |
| Aug. 22-26, 28-31.... | 8,180 | 5.3 | .00 | 28 | 3.3 | 4.7 | .6 | 66 | 33 | 2.5 | .1 | .4 | 110 | 84 | 30 | 181 | 7.6 | 0 |
| Sept. 1, 2, 4, 6-9 .... | 5,970 | 6.4 | .02 | 33 | 4.5 | 7.0 | .8 | 76 | 47 | 2.5 | .1 | .6 | 139 | 101 | 39 | 222 | 7.8 | 0 |
| Sept. 12-16, 19, 20... | 6,620 | 6.8 | .02 | 31 | 4.5 | 6.4 | .7 | 74 | 44 | 2.5 | .0 | .6 | 132 | 96 | 36 | 221 | 7.3 | 0 |
| Sept. 21-23, 26-30.... | 4,270 | 11 | .02 | 32 | 5.2 | 7.1 | .9 | 78 | 50 | 3.0 | .0 | .7 | 148 | 102 | 38 | 237 | 7.4 | 0 |

a Discharge at time of sampling.
b Mean discharge for period Jan. 1-15.

## 2840. MATANUSKA RIVER AT PALMER.--Continued

Temperature (°F) of water, water year October 1959 to September 1960

[Once-daily measurement between 8 a.m. and 6 p.m.]

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 42 | -- | | | | | | -- | 46 | -- | 44 | 42 |
| 2 | -- | 32 | | | | | | -- | 49 | -- | 43 | 42 |
| 3 | 42 | -- | | | | | | -- | 52 | -- | 46 | -- |
| 4 | -- | -- | | | | | | -- | -- | -- | 46 | 42 |
| 5 | 39 | 33 | | | | | | -- | 53 | 45 | 44 | -- |
| 6 | 38 | 33 | | | | | | 45 | 47 | 44 | 47 | 40 |
| 7 | 34 | -- | | | | | | -- | 53 | 44 | 49 | 40 |
| 8 | 34 | -- | | | | | | -- | 46 | 49 | 45 | 41 |
| 9 | 33 | 32 | | | | | | 39 | 49 | -- | 45 | 43 |
| 10 | -- | -- | | | | | | 42 | -- | -- | 46 | -- |
| 11 | 32 | -- | | | | | | 42 | -- | 54 | 46 | -- |
| 12 | 32 | -- | | | | | | 46 | -- | 53 | 46 | 43 |
| 13 | -- | -- | | | | | | -- | 48 | 53 | -- | 42 |
| 14 | -- | -- | | | | | | -- | -- | 48 | 44 | 42 |
| 15 | -- | -- | | 32 | | | | 44 | 51 | 48 | 44 | 40 |
| 16 | 32 | 33 | | | | | | -- | 52 | -- | 44 | 41 |
| 17 | -- | -- | | | | | | 48 | 51 | -- | 43 | -- |
| 18 | -- | -- | | | | | | 43 | 46 | 45 | 45 | -- |
| 19 | -- | -- | | | | | | 45 | 50 | -- | 48 | 40 |
| 20 | 32 | -- | | | | | | 48 | 48 | 46 | -- | 40 |
| 21 | -- | -- | | | | | | -- | 49 | -- | -- | 40 |
| 22 | 34 | -- | | | | | | 53 | 54 | 47 | 45 | 41 |
| 23 | -- | -- | | | | | | -- | 50 | -- | 45 | 39 |
| 24 | -- | -- | | | | | | 52 | -- | -- | 45 | -- |
| 25 | -- | -- | | | | | | 50 | -- | -- | 46 | -- |
| 26 | -- | -- | | | | | | 48 | 49 | 47 | 46 | 36 |
| 27 | 35 | -- | | | | | | 47 | 49 | 44 | -- | 40 |
| 28 | 37 | -- | | | | | | 46 | 49 | 44 | 46 | 39 |
| 29 | -- | -- | | | | | | 42 | 48 | 44 | 45 | 41 |
| 30 | -- | -- | | | | | | 46 | 45 | 47 | 49 | 39 |
| 31 | -- | -- | | | | | | -- | -- | 46 | 43 | -- |
| Average | -- | -- | | -- | | | | -- | -- | -- | 45 | -- |

## 2840. MATANUSKA RIVER AT PALMER.--Continued

Suspended sediment, May to September 1960

| Day | May | | | June | | | July | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | |
| | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day |
| 1..... | 1,760 | 1,410 | a6,700 | 8,980 | 1,230 | 29,800 | 13,500 | 2,200 | a80,200 |
| 2..... | 1,980 | 1,440 | 7,700 | 8,270 | 1,460 | 32,600 | 12,000 | 2,190 | a71,000 |
| 3..... | 2,010 | 1,740 | 9,440 | 7,970 | 1,860 | 40,000 | 11,000 | 2,150 | a63,800 |
| 4..... | 2,310 | 2,040 | 12,700 | 7,940 | 1,070 | 22,900 | 10,400 | 1,920 | a53,900 |
| 5..... | 2,060 | 1,190 | 6,620 | 8,070 | 819 | a17,800 | 10,200 | 1,640 | 45,200 |
| 6..... | 2,260 | 1,170 | 7,140 | 7,840 | 894 | 18,900 | 9,050 | 1,500 | 36,600 |
| 7..... | 2,600 | 1,770 | a12,400 | 8,000 | 1,030 | 22,200 | 8,690 | 1,350 | 31,700 |
| 8..... | 2,690 | 3,030 | a22,000 | 7,940 | 1,250 | 26,800 | 8,800 | 1,120 | 26,600 |
| 9..... | 3,140 | 4,170 | 35,400 | 7,670 | 1,210 | 25,000 | 8,690 | 1,080 | a25,300 |
| 10..... | 2,960 | 2,520 | 20,100 | 7,040 | 835 | 15,900 | 8,180 | 1,180 | a28,100 |
| 11..... | 2,560 | 1,580 | 10,900 | 6,710 | 855 | 15,500 | 9,610 | 1,420 | 36,800 |
| 12..... | 2,300 | 878 | 5,450 | 5,770 | 576 | 8,970 | 10,800 | 1,950 | 56,900 |
| 13..... | 2,100 | 615 | 3,490 | 5,390 | 490 | 7,130 | 11,800 | 2,430 | a77,400 |
| 14..... | 2,310 | 600 | a3,740 | 5,160 | 495 | a6,900 | 11,800 | 2,470 | 78,700 |
| 15..... | 2,560 | 585 | 4,040 | 5,030 | 540 | a7,330 | 12,200 | 2,250 | 74,100 |
| 16..... | 2,450 | 540 | a3,570 | 5,640 | 752 | 11,400 | 12,800 | 2,180 | a75,300 |
| 17..... | 2,360 | 458 | 2,920 | 7,260 | 2,290 | 44,900 | 13,200 | 3,360 | a120,000 |
| 18..... | 3,160 | 1,800 | 15,400 | 9,880 | 4,050 | 108,000 | 14,600 | 4,920 | 194,000 |
| 19..... | 3,210 | 1,860 | 16,100 | 9,920 | 3,290 | 88,100 | 12,300 | 2,860 | a95,000 |
| 20..... | 3,410 | 2,760 | 25,400 | 10,600 | 2,810 | a80,400 | 11,800 | 2,460 | 78,400 |
| 21..... | 3,480 | 2,340 | a22,000 | 11,000 | 2,450 | 72,800 | 13,800 | 3,040 | a113,000 |
| 22..... | 4,620 | 1,960 | 24,400 | 11,500 | 1,890 | 58,700 | 15,400 | 3,720 | 155,000 |
| 23..... | 12,200 | 4,100 | a135,000 | 12,300 | 1,890 | a62,800 | 15,100 | 2,790 | 114,000 |
| 24..... | 13,800 | 5,900 | 220,000 | 11,800 | 2,210 | a70,400 | 13,500 | 2,150 | 78,400 |
| 25..... | 16,000 | 6,100 | 264,000 | 11,200 | 2,120 | a64,100 | 14,700 | 1,950 | 77,400 |
| 26..... | 18,700 | 6,900 | 348,000 | 10,800 | 2,350 | 68,500 | 13,700 | 1,830 | 67,700 |
| 27..... | 15,900 | 5,240 | 225,000 | 11,000 | 2,010 | 59,700 | 13,200 | 1,960 | 69,800 |
| 28..... | 13,500 | 2,970 | 108,000 | 10,900 | 1,780 | 52,400 | 11,800 | 1,890 | 60,200 |
| 29..... | 14,600 | 5,040 | 199,000 | 12,200 | 2,140 | 70,500 | 11,500 | 1,940 | 60,200 |
| 30..... | 13,000 | 3,740 | 131,000 | 12,800 | 2,190 | 75,700 | 11,500 | 1,730 | 53,700 |
| 31..... | 10,600 | 1,920 | 55,000 | -- | -- | -- | 10,800 | 1,320 | 38,500 |
| Total. | 186,590 | -- | 1,962,610 | 266,580 | -- | 1,286,130 | 367,070 | -- | 2,236,900 |

| | August | | | September | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1..... | 9,920 | 1,320 | 35,400 | 6,510 | 605 | 10,600 | | | |
| 2..... | 8,870 | 1,040 | 24,900 | 6,450 | 620 | 10,800 | | | |
| 3..... | 8,520 | 1,020 | 23,500 | 6,250 | 595 | a10,000 | | | |
| 4..... | 8,440 | 1,180 | 26,900 | 6,200 | 415 | 6,950 | | | |
| 5..... | 8,410 | 1,010 | 22,900 | 6,570 | 500 | a8,870 | | | |
| 6..... | 8,980 | 1,640 | 39,800 | 6,170 | 575 | 9,580 | | | |
| 7..... | 10,000 | 1,880 | 50,800 | 5,740 | 435 | 6,740 | | | |
| 8..... | 9,240 | 1,930 | 48,100 | 5,520 | 355 | 5,290 | | | |
| 9..... | 8,870 | 1,650 | 39,500 | 5,230 | 158 | 2,230 | | | |
| 10..... | 8,270 | 1,380 | 30,800 | 5,070 | 335 | a4,580 | | | |
| 11..... | 8,520 | 1,830 | 42,100 | 5,250 | 810 | a11,500 | | | |
| 12..... | 9,270 | 2,340 | 58,600 | 6,980 | 1,440 | 27,100 | | | |
| 13..... | 9,650 | 2,340 | a61,000 | 7,320 | 1,640 | 32,400 | | | |
| 14..... | 9,880 | 2,080 | 55,500 | 7,350 | 1,350 | 26,800 | | | |
| 15..... | 9,460 | 1,800 | 46,000 | 7,160 | 1,580 | 30,500 | | | |
| 16..... | 9,960 | 1,690 | 45,400 | 6,740 | 1,170 | 21,300 | | | |
| 17..... | 10,500 | 1,910 | 54,100 | 6,420 | 845 | a14,600 | | | |
| 18..... | 10,600 | 1,640 | 46,900 | 6,090 | 658 | a10,800 | | | |
| 19..... | 10,100 | 1,160 | 31,600 | 5,640 | 578 | 8,800 | | | |
| 20..... | 9,720 | 960 | a25,200 | 5,180 | 500 | 6,990 | | | |
| 21..... | 9,460 | 1,030 | a26,300 | 4,870 | 400 | 5,260 | | | |
| 22..... | 8,940 | 1,060 | 25,600 | 4,700 | 345 | 4,380 | | | |
| 23..... | 8,520 | 985 | 22,600 | 4,490 | 315 | 3,820 | | | |
| 24..... | 8,200 | 935 | 20,700 | 4,220 | 250 | a2,850 | | | |
| 25..... | 8,030 | 990 | 21,500 | 3,920 | 170 | a1,800 | | | |
| 26..... | 8,240 | 995 | 22,100 | 3,730 | 135 | 1,360 | | | |
| 27..... | 9,350 | 1,030 | a26,000 | 3,770 | 140 | 1,420 | | | |
| 28..... | 9,050 | 1,080 | 26,400 | 4,000 | 175 | 1,890 | | | |
| 29..... | 7,930 | 940 | 20,100 | 4,470 | 290 | 3,500 | | | |
| 30..... | 7,640 | 830 | 17,100 | 4,100 | 170 | 1,880 | | | |
| 31..... | 7,070 | 710 | 13,600 | -- | -- | -- | | | |
| Total. | 279,610 | -- | 1,051,000 | 166,110 | -- | 294,590 | | | |

Total discharge for period May to September (cfs-days)..... 1,265,960
Total load for period May to September (tons)..... 6,831,230

a Computed from estimated concentration graph.

## 2840. MATANUSKA RIVER AT PALMER.--Continued

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Concentration of *suspension* analyzed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | | | |
| | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.350 | 0.500 | 1.000 | |
| October 9, 1959.. | 2:00 p.m. | 4,240 | 33 | 190 | 3,040 | 10 | 14 | 19 | 26 | 37 | 78 | 94 | 99 | | 100 | -- | SBWCM |
| May 17, 1960..... | 1:50 p.m. | 4,000 | 49 | 501 | -- | -- | -- | -- | -- | -- | 49 | 51 | 62 | | 97 | 100 | S |
| June 15..... | 2:00 p.m. | 8,310 | 51 | 594 | 2,550 | 26 | 38 | 52 | 65 | 73 | 80 | 83 | 92 | | 99 | 100 | SBWCM |
| July 13 ..... | 3:00 p.m. | 12,500 | 53 | 2,060 | 6,760 | 18 | 28 | 40 | 54 | 65 | 77 | 85 | 95 | | 99 | 100 | SPWCM |
| Sept. 23 ..... | 10:00 a.m. | 8,940 | -- | 354 | 1,770 | 30 | 44 | 56 | 65 | 67 | 76 | 79 | 90 | | 99 | 100 | SBWCM |

## 2900. Little Susitna River near Palmer

Location.--Lat 61°42'40", long 149°13'40", in NW¼ sec.26, T.19 N., R.1 E., on left bank 15 ft downstream from 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.

Records available.--Discharge: July 1948 to September 1960.
Chemical analyses: February to August 1952.

Gage.--Water-stage recorder. Datum of gage is 920.6 ft above mean sea level (river-profile survey). Prior to Aug. 16, 1948, staff gage at same site and datum.

Average discharge.--12 years, 201 cfs (145,500 acre-ft per year).

Extremes.--Maximum discharge during year, 1,600 cfs May 25 (gage height, 5.15 ft); minimum not determined.
1948-60: Maximum discharge, 5,160 cfs Aug. 24, 1959 (gage height, 7.39 ft); minimum not determined.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. Large diurnal fluctuation caused by glacier melt at source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | a190 | | | | | | 13 | a47 | 392 | *565 | a500 | 281 |
| 2 | a180 | | | | | | 13 | a80 | 388 | 460 | a450 | 373 |
| 3 | a170 | | (*) | | | | 13 | a85 | 388 | 412 | a400 | 347 |
| 4 | a170 | | | | | | 14 | *82 | 412 | 385 | a380 | 358 |
| 5 | a160 | | | | | | 15 | *86 | 455 | 344 | a360 | 369 |
| 6 | a150 | | | (*) | | | 16 | 98 | 470 | 347 | a580 | 334 |
| 7 | a140 | | | | | | 16 | 116 | 505 | 420 | a560 | 307 |
| 8 | a135 | 59 | 33 | 31 | 21 | 13 | 15 | 124 | 465 | 380 | a500 | 324 |
| 9 | *135 | | | | | | 15 | 148 | 428 | 354 | a440 | 293 |
| 10 | a130 | | | | | (*) | 15 | 128 | *400 | 351 | *396 | 284 |
| 11 | a130 | | | | | | 16 | 126 | 354 | 361 | 377 | 491 |
| 12 | a120 | | | | | | 16 | 118 | 303 | 361 | 361 | 728 |
| 13 | a110 | | | | | | 17 | 135 | 293 | 358 | 330 | 680 |
| 14 | 100 | | | | | | *17 | 161 | 310 | 337 | 300 | 602 |
| 15 | 97 | | | (*) | | | 17 | 157 | 330 | 344 | 284 | 515 |
| 16 | *95 | | | | | | 17 | 152 | 380 | 300 | 358 | 445 |
| 17 | 88 | | | | | | 17 | 170 | 428 | 313 | 344 | 388 |
| 18 | 86 | | | | | | 17 | 225 | 428 | 317 | *361 | 344 |
| 19 | 88 | | | | (*) | | 17 | 212 | 380 | 269 | 317 | *303 |
| 20 | 90 | | | | | | 18 | 248 | *380 | 278 | 290 | 278 |
| 21 | 90 | | | | | | 18 | 293 | 396 | 286 | 263 | 263 |
| 22 | 89 | | (*) | | | | 18 | 583 | 445 | 275 | 248 | 242 |
| 23 | 86 | 49 | | | 18 | | 18 | 1,020 | 455 | 303 | 245 | 225 |
| 24 | 84 | (*) | 29 | 28 | | 13 | 20 | 1,210 | 416 | 337 | 230 | 207 |
| 25 | 82 | | | | | | 22 | 1,310 | 380 | 388 | 210 | 189 |
| 26 | 79 | | | | | | 25 | 1,230 | 358 | 380 | 236 | 174 |
| 27 | 77 | | | | | | 33 | 986 | 327 | a420 | 545 | 202 |
| 28 | 75 | | | (*) | | | 34 | 777 | 330 | a420 | 412 | 386 |
| 29 | 74 | | | | | | 34 | 716 | 520 | a460 | 347 | *334 |
| 30 | *73 | | | | ------ | (*) | a37 | 565 | 428 | a480 | 310 | 269 |
| 31 | 72 | ------ | | | ------ | | ------ | 460 | ------ | a450 | 272 | ------ |
| Total | 3,445 | 1,620 | 959 | 913 | 567 | 403 | 573 | 11,829 | 11,944 | 11,385 | 11,206 | 10,535 |
| Mean | 111 | 54.0 | 30.9 | 29.5 | 19.6 | 13.0 | 19.1 | 382 | 398 | 367 | 361 | 351 |
| Ac-ft | 6,830 | 3,210 | 1,900 | 1,810 | 1,120 | 799 | 1,140 | 23,460 | 23,690 | 22,580 | 22,230 | 20,900 |

Calendar year 1959: Max 3,600 Min - Mean 232 Ac-ft 167,900
Water year 1959-60: Max 1,310 Min - Mean 179 Ac-ft 129,700

Peak discharge (base, 1,500 cfs).--May 25 (9 p.m.) 1,600 cfs (5.15 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 3 discharge measurements, weather records, and records for Ship Creek near Anchorage.
Note.--Stage-discharge relation affected by ice Oct. 14 to Apr. 27 (no gage-height record Nov. 15 to Apr. 13, except occasional days; discharge estimated on basis of 10 discharge measurements, weather records, and records for Ship Creek near Anchorage).

## 2910. Susitna River near Denali

Location.--Lat 63°04'40", long 147°31'20", on left bank 1.4 miles upstream from Butte Creek, 2.3 miles downstream from bridge on Denali Highway, 2.6 miles downstream from Windy Creek, and 7½ miles south of Denali.

Drainage area.--950 sq mi, approximately.

Records available.--Discharge: May 1957 to September 1960.
Chemical analyses: December 1957 to September 1958.
Sediment records: June 1958 to September 1960 (periodic, summer months only).

Gage.--Water-stage recorder. Altitude of gage is 2,450 ft (from topographic map).

Extremes.--Maximum discharge observed during year, 12,900 cfs July 29 (gage height, 4.43 ft); minimum not determined.
1957-60: Maximum gage height, 5.54 ft June 7, 1957, from floodmarks (discharge not determined); minimum discharge not determined.

Remarks.--Records poor. Large diurnal fluctuation caused by glacier melt at the source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,420 | | | | | | | | 4,560 | | | 4,000 |
| 2 | 2,260 | | | | | | | | 3,890 | | | 4,000 |
| 3 | 1,980 | | | | | | | | 3,720 | | | 3,800 |
| 4 | 1,730 | | | | | | | | 3,890 | | | 3,600 |
| 5 | | | | | | | | | *4,080 | (*) | | 3,400 |
| 6 | | | | | | | | 960 | | | | |
| 7 | | | | | | | | | 4,480 | | | 3,300 |
| 8 | | 790 | 580 | 490 | 340 | 290 | 260 | | 5,780 | | | 3,300 |
| 9 | | | | | | | | | 6,040 | 8,000 | 9,200 | 3,300 |
| 10 | | | | | | | | | 5,650 | | | *3,300 |
| 11 | | | | | | (*) | | | *5,010 | | | 3,500 |
| 12 | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | 2,200 | 4,800 | | | 6,700 |
| 16 | | | | | | | | | | | | |
| 17 | 1,500 | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | |
| 20 | | (*) | | | | | | *3,020 | | | | |
| 21 | | | | | | | | 2,720 | | | | |
| 22 | | | | | | | | 3,070 | | 9,600 | | |
| 23 | | 730 | 570 | 400 | 300 | 260 | 270 | 5,920 | | | *6,700 | |
| 24 | | | | | | | | 8,300 | | | | |
| 25 | | | | | | | (*) | 8,980 | | | | |
| 26 | | | | | | | | 9,840 | 6,200 | | | 4,200 |
| 27 | | | | | | | | 7,510 | | | | |
| 28 | | | | (*) | | | | 6,420 | | | | |
| 29 | | | | | | | | 6,200 | | *12,400 | | |
| 30 | | | | | | | | 6,750 | | 12,000 | | |
| 31 | | | | | | | | 5,680 | | 11,000 | | |
| Total | 48,890 | 22,800 | 17,820 | 13,750 | 9,300 | 8,510 | 7,950 | 103,820 | 157,100 | 280,200 | 245,200 | 144,500 |
| Mean | 1,577 | 760 | 575 | 444 | 321 | 275 | 265 | 3,349 | 5,237 | 9,039 | 7,910 | 4,817 |
| Ac-ft | 96,970 | 45,220 | 35,350 | 27,270 | 18,450 | 16,880 | 15,770 | 205,900 | 311,600 | 555,800 | 486,300 | 286,600 |

Calendar year 1959: Max 13,800 Min - Mean 2,733 Ac-ft 1,979,000
Water year 1959-60: Max 12,400 Min - Mean 2,896 Ac-ft 2,102,000

* Discharge measurement made on this day.
Note.--No gage-height record Oct. 5 to May 19, except occasional days (stage-discharge relation affected by ice during most of period), June 11 to Sept. 30, except occasional days; discharge estimated on basis of 6 discharge measurements, weather records, and records for other stations in the Susitna River basin.

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## 2910. SUSITNA RIVER NEAR DENALI--Continued

Periodic determinations of particle-size and discharge of suspended sediment, June to August 1960
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Discharge (tons per day) | Concentration of suspension analyzed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | |
| | | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.500 | |
| June 5, 1960 | 1:30 p.m. | 4,290 | 44 | 924 | 10,700 | 4,710 | 22 | 28 | 39 | 48 | 60 | 68 | 78 | 93 | 100 | SBWCM |
| July 5 | 2:00 p.m. | 8,560 | 43 | 1,270 | 29,400 | 5,630 | 17 | 22 | 29 | 37 | 47 | 66 | 79 | 91 | 97 | SPWCM |
| Aug. 23 | 11:30 a.m. | 6,260 | 41 | 1,070 | 18,000 | 4,460 | 17 | 20 | 25 | 34 | 44 | 62 | 75 | 94 | 100 | SBWCM |

## 2912. Maclaren River near Paxson

Location.--Lat 63°07'05", long 146°31'40", on left bank 1.5 miles downstream from Boulder Creek and 34 miles west of Paxson.

Drainage area.--280 sq mi, approximately.

Records available.--Discharge: June 1958 to September 1960.
Chemical analyses: June to September 1958.
Sediment records: June 1958 to September 1960 (periodic, summer months only).

Gage.--Water-stage recorder. Altitude of gage is 2,900 ft (from topographic map).

Extremes.--Maximum discharge during year, 8,920 cfs Sept. 13 (gage height, 7.14 ft); minimum not determined.
1958-60: Maximum discharge, that of Sept. 13, 1960; minimum not determined.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 844 | | | | | | | | 3,060 | 3,770 | 3,730 | 1,950 |
| 2 | 798 | | | | | | | | 2,660 | 3,100 | 3,640 | 2,040 |
| 3 | 642 | | | | | | | | 2,310 | 2,820 | 3,000 | 2,080 |
| 4 | 618 | | | | | | | | 2,070 | 2,650 | 2,800 | 1,980 |
| 5 | 562 | | | | | | | | 1,910 | 2,840 | 3,270 | 1,940 |
| 6 | 610 | | | | | | | | 1,880 | 2,800 | 4,010 | 1,950 |
| 7 | 555 | | | | | | | | 1,910 | 2,400 | 4,340 | 1,950 |
| 8 | 626 | 260 | | 160 | 120 | 100 | 88 | 250 | 1,940 | 2,380 | 3,650 | 1,990 |
| 9 | 555 | | | | | | | | *2,020 | 2,170 | 3,270 | 1,990 |
| 10 | 532 | | | | | | | (*) | 1,970 | 2,140 | 3,240 | 1,880 |
| 11 | 540 | | | | | | | | 1,940 | 2,260 | 3,420 | 1,970 |
| 12 | 525 | | | | | | | | 1,990 | 2,580 | 3,620 | 5,920 |
| 13 | 502 | | | | | | | | 1,980 | 2,960 | 3,690 | 7,350 |
| 14 | 467 | | | | | | | | 1,910 | 3,240 | 3,610 | *4,200 |
| 15 | 446 | | 190 | | | | | | 1,820 | 3,500 | 3,180 | 3,460 |
| 16 | 446 | | | | | | | | 1,880 | 2,970 | 3,180 | 3,150 |
| 17 | 439 | | | | | (*) | | | 1,880 | 2,860 | 3,120 | 2,800 |
| 18 | 412 | | | | | | | | 1,820 | 2,800 | 3,240 | 2,470 |
| 19 | 418 | (*) | | | | | | | 1,710 | 2,880 | 3,160 | 2,210 |
| 20 | 481 | | | | | | | 1,500 | 1,750 | 3,450 | 2,860 | 2,030 |
| 21 | 562 | | | | | | | | 1,900 | 3,890 | 2,660 | 1,890 |
| 22 | 642 | | | | 100 | | | | 2,080 | 3,780 | 2,510 | 2,080 |
| 23 | 676 | 240 | | | | 89 | 95 | | 2,190 | 3,460 | 2,400 | 2,150 |
| 24 | 701 | | | 140 | | | | 4,850 | 2,260 | 3,140 | 2,270 | 1,990 |
| 25 | 658 | | | | | | (*) | 6,250 | 2,170 | 4,040 | 2,140 | 1,760 |
| 26 | 586 | | | | | | | 6,500 | 2,470 | 4,550 | 2,040 | 1,620 |
| 27 | 548 | | | (*) | | | | 5,180 | 2,520 | 5,010 | 2,480 | 1,550 |
| 28 | 488 | | | | | | | 4,200 | 2,520 | 4,900 | 2,840 | 1,570 |
| 29 | 425 | | | | | | | 4,070 | 2,470 | *5,450 | 2,610 | 1,630 |
| 30 | 380 | | | | ------- | | | 3,970 | 2,720 | 5,160 | 2,380 | 1,630 |
| 31 | 342 | ------- | | | ------- | | ------- | 3,240 | ------- | 4,170 | 2,120 | ------- |
| Total | 17,026 | 7,500 | 5,890 | 4,640 | 3,200 | 2,924 | 2,745 | 54,010 | 63,710 | 104,120 | 94,480 | 73,180 |
| Mean | 549 | 250 | 190 | 150 | 110 | 94.3 | 91.5 | 1,742 | 2,124 | 3,359 | 3,048 | 2,439 |
| Ac-ft | 33,770 | 14,880 | 11,680 | 9,200 | 6,350 | 5,800 | 5,440 | 107,100 | 126,400 | 206,500 | 187,400 | 145,200 |

Calendar year 1959: Max 4,180 Min - Mean 875 Ac-ft 633,300
Water year 1959-60: Max 7,350 Min - Mean 1,184 Ac-ft 859,700

Peak discharge (base, 5,400 cfs).--May 26 (2 a.m.) 7,080 cfs (6.17 ft); July 30 (1 a.m.) 5,930 cfs (5.73 ft); Sept. 13 (8 a.m.) 8,920 cfs (7.14 ft).

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 28 to Nov. 9. No gage-height record Nov. 10 to May 23, except occasional days (stage-discharge relation affected by ice during most of period); discharge estimated on basis of 5 discharge measurements, weather records, and records for other stations.

## 2912. MACLAREN RIVER NEAR PAXSON--Continued

Periodic determinations of particle-size and discharge of suspended sediment, June to August 1960
(Methods of analysis: B, botiom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Discharge (tons per day) | Concentration of suspension analyzed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | | |
| | | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.500 | 1.000 | |
| June 5, 1960 | 7:40 a.m. | 1,940 | 38 | 190 | 995 | -- | -- | -- | -- | -- | -- | 60 | 67 | 85 | 98 | 100 | S |
| July 5..... | 11:45 a.m. | 2,510 | 48 | 767 | 5,200 | 3,210 | 20 | 29 | 37 | 46 | 58 | 72 | 80 | 92 | 99 | 100 | SPWCM |
| Aug. 22..... | 5:30 p.m. | 2,270 | 50 | 565 | 3,460 | 2,380 | 17 | 19 | 27 | 38 | 50 | 73 | 81 | 94 | 99 | 100 | SBWCM |

## 2920. Susitna River at Gold Creek

Location.--Lat 62°46'15", long 149°41'20", on right bank 0.2 mile upstream from Gold Creek, 0.3 mile upstream from Alaska Railroad bridge, 1 mile north of Gold Creek railroad station, and 1.7 miles downstream from Indian River.

Drainage area.--6,160 sq mi, approximately (includes that of Gold Creek).

Records available.--Discharge: August 1949 to September 1960.
Chemical analyses: May 1951 to October 1952, October to November 1953, June to September 1955, June 1956, January to September 1957.
Water temperatures: June to September 1957.
Sediment records: April to September 1952 and June to September 1957 (daily); May 1953 to August 1956 (periodic, summer months only).

Gage.--Water-stage recorder. Datum of gage is 676.50 ft above mean sea level. Prior to June 6, 1957, wire-weight gage at site 0.3 mile downstream at same datum.

Average discharge.--11 years, 9,841 cfs (7,125,000 acre-ft per year).

Extremes.--Maximum discharge recorded during year, 41,900 cfs Sept. 13 (gage height, 14.45 ft); maximum gage height, 18.23 ft, from floodmarks (ice jam); minimum discharge not determined.
1949-60: Maximum discharge, 62,300 cfs Aug. 25, 1959 (gage height, 15.42 ft); maximum gage height observed, 24.48 ft May 10, 1954 (ice jam), site then in use; minimum discharge not determined.
Flood in May 1919 reached a stage of 19.2 ft, result of ice jam, from information by Bureau of Reclamation.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Large diurnal fluctuation caused by glacier melt at source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11,900 | | | | | | | | 18,700 | 20,600 | 33,300 | a18,000 |
| 2 | 10,900 | | | | | | | | 16,100 | 30,400 | 30,500 | a18,000 |
| 3 | 10,400 | | | | | | | | 14,900 | 26,000 | 27,600 | a18,000 |
| 4 | 10,600 | | | | | | | | 14,400 | 21,700 | 24,700 | a18,000 |
| 5 | 10,400 | | | | | | | | 14,000 | 19,900 | 24,800 | a18,000 |
| 6 | 10,500 | | | | | | | | 13,400 | 20,300 | 25,800 | a18,000 |
| 7 | 10,300 | | | | | | | | 13,400 | 21,600 | 27,200 | *18,800 |
| 8 | 10,100 | 3,000 | | 2,000 | 1,500 | 1,300 | 1,100 | 7,600 | 14,800 | 21,200 | 29,300 | 19,400 |
| 9 | a9,400 | | | | | | | | 15,600 | 19,400 | 26,700 | 21,100 |
| 10 | a8,400 | | | | | | | | 15,300 | 17,500 | 22,700 | 21,400 |
| 11 | 7,200 | | | | | | | | 15,000 | 15,400 | 21,500 | 21,200 |
| 12 | 6,200 | | | | | | | | 15,000 | 15,000 | 21,600 | 30,300 |
| 13 | 5,400 | | | | | | | | 15,100 | 14,900 | 22,300 | 40,100 |
| 14 | *5,100 | | | | | | | | 15,100 | 15,600 | 22,600 | 35,600 |
| 15 | 4,700 | | 2,200 | | | | | | 14,700 | 19,200 | 22,900 | 32,900 |
| 16 | 4,400 | | | | | | | | 14,000 | 21,700 | 20,900 | 27,900 |
| 17 | 4,100 | | | | | | | | 14,400 | 19,900 | 22,600 | 24,500 |
| 18 | 3,900 | | | | | | | | 16,100 | 20,100 | 24,400 | 22,000 |
| 19 | 3,700 | | | | | | | | 15,400 | 20,600 | a24,000 | 19,400 |
| 20 | 3,700 | | | | | | | | 14,900 | 18,400 | a23,000 | 17,300 |
| 21 | 4,000 | | | | | | | 20,000 | 15,200 | 17,000 | a23,000 | 16,300 |
| 22 | 4,400 | | | | | | | | 15,500 | 19,400 | a22,000 | 16,200 |
| 23 | 4,900 | 2,700 | | | 1,400 | | 1,500 | | 16,400 | 23,300 | a21,000 | 17,500 |
| 24 | 5,200 | | | 1,700 | | 1,100 | | | 17,200 | 22,600 | a20,000 | 17,300 |
| 25 | 5,600 | | | | | | | | 17,200 | 23,800 | a19,000 | 15,800 |
| 26 | 5,500 | | | | | | (*) | a40,000 | 16,400 | 30,900 | a19,000 | 14,500 |
| 27 | 5,200 | | | | | | | 39,300 | 16,400 | 31,200 | a21,000 | 13,900 |
| 28 | *4,800 | | | | | | | 28,100 | 16,300 | *36,500 | a24,000 | 14,000 |
| 29 | 4,400 | | | | | | | 23,400 | 16,700 | 35,000 | a23,000 | 14,800 |
| 30 | 4,100 | | | (*) | ------- | | | *22,700 | 18,400 | 35,700 | a21,000 | 15,100 |
| 31 | 3,900 | ------- | | | ------- | | ------- | 21,700 | ------- | 37,500 | a20,000 | ------- |
| Total | 203,300 | 85,500 | 68,200 | 57,200 | 42,100 | 37,100 | 39,000 | 489,200 | 466,000 | 712,300 | 731,400 | 615,300 |
| Mean | 6,558 | 2,850 | 2,200 | 1,845 | 1,452 | 1,197 | 1,300 | 15,780 | 15,530 | 22,980 | 23,590 | 20,510 |
| Ac-ft | 403,200 | 169,600 | 135,300 | 113,500 | 83,500 | 73,590 | 77,360 | 970,300 | 924,300 | ‡1,413 | ‡1,451 | ‡1,220 |

Calendar year 1959: Max 59,700 Min - Mean 10,820 Ac-ft 7,836,000
Water year 1959-60: Max 40,100 Min - Mean 9,690 Ac-ft 7,035,000

Peak discharge (base, 35,000 cfs).--May 26 (time and discharge unknown); July 31 (2:30 a.m.) 41,000 cfs (14.34 ft); Sept. 13 (9 to 10 a.m.) 41,900 cfs (14.45 ft).

* Discharge measurement made on this day.
‡ Expressed in thousands.
a No gage-height record; discharge estimated on basis of 1 discharge measurement, weather records, and records for other stations.
Note.--Stage-discharge relation affected by ice Oct. 11 to about May 25 (no gage-height record Oct. 11-13, Dec. 23 to Jan. 29, Feb. 24 to Mar. 13, Apr. 16-22, May 5-25; discharge estimated on basis of 2 discharge measurements, weather records, and records for other stations).

## 2924. Chulitna River near Talkeetna

Location.--Lat 62°29', long 150°15', on right bank 1½ miles downstream from small tributary, 11 miles upstream from mouth, and 12 miles northwest of Talkeetna.

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

Records available.--February 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 500 ft (from topographic map).

Extremes.--Maximum discharge recorded during year, 38,000 cfs May 26 (gage height, 14.90 ft); minimum not determined.
1958-60: Maximum discharge, 38,800 cfs July 12, 1959 (gage height, 15.11 ft); minimum not determined.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Large diurnal fluctuation caused by glacier melt at source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | a7,800 | 3,100 | | | | | | 2,300 | 17,900 | 23,300 | | a8,700 |
| 2 | a7,400 | 2,900 | | | | | | 2,800 | 15,400 | 24,500 | | a8,400 |
| 3 | a7,000 | 2,700 | | | | | | 3,500 | a15,000 | 25,500 | | a8,000 |
| 4 | a7,000 | 2,600 | | | | | | 4,200 | a14,000 | 21,400 | | a7,800 |
| 5 | a6,900 | 2,500 | | | | | | 3,900 | a14,000 | a21,000 | | a7,600 |
| 6 | a6,800 | 2,500 | | | | | | 3,700 | a13,000 | a23,000 | | a7,400 |
| 7 | a6,600 | 2,500 | | | | | | 6,000 | a14,000 | a27,000 | | *7,400 |
| 8 | a6,400 | 2,400 | | 1,500 | 1,200 | 990 | 900 | 7,600 | a16,000 | 25,500 | a25,000 | 7,830 |
| 9 | a6,300 | 2,300 | | | | | | 8,500 | a17,000 | a21,000 | | 8,400 |
| 10 | a6,000 | 2,200 | | | | | | 7,900 | 17,100 | a19,000 | | 9,080 |
| 11 | a5,400 | 2,100 | | | | | | a7,500 | 17,000 | a18,000 | | 10,500 |
| 12 | a4,800 | 2,100 | | | | | | a7,200 | 17,000 | a17,000 | | 14,900 |
| 13 | a4,400 | 2,200 | | | | | | 7,090 | 15,800 | a17,000 | | a23,000 |
| 14 | a4,000 | 2,200 | | | | (*) | | 10,900 | 16,100 | a19,000 | | a21,000 |
| 15 | a3,700 | 2,200 | 1,700 | | | | | 11,800 | 15,600 | a22,000 | | a19,000 |
| 16 | a3,500 | *2,200 | | | (*) | | | 12,700 | *16,000 | a24,000 | | a17,000 |
| 17 | a3,300 | 2,300 | | | | | | 13,100 | 16,900 | a22,000 | | a16,000 |
| 18 | a3,200 | 2,200 | | | | | | 12,800 | 16,700 | a22,000 | | a15,000 |
| 19 | a3,100 | 2,200 | | | | | | 12,400 | 16,700 | a23,000 | | a14,000 |
| 20 | a3,000 | 2,200 | | | | | | 12,800 | 17,100 | a21,000 | | a13,000 |
| 21 | a3,100 | 2,100 | | | | | | 12,300 | 17,800 | a20,000 | | a13,000 |
| 22 | a3,300 | 2,100 | | | 1,000 | | | 12,900 | a18,000 | a23,000 | | a14,000 |
| 23 | a3,500 | 2,100 | | | | | (*) | 19,400 | a19,000 | a26,000 | | a15,000 |
| 24 | a3,700 | 2,100 | | 1,400 | | 880 | 1,100 | 27,600 | a21,000 | a23,000 | a14,000 | a14,000 |
| 25 | a4,000 | 2,200 | | | | | | 29,600 | a22,000 | a26,000 | | a13,000 |
| 26 | a4,100 | 2,200 | | | | | | 35,700 | a22,000 | 27,400 | | a12,000 |
| 27 | *4,010 | 2,100 | | | | | | 34,700 | 21,200 | *28,800 | | a11,000 |
| 28 | a3,800 | 2,100 | | | | | | 29,600 | 20,900 | 28,200 | | a12,000 |
| 29 | a3,600 | 2,000 | | | | | | 26,400 | 20,600 | 29,500 | | a13,000 |
| 30 | 3,400 | 1,900 | | | ------- | | | 23,400 | 21,000 | 33,400 | | 11,700 |
| 31 | 3,200 | ------- | | | ------- | | ------- | 20,400 | ------- | 31,700 | | ------- |
| Total | 146,410 | 68,500 | 52,700 | 44,900 | 32,000 | 28,930 | 30,000 | 430,690 | 521,800 | 733,200 | 599,000 | 372,710 |
| Mean | 4,723 | 2,283 | 1,700 | 1,448 | 1,103 | 933 | 1,000 | 13,890 | 17,390 | 23,650 | 19,320 | 12,420 |
| Ac-ft | 290,400 | 135,900 | 104,500 | 89,060 | 63,470 | 57,380 | 59,500 | 854,300 | ‡1,035 | ‡1,454 | ‡1,188 | 739,300 |

Calendar year 1959: Max 36,400 Min - Mean 8,491 Ac-ft 6,147,000
Water year 1959-60: Max 35,700 Min - Mean 8,363 Ac-ft 6,071,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
a No gage-height record; discharge estimated on basis of 2 discharge measurements, recorded range in stage, weather records, and records for other stations.
Note.--Stage-discharge relation affected by ice Oct. 30 to about May 10 (no gage-height record Dec. 22-24, Jan. 12-16, Apr. 4-13, May 4-6, 8-10; discharge estimated on basis of weather records and records for other stations).

## 2943. Skwentna River near Skwentna

Location.--Lat 61°52'25", long 151°21'25", 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.

Records available.--October 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 250 ft (from topographic map).

Extremes.--Maximum discharge recorded during year, 27,800 cfs Aug. 1 (gage height, 11.45 ft), from rating curve extended above 9,000 cfs by logarithmic plotting; minimum not determined.

Remarks.--Records poor. Large diurnal fluctuation caused by glacier melt at the source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | 22,700 | 8,200 |
| 2 | | | | | | | | | | | 25,100 | 8,000 |
| 3 | | | | | | | | | | | 20,100 | 7,800 |
| 4 | | | | | | | | | | | 18,800 | 7,600 |
| 5 | | | | | | | | | | | 20,400 | 7,400 |
| 6 | | | | | | | | | | 17,000 | 21,800 | 7,400 |
| 7 | | | | | | | | | | | 22,800 | 7,300 |
| 8 | 4,200 | 2,000 | | 1,200 | 980 | 900 | 780 | 4,600 | 13,000 | | 19,200 | 7,250 |
| 9 | | | | | | | | | | | 16,300 | 7,040 |
| 10 | | | | | | | | | | | 15,100 | 8,800 |
| 11 | | | | | | | | | | | 15,200 | 9,980 |
| 12 | | | | | | (*) | | | | | 15,600 | 12,000 |
| 13 | | | | | | | | | | | 15,100 | 15,000 |
| 14 | | | | | | | | | | | 14,700 | 14,000 |
| 15 | | | 1,400 | | | | | | | | 14,400 | 13,000 |
| 16 | | | | | | | | | 12,300 | 14,000 | 15,200 | 12,000 |
| 17 | | | | | | | | | | | 15,900 | 11,000 |
| 18 | | (*) | | | | | | | | | 15,100 | 10,000 |
| 19 | | | | | | | | | | | 14,000 | 9,200 |
| 20 | | | | | | | | | | | 14,000 | 8,400 |
| 21 | | | | | | | (*) | | | | 13,000 | 8,400 |
| 22 | 2,900 | | | | 940 | | 890 | | | | 12,000 | 9,100 |
| 23 | | 1,700 | | 1,000 | | 790 | | 16,000 | 14,000 | 15,200 | 11,000 | 9,900 |
| 24 | | | | | | | | | | 15,600 | 11,000 | 9,300 |
| 25 | | | | | | | | | | 18,100 | 11,000 | 8,600 |
| 26 | | | | (*) | | | | | | 18,700 | 11,000 | 7,800 |
| 27 | | | | | | | | | | 18,800 | 12,000 | 7,200 |
| 28 | | | | | | | | | | 19,000 | 12,000 | 7,600 |
| 29 | *3,200 | | | | | | | | | 22,200 | 10,000 | 8,300 |
| 30 | 2,900 | | | | ------- | | | | | 21,300 | 8,800 | *7,560 |
| 31 | 2,700 | ------- | | | ------- | | ------- | | ------- | 19,800 | 8,500 | ------- |
| Total | 109,500 | 55,500 | 43,400 | 34,000 | 27,860 | 26,140 | 25,050 | 325,000 | 403,300 | 506,700 | 471,800 | 275,130 |
| Mean | 3,532 | 1,850 | 1,400 | 1,097 | 961 | 843 | 835 | 10,480 | 13,440 | 16,350 | 15,220 | 9,171 |
| Ac-ft | 217,200 | 110,100 | 86,080 | 67,440 | 55,260 | 51,850 | 49,690 | 644,600 | 799,900 | ‡1,005 | 935,800 | 545,700 |

Calendar year 1959: Max - Min - Mean - Ac-ft -
Water year 1959-60: Max 25,100 Min - Mean 6,293 Ac-ft 4,569,000

* Discharge measurement made on this day.
‡ Expressed in thousands.

Note.--No gage-height record Oct. 1 to July 22, except occasional days (stage-discharge relation affected by ice during part of period), Aug. 19 to Sept. 7, Sept. 12-29; discharge estimated on basis of 6 discharge measurements, high-water mark, weather records, and records for other stations in the Susitna River basin and Matanuska River at Palmer.

## 2945. Chakachatna River near Tyonek

Location.--Lat 61°13', long 152°22', 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).

Records available.--June 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,150 ft (from topographic map).

Extremes.--Maximum discharge during year, 13,400 cfs July 27 (gage height, 21.22 ft); minimum not determined.
1959-60: Maximum discharge recorded, 17,400 cfs Aug. 28, 1959 (gage height, 22.53 ft); minimum not determined.

Remarks.--Records good except those for periods of no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3,300 | 1,270 | | | | | | | 6,100 | 8,330 | 12,500 | 7,050 |
| 2 | 3,300 | 1,260 | | | | | | | 6,050 | 8,620 | 12,400 | 6,900 |
| 3 | 3,200 | 1,260 | | | | | | | 5,940 | 8,740 | 12,100 | 6,760 |
| 4 | 3,200 | 1,240 | | | | | | | 5,860 | 8,770 | 11,800 | 6,560 |
| 5 | 3,000 | 1,220 | | | | | | | 5,830 | 8,730 | 11,500 | 6,270 |
| 6 | 2,900 | 1,200 | | | | | | | 5,880 | 8,630 | 11,300 | 5,900 |
| 7 | 2,700 | 1,180 | | | | | | | 5,990 | 8,590 | 11,300 | 5,600 |
| 8 | 2,600 | 1,160 | 730 | 530 | 400 | 330 | 260 | | 6,140 | 8,350 | 11,300 | 5,370 |
| 9 | 2,500 | 1,120 | | | | | | | 6,220 | 8,160 | 11,100 | 5,060 |
| 10 | 2,400 | 1,070 | | | | | | | 6,270 | 8,030 | 10,900 | 4,890 |
| 11 | 2,300 | 1,040 | | | | | | 420 | 6,260 | 8,030 | *10,900 | 4,780 |
| 12 | 2,200 | 1,020 | | | | | | | 6,200 | 8,200 | 11,000 | 4,700 |
| 13 | 2,100 | 998 | | | | | | | 6,090 | 8,530 | 11,100 | 4,670 |
| 14 | 2,000 | 952 | | | | (*) | | | 5,920 | 8,950 | 11,100 | 4,560 |
| 15 | 1,900 | 928 | | | | | | | 5,840 | 9,330 | *11,100 | 4,430 |
| 16 | 1,800 | 924 | | | | | | | 5,820 | 9,930 | 11,000 | 4,320 |
| 17 | 1,700 | 918 | | | | | | | 5,870 | 10,400 | 11,000 | 4,200 |
| 18 | 1,700 | 910 | | | | | | | 5,890 | 10,900 | 10,800 | 4,040 |
| 19 | 1,600 | 896 | | | | | | | 5,950 | 11,300 | 10,500 | 3,890 |
| 20 | 1,500 | 882 | | | | | | | 6,060 | 11,700 | 10,200 | 3,740 |
| 21 | 1,500 | 868 | | | | | | 1,100 | 6,170 | *12,200 | 9,900 | 3,660 |
| 22 | 1,400 | 851 | | | 360 | | | 1,300 | 6,310 | 12,700 | 9,530 | *3,560 |
| 23 | *1,400 | 840 | | | | | | *1,520 | 6,530 | 12,900 | 9,160 | 3,110 |
| 24 | 1,390 | 826 | 590 | 480 | | 320 | 240 | 1,940 | 6,740 | 13,000 | 8,840 | 2,640 |
| 25 | 1,360 | 802 | | | | | | 2,540 | 6,930 | 13,200 | 8,560 | 2,660 |
| 26 | 1,310 | 802 | | | | | | 3,270 | 7,250 | 13,300 | 8,360 | 2,710 |
| 27 | 1,300 | *823 | | | | | | 4,100 | 7,460 | 13,400 | 8,560 | 2,480 |
| 28 | 1,280 | 830 | | | | | | 4,800 | 7,600 | 13,300 | 8,360 | 2,180 |
| 29 | 1,280 | 837 | | | | | | 5,300 | 7,780 | 13,200 | 8,060 | 2,010 |
| 30 | 1,280 | 840 | | | ------- | | | 5,720 | 8,100 | 13,100 | 7,840 | 2,220 |
| 31 | 1,270 | ------- | | | ------- | | ------- | 5,980 | ------- | 12,700 | 7,380 | ------- |
| Total | 62,670 | 29,767 | 20,390 | 15,630 | 11,040 | 10,070 | 7,500 | 45,970 | 191,050 | 325,350 | 319,450 | 130,920 |
| Mean | 2,022 | 992 | 658 | 504 | 381 | 325 | 250 | 1,483 | 6,368 | 10,500 | 10,300 | 4,364 |
| Ac-ft | 124,300 | 59,040 | 40,440 | 31,000 | 21,900 | 19,970 | 14,880 | 91,180 | 378,900 | 645,300 | 633,600 | 259,700 |

Calendar year 1959: Max - Min - Mean - Ac-ft -
Water year 1959-60: Max 13,400 Min - Mean 3,196 Ac-ft 2,320,000

* Discharge measurement made on this day.
Note.--No gage-height record Oct. 1-22, Nov. 30 to May 22, except on occasional days (stage-discharge relation affected by ice during part of period); discharge estimated on basis of 3 discharge measurements, weather records, and records for other stations.

## 2960. Uganik River near Kodiak

Location.--Lat 57°41'05", long 153°25'10", on Kodiak Island, on right bank half a mile upstream from tidewater of East Arm Uganik Bay, 1 mile downstream from Mush Lake tributary, 4 miles downstream from Uganik Lake, and 40 miles west of Kodiak.

Drainage area.--123 sq mi.

Records available.--May 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 20 ft (from topographic map).

Average discharge.--9 years, 641 cfs (464,100 acre-ft per year).

Extremes.--Maximum discharge during year, 8,920 cfs Nov. 16 (gage height, 9.27 ft), from rating curve extended above 2,500 cfs by logarithmic plotting; minimum daily, 109 cfs Apr. 12, 13.
1951-60: Maximum discharge, 13,700 cfs Oct. 3, 1952 (gage height, 10.65 ft), from rating curve extended above 2,500 cfs by logarithmic plotting; minimum not determined.

Remarks.--Records good except those for the period Feb. 22 to Apr. 22, which are fair, those above 2,500 cfs and those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 974 | 754 | 996 | a250 | a210 | 193 | 140 | 1,190 | *1,470 | 2,260 | 1,590 | 496 |
| 2 | 690 | 594 | 840 | a270 | a210 | 182 | 137 | 1,110 | 1,390 | 1,950 | 1,840 | 930 |
| 3 | 536 | 520 | 690 | a290 | a220 | 170 | 135 | 1,060 | 1,210 | 2,290 | 1,400 | 860 |
| 4 | 445 | 488 | 577 | 325 | a250 | 160 | 130 | 1,030 | 1,140 | 2,380 | 1,470 | 672 |
| 5 | 374 | 431 | 536 | 628 | a290 | 160 | 128 | 1,040 | 1,250 | 2,110 | 1,320 | 528 |
| 6 | 325 | 398 | 488 | 488 | 325 | 147 | 126 | 1,040 | 1,370 | 1,750 | 1,360 | 445 |
| 7 | 296 | 374 | 431 | 374 | 340 | 147 | 124 | 952 | 1,440 | 1,530 | a1,200 | 520 |
| 8 | 266 | 315 | 386 | 325 | 320 | 142 | 119 | 952 | 2,540 | 1,640 | a1,100 | 792 |
| 9 | 251 | 275 | 335 | a290 | a300 | 142 | 117 | 963 | 3,720 | 1,540 | a930 | 717 |
| 10 | 254 | 266 | *292 | a260 | a250 | 144 | 113 | 996 | 2,630 | 1,640 | *963 | 2,110 |
| 11 | 300 | 302 | 275 | a240 | a220 | 147 | 111 | 974 | 2,240 | 1,840 | 910 | 1,460 |
| 12 | 325 | 1,060 | 258 | a230 | a200 | 154 | 109 | 1,040 | 2,500 | 1,860 | 830 | 1,020 |
| 13 | 320 | 910 | 244 | b220 | a190 | 160 | 109 | *952 | 2,540 | 1,970 | 1,350 | 840 |
| 14 | 292 | 849 | 222 | b220 | a180 | 168 | 111 | 952 | 2,080 | 1,980 | 1,300 | 681 |
| 15 | 271 | 5,950 | b210 | b220 | a180 | 168 | 113 | 1,350 | 1,840 | 1,570 | 963 | 2,470 |
| 16 | 247 | 8,010 | b220 | a260 | a190 | 168 | 119 | 1,240 | 1,900 | 1,290 | 860 | 3,120 |
| 17 | 233 | 3,940 | b230 | a320 | a200 | 160 | 126 | 1,050 | 1,690 | 1,370 | 773 | 1,680 |
| 18 | 219 | 2,170 | b260 | 444 | a230 | 154 | 130 | 941 | 1,660 | 1,640 | 663 | 1,140 |
| 19 | 206 | 1,500 | b290 | 1,660 | a260 | 150 | 130 | 870 | 1,630 | 1,660 | 594 | 860 |
| 20 | 200 | 1,140 | b320 | 1,290 | a270 | 144 | 128 | 890 | 1,720 | 1,400 | 636 | 735 |
| 21 | 464 | 930 | b340 | 811 | a230 | 137 | 133 | 1,050 | 2,290 | 1,200 | 672 | 782 |
| 22 | 2,700 | 1,280 | b290 | 602 | *206 | 135 | 160 | 2,720 | 2,170 | 1,140 | 735 | 754 |
| 23 | 2,250 | 1,390 | b250 | 459 | 165 | 135 | 262 | 3,180 | 1,920 | 1,260 | 754 | 654 |
| 24 | 1,240 | 1,080 | b230 | 380 | 154 | 135 | 362 | 2,380 | 1,720 | 1,950 | 654 | 552 |
| 25 | 900 | 900 | a220 | 330 | 222 | 137 | 350 | 2,060 | 2,890 | 1,860 | 594 | 480 |
| 26 | 2,520 | 811 | a210 | a300 | 258 | 137 | 315 | 2,170 | 3,020 | 1,660 | 802 | 417 |
| 27 | *1,980 | 1,110 | a210 | a280 | 251 | 137 | 287 | 2,210 | 2,080 | 1,400 | 860 | 374 |
| 28 | 3,420 | 1,060 | a210 | a260 | 229 | 137 | 279 | 1,920 | 2,290 | 1,440 | 708 | 356 |
| 29 | 2,950 | 1,280 | a210 | a240 | 206 | 140 | 292 | 1,780 | 3,180 | 1,400 | *552 | 335 |
| 30 | 1,540 | 1,240 | a220 | a230 | ------- | 142 | 679 | 1,680 | 2,990 | 1,120 | 452 | 320 |
| 31 | 1,010 | ------ | a230 | a220 | ------- | 142 | ------ | 1,540 | ------- | 952 | 398 | ------ |
| Total | 27,998 | 41,327 | 10,720 | 12,716 | 6,756 | 4,676 | 5,574 | 43,282 | 62,510 | 51,052 | 29,233 | 27,100 |
| Mean | 903 | 1,378 | 346 | 410 | 233 | 151 | 186 | 1,396 | 2,084 | 1,647 | 943 | 903 |
| Cfsm | 7.34 | 11.2 | 2.81 | 3.33 | 1.89 | 1.23 | 1.51 | 11.3 | 16.9 | 13.4 | 7.67 | 7.34 |
| In. | 8.47 | 12.50 | 3.24 | 3.84 | 2.04 | 1.41 | 1.69 | 13.09 | 18.90 | 15.44 | 8.84 | 8.19 |
| Ac-ft | 55,530 | 81,970 | 21,260 | 25,220 | 13,400 | 9,270 | 11,060 | 85,850 | 124,000 | 101,300 | 57,980 | 53,750 |

Calendar year 1959: Max 8,010 Min - Mean 713 Cfsm 5.80 In. 78.66 Ac-ft 515,900
Water year 1959-60: Max 8,010 Min 109 Mean 882 Cfsm 7.17 In. 97.65 Ac-ft 640,600

Peak discharge (base, 3,400 cfs).--Oct. 28 (5:30 p.m.) 4,810 cfs (8.07 ft); Nov. 16 (9 a.m.) 8,920 cfs (9.27 ft); May 23 (12:30 a.m.) 3,630 cfs (7.56 ft); June 9 (3:30 a.m.) 4,040 cfs (7.74 ft); June 25 (11 p.m.) 3,610 cfs (7.55 ft); June 29 (6:30 p.m.) 3,420 cfs (7.46 ft); Sept. 15 (8 p.m.) 4,810 cfs (7.94 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of weather records and recorded range in stage.
b Stage-discharge relation affected by ice.
Note.--Doubtful gage-height record Feb. 22 to Apr. 22; discharge estimated on basis of 1 discharge measurement, recorder record, and weather records.

## 2970. Dog Salmon Creek near Ayakulik

Location.--Lat 57°12'30", long 154°04'15", on left bank 200 ft downstream from outlet of Frazer Lake and 18 miles east of Ayakulik.

Drainage area.--72.9 sq mi.

Records available.--June to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 350 ft (from topographic map).

Extremes.--Maximum discharge during period, 478 cfs June 1 (gage height, 1.63 ft); minimum, 147 cfs probably July 21 or 22 (gage height, 0.76 ft).

Remarks.--Records fair except those for period of no gage-height record, which are poor.

Discharge, in cubic feet per second, June to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | *478 | 249 | 290 | 236 |
| 2 | | | | | | | | | 470 | 249 | 300 | 262 |
| 3 | | | | | | | | | 452 | 246 | 310 | 262 |
| 4 | | | | | | | | | 439 | 239 | 320 | 255 |
| 5 | | | | | | | | | 422 | 239 | 320 | 252 |
| 6 | | | | | | | | | 400 | 233 | 330 | 246 |
| 7 | | | | | | | | | 392 | 233 | 330 | 255 |
| 8 | | | | | | | | | 379 | 224 | 320 | 252 |
| 9 | | | | | | | | | 367 | 216 | 320 | 249 |
| 10 | | | †270 | | | | | | 363 | 210 | *308 | 252 |
| 11 | | | | | | | | | 350 | 199 | 300 | 259 |
| 12 | | | | | | | | †354 | 338 | 196 | 290 | 262 |
| 13 | | | | | | | | | 327 | 188 | 286 | 268 |
| 14 | | | | | | | | | 323 | 182 | 282 | 265 |
| 15 | | | | | | | | | 315 | 180 | 276 | 268 |
| 16 | | | | | | | | | 308 | 170 | 272 | 282 |
| 17 | | | | | | | | | 296 | 170 | 262 | 311 |
| 18 | | | | | | | | | 282 | 160 | 255 | 315 |
| 19 | | | | | | | | | 272 | 160 | 252 | 319 |
| 20 | | | | | | | | | 272 | 150 | 243 | 319 |
| 21 | | | | | | | | | 259 | 150 | 233 | 346 |
| 22 | | | | | | | | | 252 | 150 | 233 | 371 |
| 23 | | | | | | | | | 246 | 160 | 224 | 371 |
| 24 | | | | | | | | | 239 | 200 | 216 | 363 |
| 25 | | | | | | | | | 252 | 240 | 207 | 358 |
| 26 | | | | | | | | | 249 | 290 | 227 | 346 |
| 27 | | | | | | | | | 252 | 330 | 239 | 338 |
| 28 | | | | | | | | | 255 | 330 | 230 | 338 |
| 29 | | | | | | | | | 246 | 310 | *227 | 338 |
| 30 | | | | | ------ | | | | 239 | 300 | 227 | 358 |
| 31 | | ------ | | | ------ | | ------ | | ------ | 280 | 224 | ------ |
| Total | | | | | | | | | 9,734 | 6,830 | 8,353 | 8,916 |
| Mean | | | | | | | | | 324 | 220 | 269 | 297 |
| Cfsm | | | | | | | | | 4.44 | 3.02 | 3.69 | 4.07 |
| In. | | | | | | | | | 4.97 | 3.48 | 4.26 | 4.55 |
| Ac-ft | | | | | | | | | 19,310 | 13,550 | 16,570 | 17,680 |

| Calendar year | : Max | Min | Mean | Cfsm | In. | Ac-ft |
|---|---|---|---|---|---|---|
| Water year | : Max | Min | Mean | Cfsm | In. | Ac-ft |

* Discharge measurement made on this day.
† Result of discharge measurement.
Note.--No gage-height record July 15 to Aug. 9; discharge estimated on basis of 1 discharge measurement, weather records, and recorded range in stage.

## 3000. Newhalen River near Iliamna

Location.--Lat 59°52', long 154°52', on left bank 1 mile upstream from rapids, 1 mile downstream from old portage dock, 8 miles downstream from Fish Village, 8 miles downstream from outlet of Sixmile Lake, and 8 miles north of Iliamna.

Drainage area.--3,300 sq mi, approximately.

Records available.--July 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 210 ft (from topographic map).

Average discharge.--9 years, 8,938 cfs (6,471,000 acre-ft per year).

Extremes.--Maximum discharge during year, 22,900 cfs Aug. 9 (gage height, 6.59 ft); minimum not determined.
1951-60: Maximum discharge, 36,000 cfs Aug. 30, 1959 (gage height, 9.19 ft); minimum not determined.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 12,600 | 6,300 | | | | | | 1,400 | 14,000 | 16,300 | 21,800 | 19,400 |
| 2 | 12,600 | 6,200 | | | | | | 1,500 | *14,300 | 16,600 | 22,000 | 19,300 |
| 3 | 12,700 | 6,100 | | | | | | 1,600 | 14,300 | 16,800 | 21,900 | 19,500 |
| 4 | 12,600 | 6,100 | | | | | | 1,700 | 14,400 | 16,800 | 21,900 | 19,600 |
| 5 | 12,300 | 6,100 | | | | | | 1,800 | 14,400 | 16,800 | 22,100 | 19,300 |
| 6 | 12,000 | 6,000 | | | | | | 2,000 | 14,500 | 16,800 | 22,100 | 19,000 |
| 7 | 11,700 | 5,900 | | | | | | 2,100 | 14,500 | 16,900 | 22,200 | 18,700 |
| 8 | 11,300 | 5,800 | 3,900 | 3,100 | 2,400 | 1,900 | | 2,300 | 14,700 | 16,900 | 22,600 | 18,400 |
| 9 | 11,000 | 5,600 | | | | | | 2,500 | 15,000 | 17,100 | 22,800 | 17,900 |
| 10 | 10,800 | 5,500 | | | | | | 2,700 | 15,100 | 17,100 | 22,600 | 17,500 |
| 11 | 10,400 | 5,400 | | | | | | 3,000 | 15,200 | 17,100 | 22,300 | 17,100 |
| 12 | 10,100 | 5,300 | | | | | | 3,300 | 15,300 | 17,100 | 22,200 | 16,900 |
| 13 | 9,730 | 5,200 | | | | | | 3,700 | 15,300 | 17,200 | 22,500 | 16,700 |
| 14 | 9,330 | 5,200 | | | | (*) | | 4,100 | 15,100 | o7,600 | 22,500 | 16,600 |
| 15 | 8,940 | 5,100 | | | | | | 4,500 | 15,000 | 18,000 | 22,200 | 16,400 |
| 16 | 8,650 | 5,100 | | | | | 1,200 | 4,800 | 14,900 | 18,200 | 22,000 | 16,400 |
| 17 | 8,370 | 5,000 | | | | | | 5,100 | 15,000 | 18,500 | 21,900 | 16,400 |
| 18 | 8,100 | 4,900 | | | | | | 5,300 | 14,900 | 18,700 | 21,700 | 16,200 |
| 19 | 7,890 | 4,900 | | | | | | 5,500 | 14,600 | 19,000 | 21,500 | 16,100 |
| 20 | 7,670 | 4,800 | | | | | | 5,800 | 14,700 | 19,100 | 21,200 | 15,800 |
| 21 | 7,600 | 4,800 | | | | | | 6,000 | 14,800 | 19,300 | 20,900 | 15,800 |
| 22 | 7,440 | 4,600 | | | | | | 6,300 | 14,700 | 19,500 | 20,800 | 15,600 |
| 23 | 7,220 | 4,500 | | | 2,100 | | | 6,770 | 14,700 | 19,900 | 20,800 | 15,200 |
| 24 | 7,160 | 4,500 | 3,200 | 2,900 | | 1,800 | | 7,810 | 14,800 | 20,000 | 20,700 | 14,900 |
| 25 | 6,920 | 4,600 | | | | | | 8,580 | 14,900 | 20,200 | 20,500 | 14,600 |
| 26 | 7,040 | 4,700 | | | | | | 9,420 | 15,000 | 20,500 | 20,400 | 14,200 |
| 27 | *6,650 | 4,900 | | | | | | 10,500 | 15,400 | 20,800 | 20,700 | 13,900 |
| 28 | 6,370 | 4,900 | | | | | | 11,400 | 15,600 | *21,000 | 20,800 | 13,800 |
| 29 | 6,370 | 4,800 | | | | | | 12,100 | 15,800 | 21,100 | 20,800 | 13,700 |
| 30 | 6,400 | 4,800 | | | ------- | | | 12,800 | 16,000 | 21,400 | *20,500 | 13,800 |
| 31 | 6,400 | ------- | | | ------- | | ------- | 13,400 | ------- | 21,600 | 19,900 | ------- |
| Total | 284,350 | 157,600 | 109,700 | 92,900 | 65,400 | 57,300 | 36,000 | 169,780 | 446,900 | 573,900 | 688,800 | 498,700 |
| Mean | 9,173 | 5,253 | 3,539 | 2,997 | 2,255 | 1,848 | 1,200 | 5,477 | 14,900 | 18,510 | 21,570 | 16,620 |
| Ac-ft | 564,000 | 312,600 | 217,600 | 184,300 | 129,700 | 113,700 | 71,400 | 336,800 | 886,400 | ‡1,138 | ‡1,327 | 989,200 |

Calendar year 1959: Max 36,000 Min - Mean 8,352 Ac-ft 6,047,000
Water year 1959-60: Max 22,800 Min - Mean 8,638 Ac-ft 6,271,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
Note.--Stage-discharge relation affected by ice Nov. 1-26. No gage-height record Nov. 27 to May 22, except occasional days (stage-discharge relation affected by ice during most of period); discharge estimated on basis of 1 discharge measurement, weather records, and records for Nuyakuk River near Dillingham and Wood River at Aleknagik.

## 3020. Nuyakuk River near Dillingham

Location.--Lat 59°56', long 158°12', on left bank 1,000 ft downstream from outlet of Tikchik Lake, half a mile upstream from unnamed tributary, and 62 miles north of Dillingham.

Drainage area.--1,490 sq mi, approximately.

Records available.--May 1953 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 350 ft (from topographic map). Prior to Oct. 1, 1957, at datum 2.00 ft higher.

Average discharge.--7 years, 5,781 cfs (4,185,000 acre-ft per year)

Extremes.--Maximum discharge during year, 18,200 cfs June 16 (gage height, 7.17 ft); minimum not determined.
1953-60: Maximum discharge, 29,000 cfs June 25, 1958 (gage height, 9.65 ft); minimum not determined.

Remarks.--Records fair except those for period of ice effect, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10,500 | 6,360 | | | | | | 960 | 14,000 | 16,300 | 9,440 | 7,640 |
| 2 | 10,900 | 6,160 | | | | | | 1,000 | *14,400 | 16,100 | 9,740 | 7,830 |
| 3 | 11,200 | 6,060 | | | | | | 1,100 | 14,700 | 16,000 | 9,550 | 7,540 |
| 4 | 11,500 | 6,140 | | | | | | 1,200 | 15,100 | 15,700 | 9,700 | 7,320 |
| 5 | 11,800 | 5,980 | | | | | | 1,300 | 15,500 | 15,600 | 9,920 | 7,050 |
| 6 | 11,600 | 6,000 | | | | | | 1,500 | 15,900 | 15,500 | 10,200 | 6,780 |
| 7 | 11,500 | 5,770 | | | | | | 1,700 | 16,200 | 15,300 | 10,200 | 6,670 |
| 8 | 11,400 | 5,450 | 3,500 | 2,700 | 2,000 | 1,500 | 830 | 1,900 | 16,500 | 14,900 | 10,300 | 6,500 |
| 9 | 11,100 | 5,380 | | | | | | 2,200 | 17,100 | 14,600 | 10,300 | 6,300 |
| 10 | 10,900 | 5,350 | | | | | | 2,500 | 17,300 | 14,200 | 10,100 | 6,440 |
| 11 | 10,800 | 5,190 | | | | | | 2,900 | 17,500 | 13,900 | 9,880 | 6,580 |
| 12 | 10,500 | 5,260 | | | | | | 3,200 | 17,800 | 13,500 | 9,660 | 6,700 |
| 13 | 10,100 | 5,230 | | | | | | 3,500 | 17,900 | 13,200 | 9,770 | 6,750 |
| 14 | 9,740 | 5,230 | | | | | | 4,000 | 17,800 | 12,800 | 10,100 | 6,640 |
| 15 | 9,590 | 5,190 | | | | (*) | | 4,500 | 17,800 | 12,600 | 10,300 | 6,470 |
| 16 | 9,180 | 5,000 | | | | | | 4,700 | 18,000 | 12,500 | 10,300 | 6,840 |
| 17 | 8,820 | 4,900 | | | | | | 4,800 | 17,900 | 12,100 | 10,300 | 7,050 |
| 18 | 8,540 | 4,800 | | | | | | 4,980 | 17,700 | 11,700 | 10,200 | 7,080 |
| 19 | 8,230 | 4,700 | | | | | | 5,030 | 17,300 | 11,500 | 10,000 | 7,080 |
| 20 | 8,000 | 4,600 | | | | | (*) | 5,280 | 17,100 | 11,300 | 9,770 | 7,080 |
| 21 | 7,770 | 4,400 | | | | | | 5,540 | 16,800 | 10,900 | 9,660 | 7,320 |
| 22 | 7,450 | 4,300 | | | | | | 6,000 | 16,500 | 10,600 | 9,550 | 7,480 |
| 23 | 7,170 | 4,200 | | | 1,700 | | | 6,580 | 16,200 | 10,500 | 9,440 | 7,480 |
| 24 | 6,990 | 4,200 | 2,900 | 2,400 | | 1,400 | 770 | 6,990 | 15,700 | 10,500 | 9,220 | 7,480 |
| 25 | 6,780 | 4,300 | | | | | | 7,640 | 16,300 | 10,400 | 9,000 | 7,390 |
| 26 | *6,580 | 4,400 | | | | | | 8,400 | 17,000 | 10,200 | 8,860 | 7,230 |
| 27 | 6,300 | 4,500 | | | | | | 9,590 | 17,000 | 10,100 | 8,780 | 7,260 |
| 28 | 6,220 | 4,600 | | | | | | 10,800 | 17,100 | 10,000 | 8,540 | 7,420 |
| 29 | 6,470 | 4,600 | | | | | | 11,800 | 16,900 | 9,850 | 8,300 | 7,320 |
| 30 | 6,580 | 4,500 | | | ------- | | | 12,600 | 16,600 | 9,660 | 8,060 | 7,320 |
| 31 | 6,500 | ------- | | | ------- | | ------- | 13,400 | ------- | 9,440 | *7,800 | ------- |
| Total | 280,510 | 152,750 | 98,900 | 78,900 | 53,800 | 44,900 | 24,000 | 157,590 | 499,600 | 391,450 | 296,940 | 212,040 |
| Mean | 9,049 | 5,092 | 3,190 | 2,545 | 1,855 | 1,448 | 800 | 5,084 | 16,650 | 12,630 | 9,579 | 7,068 |
| Ac-ft | 556,400 | 303,000 | 196,200 | 156,500 | 106,700 | 89,060 | 47,600 | 312,600 | 990,900 | 776,400 | 589,000 | 420,600 |

Calendar year 1959: Max 16,500 Min - Mean 5,279 Ac-ft 3,822,000
Water year 1959-60: Max 18,000 Min - Mean 6,261 Ac-ft 4,545,000

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Nov. 16 to about May 17 (no gage-height record Dec. 5 to May 17; discharge estimated on basis of 2 discharge measurements, weather records and records for Wood River at Aleknagik).

## 3028. Grant Lake Outlet near Aleknagik

Location.--Lat 59°48', long 158°34', on right bank 100 ft downstream from outlet of Grant Lake, 6 miles upstream from Lake Kulik, and 36 miles north of Aleknagik.

Drainage area.--47 sq mi, approximately.

Records available.--July 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 150 ft (from topographic map).

Extremes.--1959: Maximum discharge during period July to September, 246 cfs at 12 p.m. Sept. 30, stage rising, peak occurred Oct. 1, 1959; minimum, 30 cfs Sept. 14, 15 (gage height, 1.49 ft).
1959-60: Maximum discharge recorded during water year, 500 cfs May 27 (gage height, 3.03 ft); minimum not determined.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, 1959

| Day | July | Aug. | Sept. | Day | July | Aug. | Sept. | Day | July | Aug. | Sept. | Day | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 92 | 50 | 9 | - | 62 | 35 | 17 | - | *48 | 36 | 25 | - | 51 | *58 |
| 2 | - | 87 | 48 | 10 | - | 59 | 34 | 18 | - | 47 | 46 | 26 | - | 52 | 59 |
| 3 | - | 83 | 46 | 11 | - | 58 | 33 | 19 | - | 46 | 54 | 27 | - | 54 | 62 |
| 4 | - | 79 | 44 | 12 | - | 54 | 31 | 20 | - | 48 | 52 | 28 | *101 | 54 | 83 |
| 5 | - | 76 | 41 | 13 | - | 52 | 31 | 21 | - | 48 | 51 | 29 | 101 | 54 | 158 |
| 6 | - | 70 | 40 | 14 | - | 51 | 30 | 22 | - | 47 | 52 | 30 | 96 | 53 | 220 |
| 7 | - | 67 | 38 | 15 | - | 50 | 30 | 23 | - | 47 | 54 | 31 | 92 | 52 | - |
| 8 | - | 64 | 37 | 16 | †45.8 | 49 | 31 | 24 | - | 48 | 57 | | | | |
| Total | | | | | | | | | | | | | - | 1,804 | 1,641 |
| Mean | | | | | | | | | | | | | - | 58.2 | 54.7 |
| Runoff in acre-feet | | | | | | | | | | | | | - | 3,580 | 3,250 |

* Discharge measurement made on this day.
† Result of discharge measurement.
Note.--No gage-height record Aug. 26 to Sept. 24; discharge estimated on basis of 1 d'scharge measurement, recorded range in stage, and weather records. Observation of no flow made on Jan. 26, Mar. 3, 1959.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 258 | 54 | | | | | | 42 | 342 | | 108 | 108 |
| 2 | 262 | 52 | | | | | | 48 | | | 121 | 103 |
| 3 | 246 | 52 | | | | | | 56 | | | 128 | 98 |
| 4 | 226 | 54 | | | | | | 68 | | | 164 | 92 |
| 5 | 202 | 52 | | | | | | 84 | | | 188 | 85 |
| 6 | 175 | | | | | | | 110 | | | 216 | 81 |
| 7 | 152 | | | | | | | 150 | | | 230 | 81 |
| 8 | 134 | | 24 | 14 | 10 | | 8 | 200 | 240 | 200 | 230 | 79 |
| 9 | 121 | | | | | | | 210 | | | 223 | 79 |
| 10 | 103 | 42 | | | | | | 200 | | | 209 | 90 |
| 11 | 96 | | | | | | | 198 | | | 192 | 96 |
| 12 | 81 | | | | | | | 188 | | | 185 | 98 |
| 13 | 74 | | | | | | | 175 | | | 206 | 101 |
| 14 | 69 | | | | | | | 185 | | | 242 | 98 |
| 15 | 64 | | | | | (*) 8 | | 155 | | | 270 | 98 |
| 16 | 59 | | | | | | | 149 | | | 290 | 98 |
| 17 | 55 | | | | | | | 137 | | | 290 | 98 |
| 18 | 52 | | | | | | | 143 | | | 282 | 96 |
| 19 | 49 | | | | | | | 168 | | | 262 | 94 |
| 20 | 48 | | | | | | (*) | 195 | | | 242 | 94 |
| 21 | 47 | | | | | | | 230 | | | 230 | 108 |
| 22 | 41 | | | | | | | 318 | | 110 | 223 | 123 |
| 23 | 39 | 37 | 16 | 11 | 9 | | 26 | 408 | 230 | | 202 | 128 |
| 24 | 38 | | | | | | | 413 | | | 188 | 131 |
| 25 | 36 | | | | | | | 390 | | | 178 | 131 |
| 26 | 36 | | | | | | | 426 | | | 168 | 126 |
| 27 | 37 | | | | | | | 490 | | | 155 | 128 |
| 28 | 44 | | | | | | | 495 | | | 140 | 134 |
| 29 | 50 | | | | | | | 476 | | *101 | 128 | 131 |
| 30 | 54 | | | | ------- | | | 449 | | 98 | 121 | 128 |
| 31 | 57 | ------- | | | ------- | | ------- | 400 | ------- | 98 | *113 | ------- |
| Total | 3,005 | 1,239 | 616 | 386 | 276 | 248 | 510 | 7,356 | 7,152 | 4,727 | 6,124 | 3,135 |
| Mean | 96.9 | 41.3 | 19.9 | 12.5 | 9.5 | 8 | 17.0 | 237 | 238 | 152 | 198 | 104 |
| Ac-ft | 5,960 | 2,460 | 1,220 | 766 | 547 | 492 | 1,010 | 14,590 | 14,190 | 9,380 | 12,150 | 6,220 |

Calendar year 1959: Max - Min - Mean - Ac-ft -
Water year 1959-60: Max 495 Min - Mean 95.0 Ac-ft 68,980

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Nov. 16-18. No gage-height record Nov. 6-15, Nov. 19 to May 10, except occasional reading (stage-discharge relation affected by ice during most of period), June 2 to July 28; discharge estimated on basis of 3 discharge measurements, weather records, and records for other stations.

## 3030. Wood River at Aleknagik

Location.--Lat 59°17', long 158°35', on left bank at outlet of Lake Aleknagik, 1 mile east of Aleknagik and 5 miles upstream from Arcana Creek.

Drainage area.--1,110 sq mi, approximately.

Records available.--September 1957 to September 1960.

Gage.--Staff gage read once daily. Altitude of gage is 20 ft (by barometer).

Extremes.--Maximum discharge during year, 11,200 cfs June 16 (gage height, 10.19 ft); minimum not determined.
1957-60: Maximum discharge, 16,000 cfs June 25, 1958 (gage height, 12.62 ft); minimum not determined.

Remarks.--Records fair except those for period of ice effect, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8,190 | | | | | | | 1,100 | 10,400 | 9,450 | 6,390 | 6,440 |
| 2 | 8,370 | | | | | | | 1,260 | 10,400 | 9,370 | 6,550 | 6,550 |
| 3 | 8,250 | | | | | | | 1,420 | *10,600 | 9,210 | 6,550 | 6,370 |
| 4 | 8,230 | | | | | | | 1,590 | 10,400 | 9,250 | 6,590 | 6,240 |
| 5 | 8,210 | | | | | | | 1,760 | 10,600 | 9,050 | 7,090 | 6,080 |
| 6 | 8,190 | | | | | | | 1,960 | 10,500 | 9,050 | 7,790 | 5,850 |
| 7 | 8,190 | | | | | | | 2,210 | 10,500 | 8,930 | 8,090 | 6,100 |
| 8 | 8,170 | 4,300 | 2,900 | 2,100 | 1,600 | 1,300 | 770 | 2,500 | 10,600 | 8,850 | 7,970 | 6,140 |
| 9 | 8,170 | | | | | | | 2,790 | 10,600 | 8,750 | 7,930 | 5,850 |
| 10 | 8,150 | | | | | | | 3,020 | 10,700 | 8,650 | 8,050 | 5,850 |
| 11 | 8,150 | | | | | | | 3,390 | 10,800 | 8,610 | 7,950 | 5,900 |
| 12 | 7,970 | | | | | | | 3,700 | 11,000 | 8,530 | 7,950 | 5,990 |
| 13 | 7,670 | | | | | | | 4,110 | 11,000 | 8,350 | 8,050 | 6,050 |
| 14 | 7,550 | | | | | (*) | | 4,500 | 11,100 | 8,130 | 8,170 | 6,050 |
| 15 | 7,390 | | | | | | | 5,080 | 11,200 | 7,890 | 8,270 | 5,930 |
| 16 | 7,430 | | | | | | | 5,660 | 11,000 | 7,630 | 8,250 | 5,930 |
| 17 | 7,040 | | | | | | | 6,120 | 10,400 | 7,330 | 8,170 | 5,910 |
| 18 | 6,820 | | | | | | | 6,660 | 10,200 | 7,170 | 8,130 | 5,960 |
| 19 | 6,800 | | | | | | | 6,910 | 10,100 | 7,250 | 8,090 | 5,770 |
| 20 | 6,350 | | | | | | (*) | 7,210 | 9,880 | 7,050 | 7,830 | 5,670 |
| 21 | 5,870 | | | | | | | 7,450 | 9,660 | 6,840 | 7,390 | 5,750 |
| 22 | 5,800 | | | | | | | 8,410 | 9,450 | 6,730 | 7,590 | 5,750 |
| 23 | 5,770 | 3,500 | 2,300 | 2,000 | 1,400 | 1,200 | 800 | 8,470 | 9,170 | 6,730 | 7,630 | 5,720 |
| 24 | 5,670 | | | (*) | | | | 8,650 | 9,090 | 6,730 | 7,350 | 5,690 |
| 25 | 5,510 | | | | | | | 8,810 | 9,450 | 6,550 | 7,290 | 5,910 |
| 26 | *5,320 | | | | | | | 9,090 | 9,830 | 6,550 | 7,430 | 5,830 |
| 27 | 5,150 | | | | | | | 9,490 | 9,660 | 6,510 | 7,570 | 5,750 |
| 28 | 5,100 | | | | | | | 9,700 | 9,490 | *6,510 | 7,130 | 5,870 |
| 29 | 5,210 | | | | | | | 9,920 | 9,620 | 6,370 | 6,800 | 5,950 |
| 30 | 5,290 | | | | ------ | | | 10,200 | 9,700 | 6,550 | *6,460 | 6,120 |
| 31 | 5,150 | ------ | | | ------ | | ------ | 10,300 | ------ | 6,230 | 6,440 | ------ |
| Total | 214,930 | 117,000 | 80,300 | 63,500 | 43,600 | 38,700 | 23,550 | 173,440 | 307,100 | 240,960 | 232,740 | 178,970 |
| Mean | 6,933 | 3,900 | 2,590 | 2,048 | 1,503 | 1,248 | 785 | 5,595 | 10,240 | 7,773 | 7,508 | 5,966 |
| Cfsm | 6.25 | 3.51 | 2.33 | 1.85 | 1.35 | 1.12 | 0.707 | 5.04 | 9.23 | 7.00 | 6.76 | 5.37 |
| In. | 7.20 | 3.92 | 2.69 | 2.13 | 1.46 | 1.30 | 0.79 | 5.81 | 10.29 | 8.07 | 7.80 | 6.00 |
| Ac-ft | 426,300 | 232,100 | 159,300 | 126,000 | 86,480 | 76,760 | 46,710 | 344,000 | 609,100 | 477,900 | 461,600 | 355,000 |

Calendar year 1959: Max 9,560 Min - Mean 4,055 Cfsm 3.65 In. 49.60 Ac-ft 2,936,000
Water year 1959-60: Max 11,200 Min - Mean 4,685 Cfsm 4.22 In. 57.46 Ac-ft 3,401,000

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 27 to May 14.

## 3040. Kuskokwim River at Crooked Creek

Location.--Lat 61°52', long 158°07', on right bank at Parent's Trading Post, 0.2 mile upstream from Crooked Creek and 0.7 mile upstream from village of Crooked Creek.

Drainage area.--31,100 sq mi, approximately.

Records available.--Discharge: June 1951 to September 1960.
Chemical analyses: May 1957 to September 1960.
Water temperatures: May 1957 to September 1960 (seasonal).

Gage.--Staff gage read twice daily. Altitude of gage is 200 ft (from topographic map).

Average discharge --9 years, 41,820 cfs (30,280,000 acre-ft per year).

Extremes.--Maximum discharge observed during year, 151,000 cfs May 27 (gage height, 12.32 ft); maximum gage height, 22.94 ft May 10 (ice jam), from floodmarks; minimum discharge not determined.
1951-60: Maximum discharge not determined; maximum daily, 260,000 cfs May 7, 1957; maximum gage height, 25.4 ft May 1, 1953 (ice jam), from floodmarks; minimum discharge not determined.
1959-60: Maximum water temperature, 68°F July 22.
1957-60: Maximum water temperature, 68°F June 21, 1959, July 22, 1960.

Remarks.--Records fair except those for periods of no gage-height record, which are poor. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 50,000 | | | | | | | 17,000 | 141,000 | 53,200 | 81,200 | 78,800 |
| 2 | *53,400 | | | | | | | 18,000 | 141,000 | 56,900 | 80,700 | 78,400 |
| 3 | 55,900 | | | | | | | 20,000 | *135,000 | 58,600 | 80,600 | 88,400 |
| 4 | 56,300 | | (*) | | | | | 21,000 | 128,000 | 60,300 | 80,200 | 98,300 |
| 5 | 56,400 | | | | | | | 23,000 | 118,000 | 64,600 | 81,200 | 104,000 |
| 6 | 55,900 | | | | | | | 26,000 | 104,000 | 69,700 | 83,200 | 102,000 |
| 7 | 54,100 | | | | | | | 30,000 | 89,500 | 82,500 | 90,500 | 96,100 |
| 8 | 51,800 | | 16,000 | 14,000 | 11,000 | 7,800 | 7,500 | 45,000 | 80,300 | 92,300 | 96,500 | 91,200 |
| 9 | 49,000 | | | | | | | 84,000 | 73,600 | 98,300 | 104,000 | 84,200 |
| 10 | 46,000 | | | | | | | 120,000 | 70,400 | 101,000 | 107,000 | 79,400 |
| 11 | 43,000 | | | | | | | 130,000 | 68,100 | 98,900 | 103,000 | 77,200 |
| 12 | 40,000 | | | | | | | 140,000 | 66,300 | 93,500 | 101,000 | 75,100 |
| 13 | 38,000 | | | | | | | 140,000 | 64,700 | 88,500 | 96,600 | 75,800 |
| 14 | 36,000 | | | | | | | 140,000 | 64,300 | 83,700 | 87,000 | 78,200 |
| 15 | 33,000 | 17,000 | | | | (*) | | 140,000 | 62,000 | 78,800 | 82,900 | 79,600 |
| 16 | 31,000 | | | | | | | 140,000 | 61,100 | 75,500 | 80,700 | 80,000 |
| 17 | 30,000 | | | | | | | 130,000 | 58,900 | 73,400 | 83,300 | 76,000 |
| 18 | 28,000 | | | | | | | 130,000 | 56,900 | 71,200 | 87,200 | 72,000 |
| 19 | 26,000 | | | | | | (*) | 130,000 | 55,200 | 67,600 | 88,900 | 68,000 |
| 20 | 25,000 | | | | | | | 130,000 | 52,800 | 66,200 | 89,300 | 66,000 |
| 21 | 25,000 | | | | | | | 140,000 | 50,200 | 64,400 | 89,100 | 64,300 |
| 22 | 25,000 | | | | | | | 140,000 | 48,400 | 62,700 | 88,200 | 63,300 |
| 23 | 26,000 | | 14,000 | (*) | 9,000 | 7,500 | 11,000 | 141,000 | 47,200 | 61,900 | 87,000 | 62,300 |
| 24 | 27,000 | | | 13,000 | | | | 145,000 | 46,500 | 62,700 | 86,500 | 62,100 |
| 25 | 27,000 | | | | | | | 150,000 | 46,700 | 63,600 | 85,100 | 60,900 |
| 26 | 26,000 | | | | | | | 150,000 | 47,700 | 66,300 | 84,300 | 58,400 |
| 27 | 25,000 | | | | | | | 150,000 | 50,200 | 70,600 | 81,800 | 57,500 |
| 28 | 24,000 | | | | | | | 150,000 | 52,300 | 73,300 | 84,600 | 62,300 |
| 29 | 22,000 | | | | | | | 140,000 | 53,100 | *74,500 | 89,600 | 82,700 |
| 30 | 21,000 | | | | ------ | | | 142,000 | 52,500 | 76,900 | 85,800 | *116,000 |
| 31 | 20,000 | ------ | | | ------ | | ------ | 139,000 | ------ | 79,700 | *90,300 | ------ |
| Total | ‡1,126.8 | 510,000 | 464,000 | 418,000 | 291,000 | 237,000 | 277,500 | ‡3,341 | ‡2,185.9 | ‡2,291.3 | ‡2,727.3 | ‡2,338.5 |
| Mean | 36,350 | 17,000 | 14,970 | 13,480 | 10,030 | 7,645 | 9,250 | 107,800 | 72,860 | 73,910 | 87,980 | 77,950 |
| Ac-ft | ‡2,235 | ‡1,012 | 920,300 | 829,100 | 577,200 | 470,100 | 550,400 | ‡6,627 | ‡4,336 | ‡4,545 | ‡5,410 | ‡4,638 |

Calendar year 1959: Max - Min - Mean 37,360 Ac-ft 27,050,000
Water year 1959-60: Max 150,000 Min - Mean 44,280 Ac-ft 32,150,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
Note.--No gage-height record Oct. 1, Oct. 11 to May 22, except on occasional days (stage-discharge relation affected by ice during most of period), May 25-29, Sept. 16-20; discharge estimated on basis of 4 discharge measurements, floodmarks, weather records, and records for other stations.

## 3040. KUSKOKWIM RIVER AT CROOKED CREEK--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Oct. 2-6, 1959 | 55,600 | 15 | 0.07 | 26 | 8.1 | 3.7 | 1.0 | 100 | 21 | 1.5 | 0.2 | 0.7 | 126 | 98 | 16 | 187 | 8.0 | 10 |
| Dec. 4 | a16,500 | 11 | .02 | 37 | 7.8 | 2.8 | 1.4 | 133 | 18 | 2.0 | .2 | 1.1 | 147 | 124 | 16 | 250 | 7.5 | 5 |
| Jan. 23, 1960 | a13,800 | 12 | .00 | 37 | 9.3 | 3.0 | 1.2 | 142 | 22 | 2.5 | .2 | 2.0 | 159 | 130 | 14 | 263 | 7.3 | 0 |
| Mar. 15 | a7,200 | 14 | .02 | 36 | 6.0 | 2.2 | 1.4 | 132 | 14 | 2.0 | .1 | .6 | 141 | 114 | 6 | 228 | 7.9 | 5 |
| Apr. 19 | a8,240 | 13 | .03 | 20 | 1.9 | .9 | .4 | 69 | 5.0 | .5 | .1 | .1 | 76 | 58 | 2 | 121 | 7.9 | -- |
| May 27-31 | 144,000 | 9.5 | .17 | 20 | 6.4 | 1.6 | 1.0 | 77 | 14 | 1.5 | .1 | .7 | 93 | 76 | 14 | 135 | 7.8 | 50 |
| June 1-6 | 128,000 | 10 | .19 | 23 | 5.5 | 2.0 | 1.2 | 81 | 14 | 2.0 | .1 | .6 | 99 | 80 | 14 | 155 | 8.0 | 50 |
| June 7-13 | 73,300 | 10 | .19 | 23 | 8.1 | 2.3 | 1.0 | 87 | 19 | 2.5 | .2 | .6 | 110 | 91 | 20 | 164 | 7.7 | 40 |
| June 14-20 | 58,700 | 9.5 | .03 | 25 | 8.3 | 2.6 | .9 | 93 | 19 | 2.5 | .2 | .4 | 114 | 96 | 20 | 173 | 7.8 | 10 |
| June 21-28 | 48,600 | 11 | .03 | 26 | 9.8 | 2.9 | 1.1 | 102 | 24 | 2.5 | .2 | .4 | 128 | 105 | 22 | 188 | 7.8 | 10 |
| July 8-10 | 97,200 | 9.6 | .10 | 22 | 5.2 | 1.8 | .8 | 81 | 15 | 1.0 | .0 | 1.0 | 96 | 76 | 10 | 159 | 7.5 | 20 |
| July 11-20 | 79,700 | 10 | .07 | 24 | 5.7 | 1.8 | 1.0 | 86 | 17 | 1.0 | .2 | .6 | 103 | 84 | 13 | 167 | 7.7 | 20 |
| July 21-23, 25-31 | 69,400 | 10 | .09 | 28 | 6.0 | 2.6 | 1.2 | 95 | 20 | 1.0 | .3 | .7 | 117 | 94 | 16 | 190 | 7.7 | 20 |
| July 24 | 62,700 | -- | -- | -- | 2.4 | -- | -- | 116 | -- | -- | -- | -- | -- | 120 | 25 | 225 | 7.1 | -- |
| Aug. 1-10 | 88,500 | 8.7 | .14 | 25 | 5.7 | 2.1 | .9 | 86 | 17 | 1.0 | .3 | .5 | 103 | 86 | 16 | 171 | 7.7 | 20 |
| Aug. 11-20 | 90,000 | 9.7 | .08 | 25 | 6.0 | 2.1 | 1.0 | 89 | 14 | 1.5 | .2 | .6 | 104 | 87 | 14 | 171 | 7.6 | 20 |
| Aug. 21-31 | 85,700 | 10 | .12 | 25 | 7.1 | 2.2 | 1.0 | 90 | 18 | 1.5 | .2 | .6 | 110 | 92 | 18 | 180 | 7.8 | 30 |
| Sept. 1, 3-7, 9, 10 | 91,400 | 11 | .28 | 25 | 5.2 | 2.3 | .9 | 85 | 14 | 1.0 | .2 | .5 | 102 | 84 | 14 | 170 | 7.4 | 30 |
| Sept. 2 | 78,400 | -- | -- | -- | 2.6 | -- | -- | 118 | -- | -- | -- | -- | -- | 130 | 33 | 232 | 7.6 | -- |
| Sept. 11-16, 20-23 | 72,200 | 12 | .29 | 26 | 6.0 | 2.9 | 1.0 | 94 | 17 | 1.0 | .2 | .9 | 113 | 90 | 12 | 184 | 7.5 | 20 |

a Discharge at time of sampling.

## 3040. KUSKOKWIM RIVER AT CROOKED CREEK--Continued

Temperature (°F) of water, water year October 1959 to September 1960
/Once-daily measurement at approximately 7 a.m./

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 34 | | | | | | | -- | 38 | -- | 54 | 48 |
| 2 | 34 | | | | | | | -- | 44 | -- | 54 | 46 |
| 3 | 35 | | | | | | | -- | 40 | -- | 53 | 46 |
| 4 | 36 | | | | | | | -- | 41 | -- | 54 | 45 |
| 5 | 34 | | | | | | | -- | 46 | -- | 53 | 45 |
| 6 | 32 | | | | | | | -- | 47 | -- | 52 | 43 |
| 7 | -- | | | | | | | -- | 45 | -- | 51 | 45 |
| 8 | -- | | | | | | | -- | 46 | 52 | 50 | -- |
| 9 | -- | | | | | | | -- | 46 | 51 | 50 | 45 |
| 10 | -- | | | | | | | -- | 47 | 53 | 50 | 45 |
| 11 | -- | | | | | | | -- | 47 | 54 | 52 | 45 |
| 12 | -- | | | | | | | -- | 46 | 55 | 54 | 44 |
| 13 | -- | | | | | | | -- | 46 | 57 | 54 | 46 |
| 14 | -- | | | | | | | -- | 46 | 59 | 54 | 44 |
| 15 | -- | | | | | | | -- | 46 | 62 | 54 | 48 |
| 16 | -- | | | | | | | -- | 41 | 61 | 54 | 45 |
| 17 | -- | | | | | | | -- | 45 | 63 | 53 | -- |
| 18 | -- | | | | | | | -- | 45 | 63 | 52 | -- |
| 19 | -- | | | | | | | -- | 46 | 64 | 52 | -- |
| 20 | -- | | | | | | | -- | 46 | 64 | 52 | 43 |
| 21 | -- | | | | | | | -- | 49 | 63 | 52 | 42 |
| 22 | -- | | | | | | | -- | 49 | 68 | 50 | 40 |
| 23 | -- | | | | | | | -- | 50 | 62 | 51 | 41 |
| 24 | -- | | | | | | | -- | 49 | 60 | 51 | -- |
| 25 | -- | | | | | | | -- | 46 | 55 | 52 | -- |
| 26 | -- | | | | | | | -- | 45 | 56 | 52 | -- |
| 27 | -- | | | | | | | 44 | 44 | 55 | 50 | -- |
| 28 | -- | | | | | | | 42 | 44 | 55 | 49 | -- |
| 29 | -- | | | | | | | 42 | -- | 55 | 48 | -- |
| 30 | -- | | | | | | | 41 | -- | 55 | 48 | -- |
| 31 | -- | | | | | | | 42 | -- | 55 | 47 | -- |
| Average | -- | | | | | | | -- | 45 | -- | 52 | -- |

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## 3560. Yukon River at Eagle

Location.--Lat 64°47'30", long 141°12'00", on left bank at Eagle, an eighth of a mile upstream from Mission Creek, 1.1 miles downstream from Castalia Creek, and 11 miles downstream from the international boundary.

Drainage area.--113,500 sq mi, approximately.

Records available.--Discharge: January 1911 to December 1913, June 1950 to September 1960. Monthly discharge only for some periods, published in WSP 1372.
Chemical analyses: April to October 1951, June to September 1952.
Water temperatures: May to October 1951, June to August 1952.
Sediment records: July and October 1954, April and August 1955 (periodic).

Gage.--Water-stage recorder. Altitude of gage is 750 ft (from topographic map). January 1911 to December 1913 staff gage at site half a mile downstream at different datum. June 22, 1950, to Sept. 30, 1955, staff gage at site 1.1 miles upstream at datum 10 ft higher. Oct. 1, 1955, to Aug. 10, 1957, staff gage at present site at datum 10 ft higher.

Average discharge.--12 years, 71,650 cfs (51,870,000 acre-ft per year).

Extremes.--Maximum discharge during year, 254,000 cfs Aug. 1 (gage height, 21.52 ft); maximum gage height, 25.10 ft May 9 or 10 (ice jam); minimum discharge not determined.
1911-13, 1950-60: Maximum discharge, 561,000 cfs May 30, 1957 (gage height, 33.01 ft, present datum), from rating curve extended above 250,000 cfs by logarithmic plotting; minimum not determined.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Revisions (water years).--WSP 1372: 1911-14, drainage area.

*Discharge, in cubic feet per second, water year October 1959 to September 1960*

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 92,300 | | | | | | | 54,000 | 158,000 | 200,000 | 250,000 | 152,000 |
| 2 | 91,700 | | | | | (*) | | 80,000 | 158,000 | 215,000 | 248,000 | 147,000 |
| 3 | 91,700 | | | | | | | 110,000 | 163,000 | 223,000 | 230,000 | 141,000 |
| 4 | 90,800 | | | | | | | 140,000 | 152,000 | 215,000 | *214,000 | 138,000 |
| 5 | 89,000 | | | | | | | 150,000 | 150,000 | 217,000 | 201,000 | 137,000 |
| 6 | 86,300 | | | | | | | 150,000 | 153,000 | 229,000 | 190,000 | 136,000 |
| 7 | *83,300 | | | | | | (*) | 150,000 | 152,000 | 217,000 | 180,000 | 136,000 |
| 8 | 81,900 | 35,000 | 24,000 | 20,000 | | 18,000 | 16,000 | 150,000 | 153,000 | 198,000 | 172,000 | 139,000 |
| 9 | 77,400 | | | | | | | 150,000 | 153,000 | 187,000 | 169,000 | 140,000 |
| 10 | a72,000 | | | | | | | 140,000 | a160,000 | 181,000 | 169,000 | 139,000 |
| 11 | a69,000 | | | | | | | a140,000 | *160,000 | 177,000 | 168,000 | 137,000 |
| 12 | a66,000 | | | | | | | a150,000 | 162,000 | 174,000 | 161,000 | *137,000 |
| 13 | a65,000 | | | | | | | a150,000 | 163,000 | 169,000 | 155,000 | 137,000 |
| 14 | a64,000 | | | | | | | *157,000 | 164,000 | 164,000 | 154,000 | 140,000 |
| 15 | a63,000 | | | | 19,000 | | | 156,000 | 162,000 | 157,000 | 162,000 | 146,000 |
| 16 | 61,000 | | | | | | | 146,000 | 162,000 | 155,000 | 169,000 | 149,000 |
| 17 | 60,000 | | | | | | | 136,000 | 161,000 | 163,000 | 179,000 | 148,000 |
| 18 | 58,000 | | | | | | | a130,000 | 163,000 | 170,000 | 189,000 | 147,000 |
| 19 | 57,000 | | | | | | | a120,000 | 165,000 | 165,000 | 192,000 | 145,000 |
| 20 | 54,000 | | | (*) | | | | a120,000 | 169,000 | 162,000 | 204,000 | 139,000 |
| 21 | 52,000 | | | | | | | a120,000 | 188,000 | 156,000 | 208,000 | 133,000 |
| 22 | 50,000 | | | | | | | a120,000 | 198,000 | 159,000 | 204,000 | 129,000 |
| 23 | 48,000 | 27,000 | | | | | 21,000 | a120,000 | 210,000 | 188,000 | 195,000 | 127,000 |
| 24 | 47,000 | | 21,000 | 19,000 | | 17,000 | | 131,000 | 217,000 | 203,000 | 186,000 | 125,000 |
| 25 | 45,000 | | | | | | | 141,000 | 214,000 | 206,000 | 177,000 | 122,000 |
| 26 | 44,000 | | | | | | | 148,000 | 211,000 | 203,000 | 170,000 | 119,000 |
| 27 | 43,000 | | | | | | | 153,000 | 209,000 | 204,000 | 163,000 | 116,000 |
| 28 | 42,000 | | | | | | | 164,000 | 205,000 | 208,000 | 157,000 | 112,000 |
| 29 | 41,000 | | | | | | | 176,000 | 201,000 | 212,000 | 152,000 | 110,000 |
| 30 | 40,000 | | | | ------- | | | 168,000 | 199,000 | 220,000 | 156,000 | 109,000 |
| 31 | 39,000 | ------- | | | ------- | | ------- | 160,000 | ------- | 234,000 | 158,000 | ------- |
| Total | ‡1,964.4 | 930,000 | 696,000 | 604,000 | 551,000 | 542,000 | 555,000 | ‡4,280 | ‡5,235 | ‡5,931 | ‡5,682 | ‡4,032 |
| Mean | 63,370 | 31,000 | 22,450 | 19,480 | 19,000 | 17,480 | 18,500 | 138,100 | 174,500 | 191,300 | 183,300 | 134,400 |
| Ac-ft | ‡3,896 | ‡1,845 | ‡1,380 | ‡1,198 | ‡1,093 | ‡1,075 | ‡1,101 | ‡8,489 | ‡10,380 | ‡11,760 | ‡11,270 | ‡7,997 |

Calendar year 1959: Max 306,000 Min - Mean 77,560 Ac-ft 56,140,000
Water year 1959-60: Max 250,000 Min - Mean 84,710 Ac-ft 61,480,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
a No gage-height record; discharge estimated on basis of 2 discharge measurements, weather records, and records for station at Dawson.
Note.--Stage-discharge relation affected by ice from about Oct. 16 to about May 10 (no gage-height record Oct. 16 to Nov. 3, Nov. 8 to Dec. 26, Jan. 16-19, Mar. 10 to Apr. 18, May 2-10; discharge estimated on basis of 1 discharge measurement, weather records, and records for other stations on Yukon River).

## 4680. Yukon River at Rampart

Location. Lat 65°31', long 150°11', on left bank at Rampart, half a mile downstream from Squaw Creek, 1¼ miles downstream from Minook Creek, and 3½ miles upstream from Russian Creek.

Drainage area.--199,400 sq mi, approximately.

Records available.--Discharge: June 1955 to September 1960.
Chemical analyses: June to September 1954, June to October 1955, June to September 1956, October 1958 to September 1960.
Water temperatures: June to August 1954, June, August, September 1955, May to September 1956.

Gage.--Staff gage read twice daily. Altitude of gage is 300 ft (from topographic map).

Average discharge.--5 years, 107,400 cfs (77,750,000 acre-ft per year).

Extremes.--Maximum discharge observed during year, 295,000 cfs Aug. 7 (gage height, 27.54 ft); maximum gage height observed, 34.70 ft May 30 (backwater from ice jam); minimum discharge not determined.
1955-60: Maximum discharge, 686,000 cfs June 2, 1957 (gage height, 46.40 ft, from graph based on gage readings), from rating curve extended above 350,000 cfs by logarithmic plotting; minimum not determined.

Remarks:--Records good except those for periods of ice effect, which are poor. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 125,000 | | | | | | | | 280,000 | 253,000 | 242,000 | 201,000 |
| 2 | 124,000 | | | | | | | | 280,000 | 252,000 | 253,000 | 197,000 |
| 3 | *123,000 | | | | | (*) | | | 280,000 | 249,000 | 261,000 | 188,000 |
| 4 | 121,000 | | | | | | | | 270,000 | 243,000 | 271,000 | 185,000 |
| 5 | 120,000 | | | | | | | | 257,000 | 239,000 | 283,000 | 180,000 |
| 6 | 120,000 | | | | | | (*) | | 260,000 | 243,000 | 294,000 | 177,000 |
| 7 | 121,000 | | | | | | | | 267,000 | 249,000 | 295,000 | 175,000 |
| 8 | 120,000 | 42,000 | 29,000 | 21,000 | | | 18,000 | 210,000 | 270,000 | 253,000 | 293,000 | 172,000 |
| 9 | 119,000 | | | | | | | | 266,000 | 256,000 | 291,000 | *169,000 |
| 10 | 117,000 | | | | | | | | 256,000 | 265,000 | 283,000 | 168,000 |
| 11 | 113,000 | | | | | | | | *241,000 | 267,000 | 273,000 | 167,000 |
| 12 | 107,000 | | (*) | | | | | | 229,000 | 259,000 | 258,000 | 168,000 |
| 13 | 99,000 | | | | | | | | 221,000 | 251,000 | 244,000 | 170,000 |
| 14 | 90,000 | | | | | | | | 217,000 | 243,000 | 234,000 | 172,000 |
| 15 | 80,000 | | | | 19,000 | 18,000 | | | 215,000 | 234,000 | 226,000 | 173,000 |
| 16 | 74,000 | | | | | | | *252,000 | 216,000 | 221,000 | 216,000 | 175,000 |
| 17 | 70,800 | | | | | | | 250,000 | 220,000 | 215,000 | 210,000 | 179,000 |
| 18 | 69,900 | | | | | | | 250,000 | 230,000 | 205,000 | 205,000 | 181,000 |
| 19 | 69,400 | | | | | | | 260,000 | 243,000 | 196,000 | 210,000 | 186,000 |
| 20 | 66,700 | | | | | | | 270,000 | 249,000 | 190,000 | 219,000 | 183,000 |
| 21 | 63,100 | | | (*) | | | | 280,000 | 254,000 | 188,000 | 228,000 | 183,000 |
| 22 | 60,800 | | | | | | | 270,000 | 250,000 | 190,000 | 228,000 | 185,000 |
| 23 | 59,000 | 33,000 | 25,000 | 19,000 | | | 22,000 | 260,000 | 245,000 | 189,000 | 228,000 | 183,000 |
| 24 | 57,000 | | | | | | | 250,000 | 240,000 | 184,000 | 234,000 | 183,000 |
| 25 | 55,000 | | | | | | | 240,000 | 241,000 | 180,000 | 240,000 | 188,000 |
| 26 | 54,000 | | | | | | | 240,000 | 249,000 | 177,000 | 242,000 | 178,000 |
| 27 | 53,000 | | | | | | | 240,000 | 259,000 | 186,000 | 238,000 | 173,000 |
| 28 | 52,000 | | | | | | | 250,000 | 269,000 | 208,000 | 228,000 | 169,000 |
| 29 | 51,000 | | | | | | | 270,000 | 270,000 | 223,000 | 218,000 | 166,000 |
| 30 | 50,000 | | | | ------ | | | 280,000 | 264,000 | 230,000 | 211,000 | 165,000 |
| 31 | 49,000 | ------ | ------ | ------ | ------ | ------ | ------ | 290,000 | ------ | *235,000 | 203,000 | ------ |
| Total | ‡2,653.7 | ‡1,125 | 835,000 | 619,000 | 551,000 | 558,000 | 600,000 | ‡7,302 | ‡7,518 | ‡6,973 | ‡7,559 | ‡5,339 |
| Mean | 85,600 | 37,500 | 26,940 | 19,970 | 19,000 | 18,000 | 20,000 | 235,500 | 250,600 | 224,900 | 243,800 | 178,000 |
| Ac-ft | ‡5,264 | ‡2,231 | ‡1,656 | ‡1,228 | ‡1,093 | ‡1,107 | ‡1,190 | ‡14,480 | ‡14,910 | ‡13,830 | ‡14,990 | ‡10,590 |

Calendar year 1959: Max 526,000 Min - Mean 110,900 Ac-ft 80,280,000
Water year 1959-60: Max 295,000 Min - Mean 113,800 Ac-ft 82,570,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
Note.--Stage-discharge relation affected by ice Oct. 13-16, Oct. 23 to May 15, May 17 to June 4 (no gage-height record Nov. 16 to May 26, except occasional days; discharge estimated or basis of 5 discharge measurements, weather records, and records for stations at Dawson, Eagle, Ruby and Kaltag).

## 4680. YUKON RIVER AT RAMPART--Continued

Chemical analyses, in parts per million, March to August 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Mar. 3, 1960 | 19,000 | 7.1 | 0.00 | 23 | 3.1 | 1.1 | 0.5 | 74 | 12 | 2.0 | 0.2 | 0.2 | 85 | 70 | 10 | 134 | 8.0 | 0 |
| Apr. 6 | 18,000 | 8.2 | .00 | 39 | 10 | 3.9 | 1.7 | 144 | 21 | 4.5 | .3 | .7 | 160 | 138 | 20 | 282 | 8.1 | 5 |
| May 27-29 | 253,000 | 6.4 | .12 | 24 | 6.2 | 2.8 | 1.3 | 80 | 23 | 1.0 | .2 | .9 | 105 | 86 | 20 | 179 | 7.7 | 50 |
| May 30, 31, June 1, 2 | 285,000 | 7.0 | .10 | 30 | 9.5 | 3.7 | 1.1 | 103 | 36 | 1.0 | .1 | 1.2 | 141 | 114 | 30 | 235 | 7.7 | 50 |
| June 3-9 | 267,000 | 9.0 | .10 | 35 | 13 | 5.0 | 1.2 | 122 | 46 | 1.0 | .2 | .8 | 171 | 141 | 41 | 294 | 7.8 | 30 |
| June 10-13 | 237,000 | 7.8 | -- | 26 | 10 | 2.7 | 1.0 | 93 | 28 | 2.5 | .2 | 1.0 | 125 | 106 | 30 | 198 | 7.8 | 40 |
| June 18-27 | 246,000 | 8.0 | .07 | 29 | 16 | 4.0 | 1.2 | 117 | 40 | 3.5 | .0 | 1.0 | 161 | 138 | 42 | 258 | 7.5 | 20 |
| July 1-3, 5-10 | 251,000 | 7.3 | .10 | 30 | 10 | 3.5 | 1.0 | 106 | 34 | 1.0 | .2 | .9 | 140 | 116 | 29 | 236 | 7.8 | 25 |
| July 11-12, 14-20 | 226,000 | 8.7 | .02 | 34 | 10 | 4.1 | 1.1 | 116 | 36 | 2.5 | .2 | .7 | 154 | 126 | 31 | 253 | 7.7 | 10 |
| July 21-31 | 199,000 | 8.7 | .02 | 33 | 8.3 | 3.5 | 1.2 | 108 | 36 | 1.0 | .2 | .6 | 146 | 116 | 28 | 236 | 7.4 | 10 |
| Aug. 1-10 | 277,000 | 8.6 | .02 | 32 | 12 | 3.7 | .9 | 111 | 39 | 1.5 | .2 | 1.4 | 154 | 130 | 38 | 248 | 8.2 | 20 |
| Aug. 11-20 | 230,000 | 7.6 | .02 | 34 | 12 | 3.4 | 1.1 | 118 | 39 | 1.5 | .2 | 1.2 | 158 | 134 | 38 | 256 | 7.7 | 20 |
| Aug. 21-23 | 228,000 | 13 | .02 | 37 | 13 | 4.7 | 1.2 | 128 | 44 | 1.0 | .2 | 1.1 | 180 | 146 | 38 | 289 | 8.3 | 10 |

Temperature (°F) of water, July to August 1960
/Once-daily measurement at 6 p. m. 7

| Day | July | August | Day | July | August | Day | July | August |
|---|---|---|---|---|---|---|---|---|
| 1 | -- | 54 | 11 | -- | 54 | 21 | 67 | 53 |
| 2 | -- | 52 | 12 | -- | 56 | 22 | 64 | 52 |
| 3 | -- | 53 | 13 | -- | 57 | 23 | 65 | 51 |
| 4 | -- | 52 | 14 | -- | 58 | 24 | 64 | -- |
| 5 | -- | 50 | 15 | -- | 54 | 25 | 63 | -- |
| 6 | -- | 50 | 16 | -- | 53 | 26 | 63 | -- |
| 7 | -- | 46 | 17 | -- | 53 | 27 | 60 | -- |
| 8 | -- | 43 | 18 | -- | 53 | 28 | 58 | -- |
| 9 | -- | 50 | 19 | 65 | 54 | 29 | 57 | -- |
| 10 | -- | 52 | 20 | 66 | 53 | 30 | 55 | -- |
| | | | | | | 31 | 54 | -- |

## 4700. Chisana River at Northway Junction
(Formerly published as Tanana River at Northway Junction)

Location.--Lat 63°00', long 141°48', near left bank on downstream side of bridge on highway from Northway Junction to Northway, half a mile southwest of Northway Junction and 4 miles upstream from Nabesna River.

Drainage area.--3,280 sq mi, approximately.

Records available.--Discharge: July 1949 to September 1960. Prior to October 1959, published as Tanana River at Northway Junction.
Chemical analyses: October 1957 to September 1958.
Sediment records: June 1953 to September 1960 (periodic); summer months only 1956-60.

Gage.--Wire-weight gage read once daily. Datum of gage is 1,682.85 ft above mean sea level.

Average discharge.--11 years, 2,221 cfs (1,608,000 acre-ft per year).

Extremes.--Maximum discharge during year, 6,700 cfs July 25 (gage height, 10.55 ft, from graph based on gage readings); minimum not determined.
1949-60: Maximum discharge, 9,750 cfs July 5, 1959 (gage height, 12.40 ft); minimum not determined.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor. Large diurnal fluctuation caused by glacier melt at source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,260 | | | | | | | 1,700 | 2,810 | 5,050 | 4,780 | 3,860 |
| 2 | 2,490 | | | | | | | 2,000 | *2,730 | 5,200 | *4,500 | 3,680 |
| 3 | 2,760 | (*) | | | | | | 2,400 | 2,700 | 5,270 | a4,300 | 3,010 |
| 4 | 2,770 | | | | | | | 3,000 | 2,680 | *4,930 | a4,100 | 3,170 |
| 5 | *2,530 | | | | | (*) | (*) | 3,700 | 2,710 | 4,770 | a3,900 | 3,110 |
| 6 | 2,290 | | | | | | | 4,820 | 2,900 | 4,810 | a3,700 | 3,100 |
| 7 | 2,090 | | | | | | | 3,630 | 3,010 | 4,520 | a3,600 | 3,030 |
| 8 | 2,000 | 920 | *930 | 860 | 830 | | 810 | 3,730 | 3,070 | 4,140 | 3,580 | 2,920 |
| 9 | 1,900 | | | | | | | 3,720 | 3,060 | 4,010 | 3,810 | 2,870 |
| 10 | 1,800 | | | | | | | 3,370 | 2,930 | 3,850 | 3,960 | 2,740 |
| 11 | 1,800 | | | | | | | 2,850 | 2,820 | 3,760 | 4,030 | *2,710 |
| 12 | 1,700 | | | | | | | 2,700 | 2,730 | 3,880 | 4,280 | 2,660 |
| 13 | 1,600 | | | | | | | *2,720 | *2,520 | 4,020 | 4,640 | 2,620 |
| 14 | 1,600 | | | | | | | 2,710 | 2,480 | 4,090 | 5,010 | 2,890 |
| 15 | 1,500 | | | | | | | 2,570 | 2,490 | 4,300 | 5,200 | 3,350 |
| 16 | 1,400 | | | | | 880 | | 2,570 | 2,460 | 4,640 | 5,270 | 4,160 |
| 17 | 1,400 | | | | | | | 2,550 | 2,460 | 4,910 | 5,300 | 4,590 |
| 18 | 1,300 | | | | | | | 2,590 | 2,650 | 5,350 | 5,310 | 4,640 |
| 19 | 1,300 | | | | | | | 2,650 | 2,900 | 5,760 | 5,300 | 3,430 |
| 20 | 1,300 | | | | | | | 2,610 | 3,500 | 6,040 | 5,270 | 2,640 |
| 21 | 1,300 | | | | | | | 2,480 | 4,020 | 6,280 | 5,110 | 2,510 |
| 22 | 1,400 | | | | | | | 2,430 | 4,180 | 6,380 | 4,840 | 2,450 |
| 23 | 1,400 | 910 | 870 | (*) | 860 | | 980 | 2,530 | 4,180 | 6,490 | 4,680 | 2,320 |
| 24 | 1,500 | | | 870 | | | | 2,990 | 4,270 | 6,600 | 4,530 | 2,230 |
| 25 | 1,600 | | | | | | | 3,880 | 4,470 | 6,600 | 4,380 | 2,220 |
| 26 | 1,600 | | | | | | | 4,470 | 4,440 | *6,360 | 4,080 | 2,180 |
| 27 | 1,500 | | | | | | | 4,400 | 4,450 | 6,150 | 3,910 | *2,140 |
| 28 | 1,400 | | | | | | | 4,410 | 4,510 | 5,820 | 3,960 | 2,090 |
| 29 | 1,400 | | | | | | | 4,510 | 4,700 | 5,570 | 4,100 | 2,050 |
| 30 | 1,300 | | | | ------ | | | 4,480 | 4,920 | 5,280 | 4,160 | 1,970 |
| 31 | 1,200 | ------ | ------ | ------ | ------ | ------ | ------ | 3,460 | ------ | 5,170 | 4,070 | ------ |
| Total | 53,390 | 27,450 | 27,870 | 26,820 | 24,490 | 27,280 | 26,850 | 98,630 | 99,750 | 160,000 | 137,660 | 87,340 |
| Mean | 1,722 | 915 | 899 | 865 | 844 | 880 | 895 | 3,182 | 3,325 | 5,161 | 4,441 | 2,911 |
| Ac-ft | 105,900 | 54,450 | 55,280 | 53,200 | 48,580 | 54,110 | 53,260 | 195,600 | 197,900 | 317,400 | 273,000 | 173,200 |

Calendar year 1959: Max 9,060 Min - Mean 2,378 Ac-ft 1,721,000
Water year 1959-60: Max 6,600 Min - Mean 2,179 Ac-ft 1,582,000

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of 1 discharge measurement and records for station near Tanacross.
Note.--Stage-discharge relation affected by ice Oct. 8 to May 5 (no gage-height record Oct. 15 to Apr. 29, except occasional days; discharge estimated on basis of 5 discharge measurements, weather records, and records for station near Tanacross).

## 4700. CHISANA RIVER AT NORTHWAY JUNCTION--Continued

Periodic determinations of particle-size and discharge of suspended sediment, June to September 1960
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Discharge (tons per day) | Concentration of suspension analyzed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | | |
| | | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.500 | 1.000 | |
| June 2, 1960 .... | 10:30 a.m. | 2,750 | 48 | 410 | 3,040 | 485 | 22 | 23 | 26 | 31 | 34 | 52 | 76 | 98 | 100 | | SBWCM |
| July 4 ..... | 12:00 m. | 4,920 | 55 | 1,390 | 18,500 | 1,640 | 23 | 28 | 36 | 44 | 53 | 85 | 88 | 98 | 100 | | SBWCM |
| Aug. 2..... | 5:00 p.m. | 4,550 | 54 | 1,720 | 21,100 | 2,760 | 21 | 26 | 33 | 40 | 48 | 69 | 71 | 80 | 99 | 100 | SBWCM |
| Sept. 27..... | 11:00 a.m. | 2,150 | 38 | 260 | 1,510 | -- | -- | -- | -- | -- | -- | 61 | 79 | 99 | 100 | | S |

## 4760. Tanana River near Tanacross

Location.--Lat 63°23'20", long 143°44'45", on right bank a quarter of a mile downstream from unnamed tributary, a quarter of a mile north of Cathedral Rapids, 9 miles upstream from Robertson River, and 13 miles west of Tanacross.

Drainage area.--8,550 sq mi, approximately.

Records available.--Discharge: June 1953 to September 1960.
Chemical analyses: December 1953 to October 1954, May 1957 to September 1960 (seasonal).
Water temperatures: June to September 1954, May 1957 to September 1960 (seasonal).
Sediment records: October 1953 to September 1954, May 1957 to September 1960 (daily, seasonal); October 1954 to September 1956 (periodic).

Gage.--Water-stage recorder. Datum of gage is 1,489.58 ft above mean sea level. Prior to June 13, 1959, water-stage recorder on left bank at site 120 ft upstream at same datum.

Average discharge.--7 years, 7,631 cfs (5,525,000 acre-ft per year).

Extremes.--Maximum discharge during year, 25,000 cfs July 25 (gage height, 9.08 ft); minimum recorded, 1,830 cfs Apr. 20 (gage height, 1.69 ft).
1953-60: Maximum discharge, 35,500 cfs Aug. 9, 1953 (gage height, 11.04 ft); minimum not determined.
1959-60: Maximum water temperature, 63°F May 25, June 26, 28, July 14, Aug. 12. Maximum daily sediment concentration, 3,010 ppm Aug. 16. Maximum daily sediment load, 188,000 tons Aug. 16.
1956-60: Maximum water temperature, 65°F June 2, 7, July 3, 1958. Maximum daily sediment concentration, 3,740 ppm July 7, 1958. Maximum daily sediment load, 266,000 tons July 7, 1958.

Remarks.--Records good except those below 4,000 cfs, which are fair, and those for periods of ice effect or no gage-height record, which are poor. Some diurnal fluctuation caused by glacier melt at the source. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,000 | | | | | 2,500 | 2,530 | a4,900 | a13,000 | 18,800 | 21,100 | a14,000 |
| 2 | 7,140 | | | | | 2,500 | 2,490 | a6,000 | 12,300 | 19,800 | 19,300 | a13,000 |
| 3 | 7,360 | (*) | | | | 2,500 | 2,530 | a7,700 | a11,000 | 18,200 | 17,600 | a12,000 |
| 4 | 7,580 | | | | | 2,460 | 2,450 | a9,400 | a10,000 | 18,000 | 16,500 | a11,000 |
| 5 | *7,610 | | | | | *2,350 | *2,510 | a12,000 | a9,400 | 17,300 | 15,200 | a11,000 |
| 6 | 7,300 | | | | | 2,230 | 2,460 | a15,000 | a9,400 | 16,700 | 14,300 | a10,000 |
| 7 | 6,900 | | | | | 2,240 | 2,400 | a18,000 | a10,000 | 16,400 | 13,800 | a10,000 |
| 8 | 6,500 | 3,400 | 2,900 | | | 2,280 | 2,350 | a15,000 | a11,000 | 15,200 | 14,000 | *9,920 |
| 9 | 6,200 | | (*) | | | 2,260 | 2,310 | a14,000 | a12,000 | 14,400 | 15,300 | 9,700 |
| 10 | 5,900 | | | | | 2,230 | 2,290 | a13,000 | a12,000 | 13,900 | 16,700 | 9,430 |
| 11 | 5,600 | | | 2,500 | | 2,230 | 2,260 | a11,000 | a11,000 | 13,800 | 17,500 | 9,190 |
| 12 | 5,300 | | | | | 2,230 | 2,230 | a9,900 | a11,000 | 13,600 | 17,000 | 9,280 |
| 13 | 5,100 | | | | | 2,230 | 2,200 | *8,620 | *10,200 | 13,700 | 16,400 | 9,610 |
| 14 | 4,900 | | | | | 2,230 | 2,180 | 7,670 | 9,640 | 14,200 | 17,700 | 10,400 |
| 15 | 4,700 | | | | | 2,230 | 2,170 | 7,220 | 8,950 | 15,500 | 20,600 | 11,500 |
| 16 | 4,600 | | | | 2,300 | 2,220 | 2,170 | 7,080 | 8,890 | 16,700 | 23,200 | 12,700 |
| 17 | 4,500 | | | | | 2,220 | 2,170 | 7,250 | 8,860 | 19,300 | 23,800 | 13,400 |
| 18 | 4,400 | | | | | 2,200 | 2,170 | 7,220 | 8,680 | 21,200 | 21,800 | 13,200 |
| 19 | 4,300 | | | | | 2,310 | 2,170 | 7,110 | 9,100 | 21,600 | 20,600 | 12,800 |
| 20 | 4,200 | | | | | 2,380 | 2,170 | 8,120 | 10,300 | 21,400 | a19,000 | 12,400 |
| 21 | 4,300 | | | | | 2,400 | 2,110 | 9,430 | 12,900 | 19,300 | a18,000 | 11,500 |
| 22 | 4,400 | | | *2,660 | | 2,410 | 2,140 | 8,740 | 13,600 | 18,800 | a17,000 | a10,000 |
| 23 | 4,800 | 3,000 | 2,700 | 2,610 | | 2,430 | 2,180 | 8,320 | 13,800 | 21,000 | a16,000 | a9,600 |
| 24 | 5,200 | | | 2,570 | | 2,450 | 2,230 | 7,670 | 13,700 | 23,200 | a15,000 | a8,900 |
| 25 | 5,600 | | | 2,530 | | 2,460 | a2,400 | 9,190 | 15,000 | 24,600 | a15,000 | a8,400 |
| 26 | 5,600 | | | 2,490 | | 2,450 | a2,500 | 11,900 | 15,100 | *23,700 | a14,000 | 7,890 |
| 27 | 5,500 | | | 2,460 | | 2,530 | a2,700 | 14,100 | 15,200 | 21,800 | a14,000 | 7,580 |
| 28 | 5,300 | | | 2,460 | | 2,570 | a2,900 | a13,000 | 16,000 | 21,100 | a14,000 | 7,360 |
| 29 | 5,000 | | | 2,460 | | 2,610 | a3,300 | a14,000 | 17,000 | 21,700 | a15,000 | 7,250 |
| 30 | 4,700 | | | 2,500 | ------ | 2,590 | a3,800 | a14,000 | 17,600 | 21,400 | a15,000 | 7,140 |
| 31 | 4,400 | ------ | | 2,400 | ------ | 2,610 | ------ | a14,000 | ------ | 20,700 | a14,000 | ------ |
| Total | 171,890 | 96,000 | 86,700 | 77,640 | 66,700 | 73,560 | 72,470 | 320,540 | 356,620 | 577,000 | 528,400 | 310,150 |
| Mean | 5,545 | 3,200 | 2,797 | 2,505 | 2,300 | 2,373 | 2,416 | 10,340 | 11,890 | 18,610 | 17,050 | 10,340 |
| Ac-ft | 340,900 | 190,400 | 172,000 | 154,000 | 132,300 | 145,900 | 143,700 | 635,800 | 707,300 | ‡1,144 | ‡1,048 | 615,200 |

Calendar year 1959: Max 29,200 Min - Mean 7,642 Ac-ft 5,533,000
Water year 1959-60: Max 24,600 Min 2,110 Mean 7,480 Ac-ft 5,430,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
a No gage-height record; discharge estimated on basis of 3 discharge measurements, recorded range in stage, weather records, and records for station at Northway Junction.
Note.--Stage-discharge relation affected by ice Oct. 6 to Apr. 15 (no gage-height record Jan. 30 to Mar. 3; discharge estimated on basis of weather records).

## 4760. TANANA RIVER NEAR TANACROSS--Continued

Chemical analyses, in parts per million, October 1959 to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Oct. 1-10, 1959..... | 6,950 | 13 | 0.02 | 40 | 7.8 | 6.6 | 1.5 | 140 | 30 | 3.0 | 0.0 | 0.9 | 172 | 132 | 18 | 277 | 7.9 | 5 |
| Nov. 3..... | a3,780 | 15 | .02 | 45 | 9.5 | 6.1 | 1.6 | 162 | 24 | 3.0 | .1 | .1 | 184 | 151 | 18 | 309 | 7.7 | 5 |
| Nov. 4..... | b3,400 | 9.5 | .13 | 43 | 11 | 6.6 | 2.3 | 166 | 20 | 4.5 | .0 | .4 | 179 | 152 | 16 | 311 | 8.0 | 10 |
| Dec. 3 ..... | c2,900 | 16 | .10 | 43 | 13 | 6.3 | 1.6 | 171 | 27 | 5.0 | .1 | .2 | 196 | 160 | 20 | 322 | 7.3 | 0 |
| Jan. 1, 1960 ..... | d2,500 | 23 | .00 | 33 | 9.0 | 5.4 | 2.1 | 127 | 24 | 4.5 | .0 | 1.7 | 165 | 120 | 16 | 248 | 7.9 | 0 |
| Mar. 5 ..... | a2,340 | 13 | -- | -- | -- | 4.1 | 1.7 | 111 | 21 | 2.5 | .2 | -- | -- | -- | -- | 209 | 8.0 | 20 |
| Apr. 5..... | a2,480 | 19 | .00 | 47 | 11 | 6.2 | 2.4 | 183 | 20 | 5.0 | .2 | 2.5 | 203 | 162 | 12 | 330 | 7.3 | 5 |
| Apr. 19..... | 2,170 | 18 | .10 | 47 | 9.0 | 5.5 | 1.6 | 173 | 20 | 4.0 | .2 | .3 | 191 | 154 | 12 | 311 | 7.8 | 5 |
| Apr. 20-29..... | 2,460 | 18 | .05 | 44 | 9.0 | 5.1 | 1.7 | 166 | 17 | 2.5 | .2 | 1.2 | 181 | 147 | 11 | 302 | 8.0 | 0 |
| Apr. 30, May 1-3.... | 5,600 | 12 | .05 | 36 | 7.4 | 4.8 | 1.7 | 133 | 18 | 2.0 | .2 | 1.5 | 149 | 120 | 12 | 254 | 7.9 | 00 |
| May 4-13..... | 11,200 | 11 | .09 | 30 | 5.7 | 5.0 | 1.8 | 106 | 19 | 2.0 | .2 | 1.6 | 128 | 98 | 12 | 212 | 7.7 | 30 |
| May 14-20 ..... | 7,380 | 12 | .09 | 32 | 6.2 | 5.4 | 1.7 | 116 | 20 | 2.0 | .2 | .8 | 137 | 106 | 10 | 227 | 7.7 | 25 |
| May 21 ..... | 9,430 | 15 | .13 | 32 | 7.1 | 7.0 | 1.7 | 117 | 20 | 7.0 | .2 | .4 | 148 | 109 | 13 | 227 | 7.7 | 20 |
| May 21-31 ..... | 11,300 | 11 | .10 | 32 | 6.4 | 7.1 | 2.0 | 113 | 20 | 6.0 | .1 | 1.0 | 142 | 106 | 14 | 238 | 7.9 | 10 |
| June 1-3, 5-10..... | 11,100 | 12 | .03 | 29 | 8.6 | 6.4 | 1.8 | 114 | 20 | 5.0 | .0 | 1.2 | 140 | 108 | 14 | 222 | 7.6 | 20 |
| June 2..... | 12,300 | 9.8 | .12 | 26 | 8.6 | 6.5 | 1.7 | 109 | 18 | 5.5 | .1 | .4 | 131 | 100 | 11 | 208 | 7.9 | 20 |
| June 11-20 ..... | 9,660 | 12 | .03 | 28 | 9.8 | 6.8 | 1.8 | 114 | 24 | 6.0 | .0 | 1.2 | 146 | 110 | 16 | 227 | 7.4 | 10 |
| June 21-30 ..... | 15,000 | 11 | .03 | 26 | 7.4 | 5.6 | 1.5 | 102 | 22 | 4.0 | .0 | .6 | 128 | 96 | 12 | 201 | 7.7 | 10 |
| July 1-9..... | 17,200 | 11 | .07 | 29 | 5.5 | 5.7 | 1.4 | 106 | 20 | 3.0 | .1 | .8 | 128 | 96 | 8 | 207 | 7.9 | 5 |
| July 11-20..... | 17,100 | 10 | .07 | 27 | 5.5 | 5.8 | 1.4 | 100 | 20 | 3.0 | .1 | .7 | 122 | 90 | 8 | 202 | 7.9 | 5 |
| July 21-31..... | 21,600 | 10 | .07 | 28 | 5.2 | 6.1 | 1.6 | 103 | 20 | 3.0 | .1 | .6 | 126 | 92 | 7 | 201 | 7.9 | 5 |
| Aug. 1-10..... | 16,400 | 12 | .00 | 28 | 6.0 | 6.6 | 2.0 | 110 | 17 | 2.5 | .1 | 1.1 | 129 | 94 | 4 | 214 | 7.5 | 20 |
| Aug. 11-20..... | 19,800 | 12 | .00 | 27 | 6.4 | 6.4 | 1.7 | 101 | 17 | 3.5 | .0 | 1.5 | 126 | 94 | 11 | 199 | 7.5 | 20 |
| Aug. 21-31..... | 15,200 | 13 | .00 | 29 | 9.3 | 6.3 | 1.5 | 116 | 19 | 4.5 | .0 | 1.0 | 141 | 110 | 16 | 210 | 8.0 | 20 |
| Sept. 1-10..... | 11,000 | 11 | .00 | 34 | 9.3 | 6.1 | 1.4 | 124 | 24 | 4.0 | .1 | .8 | 152 | 123 | 22 | 250 | 7.5 | 20 |
| Sept. 11-20 ..... | 11,400 | 13 | .00 | 32 | 9.5 | 6.5 | 1.8 | 118 | 27 | 3.5 | .0 | 1.3 | 153 | 119 | 22 | 246 | 7.6 | 20 |
| Sept. 21-28 ..... | 8,720 | 14 | .02 | 36 | 7.4 | 6.9 | 1.7 | 131 | 25 | 3.5 | .0 | .4 | 160 | 120 | 13 | 261 | 7.8 | 5 |

a Discharge at time of sampling.
b Mean discharge for period Nov. 1-15.
c Mean discharge for period Dec. 1-15.
d Mean discharge for period Jan. 1-21.

## 4760. TANANA RIVER NEAR TANACROSS.--Continued

Temperature (°F) of water, water year October 1959 to September 1960
/Once-daily measurement between 4 p.m. and 6 p.m./

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jnne | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 42 | | | | | | -- | 43 | 48 | 58 | 53 | 48 |
| 2 | 40 | | | | | | -- | 43 | 48 | 53 | 56 | 45 |
| 3 | 39 | | 32 | | | | -- | 39 | 51 | 59 | 58 | 45 |
| 4 | 36 | 32 | | | | | -- | 42 | 52 | 56 | 55 | 38 |
| 5 | 38 | | | | | | -- | 38 | 52 | 57 | 56 | 39 |
| 6 | 35 | | | | | | -- | 42 | 53 | 58 | 58 | 45 |
| 7 | 33 | | | | | | -- | 47 | 55 | 53 | 56 | -- |
| 8 | 33 | | | | | | -- | 47 | 58 | 55 | 59 | 43 |
| 9 | -- | | | | | | -- | 43 | 58 | 54 | 56 | -- |
| 10 | 32 | | | | | | -- | 43 | 59 | 56 | 58 | 46 |
| 11 | -- | | | | | | -- | 47 | 58 | 59 | 60 | -- |
| 12 | -- | | | | | | -- | 47 | 59 | 59 | 63 | -- |
| 13 | -- | | | | | | -- | 48 | 55 | 61 | 62 | 45 |
| 14 | -- | | | | | | -- | 56 | 57 | 57 | 58 | 46 |
| 15 | -- | | | | | | -- | 56 | 56 | 57 | 58 | 46 |
| 16 | -- | | | | | | -- | 53 | 54 | 60 | 54 | 44 |
| 17 | -- | | | | | | -- | 54 | 54 | 56 | 50 | 40 |
| 18 | -- | | | | | | -- | 54 | 53 | 58 | 58 | 38 |
| 19 | -- | | | | | | 34 | 53 | -- | 60 | 53 | 43 |
| 20 | -- | | | | | | 32 | 51 | 58 | 59 | 52 | 40 |
| 21 | -- | | | | | | 32 | 53 | 56 | 59 | 55 | 41 |
| 22 | -- | | | | | | 40 | 54 | 58 | 62 | 52 | 43 |
| 23 | -- | | | | | | 41 | 62 | 60 | 56 | 51 | 38 |
| 24 | -- | | | | | | 42 | 59 | 60 | 58 | 50 | 40 |
| 25 | -- | | | | | | 44 | 63 | 60 | 56 | 50 | 38 |
| 26 | -- | | | | | | 38 | 58 | 63 | 58 | 48 | 37 |
| 27 | -- | | | | | | 41 | 58 | 60 | 55 | 49 | 41 |
| 28 | -- | | | | | | 43 | 54 | 63 | 55 | 48 | 41 |
| 29 | -- | | | | | | 44 | 53 | 59 | 58 | 45 | 39 |
| 30 | -- | | | | | | 43 | 49 | 59 | 53 | 46 | 39 |
| 31 | -- | | | | | | -- | 52 | -- | 58 | 47 | -- |
| Aver-age | -- | | | | | | -- | 50 | 56 | 57 | 54 | 42 |

## 4760. TANANA RIVER NEAR TANACROSS--Continued

Particle-size analyses of suspended sediment, May to September 1960
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

| Date of collection | Time | Discharge (cfs) | Water temperature (° F) | Suspended sediment | | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Concentration of suspension analysed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | | | |
| | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.350 | 0.500 | 1.000 | |
| May 21, 1960 .... | 2:00 p.m. | 26,100 | 53 | 978 | 2,560 | 19 | 22 | 31 | 42 | 52 | 65 | 78 | 97 | | 100 | | SPWCM |
| June 2 ..... | 7:00 a.m. | 33,700 | 47 | 987 | 2,120 | 30 | 34 | 41 | 48 | 55 | 67 | 78 | 95 | | 100 | | SPWCM |
| July 4..... | 4:00 p.m. | 55,900 | 57 | 1,150 | 3,420 | 28 | 35 | 41 | 51 | 61 | 73 | 84 | 96 | | 100 | | SPWCM |
| Aug. 3 ..... | 3:00 p.m. | a54,600 | 54 | 1,150 | 3,430 | 33 | 40 | 48 | 56 | 62 | 75 | 84 | 96 | | 100 | | SPWCM |
| Sept. 26..... | 5:30 p.m. | 9,100 | 38 | 430 | 1,720 | 35 | 37 | 39 | 44 | 50 | 67 | 76 | 95 | | 100 | | SBWCM |

a Daily mean discharge.

## 4760. TANANA RIVER NEAR TANACROSS--Continued

Suspended-sediment, April to September 1960

| Day | April | | | May | | | June | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean discharge (cfs) | Suspended sediment: Mean concentration (ppm) | Suspended sediment: Tons per day | Mean discharge (cfs) | Suspended sediment: Mean concentration (ppm) | Suspended sediment: Tons per day | Mean discharge (cfs) | Suspended sediment: Mean concentration (ppm) | Suspended sediment: Tons per day |
| 1 | -- | -- | -- | 4,900 | 633 | 8,370 | 13,000 | 994 | 34,900 |
| 2 | -- | -- | -- | 6,000 | 783 | 12,700 | 12,300 | 1,020 | 33,900 |
| 3 | -- | -- | -- | 7,700 | 1,670 | 34,700 | 11,000 | 843 | 25,000 |
| 4 | -- | -- | -- | 9,400 | 1,930 | 49,000 | 10,000 | 786 | 21,200 |
| 5 | -- | -- | -- | 12,000 | 2,350 | 76,100 | 9,400 | 624 | 15,800 |
| 6 | -- | -- | -- | 15,000 | 1,770 | 71,700 | 9,400 | 860 | 21,800 |
| 7 | -- | -- | -- | 18,000 | 1,170 | 56,900 | 10,000 | 528 | 14,200 |
| 8 | -- | -- | -- | 15,000 | 1,090 | 44,100 | 11,000 | 500 | 14,800 |
| 9 | -- | -- | -- | 14,000 | 926 | 35,000 | 12,000 | 522 | 16,900 |
| 10 | -- | -- | -- | 13,000 | 851 | 29,900 | 12,000 | 530 | 17,200 |
| 11 | -- | -- | -- | 11,000 | 788 | 23,400 | 11,000 | 491 | 14,600 |
| 12 | -- | -- | -- | 9,900 | 691 | 18,500 | 11,000 | 532 | 15,800 |
| 13 | -- | -- | -- | 8,620 | 621 | 14,400 | 10,200 | 549 | 15,100 |
| 14 | -- | -- | -- | 7,670 | 599 | a12,400 | 9,640 | 529 | 13,800 |
| 15 | -- | -- | -- | 7,220 | 585 | 11,400 | 8,950 | 531 | 12,800 |
| 16 | -- | -- | -- | 7,080 | 513 | a9,810 | 8,890 | 505 | 12,100 |
| 17 | -- | -- | -- | 7,250 | 448 | 8,770 | 8,860 | 512 | 12,200 |
| 18 | -- | -- | -- | 7,220 | 462 | 9,010 | 8,680 | 564 | 13,200 |
| 19 | -- | -- | -- | 7,110 | 667 | 12,800 | 9,100 | 573 | a14,100 |
| 20 | 2,170 | 52 | 305 | 8,120 | 842 | 18,500 | 10,300 | 697 | a19,400 |
| 21 | 2,110 | 52 | 296 | 9,430 | 691 | 17,600 | 12,900 | 1,060 | a36,900 |
| 22 | 2,140 | 53 | 306 | 8,740 | 616 | 14,500 | 13,600 | 1,280 | a47,000 |
| 23 | 2,130 | 54 | 318 | 8,320 | 620 | 13,900 | 13,800 | 1,330 | a49,600 |
| 24 | 2,230 | 58 | 349 | 7,670 | 606 | 12,500 | 13,700 | 1,320 | a48,800 |
| 25 | 2,400 | 65 | 421 | 9,190 | 840 | 20,800 | 15,000 | 1,450 | a58,700 |
| 26 | 2,500 | 63 | 425 | 11,900 | 1,580 | 50,800 | 15,100 | 1,570 | a64,000 |
| 27 | 2,700 | 97 | 707 | 14,100 | 1,860 | 70,800 | 15,200 | 1,560 | a64,000 |
| 28 | 2,900 | 113 | 885 | 13,000 | 1,680 | 59,000 | 16,000 | 1,650 | a71,300 |
| 29 | 3,300 | 124 | 1,100 | 14,000 | 1,370 | 51,800 | 17,000 | 1,820 | a83,500 |
| 30 | 3,800 | 470 | 4,820 | 14,000 | 1,050 | 39,700 | 17,600 | 1,930 | a91,700 |
| 31 | -- | -- | -- | 14,000 | 890 | 33,600 | -- | -- | -- |
| Total | 28,430 | -- | 9,932 | 320,540 | -- | 942,460 | 356,620 | -- | 974,300 |
| | July | | | August | | | September | | |
| 1 | 18,800 | 2,100 | a106,000 | 21,100 | 1,450 | 82,600 | 14,000 | 990 | 37,800 |
| 2 | 19,800 | 2,450 | 131,000 | 19,300 | 1,340 | 69,800 | 13,000 | 902 | 31,700 |
| 3 | 18,200 | 1,680 | 82,600 | 17,600 | 1,230 | 58,400 | 12,000 | 810 | 26,200 |
| 4 | 18,000 | 1,390 | 67,600 | 16,500 | 1,100 | 49,000 | 11,000 | 659 | a19,600 |
| 5 | 17,300 | 1,170 | 54,600 | 15,200 | 1,040 | 42,700 | 11,000 | 558 | 16,500 |
| 6 | 16,700 | 1,120 | 50,500 | 14,300 | 981 | 37,900 | 10,000 | 529 | 14,300 |
| 7 | 16,400 | 1,240 | 54,900 | 13,800 | 1,020 | 38,000 | 10,000 | 535 | a14,400 |
| 8 | 15,200 | 1,020 | 41,700 | 14,000 | 1,070 | 40,400 | 9,920 | 495 | 13,200 |
| 9 | 14,400 | 862 | 33,500 | 15,300 | 1,200 | 49,600 | 9,700 | 486 | a12,700 |
| 10 | 13,900 | 783 | 29,400 | 16,700 | 1,450 | 65,400 | 9,430 | 486 | 12,400 |
| 11 | 13,800 | 772 | 28,800 | 17,500 | 1,700 | 80,300 | 9,190 | 529 | a13,100 |
| 12 | 13,600 | 972 | 35,700 | 17,000 | 1,640 | 75,300 | 9,280 | 632 | a15,800 |
| 13 | 13,700 | 880 | 32,600 | 16,400 | 1,330 | 58,900 | 9,610 | 783 | 20,300 |
| 14 | 14,200 | 747 | 28,600 | 17,700 | 1,390 | 66,400 | 10,400 | 905 | 25,400 |
| 15 | 15,500 | 1,000 | 41,800 | 20,600 | 2,100 | 117,000 | 11,500 | 837 | 26,000 |
| 16 | 16,700 | 1,260 | 56,800 | 23,200 | 3,010 | 188,000 | 12,700 | 1,040 | 35,700 |
| 17 | 19,300 | 1,740 | 90,700 | 23,800 | 2,790 | 179,000 | 13,400 | 1,370 | 49,600 |
| 18 | 21,200 | 2,160 | 124,000 | 21,800 | 2,160 | 127,000 | 13,200 | 1,360 | 48,500 |
| 19 | 21,600 | 1,930 | 112,000 | 20,600 | 1,650 | 91,800 | 12,800 | 1,210 | 41,800 |
| 20 | 21,400 | 1,750 | 101,000 | 19,000 | 1,440 | 73,900 | 12,400 | 1,050 | 35,200 |
| 21 | 19,300 | 1,540 | 80,200 | 18,000 | 1,320 | 64,200 | 11,500 | 829 | 25,800 |
| 22 | 18,800 | 1,320 | 67,000 | 17,000 | 1,490 | 68,400 | 10,000 | 653 | 17,600 |
| 23 | 21,000 | 2,210 | 125,000 | 16,000 | 1,490 | 64,400 | 9,600 | 562 | 14,600 |
| 24 | 23,200 | 2,760 | 173,000 | 15,000 | 1,220 | a49,400 | 8,900 | 443 | 10,600 |
| 25 | 24,600 | 2,610 | 173,000 | 15,000 | 886 | 35,900 | 8,400 | 378 | 8,570 |
| 26 | 23,700 | 2,200 | 141,000 | 14,000 | 848 | 32,000 | 7,890 | 351 | 7,480 |
| 27 | 21,800 | 1,680 | 98,900 | 14,000 | 1,720 | 65,000 | 7,580 | 367 | 7,510 |
| 28 | 21,100 | 1,470 | 83,700 | 14,000 | 1,750 | 66,200 | 7,360 | 362 | 7,190 |
| 29 | 21,700 | 1,540 | 90,200 | 15,000 | 1,220 | a49,400 | 7,250 | 362 | 7,090 |
| 30 | 21,400 | 1,420 | 82,000 | 15,000 | 1,240 | 50,200 | 7,140 | 329 | 6,340 |
| 31 | 20,700 | 1,400 | 78,200 | 14,000 | 1,130 | 42,700 | -- | -- | -- |
| Total | 577,000 | -- | 2,496,000 | 528,400 | -- | 2,179,200 | 310,150 | -- | 622,780 |

Total discharge for period April to September (cfs-days) ..... 2,121,140
Total load for period April to September (tons) ..... 7,234,604

a Computed from estimated concentration graph.

## 4840. Salcha River near Salchaket

Location.--Lat 64°28'15", long 146°55'45", in sec.22, T.5 S., R.4 E., near right bank on downstream side of bridge on Richardson Highway, half a mile east of Aurora Lodge 2 miles upstream from mouth, and 6 miles southeast of Salchaket.

Drainage area.--2,170 sq mi, approximately.

Records available.--Discharge: July 1909 to August 1910 (no winter records), October 1948 to September 1960. Published as "at mouth" 1909-10.
Chemical analyses: October 1957 to May 1958.

Gage.--Water-stage recorder. Datum of gage is 631.85 ft above mean sea level. July 1909 to August 1910 staff gage at site 1¼ miles downstream at different datum. Sept. 7, 1948, to Apr. 24, 1953, wire-weight gage at present site and datum.

Average discharge.--12 years (1948-60), 1,617 cfs (1,171,000 acre-ft per year).

Extremes.--Maximum discharge not determined, occurred May 2 or 3; maximum gage height, 19.6 ft May 2 or 3, from floodmarks (ice jam); minimum discharge not determined.
1909-10, 1948-60: Maximum discharge, 36,500 cfs June 23, 1956 (gage height, 16.13 ft), from rating curve extended above 16,000 cfs by logarithmic plotting; maximum gage height, that of May 2 or 3, 1960; minimum discharge not determined.

Remarks.--Records good except those for period of no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,800 | | | | | (*) | | | 5,120 | 1,770 | 1,800 | 4,000 |
| 2 | 1,860 | | | | | | | | 4,520 | 4,300 | 2,280 | 3,670 |
| 3 | 2,130 | | | | | | | | 3,150 | 3,700 | 1,980 | 3,340 |
| 4 | *2,320 | | | | | | | | 2,260 | 4,060 | 1,750 | 3,170 |
| 5 | 2,280 | (*) | | | | | | | 1,750 | 3,430 | 1,590 | 3,300 |
| 6 | 2,140 | | | | | | | 8,400 | 1,440 | 2,910 | 1,460 | 3,410 |
| 7 | 1,850 | | | | | | 200 | | 1,210 | 2,550 | 1,360 | 3,300 |
| 8 | 1,580 | 500 | 410 | 380 | 300 | | (*) | | 1,110 | 2,260 | 1,300 | 3,090 |
| 9 | 1,500 | | | | | | | | 1,090 | 2,340 | 1,250 | 2,960 |
| 10 | 1,300 | | | | | | | | 1,070 | 2,790 | 1,200 | *2,880 |
| 11 | 1,200 | | (*) | | | | | | 1,020 | 2,900 | 1,180 | 2,730 |
| 12 | 1,100 | | | | | | | *2,020 | *970 | 2,370 | 1,130 | 2,600 |
| 13 | 1,000 | | | | | | | 1,700 | 1,480 | 1,970 | 1,090 | 2,720 |
| 14 | 980 | | | | | | | 1,740 | 3,590 | 1,730 | 1,070 | 3,490 |
| 15 | 940 | | | | | | | 2,220 | 3,410 | 1,560 | 1,080 | 3,960 |
| 16 | 910 | | | | | 220 | | 2,690 | 2,630 | 1,500 | 1,350 | 3,700 |
| 17 | 890 | | | | | | | 2,480 | 2,050 | 1,920 | 1,750 | 3,410 |
| 18 | 860 | | | | | | | 2,130 | 1,760 | 1,950 | 1,810 | 3,400 |
| 19 | 840 | | | | | | | 1,650 | 1,760 | 1,730 | 1,820 | 3,250 |
| 20 | 820 | | | | | | | 1,060 | 1,560 | 1,570 | 1,850 | 2,880 |
| 21 | 820 | | | | | | | 1,020 | 1,420 | 1,450 | 2,460 | 2,730 |
| 22 | 840 | | | | | | | 1,150 | 1,280 | 1,350 | 2,910 | 2,660 |
| 23 | 870 | 450 | 380 | 320 | 260 | | 310 | 2,240 | 1,230 | 1,270 | 2,740 | 2,650 |
| 24 | 900 | | | | | | | 2,630 | 1,470 | 1,250 | 2,530 | 2,620 |
| 25 | 920 | | | | | | | 2,910 | 1,350 | 1,250 | 2,490 | 2,550 |
| 26 | 900 | | | | | | | 2,990 | 1,230 | 1,240 | 3,010 | 2,420 |
| 27 | 860 | | | | | | | 2,700 | 1,130 | *1,240 | 2,840 | 2,320 |
| 28 | 780 | | | | | | | 1,790 | 1,070 | 1,530 | 3,530 | 3,370 |
| 29 | 700 | | | | | | | 1,440 | 1,060 | 1,540 | 5,590 | 4,630 |
| 30 | 650 | | | | ------- | | | 1,360 | 1,170 | 1,430 | 5,210 | 4,790 |
| 31 | 620 | ------- | | | ------- | | ------- | 1,700 | ------- | 1,420 | 4,500 | ------- |
| Total | 37,160 | 14,250 | 12,230 | 10,820 | 8,140 | 6,820 | 7,650 | 132,020 | 55,360 | 64,280 | 67,910 | 96,000 |
| Mean | 1,199 | 475 | 395 | 349 | 281 | 220 | 255 | 4,259 | 1,845 | 2,074 | 2,191 | 3,200 |
| Ac-ft | 73,710 | 28,260 | 24,260 | 21,460 | 16,150 | 13,530 | 15,170 | 261,900 | 109,800 | 127,500 | 134,700 | 190,400 |

Calendar year 1959: Max 17,800 Min - Mean 1,553 Ac-ft 1,124,000
Water year 1959-60: Max - Min - Mean 1,401 Ac-ft 1,017,000

Peak discharge (base, 10,000 cfs).--May 2 or 3 (time and discharge unknown).

* Discharge measurement made on this day.

Note.--No gage-height record Oct. 9 to May 11 (stage-discharge relation affected by ice during most of period); discharge estimated on basis of 5 discharge measurements, weather records, and records for Chena River at Fairbanks.

## 5140. Chena River at Fairbanks

Location.--Lat 64°50'50", long 147°42'20", in NW¼ sec.11, T.1 S., R.1 W., on downstream side of second pier from right bank of bridge on Steese Highway (U.S. Highway 97) in Fairbanks, 0.15 mile upstream from Noyes Slough, 11 miles upstream from mouth, and 11 miles downstream from Chena Slough.

Drainage area.--1,980 sq mi, approximately.

Records available.--Discharge: July 1947 to September 1948 (no winter records), October 1948 to September 1960.
Chemical analyses: May to September 1953, April to September 1955, October 1957 to May 1958.
Water temperatures: May to September 1953.
Sediment records: January to August 1954, April to September 1955 (periodic).

Gage.--Wire-weight gage. Datum of gage is 422.72 ft above mean sea level. Prior to May 3, 1948, staff gage and May 4, 1948, to Nov. 17, 1957, wire-weight gage at bridge 0.5 mile downstream at datum 0.96 ft higher. Nov. 18, 1957, to May 1, 1960, water-stage recorder at same site and datum.

Average discharge.--12 years, 1,344 cfs (973,000 acre-ft per year).

Extremes.--Maximum discharge during year, 19,900 cfs May 3 (gage height, 12.84 ft, from floodmarks); minimum daily, 242 cfs Mar. 29.
1947-60: Maximum discharge, 24,200 cfs May 21, 1948 (gage height, 14.17 ft, site and datum then in use, from graph based on gage readings); minimum not determined.
Flood in August 1930 reached a stage of about 15.2 ft, present datum, from information by local residents. Flood of May 11-14, 1937, reached a stage of 15.9 ft, present datum, ice jam, from floodmarks.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,620 | 820 | 500 | 465 | 373 | *282 | 250 | 2,500 | 1,350 | 894 | 1,030 | 2,340 |
| 2 | *1,670 | 600 | 495 | 465 | 373 | 274 | 250 | a7,000 | 1,900 | 926 | 1,290 | 2,210 |
| 3 | 2,020 | 780 | 480 | 465 | 373 | 262 | 254 | 16,300 | 2,080 | 1,290 | 1,490 | 2,080 |
| 4 | 2,340 | 760 | 480 | 465 | 368 | 258 | 250 | 11,600 | 1,690 | 1,580 | 1,450 | 1,960 |
| 5 | 2,430 | *740 | 480 | 465 | 368 | 250 | 254 | 7,660 | 1,430 | 1,670 | 1,380 | 1,890 |
| 6 | 2,340 | 720 | 465 | 470 | 378 | 246 | *254 | 6,700 | 1,300 | 1,690 | 1,270 | 1,960 |
| 7 | 2,190 | 700 | 455 | 455 | 364 | 246 | 254 | 6,070 | 1,210 | 1,550 | 1,200 | 2,010 |
| 8 | 1,950 | 680 | 445 | 450 | 337 | 246 | 258 | 4,540 | 1,120 | 1,470 | 1,140 | 1,970 |
| 9 | 1,780 | 660 | 445 | 485 | 332 | 246 | 254 | 3,560 | 1,050 | 1,430 | 1,090 | 1,890 |
| 10 | 1,650 | 650 | *445 | 475 | 332 | 246 | 258 | 3,060 | 1,020 | 1,360 | 1,070 | *1,880 |
| 11 | 1,500 | 640 | 445 | 490 | 328 | 250 | 258 | *2,880 | 974 | 1,280 | 1,020 | 1,870 |
| 12 | 1,400 | 630 | 435 | 480 | 328 | 254 | 262 | 2,580 | *950 | 1,210 | 990 | 1,820 |
| 13 | 1,300 | 620 | 440 | 450 | 319 | 254 | 266 | a2,400 | 1,030 | 1,180 | 958 | 1,820 |
| 14 | 1,200 | 600 | 440 | 450 | 314 | 254 | 266 | a2,400 | 1,090 | 1,090 | 926 | 1,970 |
| 15 | 1,200 | 590 | 455 | 450 | 314 | 258 | 270 | a2,500 | 1,190 | 1,040 | 910 | 2,420 |
| 16 | 1,100 | 580 | 455 | 425 | 310 | 266 | 274 | 2,410 | 1,430 | 1,010 | 1,010 | 2,620 |
| 17 | 1,100 | 560 | 450 | 420 | 310 | 266 | 278 | 2,290 | 1,580 | 998 | 1,200 | 2,490 |
| 18 | 1,100 | 550 | 450 | 415 | 310 | 262 | 282 | 2,040 | 1,560 | 982 | 1,270 | 2,440 |
| 19 | 1,000 | 540 | 445 | *405 | 306 | 254 | 286 | 1,830 | 1,420 | 974 | 1,250 | 2,530 |
| 20 | 1,000 | 530 | 445 | 400 | 306 | 246 | 290 | 1,630 | 1,290 | 950 | 1,220 | 2,420 |
| 21 | 1,000 | 530 | 440 | 396 | 306 | 250 | 290 | 1,530 | 1,200 | 918 | 1,210 | 2,290 |
| 22 | 1,000 | 530 | 430 | 386 | 302 | 254 | 294 | 1,380 | 1,120 | 878 | 1,300 | 2,160 |
| 23 | 1,100 | 540 | 430 | 382 | 306 | 254 | 302 | 1,330 | 1,080 | 870 | 1,420 | 2,090 |
| 24 | 1,100 | 540 | 420 | 378 | 302 | 250 | 306 | 1,350 | 1,020 | 856 | 1,460 | 2,020 |
| 25 | 1,200 | 550 | 410 | 378 | 302 | 246 | 319 | 1,460 | 966 | 856 | 1,430 | 1,950 |
| 26 | 1,200 | 550 | 405 | 373 | 302 | 246 | 332 | 1,620 | 974 | 856 | 1,470 | 1,870 |
| 27 | 1,100 | 540 | 405 | 368 | 294 | 246 | 360 | 1,660 | 942 | *856 | 1,560 | 1,850 |
| 28 | 1,000 | 530 | 410 | 364 | 290 | 250 | 405 | 1,490 | 918 | 870 | 1,620 | 2,420 |
| 29 | 930 | 520 | 485 | 364 | 290 | 242 | 538 | 1,370 | 902 | 918 | 1,980 | 4,860 |
| 30 | 870 | 510 | 475 | 368 | ------- | 246 | 1,040 | 1,290 | 894 | 942 | 2,580 | 6,440 |
| 31 | 830 | ------- | 470 | 373 | ------- | 246 | ------- | 1,270 | ------- | 934 | 2,600 | ------- |
| Total | 43,220 | 18,490 | 13,930 | 13,175 | 9,437 | 7,850 | 9,454 | 107,700 | 36,680 | 34,328 | 41,794 | 70,560 |
| Mean | 1,394 | 616 | 449 | 425 | 325 | 253 | 315 | 3,474 | 1,223 | 1,107 | 1,348 | 2,352 |
| Ac-ft | 85,730 | 36,670 | 27,630 | 26,130 | 18,720 | 15,570 | 18,750 | 213,600 | 72,750 | 68,090 | 82,900 | 140,000 |

Calendar year 1959: Max - Min 146 Mean 1,352 Ac-ft 979,200
Water year 1959-60: Max 16,300 Min 242 Mean 1,111 Ac-ft 806,500

Peak discharge (base, 5,000 cfs).--May 3 (2 to 3 a.m.), 19,900 cfs (12.84 ft); Sept. 30 (9 p.m.) 6,700 cfs (6.90 ft).

* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of weather records and records for Salcha River near Salchaket.
Note.--Stage-discharge relation affected by ice Oct. 13 to Apr. 29 (no gage-height record Oct. 17 to Nov. 4; discharge estimated on basis of 1 discharge measurement and weather records).

## 5160. Nenana River near Windy

Location.--Lat 63°27'15", long 148°48'10", on left bank 400 ft upstream from bridge on Denali Highway, three-quarters of a mile upstream from Jack River, 1 mile southeast of Windy railroad station, and 2 miles downstream from Schist Creek.

Drainage area.--710 sq mi, approximately.

Records available.--Discharge: June 1950 to September 1956, October 1958 to September 1960. Sediment records: June to July 1960 (periodic).

Gage.--Water-stage recorder. Altitude of gage is 2,100 ft (from topographic map). Prior to July 27, 1950, staff gage, July 27, 1950, to Sept. 30, 1956, October 1958 to June 3, 1959, water-stage recorder on right bank, 300 ft downstream at same datum.

Average discharge.--8 years, 1,178 cfs (852,800 acre-ft per year).

Extremes.--Maximum discharge during year, 7,500 cfs Sept. 12 (gage height, 8.33 ft); minimum daily, 178 cfs Apr. 25-29.
1950-56, 1958-60: Maximum discharge, 7,640 cfs Aug. 25, 1955; maximum gage height, 8.33 ft Sept. 12, 1960.

Remarks.--Records good except those for periods of ice effect, which are poor. Some diurnal fluctuation caused by glacier melt at the source.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,450 | 680 | 370 | 360 | 269 | 221 | 236 | 300 | 1,580 | 2,520 | 3,090 | 1,750 |
| 2 | 1,480 | 660 | 360 | 370 | 272 | 218 | 245 | 499 | 1,380 | 3,100 | *3,060 | 1,850 |
| 3 | 1,380 | 630 | 350 | 380 | 272 | 212 | 251 | 798 | 1,260 | 2,280 | 2,930 | 1,880 |
| 4 | 1,310 | 620 | 340 | 390 | 272 | 212 | 257 | 1,500 | 1,220 | 1,960 | 2,760 | 1,790 |
| 5 | 1,190 | 610 | 340 | 390 | 269 | 209 | 266 | 1,300 | 1,200 | 1,770 | 2,930 | 1,730 |
| 6 | 1,130 | 610 | 330 | 380 | 272 | 203 | 257 | 1,100 | 1,230 | 1,580 | 3,300 | 1,790 |
| 7 | 1,010 | 600 | 320 | 370 | 269 | 209 | 248 | 1,350 | 1,260 | 1,530 | 3,640 | 1,750 |
| 8 | 944 | 590 | 320 | 350 | 272 | 206 | 248 | 1,800 | 1,270 | 1,570 | 3,280 | 1,940 |
| 9 | 906 | 560 | 320 | 340 | 269 | 212 | 248 | 2,400 | 1,330 | 1,510 | 2,940 | 2,210 |
| 10 | 858 | 520 | 320 | 320 | 266 | 221 | 236 | 1,900 | 1,300 | 1,440 | 2,640 | 2,170 |
| 11 | 834 | 500 | 320 | 310 | 266 | 227 | 236 | 1,650 | 1,430 | 1,450 | 2,450 | 2,360 |
| 12 | 906 | 500 | 320 | 300 | 263 | 233 | 230 | 1,550 | 1,460 | 1,450 | 2,410 | 5,610 |
| 13 | 882 | 510 | 330 | 290 | 260 | *233 | 221 | 1,500 | 1,390 | 1,530 | 2,340 | 6,940 |
| 14 | 846 | 520 | 340 | 290 | 257 | 233 | 218 | 2,510 | 1,500 | 1,630 | 2,320 | 5,060 |
| 15 | 804 | 540 | 350 | 280 | 260 | 233 | 209 | 3,740 | 1,470 | 1,830 | 2,230 | *3,630 |
| 16 | 762 | 550 | 350 | 280 | 248 | 236 | 206 | 4,190 | 1,450 | 1,980 | 2,260 | 3,010 |
| 17 | 740 | 540 | 350 | 280 | 242 | 233 | 200 | 4,190 | 1,600 | 1,710 | 2,450 | 2,660 |
| 18 | 715 | 530 | 340 | 280 | 242 | 233 | 198 | 3,920 | 1,520 | 1,750 | 2,610 | 2,300 |
| 19 | 700 | 500 | 340 | 290 | 245 | 242 | 192 | *3,530 | 1,370 | 1,820 | 2,870 | 2,040 |
| 20 | 720 | 470 | 350 | 310 | 245 | 248 | 195 | 3,070 | 1,360 | 1,950 | 2,550 | 1,920 |
| 21 | 750 | 450 | 360 | 320 | 242 | 248 | 188 | 2,800 | 1,420 | 2,090 | 2,280 | 1,830 |
| 22 | 774 | 450 | 370 | 320 | 248 | 257 | 185 | 2,940 | 1,500 | 1,990 | 2,020 | 2,110 |
| 23 | 810 | 460 | 380 | 320 | 254 | 251 | 188 | 3,950 | 1,730 | 1,810 | 1,920 | 2,330 |
| 24 | 834 | 470 | 380 | 300 | 251 | 245 | 180 | 5,480 | 1,710 | 1,730 | 1,880 | 2,260 |
| 25 | 840 | 470 | 380 | 280 | 245 | 245 | 178 | 5,890 | 1,580 | 2,250 | 1,840 | 2,060 |
| 26 | 822 | 470 | 350 | 263 | 242 | 236 | *178 | 6,090 | 1,670 | 3,110 | 1,730 | 1,840 |
| 27 | 798 | 460 | 320 | 257 | 242 | 233 | 178 | 4,070 | 1,540 | 3,220 | 2,400 | 1,700 |
| 28 | 768 | 440 | 320 | *251 | 236 | 230 | 178 | 3,040 | 1,540 | 3,310 | 2,720 | 1,680 |
| 29 | 750 | 420 | 330 | 263 | 227 | 230 | 178 | 2,590 | 1,570 | 3,330 | 2,320 | 1,700 |
| 30 | 725 | 390 | 340 | 269 | ------- | 230 | 180 | 2,340 | 1,700 | 3,460 | 2,040 | 1,650 |
| 31 | *710 | ------- | 350 | 272 | ------- | 233 | ------- | 1,880 | ------- | 3,180 | 1,880 | ------- |
| Total | 28,148 | 15,720 | 10,620 | 9,675 | 7,417 | 7,112 | 6,408 | 83,867 | 43,540 | 65,840 | 78,090 | 73,550 |
| Mean | 908 | 524 | 343 | 312 | 256 | 229 | 214 | 2,705 | 1,451 | 2,124 | 2,519 | 2,452 |
| Ac-ft | 55,830 | 31,180 | 21,060 | 19,190 | 14,710 | 14,110 | 12,710 | 166,300 | 86,360 | 130,600 | 154,900 | 145,900 |

Calendar year 1959: Max 4,220 Min - Mean 1,191 Ac-ft 862,100
Water year 1959-60: Max 6,940 Min 178 Mean 1,175 Ac-ft 852,800

Peak discharge (base, 4,200 cfs).--May 26 (2 a.m.) 7,090 cfs (7.56 ft); Sept. 12 (11 p.m.) 7,500 cfs (8.33 ft).

* Discharge measurement made on this day.
Note.--Stage-discharge relation affected by ice Oct. 15-17, Oct. 20 to May 14.

## 5160. NENANA RIVER NEAR WINDY--Continued

Periodic determinations of suspended-sediment discharge, June and July, 1960

| Date | Mean discharge (cfs) | Suspended sediment | |
|---|---|---|---|
| | | Mean concentration (ppm) | Discharge (tons per day) |
| June 6, 1960 | 1,230 | 56 | 18[3] |
| July 5 | 1,770 | 97 | 464 |

## 5180. Nenana River near Healy

Location.--Lat 63°50'40", long 148°56'35", in W½ sec.28, T.12 S., R.7 W., on right bank half a mile upstream from Healy Creek, 1.1 miles southeast of Healy, and 1.2 miles upstream from railroad bridge.

Drainage area.--1,910 sq mi, approximately.

Records available.--Discharge: October 1950 to September 1960.
Chemical analyses: October 1953 to September 1955, May 1956 to September 1957, May 1958 to September 1960.
Water temperatures: May 1957 to September 1960 (seasonal 1956-60).
Sediment records: 1953-60 (summer months only).

Gage.--Water-stage recorder. Datum of gage is 1,270.22 ft above mean sea level.

Average discharge.--10 years, 3,547 cfs (2,568,000 acre-ft per year).

Extremes.--Maximum discharge during year, 20,500 cfs May 26 (gage height, 9.26 ft, from floodmarks); minimum not determined.
1950-60: Maximum discharge, 28,500 cfs July 29, 1952; maximum gage height, 10.86 ft Aug. 25, 1955; minimum discharge not determined.
1959-60: Maximum water temperature, 52°F July 14. Maximum daily sediment concentration, 2,440 ppm May 23. Maximum daily sediment load, 101,000 tons May 26.
1957-60: Maximum water temperature, 56°F Aug. 9, 1957.
1953-60: Maximum daily sediment concentration, 7,910 ppm June 25, 1953. Maximum daily sediment load, 585,000 tons July 25, 1953.

Remarks.--Records fair except those for periods of ice effect or no gage-height record, which are poor. Some diurnal fluctuation caused by glacier melt at source. Records of specific conductance of daily samples available in district office, Quality of Water Branch, Palmer, Alaska.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4,860 | | | | | | | | 5,900 | 9,090 | 9,300 | 4,660 |
| 2 | 4,760 | | | | | | | | 4,830 | 12,000 | *9,000 | 4,690 |
| 3 | 4,410 | | | | | | | | 4,320 | 10,300 | 8,850 | 4,740 |
| 4 | 4,210 | | | | | | | | 4,130 | 8,830 | 8,380 | 4,520 |
| 5 | 3,840 | | | | | | | | 4,080 | 7,800 | 8,580 | 4,300 |
| 6 | 3,410 | | | | | | | | 4,280 | 6,730 | 9,610 | 4,170 |
| 7 | 2,950 | | | | | | | | 4,520 | 6,050 | 11,600 | 4,060 |
| 8 | 2,740 | 1,400 | 750 | 760 | 580 | 480 | 590 | | 4,710 | 5,300 | 10,800 | 4,170 |
| 9 | 2,580 | | | | | | | | 5,050 | 5,170 | 9,640 | 4,660 |
| 10 | 2,420 | | | | | | | 4,300 | 5,000 | 5,220 | 8,790 | 4,740 |
| 11 | 2,310 | | | | | | | | 5,220 | 5,620 | 8,520 | 5,320 |
| 12 | 2,500 | | | | | | | | 5,600 | 5,840 | 8,500 | 11,200 |
| 13 | 2,350 | | | | | (*) | | | 5,540 | 6,310 | 8,470 | 16,100 |
| 14 | 2,210 | | | | | | | | 5,440 | 6,810 | 8,470 | 12,800 |
| 15 | 2,110 | | | | | | | | 5,440 | 7,460 | 7,960 | *10,000 |
| 16 | 2,010 | | | | | | | | 5,440 | 7,830 | 7,570 | 8,500 |
| 17 | 1,950 | | | | | | | | 5,470 | 7,490 | 7,490 | 7,570 |
| 18 | 1,860 | | | | | | | | 5,520 | 7,800 | 8,020 | 6,730 |
| 19 | 1,790 | | | | | | | *6,490 | 5,470 | 8,240 | 8,080 | 6,030 |
| 20 | 1,860 | | | | | | | 5,900 | 5,440 | 8,270 | 7,520 | 5,570 |
| 21 | 1,910 | | | | | | | 5,200 | 5,570 | 8,550 | 6,760 | 5,240 |
| 22 | 2,000 | | | | 540 | | | 5,600 | 5,800 | 8,470 | 6,100 | 5,370 |
| 23 | 2,050 | 1,100 | 770 | 620 | | 550 | 570 | 8,600 | 6,050 | 7,540 | 5,920 | 5,720 |
| 24 | 2,100 | | | | | | | 13,000 | 6,310 | 7,320 | 5,800 | 5,570 |
| 25 | 2,100 | | | | | | | 15,000 | 6,440 | 8,520 | 5,420 | 5,120 |
| 26 | 2,050 | | | | | | (*) | 17,000 | 6,570 | 9,980 | 5,140 | 4,570 |
| 27 | 2,000 | | | | | | | 12,000 | 6,700 | 10,300 | 6,160 | 4,390 |
| 28 | 1,910 | | | | | | | *9,670 | 6,570 | 10,200 | 6,970 | 4,260 |
| 29 | 1,870 | | | (*) | | | | 8,730 | 6,490 | 10,000 | 6,050 | 4,320 |
| 30 | 1,800 | | | | ------- | | | 8,080 | 6,490 | 11,000 | 5,420 | 4,130 |
| 31 | *1,700 | ------- | | | ------- | | ------- | 7,030 | ------- | 10,000 | 4,950 | ------- |
| Total | 78,600 | 37,500 | 23,570 | 21,320 | 16,260 | 16,000 | 17,400 | 199,700 | 164,390 | 250,140 | 239,840 | 183,220 |
| Mean | 2,535 | 1,250 | 760 | 688 | 561 | 516 | 580 | 6,442 | 5,480 | 8,069 | 7,737 | 6,107 |
| Ac-ft | 155,900 | 74,380 | 46,750 | 42,290 | 32,250 | 31,740 | 34,510 | 396,100 | 326,100 | 496,100 | 475,700 | 363,400 |

Calendar year 1959: Max 16,000 Min - Mean 3,602 Ac-ft 2,608,000
Water year 1959-60: Max 17,000 Min - Mean 3,410 Ac-ft 2,475,000

Peak discharge (base, 12,000 cfs).--May 26 (5 a.m.) 20,500 cfs (9.26 ft); July 2 (9 a.m.) 12,900 cfs (7.84 ft); July 30 (time unknown) 12,000 cfs (7.71 ft); Aug. 7 (2 p.m.) 12,000 cfs (7.66 ft); Sept. 13 (9 a.m.) 17,000 cfs (8.76 ft).

* Discharge measurement made on this day.

Note.--Stage-discharge relation affected by ice from about Oct. 16 to about May 15 (no gage-height record Dec. 17 to May 15, except occasional days; discharge estimated on basis of 4 discharge measurements, weather records, and records for Matanuska River at Palmer). No gage-height record May 16-18, 20-27, July 29-31, Aug. 1; discharge estimated on basis of 3 discharge measurements, weather records, and records for station near Windy.

## 5180. NENANA RIVER NEAR HEALY--Continued

Chemical analyses, in parts per million, April to September 1960

| Date of collection | Mean discharge (cfs) | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (calculated) | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr. 26, 1960 | a 566 | 11 | 0.09 | 34 | 3.8 | 4.0 | 1.5 | 100 | 19 | 4.0 | 0.1 | 0.2 | 127 | 100 | 18 | 217 | 7.6 | 0 |
| May 1-6 | b 4,300 | 6.2 | .10 | 23 | 6.7 | 3.1 | 1.7 | 75 | 26 | .5 | .2 | .6 | 106 | 85 | 24 | 181 | 7.7 | 20 |
| May 7-13 | b 4,300 | 6.0 | .12 | 17 | 4.0 | 2.9 | 1.7 | 58 | 16 | 1.0 | .1 | .6 | 77 | 59 | 12 | 137 | 7.5 | 30 |
| May 14-20 | 4,840 | 5.7 | .12 | 17 | 5.0 | 2.0 | 1.3 | 56 | 20 | .5 | .2 | .4 | 80 | 63 | 17 | 144 | 7.6 | 20 |
| May 21-29 | 10,500 | 5.5 | .09 | 21 | 2.8 | 2.3 | 2.0 | 59 | 20 | .5 | .2 | .3 | 84 | 64 | 16 | 145 | 7.9 | 10 |
| May 30-31 | 7,560 | 3.8 | .03 | 23 | 9.8 | 3.1 | 2.0 | 70 | 42 | 3.0 | .2 | .3 | 121 | 98 | 40 | 192 | 7.9 | 0 |
| June 1-10 | 4,680 | 5.5 | .03 | 23 | 11 | 3.2 | 1.7 | 74 | 41 | 4.5 | .2 | .5 | 127 | 102 | 42 | 203 | 7.8 | 0 |
| June 11-20 | 5,460 | 5.2 | .03 | 23 | 10 | 3.2 | 1.6 | 71 | 41 | 2.5 | .2 | .4 | 122 | 98 | 40 | 196 | 7.6 | 5 |
| June 21-26 | 6,120 | 5.0 | .03 | 21 | 11 | 2.7 | 1.8 | 68 | 40 | 3.5 | .1 | .2 | 118 | 98 | 42 | 185 | 7.9 | 5 |
| June 27, 29, 30 | 6,560 | 5.5 | .03 | 25 | 14 | 3.1 | 2.3 | 97 | 38 | 4.0 | .2 | .3 | 140 | 120 | 40 | 240 | 7.4 | 5 |
| July 1-10 | 7,650 | 5.5 | .03 | 22 | 12 | 3.4 | 2.1 | 72 | 44 | 3.5 | .2 | .3 | 128 | 104 | 46 | 192 | 7.6 | 5 |
| July 11-20 | 7,170 | 5.6 | .02 | 26 | 5.2 | 2.3 | 2.5 | 67 | 35 | 1.0 | .0 | .1 | 111 | 86 | 32 | 185 | 7.7 | 0 |
| July 21-30 | 9,190 | 5.0 | .02 | 27 | 4.5 | 2.4 | 3.0 | 70 | 37 | 1.5 | .0 | .0 | 114 | 86 | 28 | 193 | 7.8 | 0 |
| July 31 | 10,000 | -- | -- | -- | 3.2 | -- | -- | 101 | -- | -- | -- | -- | -- | 159 | 76 | 262 | 7.0 | -- |
| Aug. 1-10 | 9,460 | 6.0 | .02 | 27 | 4.8 | 2.5 | 1.9 | 66 | 37 | 2.0 | .2 | .4 | 114 | 87 | 33 | 189 | 7.8 | 0 |
| Aug. 11-20 | 8,060 | 5.7 | .02 | 26 | 5.5 | 2.6 | 2.0 | 66 | 37 | 3.0 | .1 | .4 | 114 | 88 | 34 | 191 | 7.8 | 0 |
| Aug. 21-31 | 5,880 | 6.3 | .02 | 28 | 6.7 | 3.0 | 1.6 | 72 | 42 | 1.5 | .2 | .2 | 124 | 98 | 38 | 209 | 7.5 | 0 |
| Sept. 1-10 | 4,470 | 7.1 | .02 | 31 | 6.2 | 3.5 | 1.4 | 80 | 42 | 1.5 | .1 | .3 | 133 | 103 | 38 | 219 | 7.8 | 0 |
| Sept. 11-16 | 10,700 | 7.8 | .02 | 28 | 6.4 | 3.5 | 1.6 | 75 | 42 | 1.5 | .1 | .2 | 128 | 96 | 35 | 212 | 7.6 | 0 |

a Discharge at time of sampling.
b Mean discharge for the period May 1-18.

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## 5180. NENANA RIVER NEAR HEALY--Continued

Temperature (°F) of water, May to September 1960
(Once-daily measurement at approximately 4 p.m.)

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | 38 | 44 | 49 | 48 | 44 |
| 2 | | | | | | | | 38 | 45 | 48 | 49 | 43 |
| 3 | | | | | | | | 38 | 46 | 48 | 48 | 43 |
| 4 | | | | | | | | 38 | 46 | 47 | 49 | 44 |
| 5 | | | | | | | | 36 | 47 | 46 | 50 | 40 |
| 6 | | | | | | | | 37 | 48 | 44 | 50 | 39 |
| 7 | | | | | | | | 37 | 47 | 45 | 49 | 38 |
| 8 | | | | | | | | 39 | 47 | 47 | 49 | 39 |
| 9 | | | | | | | | 39 | 46 | 48 | 50 | 41 |
| 10 | | | | | | | | 40 | 46 | 48 | 48 | 43 |
| 11 | | | | | | | | 40 | 47 | 49 | 48 | 42 |
| 12 | | | | | | | | 42 | 46 | 49 | 49 | 44 |
| 13 | | | | | | | | 42 | 45 | 50 | 48 | 45 |
| 14 | | | | | | | | 42 | 45 | 52 | 49 | 46 |
| 15 | | | | | | | | 43 | 44 | 51 | 48 | 45 |
| 16 | | | | | | | | 42 | 45 | 49 | 48 | 42 |
| 17 | | | | | | | | 43 | 46 | 50 | 47 | -- |
| 18 | | | | | | | | 43 | 46 | 48 | 48 | -- |
| 19 | | | | | | | | 44 | 46 | 49 | 45 | -- |
| 20 | | | | | | | | 44 | 48 | 49 | 45 | -- |
| 21 | | | | | | | | 46 | 48 | 50 | 45 | -- |
| 22 | | | | | | | | 48 | 49 | 50 | 45 | -- |
| 23 | | | | | | | | 50 | 49 | 51 | 44 | -- |
| 24 | | | | | | | | 49 | 50 | 50 | 44 | -- |
| 25 | | | | | | | | 51 | 50 | 50 | 45 | -- |
| 26 | | | | | | | | 49 | 50 | 48 | 45 | -- |
| 27 | | | | | | | | 50 | 51 | 50 | 45 | -- |
| 28 | | | | | | | | 49 | 49 | 51 | 45 | -- |
| 29 | | | | | | | | 48 | 48 | 49 | 44 | -- |
| 30 | | | | | | | | 45 | 48 | 47 | 44 | -- |
| 31 | | | | | | | | 43 | -- | 48 | 45 | -- |
| Average | | | | | | | | 43 | 47 | 49 | 47 | -- |

Suspended sediment, May to September 1960

| Day | May | | | June | | | July | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | | Mean discharge (cfs) | Suspended sediment | |
| | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day | | Mean concentration (ppm) | Tons per day |
| 1..... | 4,300 | 110 | 1,280 | 5,900 | 100 | 1,590 | 9,090 | 978 | 24,000 |
| 2..... | 4,300 | 120 | 1,390 | 4,830 | 70 | 913 | 12,000 | 2,270 | 73,500 |
| 3..... | 4,300 | 268 | 3,110 | 4,320 | 98 | 1,140 | 10,300 | 1,120 | 31,100 |
| 4..... | 4,300 | 278 | 3,230 | 4,130 | 106 | 1,180 | 8,880 | 741 | 17,800 |
| 5..... | 4,300 | 320 | 3,720 | 4,080 | 74 | 815 | 7,800 | 444 | 9,350 |
| 6..... | 4,300 | 390 | 4,530 | 4,280 | 86 | 994 | 6,730 | 402 | 7,300 |
| 7..... | 4,300 | 1,160 | 13,500 | 4,520 | 88 | 1,070 | 6,050 | 156 | 2,550 |
| 8..... | 4,300 | 1,420 | 16,500 | 4,710 | 111 | 1,410 | 5,300 | 136 | 2,790 |
| 9..... | 4,300 | 214 | 2,480 | 5,050 | 105 | 1,430 | 5,170 | 235 | 3,280 |
| 10..... | 4,300 | 120 | 1,390 | 5,000 | 142 | 1,920 | 5,220 | 387 | 5,450 |
| 11..... | 4,300 | 252 | 2,720 | 5,220 | 148 | 2,080 | 5,620 | 432 | 6,400 |
| 12..... | 4,300 | 298 | 3,460 | 5,600 | 168 | 2,540 | 5,840 | 585 | 8,910 |
| 13..... | 4,300 | 600 | 6,970 | 5,540 | 162 | 2,420 | 6,310 | 738 | 13,100 |
| 14..... | 4,300 | 555 | 6,440 | 5,440 | 138 | 2,040 | 6,810 | 848 | 15,600 |
| 15..... | 4,300 | 505 | 5,860 | 5,440 | 146 | 2,140 | 7,460 | 938 | 18,900 |
| 16..... | 4,300 | 505 | 5,860 | 5,440 | 131 | 1,920 | 7,880 | 849 | 18,100 |
| 17..... | 4,300 | 312 | 3,620 | 5,470 | 128 | 1,890 | 7,490 | 945 | 19,100 |
| 18..... | 4,300 | 240 | 2,790 | 5,520 | 122 | 1,820 | 7,800 | 824 | 17,400 |
| 19..... | 6,490 | 358 | 6,270 | 5,470 | 120 | 1,770 | 8,240 | 930 | 21,800 |
| 20..... | 5,900 | 300 | 3,160 | 5,440 | 148 | 2,170 | 8,270 | 1,190 | 25,900 |
| 21..... | 5,200 | 2,070 | 29,100 | 5,570 | 143 | 2,150 | 8,550 | 1,360 | 31,400 |
| 22..... | 5,600 | 2,260 | 34,200 | 5,800 | 135 | 2,110 | 8,470 | 1,400 | 32,000 |
| 23..... | 8,600 | 2,440 | 56,600 | 6,050 | 230 | 3,760 | 7,540 | 1,110 | 22,600 |
| 24..... | 13,000 | 1,230 | 43,200 | 6,310 | 226 | 3,850 | 7,320 | 910 | 18,000 |
| 25..... | 15,000 | 675 | 27,300 | 6,440 | 415 | 7,220 | 8,520 | 743 | 17,100 |
| 26..... | 17,000 | 2,210 | 101,000 | 6,570 | 470 | 8,340 | 9,980 | 760 | 20,500 |
| 27..... | 12,000 | 1,660 | 53,800 | 6,700 | 375 | 6,780 | 10,300 | 802 | 22,300 |
| 28..... | 9,670 | 880 | 23,000 | 6,570 | 1,380 | 24,500 | 10,200 | 695 | 19,100 |
| 29..... | 8,730 | 390 | 9,190 | 6,490 | 1,700 | 29,800 | 10,000 | 705 | 19,000 |
| 30..... | 8,080 | 244 | 5,320 | 6,490 | 1,870 | 32,800 | 11,000 | 735 | 21,800 |
| 31..... | 7,030 | 198 | 3,760 | -- | -- | -- | 10,000 | 578 | 15,600 |
| Total | 199,700 | -- | 484,750 | 164,390 | -- | 154,562 | 250,140 | -- | 581,730 |

## 5180. NENANA RIVER NEAR HEALY--Continued

Suspended sediment, May to September 1960--Continued

| | August | | | September | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1..... | 9,300 | 715 | 18,000 | 4,660 | 178 | 2,240 | | | |
| 2..... | 9,000 | 695 | 16,900 | 4,690 | 127 | 1,610 | | | |
| 3..... | 8,850 | 1,060 | 25,300 | 4,740 | 187 | 2,390 | | | |
| 4..... | 8,380 | 578 | 13,100 | 4,520 | 150 | 1,830 | | | |
| 5..... | 8,580 | 330 | 7,640 | 4,300 | 97 | 1,130 | | | |
| 6..... | 9,610 | 418 | 10,800 | 4,170 | 75 | 842 | | | |
| 7..... | 11,600 | 335 | 10,500 | 4,060 | 47 | 515 | | | |
| 8..... | 10,800 | 305 | 8,890 | 4,170 | 44 | 495 | | | |
| 9..... | 9,640 | 395 | 10,300 | 4,660 | 32 | 403 | | | |
| 10..... | 8,790 | 458 | 10,900 | 4,740 | 34 | 435 | | | |
| 11..... | 8,520 | 465 | 10,700 | 5,320 | 65 | 934 | | | |
| 12..... | 8,500 | 478 | 11,000 | 11,200 | 64 | 1,940 | | | |
| 13..... | 8,470 | 628 | 14,400 | 16,100 | 107 | 4,650 | | | |
| 14..... | 8,470 | 680 | 15,600 | 12,800 | 138 | 4,770 | | | |
| 15..... | 7,960 | 310 | 6,660 | 10,000 | 58 | 1,570 | | | |
| 16..... | 7,570 | 428 | 8,750 | 8,500 | 45 | 1,030 | | | |
| 17..... | 7,490 | 985 | 19,900 | -- | -- | -- | | | |
| 18..... | 8,020 | 1,310 | 28,400 | -- | -- | -- | | | |
| 19..... | 8,080 | 776 | 16,900 | -- | -- | -- | | | |
| 20..... | 7,520 | 1,880 | 38,200 | -- | -- | -- | | | |
| 21..... | 6,760 | 545 | 9,950 | -- | -- | -- | | | |
| 22..... | 6,100 | 448 | 7,380 | -- | -- | -- | | | |
| 23..... | 5,920 | 352 | 5,630 | -- | -- | -- | | | |
| 24..... | 5,800 | 178 | 2,790 | -- | -- | -- | | | |
| 25..... | 5,420 | 218 | 3,190 | -- | -- | -- | | | |
| 26..... | 5,140 | 390 | 5,410 | -- | -- | -- | | | |
| 27..... | 6,160 | 110 | 1,830 | -- | -- | -- | | | |
| 28..... | 6,970 | 80 | 1,500 | -- | -- | -- | | | |
| 29..... | 6,050 | 133 | 2,170 | -- | -- | -- | | | |
| 30..... | 5,420 | 94 | 1,380 | -- | -- | -- | | | |
| 31..... | 4,950 | 306 | 4,090 | -- | -- | -- | | | |
| Total. | 239,840 | -- | 348,160 | 108,630 | -- | 26,784 | | | |

Total discharge for period May to September (cfs-days) ..... 962,700
Total load for period May to September (tons) ..... 1,595,986

Particle-size analysis of suspended sediment, July 1960

| Date of collection | Time | Discharge (cfs) | Water temperature (°F) | Suspended sediment | | | | | | | | | | | Methods of analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concentration of sample (ppm) | Concentration of suspension analyzed (ppm) | Percent finer than indicated size, in millimeters | | | | | | | | | |
| | | | | | | 0.002 | 0.004 | 0.008 | 0.016 | 0.031 | 0.062 | 0.125 | 0.250 | 0.500 | 1.000 |
| July 21, 1960 | 8:30 a.m | 8,370 | 48 | 1,930 | 5,150 | 18 | 26 | 37 | 50 | 58 | 81 | 90 | 93 | 99 | 100 | SPWCM |

## 5648. Yukon River at Ruby

Location.--Lat 64°44'25", long 155°29'55", on left bank at Ruby, 300 ft downstream from Ruby Creek, 2 miles downstream from Melozitna River, and 2¼ miles upstream from Ruby Slough.

Drainage area.--259,000 sq mi, approximately.

Records available.--October 1956 to September 1960.

Gage.--Staff gage read twice daily. Altitude of gage is 150 ft (from topographic map).

Extremes.--Maximum daily discharge during year, 355,000 cfs Aug. 8-10; maximum gage height, 23.90 ft, from floodmarks (backwater from ice); minimum discharge not determined.
1956-60: Maximum discharge, 753,000 cfs June 3 or 4, 1957 (gage height, 32.4 ft, from floodmarks), from rating curve extended above 570,000 cfs by logarithmic plotting; minimum not determined.

Remarks.--Records good except those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 186,000 | | | | | | | | 350,000 | 318,000 | 307,000 | 287,000 |
| 2 | 187,000 | | | | | | | | 350,000 | 314,000 | 314,000 | *283,000 |
| 3 | 188,000 | | | | | | | | 350,000 | 307,000 | 323,000 | 274,000 |
| 4 | 191,000 | | | | | | | | *336,000 | 305,000 | 329,000 | 265,000 |
| 5 | 193,000 | | | | | | | | *323,000 | 311,000 | 335,000 | 260,000 |
| 6 | 190,000 | | | | | | | | 310,000 | 319,000 | 342,000 | 257,000 |
| 7 | 187,000 | | | | | | | | 300,000 | 323,000 | 350,000 | 256,000 |
| 8 | 185,000 | 56,000 | 35,000 | 29,000 | 25,000 | | 24,000 | 230,000 | 298,000 | 332,000 | 355,000 | 251,000 |
| 9 | 182,000 | | | | | | | | 301,000 | 341,000 | 355,000 | 247,000 |
| 10 | 179,000 | | | | | | | | 302,000 | 346,000 | 355,000 | 241,000 |
| 11 | 174,000 | | | | | | | | 298,000 | 345,000 | 353,000 | 236,000 |
| 12 | 163,000 | | | | | | | | 288,000 | 344,000 | 347,000 | 233,000 |
| 13 | 156,000 | | | | | | | | 278,000 | 338,000 | 335,000 | 230,000 |
| 14 | 147,000 | | | | | | | | 268,000 | 326,000 | 322,000 | 230,000 |
| 15 | b140,000 | | | | | 23,000 | | | 264,000 | 316,000 | 310,000 | 234,000 |
| 16 | b130,000 | | | | | | | | 264,000 | 306,000 | 296,000 | 243,000 |
| 17 | b120,000 | | | (*) | | (*) | | | 265,000 | 297,000 | 291,000 | 253,000 |
| 18 | b110,000 | | | | | | (*) | | 271,000 | 289,000 | 293,000 | 259,000 |
| 19 | b100,000 | | | | | | | | 277,000 | 283,000 | 296,000 | 256,000 |
| 20 | b96,000 | | | | | | | | 286,000 | 278,000 | 298,000 | 254,000 |
| 21 | b91,000 | | | | | | | | 294,000 | 272,000 | 306,000 | 255,000 |
| 22 | 87,000 | | | | | | | | 298,000 | 267,000 | 314,000 | 256,000 |
| 23 | 84,000 | 41,000 | 31,000 | 31,000 | 24,000 | | 35,000 | 310,000 | 297,000 | 266,000 | 320,000 | 256,000 |
| 24 | 81,000 | | | | | | | | 292,000 | 268,000 | 319,000 | 256,000 |
| 25 | 79,000 | | | | | | | | 286,000 | 269,000 | 315,000 | 252,000 |
| 26 | 77,000 | | | | | | | | 282,000 | 268,000 | 313,000 | 247,000 |
| 27 | 75,000 | | | | | | | | 290,000 | 266,000 | 310,000 | 242,000 |
| 28 | 73,000 | | | | | | | | 299,000 | 262,000 | 310,000 | *236,000 |
| 29 | 71,000 | | | | | | | | 310,000 | 271,000 | 305,000 | 234,000 |
| 30 | 69,000 | (*) | | | ------- | | ------- | | 318,000 | *286,000 | 298,000 | 242,000 |
| 31 | 67,000 | ------- | | | ------- | | ------- | | ------- | 299,000 | 293,000 | ------- |
| Total | ‡4,058 | ‡1,455 | ‡1,021 | 931,000 | 711,000 | 713,000 | 885,000 | ‡8,410 | ‡8,945 | ‡9,332 | ‡9,909 | ‡7,525 |
| Mean | 130,900 | 48,500 | 32,940 | 30,030 | 24,520 | 23,000 | 29,500 | 271,300 | 298,200 | 301,000 | 319,600 | 250,800 |
| Ac-ft | ‡8,049 | ‡2,886 | ‡2,025 | ‡1,847 | ‡1,410 | ‡1,414 | ‡1,755 | ‡16,680 | ‡17,740 | ‡18,510 | ‡19,650 | ‡14,930 |

Calendar year 1959: Max 534,000 Min - Mean 146,800 Ac-ft 106,300,000
Water year 1959-60: Max 355,000 Min - Mean 147,300 Ac-ft 106,900,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
b Stage-discharge relation affected by ice.
Note.--No gage-height record Oct. 22 to June 3, except occasional days (stage-discharge relation affected by ice during most of period); discharge estimated on basis of 5 discharge measurements, weather records, and records for other stations in Yukon River basin.

## 5649. Koyukuk River at Hughes

Location.--Lat 66°02'50", long 154°15'50", on right bank 0.2 mile west of Hughes and 0.5 mile upstream from Hughes Creek.

Drainage area.--18,700 sq mi.

Records available.--June to September 1960.

Gage.--Staff gage. Altitude of gage is 250 ft (from topographic map).

Extremes.--Maximum discharge during period, 55,800 cfs July 10 (gage height, 15.55 ft, from graph based on gage readings), from rating curve extended above 27,000 cfs by logarithmic plotting; minimum, 7,180 cfs July 30 (gage height, 9.53 ft, from graph based on gage readings).
Flood of August 1937 reached a stage of about 34 ft, from information by local residents.

Remarks.--Records poor.

Discharge, in cubic feet per second, June to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | a35,000 | a16,000 | 9,900 | *26,300 |
| 2 | | | | | | | | | a28,000 | 19,900 | 15,900 | 26,000 |
| 3 | | | | | | | | | a23,000 | 27,300 | 26,000 | 25,100 |
| 4 | | | | | | | | | a19,000 | 27,600 | 28,800 | 22,600 |
| 5 | | | | | | | | | 15,100 | 23,100 | 29,600 | 20,000 |
| 6 | | | | | | | | | *12,400 | 39,700 | 31,100 | 16,400 |
| 7 | | | | | | | | | 11,300 | 50,200 | 31,000 | 13,800 |
| 8 | | | | | | | | | 12,600 | 47,600 | 32,100 | 12,100 |
| 9 | | | | | | | | | 15,500 | 49,000 | 33,600 | 11,000 |
| 10 | | | | | | | | | 18,900 | 54,600 | 35,700 | 10,200 |
| 11 | | | | | | | | | 23,500 | 53,500 | 35,700 | 10,600 |
| 12 | | | | | | | | | 35,700 | 48,500 | 33,900 | 11,400 |
| 13 | | | | | | | | | 29,500 | 37,700 | 32,200 | 12,200 |
| 14 | | | | | | | | | 27,300 | 27,800 | 29,300 | 16,100 |
| 15 | | | | | | | | | 27,300 | 21,000 | 27,800 | 19,500 |
| 16 | | | | †781 | | †706 | | | 28,300 | 16,800 | 25,500 | 18,600 |
| 17 | | | | | | | | | 38,000 | 13,900 | 23,700 | 18,200 |
| 18 | | | | | | | †553 | | 42,300 | 12,300 | 23,000 | 19,000 |
| 19 | | | | | | | | | 37,300 | 10,700 | 20,900 | 17,500 |
| 20 | | | | | | | | | 29,100 | 9,300 | 18,700 | 12,700 |
| 21 | | | | | | | | | 20,300 | 8,680 | a18,000 | 10,400 |
| 22 | | | | | | | | | 14,200 | 8,060 | a18,000 | 9,740 |
| 23 | | | | | | | | | 13,500 | 7,660 | a18,000 | 9,380 |
| 24 | | | | | | | | | 12,900 | 7,400 | a19,000 | 9,420 |
| 25 | | | | | | | | | 12,800 | 7,400 | a21,000 | 9,580 |
| 26 | | | | | | | | | 11,800 | 7,530 | a24,000 | 9,420 |
| 27 | | | | | | | | | 11,400 | 8,680 | 25,900 | 9,420 |
| 28 | | | | | | | | | a11,000 | 8,030 | 26,800 | 11,400 |
| 29 | | | | | | | | | a11,000 | 7,340 | 27,600 | *13,100 |
| 30 | | | | | ------ | | | | a13,000 | 7,240 | 27,800 | 18,000 |
| 31 | | ------ | | | ------ | | ------ | | ------ | *7,890 | 27,800 | ------ |
| Total | | | | | | | | | 640,800 | 692,410 | 798,300 | 449,160 |
| Mean | | | | | | | | | 21,360 | 22,340 | 25,750 | 14,970 |
| Ac-ft | | | | | | | | | ‡1,271 | ‡1,373 | ‡1,583 | 890,900 |

| | | | | |
|---|---|---|---|---|
| Calendar year | : Max | Min | Mean | Ac-ft |
| Water year | : Max | Min | Mean | Ac-ft |

† Result of discharge measurement.
‡ Expressed in thousands.
* Discharge measurement made on this day.
a No gage-height record; discharge estimated on basis of records for Chena River at Fairbanks and Salcha River near Salchaket.

## 5652. Yukon River at Kaltag

Location.--Lat 64°19'40", long 158°43'10", on right bank at Kaltag, 0.5 mile downstream from Kaltag River.

Drainage area.--296,000 sq mi, approximately.

Records available.--October 1956 to September 1960.

Gage.--Staff gage read twice daily. Altitude of gage is 100 ft (from topographic map). Prior to Oct. 1, 1957, at site 4.3 miles downstream at different datum.

Extremes.--Maximum discharge observed during year, 505,000 cfs June 3 (gage height, 14.98 ft); minimum not determined.
1957-60: Maximum discharge, 1,020,000 cfs June 5, 1957 (gage height, 30.02 ft, from graph based on gage readings, site and datum then in use), from rating curve extended above 860,000 cfs by logarithmic plotting; minimum not determined.

Remarks.--Records fair except those above 450,000 cfs and those for periods of ice effect or no gage-height record, which are poor.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *220,000 | | | | | | | | 434,000 | 405,000 | a370,000 | *384,000 |
| 2 | 222,000 | | | | | | | | 480,000 | 411,000 | a370,000 | 376,000 |
| 3 | 222,000 | | (*) | | | | | | 504,000 | 418,000 | 384,000 | 364,000 |
| 4 | 225,000 | | | | | | | | *504,000 | 412,000 | 393,000 | 362,000 |
| 5 | 222,000 | | | | | | | | 492,000 | 418,000 | 404,000 | 362,000 |
| 6 | 222,000 | | | | | | | 220,000 | 484,000 | 421,000 | 414,000 | a360,000 |
| 7 | 222,000 | | | | | | | | 480,000 | 433,000 | 422,000 | a350,000 |
| 8 | 221,000 | 67,000 | 42,000 | 35,000 | 34,000 | 31,000 | 28,000 | | 462,000 | 443,000 | a430,000 | a350,000 |
| 9 | 215,000 | | | | | | | | 448,000 | 452,000 | a440,000 | 338,000 |
| 10 | 214,000 | | | | | | | | 439,000 | 464,000 | a450,000 | 334,000 |
| 11 | 210,000 | | | | | | | | 434,000 | 472,000 | a460,000 | 328,000 |
| 12 | 205,000 | | | | | | | | 434,000 | 478,000 | a460,000 | 323,000 |
| 13 | 190,000 | | | | | | | | 420,000 | 479,000 | a460,000 | 322,000 |
| 14 | 180,000 | | | | | | | | 409,000 | 476,000 | a460,000 | 324,000 |
| 15 | 170,000 | | | | | | | | 397,000 | 465,000 | a450,000 | 324,000 |
| 16 | 160,000 | | | | | (*) | | | 386,000 | 451,000 | a440,000 | 333,000 |
| 17 | 150,000 | | | | | | | 370,000 | 374,000 | 436,000 | a430,000 | 340,000 |
| 18 | 140,000 | | | | | | | | 370,000 | 422,000 | 419,000 | 339,000 |
| 19 | 130,000 | | | (*) | | | (*) | | 377,000 | 405,000 | 409,000 | 338,000 |
| 20 | 120,000 | | | | | | | | 376,000 | 391,000 | 404,000 | 343,000 |
| 21 | 110,000 | | | | | | | | 387,000 | 377,000 | 404,000 | 346,000 |
| 22 | 110,000 | | | | | | | | 399,000 | 364,000 | 398,000 | 344,000 |
| 23 | 100,000 | 49,000 | 37,000 | 42,000 | 32,000 | 29,000 | 38,000 | 402,000 | 410,000 | 356,000 | 413,000 | 346,000 |
| 24 | 100,000 | | | | | | | 415,000 | 413,000 | 350,000 | 420,000 | 344,000 |
| 25 | 97,000 | | | | | | | 415,000 | 410,000 | 348,000 | 420,000 | 343,000 |
| 26 | 94,000 | | | | | | | 406,000 | 409,000 | 349,000 | 419,000 | 344,000 |
| 27 | 91,000 | | | | | | | 407,000 | 400,000 | 350,000 | 416,000 | 340,000 |
| 28 | 89,000 | | | | | | | 402,000 | 395,000 | 347,000 | 415,000 | 338,000 |
| 29 | 86,000 | | | | | | | 402,000 | 416,000 | 345,000 | 408,000 | *331,000 |
| 30 | 84,000 | | | | ------ | | | 410,000 | 411,000 | *347,000 | 403,000 | 327,000 |
| 31 | 82,000 | ------ | | | ------ | | ------ | 429,000 | ------ | 360,000 | 392,000 | ------ |
| Total | ‡4,903 | ‡1,740 | ‡1,222 | ‡1,197 | 958,000 | 929,000 | 990,000 | ‡10,328 | ‡12,754 | ‡12,645 | ‡12,977 | ‡10,297 |
| Mean | 158,200 | 58,000 | 39,420 | 38,610 | 33,030 | 29,970 | 33,000 | 333,200 | 425,100 | 407,900 | 418,600 | 343,200 |
| Ac-ft | ‡9,725 | ‡3,451 | ‡2,424 | ‡2,374 | ‡1,900 | ‡1,843 | ‡1,964 | ‡20,490 | ‡25,300 | ‡25,080 | ‡25,740 | ‡20,420 |

Calendar year 1959: Max 733,000 Min - Mean 186,700 Ac-ft 135,200,000
Water year 1959-60: Max 504,000 Min - Mean 193,800 Ac-ft 140,700,000

* Discharge measurement made on this day.
‡ Expressed in thousands.
a No gage-height record; discharge estimated on basis of weather records and records for station at Ruby.
Note.--Stage-discharge relation affected by ice Oct. 13 to May 22 (no gage-height record Oct. 16 to May 18, except occasional days; discharge estimated on basis of 4 discharge measurements, weather records, and records for station at Ruby).

## 7480. Ogotoruk Creek near Point Hope

Location.--Lat 68°06'40", long 165°45'10", on right bank 0.3 mile downstream from small tributary, 0.4 mile upstream from small tributary, 1.2 miles upstream from mouth, 6 miles southeast of Cape Thompson, and 32 miles southeast of Point Hope.

Drainage area.--35 sq mi, approximately.

Records available.--August 1958 to September 1960 (no winter records).

Gage.--Water-stage recorder. Altitude of gage is 20 ft (from topographic map). Prior to July 17, 1959, at different datum.

Extremes.--Maximum discharge during year, 940 cfs Aug. 10 (gage height, 3.59 ft), from rating curve extended above 80 cfs by logarithmic plotting; no flow during latter part of October and first part of May.
1958-60: Maximum discharge, 1,260 cfs July 9, 1959 (gage height, 4.3 ft, from floodmarks), from rating curve extended above 40 cfs by logarithmic plotting; no flow during latter part of October 1959 and first part of May 1960.

Remarks.--Records poor. Observation of no flow made Nov. 11, Apr. 7. Very little, if any flow each year, during period November to April.

Discharge, in cubic feet per second, water year October 1959 to September 1960

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | | | | | | | | 22 | 43 | 5 | 30 |
| 2 | 59 | | | | | | | | 40 | 39 | 4 | 24 |
| 3 | 53 | | | | | | | | 69 | 28 | 4 | 19 |
| 4 | 51 | | | | | | | | 76 | 20 | 4 | 16 |
| 5 | 56 | | | | | | | | 71 | 16 | *4 | 14 |
| 6 | 48 | | | | | | | | 98 | 13 | 4 | 12 |
| 7 | *45 | | | | | | (†) | | 104 | 12 | *4 | 11 |
| 8 | 40 | | | | | | | | 101 | 12 | 3 | 10 |
| 9 | 31 | | | | | | | | 85 | 12 | 10 | 9 |
| 10 | 23 | | | | | | | | 76 | 12 | 400 | 8 |
| 11 | 17 | (†) | | | | | | | 60 | g23 | 308 | 8 |
| 12 | | | | | | | | a9 | 43 | g38 | 93 | 8 |
| 13 | | | | | | | | | 48 | g30 | 50 | *g7 |
| 14 | | | | | | | | | 40 | g25 | 30 | g5 |
| 15 | | | | | | | | | 43 | g19 | 20 | g5 |
| 16 | | | | | | | | | 36 | g15 | 16 | g6 |
| 17 | | | | | | | | | 32 | g13 | 14 | g5 |
| 18 | | | | | | | | | 27 | g11 | 11 | g5 |
| 19 | | | | | | | | | 23 | g10 | 9 | g4 |
| 20 | | | | | | | | | 26 | g10 | 8 | g4 |
| 21 | a4 | | | | | | | | 29 | g9 | 7 | a4 |
| 22 | | | | | | | | | 24 | g8 | 7 | a3 |
| 23 | | | | | | | | | 20 | g7 | 7 | a3 |
| 24 | | | | | | | | g109 | 28 | g5 | 7 | a3 |
| 25 | | | | | | | | *95 | 33 | g5 | 10 | a3 |
| 26 | | | | | | | | 93 | 55 | g4 | 85 | a2 |
| 27 | | | | | | | | 98 | 160 | 4 | 118 | g2 |
| 28 | | | | | | | | 80 | 82 | 6 | 98 | g2 |
| 29 | | | | | | | | 55 | 53 | 12 | 62 | g2 |
| 30 | | | | | ------ | | | 36 | 42 | 9 | 85 | g2 |
| 31 | | ------ | | | ------ | | ------ | 22 | ------ | 7 | 36 | ------ |
| Total | 559 | - | - | - | - | - | - | 795 | 1,646 | 477 | 1,523 | 236 |
| Mean | 18.0 | - | - | - | - | - | - | 25.6 | 54.9 | 15.4 | 49.1 | 7.87 |
| Ac-ft | 1,110 | - | - | - | - | - | - | 1,580 | 3,260 | 946 | 3,020 | 468 |

| Calendar year | : Max | Min | Mean | Cfsm | In. | Ac-ft |
|---|---|---|---|---|---|---|
| Water year | : Max | Min | Mean | Cfsm | In. | Ac-ft |

Peak discharge (base, 400 cfs).--Aug. 10 (5 p.m.) 940 cfs (3.59 ft).

* Discharge measurement made on this day.
† Observation of no flow made on this day.
a No gage-height record; discharge estimated on basis of weather records.
g Computed from staff-gage readings.
Note.--Stage-discharge relation affected by ice Oct. 9-11, Sept. 9-12, 15-20, 27-30, and during most of periods of no gage-height record.

Measurements of streamflow in Alaska made at points other than regular gaging stations are given in the following table. Most of these measurements were made during periods of base flow when streamflow is primarily from ground-water storage. Measurements believed to have been made under base-flow conditions are identified by an asterisk (*) to the left of the discharge figure. These measurements when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of stream. The column headed, "Measured previously" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at points other than gaging stations during water year 1960

| Stream | Tributary to | Location | Drainage area (sq mi) | Measured previously (water years) | Date | Discharge (cfs) |
|---|---|---|---|---|---|---|
| Alaska west of longitude 141° | | | | | | |
| Gulkana River | Copper River. | Lat 62°16'10", long 145°22'50", at bridge on Richardson Highway, at Gulkana. | a1,980 | 1948-50, 1954, 1957-59 | July 6 | 2,240 |
| Nuka River... | Nuka Bay..... | Lat 59°39'05", long 150°40'05", 3 miles below Nuka Glacier, 8 miles above mouth, and 30 miles east of Homer. | - | 1958-59 | Mar. 3 | *4.63 |
| Deep Creek... | Cook Inlet... | Lat 60°01'50", long 151°40'45", at bridge on Sterling Highway, ¼ mile above mouth and 1½ miles southwest of Ninilchik. | - | 1951-52, 1954,1959 | May 10<br>July 8<br>Aug. 25 | 1,130<br>158<br>138 |
| Snow River... | Kenai Lake... | Lat 60°20', long 149°21', at bridge on Seward-Anchorage highway, 0.3 mile upstream from mouth and 5 miles south of Lawing. | - | 1959 | May 10<br>July 8<br>Aug. 24 | 347<br>1,080<br>1,040 |
| South Fork Campbell Creek. | Campbell Creek. | SW¼ sec.1, T.12 N., R.3 W., 1 mile above bridge on gravel road, 3.2 miles above confluence with North Fork, and 6½ miles southeast of Anchorage Post Office. | - | 1958-59 | Apr. 25 | 11.5 |
| North Fork Campbell Creek. | ....do..... | SW¼ sec.31, T.13 N., R.2 W., 5 miles above confluence with South Fork and 7 miles southeast of Anchorage Post Office. | - | 1958-59 | Apr. 25 | 3.72 |
| Do..... | ....do..... | SW¼ sec.35, T.13 N., R.3 W., at bridge on gravel road, 2½ miles above confluence with South Fork and 5½ miles southeast of Anchorage Post Office. | - | 1947-50, 1952,1954, 1955, 1958-59 | Apr. 25 | 10.3 |
| Do..... | ....do..... | NE¼ sec.34, T.13 N., R.3 W., 1½ miles above confluence with South Fork and 4½ miles southeast of Anchorage Post Office. | - | 1958-59 | Apr. 25 | 14.6 |
| Do..... | ....do..... | NE¼ sec.33, T.13 N., R.3 W., 600 ft above confluence with South Fork and 4 miles southeast of Anchorage Post Office. | 14.6 | 1958-59 | Apr. 25 | 18.4 |
| Campbell Creek. | Cook Inlet... | NW¼ sec.33, T.13 N., R.3 W., 400 ft below confluence of North Fork and South Fork, ¾ mile upstream from bridge on Lake Otis Rd., and 3¾ miles southeast of Anchorage Post Office. | - | 1958-59 | Apr. 25 | 31.8 |
| Do..... | ....do..... | NE¼ sec.32, T.13 N., R.3 W., at bridge on Lake Otis Rd., 3½ miles southeast of Anchorage Post Office. | 46.4 | 1958-59 | Apr. 25 | 36.5 |
| Chester Creek | ....do..... | N½ sec.24, T.13 N., R.3 W., at culvert on Muldoon Rd., 5½ miles east of Anchorage Post Office. | - | | Apr. 26 | 23.4 |
| Do..... | ....do..... | On line between secs. 26, 27, T.13 N., R.3 W., at culvert on Boniface Rd., 4½ miles southeast of Anchorage Post Office. | - | | Apr. 26 | 27.9 |
| Unnamed tributary. | Chester Creek | On line between secs. 22, 23, T.13 N., R.3 W., at culvert on Boniface Rd., 4 miles east of Anchorage Post Office. | - | | Apr. 26 | 2.04 |
| Russian Jack Springs. | ....do..... | NE¼ sec.22, T.13 N., R.3 W., at Anchorage prison farm, 3½ miles east of Anchorage. | - | 1948-49, 1952-59 | Oct. 12<br>Nov. 16<br>Dec. 15<br>Dec. 31<br>Jan. 11<br>Feb. 9<br>Mar. 10<br>Apr. 12<br>Apr. 26<br>May 11<br>June 14<br>June 22<br>July 25<br>Aug. 19<br>Sept.20 | 8.04<br>6.92<br>6.98<br>6.92<br>6.45<br>5.45<br>4.79<br>4.61<br>5.49<br>5.22<br>5.20<br>5.56<br>5.77<br>6.73<br>7.94 |

* Base flow.
a Approximately.

Discharge measurements made at points other than gaging stations during water year 1960--Continued

| Stream | Tributary to | Location | Drainage area (sq mi) | Measured previously (water years) | Date | Discharge (cfs) |
|---|---|---|---|---|---|---|
| | | Alaska west of longitude 141°--Continued | | | | |
| Chester Creek | Cook Inlet... | On line between secs. 21, 28, T.13 N., R.3 W., ½ mile above bridge on Lake Otis Rd. and 2½ miles southeast of Anchorage Post Office. | - | | Apr. 26 | 34.8 |
| Do..... | ....do..... | On line between secs. 19, 20, T.13 N., R.3 W., at culvert on Seward-Anchorage highway at Anchorage, 2¼ miles above mouth. | - | 1947-49, 1952, 1954-55, 1959 | Apr. 26 | 55.6 |
| Do..... | ....do..... | NE¼ sec.24, T.13 N., R.3 W., at culvert on Spenard Rd. at Anchorage, 1 mile above mouth. | - | 1947, 1959 | Apr. 26 | 61.7 |
| Ship Creek... | ....do..... | SE¼ sec.6, T.13 N., R.2 W., at Glenn Bypass Highway, 7 miles east of Anghorage Post Office. | - | 1959 | Apr. 26 | 26.8 |
| Do..... | ....do..... | SE¼ sec.1, T.13 N., R.3 W., ¼ mile below North Fork and 6 miles east of Anchorage Post Office. | - | 1959 | Apr. 26 | 22.7 |
| Do..... | ....do..... | On line between secs. 10, 11, T.13 N., R.3 W., at bridge on Glenn (Davis) Highway, 4 miles northeast of Anchorage Post Office. | - | 1958-59 | Apr. 26 | 20.4 |
| Do..... | ....do..... | NW¼ sec.17, T.13 N., R.3 W., at bridge on Post Rd., at Anchorage, 1½ miles(revised) above mouth. | - | 1959 | Apr. 26 | 44.6 |
| Do..... | ....do..... | NE¼ sec.18, T.13 N., R.3 W., just below city of Anchorage powerhouse dam at Anchorage, 1 mile above mouth. | - | | Apr. 26 | 44.6 |
| Skwentna River. | Yentna River. | Lat 61°53', long 151°20', 3 miles below Shell Creek, 7.5 miles southwest of Skwentna and 12 miles above mouth. | a2,250 | 1959 | Oct. 29<br>Nov. 18<br>Jan. 26<br>Mar. 12<br>Apr. 21<br>Sept.30 | 3,190<br>1,770<br>*1,020<br>*890<br>*758<br>7,650 |
| Susitna River | Cook Inlet... | Lat 61°33', long 150°31', at Susitna village, 2 miles below Yentna River, 20 miles above mouth, and 21 miles southeast of Willow. | - | | Aug. 16 | 115,000 |
| Big Kitoi Lake Outlet. | Kitoi Bay.... | Lat 58°11'25", long 152°22'40", on Afognak Island, 300 ft below Big Kitoi Lake Outlet, 0.3 mile above mouth, and 19 miles northeast of Afognak. | - | | Dec. 11 | 24.1 |
| West Fork.... | Denison Fork. | Lat 63°54', long 142°08', at bridge on Taylor Highway, 5 miles above mouth and 15 miles southwest of Chicken. | - | 1954-55, 1957,1959 | Oct. 6 | 102 |
| Mosquito Fork | South Fork... | Lat 64°04', long 141°57', at bridge on Taylor Highway, 1 mile west of Chicken and 2½ miles above mouth. | - | 1954-55, 1957,1959 | Oct. 6 | 324 |
| South Fork... | Forty Mile River. | Lat 64°06', long 141°47', at bridge on Taylor Highway, 5 miles east of Chicken. | - | 1954-55, 1957,1959 | Oct. 6 | 620 |
| Forty Mile River. | Yukon River.. | Lat 64°18', long 141°24', at bridge on Taylor Highway, ¼ mile below O'Brien Creek and 4½ miles northwest of Steel Creek. | a5,880 | 1954-59 | Oct. 6 | 1,580 |
| Melozitna River. | ....do..... | Lat 64°46', long 155°29', ¾ mile above mouth and 2 miles northeast of Ruby. | - | 1957-59 | Oct. 1<br>Dec. 2<br>Jan. 17<br>Mar. 17<br>Apr. 19<br>June 5<br>July 31<br>Sept. 2<br>Sept.28 | 4,300<br>377<br>*168<br>*108<br>*66.0<br>1,260<br>706<br>2,820<br>3,230 |
| Moonlight Springs. | Nome water-supply pipe. | Lat 64°33', long 165°23', at pond outlet at entrance to Nome water-supply pipe, 3 miles north of Nome. | - | | Sept.12 | .84 |
| West tributary. | Oakisoorook River. | Lat 164°53', long 67°54', 1½ miles above mouth and 15 miles northwest of Kivalina. | - | | Aug. 6 | 4.93 |
| Covreruk Springs. | Chukchi Sea.. | Lat 67°53', long 164°53', ¼ mile above mouth and 14 miles northwest of Kivalina. | - | 1959 | Apr. 9<br>Aug. 5<br>Aug. 6<br>Aug. 7 | 6.17<br>9.00<br>12.3<br>13.8 |

* Base flow.
a Approximately.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA

Chemical analyses, in parts per million, water year October 1959 to September 1960

| Location | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (residue on evaporation at 180°C) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Big Boulder Creek near Haines, mile 35 | 7- 3-60 | 4.5 | 0.08 | 12 | 3.1 | 0.6 | 1.2 | 35 | 12 | 3.0 | 0.2 | 0.6 | 54 | 42 | 14 | 76 | 7.5 | 5 |
| Willow Lake near Tonsina | 7-16-60 | 14 | .03 | 17 | 3.1 | 7.0 | 1.0 | 68 | 14 | 2.0 | .3 | .0 | 91 | 55 | 0 | 130 | 7.4 | 5 |
| McCarthy Creek near McCarthy | 9-14-60 | 5.4 | .02 | 39 | 13 | 2.6 | .7 | 126 | 45 | 1.5 | .0 | .6 | 170 | 151 | 48 | 282 | 7.6 | -- |
| Kennicott River near McCarthy | 9-19-60 | 4.7 | .02 | 20 | 3.1 | 1.8 | 1.6 | 66 | 12 | 2.0 | .1 | .0 | 77 | 62 | 8 | 115 | 8.0 | -- |
| Unnamed Stream, 20 feet upstream from Kotsina, near Streina | 8-19-60 | 8.2 | .00 | 126 | 29 | 6.0 | 1.0 | 213 | 259 | 1.5 | .2 | .4 | 536 | 434 | 259 | 778 | 7.7 | 0 |
| Kluvesna River near Streina | 8-18-60 | 5.6 | .02 | 17 | 2.1 | 3.0 | 1.3 | 58 | 6.0 | 2.5 | .2 | .0 | 69 | 51 | 4 | 117 | 7.5 | -- |
| Clear Creek, 20 feet upstream from Kotsina River, near Streina | 8-18-60 | 8.4 | .0 | 40 | 4.3 | 1.6 | .4 | 114 | 28 | 1.5 | .1 | .1 | 140 | 118 | 24 | 227 | 7.8 | 0 |
| Elliott Lake near Streina | 7-22-60 | 3.5 | .03 | 15 | 5.5 | .8 | 1.7 | 63 | 5.0 | 4.0 | .1 | .3 | 67 | 60 | 8 | 102 | 7.4 | 20 |
| Cow Creek near Streina | 8-12-60 | 10 | .00 | 46 | 2.1 | 1.2 | .4 | 143 | 8.0 | 1.0 | .1 | 2.2 | 141 | 124 | 6 | 237 | 7.9 | 5 |
| Ten feet upstream from waterfall-Benito Creek, near Streina | 8-12-60 | 9.5 | .0 | 29 | 1.9 | 2.3 | .3 | 83 | 17 | 2.0 | .1 | .6 | 104 | 80 | 12 | 167 | 7.5 | 5 |
| Lorraine Creek near Streina | 7- 8-60 | 10 | .03 | 38 | 6.4 | 2.6 | .3 | 125 | 15 | 2.5 | .2 | 1.0 | 138 | 122 | 19 | 218 | 7.8 | 5 |
| Iron Mountain Creek near Streina | 8-10-60 | 10 | .0 | 58 | 5.0 | 3.8 | .6 | 172 | 33 | 1.0 | .2 | .2 | 196 | 165 | 24 | 319 | 7.7 | 5 |
| Kotsina River near Chitina | 6-27-60 | 10 | 5.4 | 24 | 5.0 | 7.8 | 1.4 | 82 | 20 | 6.0 | .4 | .0 | 120 | 80 | 14 | 175 | 7.9 | 30 |
| Iron Creek near Streina | 7- 9-60 | 12 | .03 | 60 | 6.4 | 3.6 | .8 | 198 | 19 | 4.0 | .2 | .3 | 204 | 176 | 14 | 335 | 7.8 | 10 |
| Unnamed stream, 2.5 miles west of the Gilahina River, Chitina River tributary | 9- 6-60 | 8.6 | .02 | 41 | 14 | 4.8 | 2.7 | 176 | 20 | 1.5 | .2 | .8 | 181 | 160 | 16 | 296 | 7.7 | -- |
| Chitina River near Streina | 6- 6-60 | 6.2 | 13 | 23 | 7.6 | 3.4 | 2.1 | 85 | 20 | 6.0 | .2 | .0 | 124 | 88 | 19 | 169 | 7.7 | 10 |
| Streina Creek near Streina | 6-23-60 | 6.2 | 2.2 | 44 | 7.4 | 2.3 | .4 | 112 | 44 | 1.5 | .3 | .0 | 163 | 140 | 48 | 270 | 7.7 | 5 |

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Location | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (residue on evaporation at 180°C) | Hardness as $CaCO_3$: Calcium, magnesium | Hardness as $CaCO_3$: Noncarbonate | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chitina River near Chitina | 9- 6-60 | 4.6 | 0.02 | 23 | 6.2 | 2.9 | 2.2 | 78 | 21 | 3.0 | 0.0 | 0.1 | 101 | 83 | 19 | 171 | 7.7 | -- |
| 2740. South Fork Campbell Creek near Anchorage | 2- 9-60 | -- | .03 | -- | -- | -- | -- | 40 | -- | -- | -- | -- | -- | 46 | 13 | 98 | 7.8 | -- |
| | 4-12-60 | -- | .03 | -- | -- | -- | -- | 48 | -- | -- | -- | -- | -- | 56 | 16 | 104 | 7.8 | -- |
| | 4-25-60 | -- | .05 | -- | -- | -- | -- | 46 | -- | -- | -- | -- | -- | 50 | 12 | 104 | 7.5 | -- |
| | 6-22-60 | -- | .00 | -- | -- | -- | -- | 25 | -- | -- | -- | -- | -- | 36 | 16 | 72 | 7.2 | -- |
| | 7- 6-60 | -- | -- | -- | -- | -- | -- | 30 | -- | -- | -- | -- | -- | 48 | -- | 74 | 7.0 | 5 |
| North Fork Campbell Creek near Anchorage | 2- 9-60 | -- | .02 | -- | -- | -- | -- | 62 | -- | -- | -- | -- | -- | 76 | 25 | 151 | 7.7 | -- |
| | 4-25-60 | -- | .28 | -- | -- | -- | -- | 43 | -- | -- | -- | -- | -- | 46 | 11 | 97 | 7.6 | -- |
| | 6-22-60 | -- | .08 | -- | -- | -- | -- | 44 | -- | -- | -- | -- | -- | 64 | 30 | 117 | 7.4 | -- |
| | 7- 6-60 | -- | -- | -- | -- | -- | -- | 49 | -- | -- | -- | -- | -- | 85 | -- | 123 | 7.2 | 0 |
| Little Campbell Creek near Anchorage | 2- 4-60 | -- | .24 | -- | -- | -- | -- | 100 | -- | -- | -- | -- | -- | 92 | 10 | 108 | 7.4 | -- |
| | 5- 3-60 | -- | .28 | -- | -- | -- | -- | 57 | -- | -- | -- | -- | -- | 62 | 16 | 108 | 7.4 | -- |
| Campbell Creek near Anchorage | 2- 4-60 | -- | .19 | -- | -- | -- | -- | 45 | -- | -- | -- | -- | -- | 57 | 20 | 114 | 7.2 | -- |
| | 4-25-60 | -- | .33 | -- | -- | -- | -- | 44 | -- | -- | -- | -- | -- | 46 | 10 | 99 | 7.4 | -- |
| | 5- 3-60 | -- | .29 | -- | -- | -- | -- | 48 | -- | -- | -- | -- | -- | 52 | 12 | 103 | 7.6 | -- |
| Russian Jack Spring near Anchorage | 12-19-59 | 15 | .07 | 23 | 9.8 | 4.4 | 0.8 | 104 | 13 | 4.0 | .1 | 2.1 | a 123 | 98 | 12 | 208 | 7.7 | 10 |
| | 1-11-60 | -- | -- | -- | -- | -- | -- | 108 | -- | -- | -- | -- | -- | 110 | 22 | 214 | 8.1 | -- |
| | 2- 9-60 | -- | .02 | -- | -- | -- | -- | 106 | -- | -- | -- | -- | -- | 100 | 13 | 205 | 7.5 | -- |
| | 4-12-60 | -- | .10 | -- | -- | -- | -- | 108 | -- | -- | -- | -- | -- | 110 | 22 | 199 | 7.7 | -- |
| | 4-26-60 | -- | .02 | -- | -- | -- | -- | 109 | -- | -- | -- | -- | -- | 110 | 20 | 206 | 7.4 | -- |
| Chester Creek near Anchorage | 2- 4-60 | -- | 1.20 | -- | -- | -- | -- | 91 | -- | -- | -- | -- | -- | 90 | 16 | 187 | 7.5 | -- |
| | 4-12-60 | -- | .02 | -- | -- | -- | -- | 82 | -- | -- | -- | -- | -- | 80 | 13 | 165 | 7.2 | -- |
| | 4-26-60 | -- | .03 | -- | -- | -- | -- | 72 | -- | -- | -- | -- | -- | 70 | 11 | 138 | 7.5 | -- |
| | 6-22-60 | -- | .00 | -- | -- | -- | -- | 86 | -- | -- | -- | -- | -- | 81 | 16 | 166 | 7.7 | -- |
| | 7- 6-60 | -- | -- | -- | -- | -- | -- | 91 | -- | -- | -- | -- | -- | 79 | -- | 170 | 7.0 | 0 |

a Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Location | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (residue on evaporation at 180°C) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Ship Creek near Anchorage | 2- 5-60 | -- | 0.10 | -- | -- | -- | -- | 63 | -- | -- | -- | -- | -- | 78 | 26 | 150 | 7.4 | -- |
| | 4-13-60 | -- | .00 | -- | -- | -- | -- | 66 | -- | -- | -- | -- | -- | 71 | 17 | 148 | 7.5 | -- |
| | 4-26-60 | -- | .05 | -- | -- | -- | -- | 108 | -- | -- | -- | -- | -- | 110 | 22 | 210 | 7.6 | -- |
| | 7- 6-60 | -- | -- | -- | -- | -- | -- | 50 | -- | -- | -- | -- | -- | 51 | -- | 125 | 7.5 | 0 |
| Bear Lake near Chugiak | 3-30-60 | 12 | .04 | 45 | 9.3 | 4.7 | 1.4 | 164 | 24 | 1.0 | 0.2 | 1.9 | a180 | 150 | 16 | 307 | 7.6 | 10 |
| Matanuska River, one fourth mile below Glacier, near Sutton | 1-25-60 | 5.3 | .30 | 45 | 9.0 | 4.1 | 1.0 | 99 | 72 | 3.0 | .0 | .2 | a189 | 149 | 68 | 307 | 7.5 | 5 |
| 2910. Susitna River near Denali | 7- 5-60 | 7.3 | .04 | 18 | 2.4 | 3.4 | 2.8 | 60 | 14 | 3.0 | .1 | .4 | a 81 | 55 | 6 | 129 | 7.8 | 0 |
| 2912. MacLaren River near Paxson | 7- 5-60 | 5.0 | .37 | 13 | 4.3 | 1.8 | 2.6 | 44 | 15 | 3.0 | .2 | .4 | a 68 | 50 | 14 | 103 | 7.8 | 20 |
| Barrier Glacier Creek, Chakachamna near Tyonek | 8- 8-60 | 2.4 | .03 | 2.4 | .0 | .1 | .5 | 8.0 | .0 | .0 | .1 | .1 | a 10 | 6 | 0 | 10 | 6.8 | 0 |
| Barrier Glacier Creek on west side of Chakachamna Lake, near Tyonek | 8-15-60 | .5 | .00 | 1.6 | -- | .4 | .2 | 6.0 | .0 | .5 | -- | -- | a 6 | 4 | 0 | 9 | 6.8 | 20 |
| Nagishlamina River near Tyonek | 8-12-60 | 7.6 | .00 | 25 | 3.5 | 2.2 | 2.1 | 24 | 57 | 4.0 | .2 | .0 | a114 | 77 | 58 | 173 | 7.0 | 0 |
| Chilligan River at Chakachamna Lake, near Tyonek | 8-12-60 | 6.6 | .14 | 6.4 | 1.0 | 1.1 | 1.0 | 22 | 4.0 | 1.0 | -- | -- | 32 | 20 | 2 | 45 | 7.0 | 20 |
| Shamrock Glacier Creek-Chakachamna, near Tyonek | 8-14-60 | 1.2 | -- | 2.4 | .5 | 1.6 | .8 | 10 | -- | 3.5 | -- | -- | 15 | 8 | 0 | 24 | 6.9 | 20 |
| Shamrock Glacier Creek-Chakachamna Lake, near Tyonek | 8-14-60 | 2.9 | .02 | 2.4 | .0 | .4 | 1.3 | 8.0 | .0 | 1.5 | .0 | .2 | 13 | 6 | 0 | 12 | 6.8 | -- |
| Moore Glacier Creek-Chakachamna Lake, near Tyonek | 8-14-60 | 1.8 | .40 | .8 | .2 | .2 | 1.3 | 6.0 | .0 | .5 | -- | -- | 3 | 3 | 0 | 3 | 7.0 | 20 |
| | 8-14-60 | 2.2 | .31 | 2.4 | .7 | .3 | 1.2 | 7.0 | 1.0 | 3.5 | -- | -- | 15 | 9 | 4 | 15 | 7.1 | 20 |
| Chakachatna River near Tyonek | 8-11-60 | 5.5 | .17 | 8.7 | 1.0 | 1.3 | 1.6 | 25 | 7.0 | 2.0 | -- | -- | 39 | 26 | 5 | 64 | 7.0 | 20 |

a Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

| Location | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium (Na) | Potassium (K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids (residue on evaporation at 180°C) | Hardness as $CaCO_3$ | | Specific conductance (micromhos at 25°C) | pH | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Calcium, magnesium | Noncarbonate | | | |
| Grant Lake outlet near Aleknagik | 4-20-60 | 6.5 | 0.05 | 6.4 | 0.2 | 1.3 | 0.2 | 20 | 5.0 | 1.0 | 0.0 | 0.0 | 31 | 17 | 0 | 42 | 7.0 | -- |
| 3030. Wood River near Aleknagik | 4-20-60 | 5.2 | .03 | 6.4 | .0 | 1.2 | .2 | 15 | 5.0 | 1.0 | .0 | .0 | 26 | 16 | 4 | 41 | 6.8 | -- |
| | 7-28-60 | 4.0 | .03 | 5.2 | 2.1 | 1.0 | .1 | 20 | 3.0 | 2.5 | .0 | .3 | 28 | 22 | 5 | 40 | 7.1 | 5 |
| | 8-30-60 | 4.8 | .03 | 5.2 | 5.0 | 1.2 | .2 | 19 | 8.0 | 9.0 | .1 | .4 | 43 | 34 | 18 | 42 | 6.8 | 0 |
| South Fork Fortymile River near Chicken | 10- 6-59 | 14 | .18 | 11 | 4.5 | 3.6 | .5 | 47 | 13 | 3.0 | .1 | .8 | 74 | 46 | 8 | 102 | 7.6 | 80 |
| Mosquito Fork Fortymile River near Chicken River | 10- 6-59 | 12 | .15 | 12 | 4.5 | 3.6 | .7 | 48 | 12 | 2.5 | .1 | .6 | 72 | 48 | 9 | 107 | 7.2 | 60 |
| Fortymile River near Chicken | 10- 6-59 | 8.8 | .17 | 9.1 | 3.8 | 2.7 | .4 | 32 | 13 | 3.0 | .2 | .8 | 58 | 38 | 12 | 75 | 7.2 | 80 |
| Fortymile River near Boundry | 10- 6-59 | 12 | .15 | 14 | 6.7 | 2.6 | .5 | 51 | 17 | 3.0 | .1 | .6 | 82 | 62 | 20 | 114 | 7.6 | 60 |
| Gardiner Creek near Northway Junction | 7- 4-60 | 14 | .47 | 12 | 5.0 | 3.5 | .8 | 55 | 6.0 | 3.5 | .3 | .3 | 94 | 50 | 6 | 88 | 7.3 | 150 |
| Brushkana Creek near Windy | 7- 5-60 | 8.4 | .04 | 9.5 | 1.0 | 2.6 | .8 | 32 | 4.0 | 3.0 | .1 | .3 | 46 | 28 | 2 | 68 | 7.5 | 0 |
| Seattle Creek near Windy | 7- 5-60 | 11 | .04 | 13 | 2.8 | 2.4 | .9 | 45 | 13 | 1.0 | .1 | .2 | 66 | 44 | 7 | 88 | 7.5 | 0 |
| Melozitna River near Ruby | 1-17-60 | 8.0 | .13 | 8.3 | 2.6 | 1.8 | .3 | 32 | 7.0 | 1.0 | .2 | .6 | 46 | 31 | 5 | 71 | 7.1 | 40 |
| | 4-19-60 | 9.9 | .24 | 13 | 4.0 | 4.4 | 1.0 | 57 | 9.0 | 1.5 | .2 | 2.8 | 74 | 49 | 2 | 119 | 6.8 | -- |
| Koyukuk River at Hughes | 1-16-60 | 6.7 | .00 | 35 | 16 | 5.5 | 2.8 | 166 | 24 | 5.5 | .0 | 1.5 | 179 | 154 | 18 | 314 | 7.4 | 10 |
| | 4-18-60 | 8.7 | .02 | 41 | 7.4 | 2.2 | .8 | 147 | 19 | 1.0 | .1 | .7 | 153 | 132 | 12 | 260 | 7.9 | 5 |
| West Tributary Oakpisoorok Stream near Kivalina | 8- 6-60 | 4.5 | .03 | 62 | 26 | 142 | 2.3 | 167 | 9.5 | 320 | .1 | .6 | 646 | 262 | 124 | 1,220 | 8.0 | 5 |
| Covroeruk Springs near Kivalina | 8- 6-60 | 4.5 | .03 | 58 | 56 | 310 | 12 | 161 | 76 | 605 | .2 | .0 | 1,200 | 374 | 242 | 2,250 | 7.9 | 0 |
| Stream, 3¼ miles southeast of Cape Thompson | 6- 5-60 | 5.3 | .00 | 164 | 313 | 2,860 | 116 | 293 | 542 | 4,880 | .4 | .0 | 9,020 | 1,700 | 1,460 | 14,500 | 7.1 | 10 |
| Creek, 400 feet upstream 2¾ miles southeast of Cape Thompson | 8- 4-60 | 4.1 | .00 | 43 | 16 | 6.1 | .9 | 158 | 43 | 9.5 | .1 | 1.2 | 202 | 173 | 44 | 341 | 7.6 | 0 |
| Emmikroak Creek, 1½ miles southeast of Cape Thompson | 8- 4-60 | 2.6 | .00 | 43 | 7.6 | 3.7 | .3 | 151 | 18 | 6.0 | .2 | .2 | 156 | 138 | 14 | 274 | 7.5 | 0 |

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Periodic determinations of suspended-sediment discharge, water year October 1959 to September 1960

| Location | Date of collection | Discharge (cfs) | Suspended sediment | |
|---|---|---|---|---|
| | | | Mean concentration (ppm) | Discharge (tons per day) |
| 2004. Gulkana River at Gulkana..... | 12- 2-59 | e3,000 | 1 | 8 |
| | 6- 1-60 | e3,100 | 73 | 611 |
| | 7- 6-60 | 2,240 | 22 | 133 |
| | 8-23-60 | e2,000 | 10 | 54 |
| 2415. Deep Creek near Ninilchik ..... | 5-10-60 | 1,130 | 150 | 458 |
| | 7- 8-60 | 158 | 2 | .8 |
| | 8-25-60 | 138 | 3 | 1 |
| 2439. Snow River near Lawing..... | 5-10-60 | 347 | 35 | 33 |
| | 7- 8-60 | 1,080 | 146 | 426 |
| | 8-24-60 | 1,040 | 101 | 284 |
| 2722. Placer River at Portage..... | 5-10-60 | 1,560 | 276 | 1,160 |
| | 7- 8-60 | 2,820 | 167 | 1,270 |
| | 8-24-60 | 2,110 | 117 | 666 |

e Estimated.

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