SEDIMENT DISCHARGE DATA FOR THE SUSITNA RIVER BASIN, ALASKA, 1981-82

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U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 83-

Prepared in cooperation with the
ALASKA POWER AUTHORITY

UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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By James M. Knott and Stephen W. Lipscomb

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1983

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

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Multiply	by	to obtain
foot (ft)	0.3048	meter (m)
square mile (mi^2)	2.590	square kilometer (km)
acre-foot (acre-ft)	1,233	cubic meter (m^3)
foot per second (ft/s)	0.3048	meter per second (m/s)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
ton, short	0.9072	megagram (Mg) or metric ton
ton per day (ton/d)	0.9072	megagram or metric ton per day (Mg/d)
degree Fahrenheit (°F)	°C=5/9 (°F-32)	degree Celsius (°C)

Milligram per liter (mg/L) is a standard reporting unit for which no inch-pound equivalent is used.

National Geodetic Vertical Datum of 1929 (NGVD of 1929): The reference surface to which relief features and altitude data related; formerly called mean sea level.

SEDIMENT DISCHARGE DATA FOR THE SUSITNA RIVER BASIN, ALASKA, 1981-82

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INTRODUCTION

The Susitna River is one of the major rivers in Alaska, ranking fifth in drainage area and annual runoff. The upper reaches of the river are under consideration as possible sites for several dams and reservoirs that will be used as part of a large power-generation system in south-central Alaska.

This report constitutes a summary of sediment and hydraulic data collected in the Susitna River basin in the area between the proposed damsites and Sunshine (fig. 1). These data were collected during 1981-82 to determine total-sediment discharge of the Susitna, Chulitna, and Talkeetna Rivers prior to any construction. The data-collection effort is part of a cooperative program between the Alaska Power Authority and the U.S. Geological Survey.

Figure 1 near here

DESCRIPTION OF AREA

The Susitna River basin (fig. 1) lies on the southern flank of the Alaska Range in south-central Alaska. The basin, which has a drainage area of about 19,400 mi^2, is a contrast of steep rugged mountains towering above wide valley lowlands. Elevations range from 20,320 ft at Mt. McKinley tc sea level where the Susitna River empties into Cook Inlet.

Tributaries to the Susitna River are commonly referred to as glacial or nonglacial streams. The nonglacial streams are noted for their clarity, even during intense summer rainstorms. Glacial streams are generally turbid throughout most of the open-flow season (May through October). The Susitna River and its larger tributaries are all affected to a large degree by glacial runoff.

Because of the remoteness of the area and rugged landscape, population is sparse and development of the basin has been slow. The economy is based principally on recreation and tourism. The many forests, streams, and mountains are extremely popular with recreationists who enjoy the good hunting, fishing, and scenic beauty of the area.

CLIMATE

The climate of the Susitna River basin is divided into two broad categories according to maps prepared by Searby (1968). Higher elevations of the basin are included in the Continental Zone, where diurnal and annual temperature variations are great and precipitation is relatively low. Mean annual temperature ranges from 15 to 25°F (Hartman and Johnson, 1978). The lowlands lie in the Transition Zone where temperatures are less variable than in the Continental Zone. Mean annual temperatures generally range from 25 to 35°F.

Climatological records for the Talkeetna weather stations are probably representative of lowland areas. A summary of climatological data for this station (Selkregg, 1974) indicates that summer temperatures range from 38 to 62°F, winter temperatures range from -9 to 18°F, and extremes range from -44 to 85°F. Annual precipitation averages 28 in., about 60 percent of which is rainfall.

DATA COLLECTION AND ANALYSIS

Systematic measurements of sediment discharge and hydraulic data were obtained at four sites in the basin during the 1982 water year (October 1981 - September 1982). Samples were obtained at weekly intervals from the Susitna, Talkeetna, and Chulitna Rivers near Talkeetna and from the Susitna River at Sunshine. The measurements were initiated to define the amount and distribution of sediment transport by the Susitna River and its major tributaries between Gold Creek and Sunshine (fig. 1). The program included:

(1) Measurement of suspended-sediment concentration, bedload discharge, and cross-sectional dimensions at weekly intervals following spring breakup.

(2) Analysis of selected samples for particle-size distribution.

(3) Supplemental samples of streambed material.

Streamflow characteristics were defined from data available for existing streamgaging stations. At sampling sites that did not coincide with streamgaging sites, sufficient discharge measurements were obtained to develop stage-discharge relations. All measurements were made from a boat; either a cableway or sextant were used for stationing.

Suspended-sediment samples were collected with a standard depth-integrating P-61 sampler (Guy and Norman, 1970). Samples were collected at selected verticals in the stream cross section and analyzed to determine average suspended-sediment concentration and particle-size distribution of sediment in the water-sediment mixture. Samples of suspended sediment contain particles (usually finer than 2.0 mm) transported in the stream between the water surface and a point about 0.5 ft above the streambed.

Sediment transported on or near the streambed (0.3 ft) was sampled using a bedload sampler (Helley and Smith, 1971, p. 1-18) designed for collecting coarse sediment (0.062-76.2 mm). Sampling time, number of sampling points, stream width and depth, and dry sediment were recorded to determine bedload discharge. Trap efficiency of the sampler was assumed to be 1.0. The Helley-Smith sampler is not yet considered "standard" equipment for determining bedload discharge because testing and calibration research has not been completed. In the interim, the Geological Survey uses a provisional method to calculate bedload discharge (U.S. Geological Survey, written comm., 1979) based on field calibration tests (Emmett, 1980).

A few bed-material samples were obtained at each site using a 6-inch diameter pipe dredge. At some sites, deep and swift rivers, armoring, and the presence of coarse particles on the streambed made sampling difficult. Results range from poor at Susitna River near Talkeetna to good at Chulitna River near Talkeetna.

Measurements of depth and width at sampling sections were generally obtained during bedload measurements. Depths were measured by sounding with the Helley-Smith sampler at 18 to 25 verticals in the cross section. Stream width was determined from station markings on cableways or from sextant readings. Average velocity was determined by dividing the rated discharge of the stream by the cross-sectional area.

SEDIMENT DISCHARGE

Sediment Transport

Sediment is transported in suspension, as bedload, or as a combination of both. Suspended sediment, as the name implies, consists of particles which are trans-

ported in a stream while being held in suspension by the turbulent components of the flowing water. Coarse sediment that is transported on or near the streambed constitutes the bedload. Clay and silt particles usually are moved in suspension and gravel particles move on or near the streambed. Sand particles may be transported either as suspended load or as bedload, or both.

Suspended-Sediment Discharge

Suspended-sediment sampling for this study was initiated during the 1981 water year. Samples were obtained at monthly intervals at Susitna River at Gold Creek (15292000), Chulitna River near Talkeetna (15292400), Talkeetna River near Talkeetna (15292700), and Susitna River at Sunshine (15292780). In 1982, the program was modified to include weekly sampling at the Chulitna, Talkeetna, and Sunshine sites and to establish a new site, designated "Susitna River near Talkeetna" (15292100). Sediment-transport rates for the new site are more comparable to those for the other sites than is Gold Creek because of its closer proximity to the other sites.

Suspended-sediment data obtained during the 1981-82 water years are listed in table 1. Comparison of data from the five sites indicates both similarities and differences between the amount of sediment transported by the Susitna River and its tributaries.

Table 1 near here

During the winter period (November - March) suspended-sediment concentrations are generally less than 10 mg/L at all sampling sites. The rivers are generally ice

covered and streamflow is at its annual mininum--precipitation is stored as snow or ice and glacier melting is at a minimum.

Spring breakup usually occurs in May. Concentrations of suspended sediment increase rapidly to several hundred milligrams per liter soon after the breakup period. Samples collected in late May and early June typically contain a large percentage of sand, which may indicate that coarse sediment is being primarily eroded from stream channels or banks. Water levels are generally high during this period. Large parts of the river flood plain are covered by ice, so that flow is confined and diverted toward the other bank. Bank erosion by ice-block abrasion may be severe.

Suspended-sediment concentrations at the different sampling sites are most variable during the summer (July-August). The Susitna and Talkeetna Rivers are moderately affected by glacial runoff; glaciers account for 5 to 7 percent of the drainage areas. Concentrations for the sites on these rivers "near Talkeetna" (nos. 15292100 and 15292700) ranged from 90 to 768 mg/L during July and August 1982. The larger concentrations typically occur during periods of storm runoff.

About 28 percent of the drainage area above the Chulitna sampling site (15292400) is covered by glaciers. Concentrations of suspended sediment at this site ranged from 766 to 1,270 mg/L during July and August 1982. Concentrations during periods of maximum glacial melt were roughly equivalent to those during periods of storm runoff. During July and August 1982 suspended-sediment concentrations for the Sunshine site (15292780) ranged from 424 to 1,430 mg/L and represent a complex mixture of sediment and streamflow contributions from the Susitna, Chulitna, and Talkeetna Rivers near Talkeetna.

Particle-size data for July and August indicate significant differences in the composition of suspended sediment for the sampling sites. The Susitna River near Talkeetna typically transports a small percentage of sand (21 percent) compared to the Chulitna River (29 percent) and the Talkeetna River (55 percent). The Susitna River at Sunshine transports an average of 28 percent sand.

Relation Between Suspended-Sediment Discharge and Water Discharge

A common method for analyzing sediment-transport characteristics at a site is to construct a graph of sediment discharge versus water discharge. This relation is generally expressed as a plot on logarithmic paper and is referred to as a sediment-transport curve. Sediment-transport curves showing the relation between instantaneous sediment discharge and water discharge for the Susitna, Chulitna, and Talkeetna River sites are shown in figures 2-5. Similar curves were prepared for the silt-clay and sand fractions to examine possible differences in sediment supplied from glacial runoff and storm runoff. Coefficients of determination (r^2) were computed to provide a qualitative measure of the variance of sediment discharge to water discharge.

Figures 2-5 near here

The transport curves are probably representative only for sediment transport during June to September 1982. Although runoff during the 1982 water year was about average in total flow, maximum water discharges were well below extremes for the period of record and minimum flows were well above low flows for most years.

Suspended-sediment discharge characteristics were quite similar at all sampling sites, in that sediment discharge increased at about the same rates relative to water discharge. Sediment discharge increased exponentially at a faster rate than water discharge. Exponents of water discharge, Q, in the equation (figs. 2-5) ranged from 2.11 for Susitna River at Sunshine to 2.37 for Chulitna River near Talkeetna; r^2 ranged from 0.75 to 0.91. Division of suspended sediment into silt-clay and sand fractions, however, indicated some extreme differences between individual sites.

At Susitna River near Talkeetna, the amount of suspended sand carried by the stream increased at more than twice the rate of silt-clay with increases in water discharge. At the lowest discharge sampled, sand discharge was 1,090 ton/d compared to a silt-clay discharge of 8,840 ton/d. At the highest discharge sampled, sand and silt-clay discharges were both about 35,000 ton/d.

At the Chulitna and Talkeetna Rivers, sand and silt-clay discharges both increased at approximately the same rates. Silt-clay discharge increased at a slightly faster rate than sand discharge at the Chulitna River and at a slightly slower rate at the Talkeetna River.

At the Sunshine site, sand discharge increased at a much faster rate than silt-clay discharge. For all ranges of discharge sampled, however, the amount of sand transported was less than the silt and clay sized material.

Bedload Discharge and Hydraulic Characteristics

The bedload and hydraulic data for the three sampling sites near Talkeetna and the Susitna River at Sunshine are summarized in table 2. Bedload is expressed both in tons per day and in terms of the particle size distribution, as percent finer than the indicated sieve size. Samples were collected monthly starting in July 1981 and weekly beginning in June 1982.

Table 2 near here

The bedload discharge for the Susitna River near Talkeetna ranged from 106 to 2840 ton/d during the 1982 water year. During this same period, the water discharge ranged from 16,900 to 44,400 ft^3/s. In contrast, in 1982, the bedload rate at the Chulitna River site ranged from 2560 to 18,300 ton/d, with water discharge varying from 12,500 to 33,400 ft^3/s.

During the summer of 1981, bedload samples were collected at Susitna River at Gold Creek (table 2). In 1982 the sampling site was relocated downstream to the new station, Susitna River near Talkeetna. A comparison of data from the two sites indicates that, for a given discharge, similar amounts of sediment are transported past them. The grain-size distribution for both locations showed a fairly even mixture of sand and gravel at the beginning of the summer with a steady decrease in gravel size material as the summer progressed and flows diminished. This trend is interrupted only during the major storms of the summer, which occurred near the end of July and in mid-September. During these periods of higher flows there is a shift to increasing grain size but the median still remained in the sand range.

The particle-size distribution on the Chulitna River tended toward a higher percentage of gravel than sand. A typical mixture of 30-40 percent sand and 60-70 percent gravel was fairly constant throughout the summer. Storm-runoff events produced only a slightly larger median particle size. Low flows seemed to produce variable results, sometimes increasing and sometimes reducing the median size of bedload.

In the 1982 water year, bedload discharge at the Talkeetna River site ranged from 243 to 5790 ton/d for flows ranging from 5960 to 19,100 ft^3/s. The particle sizes on the Talkeetna River were typically 70-90 percent sand. Exceptions occurred during snowmelt runoff in early June. For this period the size distribution changed to about 65 percent gravel and 35 percent sand. During a September storm the amount of gravel again rose to 73 percent. Although the size of the material was related to stream discharge, the amount of bedload transported seemed to be independent of discharge. In June and again in August and September bedload discharges typically ranged from 1000 to 2000 ton/d. For several weeks in July bedload discharge decreased to less than 1000 ton/d. Even during the storm on July 27-28, when streamflow was 14,300 ft^3/s at the time of the sampling, the bedload discharge was only 885 ton/d. Then in August it rose to its earlier levels and remained at those levels throughout the summer and fall.

At Susitna River at Sunshine in 1982, bedload discharge ranged from 1050 to 13,600 ton/d; streamflow from 38,500 to 99,000 ft^3/s. During most of the 1982 sampling period, (June-September), the total bedload discharge at the three upstream sites was two to five times larger than that at Sunshine. This indicates that the excess material, moved through the three sites above Talkeetna, is either deposited in the

Susitna River between Talkeetna and Sunshine or in the Chulitna River downstream of the sampling site. The only exceptions to this were on July 26 and again on September 18, when the total of the three upstream sites was slightly less than that measured at Sunshine. These two dates correspond to the two peak flows at Sunshine during 1982. Thus, the data indicate that material deposited above Sunshine during low and medium flows is transported during high flows.

At Sunshine, the sand and gravel fractions of bedload discharge varied with season and water discharge. In the early part of June the mixture was about 20 percent sand and 80 percent gravel. This coincided with the high runoff flows during that period. Later during August, when the water discharge was low, the gravel proportion decreased to about 15 percent, with sand increasing to 85 percent. This mixture was affected during the storm events in July and September when gravel increased to 75 percent.

Selected channel cross sections for the four sites, with a corresponding plot of bedload discharge at individual sampling points are shown on figure 6-9. In most cases the location of the active bedload movement is within the deeper part of the channel where the velocities are greatest. The bedload values for each individual point across the section were estimated during sampling, as most analyses were composited from samples obtained at more than one point. The estimated values were used, together with the actual weight of the cumulative sample, to give a weighted estimate of each point sampled in the cross section. This method gives a qualitative approximation for the lateral distribution of bedload movement.

Figures 6-9 near here

Relation Between Bedload Discharge and Water Discharge

A relation can be defined between bedload discharge and water discharge, using similar methods as for suspended sediment. Log-transformed data and a least-squares method are used to obtain a best-fit line through the plotted points. Transport curves and corresponding equations describing the relations are shown in figures 10-13.

Figures 10-13 near here

The small scatter of data points for the Susitna River near Talkeetna suggests that water discharge has a strong influence on bedload discharge; an increase in water discharge results in an exponential increase in bedload discharge. Data for the Chulitna and Talkeetna Rivers have considerably more scatter, indicating that bedload discharge is influenced by several factors. It is likely that glacial processes are partly responsible for this increased scatter. Other factors may include the available supply of coarse material, bedload-suspended sediment interaction (sand sizes), and timing of sampling visits with respect to storm events. Most visits in 1982 were made during recession periods after peak discharge or during extended base-flow periods.

During some periods when either glacial or storm processes were dominant, the slope for the bedload to water discharge relation was similar to that for suspended-sand discharge. Transport curves developed from correlations between bedload and suspended-sand discharge were used where coefficients of determination (r^2) for regression equations were unusually low.

BED-MATERIAL DATA

Bed-material samples, representative of the sediment occurring in the submerged parts of the river channels, were extremely difficult to obtain because the rivers were too deep and swift for direct access to streambeds. Representative samples, were obtained, however, at Chulitna River near Talkeetna (15292400) and at most sampling points at Susitna River at Sunshine (15292780). A few samples were obtained at the Talkeetna River (15292700) and Susitna River near Talkeetna (15292100) sites. Most samples obtained at the latter sites consisted of a few coarse particles. Bed-material data for 1981-82 are listed in table 3.

Table 3 near here

ESTIMATED SEDIMENT YIELD, MAY TO SEPTEMBER 1982

The sediment yield from a drainage basin is commonly expressed in terms of weight (short or metric tons) or volume (acre-feet or cubic meters). Sediment yields may be estimated by several methods, depending generally on the amount and type of available data. If daily records of streamflow are available, but sediment discharge has been measured only infrequently, the method most commonly used involves defining a relation between instantaneous sediment discharge and water discharge

and applying this relation to daily values of water discharge. This method was initially used to estimate sediment yield for this study.

At some sites, however, a single sediment-transport curve could not be applied for the entire period because of seasonal changes in the amount and particle-size distribution of sediment for given water discharges. At the Chulitna River site the scatter of bedload-discharge data was such that even the definition of a bedload-water discharge relation is subject to individual interpretation. Several alternative methods were selected to estimate sediment yield for the period May to September 1982.

Suspended-sediment yield was estimated using the Colby shift-control method (Colby, 1956). According to Colby, part of the scatter of sediment data in sediment-transport relations is due to random or very short-term fluctuations in concentration, particularly the concentration of the coarse sediments. Part may be due to inflow from tributaries or an actual change that may persist for days, weeks, or seasons. In the opinion of the authors, most of the observed scatter is probably due to seasonal changes and complex mixing of sediment produced from glacial melt and storm runoff, and Colby's method would result in more accurate estimates.

Colby suggests that if a change in the relation persists for several days or more the transport curve could be shifted to pass through or near each individual measurement. The method is subjective in that judgment is used to decide whether the measurement is representative of an actual change or a random fluctuation. An important advantage in using this method is that the accuracy of fit of the transport-curve is of small importance.

Bedload yield also was estimated using the Colby shift-control method. At sites where the scatter in data on bedload discharge was extreme, the initial transport curve was constructed based on transport curves of suspended sand. Sediment-transport curves were constructed for silt-clay, sand, and gravel components for both suspended-sediment and bedload discharge measurements.

Estimated sediment yields for the period May to September 1982 are given in table 4. Total sediment yields (sum of bedload and suspended-sediment yield) for the sites near Talkeetna ranged from 1.5 million tons for the Talkeetna River to 8.2 million tons for the Chulitna River. The Susitna River near Talkeetna transported about 2.8 million tons of sediment from May to September 1982.

Table 4 near here

Sediment composition was predominantly silt-clay for the Susitna (68 percent) and Chulitna (62 percent) Rivers near Talkeetna and sand (54 percent) for the Talkeetna River. The amount of gravel ranged from 0.3 percent of total sediment yield for the Susitna River near Talkeetna site to 7.3 and 8.3 percent for the Talkeetna and Chulitna River sites respectively. The total sediment yield transported past the three sites near Talkeetna (12,500,000 tons) agrees reasonably well with that estimated for the site at Sunshine (13,000,000 tons). Examination of the bedload-size data, however, indicates that less than half of the gravel transported past the upper sites reached Sunshine during 1982.

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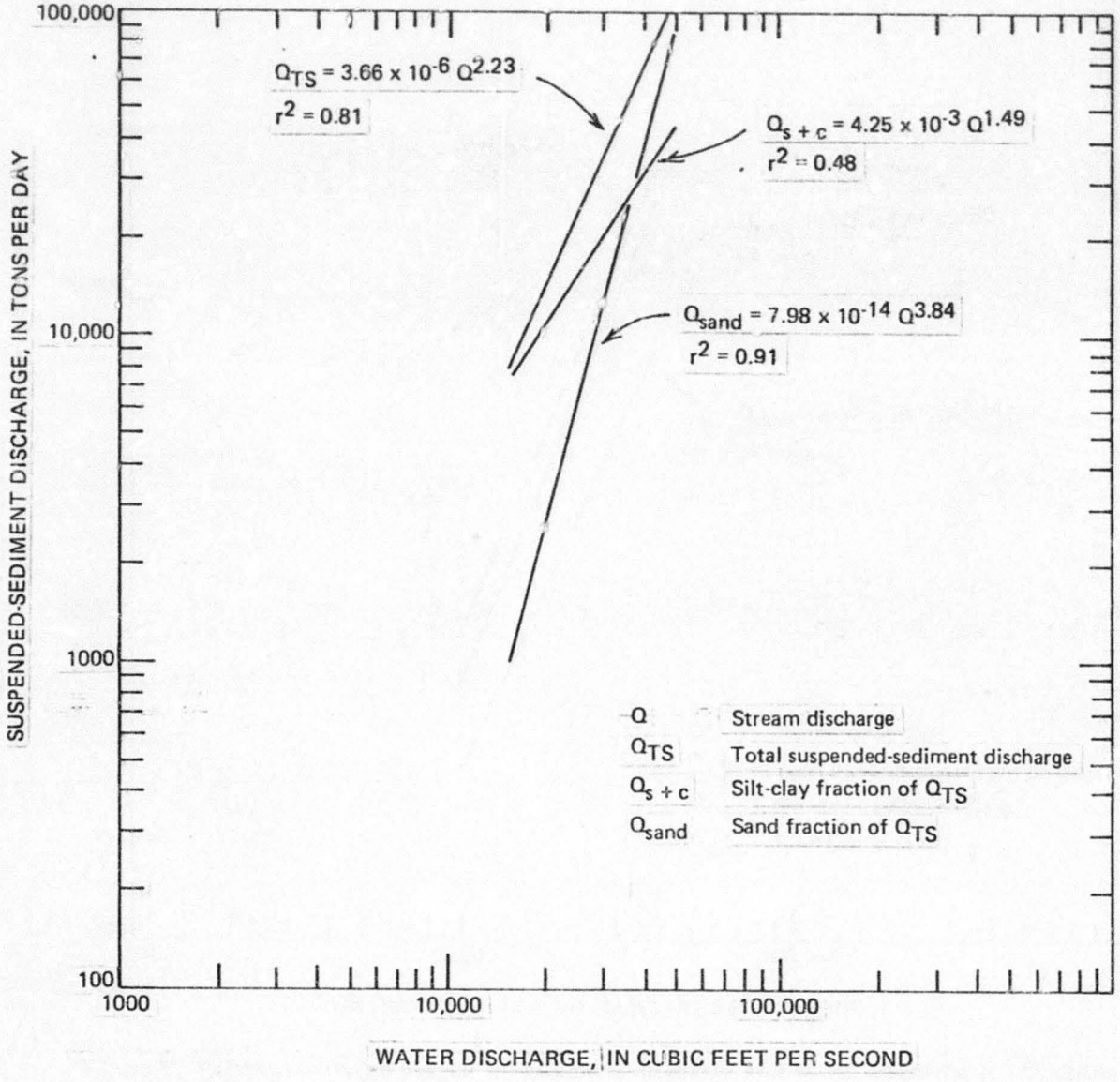

Figure 2.--Relation between suspended-sediment discharge and water discharge for Susitna River near Talkeetna, 1982 water year.

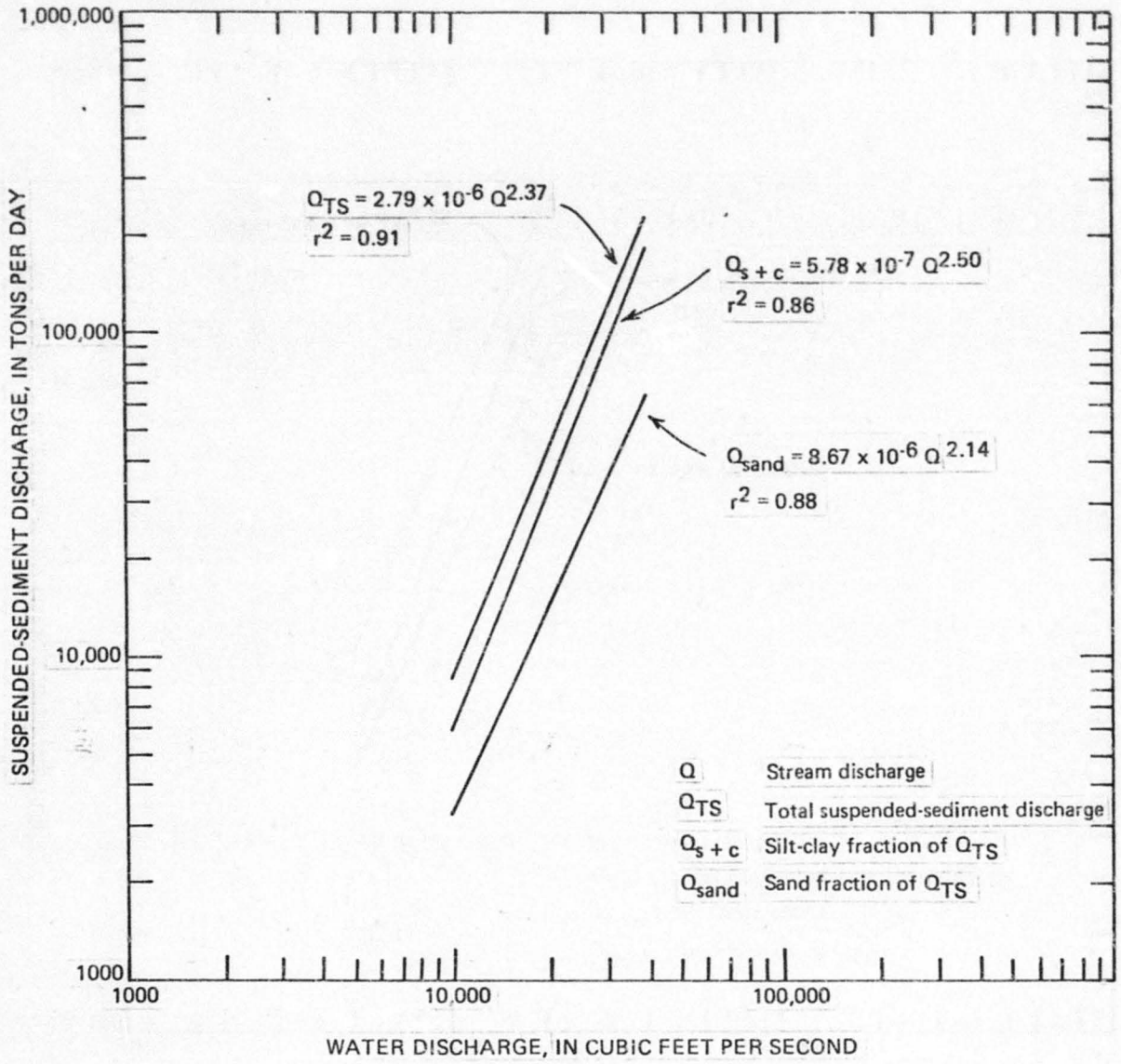

Figure 3.--Relation between suspended-sediment discharge and water discharge for Chulitna River near Talkeetna, 1982 water year.

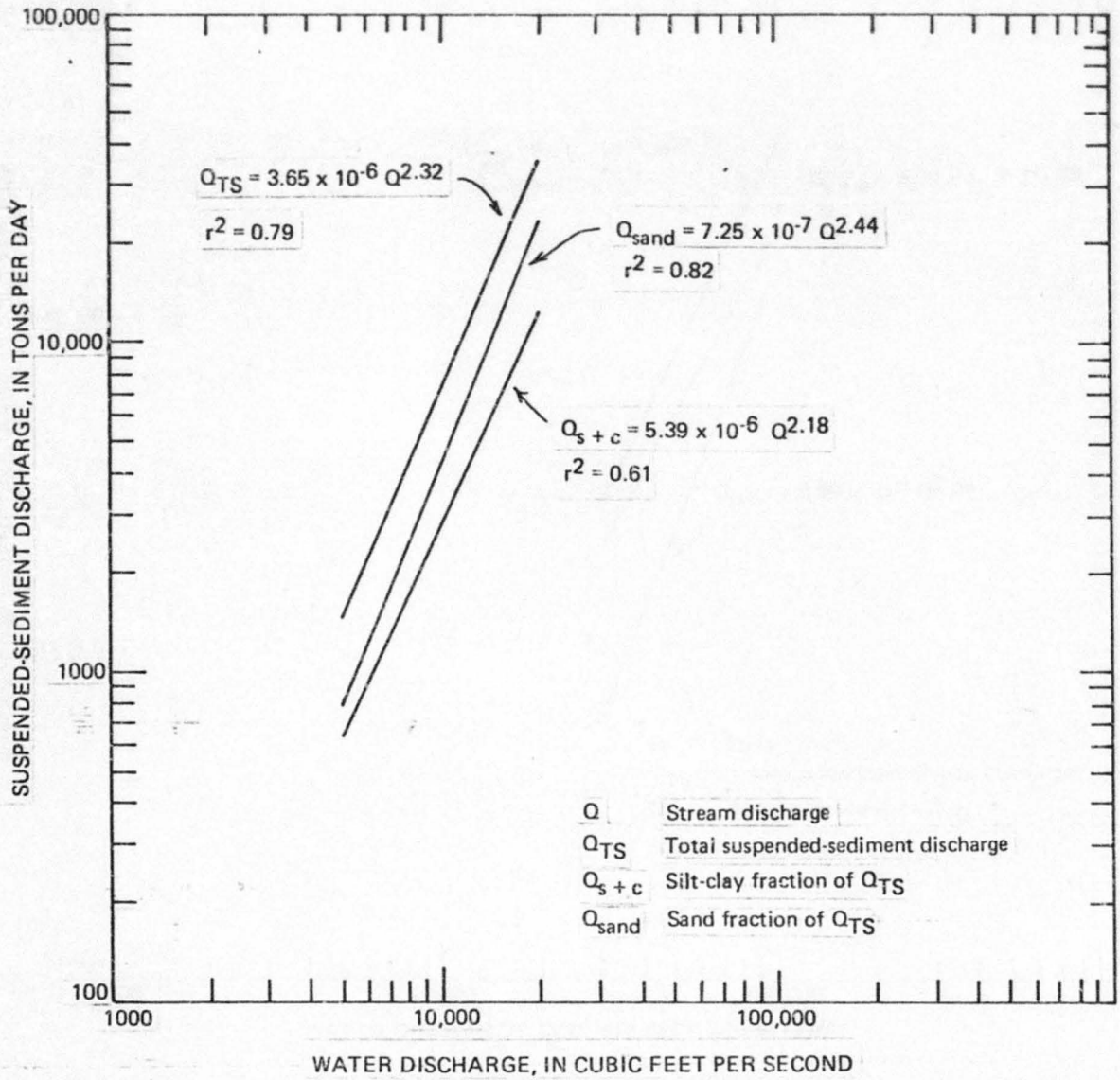

Figure 4.--Relation between suspended-sediment discharge and water discharge for Talkeetna River near Talkeetna, 1982 water year.

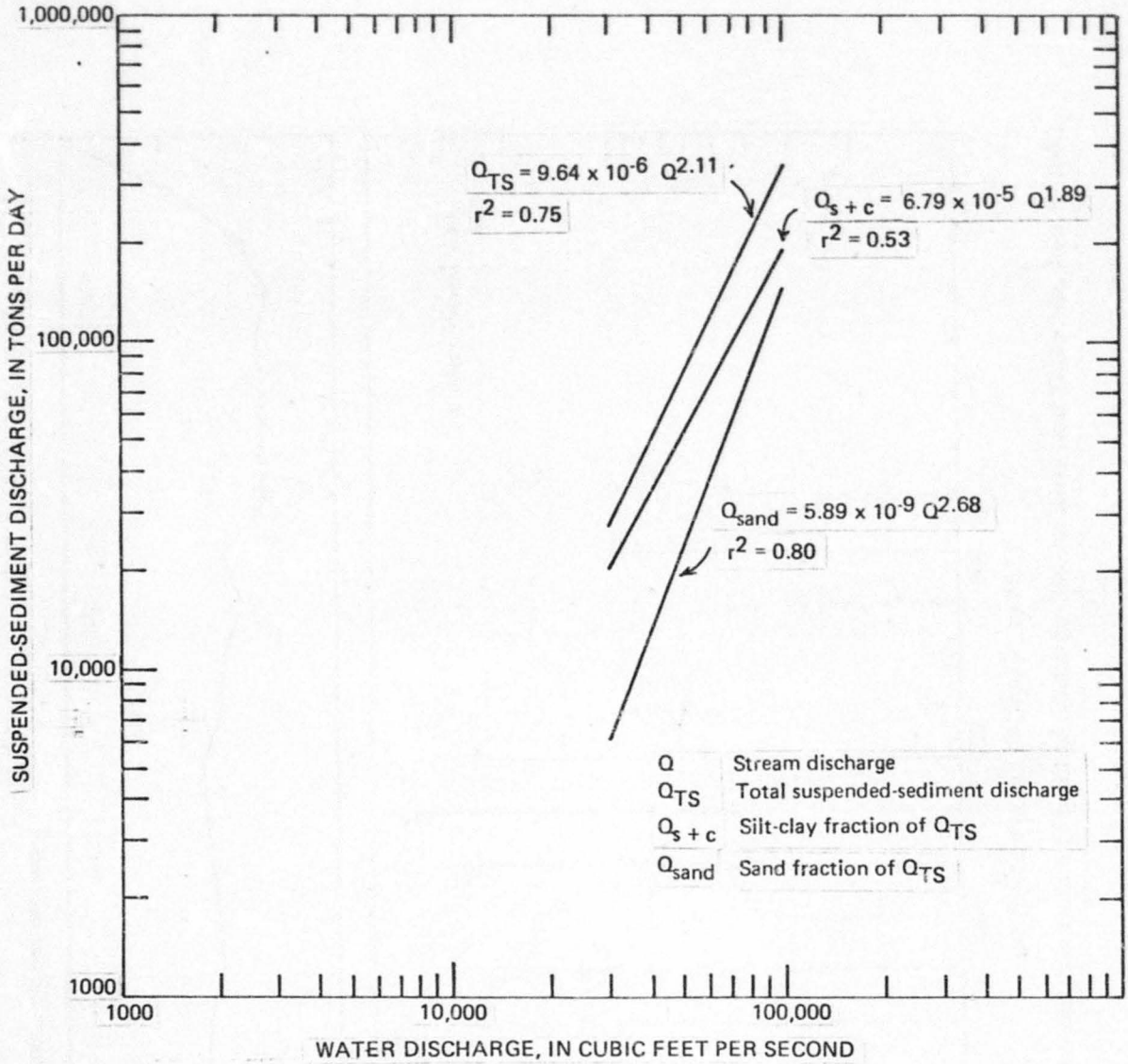

Figure 5.--Relation between suspended-sediment discharge and water discharge for Susitna River at Sunshine, 1982 water year.

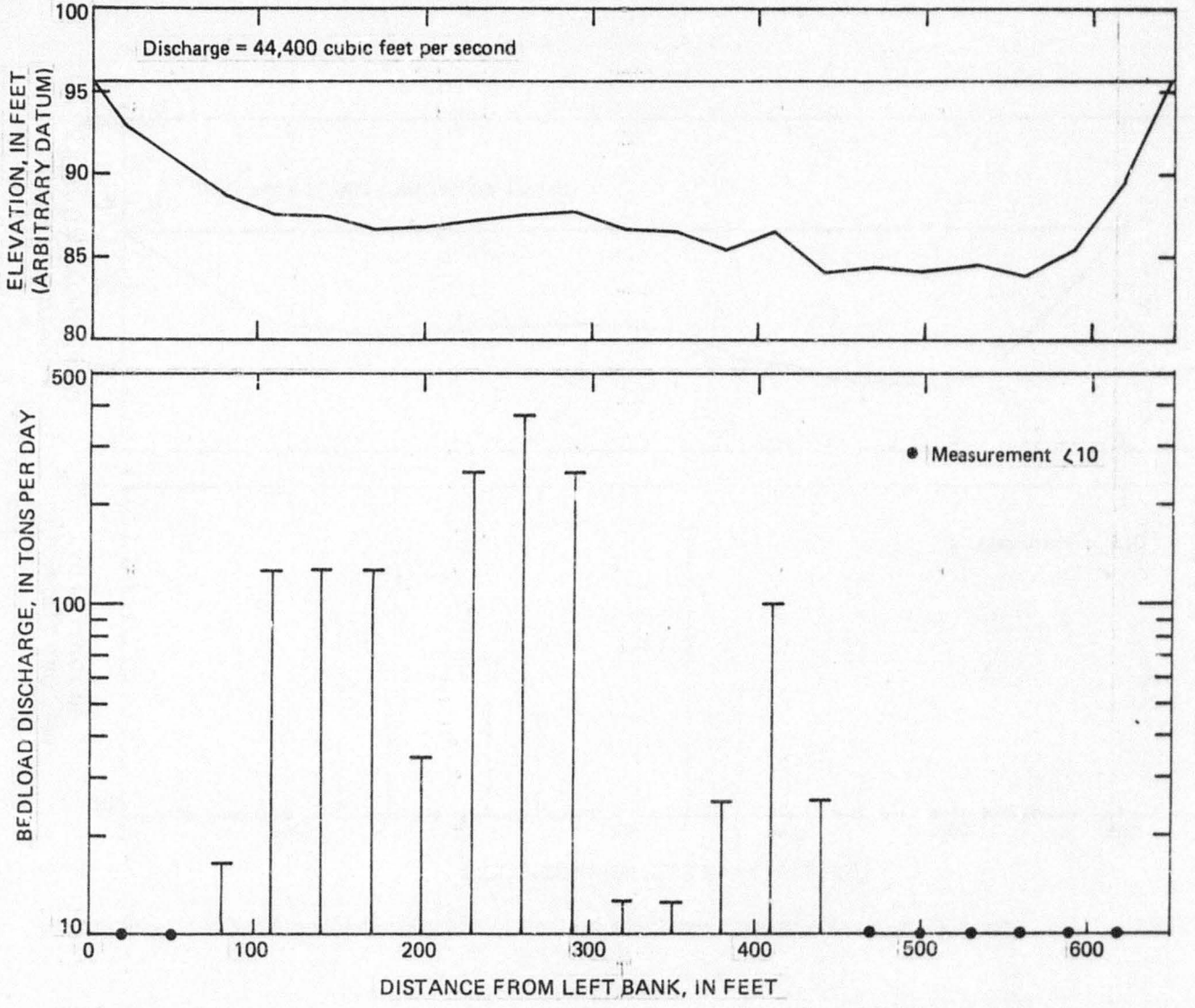

Figure 6a.--Cross section and distribution of bedload discharge, Susitna River near Talkeetna, June 8, 1982.

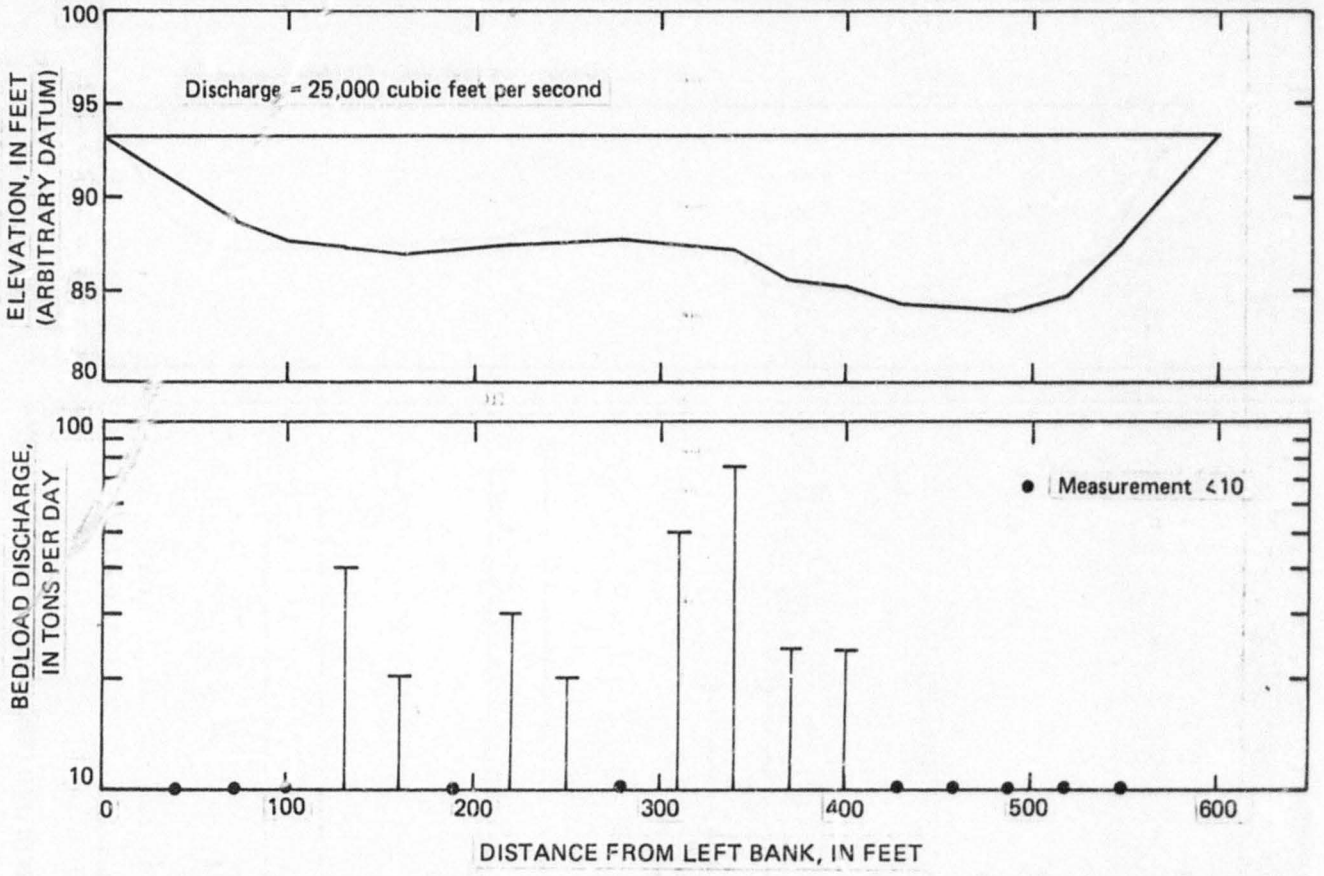

Figure 6b.--Cross section and distribution of bedload discharge, Susitna River near Talkeetna, July 21, 1982.

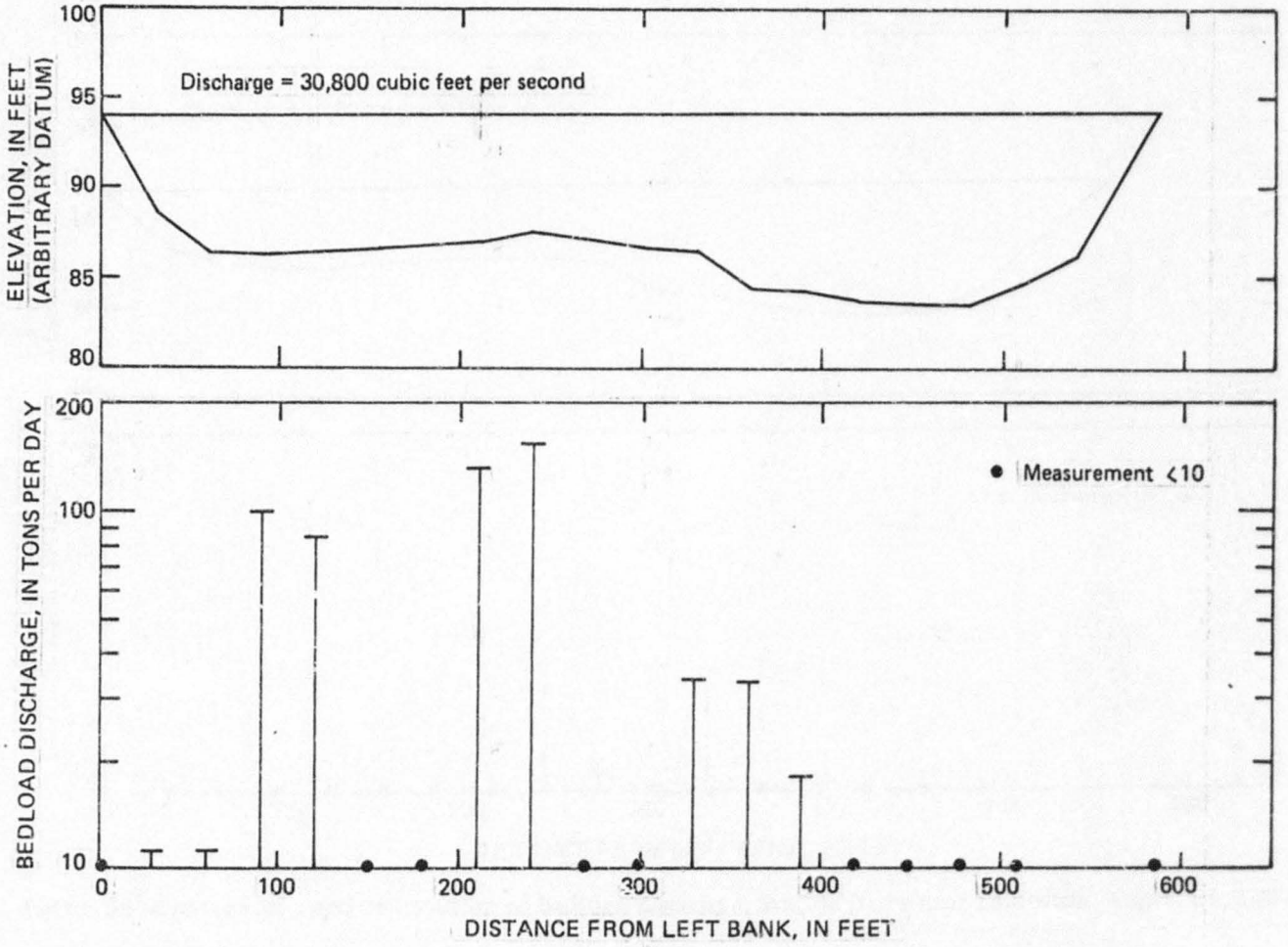

Figure 6c.--Cross section and distribution of bedload discharge, Susitna River near Talkeetna, July 28, 1982.

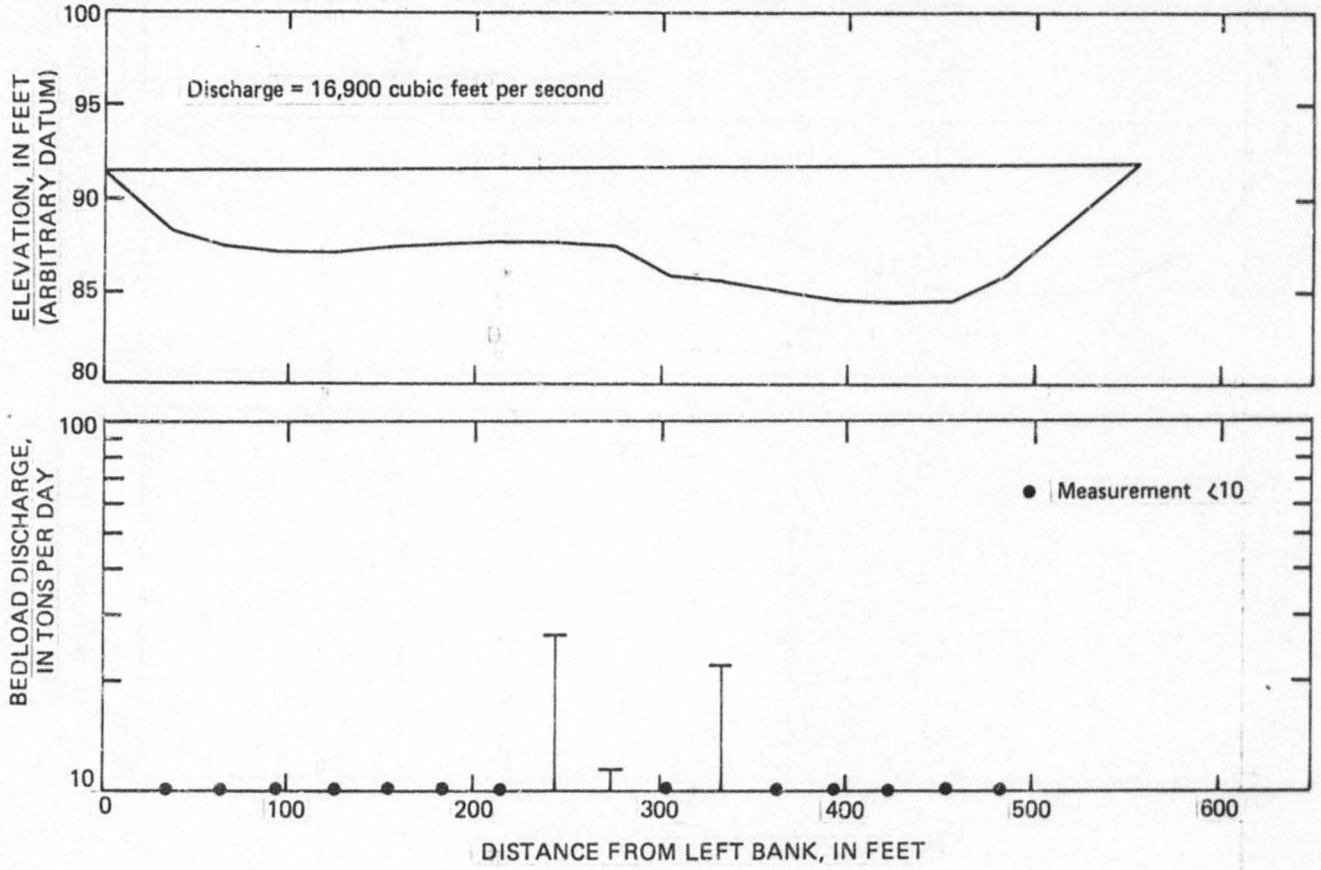

Figure 6d.--Cross section and distribution of bedload discharge, Susitna River near Talkeetna, August 25, 1982.

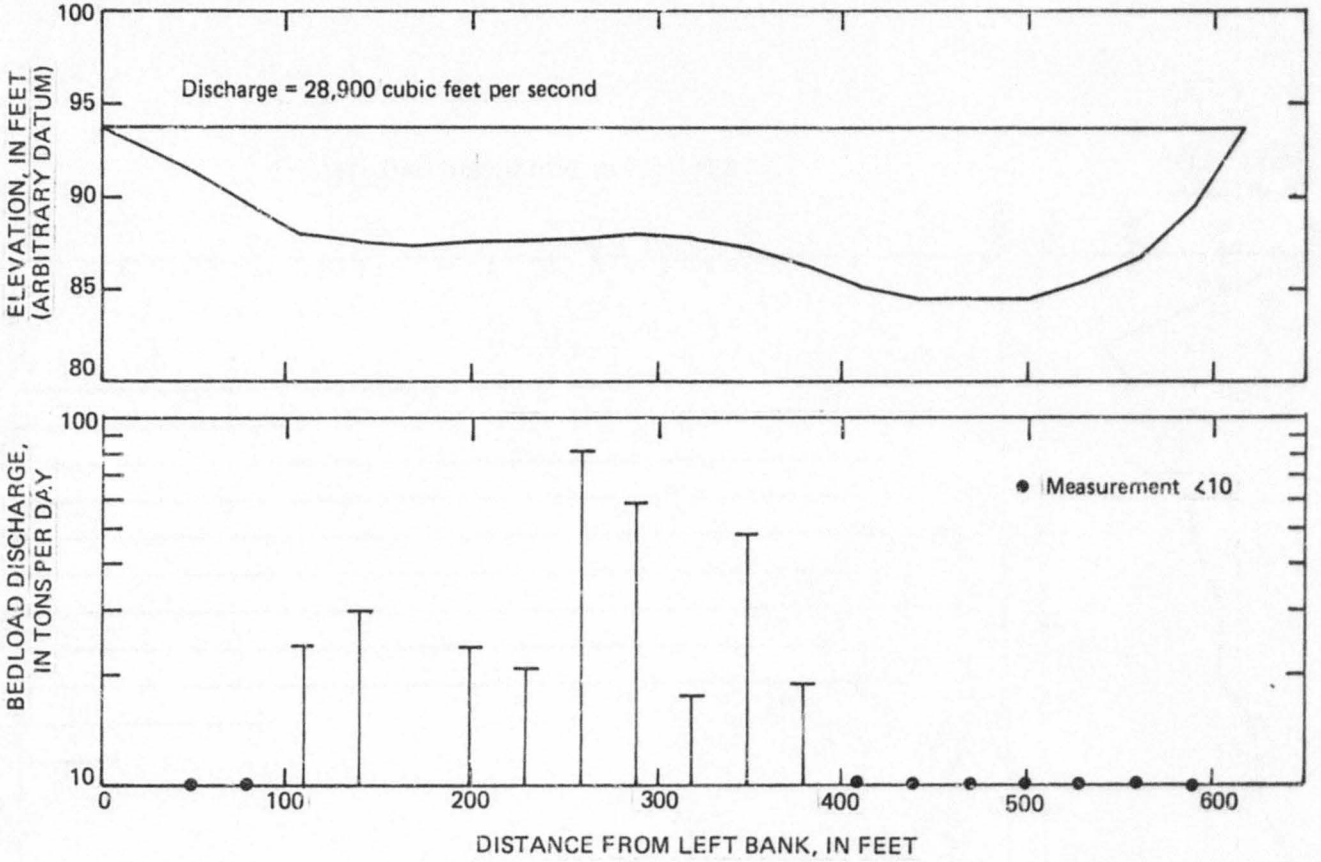

Figure 6e.--Cross section and distribution of bedload discharge, Susitna River near Talkeetna, September 19, 1982.

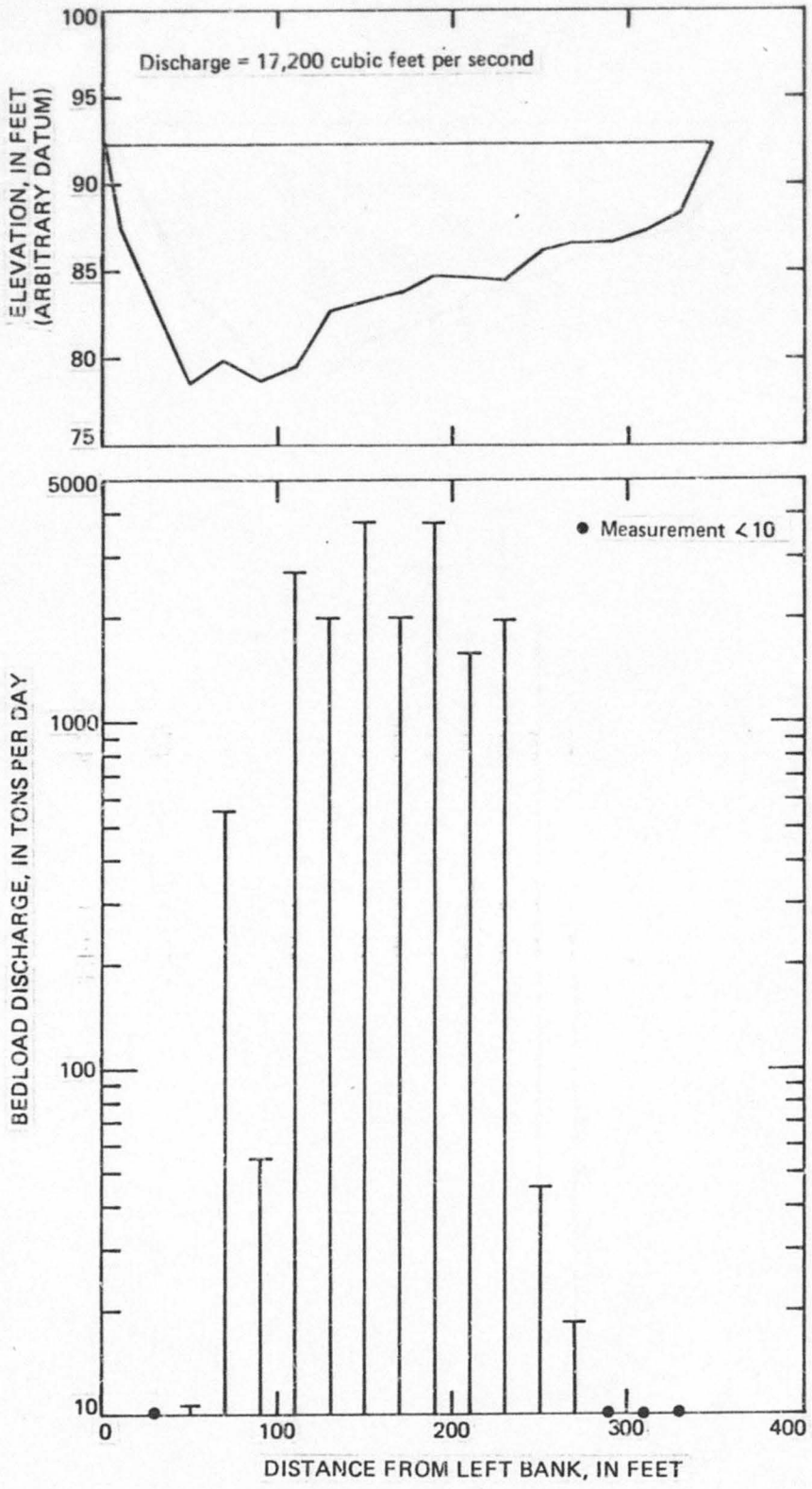

Figure 7a.--Cross section and distribution of bedload discharge, Chulitna River near Talkeetna, June 9, 1982.

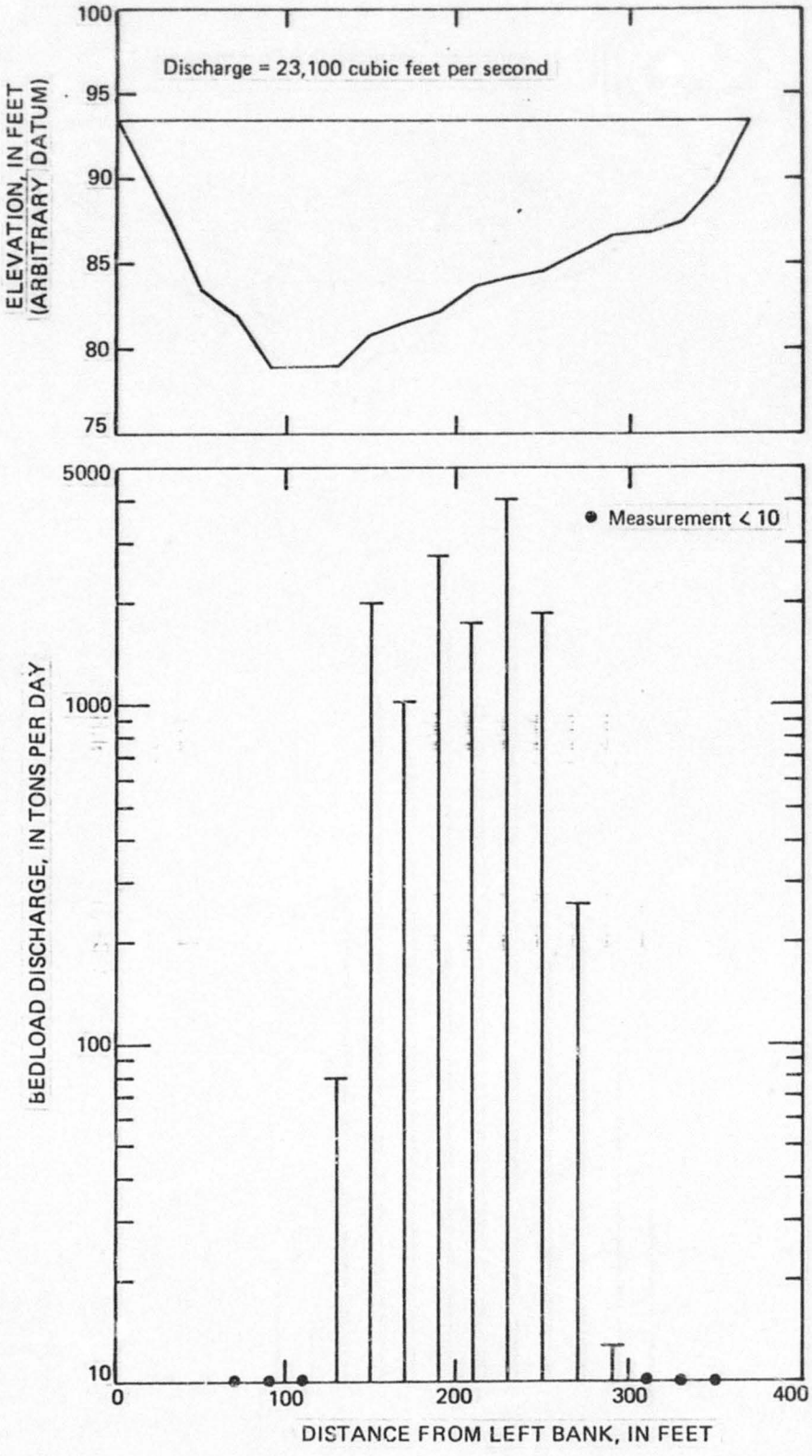

Figure 7b.--Cross section and distribution of bedload discharge, Chulitna River near Talkeetna, July 20, 1982.

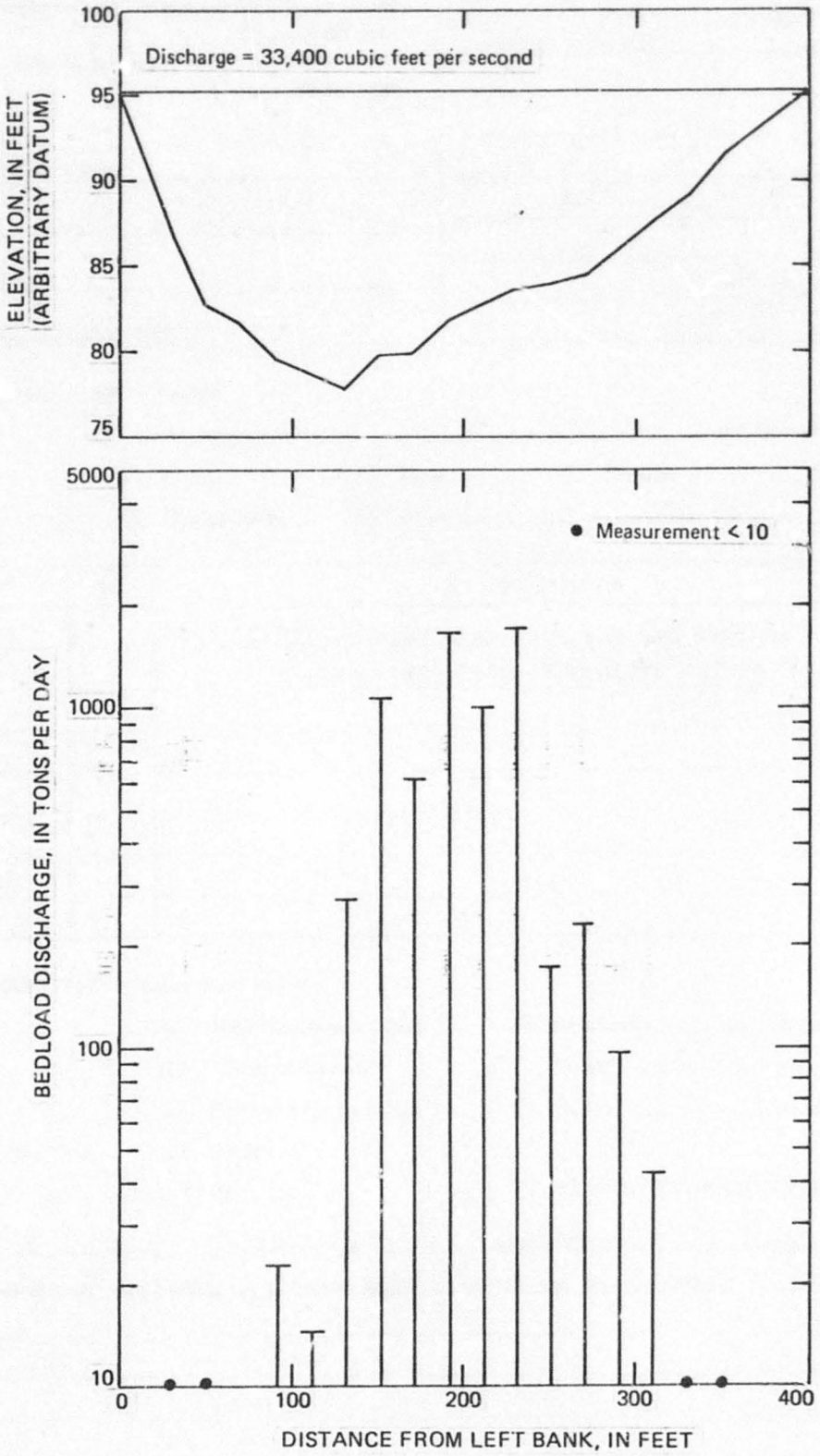

Figure 7c.--Cross section and distribution of bedload discharge, Chulitna River near Talkeetna, July 27, 1982.

HARZA-EBASCO SUSITNA JOINT VENTURE

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
1515 E. 13th Avenue
Anchorage, Alaska 99501

October 7, 1983

Mr. Eric P. Yould
Executive Director
Alaska Power Authority
334 West Fifth Avenue, Second Floor
Anchorage, Alaska 99501

Attention: Eric Marchegiani

Dear Mr. Yould:

Enclosed are 10 copies of the report "Sediment discharge data for the Susitna River basin, Alaska, 1981-82" by James M. Knott and Stephen W. Lipscomb. The report has not yet been reviewed for conformance with U.S. Geological Survey editorial standards nor approved for formal publication. Although the data may be used within your agency and by your planning and design contractors, we request that neither the report nor its contents be quoted nor distributed further at this time.

Bill

We will be submitting this manuscript to our regular review process so that it can be released as an Open-File report. We would welcome any comments or suggestions for changes to be incorporated in the final version. Please direct any comments or questions on the technical aspects of the report to Jim Knott at this office, phone number 271-4138. Thank You.

Sincerely,

Philip A. Emery

Philip A. Emery
District Chief

Enclosures

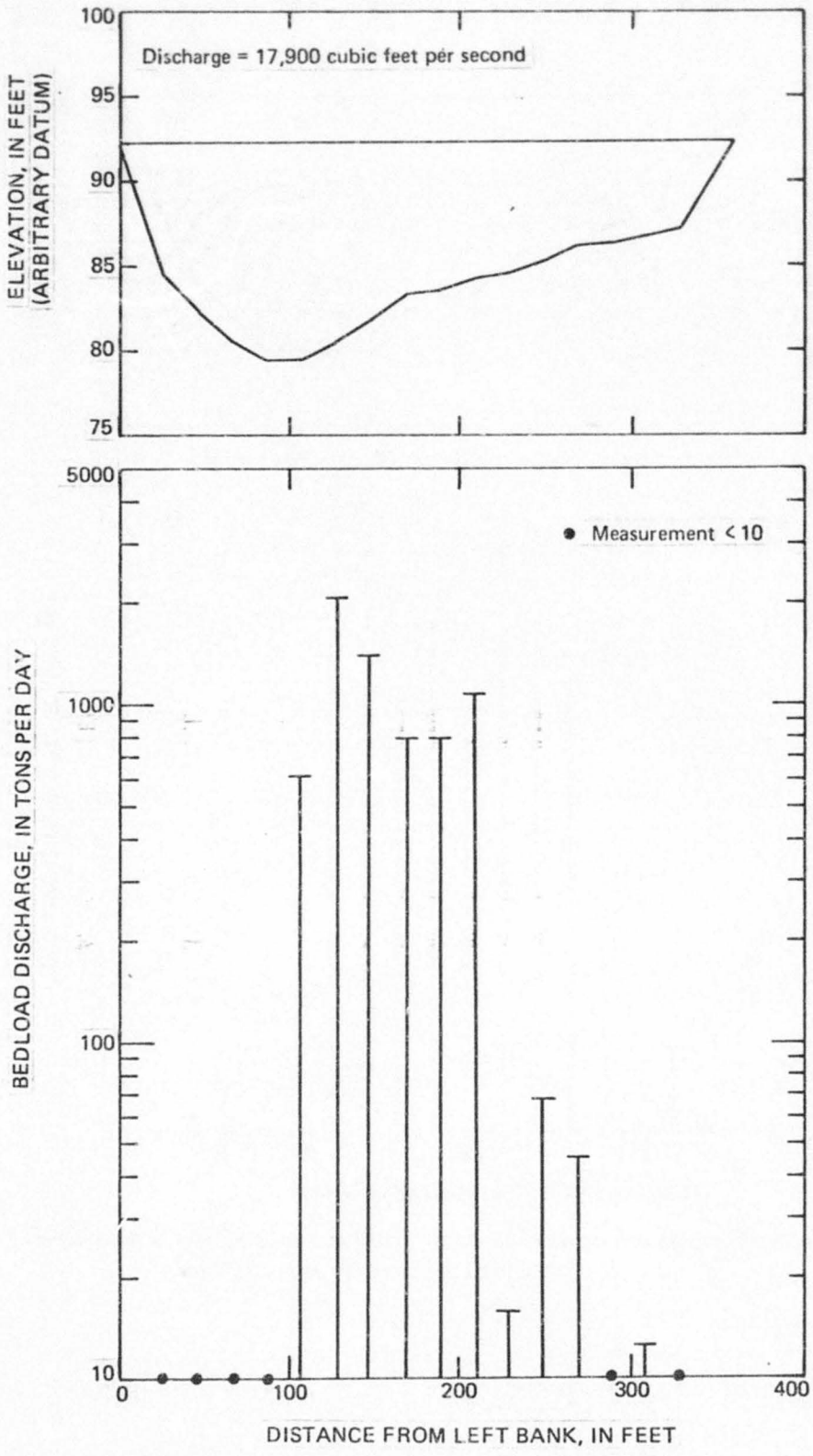


Figure 7d.--Cross section and distribution of bedload discharge, Chulitna River near Talkeetna, August 24, 1982.

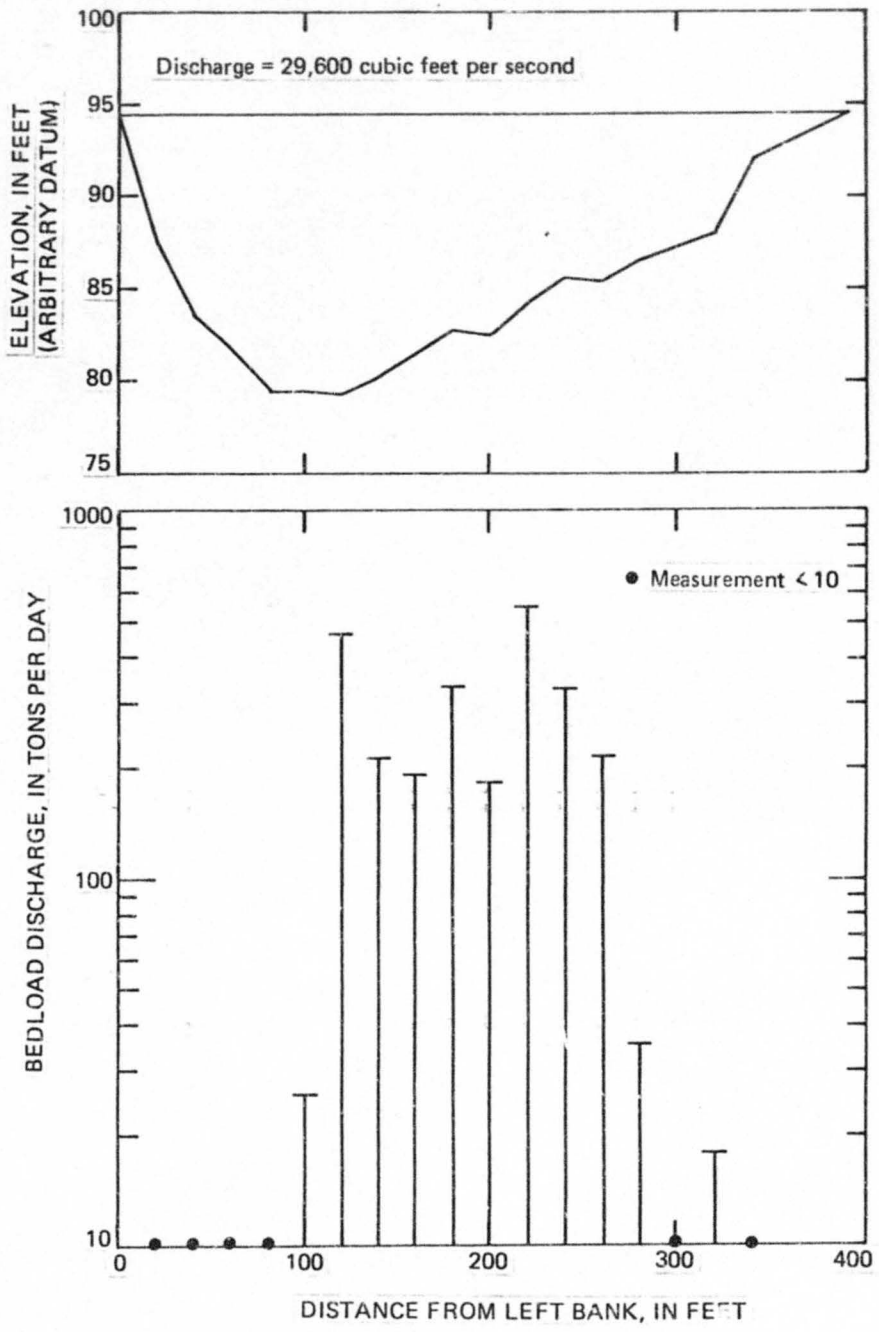


Figure 7e.--Cross section and distribution of bedload discharge, Chulitna River near Talkeetna, September 18, 1982.

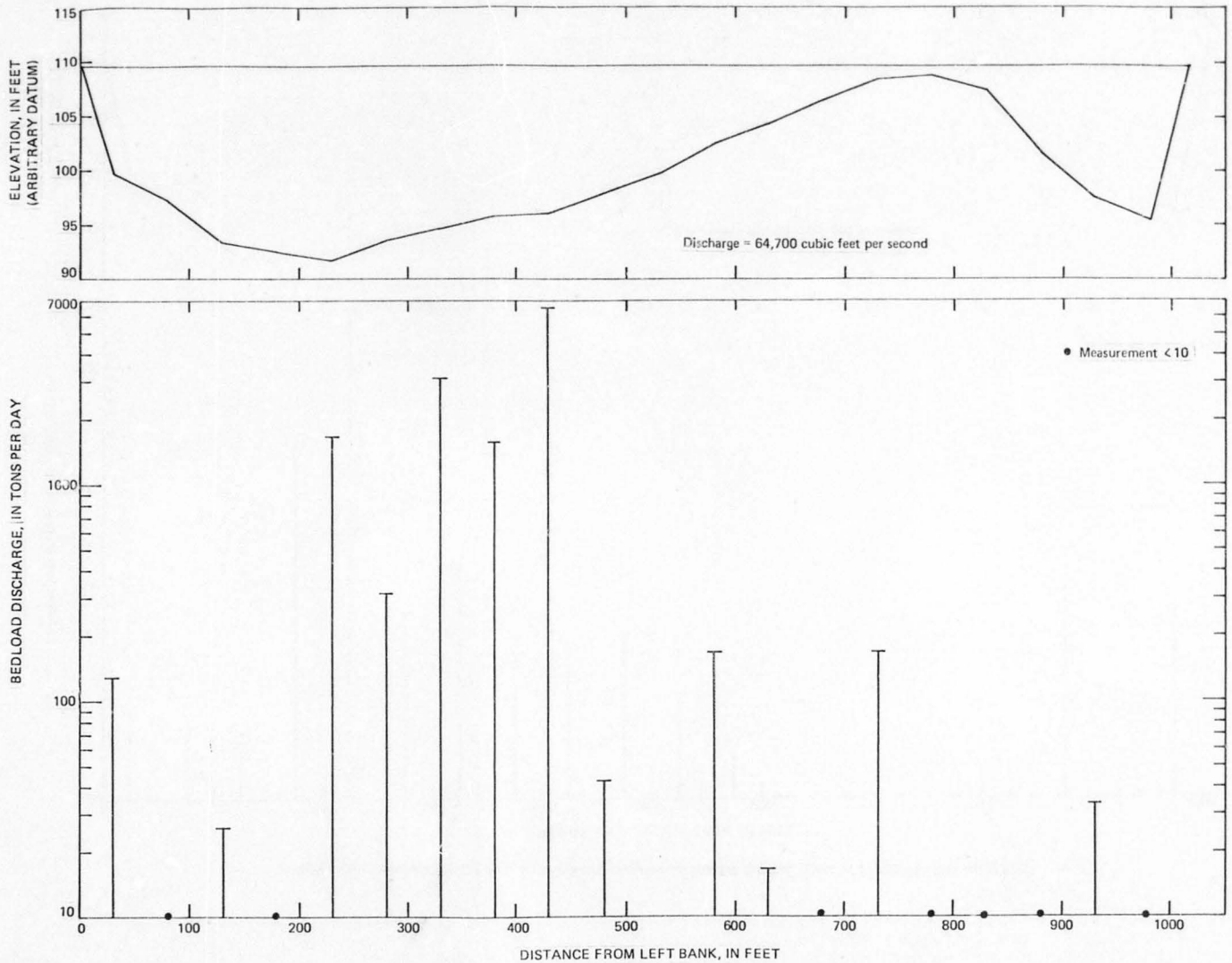


Figure 9a.--Cross section and distribution of bedload discharge, Susitna River at Sunshine, June 10, 1982.

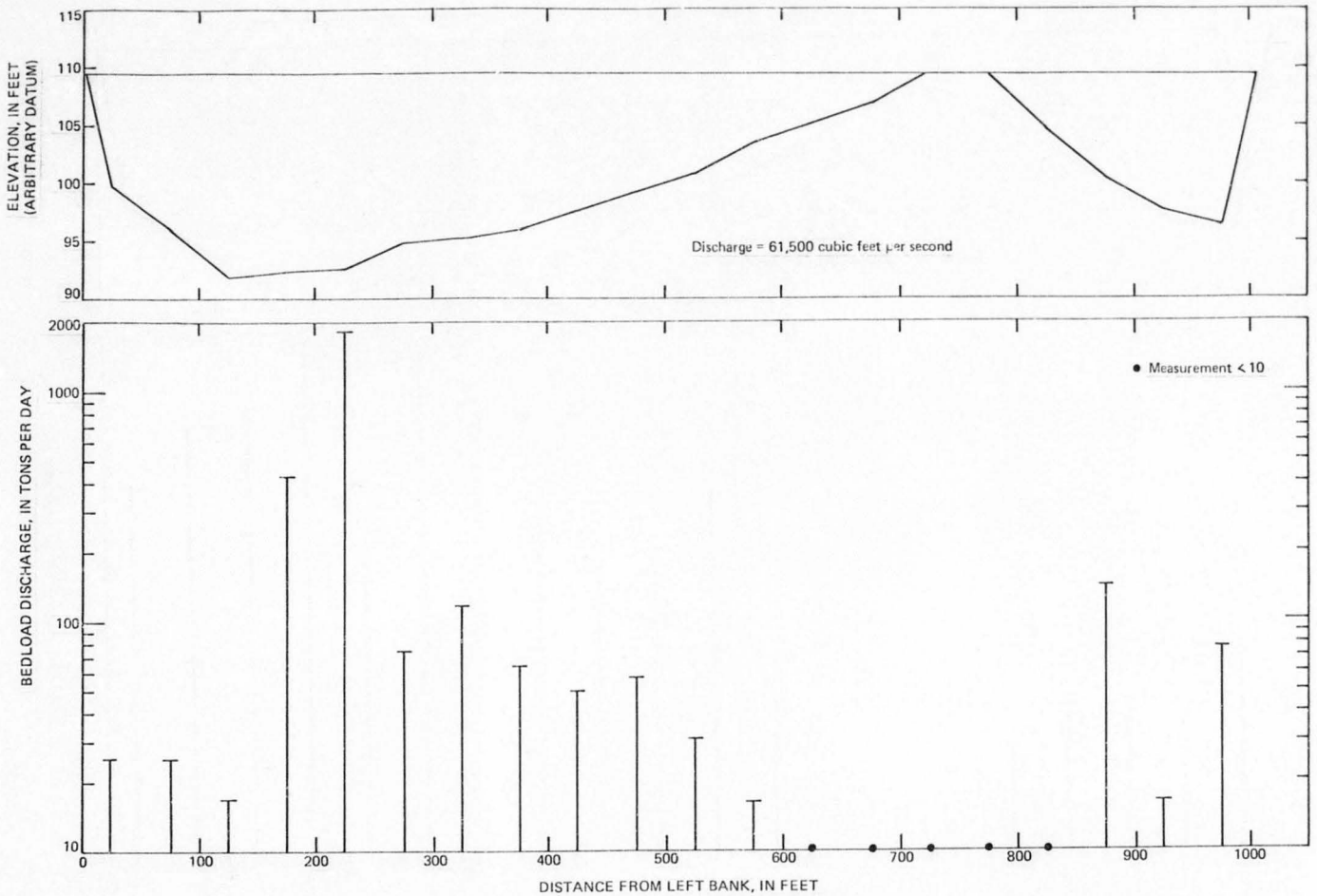


Figure 9b.--Cross section and distribution of bedload discharge, Susitna River at Sunshine, July 19, 1982.

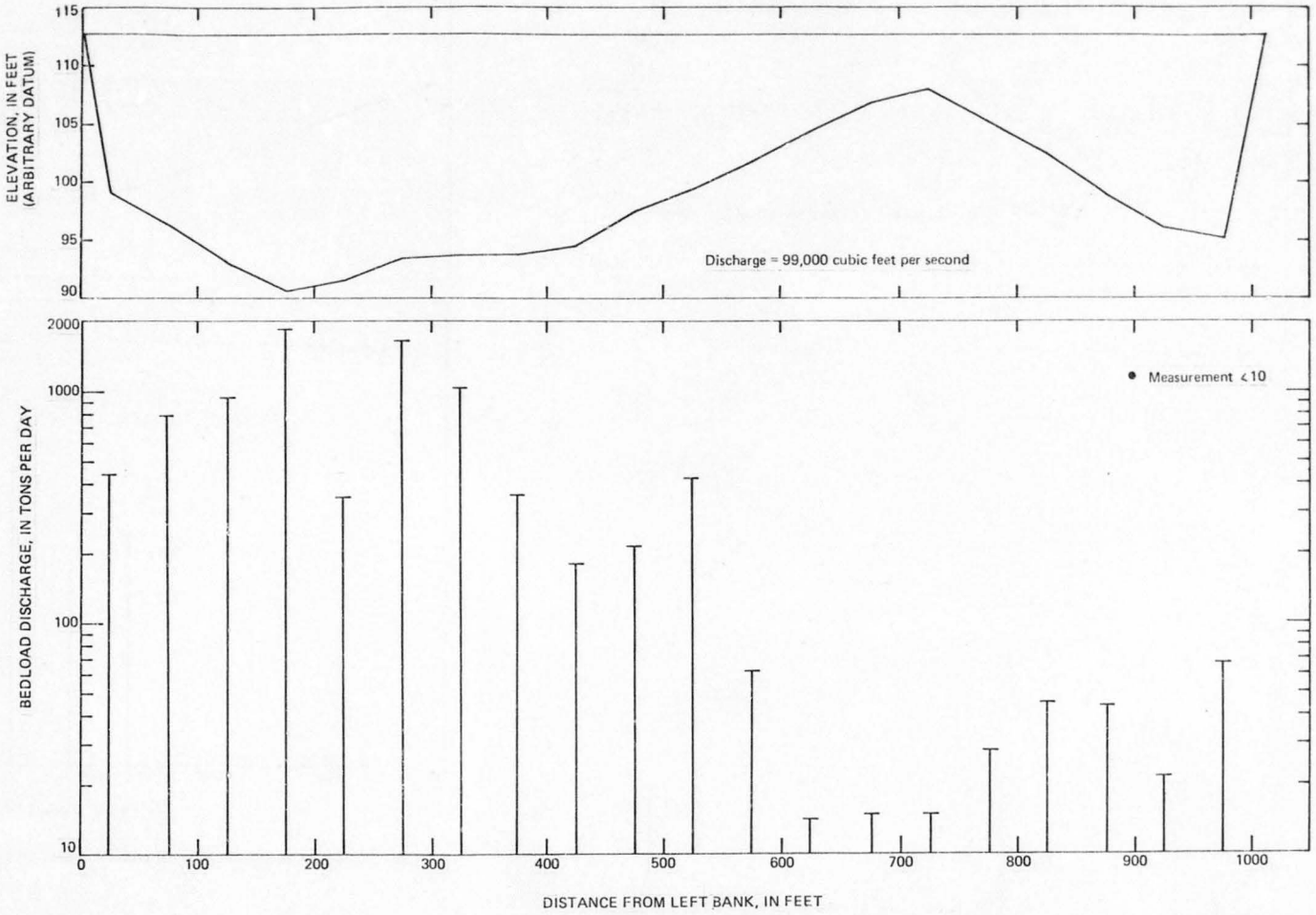


Figure 9c.--Cross section and distribution of bedload discharge, Susitna River at Sunshine, July 26, 1982.

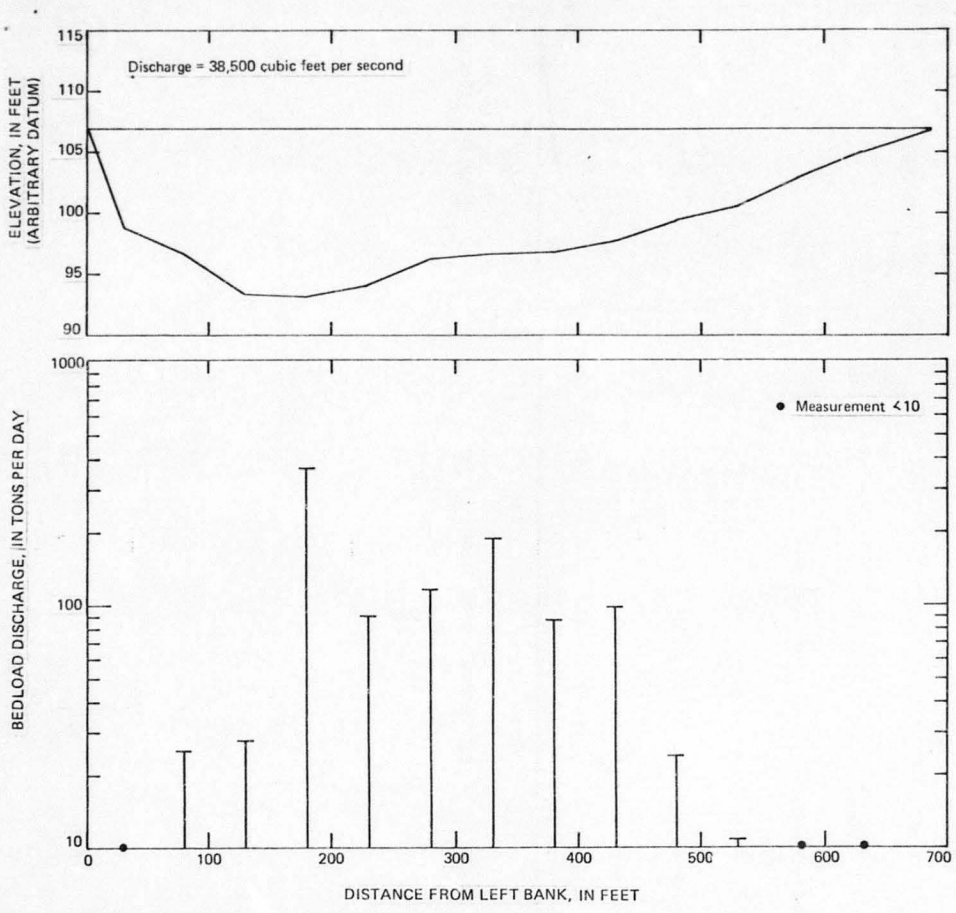
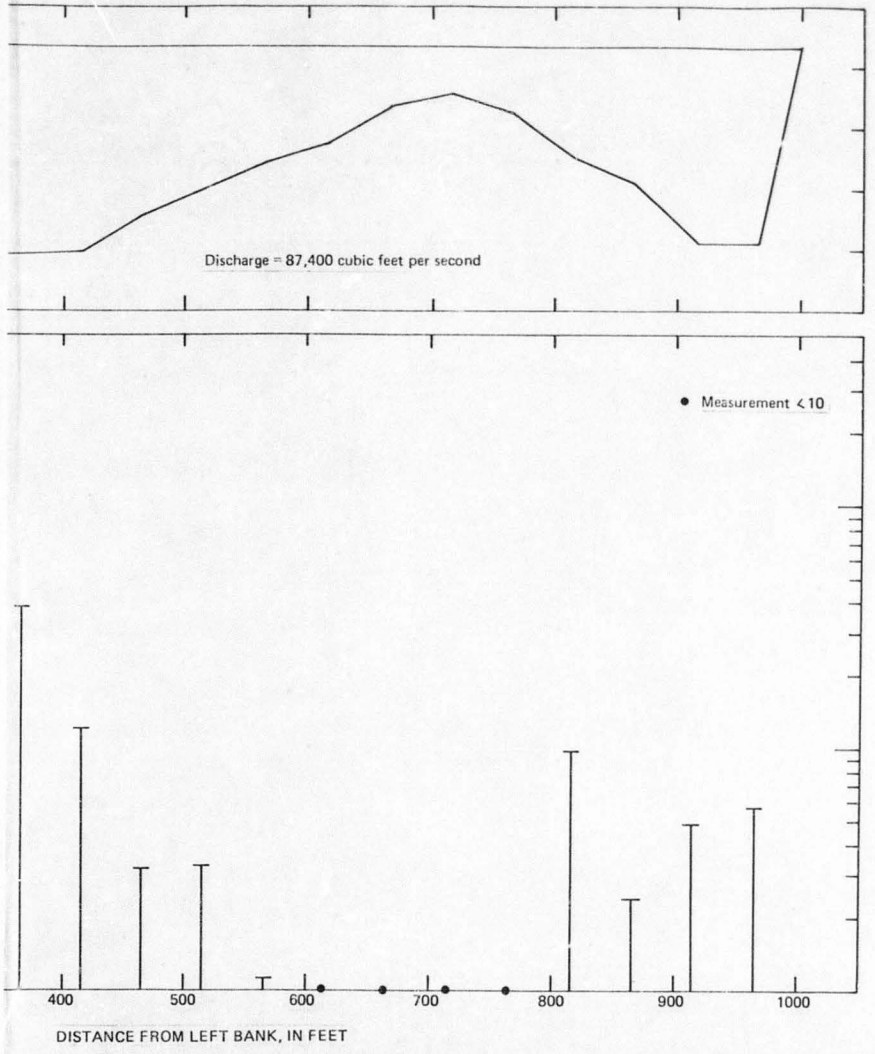


Figure 9d.--Cross section and distribution of bedload discharge, Susitna River at Sunshine, August 23, 1982.



listribution of bedload discharge, Susitna River at Sunshine, September 17, 1982.

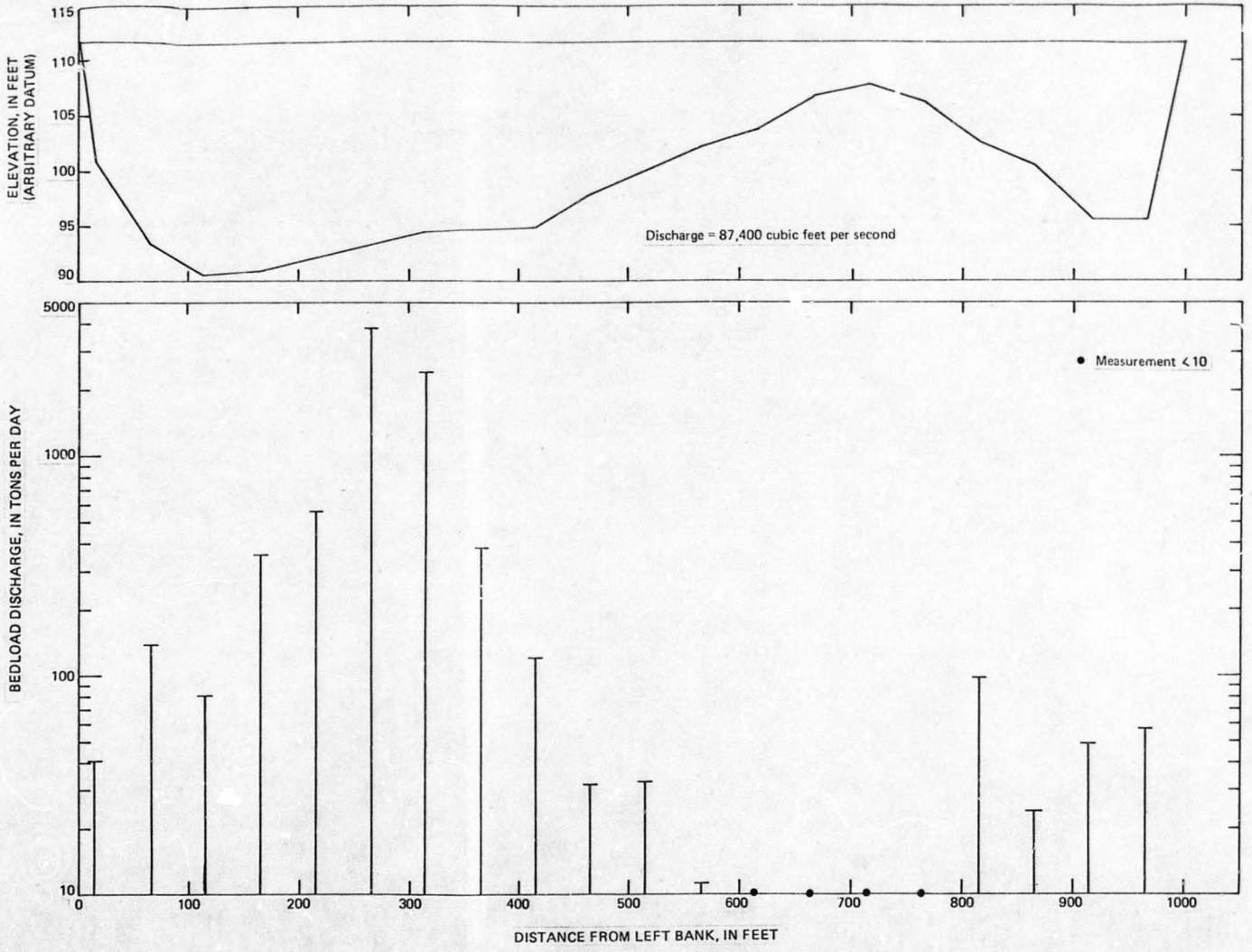


Figure 9e.--Cross section and distribution of bedload discharge, Susitna River at Sunshine, September 17, 1982.

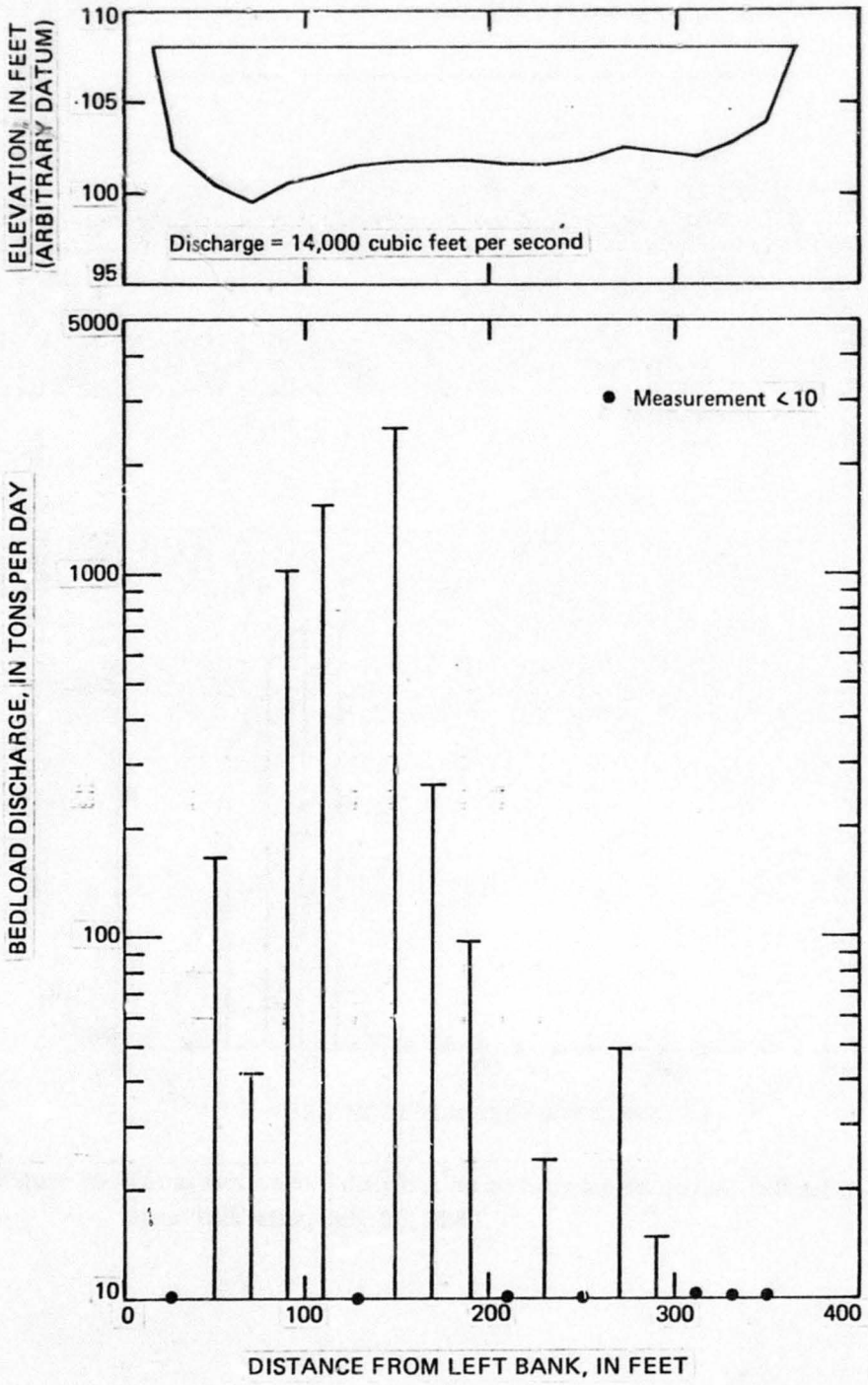


Figure 8a.--Cross section and distribution of bedload discharge, Talkeetna River near Talkeetna, June 9, 1982.

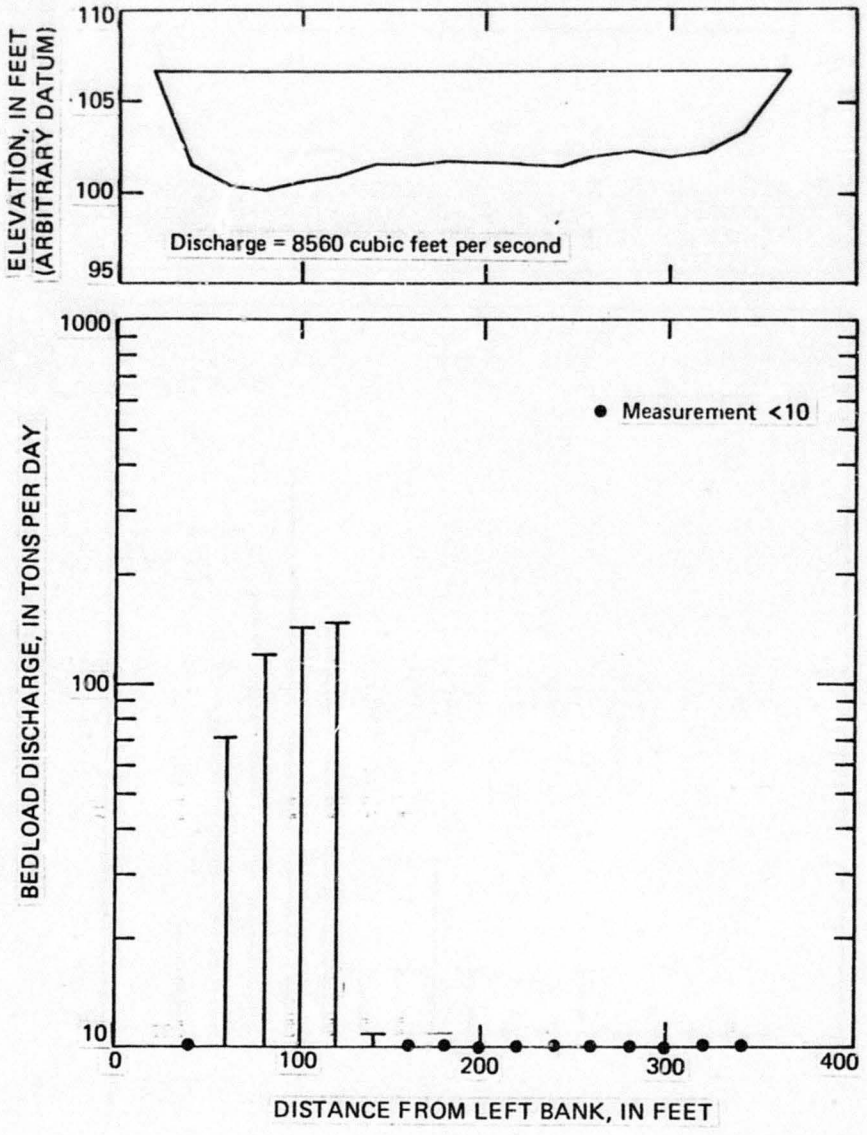


Figure 8b.--Cross section and distribution of bedload discharge, Talkeetna River near Talkeetna, July 20, 1982.

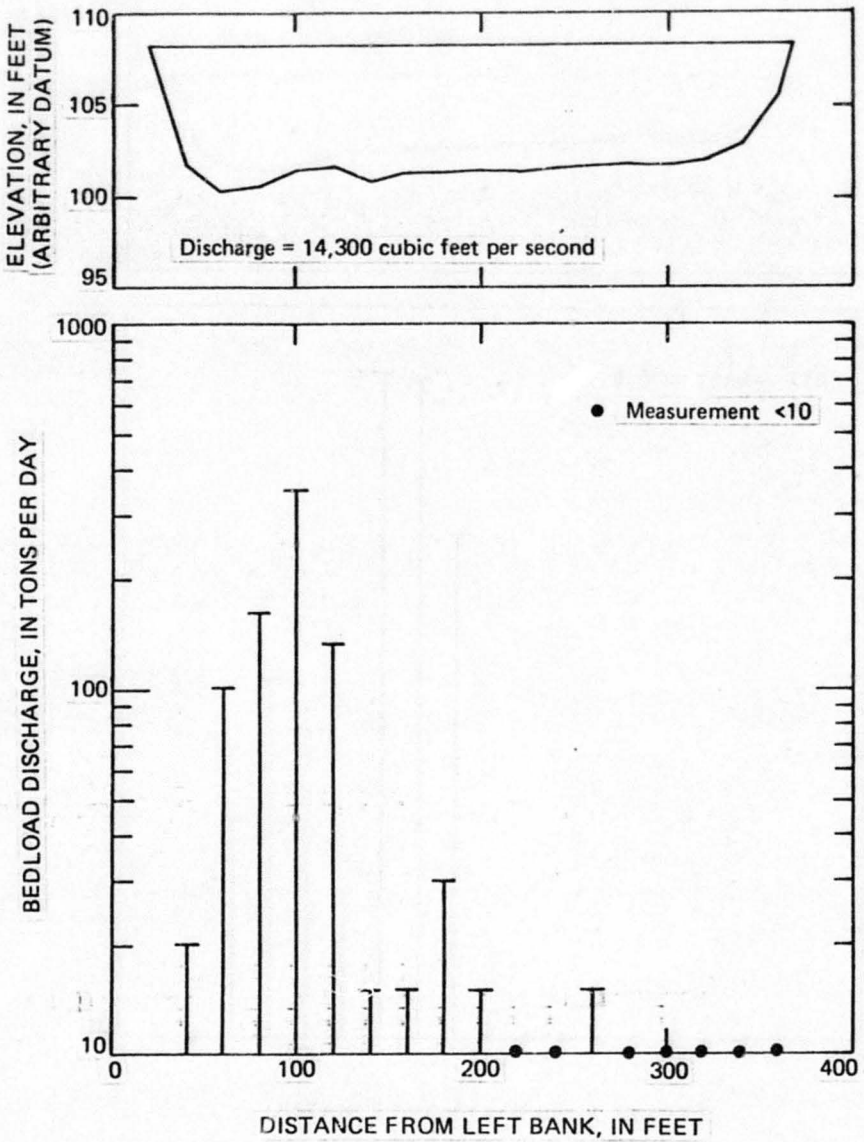


Figure 8c.--Cross section and distribution of bedload discharge, Talkeetna River near Talkeetna, July 28, 1982.

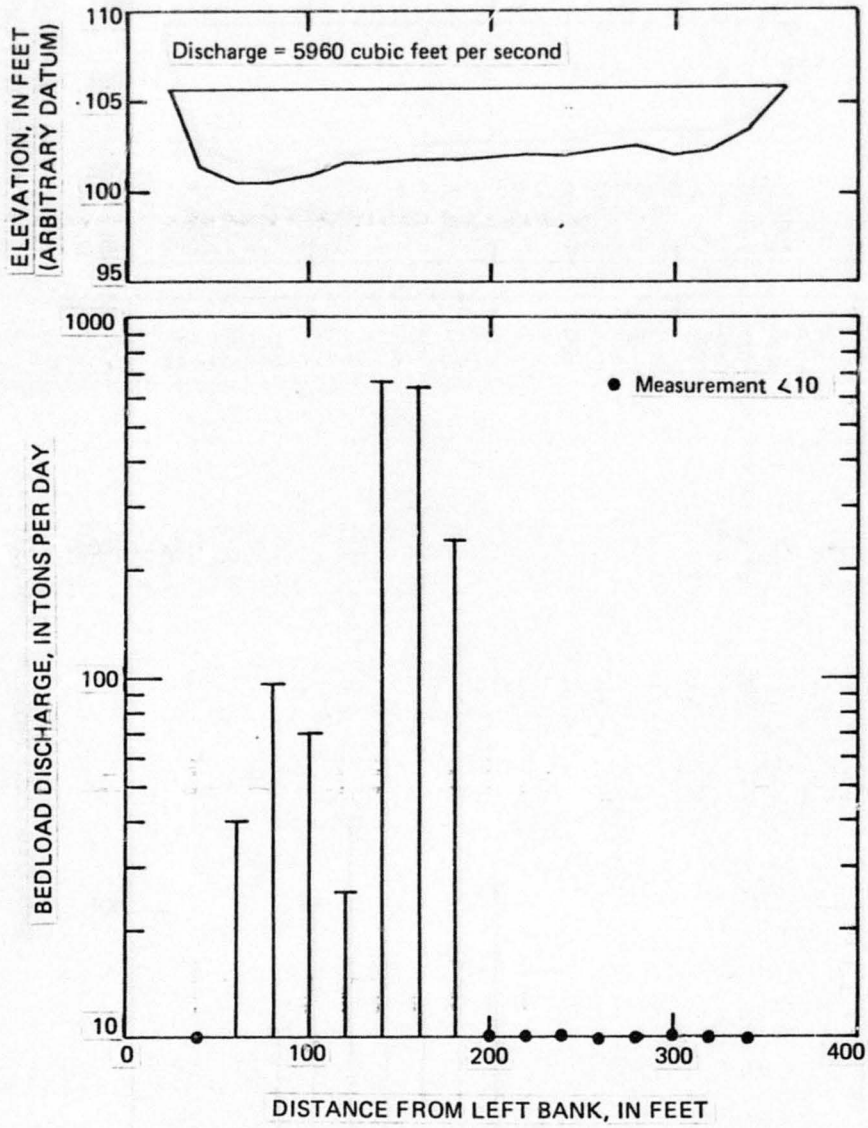


Figure 8d.--Cross section and distribution of bedload discharge, Talkeetna River near Talkeetna, August 24, 1982.

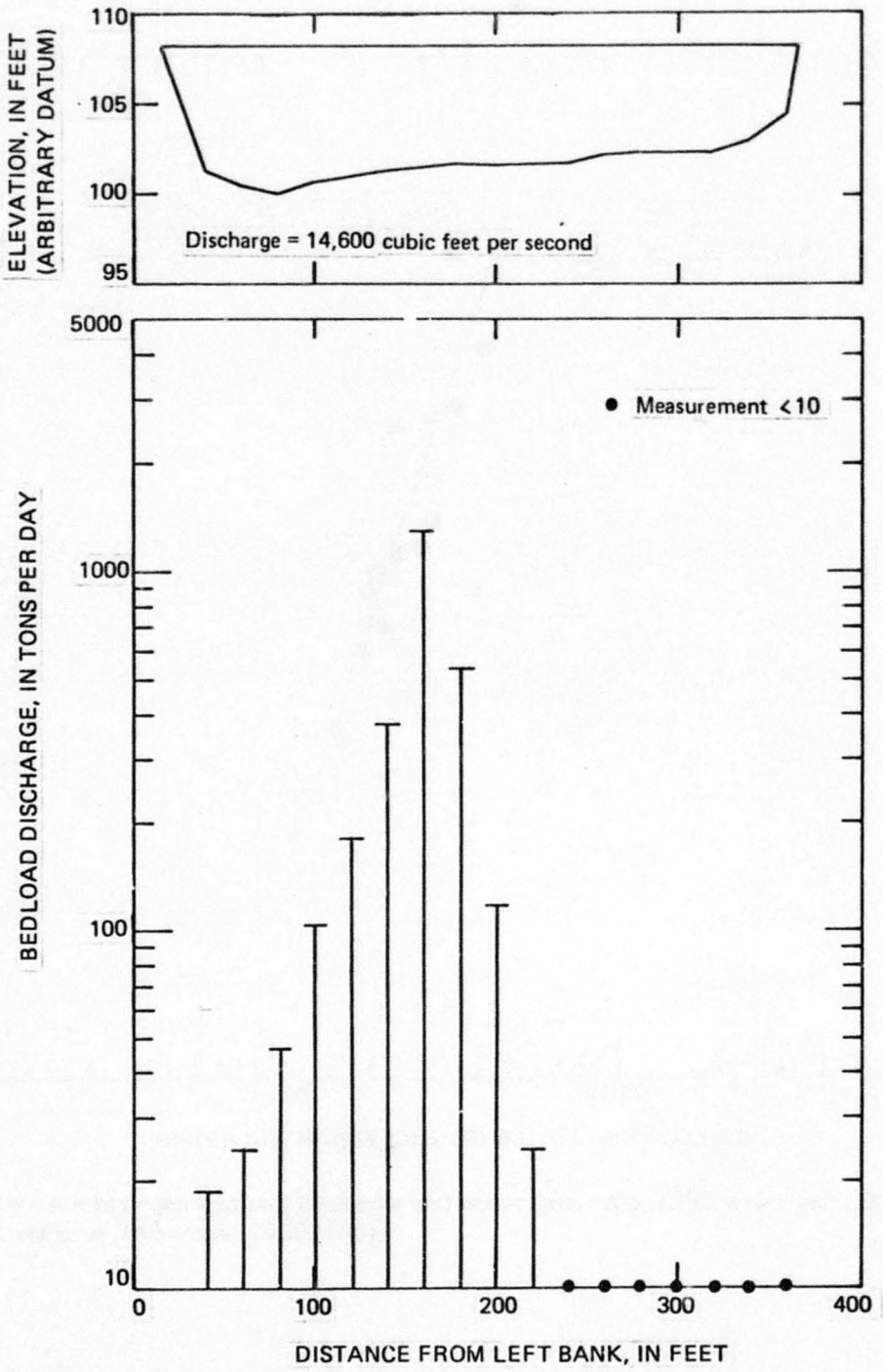


Figure 8e.--Cross section and distribution of bedload discharge, Talkeetna River near Talkeetna, September 20, 1982.

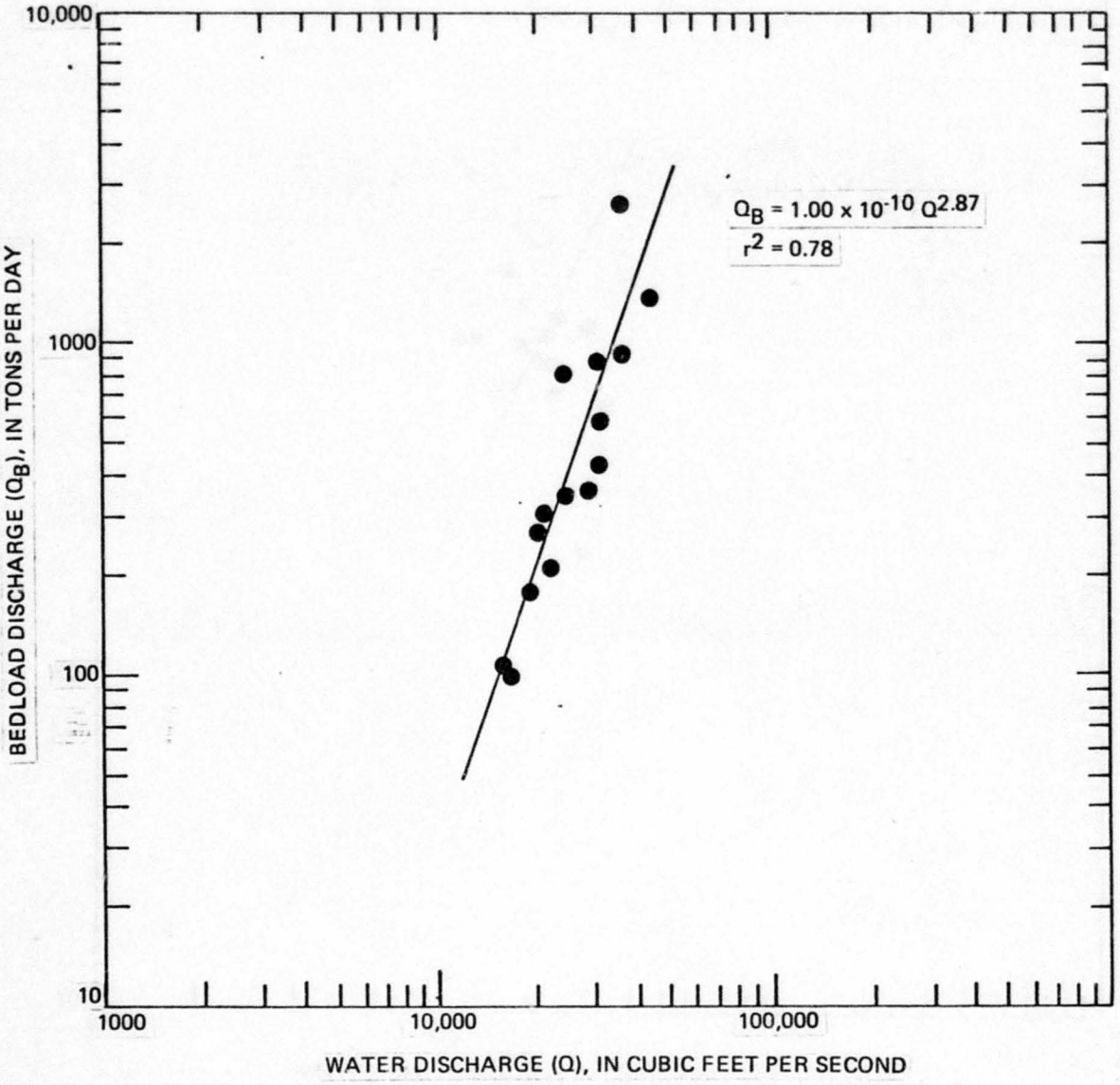


Figure 10.--Relation between bedload discharge and water discharge, 1982 water year, Susitna River near Talkeetna (15292100).

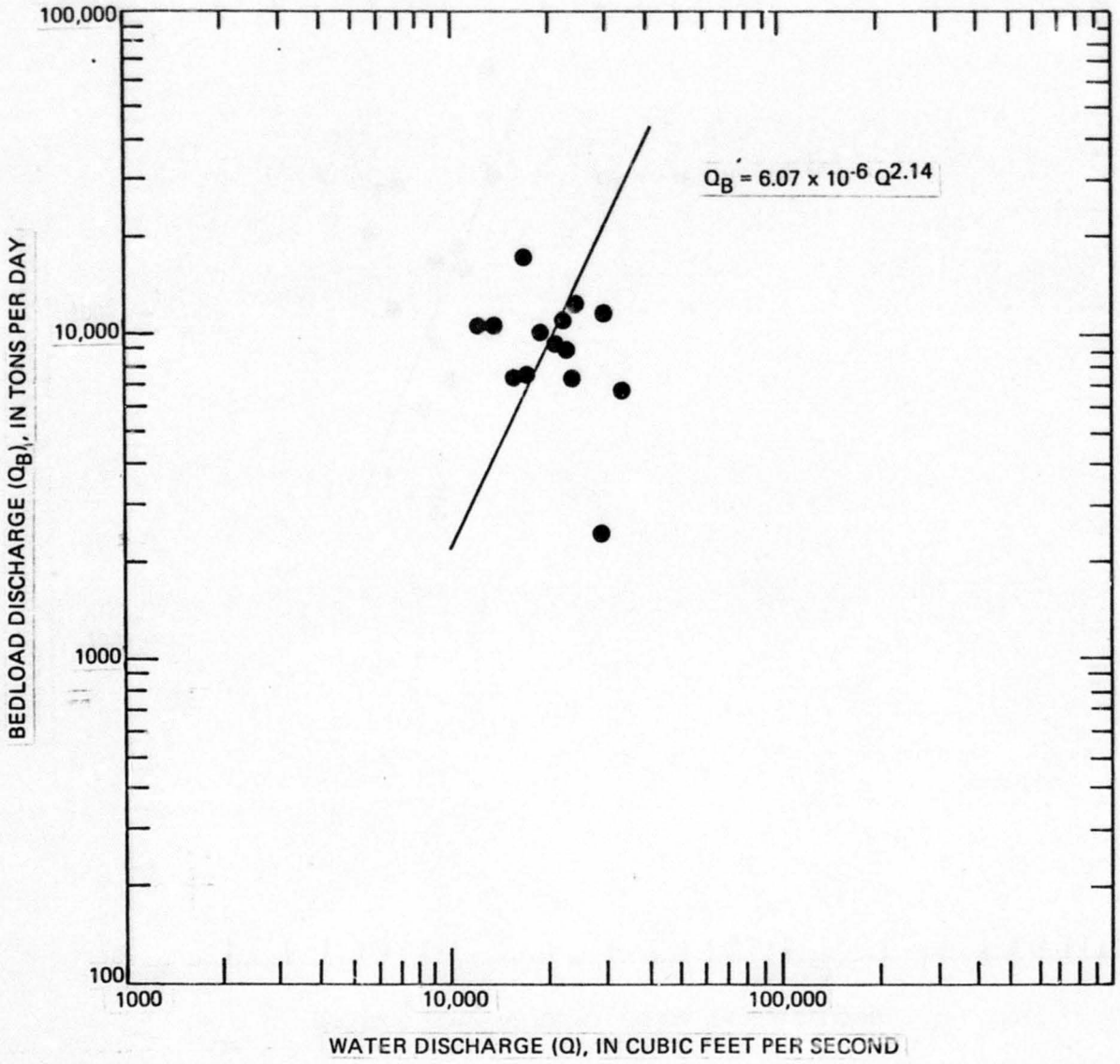


Figure 11.--Relation between bedload discharge and water discharge, 1982 water year, Chulitna River near Talkeetna (15292400).

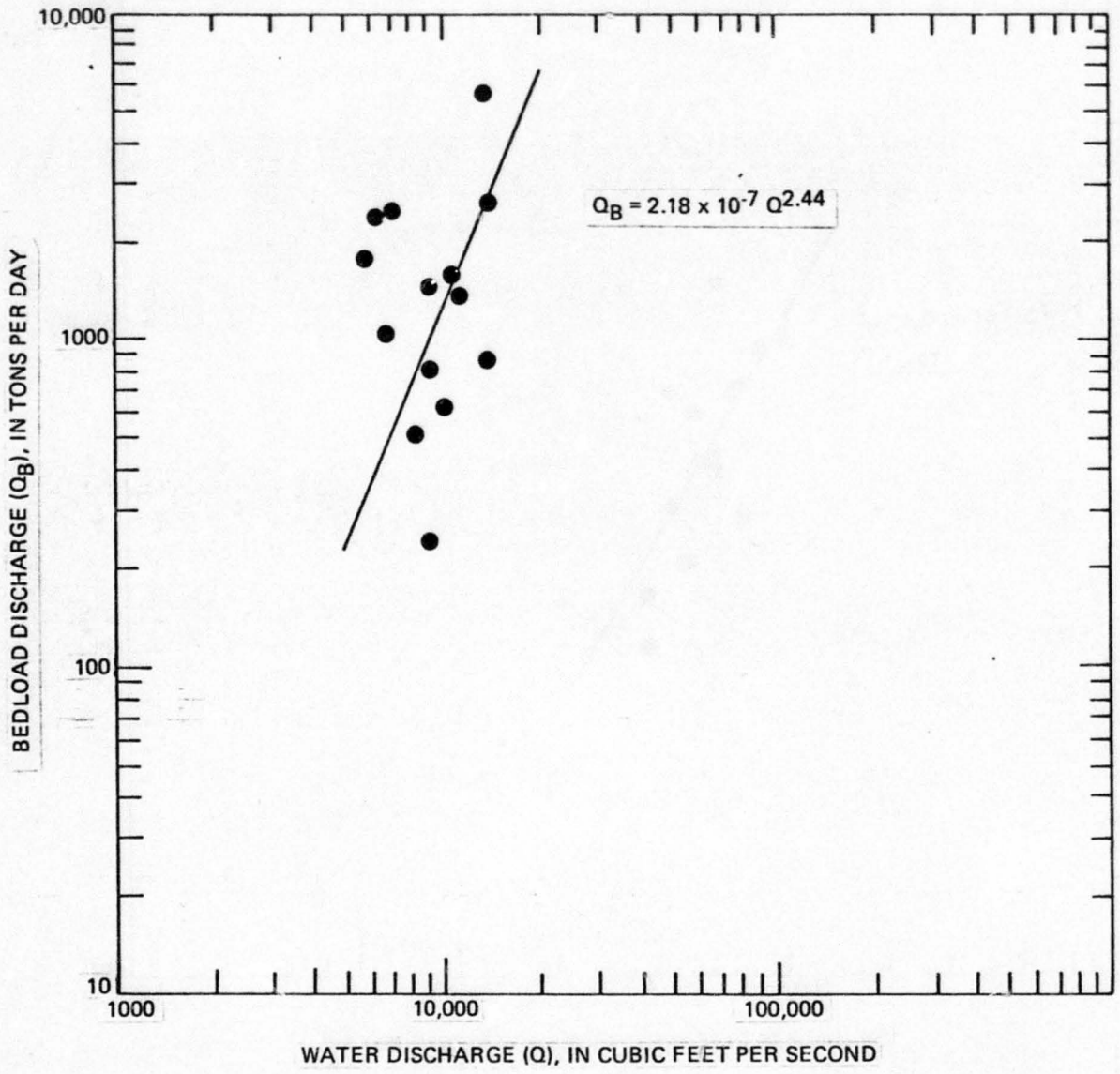


Figure 12.--Relation between bedload discharge and water discharge, 1982 water year, Talkeetna River near Talkeetna (15292700).

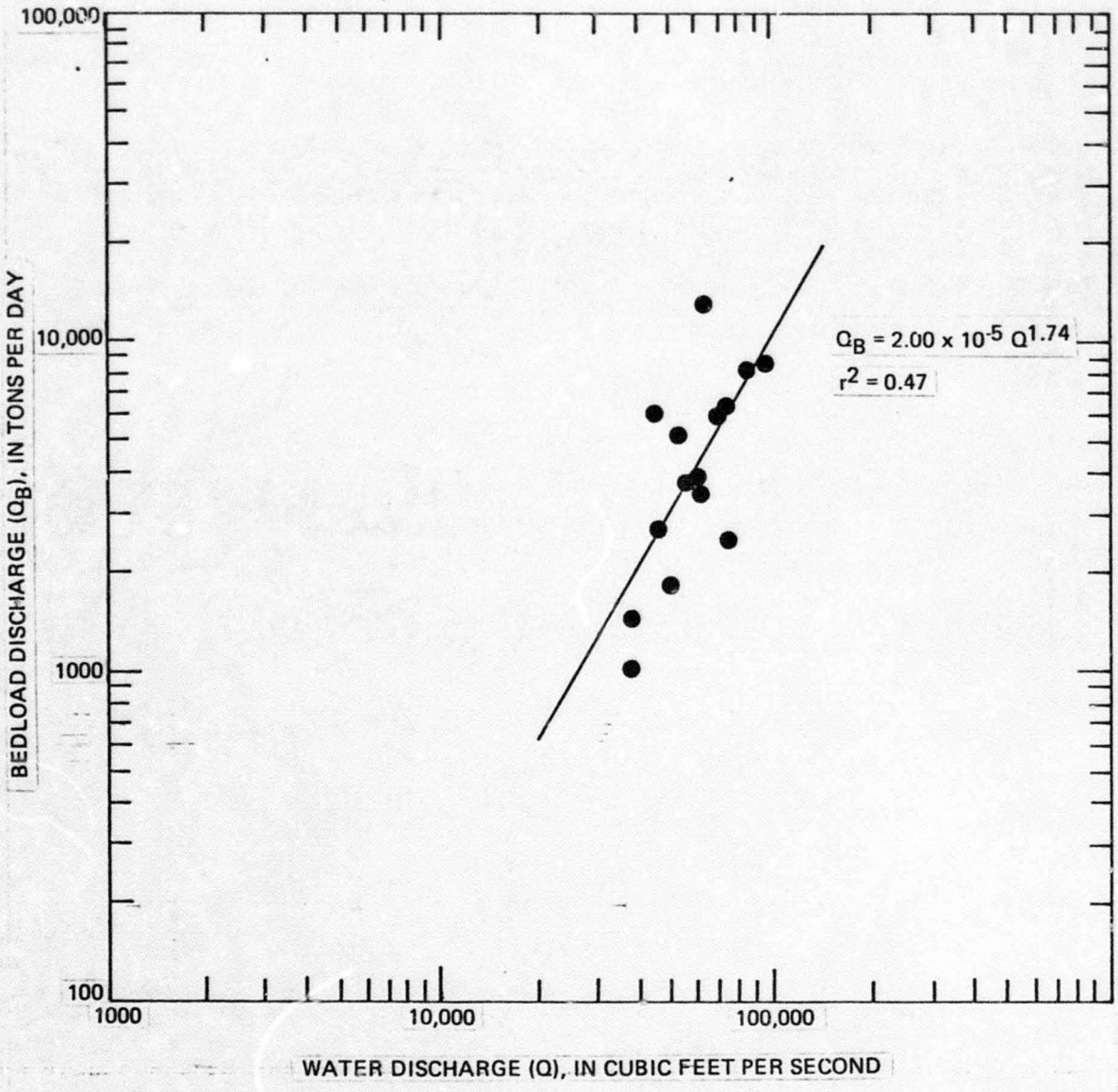


Figure 13.--Relation between bedload discharge and water discharge, 1982 water year, Susitna River at Sunshine (15292780).

Table 1.--Suspended-sediment data for selected stations in the Susitna River basin, 1981-82 water years

Station name and number	Water temperature (°C)	Date of collection	Discharge (ft^3/s)	Sediment concentration (mg/L)	Sediment discharge (ton/d)	Suspended sediment: Percent finer than size indicated, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
Susitna River at Gold Creek (15292000)		1980														
	4.0	Oct. 7	9,060	13	318	--	--	--	--	--	--	--	--	--	--	--
		1981														
	.0	Jan. 16	2,080	1	--	--	--	--	--	--	--	--	--	--	--	--
	.0	Feb. 12	2,200	2	12	--	--	--	--	--	--	--	--	--	--	--
	.0	Mar. 24	1,680	2	9.1	--	--	--	--	--	--	--	--	--	--	--
	10.0	May 27	15,900	164	7,040	8	10	14	19	26	37	51	79	98	100	--
	12.5	June 23	17,800	327	15,700	26	37	46	57	64	70	77	86	98	100	--
	10.5	July 21	42,500	680	78,000	--	17	23	31	39	49	58	80	97	100	--
	12.0	Aug. 27	26,600	158	11,300	7	10	21	27	36	49	64	86	100	--	--
	.5	Sept. 28	8,540	44	1,020	--	--	--	--	--	--	--	--	--	--	--
		1982														
	.0	Jan. 20	2,310	2	12	--	--	--	--	--	--	--	--	--	--	--
	.0	Mar. 3	1,070	1	2.9	--	--	--	--	--	--	--	--	--	--	--
	.0	Mar. 30	1,520	8	33	--	--	--	--	--	--	--	--	--	--	--
	5.0	May 27	23,600	524	33,400	--	--	--	--	--	26	43	76	96	99	100
	10.0	July 1	24,500	303	20,000	29	40	--	55	--	69	76	88	99	100	--
	10.5	Aug. 19	13,200	238	8,480	36	51	--	71	--	84	87	95	100	--	--
	7.5	Sept. 16	34,600	812	75,900	--	--	--	--	--	45	--	--	--	--	--
Susitna River near Talkeetna (15292100)		1982														
	6.0	June 3	35,800	769	74,300	8	10	--	16	--	31	48	78	100	--	--
	7.5	June 9	46,600	548	68,900	11	14	--	24	--	46	59	82	100	--	--
	8.0	June 15	24,200	181	11,800	--	--	--	--	--	40	47	75	100	--	--
	10.0	June 22	37,000	438	43,800	13	16	--	27	--	46	59	82	100	--	--
	11.5	June 30	30,200	438	35,700	22	34	--	52	--	73	79	90	100	--	--
	14.5	July 8	20,700	145	8,100	--	--	--	--	--	76	80	92	100	--	--
	12.0	July 14	30,800	768	63,900	30	42	50	59	71	80	87	94	100	--	--
	13.5	July 21	24,900	383	25,700	29	35	--	56	--	72	78	86	97	100	--
	--	July 28	30,800	461	38,300	21	27	32	44	58	68	75	88	99	100	--
	13.0	Aug. 4	22,700	341	20,900	30	39	--	63	--	77	82	90	100	--	--
	10.0	Aug. 10	20,000	289	15,600	30	43	--	71	--	87	90	96	100	--	--
	10.5	Aug. 18	17,700	285	13,600	43	51	54	77	88	92	93	97	100	--	--
	12.0	Aug. 25	16,800	219	9,930	32	44	--	68	--	89	92	97	100	--	--
	9.0	Aug. 31	19,300	251	13,100	23	29	--	48	--	72	80	94	100	--	--
	6.5	Sept. 19	28,700	442	34,300	33	41	47	53	60	67	74	88	99	100	--

Table 1.--Continued

Station name and number	Water temperature (°C)	Date of collection	Discharge (ft^3/s)	Sediment concentration (mg/L)	Sediment discharge (ton/d)	Suspended sediment: Percent finer than size indicated, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
Chulitna River near Talkeetna (15292400)		1980														
	5.0	Oct. 22	4,530	47	575	--	--	--	--	--	--	--	--	--	--	--
		1981														
	.0	Jan. 14	1,620	3	13	--	--	--	--	--	--	--	--	--	--	--
	--	Feb. 10	1,540	5	21	--	--	--	--	--	--	--	--	--	--	--
	--	Mar. 25	1,150	7	22	--	--	--	--	--	--	--	--	--	--	--
	--	May 18	11,700	500	15,800	17	26	35	43	51	59	67	79	94	100	--
	8.0	June 23	22,100	1,420	84,700	--	34	46	56	64	70	75	84	94	99	100
	--	July 20	34,000	1,010	92,700	16	24	35	46	55	62	71	86	98	100	--
	14.5	Aug. 24	23,500	782	49,600	11	17	24	30	37	42	47	64	88	100	--
	--	Sept. 28	5,950	129	2,070	--	--	--	--	--	53	--	--	--	--	--
		1982														
	--	Mar. 2	789	4	8.5	--	--	--	--	--	--	--	--	--	--	--
	--	Apr. 8	1,100	383	1,140	--	--	--	--	--	--	--	--	--	--	--
	6.0	June 4	11,500	424	13,200	22	32	37	46	54	59	68	88	99	100	--
	6.5	June 9	16,900	760	34,700	19	27	--	41	--	77	83	96	99	100	--
	4.5	June 16	14,500	428	16,800	24	36	--	48	--	62	68	84	100	--	--
	7.5	June 22	19,500	880	46,300	19	25	32	39	47	58	64	75	98	100	--
	7.0	June 29	29,000	1,600	125,000	34	45	56	62	70	77	83	94	100	--	--
	9.0	July 7	20,700	1,000	55,900	26	36	51	60	69	78	84	93	100	--	--
	6.5	July 13	22,700	1,270	77,800	--	--	--	--	--	71	76	83	99	100	--
	9.0	July 20	23,100	1,140	71,100	30	44	54	65	77	78	84	92	100	--	--
	6.0	July 27	31,900	1,110	95,600	16	25	30	42	51	60	70	85	98	99	100
	8.0	Aug. 3	23,300	803	50,500	24	33	42	55	67	73	77	87	99	100	--
	6.0	Aug. 11	21,300	766	44,100	23	34	40	51	60	68	75	85	99	100	--
	5.0	Aug. 17	21,900	1,180	69,800	25	37	48	59	68	75	80	87	97	100	--
	5.5	Aug. 24	18,200	830	40,800	24	34	42	54	65	75	81	93	100	--	--
	6.0	Sept. 1	17,300	506	23,600	17	26	--	42	--	64	68	84	100	--	--
	5.0	Sept. 18	29,200	1,680	132,000	33	43	52	58	68	74	86	96	99	100	--

Table 1.--Continued

Station name and number	Water temperature (°C)	Date of collection	Discharge (ft^3/s)	Sediment concentration (mg/L)	Sediment discharge (ton/d)	Suspended sediment: Percent finer than size indicated, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
Talkeetna River near Talkeetna (15292700)		1980														
	4.0	Oct. 8	3,340	20	180	--	--	--	--	--	--	--	--	--	--	--
		1981														
	.0	Jan. 17	659	9	16	--	--	--	--	--	--	--	--	--	--	--
	.0	Feb. 11	530	2	2.9	--	--	--	--	--	--	--	--	--	--	--
	.0	Mar. 26	556	4	6.0	--	--	--	--	--	--	--	--	--	--	--
	8.5	May 29	7,300	222	4,380	--	--	--	--	--	44	59	86	98	100	--
	10.0	June 24	7,750	407	8,520	15	17	29	43	56	65	74	85	98	100	--
	9.0	July 22	15,700	498	21,100	--	--	--	--	--	42	--	--	--	--	--
	10.0	Aug. 28	9,900	447	11,900	8	16	27	37	46	55	64	82	100	--	--
	1.5	Sept. 28	3,010	61	496	--	--	--	--	--	53	--	--	--	--	--
		1982														
	--	Mar. 3	260	1	.70	--	--	--	--	--	--	--	--	--	--	--
	--	Apr. 9	432	2	2.3	--	--	--	--	--	--	--	--	--	--	--
	--	June 1	9,440	333	8,490	--	--	--	--	--	32	48	70	92	99	100
	4.0	June 2	17,900	1,340	64,800	--	--	--	--	--	45	--	--	--	--	--
	6.0	June 9	14,200	302	11,600	--	--	--	--	--	28	40	66	100	--	--
	--	June 16	11,400	171	5,260	--	--	--	--	--	29	44	68	92	100	--
	7.0	June 23	12,400	171	5,730	--	--	--	--	--	29	42	63	100	--	--
	9.5	June 29	10,700	309	8,930	--	--	--	--	--	42	59	82	100	--	--
	--	July 2	8,240	204	4,540	--	--	--	--	--	29	37	65	100	--	--
	13.0	July 7	6,750	90	1,640	--	--	--	--	--	36	46	67	99	100	--
	10.0	July 13	8,880	226	5,420	--	--	--	--	--	64	72	92	100	--	--
	13.0	July 20	8,400	226	5,130	--	--	--	--	--	69	--	--	--	--	--
	9.0	July 28	14,200	696	26,700	17	22	27	35	47	56	66	79	94	100	--
	11.0	Aug. 3	8,980	206	4,990	--	--	--	--	--	40	56	74	100	--	--
	9.0	Aug. 10	6,980	203	3,830	--	--	--	--	--	32	43	62	100	--	--
	9.0	Aug. 17	6,230	212	3,570	--	--	--	--	--	41	54	74	100	--	--
	--	Aug. 24	5,920	179	2,860	--	--	--	--	--	51	62	79	100	--	--
	8.5	Aug. 31	9,120	276	6,800	--	--	--	--	--	32	46	82	100	--	--
	6.0	Sept. 17	17,000	612	28,100	7	9	--	16	--	34	48	73	92	100	--
	6.0	Sept. 20	14,800	301	12,000	--	--	--	--	--	32	41	66	91	96	100

Table 1.--Continued

Station name and number	Water temperature (°C)	Date of collection	Discharge (ft^3/s)	Sediment concentration (mg/L)	Sediment discharge (ton/d)	Suspended sediment: Percent finer than size indicated, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
Susitna River at Sunshine (15292780)		1981														
	.0	Mar. 25	3,800	2	21	--	--	--	--	--	--	--	--	--	--	--
	9.0	May 28	41,500	508	56,900	15	21	29	37	45	58	71	86	98	100	--
	11.5	June 25	55,000	735	109,000	--	36	49	60	69	75	81	90	99	100	--
	10.5	July 23	86,300	713	166,000	--	23	32	40	50	57	68	87	99	100	--
	11.5	Aug. 28	62,400	625	105,000	13	24	36	47	54	60	70	80	100	--	--
	1.5	Sept. 29	19,100	76	3,920	--	--	--	--	--	57	--	--	--	--	--
		1982														
	.0	Mar. 2	2,660	1	7.2	--	--	--	--	--	--	--	--	--	--	--
	--	June 3	73,800	847	169,000	--	--	--	--	--	42	62	85	97	99	100
	7.5	June 10	64,500	414	72,100	16	20	--	32	--	52	62	95	100	--	--
	7.0	June 17	50,800	360	49,400	--	--	--	--	--	35	42	62	100	--	--
	7.0	June 21	78,300	683	144,000	17	20	27	37	48	60	76	93	100	--	--
	11.0	June 28	75,700	702	143,000	25	33	43	53	62	73	82	92	100	--	--
	--	July 2	58,700	659	104,000	32	41	49	57	66	72	78	90	100	--	--
	10.0	July 6	46,600	503	63,300	25	40	45	54	62	67	72	84	100	--	--
	--	July 12	59,800	800	129,000	--	--	--	--	--	75	82	90	100	--	--
	9.5	July 19	60,800	548	90,000	27	39	47	60	69	78	85	93	99	100	--
	9.5	July 26	96,800	1,430	374,000	13	18	27	36	47	59	74	90	99	100	--
	11.0	Aug. 2	62,400	704	119,000	--	--	--	--	--	61	--	--	--	--	--
	10.5	Aug. 9	54,000	813	119,000	28	33	43	55	66	75	81	89	100	--	--
	10.5	Aug. 16	47,800	726	93,700	37	42	55	67	77	83	88	93	100	--	--
	10.0	Aug. 23	38,600	527	54,900	27	41	50	62	73	81	86	94	100	--	--
	9.0	Aug. 30	39,800	424	45,600	19	25	34	49	62	72	80	90	99	100	--
	7.0	Sept. 15	70,100	1,620	307,000	6	9	11	22	39	60	79	91	99	100	--
	6.5	Sept. 17	86,500	1,300	304,000	28	38	46	54	65	72	82	94	99	100	--

Table 2.--Hydraulic and bedload data for selected stations in the Susitna River basin, 1981-82 water years

Station name and number	Date	Water discharge (ft^3/s)	Average depth (ft)	Width (ft)	Average velocity (ft/s)	Slope (ft/ft)	Bedload discharge (ton/d)	Particle-size distribution of bed sediment: Percentage, by weight, finer than size (mm) indicated											
								.062	.125	.25	.5	1.0	2.0	4.0	8.0	16.0	32.0	64.0	76.0
Susitna River at Gold Creek (15292000)	1981																		
	July 22	37,200	--	--	--	--	1,970	--	--	2	20	28	33	36	38	44	61	89	100
	Aug. 26	25,900	--	--	--	--	350	--	--	5	41	51	55	58	59	66	72	82	100
	Sept. 28	8,540	--	--	--	--	1.3	--	--	15	78	88	97	100	--	--	--	--	--
Susitna River near Talkeetna (15292100)	1982																		
	June 3	35,800	7.76	625	7.38	--	2,840	--	--	3	37	47	48	49	52	54	58	74	100
	June 8	44,400	8.26	660	8.15	0.0014	1,500	--	1	3	53	63	69	71	75	79	86	100	--
	June 15	24,200	5.27	619	7.42	--	831	--	--	--	24	32	32	33	35	38	44	76	100
	June 22	37,000	7.37	645	7.78	.0015	992	--	--	2	47	58	60	60	61	61	62	64	100
	June 30	30,200	6.52	623	7.44	.0018	442	--	--	1	33	39	40	41	43	46	84	100	--
	July 8	20,800	5.15	596	6.78	.0013	324	--	--	--	65	94	96	97	99	99	100	--	--
	July 14	30,800	6.66	622	7.43	.0014	906	--	--	1	51	71	74	75	77	81	90	100	--
	July 21	25,000	5.87	603	7.06	.0015	360	--	--	1	65	90	92	93	94	96	100	--	--
	July 28	30,800	7.28	618	6.84	.0016	600	--	--	1	70	85	86	88	91	93	100	--	--
	Aug. 4	22,800	5.53	604	6.82	.0014	215	--	--	2	78	98	99	99	99	100	--	--	--
	Aug. 10	20,200	5.07	596	6.68	.0013	282	--	--	1	66	94	96	96	96	97	100	--	--
	Aug. 18	17,800	4.96	557	6.45	.0014	106	--	--	1	69	97	99	100	--	--	--	--	--
	Aug. 25	16,900	4.54	557	6.68	.0013	110	--	--	1	69	97	99	100	--	--	--	--	--
	Aug. 31	19,400	4.74	585	7.00	.0013	188	--	1	1	73	95	97	97	98	98	100	--	--
	Sept. 19	28,900	6.06	616	7.75	.0014	372	--	--	2	63	78	80	80	82	84	91	100	--
Chulitna River near Talkeetna (15292400)	1981																		
	July 22	31,900	10.90	420	6.97	--	2,970	--	--	2	15	22	26	30	45	70	93	96	100
	Aug. 26	22,500	10.24	295	7.45	--	3,870	--	--	1	12	19	27	40	56	73	89	97	100
	Sept. 29	6,000	5.95	215	4.69	--	2,900	--	--	--	15	29	44	55	77	91	99	100	--
	1982																		
	June 4	12,500	6.50	343	5.61	.00080	11,400	--	--	1	14	28	35	54	74	90	99	100	--
	June 9	17,200	8.01	347	6.19	--	18,300	--	--	1	15	38	47	54	67	82	95	100	--
	June 16	14,600	7.33	345	5.77	.00068	11,400	--	--	1	11	40	52	63	74	83	93	100	--
	June 22	19,400	8.07	357	6.74	.0012	10,200	--	--	1	28	53	58	64	71	79	91	100	--
	June 29	28,900	9.46	389	7.85	.0014	13,000	--	--	2	26	38	45	57	74	87	98	100	--
	July 7	20,600	8.23	357	7.01	.0012	9,610	--	--	1	17	47	53	58	68	80	94	100	--
	July 13	22,800	8.67	375	7.02	.0011	9,110	--	--	--	11	20	24	34	50	69	88	99	100
	July 20	23,100	8.94	368	7.02	.0012	13,800	--	--	1	12	35	40	45	57	67	85	100	--
	July 27	33,400	10.07	405	8.19	.0014	6,900	--	--	1	15	28	35	42	53	63	84	100	--
	Aug. 3	23,500	8.22	377	7.58	.0014	7,490	--	--	1	16	38	46	53	62	75	90	98	100
	Aug. 11	21,700	8.25	361	7.28	.0010	9,670	--	--	--	13	30	35	41	51	67	90	100	--
	Aug. 17	22,000	8.50	361	7.17	.0012	12,100	--	--	1	12	39	46	54	66	80	93	100	--
	Aug. 24	17,900	7.99	358	6.26	.0010	7,560	--	--	1	12	25	29	37	52	70	91	100	--
	Sept. 1	17,100	7.68	354	6.29	.00092	7,480	--	--	1	17	40	56	64	75	86	95	100	--
	Sept. 18	29,600	9.16	391	8.27	.0012	2,560	--	--	1	22	36	41	45	53	64	82	100	--

Table 2.--Continued

Station name and number	Date	Water discharge (ft^3/s)	Average depth (ft)	Width (ft)	Average velocity (ft/s)	Slope (ft/ft)	Bedload discharge (ton/d)	Particle-size distribution of bed sediment: Percentage, by weight, finer than size (mm) indicated											
								.062	.125	.25	.5	1.0	2.0	4.0	8.0	16.0	32.0	64.0	76.0
Talkeetna River near Talkeetna (15292700)	1981																		
	July 21	16,800	8.63	351	5.54	--	2,340	--	1	12	46	54	56	57	59	64	78	97	100
	Aug. 25	9,900	5.19	335	5.69	--	756	--	--	5	68	85	87	88	89	91	93	100	--
	Sept. 29	2,910	3.07	310	3.05	--	25	--	--	6	86	99	100	--	--	--	--	--	--
	1982																		
	June 2	19,100	7.11	357	7.52	--	2,800a	--	1	3	35	90	94	96	97	100	--	--	--
	June 9	14,000	6.03	350	6.64	.00096	5,790	--	--	1	12	30	34	36	41	56	85	100	--
	June 16	11,400	5.63	350	5.79	--	1,630	--	--	--	13	31	35	38	41	46	59	86	100
	June 23	12,400	5.73	344	6.29	--	1,410	--	--	1	32	60	64	66	71	82	98	100	--
	June 29	10,900	5.70	349	5.48	--	620	--	--	2	44	73	76	77	79	83	91	100	--
	July 7	6,840	4.35	331	4.75	--	1,080	--	--	--	39	91	93	93	93	94	96	100	--
	July 13	9,020	4.78	341	5.53	--	243	--	--	18	66	89	91	92	93	95	96	100	--
	July 20	8,560	4.83	344	5.16	--	516	--	--	1	42	64	65	65	65	65	67	100	--
	July 28	14,300	6.26	348	6.56	--	885	--	--	3	52	81	85	88	90	92	95	100	--
	Aug. 3	9,140	4.83	344	5.51	--	802	--	--	2	38	62	64	65	67	69	78	84	100
	Aug. 10	7,070	4.35	338	4.81	--	2,470	--	--	1	55	97	98	99	99	99	100	--	--
	Aug. 17	6,260	3.83	337	4.85	--	2,380	--	--	1	23	82	93	96	98	99	100	--	--
	Aug. 24	5,960	3.73	335	4.77	--	1,800	--	--	--	14	84	95	97	98	99	100	--	--
	Aug. 31	9,200	4.53	351	5.79	--	1,460	--	--	1	18	84	92	93	94	95	99	100	--
	Sept. 20	14,600	6.55	348	6.40	.00049	2,740	--	--	1	12	26	27	28	33	49	82	100	--
Susitna River at Sunshine (15292780)	1981																		
	July 22	89,000	12.73	990	7.06	--	3,540	--	1	13	42	47	49	54	60	70	85	100	--
	Aug. 26	61,900	9.99	975	6.36	--	3,040	--	1	22	76	79	81	83	87	92	98	100	--
	Sept. 30	19,100	7.70	583	4.25	--	385	--	--	7	62	70	70	72	73	77	83	100	--
	1982																		
	June 3	71,000	10.20	1,020	6.83	--	6,080	--	--	2	15	22	26	27	30	38	64	100	--
	June 10	64,700	10.10	1,020	6.28	.0015	13,600	--	--	2	12	17	17	18	20	29	54	96	100
	June 17	50,700	8.98	967	5.84	.0014	1,870	--	--	2	47	65	65	66	66	69	75	100	--
	June 21	78,900	12.18	1,010	6.41	.0018	2,510	--	1	12	18	50	51	53	57	62	70	95	100
	June 28	75,400	11.10	1,000	6.79	--	6,390	--	--	3	17	22	23	25	27	46	64	100	--
	July 6	46,700	8.94	900	5.80	.0014	6,020	--	--	2	35	46	47	49	57	71	86	100	--
	July 12	59,200	9.67	939	6.52	.0015	3,800	--	--	3	52	75	77	80	85	88	96	100	--
	July 19	61,500	9.70	1,000	6.34	.0022	3,960	--	--	2	40	54	58	62	69	75	84	87	100
	July 26	99,000	14.55	1,010	6.73	.0024	8,750	--	--	2	18	28	30	33	39	53	77	97	100
	Aug. 2	63,600	10.30	1,000	6.17	.0022	3,480	--	--	4	60	73	74	74	75	78	93	97	100
	Aug. 9	53,800	9.40	950	6.02	.0019	5,220	1	1	5	62	81	82	83	85	89	94	100	--
	Aug. 16	48,100	9.39	859	5.96	.0016	2,740	--	--	2	61	83	84	85	86	92	98	100	--
	Aug. 23	38,500	8.52	685	6.59	.0017	1,050	--	--	1	55	85	88	89	90	92	92	100	--
	Aug. 30	39,200	8.81	675	6.59	.0015	1,480	1	2	4	44	63	64	64	65	66	70	100	--
	Sept. 17	87,400	13.30	1,000	6.57	.0022	8,120	--	--	1	12	20	23	26	37	60	78	100	--

a Estimated

Table 3.--Bed-material data for selected sites in the Susitna River basin

[Sampling point stationing from left bank]

Station name and number	Date of collection	Sampling point	Bed material: Percent finer than size indicated, in millimeters											
			0.062	0.125	0.25	0.50	1.0	2.0	4.0	8.0	16.0	32.0	64.0	128.0
Susitna River at Gold Creek (15292000)	1981 Sept. 28	100a	--	--	--	--	--	--	--	--	--	--	--	100
		130b	--	--	--	--	--	--	--	--	--	--	--	--
		160b	--	--	--	--	--	--	--	--	--	--	--	--
		190b	--	--	--	--	--	--	--	--	--	--	--	--
		220b	--	--	--	--	--	--	--	--	--	--	--	--
		250b	--	--	--	--	--	--	--	--	--	--	--	--
		280b	--	--	--	--	--	--	--	--	--	--	--	--
		310a	--	--	--	--	--	--	--	--	0	1	27	100
		370b	--	--	--	--	--	--	--	--	--	--	--	--
Susitna River near Talkeetna (15292100)	1982 July 28	550a	--	--	--	--	--	--	--	--	--	--	0	100
		410a	--	--	--	--	--	--	--	--	0	100	--	--
		290b	--	--	--	--	--	--	--	--	--	--	--	--
		200b	--	--	--	--	--	--	--	--	--	--	--	--
		120b	--	--	--	--	--	--	--	--	--	--	--	--
	Aug. 4	130b	--	--	--	--	--	--	--	--	--	--	--	--
		210b	--	--	--	--	--	--	--	--	--	--	--	--
		310c	--	--	--	--	--	--	--	--	0	7	53	100
		400c	--	--	--	--	--	--	--	0	1	6	42	100
		540b	--	--	--	--	--	--	--	--	--	--	--	--
	Sept. 19	140a	--	--	--	--	--	--	--	--	--	0	18	100
		210a	--	--	--	--	--	--	--	--	--	--	0	100
		300a	--	--	--	--	--	--	--	--	0	4	30	100
		430a	--	--	--	--	--	--	--	--	0	2	19	100
		570a	--	--	--	--	--	--	--	--	--	0	5	100
Chulitna River near Talkeetna (15292400)	1981 Sept. 29	90c	--	--	--	--	--	0	7	52	81	94	100	--
		110c	--	--	0	1	1	2	10	57	92	100	--	--
		130c	--	--	0	2	5	15	30	68	90	100	--	--
		150c	--	--	0	2	10	18	30	59	83	98	100	--
		170c	--	--	0	4	60	76	79	84	91	99	100	--
		190c	--	--	0	1	26	47	53	65	78	94	100	--
		210b	--	--	--	--	--	--	--	--	--	--	--	--
		230c	0	2	24	84	100	--	--	--	--	--	--	--
	1982 July 27	180c	--	--	--	--	0	1	3	15	46	71	89	100
		240c	--	--	--	--	0	1	5	18	44	72	93	100
		290c	--	--	0	5	29	34	36	42	52	67	100	--
		330c	--	--	--	--	--	--	--	--	--	5	24	100
		380c	--	--	0	2	5	6	6	8	13	36	87	100

a Few particles obtained, non-representative sample
b Streambed too coarse for obtaining samples
c Representative sample obtained

Table 3.--Continued

[Sampling point stationing from left bank]

Station name and number	Date of collection	Sampling point	Bed material: Percent finer than size indicated, in millimeters											
			0.062	0.125	0.25	0.50	1.0	2.0	4.0	8.0	16.0	32.0	64.0	128.0
Talkeetna River near Talkeetna (15292700)	1981 Sept. 29	60a	--	--	--	--	--	--	--	--	--	--	0	100
		90c	--	--	--	0	3	8	8	8	8	8	13	100
		120c	--	--	--	--	--	--	--	--	0	2	52	100
		150c	--	--	--	--	--	--	--	0	1	3	100	--
		180a	--	--	--	--	--	--	--	--	0	7	100	--
		210a	--	--	--	--	--	--	--	--	0	2	18	100
		240a	--	--	--	--	--	--	--	--	--	0	11	100
		270a	--	--	--	--	--	--	--	--	--	0	45	100
		300c	--	--	--	--	--	--	--	--	--	0	35	100
	1982 July 28	50b	--	--	--	--	--	--	--	--	--	--	--	--
		70b	--	--	--	--	--	--	--	--	--	--	--	--
		110c	--	0	1	7	50	74	84	91	95	100	--	--
		180c	--	--	--	--	--	--	--	0	4	25	100	--
		240a	--	--	--	--	--	--	--	--	0	7	100	--
		300a	--	--	--	--	--	--	--	--	--	0	100	--
		340b	--	--	--	--	--	--	--	--	--	--	--	--
	Sept. 20	40b	--	--	--	--	--	--	--	--	--	--	--	--
		80c	--	--	--	--	--	--	--	--	--	0	6	100
		140c	--	--	--	--	--	--	0	5	22	65	100	--
		200c	--	--	--	--	--	--	--	0	4	38	80	100
		270c	--	--	--	--	--	--	--	0	1	3	30	100
Susitna River at Sunshine (15292780)	1981 Sept. 30	490a	--	--	--	--	--	--	--	--	--	--	0	100
		560a	--	--	--	--	--	--	--	--	--	0	58	100
		625a	--	--	--	--	--	--	--	--	--	0	100	--
		690a	--	--	--	--	--	--	--	--	0	18	100	--
		755a	--	--	--	--	--	--	--	--	0	41	100	--
		820c	--	0	2	47	64	67	69	74	86	96	100	--
		885a	--	--	--	--	--	--	--	--	--	0	36	100
		950a	--	--	--	--	--	--	--	--	--	0	52	100
	1982 July 26	230c	--	--	--	--	--	--	--	0	2	18	100	--
		530c	--	--	--	--	--	--	--	--	0	8	54	100
		650c	--	--	--	--	--	--	--	--	0	4	31	100
		800c	--	--	0	1	3	5	11	23	38	53	62	100
		830c	--	--	--	--	--	--	--	0	1	15	100	--
		900c	--	--	--	0	2	4	6	12	23	64	100	--

a Few particles obtained, non-representative sample
b Streambed too coarse for obtaining samples
c Representative sample obtained

Table 4.--Water discharge and estimated sediment yields at selected sites in the Susitna River basin, May to September 1982

Station name and number	Drainage area (mi^2)	Period	Water discharge (acre-ft)	Suspended sediment (tons)		Bedload (tons)		Total sediment (tons)			
				Silt-clay	Sand	Sand	Gravel	Silt-clay	Sand	Gravel	Total
Susitna River near Talkeetna (15292100)	6,320	May	920,000a	170,000	100,000	3,200	1,100	170,000	100,000	1,100	270,000
		June	1,700,000a	430,000	320,000	12,000	5,300	430,000	330,000	5,300	770,000
		July	1,500,000a	680,000	210,000	11,000	1,900	680,000	220,000	1,900	900,000
		August	1,000,000a	310,000	48,000	4,100	100	310,000	52,000	100	360,000
		September	1,100,000a	330,000	140,000	4,700	900	330,000	140,000	900	480,000
		May - September	6,200,000a	1,900,000	820,000	35,000	9,300	1,900,000	840,000	9,300	2,800,000
Chulitna River near Talkeetna (15292400)	2,570	May	386,700	88,000	45,000	28,000	48,000	88,000	73,000	48,000	210,000
		June	1,092,000	880,000	400,000	210,000	230,000	880,000	610,000	230,000	1,700,000
		July	1,575,000	1,900,000	760,000	150,000	190,000	1,900,000	910,000	190,000	3,000,000
		August	1,252,000	1,000,000	400,000	110,000	150,000	1,000,000	510,000	150,000	1,700,000
		September	1,085,000	1,200,000	300,000	54,000	66,000	1,200,000	350,000	66,000	1,600,000
		May - September	5,390,700	5,100,000	1,900,000	550,000	680,000	5,100,000	2,500,000	680,000	8,200,000
Talkeetna River near Talkeetna (15292700)	2,006	May	203,700	34,000	26,000	2,000	1,900	34,000	28,000	1,900	64,000
		June	770,200	150,000	250,000	34,000	63,000	150,000	280,000	63,000	500,000
		July	680,900	280,000	180,000	22,000	14,000	280,000	200,000	14,000	500,000
		August	447,100	55,000	65,000	54,000	4,600	55,000	120,000	4,600	180,000
		September	568,600	85,000	160,000	17,000	23,000	85,000	180,000	23,000	280,000
		May - September	2,670,000	600,000	680,000	130,000	110,000	600,000	810,000	110,000	1,500,000
Susitna River at Sunshine (15292780)	11,100	May	1,633,000	280,000	250,000	8,400	15,000	280,000	260,000	15,000	550,000
		June	3,738,000	1,500,000	1,200,000	45,000	130,000	1,500,000	1,200,000	130,000	2,900,000
		July	3,876,000	2,800,000	1,300,000	76,000	75,000	2,800,000	1,400,000	75,000	4,300,000
		August	2,083,000	1,800,000	600,000	60,000	14,000	1,800,000	660,000	14,000	2,500,000
		September	2,906,000	1,900,000	830,000	48,000	46,000	1,900,000	880,000	46,000	2,800,000
		May - September	14,236,000	8,300,000	4,200,000	240,000	280,000	8,300,000	4,400,000	280,000	13,000,000

a Estimated

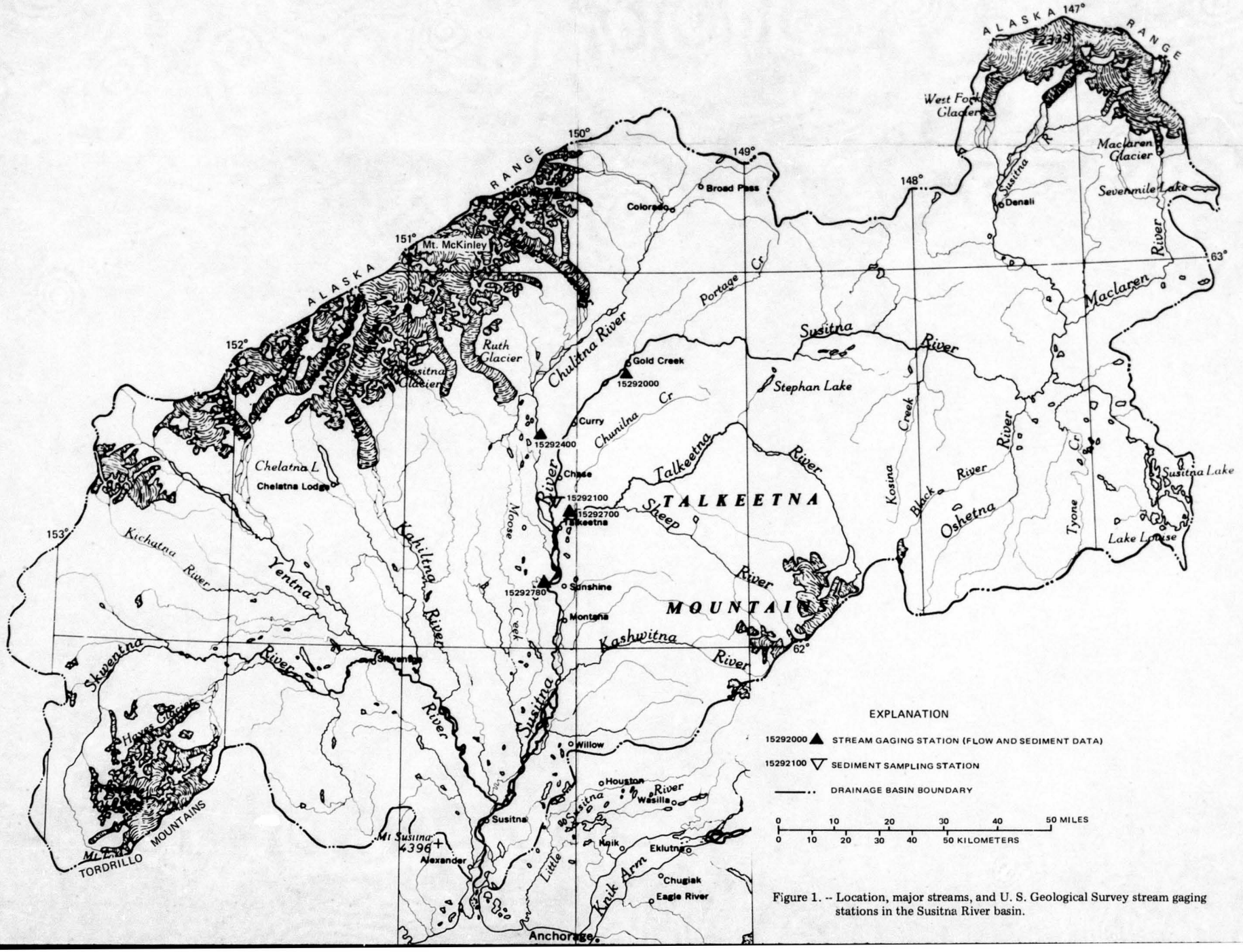
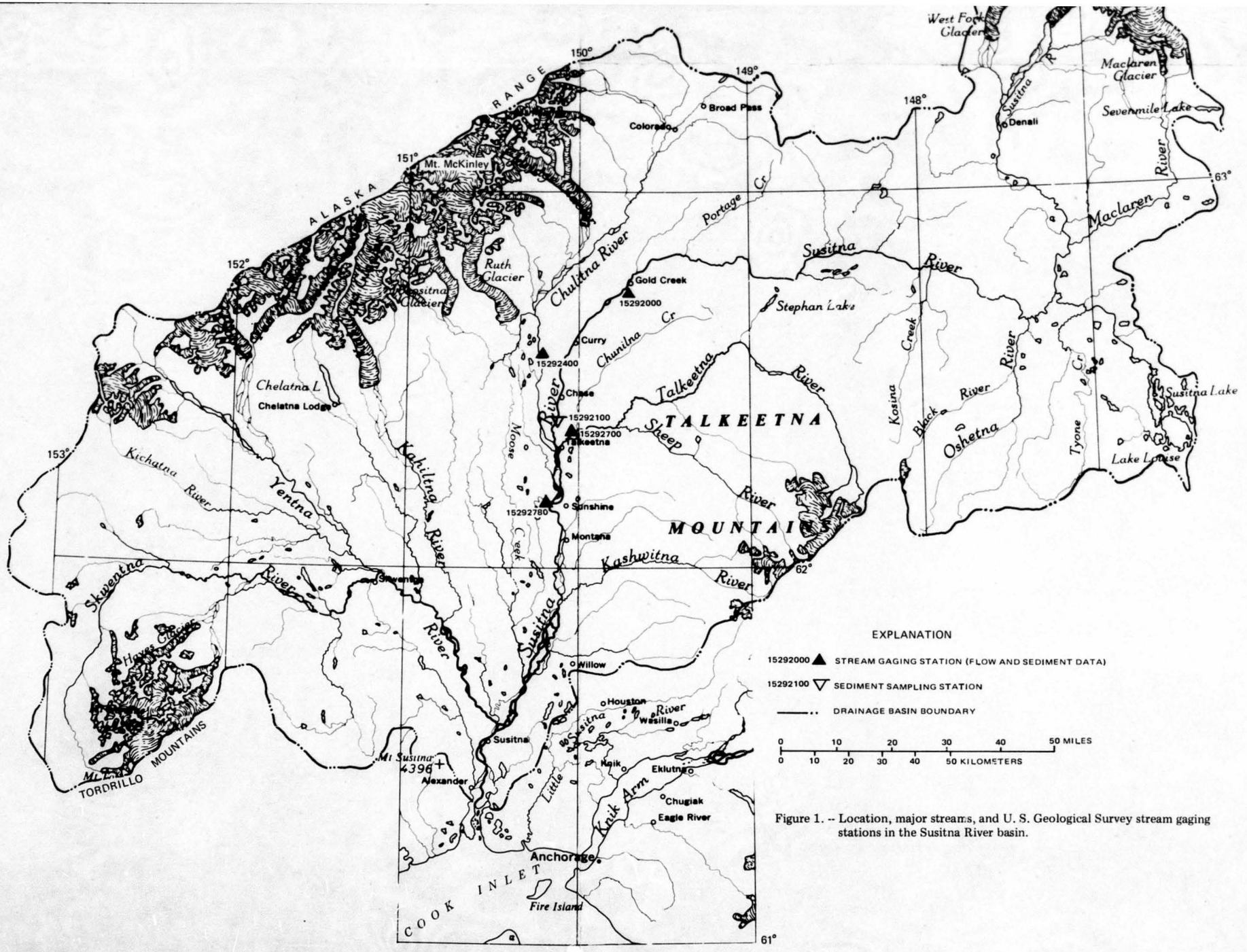


Figure 1. -- Location, major streams, and U. S. Geological Survey stream gaging stations in the Susitna River basin.



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