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Sediment Transport
IN THE TANANA RIVER
NEAR FAIRBANKS, ALASKA 1980–81

U.S. GEOLOGICAL SURVEY WATER-RESOURCES INVESTIGATIONS REPORT 83-4064
PREPARED IN COOPERATION WITH U.S. ARMY CORPS OF ENGINEERS, ALASKA DISTRICT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SEDIMENT TRANSPORT IN THE TANANA RIVER NEAR FAIRBANKS, ALASKA, 1980-81

by Robert L. Burrows and Philip E. Harrold

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Anchorage, Alaska
1983

UNITED STATES DEPARTMENT OF THE INTERIOR

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CONVERSION TABLE

The following factors may be used to convert the International System Of Units (SI) used herein to the inch-pound system of units.

Multiply SI units	by	to obtain inch-pound units
millimeter (mm)	0.0394	inch (in.)
centimeter (cm)	0.394	inch (in.)
meter (m)	3.281	foot (ft)
square meter (m^2)	10.76	square foot (ft^2)
kilometer (km)	0.621	mile (mi)
megagram (Mg) or metric ton	1.102	ton, short
cubic meter per second (m^3/s)	35.311	cubic foot per second (ft^3/s)
kilogram per meter per second [(kg/m)/s]	0.672	pound per foot per second [(lb/ft)/s]

Suspended-sediment concentrations are given only in milligram per liter (mg/L) because these values are (within the range of values presented) numerically equal to equivalent values expressed in parts per million.

LIST OF SYMBOLS

A - Cross-section area of flow (m^2)
D - Mean depth of flow (m)
GH - Gage height (m)
Q - Discharge or flow rate (m^3/s)
V - Mean velocity of flow (m/s)
W - Surface width of flow (m)
d - Particle size (mm)
G_B - Bedload-transport rate (Mg/d)
G_S - Suspended-sediment transport rate (Mg/d)
r^2 - Coefficient of determination

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

NOTE: The authors wish to thank Judy C. Fleming for compiling the base map for figure 1 from available maps and photographs.

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ABSTRACT

Suspended-sediment and bedload-transport rates for the Tanana River near Fairbanks, Alaska, can be related to water discharge, and annual sediment loads can be computed using these relations. For a site at Fairbanks, the annual loads in 1980 were 22.0 million metric tons of suspended sediment and 272,000 metric tons of bedload; in 1981, 27.3 million metric tons of suspended sediment and 333,000 metric tons of bedload passed the Fairbanks site. Data collected at five other locations within a 40-kilometer reach of the river indicate very similar suspended-sediment-transport relations, but bedload-transport relations varied from site to site and between 1980 and 1981. For all sites bedload is usually 1 to 1.5 percent of suspended-sediment load.

Particle-size distribution for suspended sediment is similar at all six sites. Median particle size is generally in the silt range; only occasionally is it in the very fine sand range.

Median particle size of bedload varied from the gravel range to the medium sand range for five of the six sampling sites in both years. At the sixth site, the farthest downstream location, median particle size of bedload was in the sand range.

Bed material particles were somewhat coarser at the upstream sites than at the downstream sites. Coarser particles dominated the deeper portions of the channels and finer material was predominant on the bars and overflow parts of the channels. Median particle size of bed material was generally in the coarse gravel range, but was in the medium sand range at the farthest downstream site.

Water-surface profiles show that at all discharges the water-surface slope was steeper at the upstream sites than at the downstream sites.

INTRODUCTION

To facilitate design and operation of engineering structures and the regulation of gravel extraction along the Tanana River near Fairbanks, the U.S. Army Corps of Engineers, Alaska District, requested that the U.S. Geological Survey collect and evaluate sediment-transport and river-hydraulic data during periods of principal runoff, beginning in 1977. In 1977, data-collection sites were established at the Geological Survey gaging station Tanana River at Fairbanks (station 15485500), and at a site, Tanana River near North Pole, approximately 24 km upstream from the Fairbanks station. In 1980 four additional sampling sites were established: Tanana River at Byers Island, 6 km downstream of the Fairbanks station; Tanana River at lower and upper ends Goose Island, 5.4 km and 6.6 km upstream of the Fairbanks site; and Tanana River above Chena River Floodway, 3.5 km upstream of the North Pole site (fig. 1). Aerial photographs of the sampling sites are shown in figures

2, 3, and 4. Eleven staff gage sites, originally established in 1971, were rehabilitated in 1980 to define water-surface profile data throughout the study area (fig. 1).

The four additional sampling sites, combined with the original two sites, were chosen to place data-collection locations above and below major in-river disturbances. The Byers Island and Fairbanks sites are downstream and upstream respectively of the lower end of the Tanana River Levee system, part of a Corps of Engineers' flood protection project for Fairbanks. This part of the levee, completed in 1981, cut across a bend of the river and the flow was redirected into a pilot channel (fig. 2). The two sites at Goose Island are downstream and upstream of the most active area of gravel mining from the Tanana (fig. 3).

The North Pole and Chena River Floodway sites are downstream and upstream of the end of the Chena River Floodway, another part of the flood protection project completed in 1979. This includes an L-shaped dike extending into the Tanana River (fig. 4).

Streamflow data for the Fairbanks station are published annually in the U.S. Geological Survey's "Water Resources Data for Alaska." A previous report by Burrows and others, (1981) presented results of data collected in 1977-79. The current report contains data collected during 1980 and 1981. Data in this report are presented in the International System of Units. Data are presented in tables and graphs and most of the text is devoted to explaining them; the format is consistent with the previous report to make comparison easy. The primary purpose of this report is to provide the Corps of Engineers information pertinent to their design computations and regulation of gravel extraction.

The study program is funded by the Corps of Engineers through their Cold Regions Research and Engineering Laboratory, Alaska Projects Office, in a cooperative agreement with the U.S. Geological Survey. All fieldwork and compilation of data were done by the Geological Survey.

INSTRUMENTATION AND DATA COLLECTION

A continuous record of river stage was collected during the open-water season at the Fairbanks station. This record was analyzed to determine daily mean gage heights and corresponding daily mean discharges. During the winter-flow period, values of daily mean discharge were estimated using periodic discharge measurements and climatological data, and by correlation with data available from the gaging station Tanana River at Nenana.

Measurements of depth and velocity and collection of sediment were done from a boat. Stationing on the cross section was determined using sextant readings on a base line or by using an electronic distance measuring unit, while the boat's position was maintained by visual reference to the cross-section end markers.

Water-surface profiles were obtained by determining water-surface elevations at 11 gage sites along the study reach over the several hours taken to travel the river. Distances between sites were measured from topographic maps along a base line drawn to follow the general path of the river's main channels.

Bed-material samples were collected in July 1980 and August 1981. Both sets of samples were collected at fairly high flow: just before the peak in 1980 and just after the peak in 1981. Samples were obtained at increments of 15 m across the active width of channel. Samples from exposed or shallowly covered bars were collected using a shovel. In channels with flow, samples were collected with either a hand-held (100-mm diameter) or a cable-suspended (200-mm diameter) pipe dredge while wading or from a boat. These samples represent the top 10-20 cm of the bed.

A P-61 or a D-49 suspended-sediment sampler (Guy and Norman, 1970) was used to collect depth-integrated water samples for analysis of concentration and particle-size distribution of the suspended sediment. A Helley-Smith type bedload sampler with a 76.2-mm by 76.2-mm orifice (Helley and Smith, 1971) was used to collect bedload samples that were analyzed to determine transport rate and particle-size distribution of the bedload. The Helley-Smith bedload sampler has not been adopted by the U.S. Geological Survey as standard equipment; therefore, results obtained through its use cannot be certified for accuracy. However, the Geological Survey has described provisional methods for the use of the Helley-Smith sampler pending further research and testing. A field calibration of the sediment-trapping characteristics of the Helley-Smith bedload sampler (Emmett, 1980) indicated that no correction factor need be applied to the bedload data as collected. The sampler has been used with apparent success in other rivers that have bedload-transport rates and bedload particle-size characteristics similar to those of the Tanana River (Emmett, 1976; Emmett and Thomas, 1978).

Most of the bedload samples were obtained at 15-m increments across the part of stream width where bedload transport occurs. Generally, this resulted in collection of 18 to 20 samples across the stream width. Sampling duration was usually 30 seconds at each location. For most traverses of the stream, each individual bedload sample was given equal consideration in the determination of average stream-wide transport rate. When duplicate samples were obtained at a given location, these sample data were averaged, and the average value used in the same manner as individual values. Samples collected at each end of the traverses were given the same consideration as other individual samples, regardless of the incremental width of channel associated with the samples collected near each bank.

RIVER HYDRAULICS AND SEDIMENT TRANSPORT DATA

To facilitate application of the sediment data in this report, appropriate hydraulic data are provided. Data for streamflow, hydraulic and channel geometry, slope, and bed material allow empirical evaluation and interpretation of the sediment-transport data.

Streamflow

Table 1 presents a summary of discharge measurements made during the periods of sediment sampling in 1980-81 on the Tanana River at Fairbanks. Three of the discharge measurements listed in table 1 were made at the upper end Goose Island site; only gage height and discharge are listed for these.

Values of daily mean discharge for the Tanana River at Fairbanks are presented in tables 2 and 3 for water years 1980 and 1981 respectively. Because a continuous record of the stage is not obtained for the other five sites, daily mean discharges are not determined for those stations. However, except for a travel-time difference of less than a day, values of daily mean discharge are approximately the same for any of the sites, except Byers Island which is below the mouth of the Chena River. For the purposes of this report the Byers Island site was considered to have the same flow as the other sites, that is, contributing flow from the Chena was not included. Mean daily flow of the Chena ranged from 2 to 15 percent of that of the Tanana at Fairbanks; the mean annual flow 5-6.5 percent. This approximation does not greatly affect later computations.

Hydraulic Geometry

Data from the discharge measurements in table 1 are plotted as at-a-station values of hydraulic geometry (Leopold and Maddock, 1953) in figures 5 and 6. Relations shown for gage height, velocity, depth, width, and flow area, as functions of discharge were determined by log-transformed, least-squares linear regression of the data. As shown by the present and earlier data (Burrows and others, 1981), there is some annual shifting of the gage height, velocity, depth, and width relations. Despite the instability of these relations, the flow area-discharge relation was quite consistent. This year-to-year consistency for the flow area-discharge relations is indicative of the river's complex adjustments in maintaining a consistent relation of channel size to discharge. Sufficient discharge measurements to determine at-a-station relations of hydraulic geometry for the other five sites are not available.

Channel Geometry

Cross-section data are plotted in figures 7-11, showing channel geometry before, near, and after the peak runoff in 1980 and 1981 at the six sampling sites. These data were collected while sampling bedload, so only those channels with significant flow and transport are shown. Tops of exposed bars are shown as straight lines between channels. At Byers Island, shown in figure 7, there was some change in the main channel and in the middle channel from 1980 to 1981 but no great lateral shifting of the thalweg (thread of maximum depth) in each. Some deposition occurred from station 230 m to 270 m in the main channel in late 1980 and remained through 1981.

At the Fairbanks site (fig. 8), during the two runoff seasons there was shifting of bed material from the sand and gravel bar to the thalweg and vice-versa, resulting in a change in the cross-section configuration. The thalweg was at about station 230 m in early 1980, at station 170 m in the fall of 1980, but shifting back to between stations 230 m to 330 m by October 1981. The sand and gravel bar exposed between stations 330 and 370 m in June 1980 was considerably reduced in size by October 1981, by the channel shift to the left as seen in the lower part of figure 8.

Much of this lateral shifting occurred during high water, but it can be seen that from July 30 to October 23, 1980 and from July 29 to October 7, 1981, significant shaping of the channel occurred during streamflow recession. That is, even as less

transport of bed material occurred in the downstream direction, significant lateral shifting of the channel was still taking place. As previously observed (Burrows and others, 1981), such shifting of the thalweg from one side of the active channel to the other can occur in less than two months.

At the lower end Goose Island site (fig. 9, top) there was seasonal scour and fill tending toward net aggradation of the channel, although the general shape remained the same in 1980. In 1981 at this site the channel shape was the same as in 1980 up to the peak but a shift of the thalweg occurred as shown by the October 1981 cross-section plot in the upper right part of figure 9.

It is important to note that a significant channel change occurred upstream of this cross section. The aerial photograph (fig. 3) shows a channel bypassing this section to the right or north. This channel in fact was blocked until August 10, 1981, so that until that date all the flow went through the main channel.

The lower portion of figure 9 shows the cross section at the upper end Goose Island site. The most prominent change is the growth, especially in 1980, of the sand and gravel bar centered around station 100 m and the concurrent scour of the right part of the channel.

At Tanana River near North Pole no significant change occurred in the overall size and shape of the south channel, as seen in figure 10. Large changes took place in the north channels. The most significant change is from stations 300 m to 500 m where several smaller channels were scoured to form a single larger one. More noticeable is the scour occurring at about stations 350 m on the recession, totalling nearly 3.5 m between June 16, and October 15, 1981.

At the sampling site above Chena River Floodway, shown in figure 11, seasonal changes in the southern channel can be seen but no major shifting of the deeper portions of the channel occurred. The north channel is split by a centrally located bar; in both channels there has been seasonal variation in channel shape but overall the comparison of the October cross sections indicated deposition has occurred during 1980 and 1981.

Water-Surface Profile

Table 4 gives water-surface elevations over a range of discharges at gage sites along the study reach. The sites are listed in upstream order and labeled GS-1, and T-1 through T-10. Distance in kilometers from 0.0 km at T-10 is shown for each site. Profiles of the water surface along the right or north bank, for the highest and lowest flows in 1980 and 1981, shown in table 4 are plotted in figure 12. The profiles show a general reduction in gradient from upstream (T-10) to downstream (GS-1).

Slopes may be determined for reaches of the river near Byers Island, Fairbanks, Goose Island, and North Pole and Chena River Floodway data-collection sites. For Byers Island the slope was computed between GS-1 and T-1; for Fairbanks, between T-1 and T-2; for both Goose Island sites, the slope was computed between T-3 and 4;

and for the North Pole and Chena River Floodway sites the slope was computed between T-7, 8, and 9 and averaged. Mean values of slope at water discharge less than 1,000 m^3/s and greater than 1,000 m^3/s are shown below:

	<1,000 m^3/s	>1,000 m^3/s
Byers Island	0.000399	0.000382
Fairbanks	.000552	.000534
Goose Island sites	.000792	.000726
North Pole and above Chena River Floodway	.00118	.00115

Bed Material

Particle-size distributions for bed-material samples at all sites in both 1980 and 1981 are given in tables 5-24.

Graphic representation of percentages by weight of four size classes (silt, sand, gravel, and cobble) of each sample across the channel is in figures 13-30. Cross sections shown in the bottom part of these figures are those measured on the same day or within a day of the time of sampling. Exposed bars were surveyed in 1980 when bed-material samples were collected. No data exist for the geometry of exposed bars in 1981 as bed elevations are determined from measured water depths. Particle sizes are finer on shallowly covered or exposed bars and coarser in the main or deeper parts of the channels. It can be seen that from 1980 to 1981, wherever there was scour in a given part of a section, the bed material at a station was generally coarser, and wherever deposition occurred, the material was nearly always finer.

Composite-size distributions of bed material and the associated statistics for each channel at each site are shown in tables 25 and 26. The composites were derived by averaging the percentage, by weight, retained on each size sieve for all samples across the section.

Median particle size (d_{50}) of bed material at Byers Island was much finer than that of any other site in both years. In general d_{50} was coarser in 1981 than in 1980 for all sites with the exception of the south channel near North Pole.

For both years, particle sizes of bed material are generally coarser at the upstream sites than at the downstream sites. The composite distributions and statistics are influenced by large areas of shallow bars composed of finer material. For this reason, the decreasing size of bed material in the successive downstream sections is better illustrated by observing the graphs of cross-channel bed-material distribution for the main channel and thalweg at each site (figures 13-30).

Suspended Sediment

Tables 27-32 list values of instantaneous water discharge, suspended-sediment concentration, transport rate, and median particle size for the sites at Byers Island, Fairbanks, lower end Goose Island, upper end Goose Island, North Pole, and above Chena River Floodway respectively. The suspended-sediment transport rate, G_S, in megagrams (metric tons) per day, is computed as:

$$G_S = 0.0864 \times \text{concentration (mg/L)} \times \text{water discharge } (m^3/s).$$

In 1980, suspended sediment was sampled initially at only the Fairbanks and North Pole sites. Later in the season several suspended-sediment samples were collected at all sites and analyzed for concentration and percentage of silt and sand.

In 1981, suspended-sediment samples were collected at all sites and analyzed for concentration and complete particle-size distribution. At Byers Island and at the upper end Goose Island several suspended-sediment samples were collected through ice cover in March 1981.

Bedload

Tables 33-38 list values of river hydraulics and bedload transport rate for the six sites. Where two or more channels were sampled the combined bedload totals are given rather than for separate channels. The total bedload-transport rate, in metric tons per day, was computed by applying the measured unit transport rate over the width of the channel. Two samples were collected through ice cover at the upper end Goose Island in March 1981. Widths shown are those measured in the field.

Sediment-Transport Relations

The relations of sediment transport rate to discharge are illustrated in figures 31-36. The data are from tables 27-38. The log-transformed least-squares linear regression describing the relations follow:

SUSPENDED SEDIMENT
(megagrams per day)

Byers Island

1981 $G_S = 1.444 \times 10^{-4} Q^{2.952}$ ($r^2 = 0.976$)

Fairbanks

1980 $G_S = 1.134 \times 10^{-3} Q^{2.689}$ ($r^2 = 0.968$)

1981 $G_S = 1.577 \times 10^{-4} Q^{2.958}$ ($r^2 = 0.981$)

Upper end Goose Island

1981 $G_S = 4.524 \times 10^{-4} Q^{2.791}$ ($r^2 = 0.987$)

Lower end Goose Island

1981 $G_S = 5.761 \times 10^{-2} Q^{2.103}$ ($r^2 = 0.929$)

North Pole

1980 $G_S = 1.114 \times 10^{-4} Q^{3.003}$ ($r^2 = 0.925$)

1981 $G_S = 2.180 \times 10^{-4} Q^{2.889}$ ($r^2 = 0.988$)

Chena River Floodway

1981 $G_S = 1.281 \times 10^{-4} Q^{2.962}$ ($r^2 = 0.988$)

BEDLOAD
(megagrams per day)

Byers Island

1980 $G_B = 1.052 \times 10^{-2} Q^{1.643}$ ($r^2 = 0.894$)

1981 $G_B = 0.6776 Q^{1.050}$ ($r^2 = 0.421$)

Fairbanks

1980 $G_B = 2.008 \times 10^{-2} Q^{1.642}$ ($r^2 = 0.745$)

1981 $G_B = 4.817 \times 10^{-4} Q^{2.183}$ ($r^2 = 0.644$)

Lower end Goose Island

1980 $G_B = 2.191 \times 10^{-4} Q^{2.246}$ ($r^2 = 0.879$)

1981 $G_B = 2.491 \times 10^{-3} Q^{1.985}$ ($r^2 = 0.816$)

Upper end Goose Island

1980 $G_B = 6.815 \times 10^{-6} Q^{2.666}$ ($r^2 = 0.844$)

1981 $G_B = 5.630 \times 10^{-3} Q^{1.926}$ ($r^2 = 0.710$)

North Pole

1980 $G_B = 2.295 \times 10^{-3} Q^{1.894}$ ($r^2 = 0.500$)

1981 $G_B = 1.964 \times 10^{-2} Q^{1.635}$ ($r^2 = 0.720$)

Chena River Floodway

1980 $G_B = 9.424 \times 10^{-5} Q^{2.425}$ ($r^2 = 0.826$)

1981 $G_B = 2.313 Q^{0.9525}$ ($r^2 = 0.307$)

Data were insufficient to define relations for suspended-sediment transport rates for four of the sites in 1980: Byers Island, the two Goose Island sites, and the site above Chena River Floodway.

Although there are few data points for these four sites in 1980, the range of transport rates is similar to those in 1981 and the 1980 data visually fit the 1981 regressions fairly well.

The winter samples of suspended sediment were not included in the regression analysis of the 1981 suspended-sediment data at Byers Island and at upper end Goose Island.

Bedload-transport rates vary from site to site and from year to year, but are generally two orders of magnitude less than that of the suspended sediment. In 1980 the highest measured transport rate for flows greater than 1,000 m^3/s was at the site above Chena River Floodway; the lowest measured rate was at upper end Goose Island. For flows less than 1,000 m^3/s the highest measured rate ocurred at the North Pole site, and the lowest at upper end Goose Island. In 1981 for flows greater than 1,000 m^3/s the highest rate was at lower end Goose Island and the lowest above Chena River Floodway. At flows less than 1,000 m^3/s both the highest and lowest measured rates were at the Fairbanks site.

In March 1981 two bedload samples were collected at upper end Goose Island, but were not included in the regression analysis. Transport rates for those two winter samples are of the same magnitude as transport rates during low-flow open-water conditions. There is considerable consistency to the measured bedload data. Seventy-five percent of the bedload-transport data fall into the tenfold range of 0.5 to 5 percent of the suspended-sediment transport rate.

Particle-Size Data for Suspended Sediment and Bedload

Tables 39-44 list suspended-sediment particle-size data for the six sampling sites. Samples collected in 1980, as previously noted, were not all analyzed for a standard size distribution (0.002-2.0 mm), and only show the percentage division between silt-clay and sand. Size determination was made by sieve or visual-accumulation tube analysis for particles larger than silt (>0.062 mm), and by pipet analysis for particles of silt size and smaller. All data are expressed in percentage, by weight finer than indicated particle size. Values of median particle size were determined where possible and are included as part of the suspended-sediment data in tables 27-32. Median particle size is nearly always in the silt range (0.004-0.062 mm) and only occasionally in the very fine sand range (0.062-0.125 mm).

Particle-size distribution data for bedload as determined by dry-sieve analysis are given in tables 45-50. Statistics of the particle-size determinations are presented in tables 51-56. This latter compilation is especially useful in visualizing bedload-particle sizes as functions of discharge or bedload-transport rate. The median particle size, d_{50}, from this compilation is included in tables 33-38 as part of the bedload data.

Median particle size of bedload at Byers Island was always less than 1 mm. For all other sites the median particle size of bedload was sometimes in the gravel range (2.0-64 mm), but at other times in the medium sand range (0.25-0.5 mm). This large variability in median particle size has been observed previously (Emmett, 1976) and is apparently related to the availability and mobility of particles composing the bed material.

The transport-rate weighted, yearly composite size distributions are presented in tables 57-58 and illustrated in figures 37-42. These size distributions are obtained by using the actual weights of samples collected at nearly uniform increments of time over the runoff period. Thus, samples collected at higher transport rates "carry more weight" because their actual weights are greater.

For both years, at all sites except Byers Island, 40 to 60 percent of the annual bedload was gravel and, although median particle size varied between 0.4 mm and 5.6 mm from site to site and year to year, most particle-size distributions were very similar. The greatest year-to-year variation was at the Fairbanks site, where d_{50} was 5.6 mm in 1980 but only 0.40 mm in 1981, and percentage of gravel was 60 percent in 1980 but only 36 percent in 1981. At Byers Island the bedload was much finer in both years than at any other site. Only 19 and 26 percent of the bedload was gravel in 1980 and 1981 respectively; median particle size was 0.38 mm and 0.31 mm.

Annual Sediment Loads

Daily mean discharges from tables 3 and 4 can be arranged in order of magnitude to indicate the number of days during which each discharge is equaled or exceeded. The number of days can then be multiplied by the corresponding sediment-transport rate to provide estimates of the annual sediment load (tables 59 and 60).

In 1980, 22.0 million metric tons of suspended sediment and 272,000 metric tons of bedload passed the Fairbanks site; in 1981, 27.3 million metric tons of suspended sediment and 333,000 metric tons of bedload passed the site. While not shown, the same type of computations may be made using the same discharge data and transport functions for each site. As can be seen by examining the transport relations in figures 31-36, there should be only slight differences in estimated annual suspended sediment loads from site to site, but estimates of annual bedload vary more from site to site and between years.

Annual bedloads shown are between 1 and 1.5 percent of the suspended-sediment load. The average bedload-transport rate expressed as a percentage of average suspended-sediment-transport rate, ranges from 1 percent at highest flows to about 4 percent at low flows (column 8 in tables 59 and 60). No percentage is shown for flows less than 200 m^3/s; the bedload-transport functions are extrapolated to define the transport rates at much lower flows than those for which bedload data have been collected. High ratios of bedload- to suspended-sediment-transport rate at very low flows, as indicated by the transport functions, may not actually occur. This does not greatly affect the annual load computations, because most of the transport occurs at higher flows.

Eighty percent of the bedload is transported during about 30 percent of the year at flows exceeding 600 m^3/s. More than half of the suspended-sediment load is transported in about 10 percent of the year at flows greater than 1,300 m^3/s.

For 8 years of complete record (1974-81) annual mean discharge of the Tanana River at Fairbanks ranged from 475 m^3/s to 613 m^3/s and averaged 533 m^3/s. In 1980 and 1981 the annual mean discharge was 491 m^3/s and 532 m^3/s respectively. The transport functions defined by the 1980-81 sediment data are very similar to those defined by 1977-79 data and the above values of sediment load fall within the previously estimated range of 18-30 million metric tons of suspended-sediment load and 250,000-450,000 metric tons of bedload (Burrows and others, 1981).

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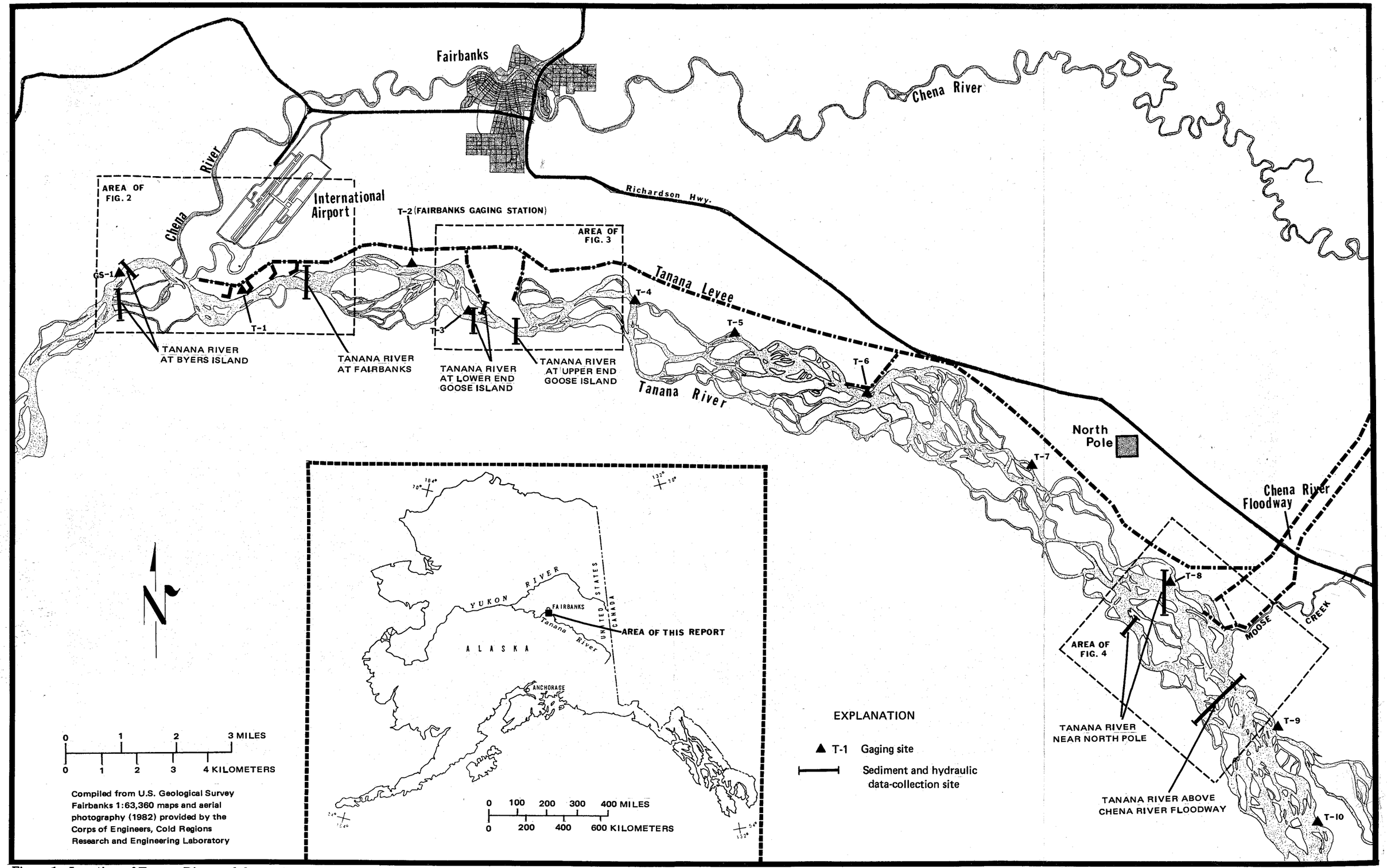
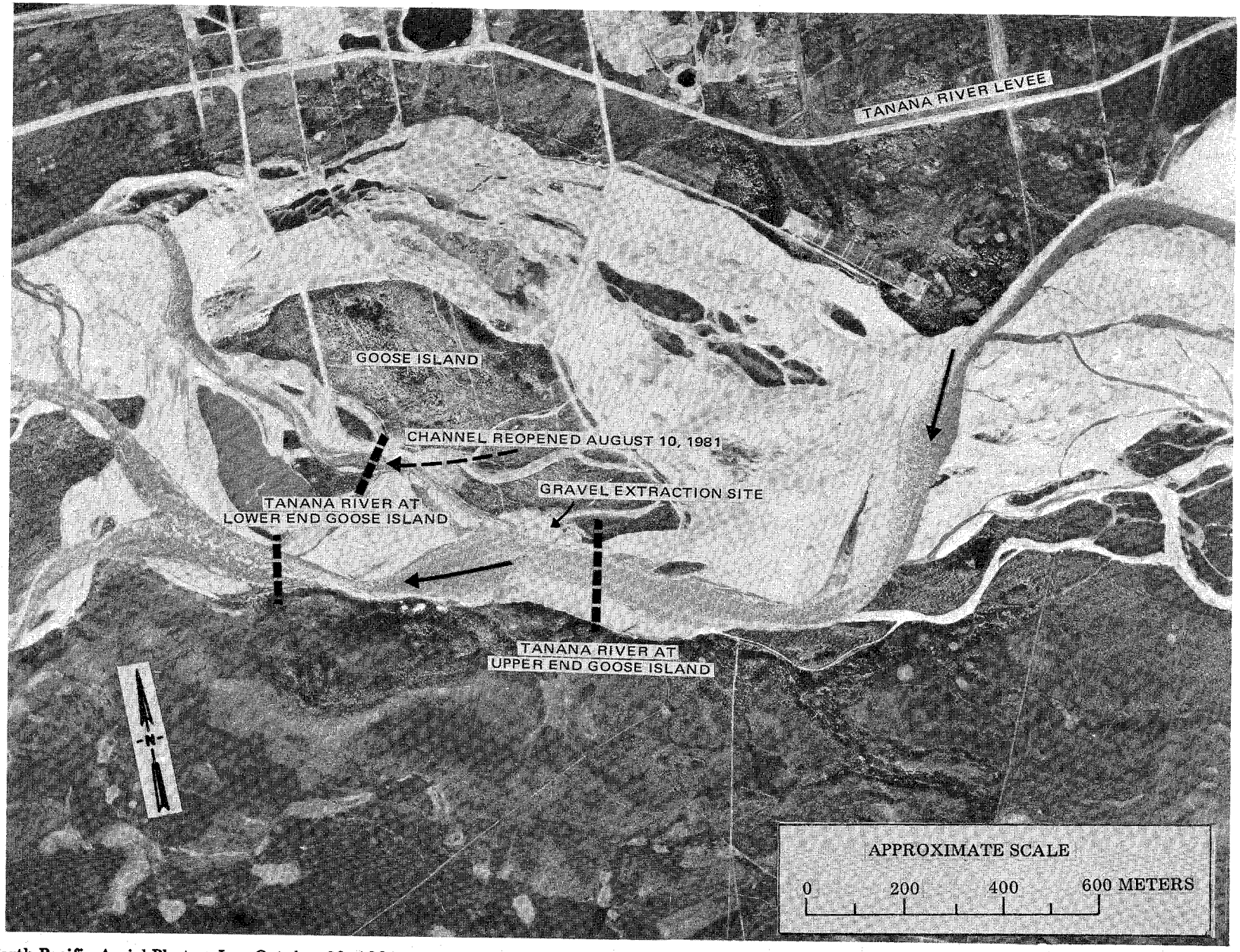


Figure 1.--Location of Tanana River and data-collection stations.

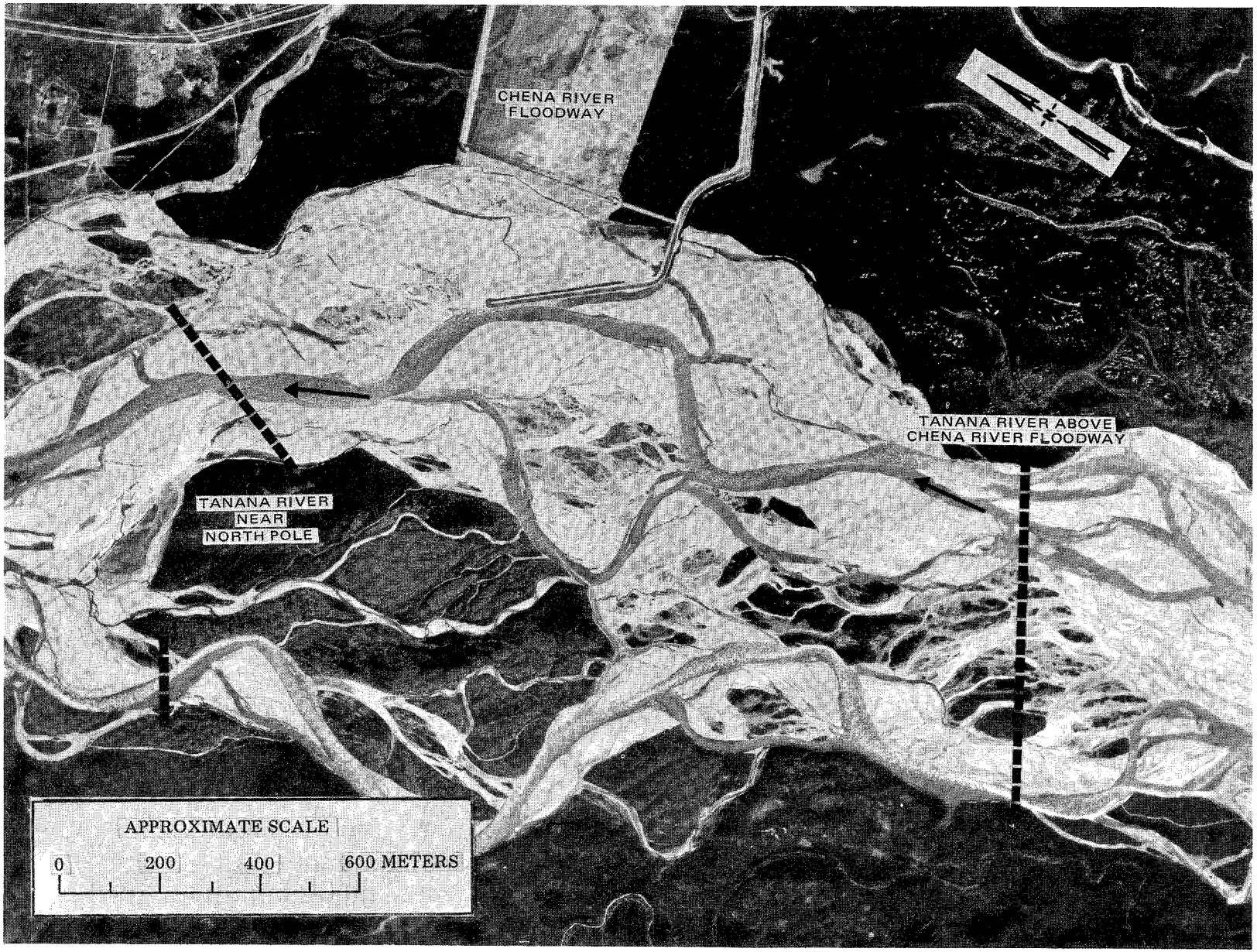
North Pacific Aerial Photos, Inc. October 20, 1981

Figure 2. -- Data-collection sites near Fairbanks.



North Pacific Aerial Photos, Inc. October 20, 1981

Figure 3.--Data-collection sites at Goose Island.



North Pacific Aerial Photos, Inc. October 20, 1981

Figure 4.--Data-collection sites near North Pole.

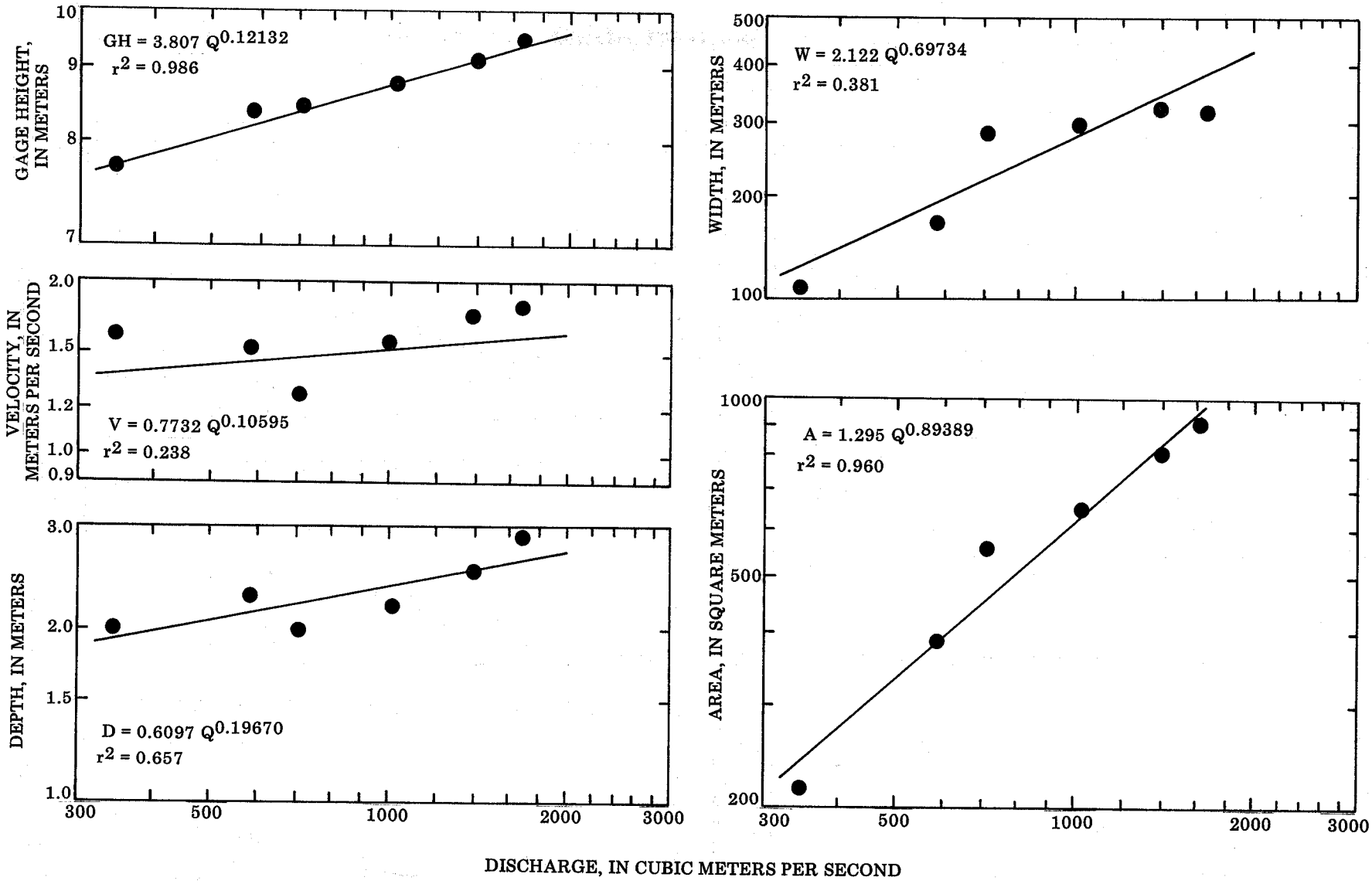


Figure 5.--At-a-station relations of hydraulics and channel geometry, Tanana River at Fairbanks, 1980.

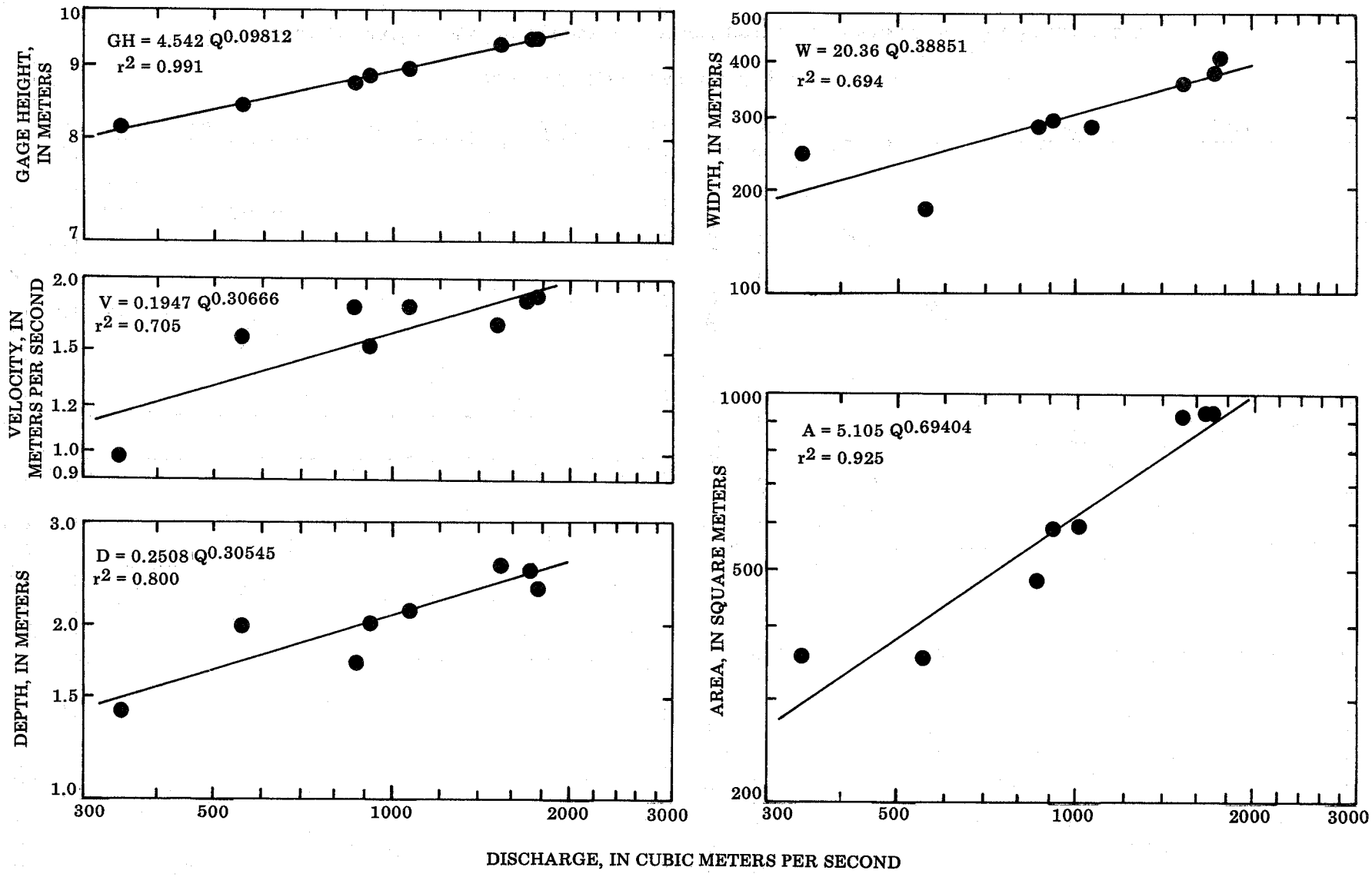


Figure 6.--At-a-station relations of hydraulics and channel geometry, Tanana River at Fairbanks, 1981.

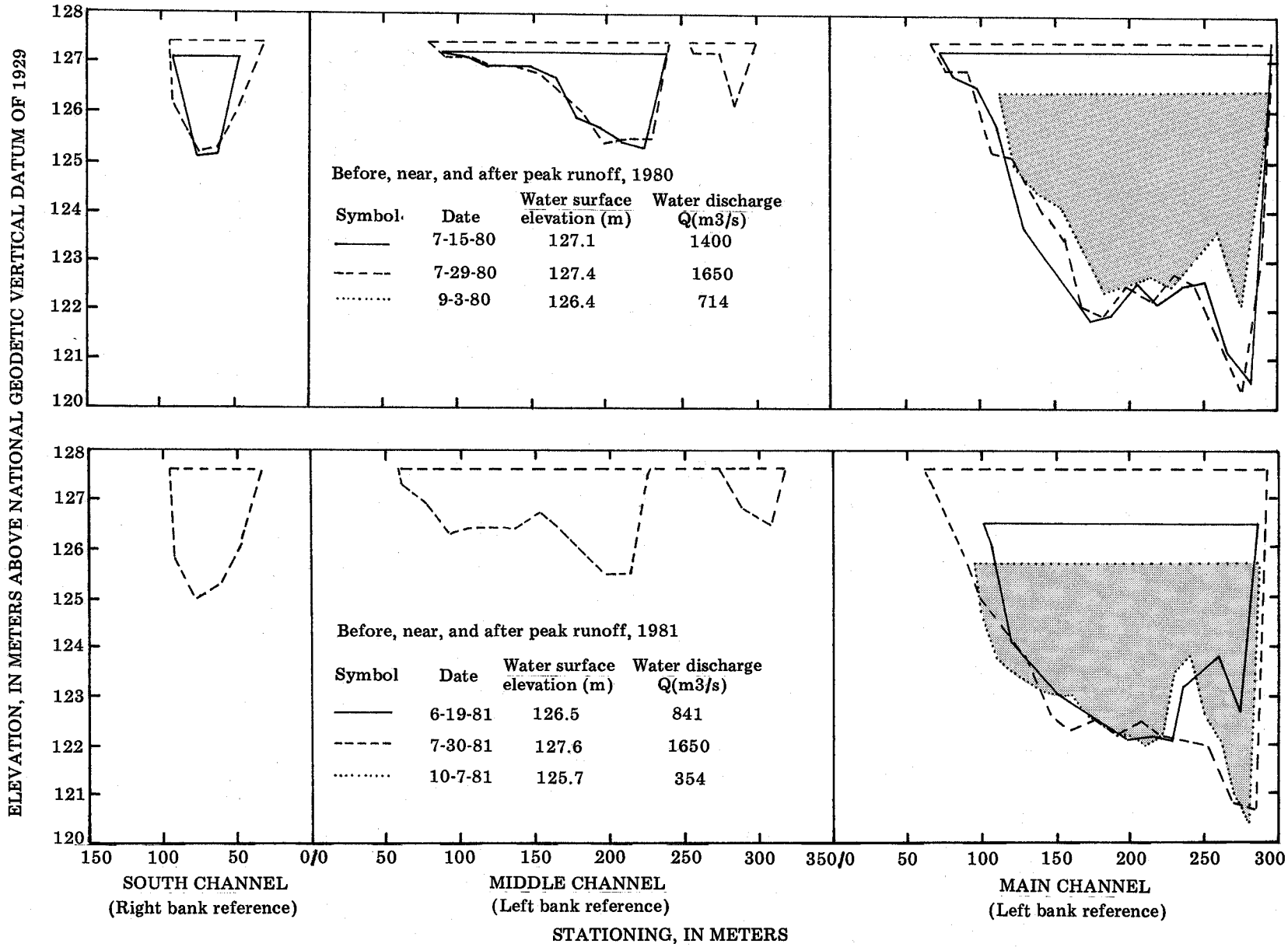


Figure 7.--Cross sections of the Tanana River at Byers Island, 1980-81.
(No cross-sections shown for 6-19-81, and 10-7-81 in middle and south channels).

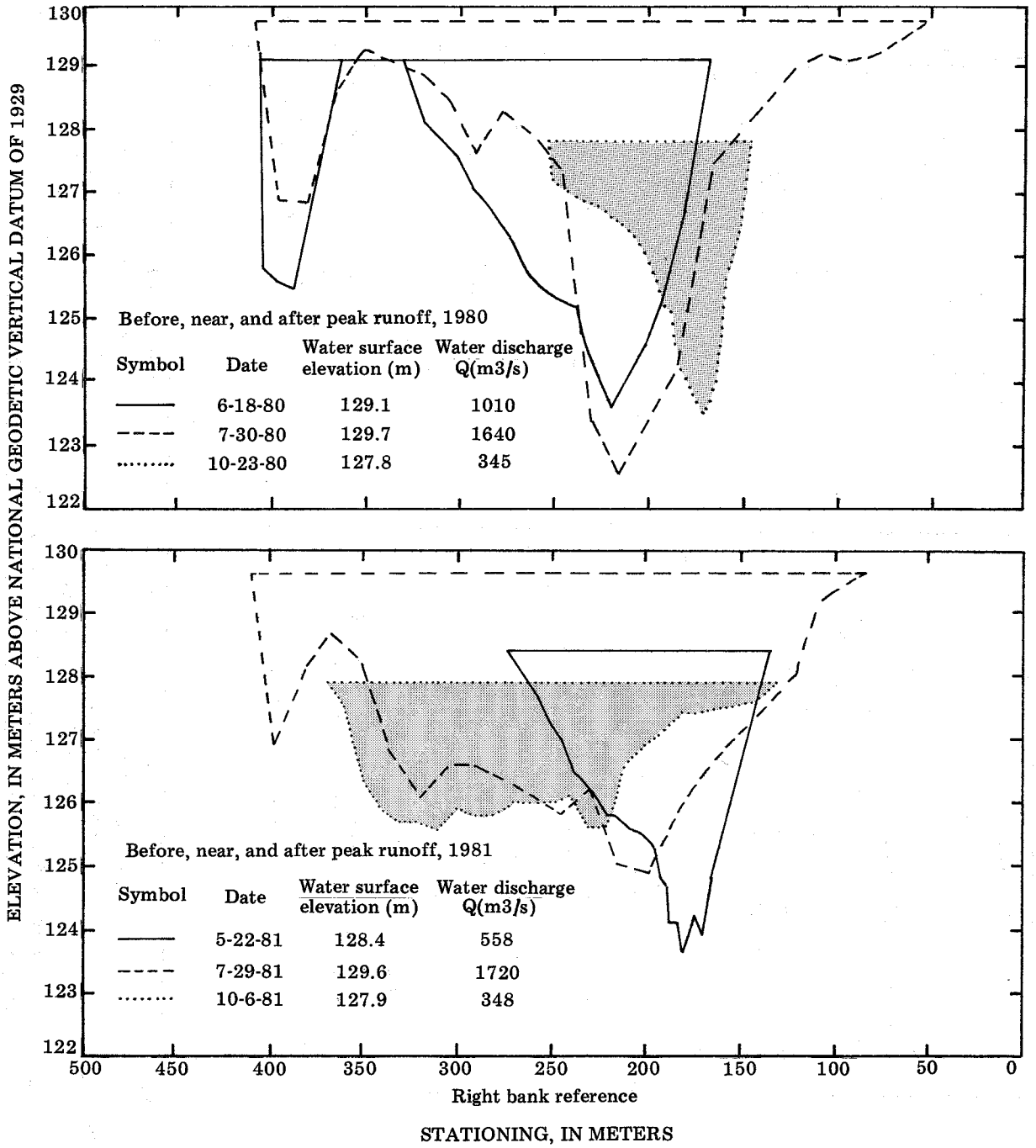
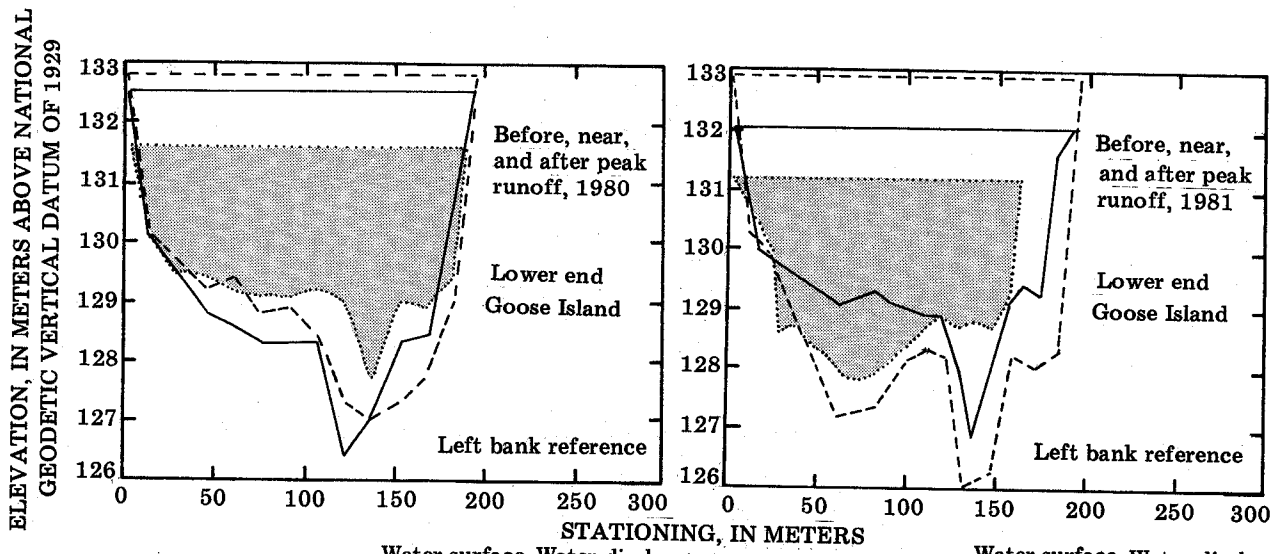
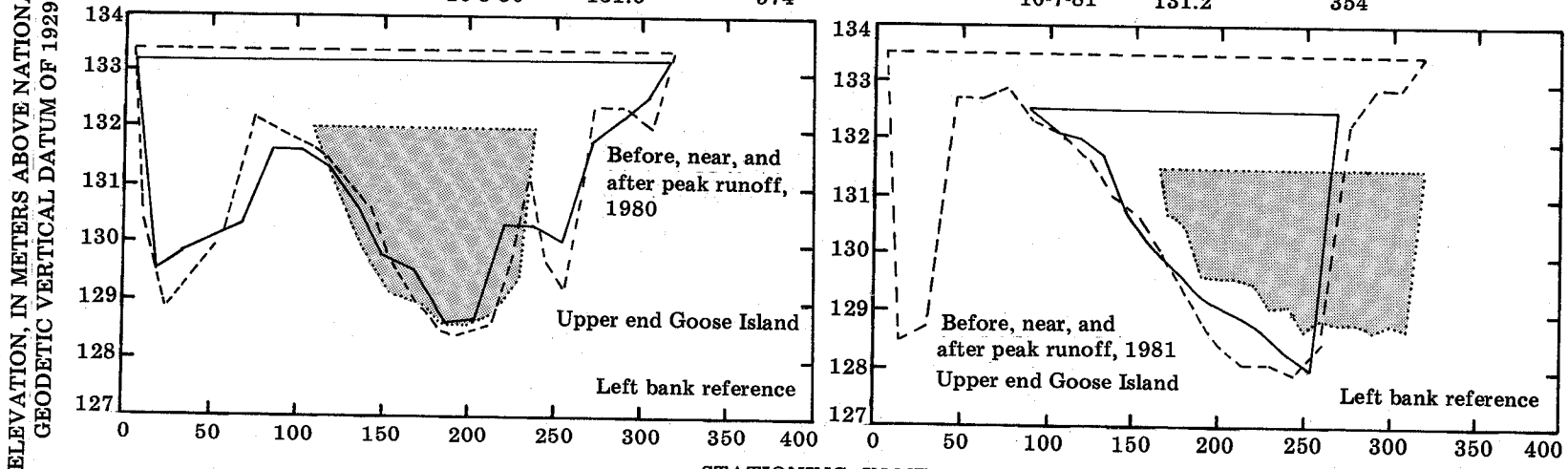


Figure 8.--Cross sections of the Tanana River at Fairbanks, 1980-81.



Symbol	Date	Water surface elevation(m)	Water discharge Q(m3/s)
———	7-16-80	132.5	1340
- - - - -	7-30-80	132.8	1640
·····	10-8-80	131.6	574

Symbol	Date	Water surface elevation(m)	Water discharge Q(m3/s)
———	6-19-81	132.0	841
- - - - -	7-28-81	132.9	1820
·····	10-7-81	131.2	354



Symbol	Date	Water surface elevation(m)	Water discharge Q(m3/s)
———	7-16-80	133.2	1340
- - - -	7-30-80	133.4	1640
·····	10-8-80	132.0	574

Symbol	Date	Water surface elevation (m)	Water discharge Q(m3/s)
———	6-19-81	132.5	841
- - - -	7-28-81	133.5	1820
·····	10-7-81	131.5	354

Figure 9.--Cross sections of the Tanana River at upper and lower ends Goose Island near Fairbanks, 1980-81.

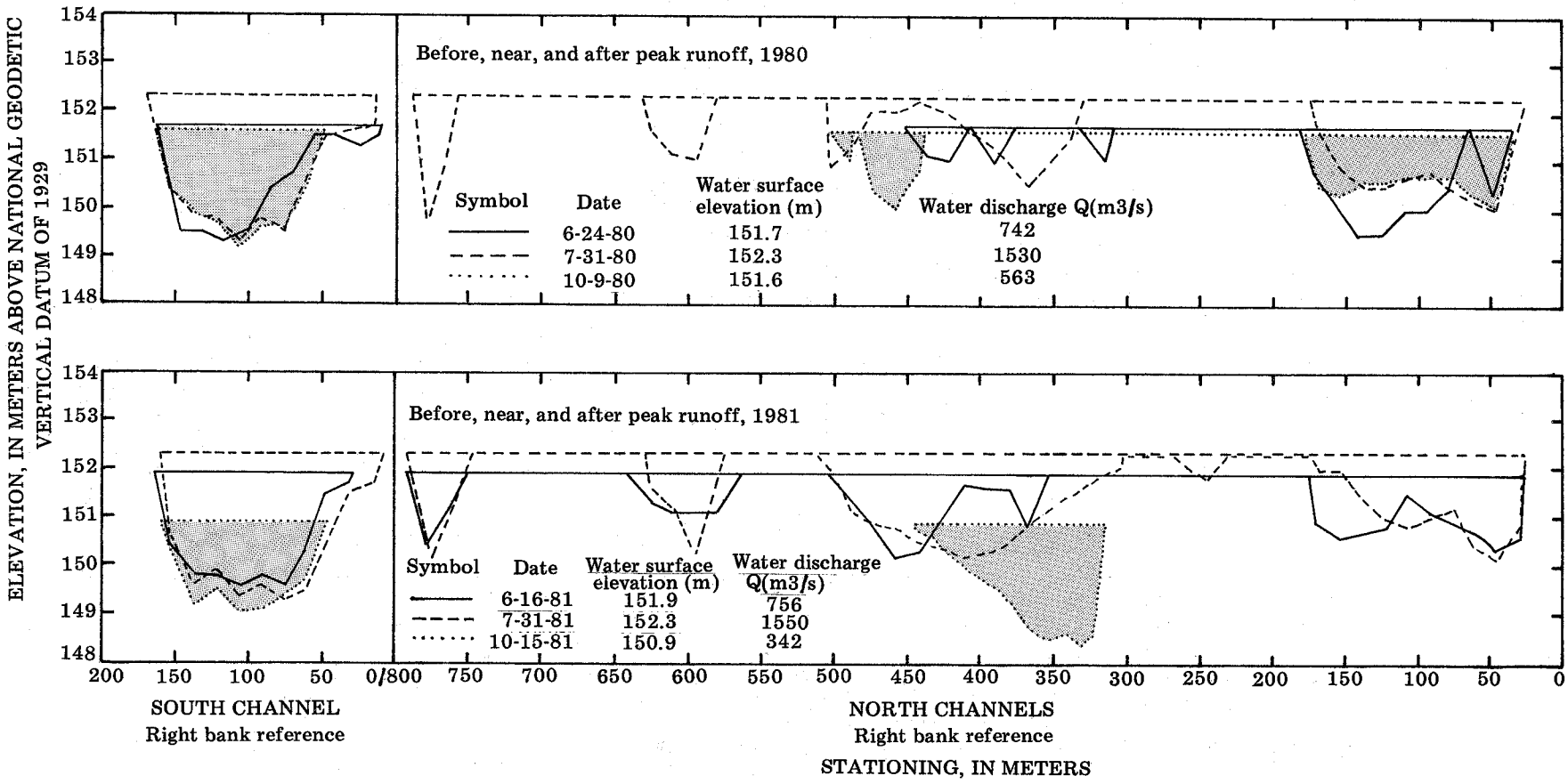


Figure 10.--Cross sections of the Tanana River near North Pole, 1980-81.

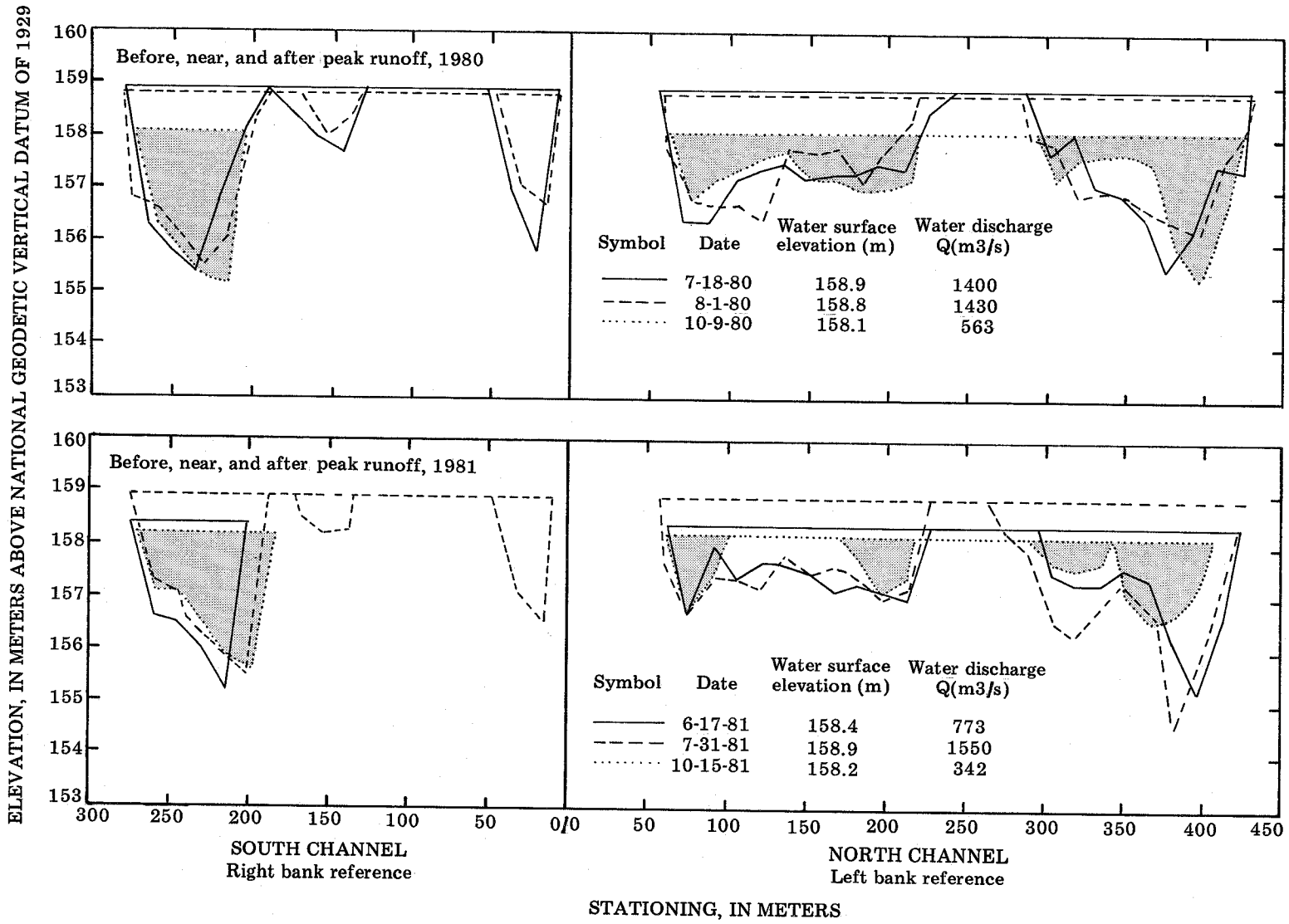


Figure 11.--Cross sections of the Tanana River above Chena River Floodway, near North Pole, 1980-81.

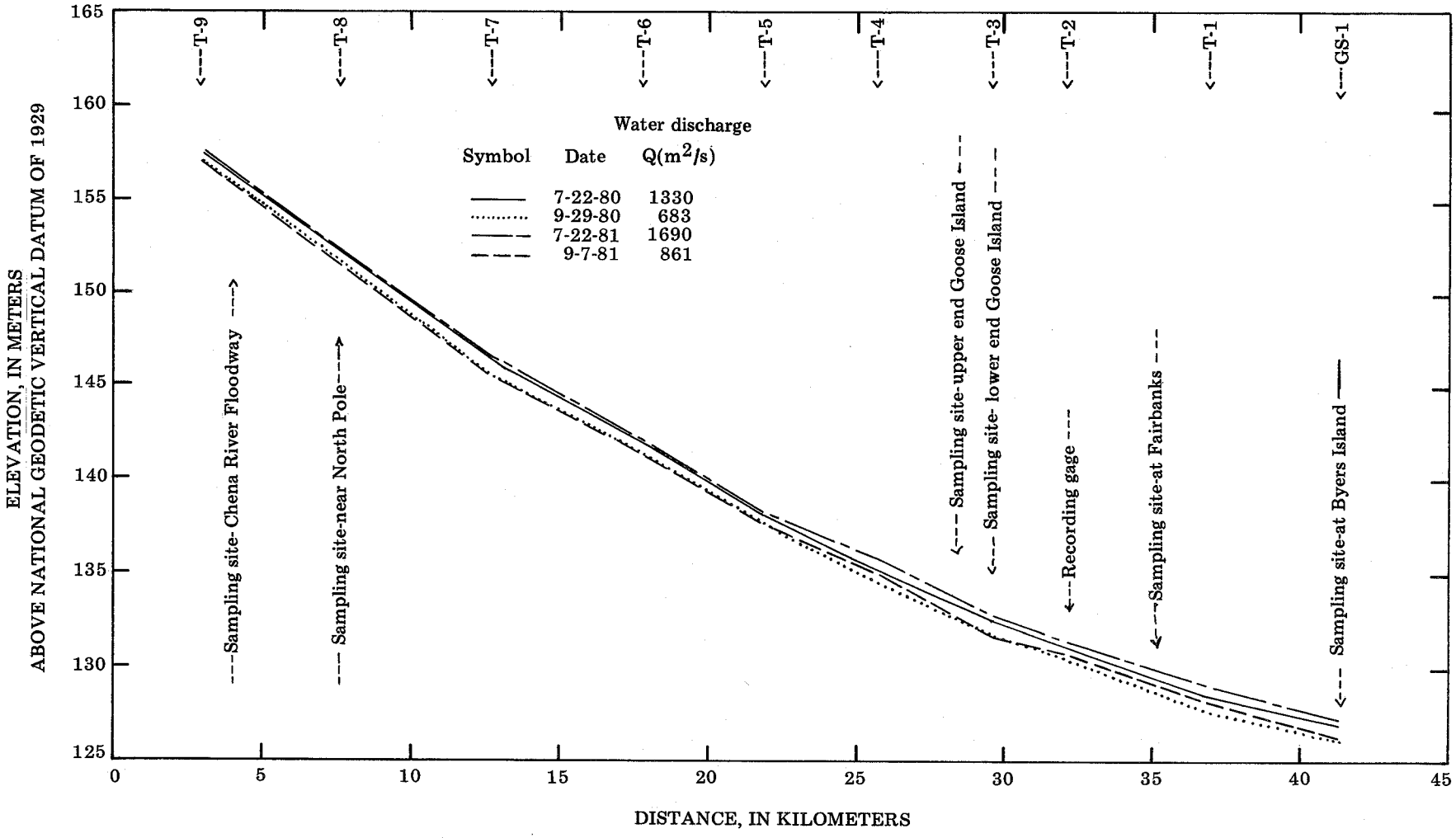


Figure 12.--Water-surface profiles, Tanana River at Fairbanks, 1980-81.

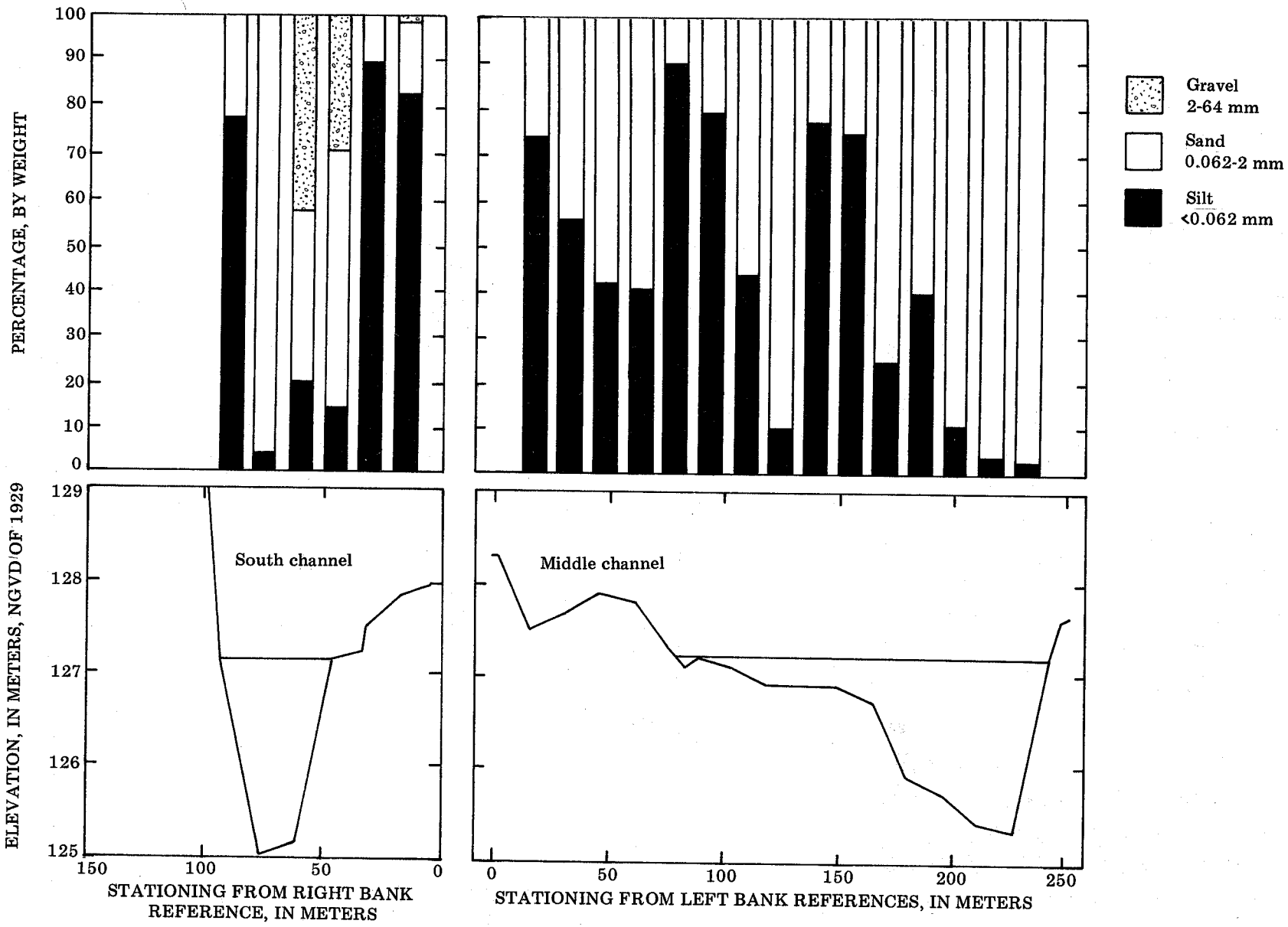


Figure 13.--Cross-channel particle-size distribution of bed material, Tanana River at Byers Island, south and middle channels, July 16, 1980.

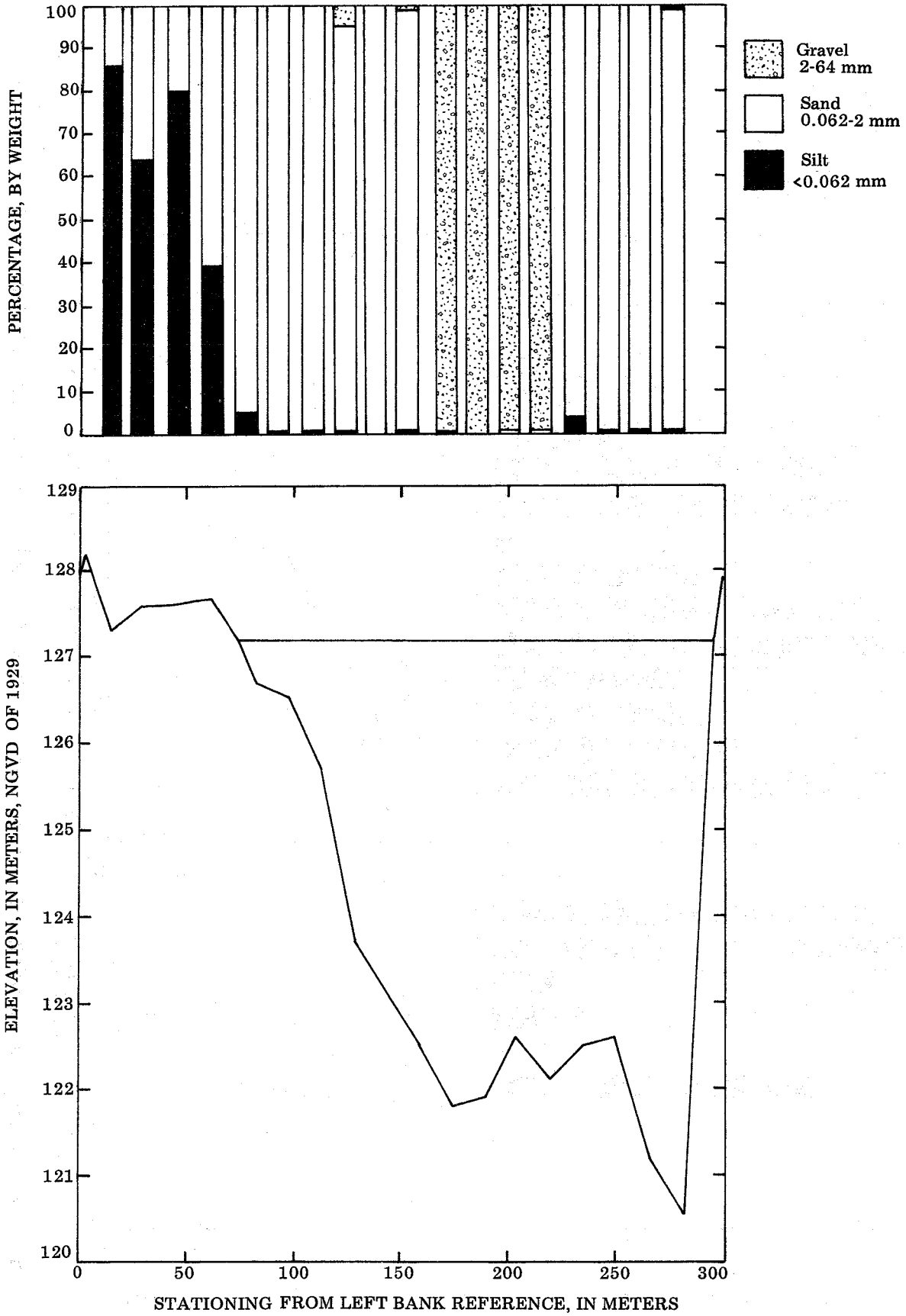


Figure 14.--Cross-channel particle-size distribution of bed material, Tanana River at Byers Island, north channel, July 16, 1980.

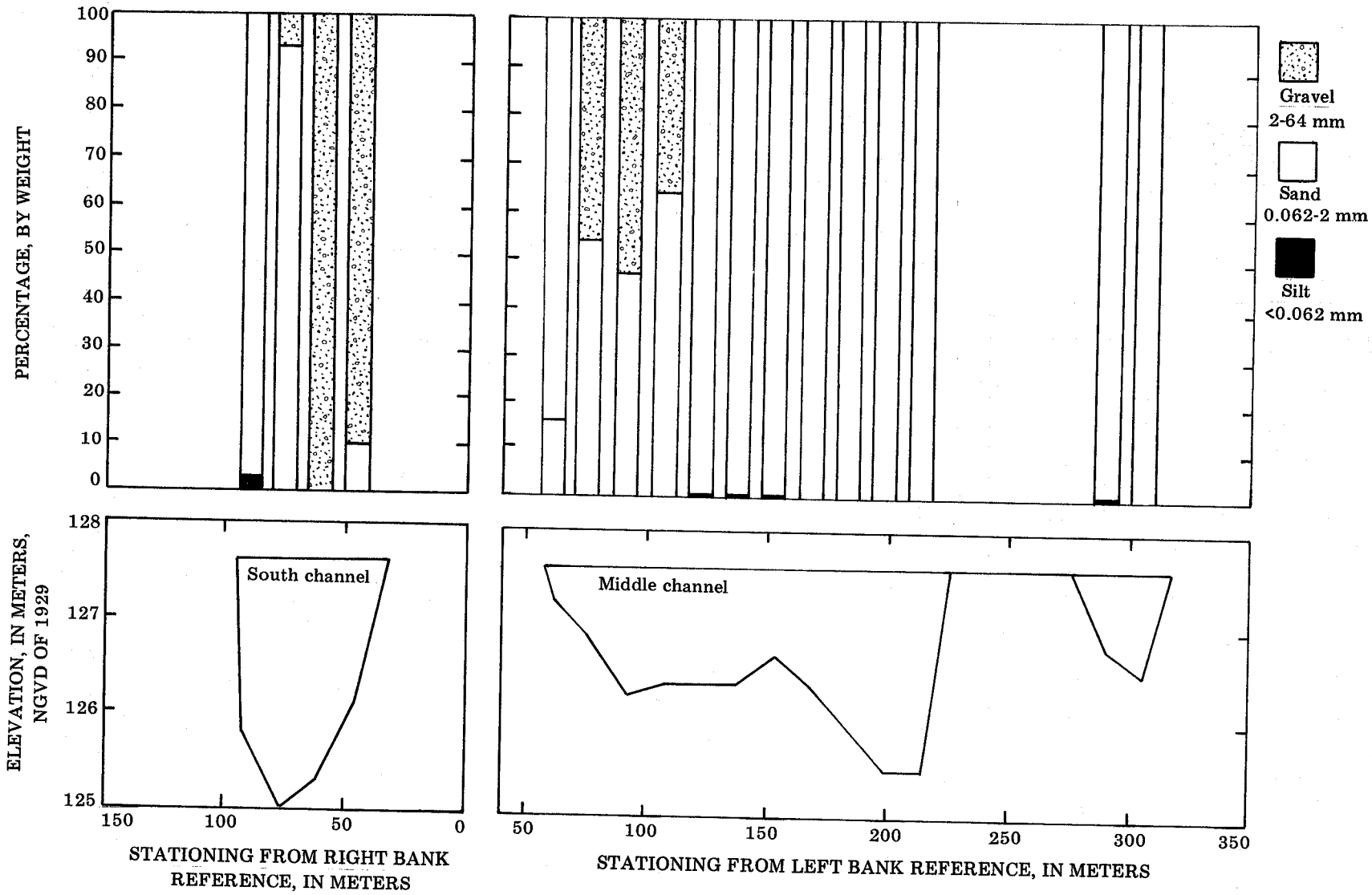


Figure 15.--Cross-channel particle-size distribution of bed material, Tanana River at Byers Island, south and middle channels, July 30, 1981.

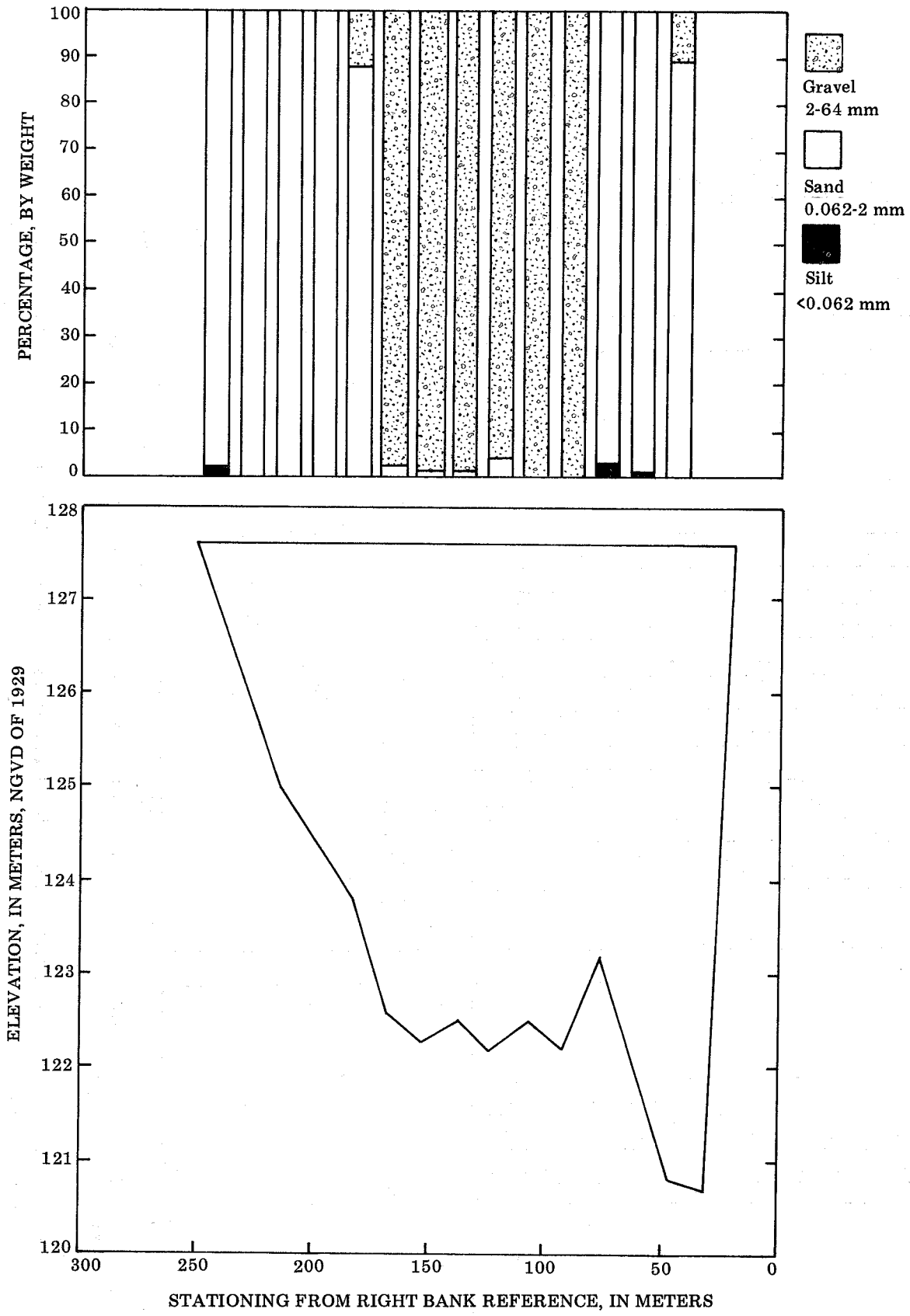


Figure 16.--Cross-channel particle-size distribution of bed material, Tanana River at Byers Island, north channel, July 30, 1981.

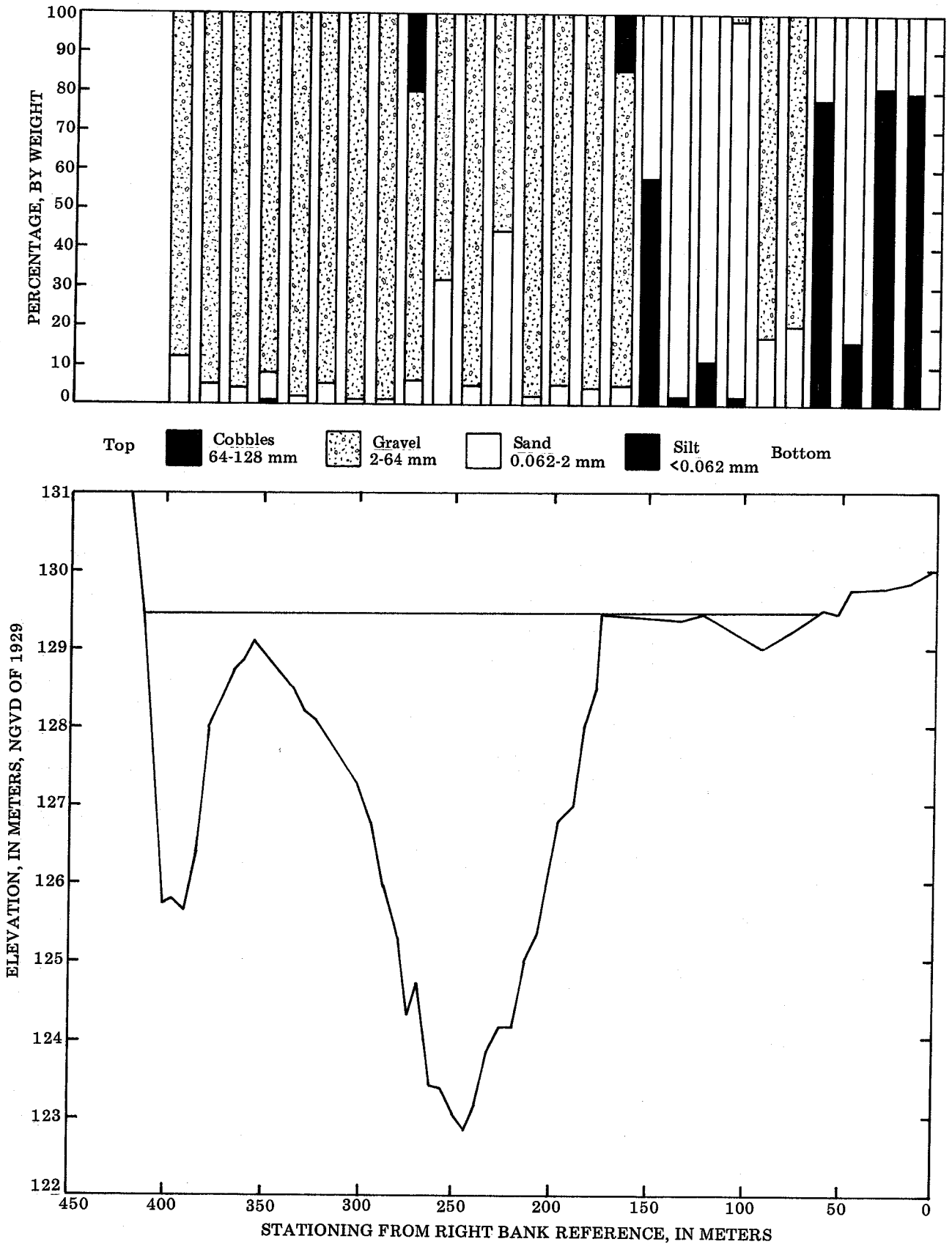


Figure 17.--Cross-channel particle-size distribution of bed material, Tanana River at Fairbanks, July 17, 1980.

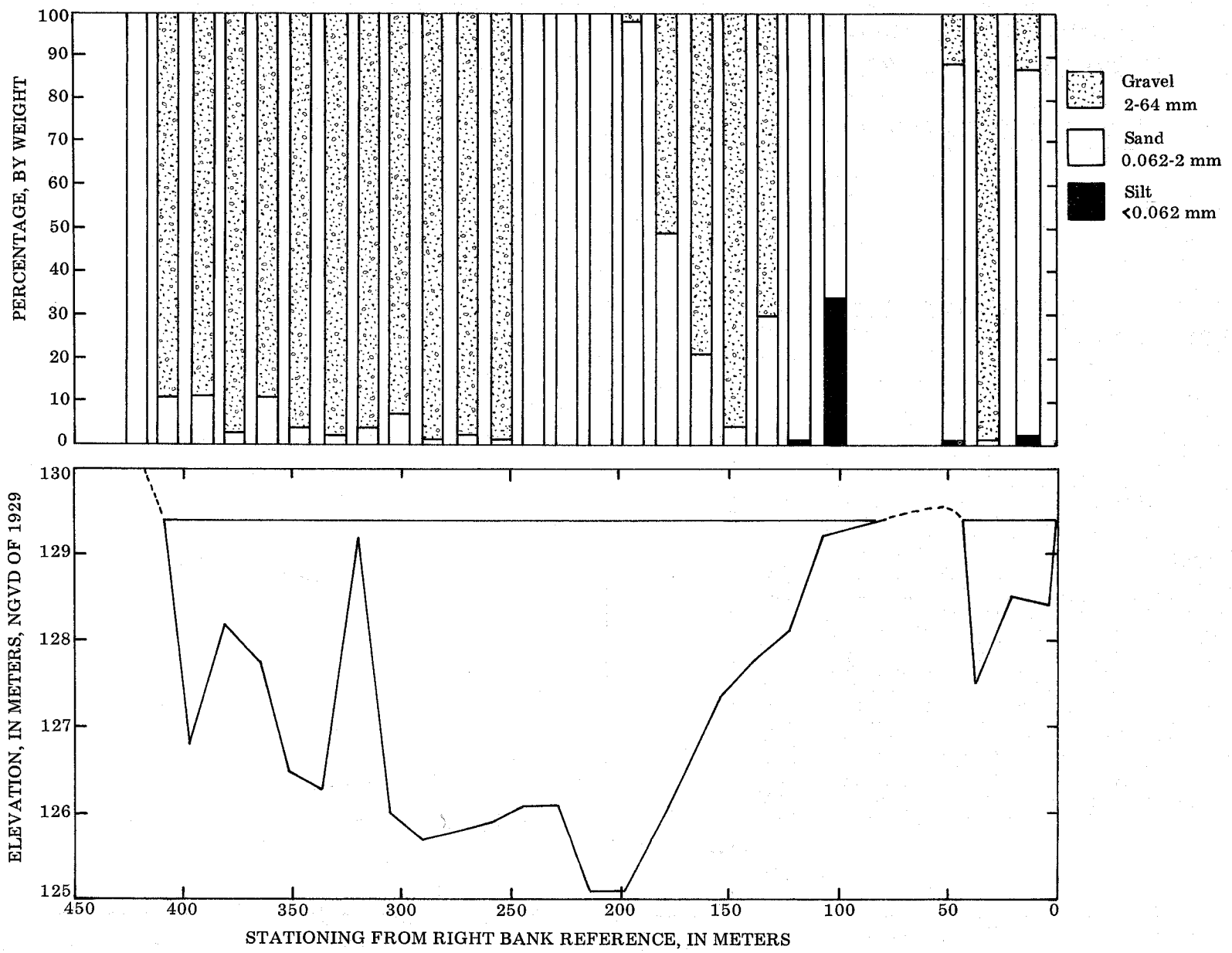


Figure 18.--Cross-channel particle-size distribution of bed material, Tanana River at Fairbanks, August 5, 1981.

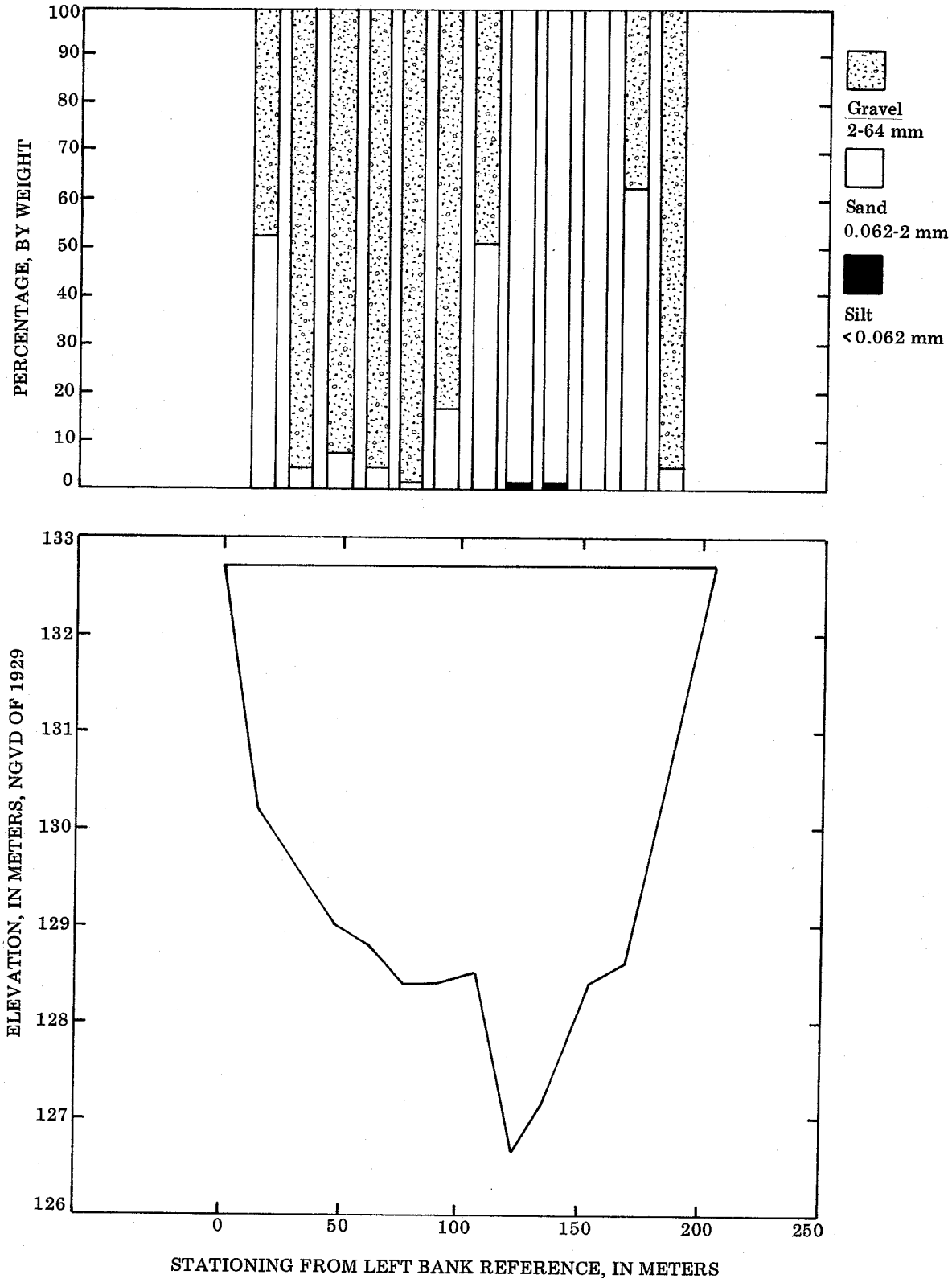


Figure 19.--Cross-channel particle-size distribution of bed material, Tanana River at lower end Goose Island, July 18, 1980.

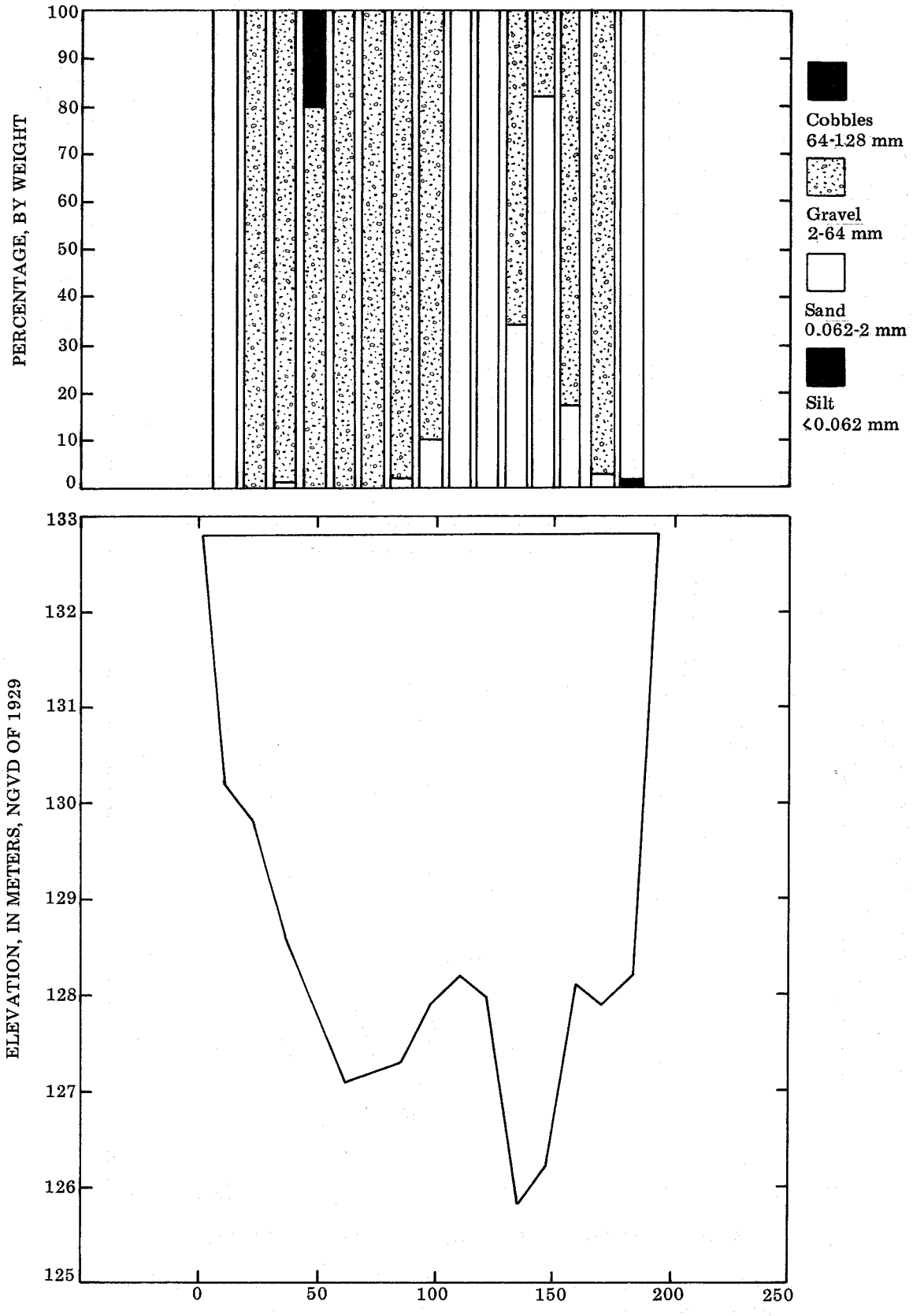


Figure 20.--Cross-channel particle-size distribution of bed material, Tanana River at lower end Goose Island, August 3, 1981.

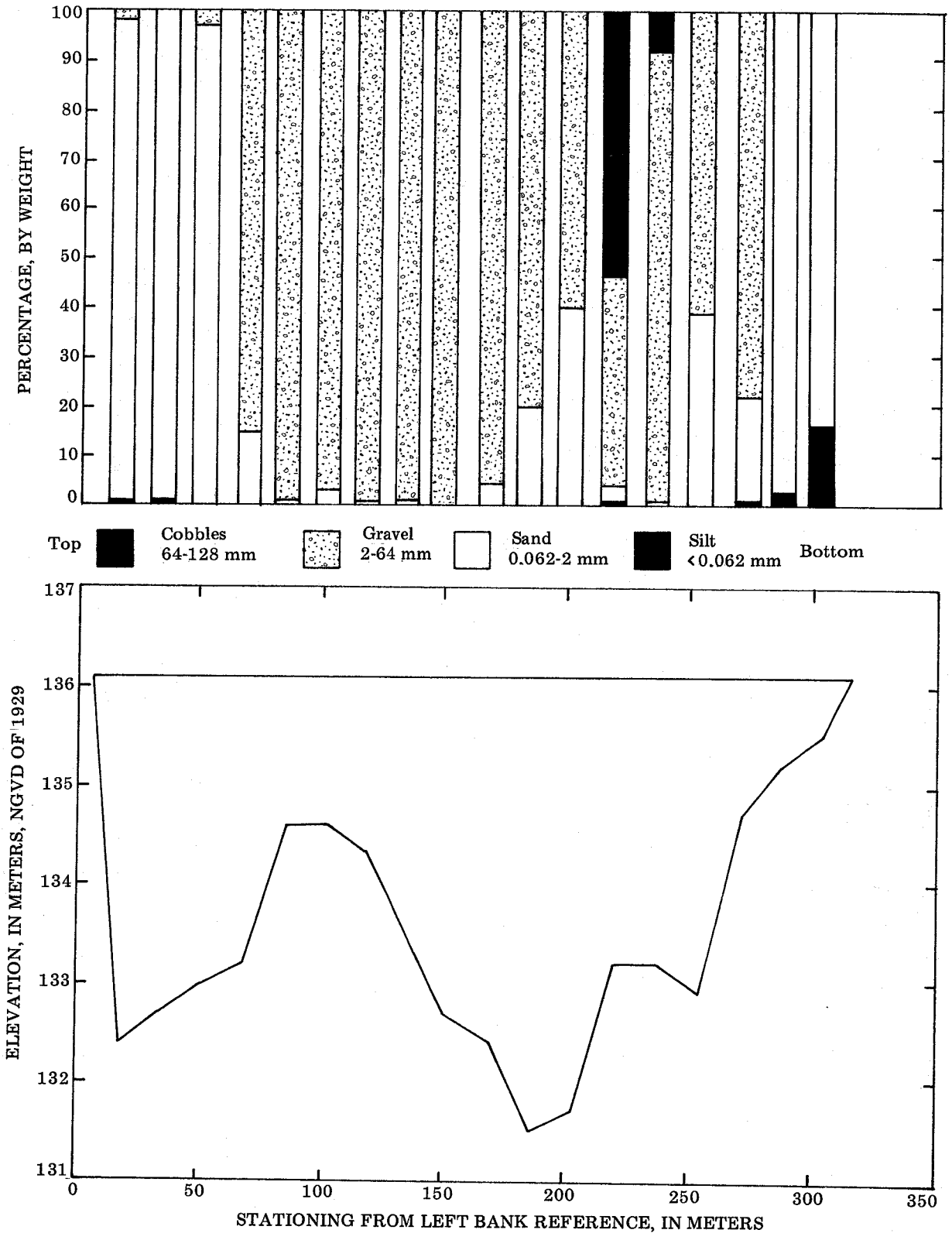


Figure 21.--Cross-channel particle-size distribution of bed material, Tanana River at upper end Goose Island, July 18, 1980.

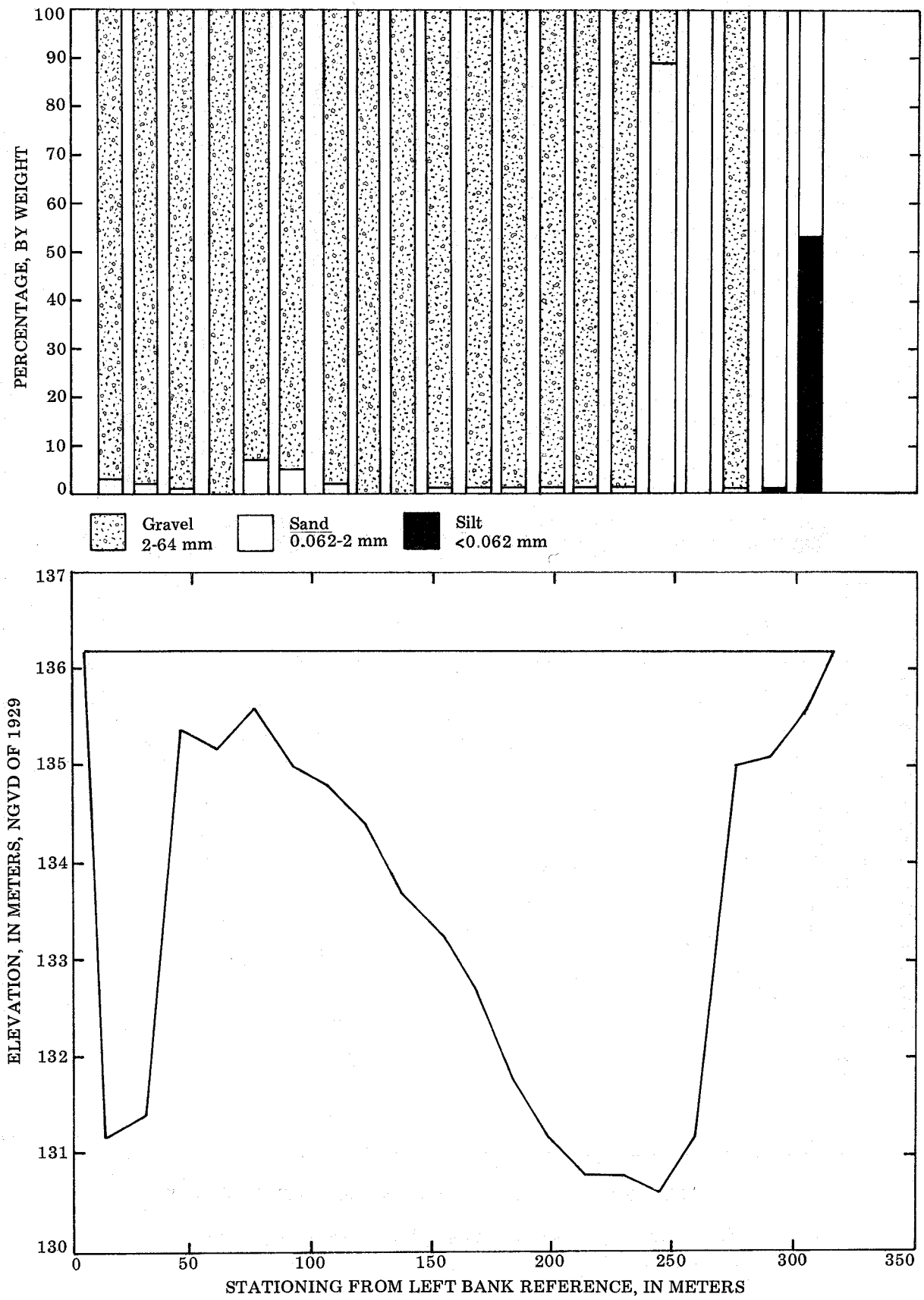


Figure 22.--Cross-channel particle-size distribution of bed material, Tanana River at upper end Goose Island, August 13, 1981.

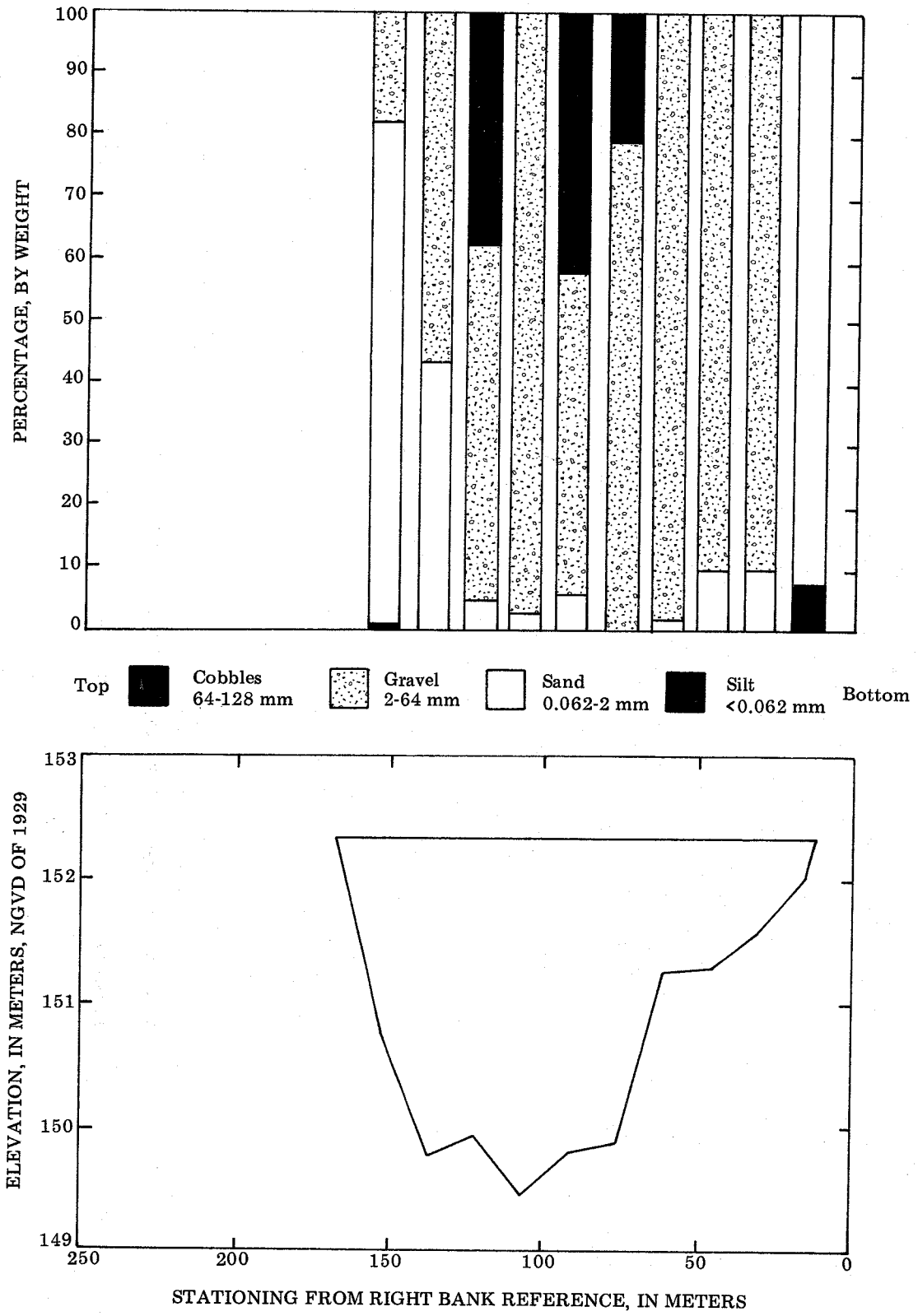


Figure 23.--Cross-channel particle-size distribution of bed material, Tanana River near North Pole, south channel, July 23, 1980.

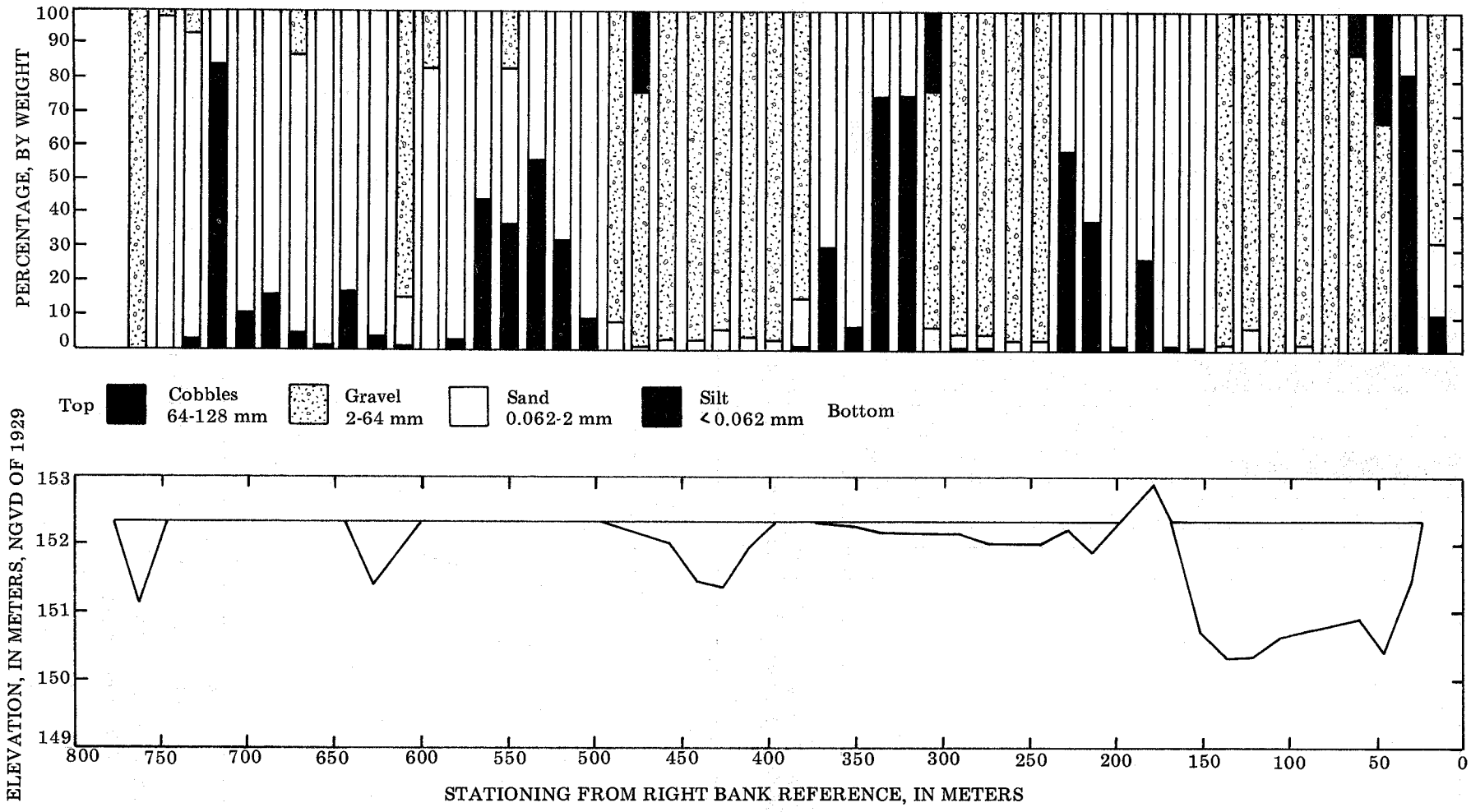


Figure 24.--Cross-channel particle-size distribution of bed material, Tanana River near North Pole, north channel, July 23, 1980.

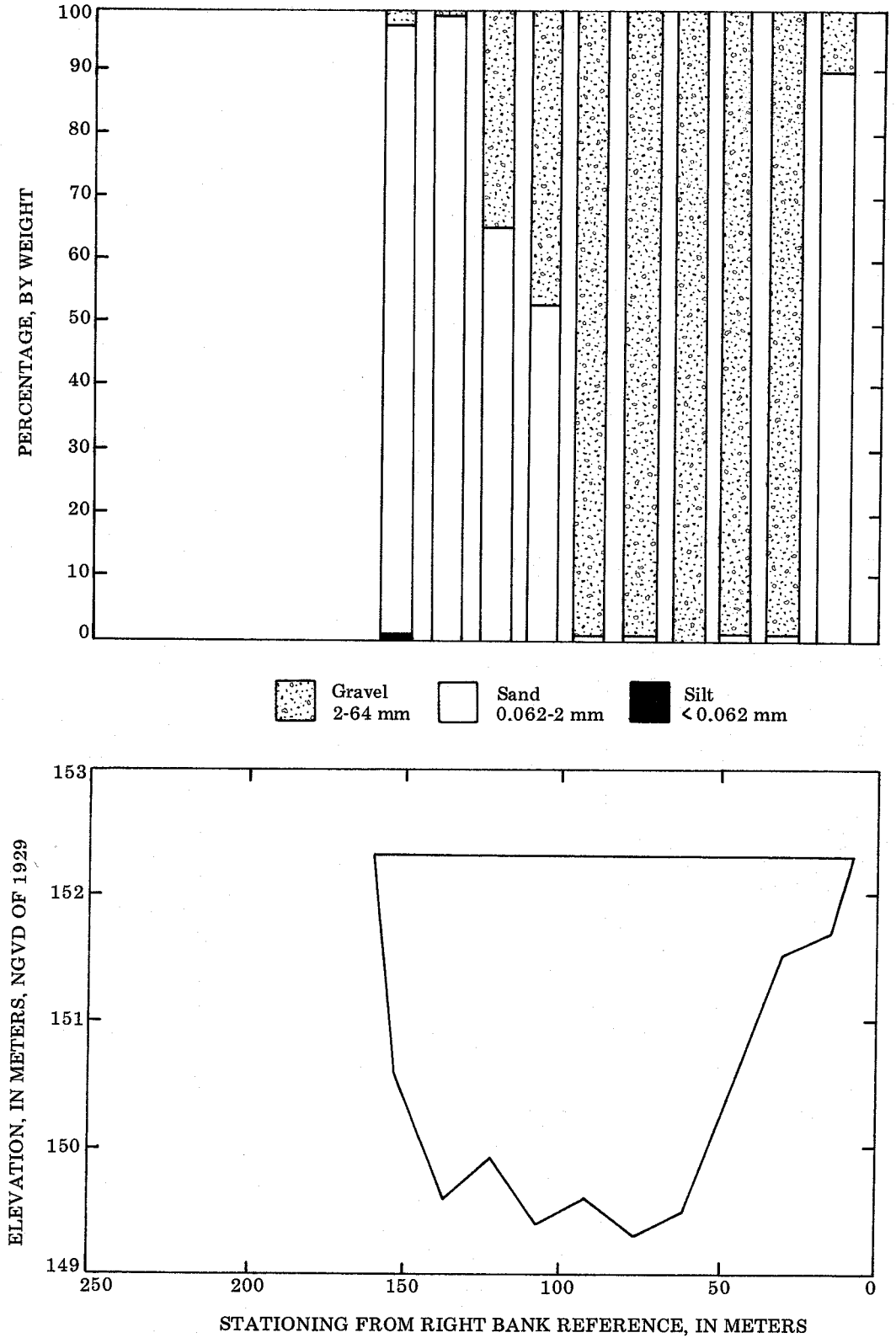


Figure 25.--Cross-channel particle-size distribution of bed material, Tanana River near North Pole, south channel, August 4, 1981.

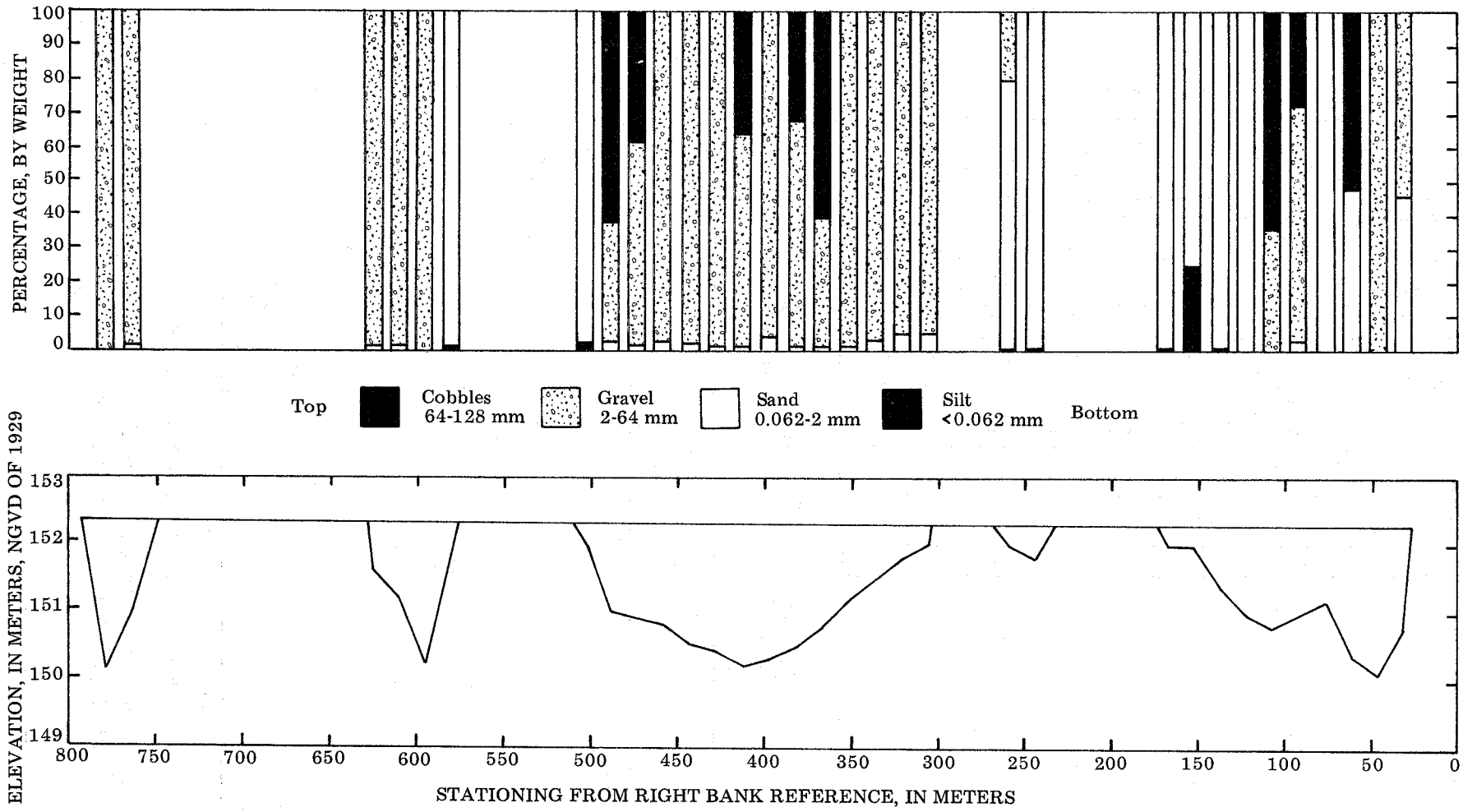


Figure 26.--Cross-channel particle-size distribution of bed material, Tanana River near North Pole, north channel, August 4, 1981.

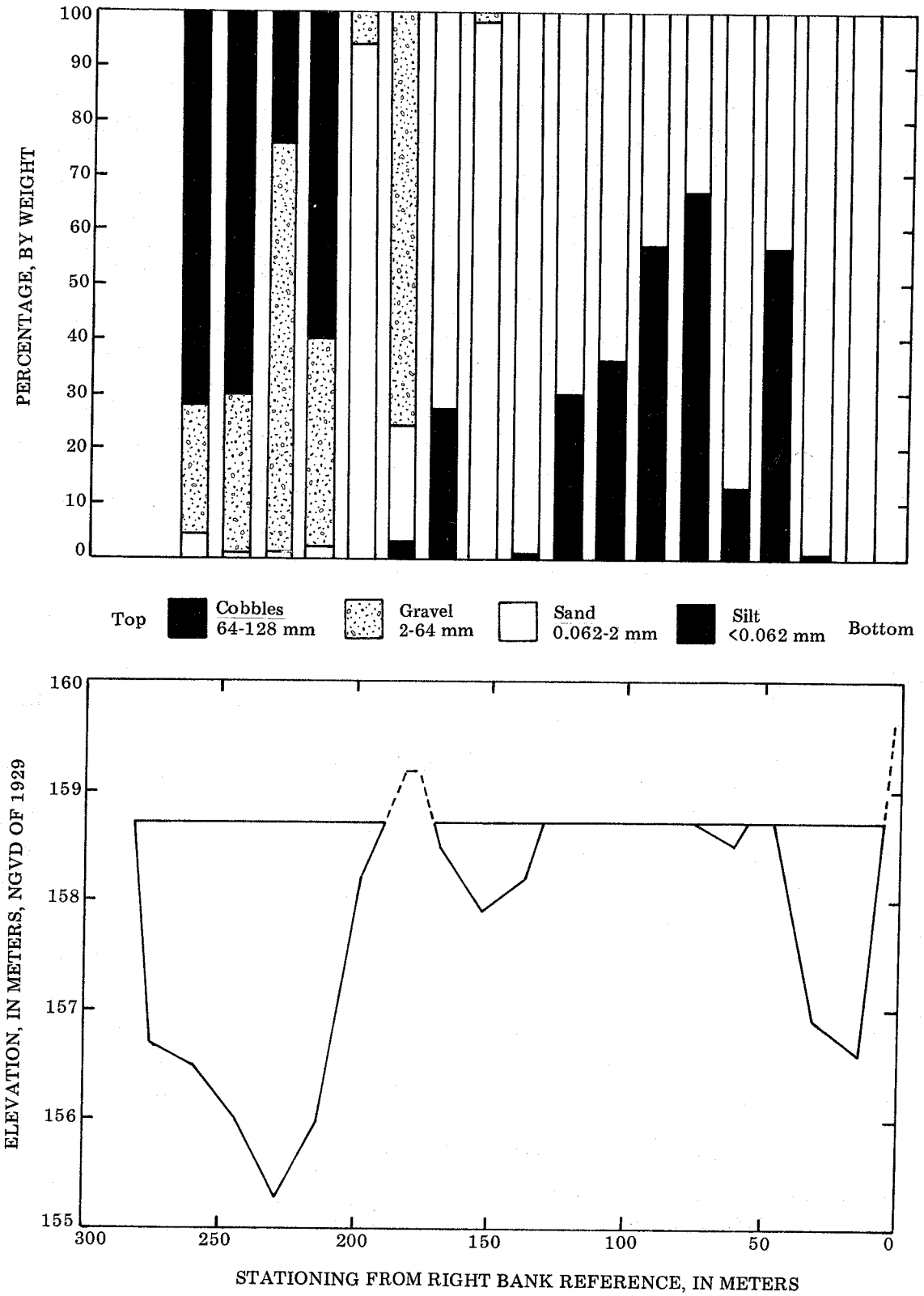


Figure 27.--Cross-channel particle-size distribution of bed material, Tanana River above Chena River Floodway, south channel, August 5, 1980.

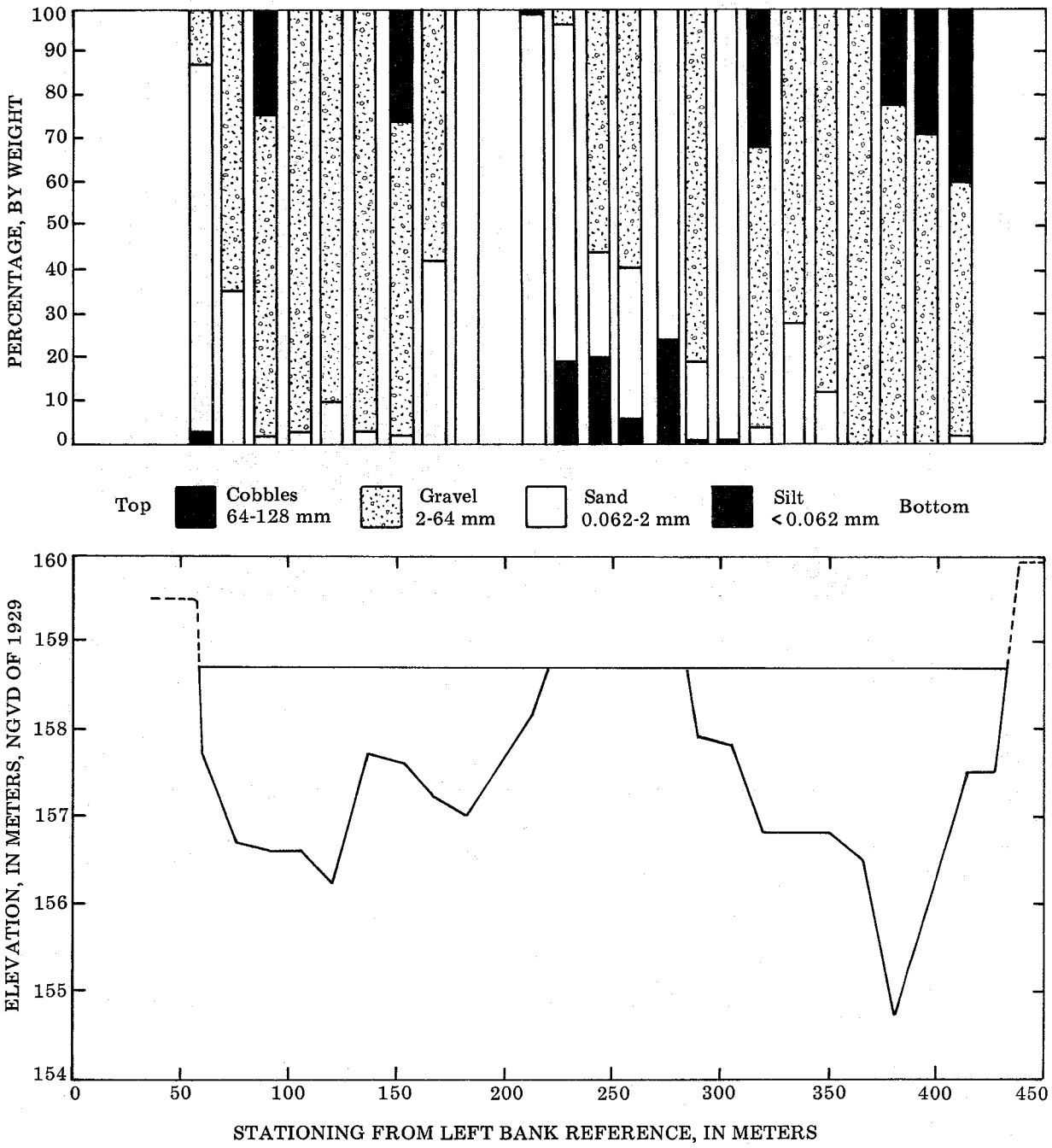


Figure 28.--Cross-channel particle-size distribution of bed material, Tanana River above Chena River Floodway, north channel, August 5, 1980.

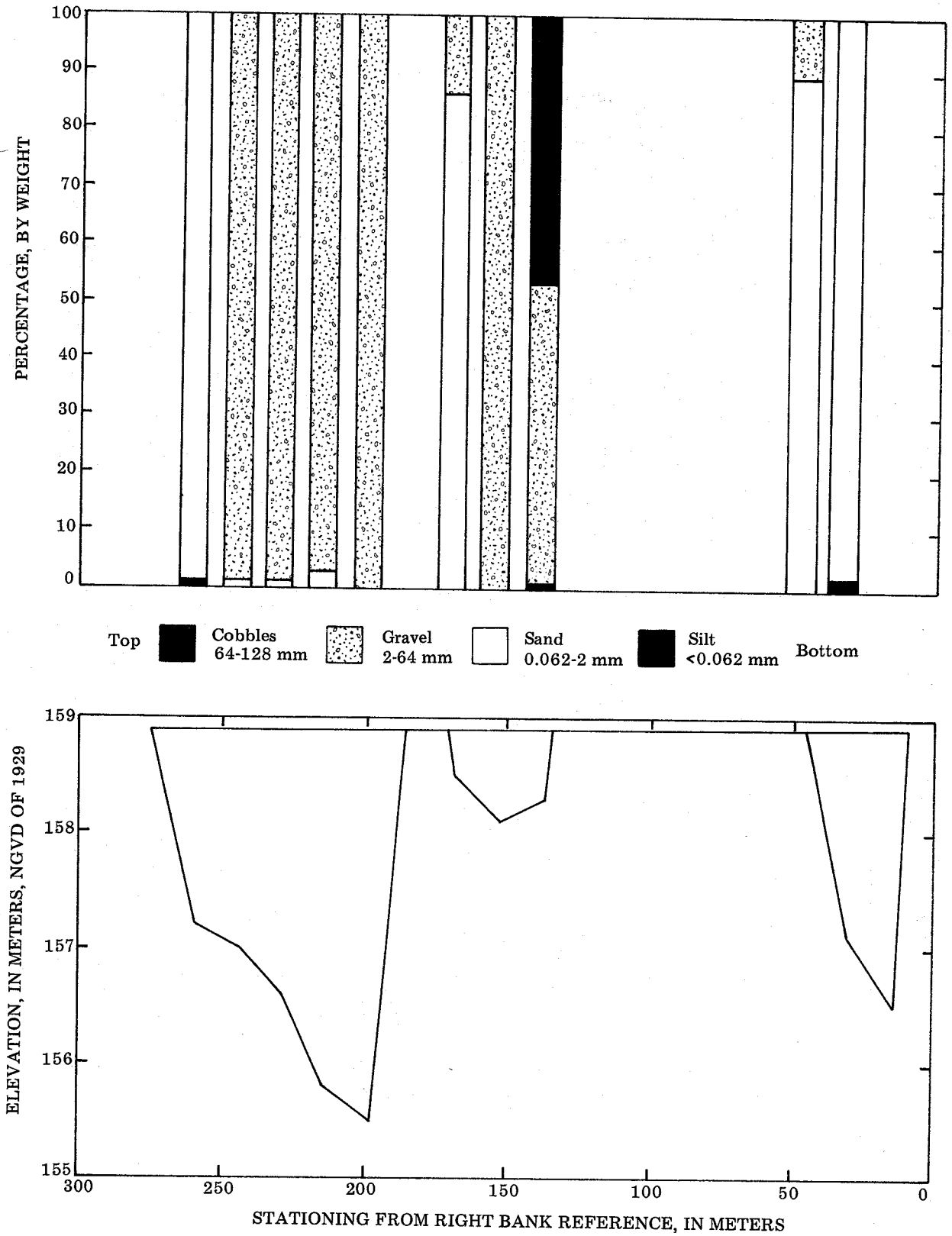


Figure 29.--Cross-channel particle-size distribution of bed material, Tanana River above Chena River Floodway, south channel, August 4, 1981.

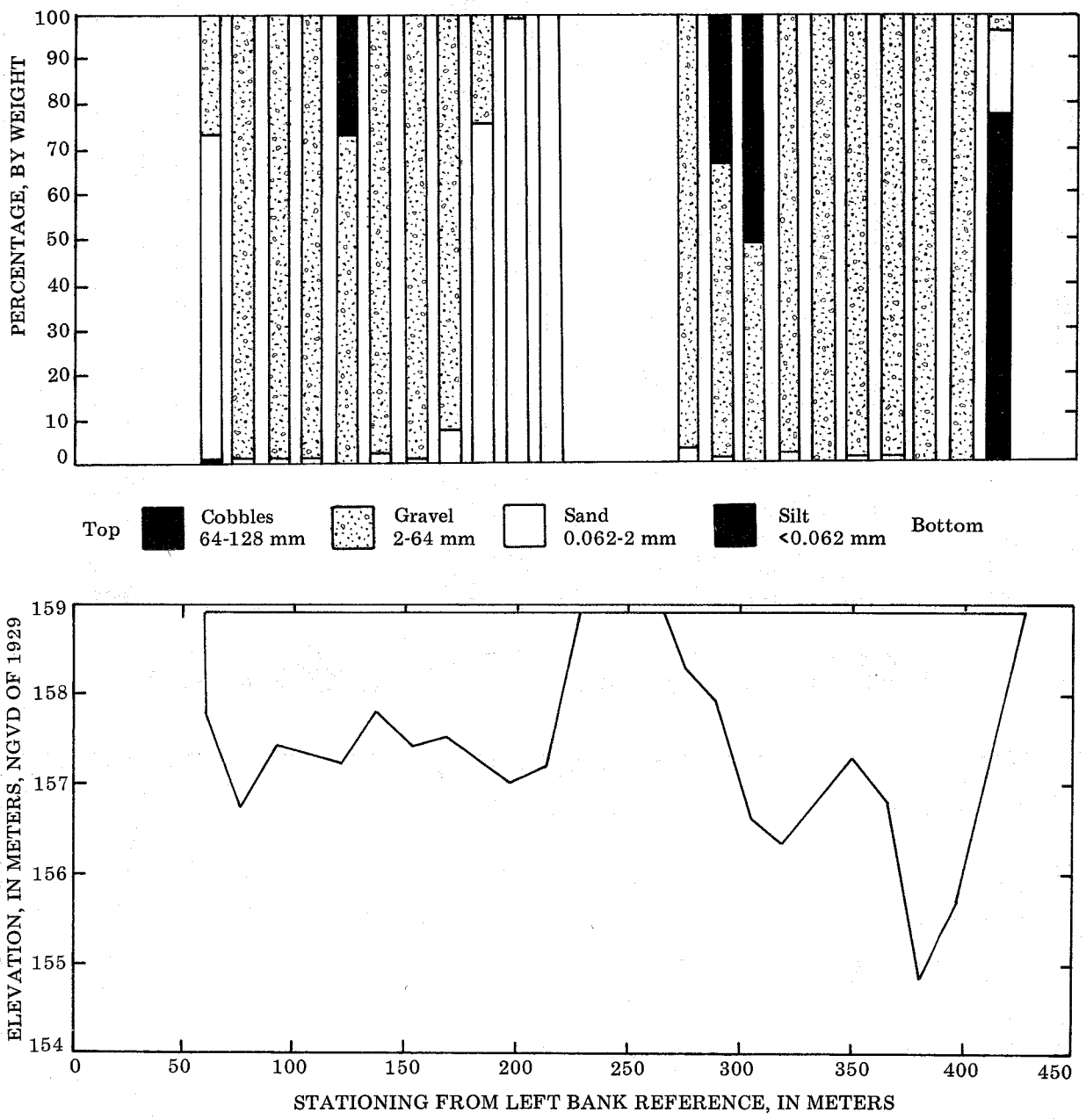


Figure 30.--Cross-channel particle-size distribution of bed material, Tanana River above Chena River Floodway, north channel, August 4, 1981.

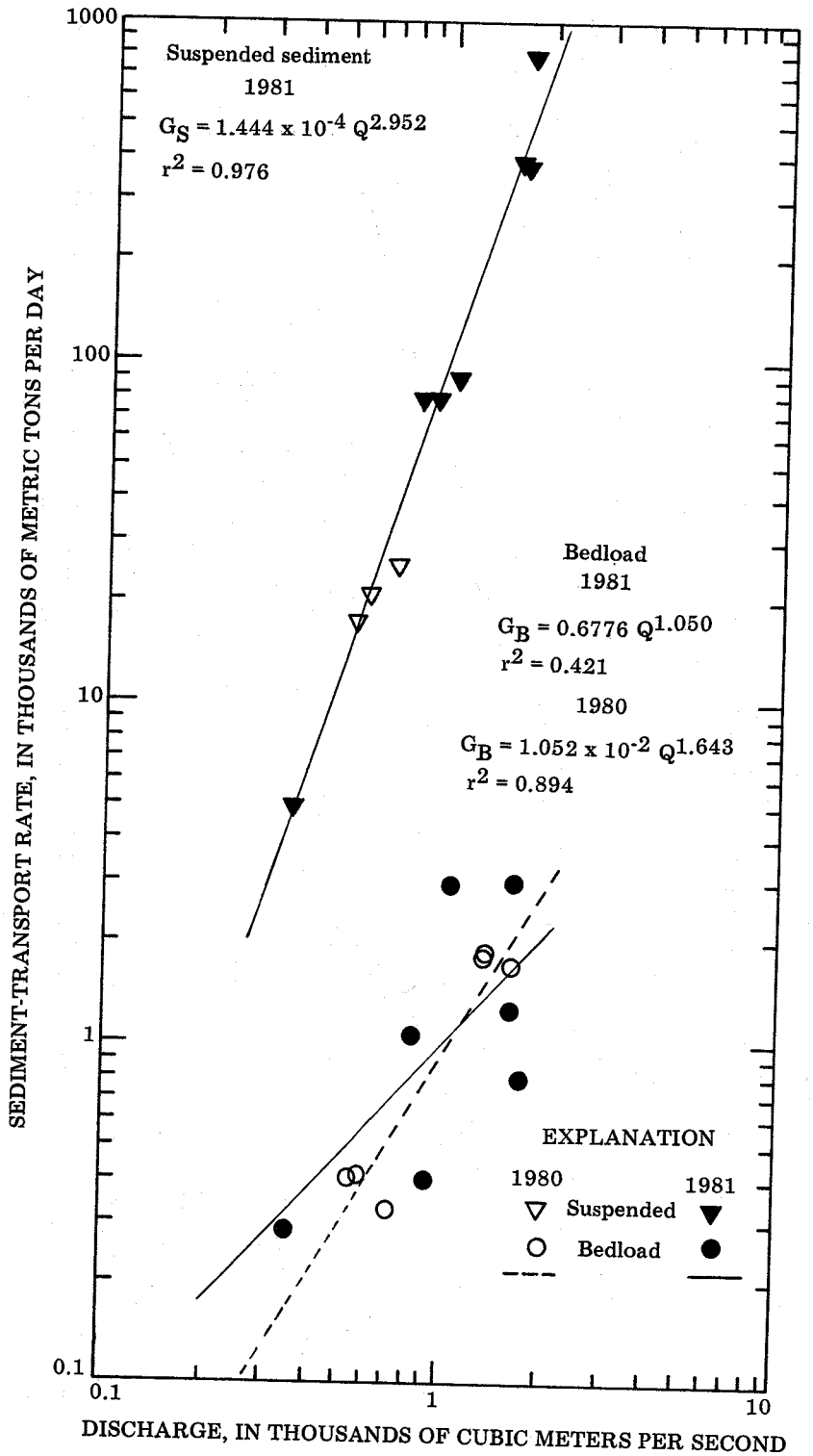


Figure 31.--Sediment-transport rate as a function of discharge, Tanana River at Byers Island near Fairbanks, 1980-1981.

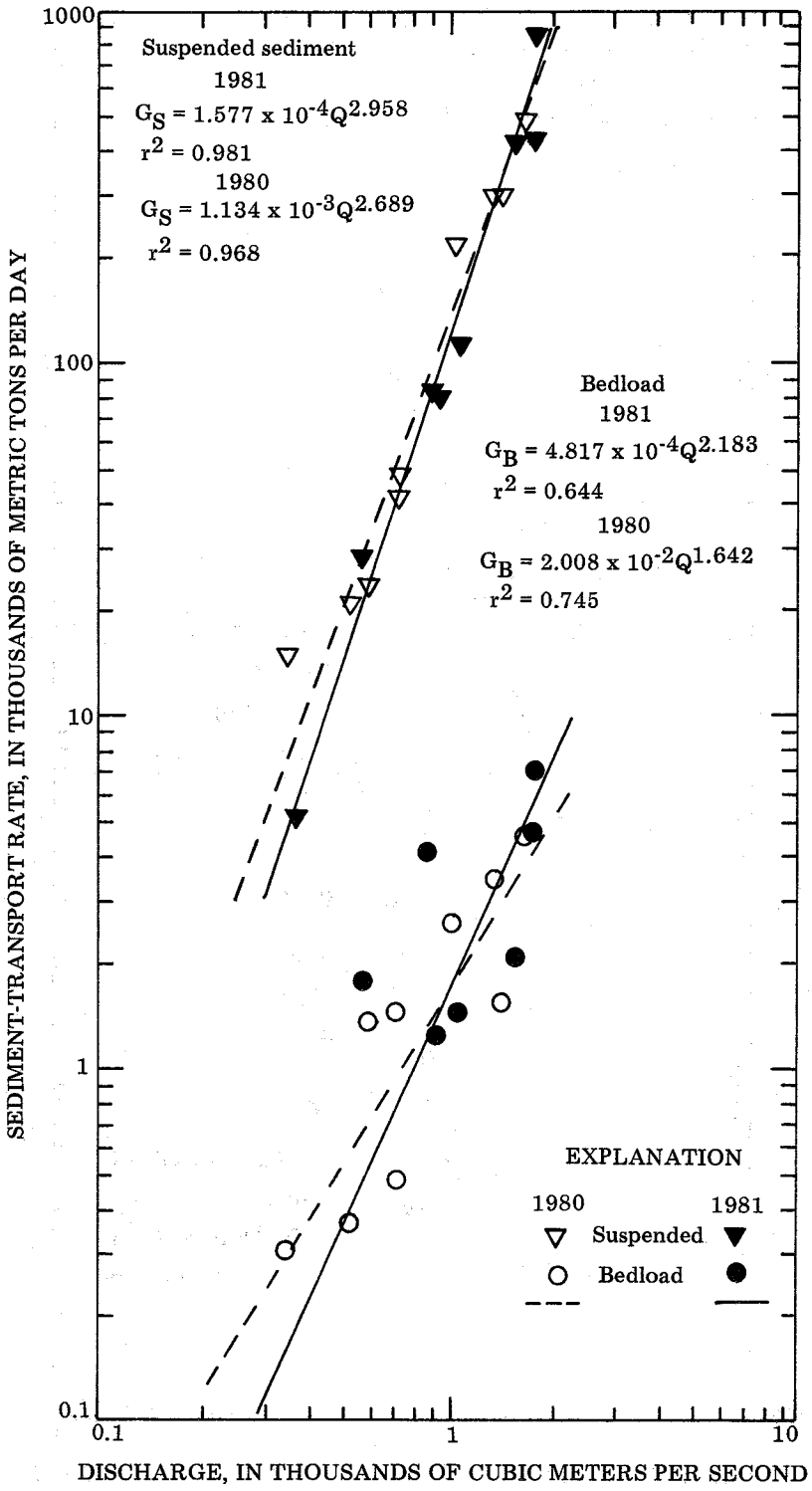


Figure 32.--Sediment-transport rate as a function of discharge, Tanana River at Fairbanks, 1980-1981.

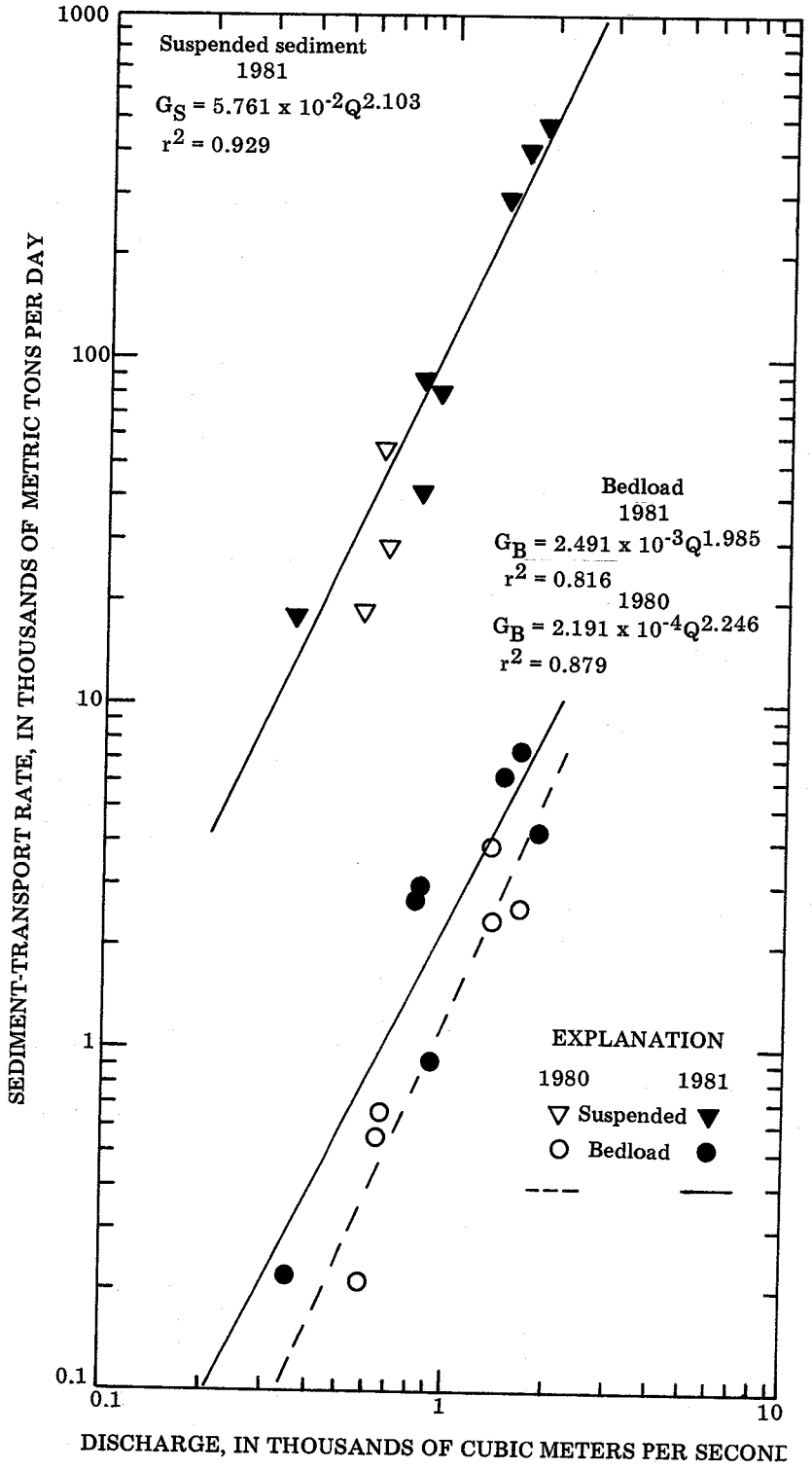


Figure 33.--Sediment-transport rate as a function of discharge, Tanana River at lower end Goose Island, 1980-198

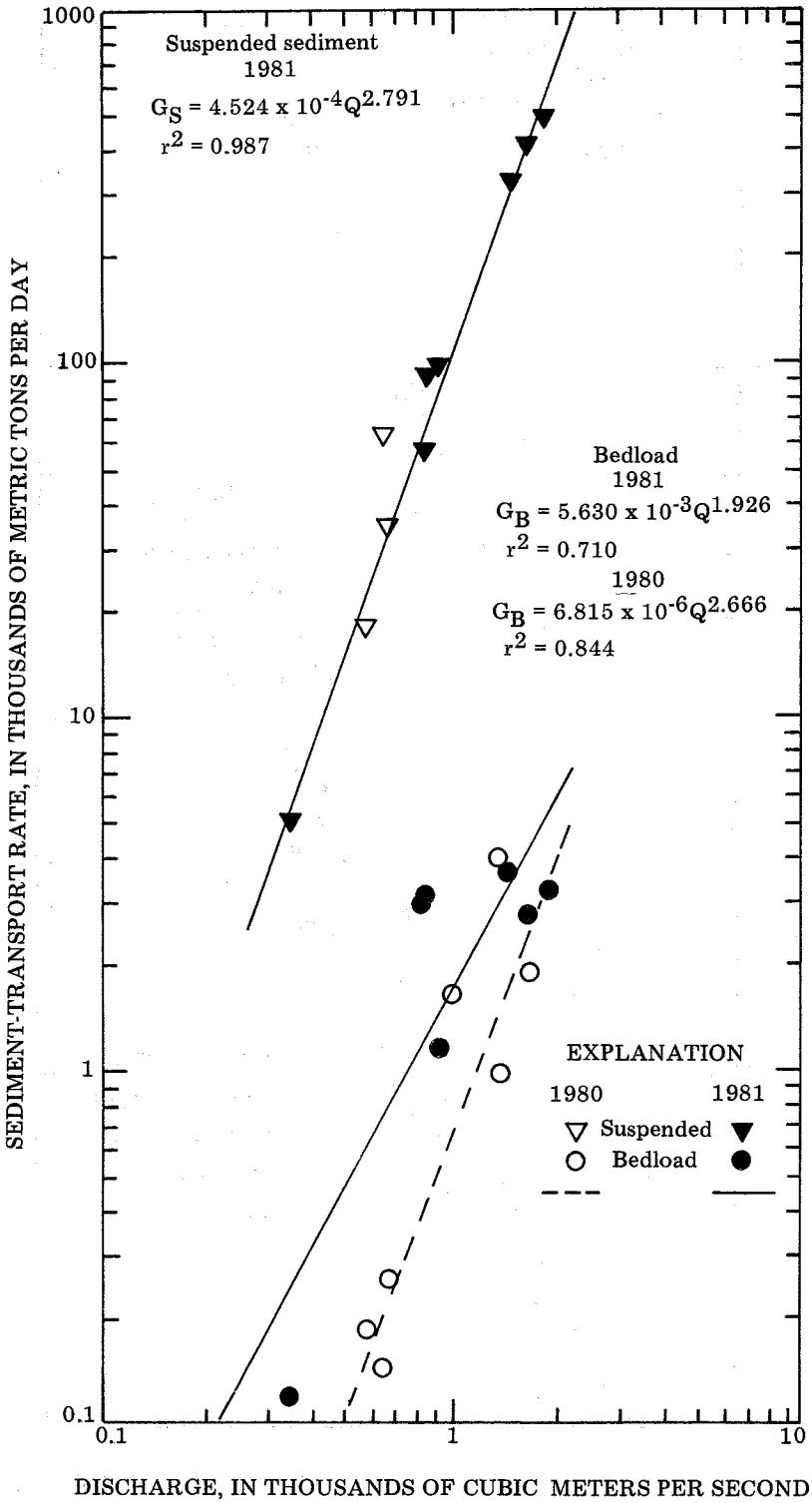


Figure 34.--Sediment-transport rate as a function of discharge, Tanana River at upper end Goose Island, 1980-1981.

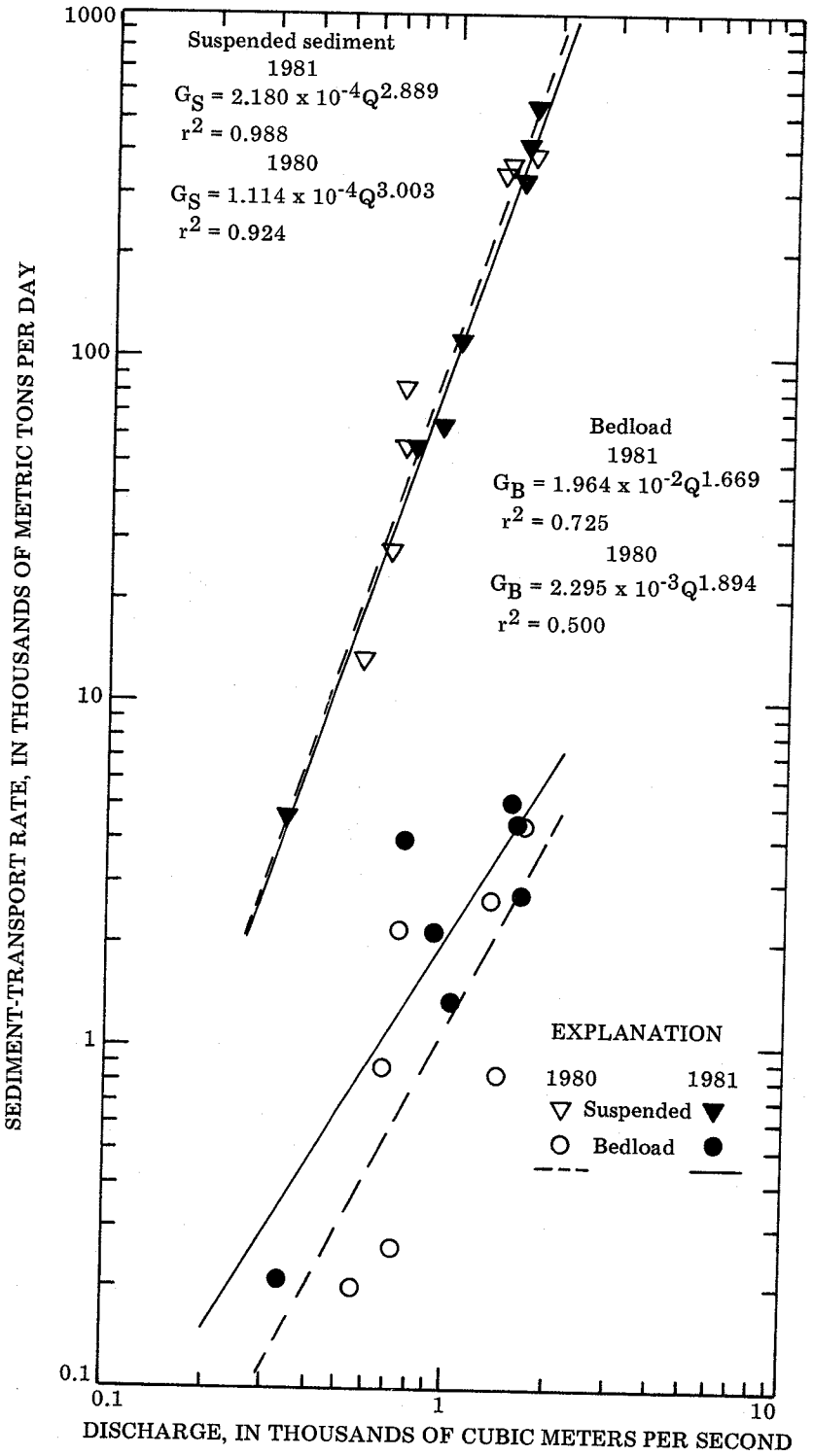


Figure 35.--Sediment-transport rate as a function of discharge, Tanana River near North Pole, 1980-1981.

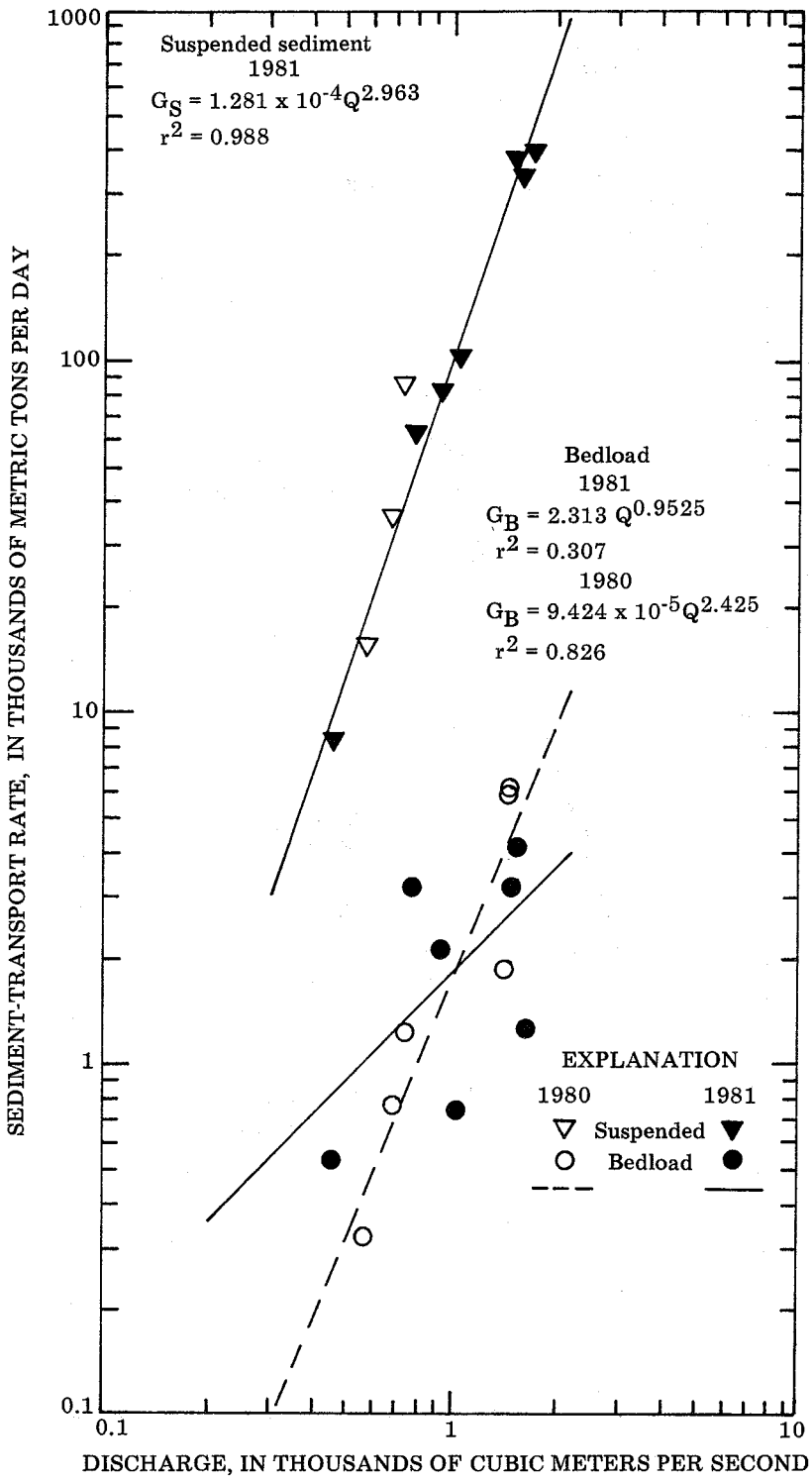


Figure 36.--Sediment-transport rate as a function of discharge, Tanana River above Chena River Floodway, 1980-1981.

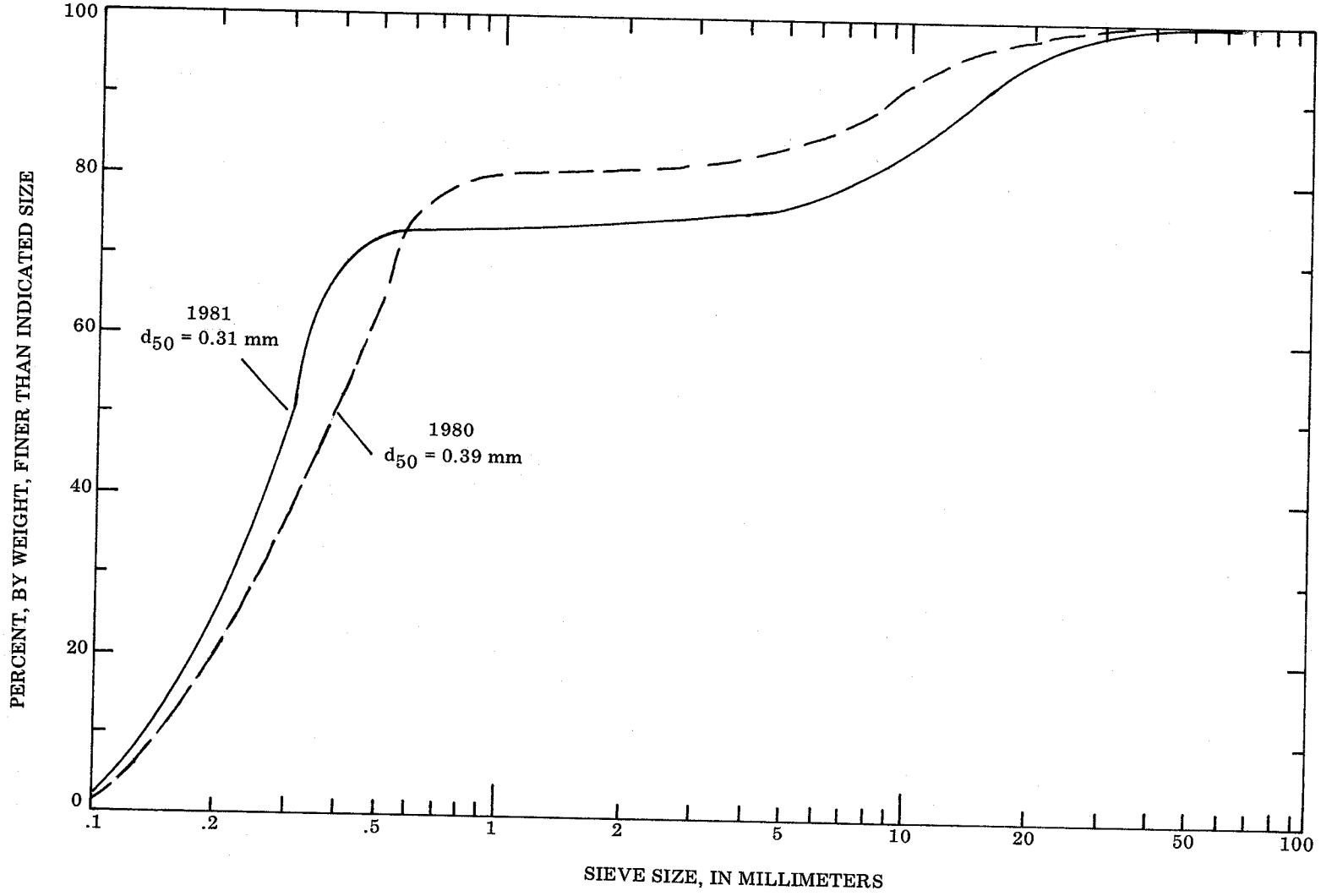


Figure 37.--Particle-size distribution of bedload; comparison of 1980 and 1981 for Tanana River at Byers Island.

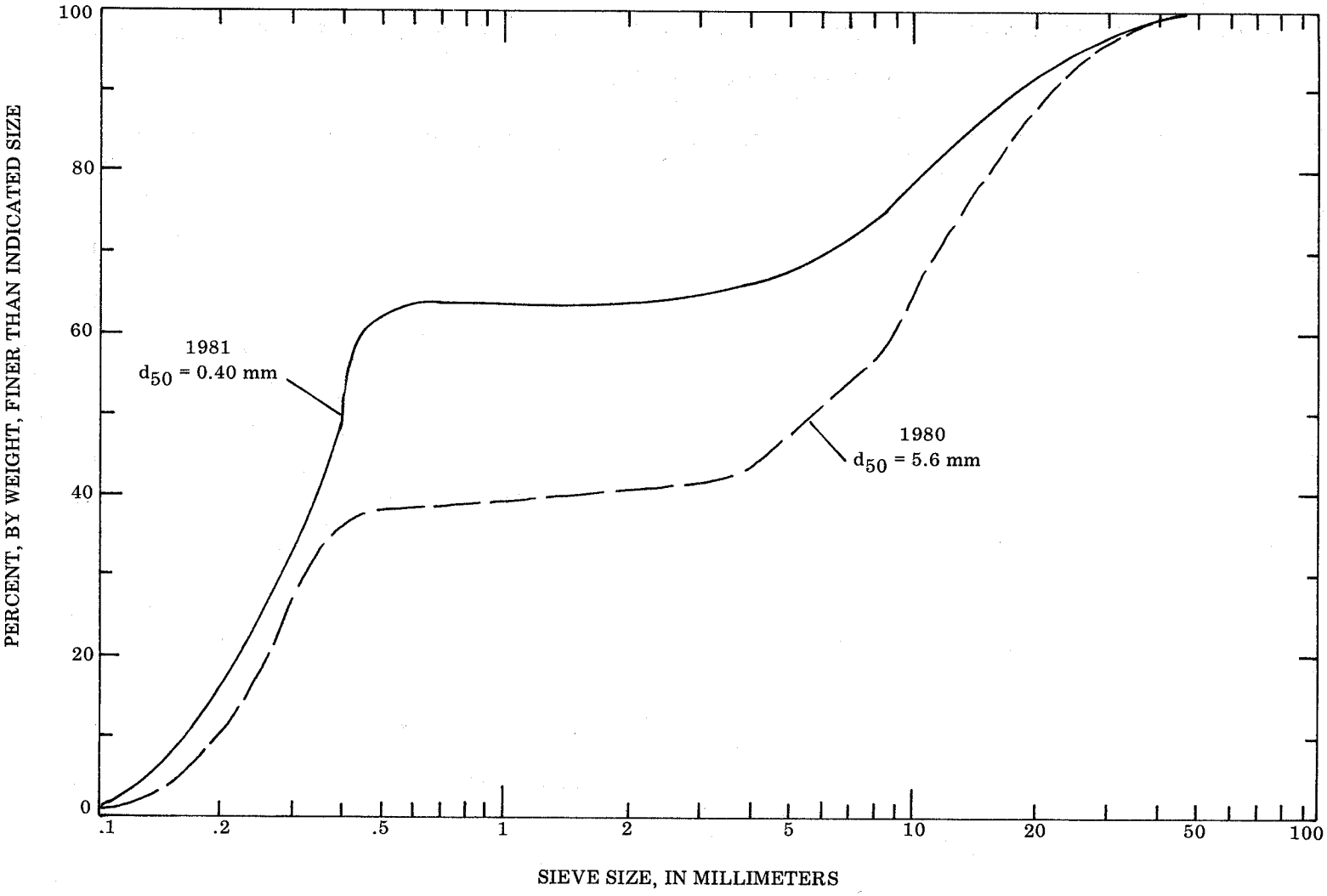


Figure 38.--Particle-size distribution of bedload; comparison of 1980 and 1981 for Tanana River at Fairbanks.

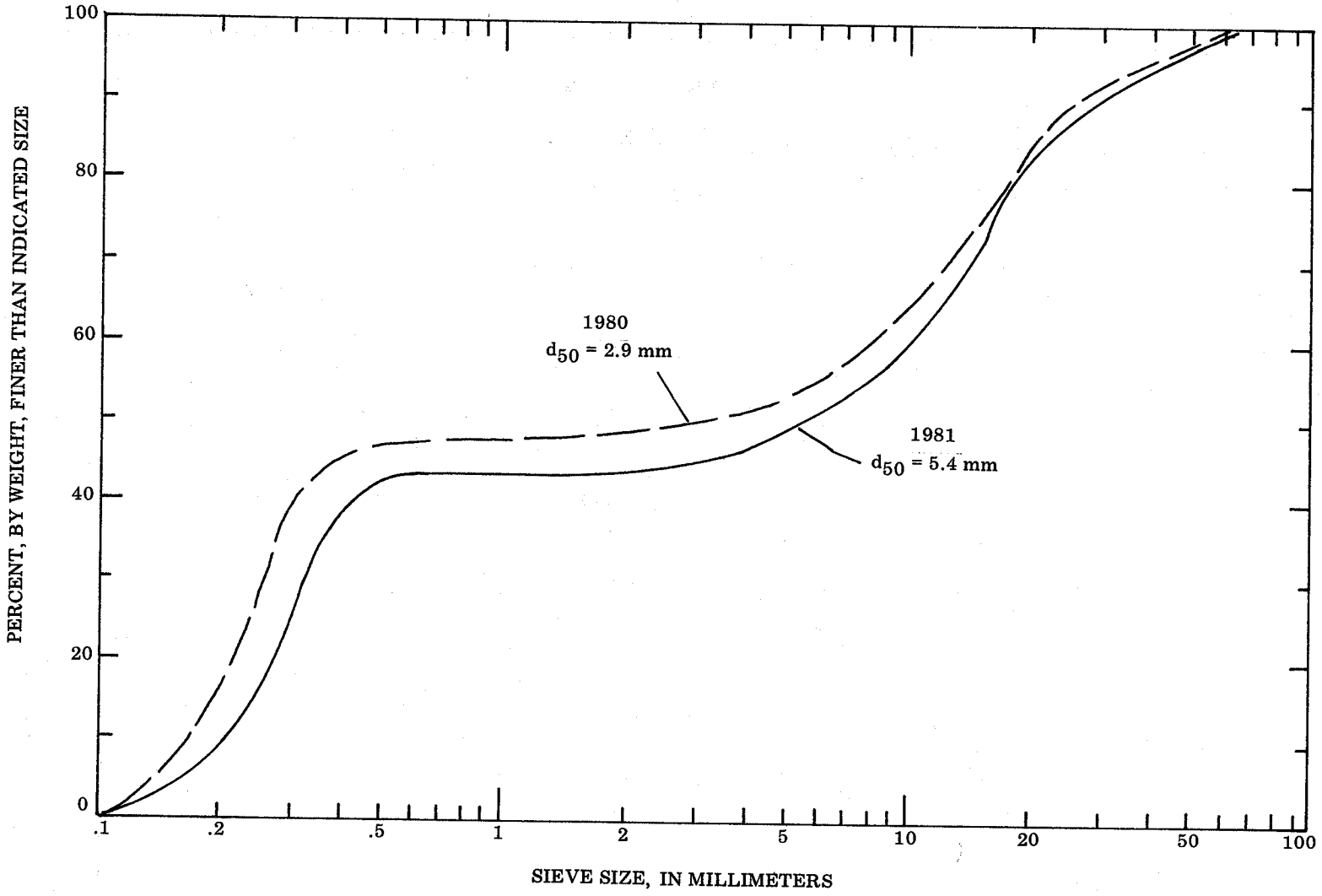


Figure 39.--Particle-size distribution of bedload; comparison of 1980 and 1981 for Tanana River at lower end Goose Island.

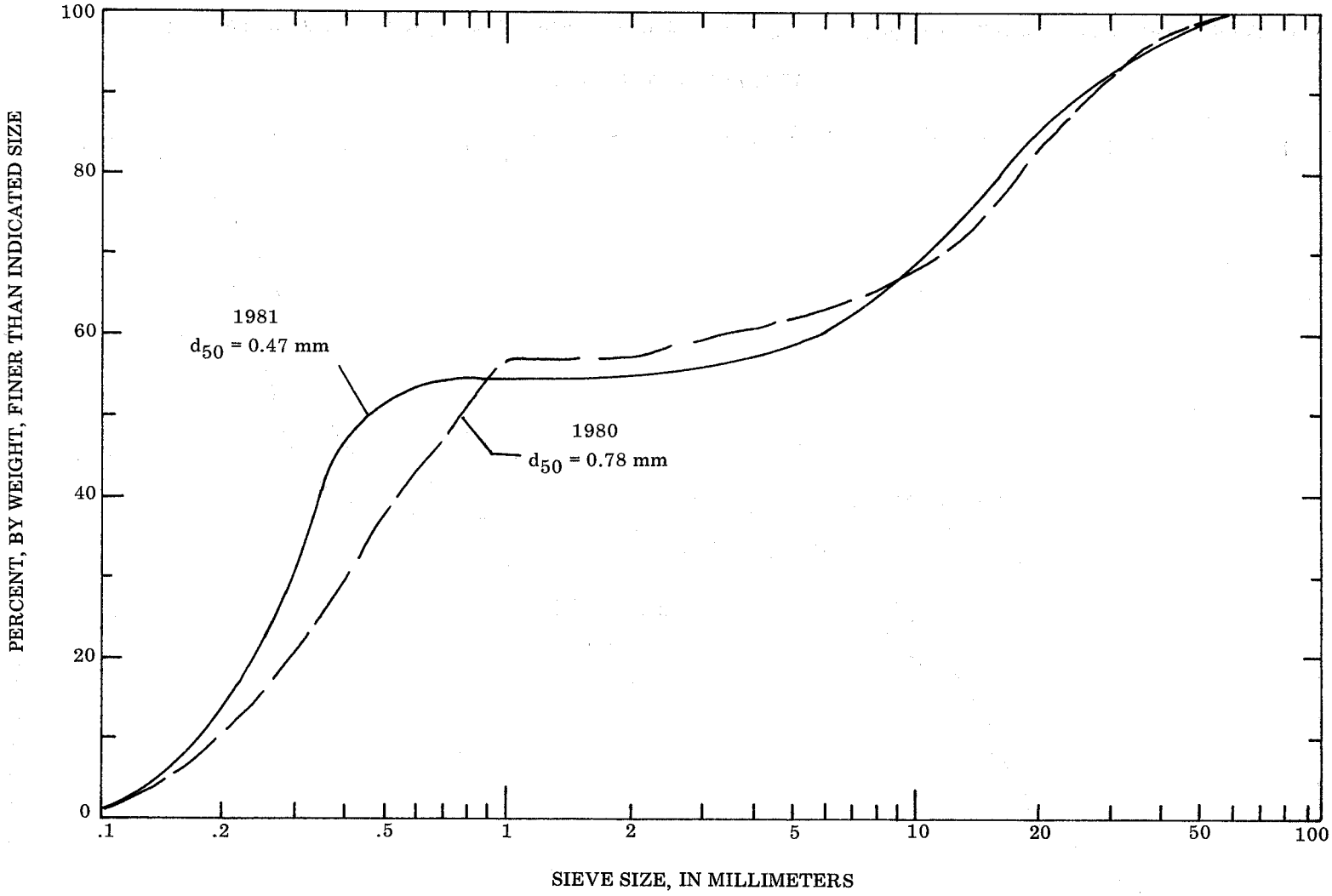


Figure 40.--Particle-size distribution of bedload, comparison of 1980 and 1981 for Tanana River at upper end Goose Island.

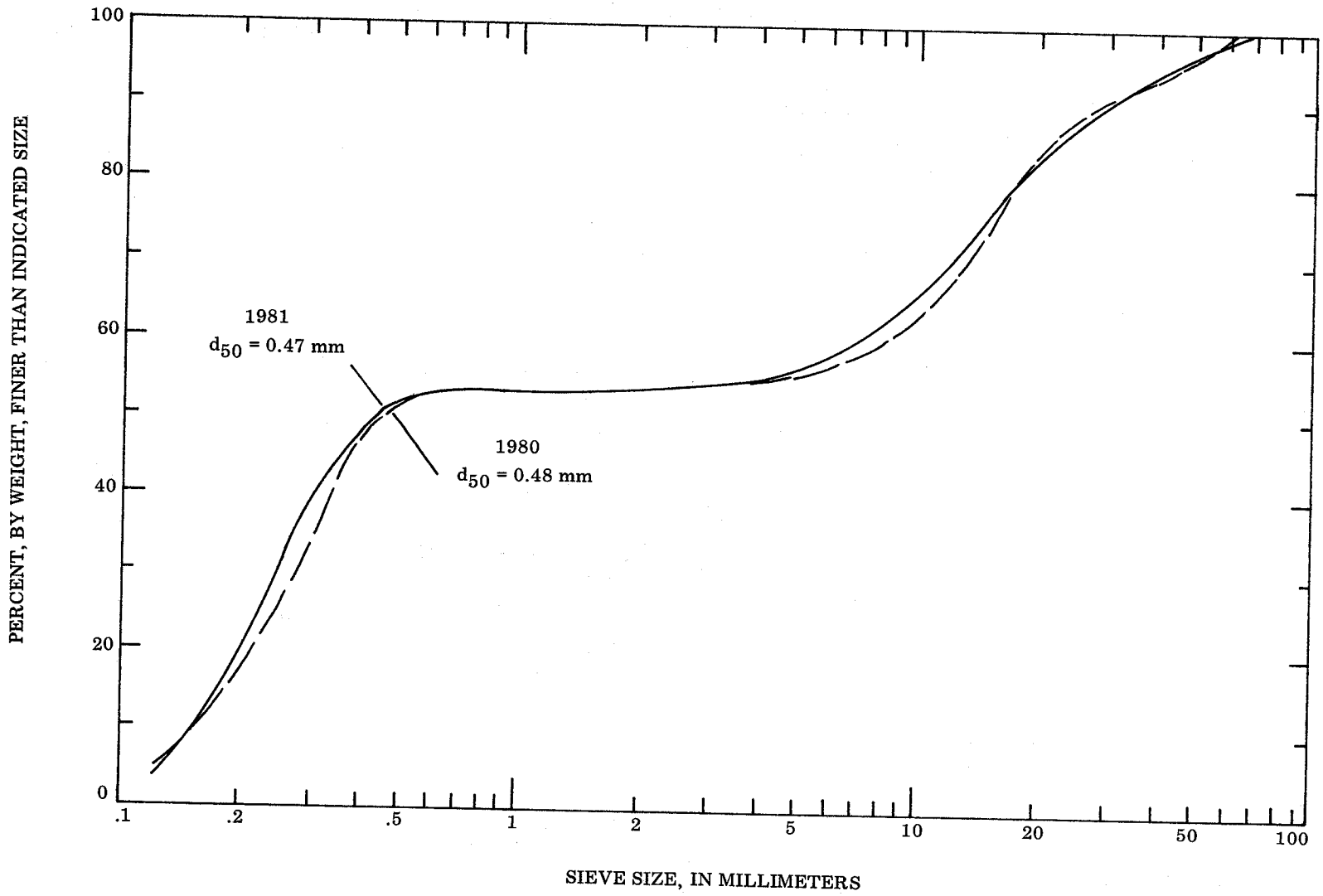


Figure 41.--Particle-size distribution of bedload; comparison of 1980 and 1981 for Tanana River near North Pole.

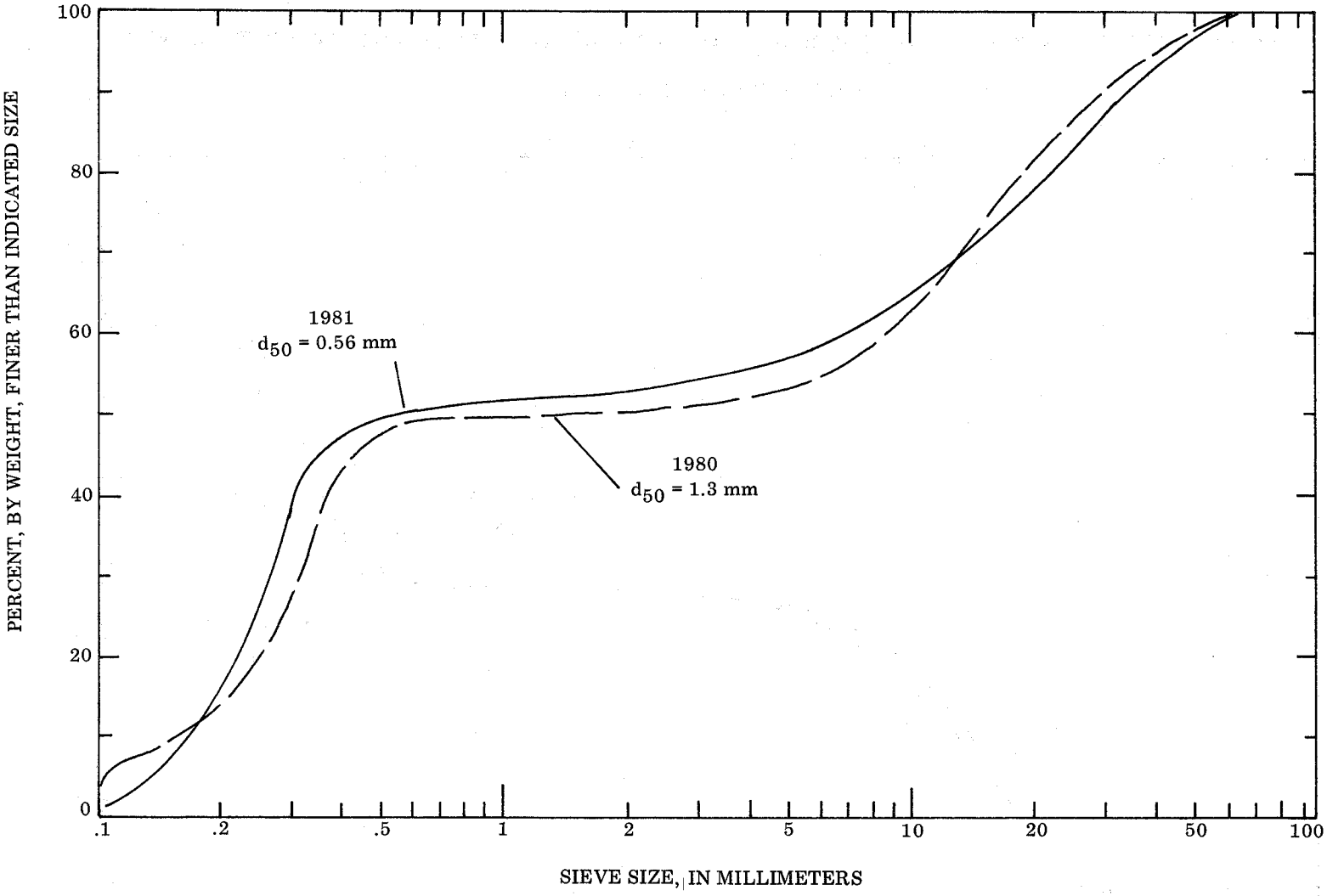


Figure 42.--Particle-size distribution of bedload; comparison of 1980 and 1981 for Tanana River above Chena River Floodway.

Table 1.--Summary of discharge measurements made during period of sediment sampling, Tanana River at Fairbanks

Date	Gage height (m)	Discharge (m^3/s)	Flow area (m^2)	Surface width (m)	Mean velocity (m/s)	Mean depth (m)
6-18-80	8.742	1,010	649	296	1.556	2.193
6-25-80	8.415	711	560	282	1.270	1.986
7-15-80	9.120	1,400	801	320	1.748	2.503
7-30-80	9.415	1,640	901	313	1.820	2.879
[1]8-11-80	9.204	1,340	---	---	---	---
[1]9-03-80	8.577	714	---	---	---	---
[1]9-16-80	8.382	532	---	---	---	---
10-07-80	8.361	586	385	169	1.522	2.278
10-23-80	7.705	345	215	107	1.605	2.009
5-22-81	8.409	558	355	177	1.572	2.006
6-18-81	8.754	864	490	284	1.763	1.725
6-30-81	8.967	1,070	595	284	1.798	2.095
7-13-81	9.485	1,760	939	406	1.874	2.313
7-29-81	9.449	1,720	939	378	1.832	2.484
8-13-81	9.373	1,530	921	357	1.661	2.580
9-03-81	8.857	920	601	294	1.531	2.044
10-06-81	8.129	348	352	247	.9886	1.425

[1]Discharge measurement made at Tanana River at upper end Goose Island; gage height from gaging station.

Table 2.--Values of daily mean discharge, 1980 water year, Tanana River at Fairbanks

[Winter flow period, November through April, estimated based on periodic discharge measurements, climatological records, and correlation with data obtained for Tanana River at Nenana.]

	Mean daily discharge, in cubic meters per second, water year October 1979 to September 1980											
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	513	227	170	125	122	119	119	496	685	1190	1450	773
2	496	227	170	125	122	119	122	481	668	1370	1390	745
3	493	227	170	125	122	119	122	459	649	1340	1300	722
4	487	227	170	125	122	119	125	462	634	1250	1220	697
5	473	227	170	125	122	119	125	479	680	1210	1180	666
6	462	227	170	125	122	119	127	496	753	1190	1210	629
7	456	227	170	125	122	119	127	501	850	1180	1210	617
8	436	198	170	125	122	119	130	515	926	1190	1250	603
9	425	198	170	125	122	119	133	544	954	1190	1360	578
10	419	198	142	125	122	119	136	569	903	1230	1390	549
11	442	198	142	125	119	119	139	569	878	1260	1380	530
12	445	198	142	125	119	119	142	558	895	1280	1460	513
13	442	198	142	125	119	119	147	515	915	1350	1420	504
14	430	198	142	125	119	119	153	501	901	1410	1420	504
15	416	198	142	125	119	119	159	498	878	1380	1420	507
16	402	198	127	125	119	119	164	498	875	1360	1400	547
17	385	198	127	125	119	119	170	501	875	1380	1400	643
18	368	198	127	125	119	119	184	507	1010	1420	1400	722
19	340	198	127	125	119	119	193	513	1250	1410	1400	728
20	340	198	127	125	119	119	198	507	1160	1340	1280	756
21	312	198	127	122	119	119	210	501	997	1330	1200	835
22	312	198	127	122	119	119	221	498	903	1330	1140	872
23	312	170	127	122	119	119	232	501	838	1290	1070	869
24	283	170	127	122	119	119	249	507	765	1250	994	830
25	283	170	127	122	119	119	266	507	731	1260	932	782
26	283	170	127	122	119	119	283	513	728	1300	895	739
27	255	170	127	122	119	119	312	513	716	1330	884	705
28	255	170	127	122	119	119	340	527	773	1410	852	694
29	255	170	127	122	119	119	396	564	867	1650	838	683
30	255	170	127	122	---	119	481	612	1000	1670	810	680
31	255	---	127	122	---	119	---	668	---	1550	787	---

Table 3.--Values of daily mean discharge, 1981 water year, Tanana River at Fairbanks

[Winter flow period, November through April, estimated based on periodic discharge measurements, climatological records, and correlation with data obtained for Tanana River at Nenana.]

	Mean daily discharge, in cubic meters per second, water year October 1980 to September 1981											
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	685	269	184	153	150	156	164	238	875	940	1580	1040
2	688	255	184	153	150	156	164	255	827	835	1630	986
3	680	255	184	153	150	156	164	272	1310	784	1690	952
4	668	241	170	153	153	156	164	283	1190	770	1660	918
5	637	241	170	153	153	156	164	312	1020	810	1510	906
6	612	227	170	153	153	156	167	340	986	844	1410	886
7	586	227	170	153	153	156	167	382	991	1020	1360	861
8	581	227	170	153	153	156	167	430	937	1140	1450	833
9	569	227	170	153	153	156	167	487	898	1190	1580	799
10	547	212	170	153	153	156	167	547	903	1340	1740	765
11	518	212	170	153	153	159	167	632	861	1350	1720	728
12	510	212	170	153	153	159	167	649	816	1510	1630	708
13	481	212	170	153	153	159	170	595	787	1720	1610	685
14	481	212	170	153	153	159	170	558	767	1650	1650	651
15	453	212	170	153	153	159	170	530	767	1500	1620	617
16	425	198	156	153	153	159	176	510	765	1480	1550	583
17	425	198	156	153	153	159	176	507	782	1570	1450	572
18	396	198	156	153	153	159	176	515	818	1670	1310	552
19	396	198	156	153	153	161	176	566	841	1750	1180	535
20	368	198	156	153	153	161	176	598	844	1760	1100	521
21	368	198	156	150	156	161	181	566	850	1700	1100	524
22	368	198	153	150	156	161	181	538	841	1690	1070	507
23	348	198	153	150	156	161	187	527	855	1700	1030	493
24	340	198	153	150	156	161	187	487	909	1770	997	487
25	340	198	153	150	156	161	193	445	901	1720	969	487
26	312	198	153	150	156	161	198	481	895	1740	943	481
27	312	184	153	150	156	161	204	688	932	1780	969	467
28	312	184	153	150	156	161	210	677	929	1840	1020	450
29	283	184	153	150	---	161	221	651	1070	1710	1070	433
30	283	184	153	150	---	161	227	799	1060	1650	1110	425
31	269	---	153	150	---	161	---	827	---	1560	1100	---

Table 4.--Water surface elevations along a reach of the Tanana River near Fairbanks

[Elevation, in meters above National Geodetic Vertical Datum of 1929]

Date	Gage sites											Water discharge[1] (m^3/s)
	GS-1	T-1	T-2	T-3	T-4	T-5	T-6	T-7	T-8	T-9	T-10	
	Distance in kilometers from T-10											
	41.3	36.9	32.1	29.6	25.7	21.9	17.8	12.7	7.6	2.9	0	
7-10-80	126.73	---	130.91	132.31	135.01	137.90	141.83	146.48	152.11	157.40	160.84	1,230
7-22-80	126.92	128.50	131.08	132.52	135.19	138.07	141.95	146.34	152.24	157.58	161.07	1,330
8-05-80	126.70	128.22	131.01	132.29	135.01	137.89	141.77	146.07	152.10	157.47	160.84	1,180
9-29-80	126.11	127.61	130.43	131.70	134.51	137.57	141.30	145.44	151.67	157.12	160.56	683
6-04-81	126.65	128.45	131.00	132.24	135.29	137.93	141.79	146.08	151.83	157.43	160.75	1,190
6-24-81	126.33	128.21	130.78	131.98	135.08	137.80	141.65	145.89	151.81	157.30	160.67	909
7-22-81	127.19	129.02	131.37	132.76	135.79	138.20	142.04	146.53	152.20	157.74	---	1,690
9-07-81	126.25	128.14	130.71	131.63	134.99	137.60	141.29	145.50	151.44	157.17	---	861

[1] Water discharge is from gaging station Tanana River at Fairbanks (site T-2)

Table 5.--Particle-size distribution of bed material, south channel, Tanana River at Byers Island, July 16, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters					
	15	30	45	60	75	90
128	---	---	---	---	---	---
128	---	---	---	---	---	---
64	---	---	---	---	---	---
32	---	---	100	100	---	---
16	---	---	98	96	---	---
8	---	---	89	85	---	---
4	100	---	79	69	---	---
2	99	---	71	58	---	---
1	98	100	60	48	---	---
.5	95	99	47	36	---	---
.25	91	99	36	30	100	100
.125	88	97	29	26	21	96
.062	83	90	15	21	5	78

Table 6.--Particle-size distribution of bedload material, middle channel, Tanana River at Byers Island, July 16, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters							
	15	30	45	60	75	90	105	120
128	---	---	---	---	---	---	---	---
64	---	---	---	---	---	---	---	---
32	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---
2	100	---	---	---	---	---	---	---
1	99	100	---	100	100	100	---	---
.5	98	99	100	99	99	99	100	100
.25	97	98	99	95	98	95	97	68
.125	94	88	87	81	96	89	75	28
.062	74	56	42	41	90	79	44	10

Particle size (mm)	Stationing, from left bank reference, in meters						
	135	150	165	180	195	210	225
128	---	---	---	---	---	---	---
64	---	---	---	---	---	---	---
32	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---
1	---	---	---	---	---	---	100
.5	100	---	---	100	---	100	99
.25	94	100	100	99	100	48	31
.125	87	98	91	85	60	21	17
.062	77	75	25	40	11	4	3

Table 7.--Particle-size distribution of bed material, north channel, Tanana River at Byers Island, July 16, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters								
	15	30	45	60	75	90	105	120	135
128	---	---	---	---	---	---	---	---	---
64	---	---	---	---	---	---	---	---	---
32	---	---	---	---	---	---	---	100	---
16	---	---	---	---	---	---	---	96	---
8	---	---	---	---	---	---	---	95	---
4	---	---	---	---	---	---	---	95	---
2	---	100	---	---	---	---	---	95	---
1	100	99	100	---	---	---	---	95	---
.5	99	99	99	100	100	100	100	95	100
.25	98	98	98	99	87	65	89	17	26
.125	95	92	94	77	18	7	12	3	3
.062	86	64	80	39	5	.8	1	.5	.3

Particle size (mm)	Stationing, from left bank reference, in meters								
	150	165	180	195	210	225	240	255	270
128	---	---	---	---	---	---	---	---	---
64	---	100	100	100	100	---	---	---	---
32	100	79	66	40	27	---	---	---	---
16	99	51	21	13	4	---	---	---	---
8	99	15	4	5	1	---	---	---	---
4	99	3	.6	2	.6	---	---	---	---
2	99	1	.4	.9	.5	---	---	---	100
1	99	.6	.3	.6	.4	---	---	---	99
.5	99	.5	.3	.5	.4	100	100	100	99
.25	24	.4	.2	.3	.3	99	57	62	95
.125	3	.1	.1	.1	.1	25	8	6	13
.062	.5	0	0	.1	.1	4	.8	.6	2

Table 8.--Particle-size distribution of bed material, south channel, Tanana River at Byers Island, July 30, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters			
	45	60	75	90
128	---	---	---	---
64	---	100	---	---
32	100	76	100	---
16	50	16	99	---
8	24	2	98	---
4	13	.4	95	---
2	10	.3	93	---
1	9	.3	91	---
.5	9	0	87	100
.25	8	0	24	91
.125	1	0	3	54
.062	.1	0	.1	3

Table 9.--Particle-size distribution of bed material, middle channel, Tanana River at Byers Island, July 30, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters						
	60	75	90	105	120	135	150
128	---	---	---	---	---	---	---
64	100	---	100	---	---	---	---
32	84	100	85	100	---	---	---
16	61	78	76	91	---	---	---
8	35	60	62	71	---	---	---
4	21	55	50	66	---	---	---
2	16	54	47	64	---	---	---
1	16	54	47	64	---	---	---
.5	15	53	47	64	100	100	100
.25	10	34	31	53	89	93	94
.125	1	2	2	4	13	16	11
.062	.3	.1	.2	.2	1	1	1

Particle size (mm)	Stationing, from left bank reference, in meters					
	165	180	195	210	290	305
128	---	---	---	---	---	---
64	---	---	---	---	---	---
32	---	---	---	---	---	---
16	---	---	---	---	---	---
8	---	---	---	---	---	---
4	---	---	---	---	---	---
2	---	---	---	---	---	---
1	---	---	---	---	---	---
.5	100	100	100	100	100	100
.25	85	84	76	81	85	80
.125	6	10	11	4	12	13
.062	.4	.4	.3	.3	1	.3

Table 10.--Particle-size distribution of bed material, north channel, Tanana River at Byers Island, July 30, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters						
	45	60	75	90	105	120	135
128	---	---	---	---	---	---	---
64	---	---	---	100	100	---	100
32	100	---	---	25	42	100	94
16	99	---	---	10	3	70	48
8	95	---	---	.2	1	27	9
4	91	---	---	0	.2	8	1
2	89	---	---	0	.1	4	1
1	88	---	---	0	.1	4	.4
.5	83	100	---	0	0	4	0
.25	27	98	100	0	0	2	0
.125	4	43	72	0	0	.4	0
.062	.2	1	3	0	0	0	0

Particle size (mm)	Stationing, from right bank reference, in meters						
	150	165	180	195	210	225	240
128	---	---	---	---	---	---	---
64	100	100	---	---	---	---	---
32	88	96	100	---	---	---	---
16	50	69	99	---	---	---	---
8	12	27	93	---	---	---	---
4	2	8	89	---	---	---	---
2	1	2	88	---	---	---	---
1	.4	1	87	---	---	---	---
.5	0	1	87	100	100	100	100
.25	0	1	53	88	95	92	98
.125	0	.2	2	8	14	12	33
.062	0	0	.1	.3	.3	.4	2

Table 11.--Particle-size distribution of bed material, Tanana River at Fairbanks, July 17, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters												
	15	30	45	60	75	90	105	120	135	150	165	180	195
128	---	---	---	---	---	---	---	---	---	---	100	---	---
64	---	---	---	---	---	100	---	---	---	---	85	100	100
32	---	---	---	---	100	86	---	---	---	---	64	43	86
16	---	---	---	---	66	60	100	---	---	---	29	20	48
8	---	---	---	---	43	39	99	---	---	---	17	8	18
4	---	---	---	---	25	23	98	---	---	---	9	5	7
2	---	---	---	---	20	17	98	---	---	---	5	4	5
1	---	---	---	---	18	15	98	---	---	---	4	4	4
.5	---	---	100	---	18	15	98	100	100	100	3	4	3
.25	100	100	95	---	12	10	83	93	87	97	1	2	1
.125	99	99	48	100	1	2	13	40	18	79	.2	.2	.1
.062	80	81	16	78	.3	.4	2	11	2	58	0	0	0

Particle size (mm)	Stationing, from right bank reference, in meters												
	210	225	240	255	270	285	300	315	330	345	360	375	390
128	---	---	---	---	100	---	---	---	---	---	---	---	---
64	100	100	100	100	80	100	---	---	---	---	---	---	---
32	76	99	64	74	51	64	100	100	100	100	100	100	100
16	44	82	46	63	20	21	50	65	64	84	59	43	87
8	17	56	21	45	11	5	6	13	9	21	12	12	40
4	5	46	8	35	7	2	1	5	2	8	5	6	16
2	2	44	5	32	6	1	1	5	2	8	4	5	12
1	2	43	5	32	6	1	1	5	2	7	4	5	10
.5	2	40	5	31	6	1	1	4	2	7	4	5	10
.25	1	11	3	18	4	1	1	3	1	6	3	4	6
.125	.1	1	.2	1	1	.3	.3	1	.2	3	1	1	1
.062	0	.1	0	.1	.2	.1	.1	.1	0	1	.2	.2	.1

Table 12.--Particle-size distribution of bed material, Tanana River at Fairbanks, August 5, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters												
	0	15	30	90	105	120	135	150	165	180	195	210	225
128	---	---	---	---	---	---	---	---	---	---	---	---	---
64	100	100	---	---	---	---	---	100	---	---	---	---	---
32	92	95	100	---	---	100	100	89	100	---	---	---	---
16	87	31	88	---	---	84	60	45	62	100	---	---	---
8	87	5	88	---	---	59	20	26	51	99	---	---	---
4	87	2	88	---	---	39	7	22	49	99	---	---	---
2	87	1	88	---	---	30	4	21	49	98	---	---	---
1	87	1	87	---	---	26	4	21	49	98	---	---	---
.5	87	1	87	100	100	20	3	21	49	98	100	100	100
.25	86	1	75	99	93	10	1	15	36	77	97	97	96
.125	56	.4	24	89	16	1	.1	1	2	4	14	17	12
.062	2	0	1	34	1	.1	0	.1	.1	.1	.2	.3	.4

Particle size (mm)	Stationing, from right bank reference, in meters											
	240	255	270	285	300	315	330	345	360	375	390	405
128	---	---	---	---	---	---	---	---	---	---	---	---
64	100	100	100	100	100	---	---	100	100	---	100	---
32	34	91	56	92	88	100	100	99	80	100	84	---
16	7	30	14	50	61	72	85	79	31	34	29	---
8	3	7	3	20	28	24	39	33	10	16	14	---
4	2	3	1	10	9	6	9	15	4	11	11	---
2	1	2	1	7	4	2	4	11	3	11	11	---
1	1	2	1	6	3	2	3	10	3	10	10	---
.5	1	2	1	6	3	1	2	9	3	10	10	100
.25	1	1	1	2	1	1	1	5	1	4	6	81
.125	.2	.2	.2	.2	.2	.1	.1	.3	.1	.4	.4	4
.062	0	0	0	0	0	0	0	0	0	0	0	.2

Table 13.--Particle-size distribution of bed material, Tanana River at lower end Goose Island, July 18, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters					
	15	30	45	60	75	90
128	---	---	---	---	---	---
64	100	100	100	100	100	100
32	62	64	91	85	92	99
16	52	37	57	46	65	75
8	52	18	28	20	24	44
4	52	8	14	9	6	24
2	52	4	7	4	1	16
1	52	3	4	3	1	14
.5	52	2	3	2	1	12
.25	43	.4	1	.4	.3	4
.125	5	.2	1	.2	.2	1
.062	.4	.1	.2	.1	.1	.1

Particle size (mm)	Stationing, from left bank reference, in meters					
	105	120	135	150	165	180
128	---	---	---	---	---	---
64	100	---	---	---	100	100
32	78	---	---	---	87	98
16	63	---	---	---	77	75
8	53	---	---	---	67	33
4	52	---	---	---	63	11
2	51	---	---	---	62	4
1	51	---	---	---	61	3
.5	50	100	100	100	59	2
.25	36	87	87	86	27	1
.125	1	2	5	5	1	.3
.062	.2	1	1	.4	.1	.1

Table 14.--Particle-size distribution of bed material, Tanana River at lower end Goose Island, August 3, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters							
	12	24	36	48	60	72	84	96
128	---	---	---	100	---	---	---	---
64	---	100	100	80	100	100	100	100
32	---	15	78	78	66	87	94	88
16	---	2	47	33	29	52	62	64
8	---	1	18	8	8	19	23	35
4	---	.3	5	1	2	4	7	17
2	---	.3	1	.1	.3	.3	2	10
1	---	.3	.2	0	.1	.1	1	8
.5	100	0	0	0	0	0	.2	6
.25	77	0	0	0	0	0	.1	1
.125	9	0	0	0	0	0	0	.2
.062	.4	0	0	0	0	0	0	0

Particle size (mm)	Stationing, from left bank reference, in meters						
	108	120	132	144	156	168	180
128	---	---	---	---	---	---	---
64	---	---	100	---	100	100	---
32	---	---	72	100	88	91	---
16	---	---	49	92	62	51	---
8	---	---	38	84	32	23	---
4	---	---	35	81	20	8	---
2	---	---	34	81	17	3	---
1	---	---	34	81	16	2	---
.5	100	100	34	81	15	2	100
.25	86	89	29	68	5	1	88
.125	4	5	2	3	.4	.2	39
.062	.1	.1	.2	.1	0	0	2

Table 15.--Particle-size distribution of bed material, Tanana River at upper end Goose Island, July 18, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters								
	17	34	51	68	85	102	119	136	153
128	---	---	---	---	---	---	---	---	---
64	---	---	---	---	100	100	100	100	100
32	---	---	100	100	96	91	98	84	91
16	100	---	99	86	64	56	55	38	46
8	99	---	98	36	21	22	22	10	12
4	99	---	98	17	5	8	4	2	2
2	98	---	97	15	1	3	1	1	.4
1	98	---	96	15	1	2	.5	1	.3
.5	98	100	90	15	1	2	0	1	0
.25	62	93	39	9	.3	2	0	1	0
.125	4	7	3	2	.2	1	0	.2	0
.062	1	1	.2	.4	.1	.3	0	.1	0

Particle size (mm)	Stationing, from left bank reference, in meters								
	170	187	204	221	238	255	272	289	306
128	---	---	---	---	100	100	---	---	---
64	100	100	100	100	46	92	100	---	---
32	87	50	56	36	20	85	91	---	---
16	59	28	46	9	7	65	58	---	---
8	27	22	41	5	2	49	36	---	---
4	10	20	40	4	1	42	26	---	---
2	4	20	40	4	1	39	22	---	---
1	3	20	40	4	1	39	22	---	---
.5	2	19	40	4	1	38	21	100	100
.25	1	13	36	3	.4	26	18	99	98
.125	.2	1	3	1	.2	1	3	65	82
.062	0	.1	.3	1	.1	.3	1	3	16

Table 16.--Particle-size distribution of bed material, Tanana River at upper end Goose Island, August 3, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters									
	15	30	45	60	75	90	105	120	135	150
128	---	---	---	---	---	---	---	---	---	---
64	100	100	100	100	---	100	100	100	100	100
32	36	84	70	71	100	95	87	21	92	84
16	10	60	33	23	79	68	50	9	61	38
8	4	22	10	6	38	33	20	4	24	10
4	3	5	2	1	13	13	8	1	4	2
2	3	2	1	.2	7	5	2	.3	.3	1
1	3	2	1	.1	6	3	1	.1	.1	1
.5	3	1	.4	0	5	2	1	0	0	0
.25	1	.4	.2	0	2	1	.2	0	0	0
.125	.1	.1	0	0	1	.3	.1	0	0	.1
.062	0	0	0	0	.1	.1	0	0	0	0

Particle size (mm)	Stationing, from left bank reference, in meters									
	165	180	195	210	225	240	255	270	285	300
128	---	---	---	---	---	---	---	---	---	---
64	100	100	100	100	100	---	---	100	---	---
32	84	82	91	40	43	---	---	66	---	---
16	47	46	43	10	18	100	---	19	---	---
8	16	21	15	2	5	95	---	3	---	---
4	4	6	3	1	2	91	---	1	---	---
2	1	1	1	1	1	89	---	1	---	---
1	1	1	1	.4	1	89	---	1	---	---
.5	.3	1	.4	0	1	89	100	1	100	---
.25	.2	1	.3	0	1	78	89	.4	74	100
.125	.1	.1	.1	0	.2	13	7	.1	22	98
.062	0	0	0	0	0	.4	.4	0	1	53

Table 17.--Particle-size distribution of bed material, south channel, Tanana River near North Pole, July 23, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters									
	15	30	45	60	75	90	105	120	135	150
128	---	---	---	---	100	100	---	100	---	---
64	---	100	100	100	79	58	100	62	100	100
32	---	69	94	28	59	17	20	5	63	96
16	---	36	52	12	31	7	3	5	63	90
8	---	21	26	7	8	6	3	5	50	84
4	---	14	14	4	1	6	3	5	47	83
2	---	10	10	2	.1	6	3	5	43	82
1	---	9	8	1	0	6	3	5	43	82
.5	100	8	5	1	0	6	3	5	42	82
.25	95	4	3	.4	0	5	2	4	40	78
.125	24	1	1	.1	0	.4	.4	1	9	19
.062	8	.1	.2	0	0	.1	.1	.1	.4	1

Table 18.--Particle-size distribution of bed material, north channel, Tanana River near North Pole, July 23, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters												
	15	30	45	60	75	90	105	120	135	150	165	180	195
128	---	---	100	100	---	---	---	---	---	---	---	---	---
64	100	---	68	88	100	100	100	100	100	---	---	---	---
32	97	---	30	35	30	19	16	48	88	---	---	---	---
16	66	---	11	14	10	11	9	31	51	---	---	---	---
8	44	---	4	2	4	6	4	20	19	---	---	---	---
4	34	---	1	.3	2	4	2	10	4	---	---	---	---
2	32	---	1	.1	1	2	1	7	2	---	---	---	---
1	31	---	1	0	1	2	1	6	2	---	---	---	---
.5	30	100	1	0	1	1	1	6	2	100	100	---	100
.25	25	98	.2	0	1	.3	.3	1	1	92	99	100	96
.125	17	96	.1	0	.1	0	.1	.3	.2	16	59	87	41
.062	11	82	0	0	0	0	0	.1	0	1	2	27	2

Particle size (mm)	Stationing, from right bank reference, in meters											
	210	225	240	255	270	285	300	315	330	345	360	375
128	---	---	---	---	---	---	100	---	---	---	---	---
64	---	---	100	100	100	100	77	---	---	---	---	100
32	---	---	75	66	85	97	38	---	---	---	---	91
16	---	---	33	16	23	40	20	---	---	---	---	57
8	---	---	4	6	6	6	13	---	---	---	---	25
4	---	---	3	3	5	5	8	---	---	---	---	16
2	---	---	3	3	5	5	7	---	---	---	---	15
1	---	---	3	3	5	5	7	---	---	---	---	15
.5	---	---	3	3	5	5	7	---	---	100	100	15
.25	100	100	3	3	4	4	6	100	100	95	99	11
.125	97	99	1	1	2	3	2	98	98	57	91	2
.062	38	59	.4	.3	1	1	.4	75	75	7	30	1

Table 18.--Continued

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters												
	390	405	420	435	450	465	480	495	510	525	540	555	570
128	---	---	---	---	---	100	---	---	---	---	---	---	---
64	100	100	100	100	100	76	100	---	---	---	---	---	---
32	79	92	86	93	91	38	66	---	---	---	100	---	---
16	44	54	48	50	55	11	37	---	---	---	91	---	---
8	15	22	22	15	22	3	20	---	---	---	85	---	---
4	5	8	10	3	5	1	11	---	---	---	83	---	---
2	3	4	6	3	3	1	8	---	100	100	83	---	---
1	2	4	4	3	3	1	8	---	99	99	83	---	---
.5	2	3	3	3	3	1	7	---	99	97	83	---	100
.25	1	1	1	2	2	1	5	100	99	97	80	100	98
.125	.1	.1	.2	.2	.2	.2	.4	85	89	93	69	94	43
.062	0	0	.1	0	0	0	0	9	32	56	37	44	3

Particle size (mm)	Stationing, from right bank reference, in meters											
	585	600	615	630	645	660	675	690	705	720	735	750
128	---	---	---	---	---	---	---	---	---	---	---	---
64	100	100	---	---	---	---	---	---	---	---	---	100
32	90	87	---	---	---	100	---	---	---	100	---	41
16	84	59	---	---	---	91	---	---	---	98	---	9
8	84	30	---	---	---	88	---	---	---	94	100	2
4	83	18	---	---	---	88	---	---	---	93	99	1
2	83	15	---	---	---	87	---	---	---	93	98	.4
1	83	15	---	---	100	87	---	---	---	92	98	.3
.5	82	15	100	100	53	83	---	100	---	91	98	0
.25	55	13	98	99	18	36	100	93	100	34	64	0
.125	3	3	61	70	3	12	73	31	97	11	3	0
.062	.2	1	4	17	1	5	16	11	84	3	.4	0

Table 19.--Particle-size distribution of bed material, south channel, Tanana River near North Pole, August 4, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters									
	15	30	45	60	75	90	105	120	135	150
128	---	---	---	---	---	---	---	---	---	---
64	---	100	100	100	100	---	100	100	---	---
32	100	63	90	78	94	100	78	65	---	---
16	93	14	48	35	55	20	59	65	---	100
8	91	3	15	8	17	3	54	65	---	97
4	90	1	3	1	4	1	53	65	100	97
2	90	1	1	.3	1	1	53	65	99	97
1	89	1	.4	.2	.5	1	53	65	99	97
.5	87	1	.4	0	.4	1	53	65	94	97
.25	76	1	.3	0	.3	1	44	52	53	95
.125	9	.3	.1	0	.1	1	3	4	6	36
.062	.3	0	0	0	0	.1	.1	.2	.2	1

Table 20.--Particle-size distribution of bed material, north channel, Tanana River near North Pole, August 4, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters											
	30	45	60	75	90	105	120	135	150	165	245	260
128	---	---	100	---	100	100	---	---	---	---	---	---
64	100	100	48	---	72	36	---	---	---	---	---	---
32	74	75	48	---	26	6	---	---	---	---	---	---
16	60	2	48	---	10	.4	---	---	---	---	---	100
8	48	1	48	---	4	0	---	---	---	---	---	94
4	46	.2	48	---	3	0	---	---	---	---	---	84
2	46	.2	48	---	3	0	---	---	---	---	---	80
1	46	.2	48	---	3	0	---	---	---	---	---	79
.5	46	0	48	100	3	0	100	100	---	100	100	77
.25	44	0	43	61	2	0	82	99	100	94	91	61
.125	8	0	2	8	.2	0	5	39	92	23	26	11
.062	.3	0	.1	.2	0	0	.2	1	25	1	1	1

Particle size (mm)	Stationing, from right bank reference, in meters											
	300	315	330	345	360	375	390	405	420	435	450	465
128	---	---	---	---	100	100	---	100	---	---	---	100
64	---	100	100	100	39	68	100	64	100	100	100	61
32	100	67	50	49	27	55	89	32	50	54	78	35
16	55	30	15	14	10	29	67	7	18	33	41	14
8	13	14	5	3	4	10	26	2	5	12	14	5
4	5	8	3	1	1	3	8	1	1	4	4	2
2	5	5	3	1	1	1	4	1	1	2	2	1
1	4	5	3	1	1	1	2	.5	1	2	1	1
.5	4	5	3	1	.4	.5	1	.4	1	2	1	1
.25	3	3	2	1	.2	.3	1	.2	.5	1	1	.3
.125	1	.3	.2	.1	0	.1	.1	0	.1	.1	.1	0
.062	0	0	0	0	0	0	0	0	0	0	0	0

Table 20.--Continued

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters							
	480	495	580	595	610	625	760	775
128	100	---	---	---	---	---	---	---
64	38	---	---	100	100	100	100	100
32	28	---	---	27	44	31	89	29
16	11	---	---	5	14	3	38	9
8	6	---	---	.4	2	1	7	2
4	4	---	---	.1	1	1	2	1
2	2	---	---	.1	1	1	1	.2
1	2	---	---	.1	1	1	1	.1
.5	2	100	100	0	.4	1	1	0
.25	1	95	93	0	.4	1	.3	0
.125	.2	38	31	0	.1	.1	0	0
.062	0	2	1	0	0	0	0	0

Table 21.--Particle-size distribution of bed material, south channel, Tanana River above Chena River Floodway, August 5, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from right bank reference, in meters								
	18	33	48	63	78	93	108	125	140
128	---	---	---	---	---	---	---	---	---
64	---	---	---	---	---	---	---	---	---
32	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---
1	---	---	---	100	---	---	---	---	100
.5	100	100	---	99	---	---	100	100	99
.25	73	96	100	91	100	100	98	99	79
.125	5	16	98	57	99	97	79	86	5
.062	.2	1	56	13	67	57	36	30	1

Particle size (mm)	Stationing, from right bank reference, in meters							
	155	170	185	200	215	230	245	260
128	---	---	---	---	100	100	100	100
64	---	---	100	100	40	76	30	28
32	---	---	97	97	8	47	11	8
16	100	---	73	95	4	17	4	6
8	99	---	46	94	3	5	2	5
4	98	---	30	94	3	2	1	5
2	98	---	24	94	2	1	1	4
1	98	---	21	94	2	1	1	4
.5	98	---	20	80	1	.3	1	4
.25	61	100	16	13	.2	.1	.1	.4
.125	3	93	9	1	.2	0	0	0
.062	.2	27	3	0	0	0	0	0

Table 22.--Particle-size distribution of bed material, north channel, Tanana River above Chena River Floodway, August 5, 1980

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters											
	60	75	90	105	120	135	150	165	180	210	225	240
128	---	---	100	---	---	---	100	---	---	---	---	---
64	---	---	75	100	100	100	74	100	---	---	---	100
32	100	100	54	76	86	45	51	56	---	100	100	93
16	96	81	25	52	63	10	26	47	---	99	96	71
8	91	55	8	21	28	4	10	43	---	99	96	48
4	88	38	3	6	13	3	3	42	---	99	96	45
2	87	35	2	3	10	3	2	42	---	99	96	44
1	87	33	2	2	8	3	2	42	---	99	96	44
.5	87	32	1	2	7	3	2	42	100	99	96	44
.25	81	25	1	1	4	2	1	36	89	72	96	44
.125	26	3	.1	.1	.4	.3	.1	2	11	13	84	39
.062	3	.2	0	0	0	0	0	.2	.3	.3	19	20

Particle size (mm)	Stationing, from left bank reference, in meters										
	255	270	285	300	315	330	345	360	375	390	405
128	---	---	---	---	100	---	---	---	100	100	100
64	---	---	---	---	68	100	100	100	78	71	60
32	100	---	100	---	27	74	93	60	38	4	30
16	74	---	62	---	8	41	56	15	11	1	12
8	53	---	31	---	5	31	27	1	1	.3	5
4	44	---	21	---	4	28	16	.3	.1	.2	3
2	41	---	19	---	4	28	12	.3	.1	.2	2
1	40	---	18	---	4	27	11	.2	.1	.2	2
.5	39	---	18	100	4	26	10	0	0	0	1
.25	34	100	13	98	3	10	3	0	0	0	.4
.125	17	90	4	54	.3	1	.4	0	0	0	.1
.062	6	24	1	1	0	.1	0	0	0	0	0

Table 23.--Particle-size distribution of bed material, south channel, Tanana River above Chena River Floodway, August 4, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters									
	30	45	135	150	165	195	210	225	240	255
128	---	---	100	---	---	---	---	---	---	---
64	---	---	53	---	100	100	100	100	100	---
32	---	---	18	100	88	52	77	72	67	---
16	---	100	4	0	87	16	57	40	34	---
8	---	94	1	0	87	3	22	12	13	---
4	---	91	1	0	86	1	7	3	3	---
2	---	89	1	0	86	.3	3	1	1	---
1	---	86	1	0	86	.3	2	.3	.4	---
.5	---	68	1	0	86	0	2	0	0	100
.25	100	13	.4	0	84	0	1	0	0	90
.125	62	3	0	0	31	0	.1	0	0	13
.062	2	.2	0	0	0	0	0	0	0	1

Table 24.--Particle-size distribution of bed material, north channel, Tanana River above Chena River Floodway, August 4, 1981

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	Stationing, from left bank reference, in meters										
	60	75	90	105	120	135	150	165	180	195	210
128	---	---	---	---	100	---	---	---	---	---	---
64	100	100	100	100	73	100	100	100	100	---	---
32	84	93	66	38	37	60	71	64	90	---	---
16	75	57	25	10	10	18	32	35	82	100	---
8	73	17	7	5	3	6	8	13	76	99	---
4	73	3	2	2	1	3	1	8	75	99	---
2	73	1	1	1	.2	2	1	7	75	99	---
1	73	1	1	.5	.1	2	1	7	75	99	---
.5	73	1	1	.3	0	1	1	7	75	99	100
.25	65	1	.3	.2	0	1	1	5	58	84	99
.125	8	.1	0	0	0	.3	.2	1	8	10	11
.062	1	0	0	0	0	0	0	0	.4	.4	.2

Particle size (mm)	Stationing, from left bank reference, in meters									
	275	290	305	320	335	350	365	380	395	410
128	---	100	100	---	---	---	---	---	---	---
64	100	66	49	100	100	100	100	100	100	---
32	31	22	24	43	27	43	87	42	93	---
16	7	5	9	22	9	15	48	11	53	100
8	4	2	2	7	2	4	15	3	10	96
4	3	1	1	2	.4	1	3	1	1	96
2	3	1	.2	2	.2	1	1	.2	.2	96
1	3	.4	.1	1	.1	1	.5	.1	.1	96
.5	3	0	0	1	0	.4	.3	0	0	96
.25	2	0	0	1	0	.2	.1	0	0	96
.125	1	0	0	.1	0	0	0	0	0	94
.062	0	0	0	0	0	0	0	0	0	77

Table 25.--Composite particle-size distribution and statistics of bed material, Tanana River, 1980

[Percentage, by weight, finer than indicated sieve size]

1980

Particle size (mm)	Byers Island			Fairbanks	Lower end Goose Is.	Upper end Goose Is.	North Pole		Chena R. Floodway	
	South channel	Middle channel	North channel	Single channel	Single channel	Single channel	South channel	North channel	South channel	North channel
128	---	---	---	100	---	100	100	100	100	100
64	---	---	100	98.7	100	96.6	89.9	98.2	86.7	92.4
32	100	---	89.6	89.1	88.0	82.5	55.1	83.6	80.5	73.3
16	99.1	---	82.4	68.6	70.6	62.0	39.9	68.5	76.4	54.2
8	96.3	---	78.8	47.9	53.3	44.6	31.0	59.3	73.8	41.6
4	92.6	100	77.8	41.2	44.9	37.7	27.7	56.1	72.5	37.1
2	89.7	99.9	77.5	39.9	41.8	35.9	26.1	55.4	72.0	36.1
1	86.4	99.9	77.4	39.5	41.0	35.7	25.7	55.3	71.8	35.7
.5	82.0	99.4	77.1	39.2	40.3	35.1	25.2	54.1	70.7	35.3
.25	78.1	88.2	51.8	34.9	31.1	27.8	23.1	48.7	60.4	31.0
.125	63.0	73.6	24.7	22.3	1.8	9.7	5.6	34.2	38.1	15.0
.062	51.9	45.1	15.7	13.4	.3	1.4	1.0	14.7	17.1	3.3

Particle-size statistics

Percent-finer parameter	[Particle diameter (mm) at given percent-finer parameter]									
d_5	---	---	---	---	0.15	0.096	0.12	0.035	0.030	0.074
d_{16}	---	---	0.064	0.078	.20	.17	.20	.070	.060	.13
d_{35}	---	---	.17	.25	.34	.50	11	.14	.11	.48
d_{50}	---	0.070	.24	8.6	6.1	9.9	25	.34	.18	13
d_{65}	0.14	.10	.35	14	13	17	37	13	.34	23
d_{84}	.69	.20	18	26	26	34	54	33	47	44
d_{90}	2.1	.26	32	33	33	42	64	39	68	56
d_{95}	6.0	.32	37	43	38	56	74	49	77	70

Table 26.--Composite particle-size distribution and statistics of bed material, Tanana River, 1981

[Percentage, by weight, finer than indicated sieve size]

1981

Particle size (mm)	Byers Island			Fairbanks	Lower end Goose Is.	Upper end Goose Is.	North Pole		Chena R. Floodway	
	South channel	Middle channel	North channel	Single channel	Single channel	Single channel	South channel	North channel	South channel	North channel
128	---	---	---	---	100	---	---	100	100	100
64	100	100	100	100	98.7	100	100	88.3	95.3	94.7
32	94.0	97.6	88.9	91.5	83.8	77.3	86.8	64.5	77.4	62.6
16	66.3	92.8	74.9	65.6	62.9	50.7	58.9	44.8	53.8	39.2
8	56.0	86.8	61.7	47.8	45.9	31.4	45.3	35.2	43.2	26.3
4	52.1	84.0	57.1	40.8	38.7	23.0	41.5	32.2	39.2	22.7
2	50.8	83.2	56.1	39.0	36.6	20.8	40.8	31.5	38.1	22.1
1	50.1	83.2	55.8	38.6	36.2	20.6	40.6	31.4	37.6	22.0
.5	49.0	83.0	55.4	38.1	35.9	20.3	39.9	31.2	35.7	21.9
.25	30.8	68.8	46.7	33.0	29.6	17.4	32.3	27.5	28.8	19.3
.125	14.5	8.1	13.5	7.4	4.2	7.1	5.9	8.9	10.9	6.4
.062	.8	.5	.5	1.7	.2	2.8	.2	1.0	.3	3.8

Particle-size statistics

Percent-finer parameter	[Particle diameter (mm) at given percent-finer parameter]									
d_5	0.092	0.11	0.097	0.10	0.13	0.095	0.12	0.10	0.10	0.089
d_{16}	.13	.14	.13	.17	.19	.23	.18	.17	.16	.22
d_{35}	.30	.18	.20	.33	.45	9.2	.32	7.6	.47	13
d_{50}	.94	.21	.32	8.7	9.4	16	10	19	12	22
d_{65}	15	.24	9.4	16	17	23	18	32	22	33
d_{84}	23	4.1	24	24	32	34	29	54	38	46
d_{90}	27	11	33	30	38	38	34	66	48	54
d_{95}	33	20	38	36	46	42	39	76	63	65

Table 27.--Summary of suspended-sediment data, Tanana River at Byers Island

[NA, not available]

Date	Discharge (m^3/s)	Suspended sediment Concentration (mg/L)	Suspended sediment Transport rate (Mg/d)	Median particle size (mm)
9-03-80	722	395	24,600	NA
9-16-80	547	360	17,000	NA
10-07-80	586	404	20,500	NA
3-03-81	156	72	970	NA
3-05-81	156	152	2,050	NA
3-11-81	159	127	1,740	NA
3-17-81	159	65	893	NA
3-25-81	161	119	1,660	NA
6-19-81	841	1,070	77,700	0.014
6-30-81	1,060	973	89,100	.047
7-13-81	1,720	5,330	792,000	.015
7-30-81	1,650	2,580	368,000	.028
8-13-81	1,610	2,740	381,000	.019
9-04-81	917	976	77,300	.058
10-07-81	354	162	4,950	NA

Table 28.--Summary of suspended-sediment data, Tanana River at Fairbanks

[NA, not available]

Date	Discharge (m^3/s)	Suspended sediment Concentration (mg/L)	Suspended sediment Transport rate (Mg/d)	Median particle size (mm)
6-18-80	1,010	2,530	221,000	0.024
6-25-80	711	790	48,500	.052
7-15-80	1,400	2,520	305,000	.015
7-30-80	1,640	3,500	496,000	.018
8-11-80	1,340	2,620	303,000	.019
9-03-80	714	679	41,900	NA
9-16-80	532	452	20,800	NA
10-07-80	586	470	23,800	NA
10-23-80	345	352	10,500	NA
5-22-81	558	589	28,400	NA
6-18-81	864	1,140	85,100	.029
6-30-81	1,070	1,260	117,000	.066
7-13-81	1,760	5,700	867,000	.011
7-29-81	1,722	2,940	437,000	.028
8-13-81	1,530	3,250	430,000	.026
9-03-81	920	1,060	84,300	.028
10-06-81	368	164	5,210	NA

Table 29.--Summary of suspended-sediment data, Tanana River at lower end Goose Island

[NA, not available]

Date	Discharge (m^3/s)	Suspended sediment Concentration (mg/L)	Suspended sediment Transport rate (Mg/d)	Median particle size (mm)
9-05-80	666	497	28,600	NA
9-17-80	643	979	54,400	NA
10-08-80	581	362	18,200	NA
6-19-81	842	1,210	88,000	0.020
7-02-81	836	577	41,700	.016
7-16-81	1,480	2,320	297,000	.023
7-28-81	1,840	3,060	486,000	.020
8-14-81	1,650	2,870	409,000	.015
9-04-81	919	1,030	81,800	.020
10-07-81	354	601	18,400	NA

Table 30.--Summary of suspended-sediment data, Tanana River at upper end Goose Island

[NA, not available]

Date	Discharge (m^3/s)	Suspended sediment Concentration (mg/L)	Suspended sediment Transport rate (Mg/d)	Median particle size (mm)
9-05-80	666	597	34,400	NA
9-17-80	643	1,130	62,800	NA
10-08-80	581	374	18,800	NA
3-06-81	156	47	633	NA
3-24-81	161	51	709	NA
6-19-81	842	1,250	90,900	0.026
7-02-81	836	781	56,400	.050
7-16-81	1,480	2,540	325,000	.033
7-28-81	1,840	3,120	496,000	.020
8-14-81	1,650	2,940	419,000	.016
9-04-81	919	1,240	98,500	.062
10-07-81	354	166	5,080	NA

Table 31.--Summary of suspended-sediment data, Tanana River near North Pole

[NA, not available]

Date	Discharge (m^3/s)	Suspended sediment Concentration (mg/L)	Suspended sediment Transport rate (Mg/d)	Median particle size (mm)
6-24-80	742	865	55,500	0.046
7-17-80	1,380	2,840	339,000	.020
7-31-80	1,670	2,690	388,000	.028
8-12-80	1,440	2,900	361,000	.024
9-04-80	670	478	27,700	NA
9-18-80	722	1,290	80,500	NA
10-09-80	574	264	13,100	NA
6-16-81	765	854	56,500	.062
7-01-81	940	780	63,300	.036
7-14-81	1,650	3,760	536,000	.022
7-31-81	1,560	2,380	321,000	.019
8-12-81	1,630	2,960	417,000	.020
9-01-81	1,040	1,230	111,000	.015
10-15-81	345	160	4,770	NA

Table 32.--Summary of suspended-sediment data, Tanana River above Chena River Floodway

[NA, not available]

Date	Discharge (m^3/s)	Suspended sediment Concentration (mg/L)	Suspended sediment Transport rate (Mg/d)	Median particle size (mm)
9-04-80	696	596	35,800	NA
9-18-80	720	1,410	87,700	NA
10-09-80	571	311	15,300	NA
6-17-81	781	938	63,300	0.029
7-01-81	940	1,010	82,000	.075
7-15-81	1,500	2,880	373,000	.017
7-31-81	1,560	2,440	329,000	.021
8-12-81	1,630	2,780	392,000	.018
9-01-81	1,040	1,140	102,000	.008
10-15-81	453	211	8,260	.019

Table 33.--Summary of bedload data, Tanana River at Byers Island

Date	Discharge (m^3/s)	Width (m)	Bedload-transport rate Unit [(kg/m)/s]	Bedload-transport rate Total (Mg/d)	Median particle size (mm)
7-15-80	1,380	424	0.04968	1,820	0.37
7-29-80	1,650	503	.03866	1,680	.65
8-11-80	1,380	434	.04854	1,820	.36
9-03-80	722	187	.02005	324	.35
9-16-80	547	184	.02554	406	.20
10-07-80	586	183	.02606	412	.25
6-19-81	841	186	.06471	1,040	.35
6-30-81	1,060	315	.10839	2,950	.45
7-13-81	1,720	520	.01758	790	.27
7-30-81	1,650	503	.06811	2,960	.31
8-13-81	1,610	524	.02717	1,230	.25
9-04-81	917	201	.02281	396	.19
10-07-81	354	185	.01752	280	.21

Table 34.--Summary of bedload data, Tanana River at Fairbanks

Date	Discharge (m^3/s)	Width (m)	Bedload-transport rate Unit [(kg/m)/s]	Bedload-transport rate Total (Mg/d)	Median particle size (mm)
6-18-80	1,010	296	0.10197	2,610	0.45
6-25-80	711	282	.05843	1,420	.30
7-15-80	1,400	320	.05518	1,530	.44
7-30-80	1,640	361	.14716	4,590	8.4
8-11-80	1,340	350	.11238	3,400	8.8
9-03-80	714	195	.02938	495	.44
9-16-80	532	152	.02708	356	4.0
10-07-80	586	169	.09172	1,340	5.3
10-23-80	345	107	.03267	302	8.3
5-22-81	558	177	.11748	1,800	.43
6-18-81	864	283	.17135	4,190	.35
6-30-81	1,070	283	.05790	1,420	.32
7-13-81	1,760	405	.13419	4,700	10
7-29-81	1,722	378	.21618	7,060	.36
8-13-81	1,530	357	.06810	2,100	.25
9-03-81	920	294	.04756	1,210	.19
10-06-81	368	247	.00246	52.5	.23

Table 35.--Summary of bedload data, Tanana River at lower end Goose Island

Date	Discharge (m^3/s)	Width (m)	Bedload-transport rate Unit [(kg/m)/s]	Bedload-transport rate Total (Mg/d)	Median particle size (mm)
7-16-80	1,360	195	0.13936	2,350	0.75
7-30-80	1,670	194	.15003	2,510	.44
8-11-80	1,380	192	.23138	3,840	10
9-05-80	666	192	.03888	645	.21
9-17-80	643	189	.03333	544	.18
10-08-80	581	188	.01295	210	.21
6-19-81	842	189	.18095	2,950	.34
7-02-81	836	191	.16464	2,720	.34
7-16-81	1,480	191	.37695	6,220	17
7-28-81	1,840	194	.25793	4,320	9.4
8-14-81	1,650	299	.28422	7,340	11
9-04-81	919	292	.03591	906	.20
10-07-81	354	159	.01570	216	.21

Table 36.--Summary of bedload data, Tanana River at upper end Goose Island

Date	Discharge (m^3/s)	Width (m)	Bedload-transport rate Unit [(kg/m)/s]	Bedload-transport rate Total (Mg/d)	Median particle size (mm)
7-16-80	1,360	312	0.14832	4,000	0.67
7-30-80	1,670	313	.07038	1,900	8.4
8-11-80	1,380	314	.03600	977	.37
9-05-80	666	156	.01907	257	.39
9-17-80	643	172	.00958	142	.22
10-08-80	581	144	.01500	187	8.1
3-06-81	156	107	.03650	337	.39
3-24-81	161	107	.00252	23.3	.40
6-19-81	842	179	.19849	3,070	.43
7-02-81	836	207	.16748	3,000	.32
7-16-81	1,480	311	.13132	3,530	4.6
7-28-81	1,840	312	.12208	3,290	10
8-14-81	1,650	311	.10256	2,760	2.7
9-04-81	919	196	.06994	1,180	.29
10-07-81	354	152	.00910	120	.23

Table 37.--Summary of bedload data, Tanana River near North Pole

Date	Discharge (m^3/s)	Width (m)	Bedload-transport rate Unit [(kg/m)/s]	Bedload-transport rate Total (Mg/d)	Median particle size (mm)
6-24-80	742	398	0.06252	2,150	0.78
7-17-80	1,380	456	.06777	2,670	17
7-31-80	1,670	559	.09048	4,370	2.4
8-12-80	1,440	549	.01767	838	.19
9-04-80	670	416	.02443	878	5.1
9-18-80	722	347	.00861	258	.20
10-09-80	574	317	.00730	200	.20
6-16-81	765	551	.08234	3,920	4.5
7-01-81	940	570	.04325	2,130	.81
7-14-81	1,650	693	.07432	4,450	.46
7-31-81	1,560	637	.09212	5,070	1.4
8-12-81	1,630	652	.04917	2,770	7.5
9-01-81	1,040	433	.03555	1,330	.22
10-15-81	345	248	.00985	211	.21

Table 38.--Summary of bedload data, Tanana River above Chena River Floodway

Date	Discharge (m^3/s)	Width (m)	Bedload-transport rate Unit [(kg/m)/s]	Bedload-transport rate Total (Mg/d)	Median particle size (mm)
7-18-80	1,420	529	0.04048	1,850	0.31
8-01-80	1,450	495	.14006	5,990	.49
8-12-80	1,440	578	.12375	6,180	9.2
9-04-80	696	361	.02421	755	.27
9-18-80	720	359	.03933	1,220	5.8
10-09-80	571	362	.01055	330	.20
6-17-81	781	370	.09947	3,180	.55
7-01-81	940	447	.05515	2,130	16
7-15-81	1,500	515	.07596	3,380	.47
7-31-81	1,560	492	.09598	4,080	5.8
8-12-81	1,630	476	.03039	1,250	.29
9-01-81	1,040	615	.01393	740	.19
10-15-81	354	284	.02193	538	.28

Table 39.--Particle-size distribution of suspended sediment, Tanana River at Byers Island

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	9-03-80	9-16-80	10-07-80	3-03-81	3-05-81	3-11-81	3-17-81	3-25-81
1.0	---	---	---	---	---	---	---	---
.50	---	---	---	---	---	---	---	---
.25	---	---	---	---	---	---	---	---
.125	---	---	---	---	---	---	---	---
.062	45	42	41	52	77	55	41	65
.031	---	---	---	---	---	---	---	---
.016	---	---	---	---	---	---	---	---
.008	---	---	---	---	---	---	---	---
.004	---	---	---	---	---	---	---	---
.002	---	---	---	---	---	---	---	---

Particle size (mm)	6-19-81	6-30-81	7-13-81	7-30-81	8-13-81	9-04-81	10-07-81
1.0	---	---	---	---	---	---	---
.50	---	---	---	---	---	100	---
.25	100	100	100	100	100	96	---
.125	89	78	96	83	90	68	---
.062	73	55	83	64	74	51	37
.031	63	43	66	52	59	42	---
.016	52	32	51	40	47	36	---
.008	39	26	38	30	35	28	---
.004	27	18	25	21	24	19	---
.002	15	13	15	14	16	14	---

Table 40.--Particle-size distribution of suspended sediment, Tanana River at Fairbanks

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	6-18-80	6-25-80	7-15-80	7-30-80	8-11-80	9-03-80	9-16-80	10-07-80	10-23-80
1.0	---	---	---	---	---	---	---	---	---
.50	100	100	100	100	100	---	---	---	---
.25	99	98	99	98	99	---	---	---	---
.125	91	75	92	92	87	---	---	---	---
.062	74	53	79	78	72	31	35	35	36
.031	57	42	64	61	59	---	---	---	---
.016	39	34	51	47	47	---	---	---	---
.008	25	28	38	34	35	---	---	---	---
.004	16	21	27	24	23	---	---	---	---
.002	10	15	17	15	15	---	---	---	---

Particle size (mm)	5-22-81	6-18-81	6-30-81	7-13-81	7-29-81	8-13-81	9-03-81	10-06-81
1.0	---	---	---	---	---	---	---	---
.50	---	100	100	---	---	---	100	---
.25	---	98	98	100	100	100	99	---
.125	---	76	74	97	88	86	75	---
.062	43	61	48	86	67	65	59	40
.031	---	51	36	72	52	53	51	---
.016	---	42	29	58	40	41	45	---
.008	---	31	22	41	28	29	28	---
.004	---	20	14	25	20	20	26	---
.002	---	12	8	17	12	12	18	---

Table 41.--Particle-size distribution of suspended sediment, Tanana River at lower end Goose Island

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	9-05-80	9-17-80	10-08-80	6-19-81	7-02-81	7-16-81	7-28-81	8-14-81	9-04-81	10-07-81
1.0	---	---	---	---	---	---	---	---	---	---
.50	---	---	---	---	---	---	---	---	---	---
.25	---	---	---	100	100	100	100	100	100	---
.125	---	---	---	85	85	90	94	93	81	---
.062	39	50	38	67	72	68	75	78	64	11
.031	---	---	---	57	58	55	58	65	56	---
.016	---	---	---	46	50	43	45	51	47	---
.008	---	---	---	35	38	30	33	37	33	---
.004	---	---	---	24	28	22	24	25	23	---
.002	---	---	---	15	23	14	16	15	15	---

Table 42.--Particle-size distribution of suspended sediment, Tanana River at upper end Goose Island

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	9-05-80	9-17-80	10-08-80	3-06-81	3-24-81	6-19-81
1.0	---	---	---	---	---	---
.50	---	---	---	---	---	---
.25	---	---	---	---	---	100
.125	---	---	---	---	---	79
.062	33	42	41	41	51	63
.031	---	---	---	---	---	53
.016	---	---	---	---	---	42
.008	---	---	---	---	---	30
.004	---	---	---	---	---	20
.002	---	---	---	---	---	13

Particle size (mm)	7-02-81	7-16-81	7-28-81	8-14-81	9-04-81	10-07-81
1.0	---	---	---	---	---	---
.50	100	---	---	---	100	---
.25	98	100	100	100	98	---
.125	75	85	94	94	66	---
.062	54	60	75	78	50	37
.031	42	49	58	63	44	---
.016	35	39	45	50	38	---
.008	28	27	33	36	28	---
.004	22	18	23	25	18	---
.002	14	12	16	16	12	---

Table 43.--Particle-size distribution of suspended sediment, Tanana River near North Pole

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	6-24-80	7-17-80	7-31-80	8-12-80	9-04-80	9-18-80	10-09-80
1.0	---	---	---	---	---	---	---
.50	100	100	100	100	---	---	---
.25	97	98	99	98	---	---	---
.125	76	86	89	86	---	---	---
.062	54	72	70	70	39	70	52
.031	45	56	52	55	---	---	---
.016	37	47	41	42	---	---	---
.008	31	30	30	30	---	---	---
.004	23	20	21	20	---	---	---
.002	16	13	14	14	---	---	---

Particle size (mm)	6-16-81	7-01-81	7-14-81	7-31-81	8-12-81	9-01-81	10-15-81
1.0	---	---	---	---	---	---	---
.50	100	---	---	100	100	100	---
.25	97	100	100	99	99	98	---
.125	67	81	91	91	91	78	---
.062	50	57	70	75	76	66	43
.031	42	48	57	59	60	60	---
.016	36	40	44	46	45	51	---
.008	29	30	32	33	32	39	---
.004	20	16	22	22	21	27	---
.002	12	16	13	15	12	16	---

Table 44.--Particle-size distribution of suspended sediment, Tanana River above Chena River Floodway

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	9-04-80	9-18-80	10-09-80	6-17-81	7-01-81	7-15-81	7-31-81	8-12-81	9-01-81	10-15-81
1.0	---	---	---	---	---	---	---	---	---	---
.50	---	---	---	100	100	100	---	---	100	---
.25	---	---	---	98	97	99	100	100	98	---
.125	---	---	---	75	66	88	90	94	86	---
.062	31	75	43	58	44	71	72	78	73	36
.031	---	---	---	51	36	60	56	62	65	---
.016	---	---	---	42	30	49	46	47	55	---
.008	---	---	---	31	23	35	32	33	50	---
.004	---	---	---	21	16	22	22	22	34	---
.002	---	---	---	13	12	13	17	16	18	---

Table 45.--Particle-size distribution of bedload sediment, Tanana River at Byers Island

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	7-15-80	7-29-80	8-11-80	9-03-80	9-16-80	10-07-80	6-19-81
128	---	---	---	---	---	---	---
64	100	---	---	---	---	---	---
32	98.3	100	100	100	---	---	100
16	93.5	99.0	94.9	97.4	---	---	91.8
8	81.9	91.5	87.0	85.3	---	---	81.1
4	75.5	87.5	79.2	77.2	---	---	75.0
2	73.8	85.4	76.5	73.8	---	---	72.4
1	73.0	84.5	75.5	72.2	100	100	70.7
.5	68.4	27.3	73.2	70.6	99.8	99.9	69.3
.25	27.0	14.0	25.2	31.5	74.0	49.8	33.0
.125	4.0	4.0	6.5	10.5	8.9	8.6	4.0
.062	1.1	.7	.7	.4	.5	.2	.3

Particle size (mm)	6-30-81	7-13-81	7-30-81	8-13-81	9-04-81	10-07-81
128	---	---	---	---	---	---
64	100	---	---	100	---	---
32	97.9	---	100	95.5	100	---
16	85.1	100	95.6	86.0	98.7	---
8	65.3	98.5	90.9	73.5	97.5	100
4	56.9	97.5	87.6	67.2	97.2	99.9
2	55.4	97.3	85.9	65.2	97.1	99.9
1	55.2	97.2	85.0	64.7	97.0	99.0
.5	54.9	96.2	82.8	64.7	97.0	99.0
.25	26.4	42.7	35.0	49.8	86.0	70.0
.125	3.5	20.5	8.4	6.3	6.0	3.0
.062	.4	5.5	1.1	.6	.2	.1

Table 46.--Particle-size distribution of bedload sediment, Tanana River at Fairbanks

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	6-18-80	6-25-80	7-15-80	7-30-80	8-11-80	9-03-80	9-16-80	10-07-80	10-23-80
128	---	---	---	---	---	---	---	---	---
64	100	---	100	100	100	---	---	---	---
32	97.7	100	85.0	96.8	96.3	100	100	100	100
16	79.4	96.1	72.7	80.6	73.3	95.8	73.9	93.9	76.1
8	64.5	93.0	64.6	47.3	45.9	80.3	57.5	60.0	48.3
4	57.6	91.6	60.0	29.4	32.8	64.7	49.9	43.1	39.6
2	56.2	91.3	58.6	24.4	28.2	59.9	47.8	41.2	37.8
1	55.5	91.2	58.2	22.7	26.7	58.0	47.0	41.0	37.5
.5	54.5	90.6	57.4	20.1	26.0	56.0	46.0	40.0	37.0
.25	23.7	31.8	20.8	4.0	18.0	25.0	34.0	25.0	27.0
.125	3.9	2.4	3.1	1.1	2.0	1.0	2.0	1.0	1.0
.062	1.4	.4	.9	.3	.3	.1	.2	.0	.1

Particle size (mm)	5-22-81	6-18-81	6-30-81	7-13-81	7-29-81	8-13-81	9-03-81	10-06-81
128	---	---	---	---	---	---	---	---
64	100	---	---	100	---	100	---	---
32	92.9	100	100	95.8	100	94.1	100	---
16	79.9	95.0	96.6	71.1	94	88.5	99.0	---
8	67.0	84.9	91.7	36.5	84.7	76.5	98.0	100
4	62.5	79.8	89.8	21.4	78.5	68.6	97.2	99.9
2	61.6	78.3	89.3	18.0	76.4	65.4	96.7	99.7
1	61.2	77.7	89.0	17.1	75.8	64.3	96.6	99.0
.5	60.7	76.3	88.4	15.8	74.9	63.5	96.6	99.0
.25	14.4	23.3	24.9	2.7	23.6	49.8	85.2	59.0
.125	1.5	2.5	4.5	1.2	4.8	6.1	5.2	3.0
.062	.1	.3	.7	.2	.7	.7	.2	.0

Table 47.--Particle-size distribution of bedload sediment, Tanana River at lower end Goose Island

[Percentage, by weight, than particle size indicated]

Particle size (mm)	7-16-80	7-30-80	8-11-80	9-05-80	9-17-80	10-08-80	6-19-81
128	---	---	---	---	---	---	---
64	100	100	100	---	---	---	---
32	98.3	88.4	89.2	---	---	---	100
16	80.9	77.2	65.6	---	---	---	98.4
8	61.5	65.3	41.0	---	---	100	95.3
4	53.9	59.3	26.9	---	100	99.6	94.3
2	51.3	57.3	22.2	---	99.9	99.3	93.9
1	50.5	56.8	21.0	---	99.8	99.0	93.5
.5	49.3	56.1	20.0	100	99.8	99.0	90.6
.25	17.6	22.5	15.0	73.0	89.0	73.0	16.5
.125	2.7	3.4	2.0	4.0	6.0	3.0	1.9
.062	.6	.8	.3	.2	.4	.1	.2

Particle size (mm)	7-02-81	7-16-81	7-28-81	8-14-81	9-04-81	10-07-81
128	---	---	---	---	---	---
64	---	100	100	100	---	---
32	100	73.1	95.7	92.9	100	---
16	97.3	46.4	72.0	68.7	98.5	100
8	89.3	28.9	43.0	36.3	94.3	99.9
4	84.3	22.0	31.3	18.8	91.5	99.3
2	83.2	19.5	28.1	14.3	90.3	99.0
1	83.1	18.9	27.2	13.2	89.3	98.7
.5	82.7	18.5	26.2	12.9	89.3	98.7
.25	22.4	5.8	16.0	6.6	73.2	72.8
.125	2.7	1.5	2.9	0.7	7.2	3.0
.062	.2	.3	.5	.1	.3	.0

Table 48.--Particle-size distribution of bedload sediment, Tanana River at upper end Goose Island

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	7-16-80	7-30-80	8-11-80	9-05-80	9-17-80	10-08-80	3-06-81	3-24-81
128	---	---	---	---	---	---	---	---
64	100	100	100	---	---	---	100	---
32	94.1	93.9	84.3	100	---	100	96.8	---
16	82.0	67.7	63.6	94.9	100	65.7	94.0	100
8	73.7	48.5	60.0	84.5	92.1	49.6	90.9	94.9
4	70.1	39.6	58.3	81.3	90.0	45.8	87.1	80.8
2	69.4	26.3	57.8	80.5	90.2	44.7	86.3	79.1
1	69.2	25.5	57.6	80.1	90.0	44.6	86.0	77.9
.5	35.2	23.9	57.4	78.5	89.0	44.6	83.2	75.6
.25	8.2	14.5	41.1	6.8	63.0	38.0	5.4	6.2
.125	1.1	2.9	10.0	6.4	4.0	1.0	2.5	2.3
.062	.2	.5	1.5	.1	.1	.0	.1	.2

Particle size (mm)	6-19-81	7-02-81	7-16-81	7-28-81	8-14-81	9-04-81	10-07-81
128	---	---	---	---	---	---	---
64	100	---	100	100	100	---	---
32	95.0	100	91.5	91.0	88.9	100	---
16	80.9	98.1	72.0	67.1	75.3	92.1	100
8	69.2	88.6	56.9	39.7	58.5	78.4	95.9
4	65.7	82.6	48.4	27.1	51.3	71.4	91.5
2	65.0	81.7	46.4	23.3	49.0	69.5	91.4
1	64.8	81.6	45.7	21.9	48.4	68.2	91.0
.5	64.0	81.5	42.5	20.4	47.8	67.2	91.0
.25	8.5	32.7	17.0	9.2	37.4	45.2	59.0
.125	1.0	2.9	3.4	2.8	7.7	2.0	3.0
.062	.1	.3	.6	.6	.5	.1	.0

Table 49.--Particle-size distribution of bedload sediment, Tanana River near North Pole

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	North Channel							South Channel			
	6-24-80	7-17-80	7-31-80	8-12-80	9-04-80	9-18-80	10-09-80	6-24-80	7-17-80	7-31-80	8-12-80
128	---	---	---	---	---	---	---	---	---	---	---
64	100	---	100	---	---	---	---	100	100	---	---
32	95.7	---	93.4	100	100	---	---	91.0	64.7	---	100
16	87.4	---	74.3	93.0	97.8	100	---	66.0	42.8	100	78.5
8	79.6	---	52.3	88.5	95.0	99.2	100	31.3	37.1	98.1	67.2
4	76.0	---	43.8	87.2	94.8	98.9	99.9	25.8	35.5	97.2	66.0
2	74.9	---	41.4	87.0	94.3	98.8	99.7	24.9	34.8	96.8	65.7
1	74.4	100	40.4	86.9	93.9	98.7	99.6	24.1	34.3	96.7	65.6
.5	73.4	99.4	38.8	86.9	93.0	98.7	99.6	22.4	33.4	94.3	65.6
.25	35.4	85.6	11.1	75.0	55.0	75.0	78.0	8.4	17.4	26.4	60.0
.125	5.3	13.9	2.8	20.0	3.0	5.0	3.0	1.0	3.3	7.0	19.0
.062	.9	2.7	.6	4.0	.2	.4	.1	.2	.8	2.0	3.0

Particle size (mm)	South Channel			Composite Channels						
	9-04-80	9-18-80	10-09-80	6-24-80	7-17-80	7-31-80	8-12-80	9-04-80	9-18-80	10-09-80
128	---	---	---	---	---	---	---	---	---	---
64	100	---	---	100	100	100	---	100	---	---
32	86.7	---	---	93.5	67.6	94.4	100	89.9	---	---
16	71.7	100	---	77.2	47.5	78.0	86.9	78.1	100	---
8	39.1	94.4	100	56.6	42.3	59.0	79.6	52.7	98.7	100
4	33.7	89.3	98.3	52.1	40.8	51.6	78.3	48.6	98.0	99.7
2	33.3	88.6	98.3	51.1	40.2	49.4	78.1	48.2	97.8	99.5
1	33.0	88.0	98.0	50.5	39.7	48.6	78.0	47.9	97.7	99.4
.5	33.0	88.0	98.0	49.1	38.9	46.9	78.0	47.6	97.7	99.4
.25	19.0	80.0	91.0	22.5	23.0	13.3	68.7	27.8	75.5	79.8
.125	1.0	7.0	11.0	3.3	4.2	3.4	19.6	1.5	5.2	4.1
.062	.1	.4	.2	.6	1.0	.8	3.6	.1	.4	.1

Table 49.--Continued

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	North Channel							South Channel			
	6-16-81	7-01-81	7-14-81	7-31-81	8-12-81	9-01-81	10-15-81	6-16-81	7-01-81	7-14-81	7-31-81
128	---	---	---	100	---	---	---	---	---	---	---
64	100	100	100	95.2	100	100	---	---	100	100	100
32	81.0	84.7	89.2	82.1	96.8	94.0	---	100	94.4	83.9	96.6
16	64.7	67.3	80.3	67.3	76.7	81.9	100	91.7	62.2	53.0	86.7
8	54.7	55.8	71.1	51.5	64.8	78.2	99.7	64.8	56.0	38.9	79.4
4	50.6	51.8	67.6	43.7	59.2	76.4	99.3	44.9	55.7	34.2	75.7
2	48.8	49.8	66.6	41.3	57.3	75.6	99.1	42.8	55.7	33.1	74.9
1	48.1	49.1	66.3	40.4	56.6	75.2	99.0	42.8	55.7	32.8	74.4
.5	46.2	48.0	65.3	39.9	56.0	74.8	99.0	42.4	55.3	32.3	73.4
.25	11.9	20.0	28.3	29.0	43.9	57.0	69.0	14.9	21.6	15.2	57.6
.125	1.4	3.2	8.1	2.6	8.3	3.6	4.0	1.1	2.9	2.9	6.3
.062	.1	.3	1.8	.3	.6	.3	.1	.1	.4	.5	.7

Particle size (mm)	South Channel			Composite Channels						
	8-12-81	9-01-81	10-15-81	6-16-81	7-01-81	7-14-81	7-31-81	8-12-81	9-01-80	10-15-81
128	---	---	---	---	---	---	100	---	---	---
64	---	---	---	100	100	100	96.5	100	100	---
32	100	---	100	89.7	86.5	87.4	86.0	98.2	96.2	100
16	81.9	100	81.5	77.0	66.4	71.2	72.6	79.1	88.7	96.7
8	34.0	97.1	78.5	59.3	55.8	60.4	59.0	50.9	85.2	95.9
4	20.8	96.7	77.1	48.0	52.5	56.5	52.3	41.8	84.0	95.3
2	19.6	96.7	77.0	46.1	50.9	55.5	50.4	40.2	83.5	95.1
1	19.4	96.0	76.8	45.7	50.3	55.2	49.6	39.7	83.0	95.0
.5	19.3	96.0	76.0	44.5	49.3	54.3	49.0	39.3	82.7	94.9
.25	15.9	72.0	71.0	13.3	20.3	24.0	36.8	31.2	62.6	69.4
.125	2.0	6.0	3.0	1.3	3.1	6.4	3.6	5.4	4.5	3.8
.062	.2	.3	.0	.1	.3	1.4	.4	.4	.3	.1

Table 50.--Particle-size distribution of bedload sediment, Tanana River above Chena River Floodway

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	North Channel						South Channel		
	7-18-80	8-01-80	8-12-80	9-04-80	9-18-80	10-09-80	7-18-80	8-01-80	8-12-80
128	---	---	---	---	---	---	---	---	---
64	100	100	100	---	---	---	100	100	100
32	95.4	95.6	80.8	100	---	---	84.0	94.2	92.5
16	89.6	77.5	59.6	83.7	100	---	71.8	77.2	86.1
8	82.5	56.9	47.7	77.6	98.4	---	64.2	67.7	40.0
4	79.3	49.5	42.6	77.1	97.1	100	62.6	62.8	26.9
2	78.6	48.2	40.3	76.8	96.9	99.9	62.1	60.8	24.6
1	78.2	47.7	39.1	76.6	96.0	99.9	61.8	59.8	24.1
.5	76.8	45.9	34.1	76.6	96.0	99.0	60.9	58.1	22.4
.25	38.7	14.8	8.2	48.0	77.0	78.0	37.2	17.6	9.3
.125	8.5	2.8	3.2	2.0	5.0	4.0	9.7	5.5	2.1
.062	2.2	.4	.4	.1	.3	.1	2.9	.6	.2

Particle size (mm)	South Channel			Composite Channels					
	9-04-80	9-18-80	10-09-80	7-18-80	8-01-80	8-12-80	9-04-80	9-18-80	10-09-80
128	---	---	---	---	---	---	---	---	---
64	---	100	---	100	100	100	---	100	---
32	100	78.8	---	93.3	95.1	85.1	100	87.2	---
16	83.5	52.9	---	86.4	77.4	69.3	83.7	71.7	---
8	76.7	23.8	---	79.2	61.0	44.9	77.4	53.5	---
4	71.5	12.1	100	76.3	54.6	36.8	75.9	46.0	100
2	68.5	11.6	99.8	75.6	53.0	34.5	75.0	45.6	99.9
1	67.8	11.6	99.5	75.2	52.3	33.6	74.7	45.2	99.8
.5	67.0	11.6	98.0	73.9	50.6	29.8	74.6	45.2	98.9
.25	38.0	6.0	72.0	38.4	15.9	8.6	45.9	34.3	77.2
.125	1.0	1.0	3.0	8.7	3.8	2.8	1.8	2.6	3.9
.062	.1	.1	.1	2.3	.5	.3	.1	.2	.1

Table 50.--Continued

[Percentage, by weight, finer than particle size indicated]

Particle size (mm)	North Channel							South Channel			
	6-17-81	7-01-81	7-15-81	7-31-81	8-12-81	9-01-81	10-15-81	6-17-81	7-01-81	7-15-81	7-31-81
128	---	---	---	---	---	---	---	---	---	---	---
64	100	100	---	100	100	---	---	100	---	100	100
32	88.9	70.6	100	98.0	92.1	---	100	86.6	100	75.6	73.0
16	77.5	47.1	90.8	83.5	92.1	100	91.2	60.5	68.2	55.6	50.1
8	72.1	35.1	79.1	63.9	87.9	99.1	81.6	40.3	48.8	42.5	37.3
4	68.5	31.3	72.7	56.5	85.2	98.2	77.9	24.8	42.3	33.5	26.7
2	66.9	29.5	70.3	54.3	83.8	97.7	77.1	21.8	39.5	30.8	20.1
1	66.0	28.8	69.5	53.2	82.9	96.8	76.1	21.2	37.5	29.5	18.3
.5	60.5	27.9	68.4	52.2	81.6	96.7	75.6	19.3	34.2	26.9	18.0
.25	11.6	10.1	22.9	35.5	55.2	88.1	43.7	2.1	2.7	8.9	12.6
.125	1.4	1.8	4.5	4.0	9.3	10.1	3.0	.4	.9	2.5	1.4
.062	.1	.3	.8	.3	2.1	.4	.0	.1	.0	.4	.1

Particle size (mm)	South Channel			Composite Channels						
	8-12-81	9-01-81	10-15-81	6-17-81	7-01-81	7-15-81	7-31-81	8-12-81	9-01-81	10-15-81
128	---	---	---	---	---	---	---	---	---	---
64	100	---	---	100	100	100	100	100	---	---
32	85.1	100	---	88.3	75.2	91.5	88.6	88.8	100	100
16	64.1	84.0	---	72.9	50.4	78.5	71.0	78.7	98.3	94.4
8	56.0	75.3	100	63.5	37.3	66.3	53.9	72.6	96.6	88.1
4	53.3	72.6	99.9	56.7	33.0	59.0	45.3	69.9	95.4	85.7
2	51.1	71.5	99.9	54.8	31.1	56.5	41.4	68.1	94.9	85.2
1	48.8	70.0	96.0	53.9	30.2	55.5	40.1	66.6	93.9	83.2
.5	47.0	69.0	95.0	49.4	28.9	53.9	39.4	65.0	93.7	82.5
.25	36.5	51.0	43.0	9.0	8.9	18.0	26.9	46.2	84.2	43.5
.125	5.4	4.0	3.0	1.1	1.6	3.8	3.0	7.4	9.4	3.0
.062	.9	.1	.1	.1	.2	.7	.0	1.5	.3	.1

Table 51.--Statistical data for particle-size distribution of bedload sediment, Tanana River at Byers Island

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	7-15-80	7-29-80	8-11-80	9-03-80	9-16-80	10-07-80	6-19-81
d_5	0.13	0.14	0.11	0.10	0.11	0.11	0.13
d_{16}	.20	.28	.19	.16	.14	.15	.19
d_{35}	.29	.55	.29	.27	.17	.21	.26
d_{50}	.37	.65	.36	.35	.20	.25	.35
d_{65}	.47	.76	.44	.45	.23	.27	.46
d_{84}	8.9	.99	6.0	7.1	.28	.31	9.4
d_{90}	12	6.0	9.9	9.6	.30	.33	14
d_{95}	19	9.8	16	13	.34	.36	18

Percent finer parameter	6-30-81	7-13-81	7-30-81	8-13-81	9-04-81	10-07-81
d_5	0.14	0.06	0.10	0.12	0.12	0.13
d_{16}	.20	.11	.16	.16	.14	.16
d_{35}	.31	.20	.25	.21	.17	.19
d_{50}	.45	.27	.31	.25	.19	.21
d_{65}	7.8	.31	.37	1.4	.21	.24
d_{84}	15	.38	.76	14	.24	.30
d_{90}	19	.42	6.5	20	.30	.33
d_{95}	24	.48	14	30	.41	.38

Table 52.--Statistical data for particle-size distribution of bedload sediment, Tanana River at Fairbanks

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	6-18-80	6-25-80	7-15-80	7-30-80	8-11-80	9-03-80	9-16-80	10-07-80	10-23-80
d_5	0.14	0.15	0.14	0.27	0.16	0.17	0.15	0.17	0.16
d_{16}	.21	.20	.22	.44	.24	.22	.20	.22	.21
d_{35}	.33	.26	.34	5.0	4.5	.32	.27	.40	.44
d_{50}	.45	.30	.44	8.4	8.8	.44	4.0	5.3	8.3
d_{65}	8.2	.35	8.2	11	13	4.0	11	8.6	12
d_{84}	18	.44	30	18	20	9.0	18	12	17
d_{90}	21	.49	35	21	24	11	19	14	19
d_{95}	26	12	39	28	29	15	21	17	21

Percent finer parameter	5-22-81	6-18-81	6-30-81	7-13-81	7-29-81	8-13-81	9-03-81	10-06-81
d_5	0.17	0.15	0.13	0.31	0.13	0.12	0.12	0.14
d_{16}	.26	.21	.20	.52	.20	.16	.15	.17
d_{35}	.36	.29	.28	7.5	.30	.21	.17	.20
d_{50}	.43	.35	.32	10	.36	.25	.19	.23
d_{65}	5.8	.43	.37	14	.43	1.5	.21	.26
d_{84}	19	7.1	.47	21	7.5	12	.25	.32
d_{90}	26	11	4.3	25	11	19	.31	.35
d_{95}	35	16	12	30	17	33	.43	.40

Table 53.--Statistical data for particle-size distribution of bedload sediment, Tanana River at lower end Goose Island

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	7-16-80	7-30-80	8-11-80	9-05-80	9-17-80	10-08-80	6-19-81
d_5	0.15	0.14	0.17	0.13	0.12	0.13	0.16
d_{16}	.24	.21	.28	.16	.14	.16	.25
d_{35}	.38	.33	6.0	.19	.17	.19	.30
d_{50}	.75	.44	10	.21	.18	.21	.34
d_{65}	8.9	7.7	16	.23	.20	.23	.38
d_{84}	17	24	26	.28	.24	.29	.45
d_{90}	20	33	33	.30	.26	.33	.49
d_{95}	25	38	37	.33	.30	.38	6.4

Percent finer parameter	7-02-81	7-16-81	7-28-81	8-14-81	9-04-81	10-07-81
d_5	0.15	0.23	0.15	0.23	0.11	0.13
d_{16}	.22	.45	.25	2.6	.15	.16
d_{35}	.29	10	5.0	7.6	.18	.19
d_{50}	.34	17	9.4	11	.20	.21
d_{65}	.40	26	13	15	.23	.24
d_{84}	3.6	36	21	23	.38	.30
d_{90}	8.3	39	25	28	1.6	.33
d_{95}	12	43	31	35	8.6	.39

Table 54.--Statistical data for particle-size distribution of bedload sediment, Tanana River at upper end Goose Island

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	7-16-80	7-30-80	8-11-80	9-05-80	9-17-80	10-08-80	3-06-81	3-24-81
d_5	0.21	0.15	0.09	0.12	0.13	0.16	0.23	0.21
d_{16}	.33	.28	.15	.29	.16	.20	.29	.30
d_{35}	.50	3.2	.23	.35	.20	.24	.35	.36
d_{50}	.67	8.4	.37	.39	.22	8.1	.39	.40
d_{65}	.91	14	17	.44	.26	15	.43	.45
d_{84}	18	23	32	7.4	.42	19	.62	4.5
d_{90}	24	27	35	11	1.0	20	6.7	5.8
d_{95}	33	33	40	16	8.8	22	20	8.0

Percent finer parameter	6-19-81	7-02-81	7-16-81	7-28-81	8-14-81	9-04-81	10-07-81
d_5	0.21	0.14	0.14	0.17	0.11	0.14	0.14
d_{16}	.29	.19	.24	.39	.16	.18	.17
d_{35}	.37	.26	.42	6.2	.24	.23	.20
d_{50}	.43	.32	4.6	10	2.7	.29	.23
d_{65}	1.8	.38	11	15	10	.46	.28
d_{84}	18	4.7	23	25	24	10	.40
d_{90}	23	8.5	30	31	33	14	.48
d_{95}	32	11	36	36	38	18	6.7

Table 55.--Statistical data for particle-size distribution of bedload sediment, Tanana River near North Pole

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	North Channel						
	6-24-80	7-17-80	7-31-80	8-12-80	9-04-80	9-18-80	10-09-80
d_5	0.12	0.08	0.16	0.07	0.14	0.13	0.13
d_{16}	.18	.13	.29	.11	.17	.15	.16
d_{35}	.25	.16	.46	.15	.21	.18	.18
d_{50}	.32	.18	6.6	.18	.24	.20	.20
d_{65}	.42	.20	12	.22	.29	.23	.23
d_{84}	12	.25	21	.41	.39	.29	.27
d_{90}	19	.28	27	9.8	.45	.33	.30
d_{95}	29	.33	34	17	8.0	.39	.35

Percent finer parameter	North Channel						
	6-16-81	7-01-81	7-14-81	7-31-81	8-12-81	9-01-81	10-15-81
d_5	0.18	0.14	0.10	0.15	0.11	0.13	0.13
d_{16}	.28	.22	.17	.20	.15	.17	.16
d_{35}	.41	.37	.29	.37	.22	.21	.19
d_{50}	3.2	2.1	.38	7.0	.35	.24	.21
d_{65}	16	14	.50	14	8.1	.34	.24
d_{84}	33	31	21	34	19	18	.30
d_{90}	36	35	33	45	23	24	.34
d_{95}	41	40	37	63	28	33	.39

Table 55.--Continued

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	South Channel						
	6-24-80	7-17-80	7-31-80	8-12-80	9-04-80	9-18-80	10-09-80
d_5	0.21	0.15	0.10	0.07	0.17	0.11	0.10
d_{16}	.38	.24	.18	.11	.24	.14	.13
d_{35}	8.7	2.4	.27	.17	4.7	.17	.16
d_{50}	12	20	.30	.21	10	.19	.17
d_{65}	16	32	.34	.46	14	.22	.19
d_{84}	25	38	.42	17	28	.35	.23
d_{90}	31	40	.46	19	34	4.3	.25
d_{95}	36	44	.59	21	39	8.2	.34

Percent finer parameter	South Channel						
	6-16-81	7-01-81	7-14-81	7-31-81	8-12-81	9-01-81	10-15-81
d_5	0.18	0.15	0.15	0.11	0.16	0.12	0.13
d_{16}	.26	.22	.26	.15	.25	.15	.16
d_{35}	.43	.34	4.5	.20	8.1	.18	.19
d_{50}	4.8	.45	14	.23	9.9	.21	.21
d_{65}	8.0	17	20	.34	12	.23	.24
d_{84}	12	23	32	12	16	.32	17
d_{90}	15	27	35	19	18	.38	18
d_{95}	18	33	40	27	20	.47	20

Table 55.--Continued

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	Composite Channels						
	6-24-80	7-17-80	7-31-80	8-12-80	9-04-80	9-18-80	10-09-80
d_5	0.14	0.13	0.15	0.07	0.16	0.12	0.13
d_{16}	.21	.21	.27	.11	.21	.15	.15
d_{35}	.35	.43	.41	.16	.33	.18	.18
d_{50}	.78	17	2.4	.19	5.1	.20	.20
d_{65}	10	29	9.8	.24	11	.23	.22
d_{84}	20	37	19	12	22	.29	.27
d_{90}	26	40	25	17	32	.34	.30
d_{95}	34	44	33	19	37	.41	.35

Percent finer parameter	Composite Channels						
	6-16-81	7-01-81	7-14-81	7-31-81	8-12-81	9-01-81	10-15-81
d_5	0.18	0.15	0.11	0.13	0.12	0.13	0.13
d_{16}	.27	.22	.19	.18	.18	.16	.16
d_{35}	.42	.37	.33	.24	.35	.20	.19
d_{50}	4.5	.81	.46	1.4	7.5	.22	.21
d_{65}	9.8	15	11	11	11	.27	.24
d_{84}	23	29	27	28	18	4.3	.34
d_{90}	32	34	34	39	21	17	.40
d_{95}	37	39	38	55	25	27	1.0

Table 56.--Statistical data for particle-size distribution of bedload sediment, Tanana River above Chena River Floodway

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	North Channel						
	7-18-80	8-01-80	8-12-80	9-04-80	9-18-80	10-09-80	6-17-81
d_5	0.09	0.15	0.17	0.14	0.13	0.13	0.18
d_{16}	.16	.26	.33	.18	.15	.15	.27
d_{35}	.23	.41	.57	.22	.18	.18	.37
d_{50}	.30	4.2	9.1	.26	.20	.20	.44
d_{65}	.39	10	19	.37	.23	.22	.88
d_{84}	9.2	19	33	16	.30	.28	23
d_{90}	17	23	36	18	.36	.31	33
d_{95}	30	31	41	20	.47	.37	38

Percent finer parameter	North Channel					
	7-01-81	7-15-81	7-31-81	8-12-81	9-01-81	10-15-81
d_5	0.18	0.13	0.13	0.09	0.10	0.14
d_{16}	.33	.21	.18	.15	.14	.18
d_{35}	7.9	.31	.25	.20	.16	.23
d_{50}	17	.38	.46	.23	.18	.28
d_{65}	27	.47	8.3	.31	.20	.39
d_{84}	36	10	16	2.4	.24	9.3
d_{90}	39	15	19	11	.28	14
d_{95}	43	18	25	35	.41	18

Table 56.--Continued

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	South Channel						
	7-18-80	8-01-80	8-12-80	9-04-80	9-18-80	10-09-80	6-17-81
d_5	0.08	0.12	0.18	0.16	0.23	0.13	0.32
d_{16}	.15	.23	.37	.20	5.2	.16	.46
d_{35}	.24	.35	6.2	.24	11	.19	6.4
d_{50}	.36	.44	9.1	.33	15	.21	11
d_{65}	8.6	5.4	11	.47	22	.24	18
d_{84}	32	20	15	16	34	.30	29
d_{90}	35	25	24	18	37	.35	34
d_{95}	40	33	35	20	41	.41	39

Percent finer parameter	South Channel					
	7-01-81	7-15-81	7-31-81	8-12-81	9-01-81	10-15-81
d_5	0.28	0.18	0.18	0.12	0.13	0.14
d_{16}	.38	.35	.39	.17	.17	.18
d_{35}	.59	4.5	6.9	.24	.21	.23
d_{50}	8.3	12	16	1.4	.25	.27
d_{65}	14	22	25	16	.42	.31
d_{84}	18	35	36	31	16	.39
d_{90}	20	38	39	35	18	.44
d_{95}	22	42	43	39	20	.50

Table 56.--Continued

[Particle diameter (mm) at given percent-finer parameter]

Percent finer parameter	Composite Channels						
	7-18-80	8-01-80	8-12-80	9-04-80	9-18-80	10-09-80	6-17-81
d_5	0.09	0.14	0.18	0.15	0.14	0.13	0.20
d_{16}	.16	.25	.34	.18	.19	.15	.30
d_{35}	.24	.38	2.3	.23	.26	.18	.41
d_{50}	.31	.49	9.2	.27	5.8	.20	.55
d_{65}	.41	9.3	14	.39	12	.23	8.9
d_{84}	13	19	30	16	27	.28	25
d_{90}	22	24	35	18	34	.32	33
d_{95}	34	32	39	20	38	.37	38

Percent finer parameter	Composite Channels					
	7-01-81	7-15-81	7-31-81	8-12-81	9-01-81	10-15-81
d_5	0.19	0.14	0.14	0.10	0.11	0.14
d_{16}	.34	.23	.20	.16	.14	.18
d_{35}	5.5	.36	.40	.22	.17	.23
d_{50}	16	.47	5.8	.29	.19	.28
d_{65}	24	7.0	12	.50	.21	.35
d_{84}	35	21	26	22	.25	1.4
d_{90}	38	29	33	33	.36	9.5
d_{95}	42	36	38	38	2.3	16

Table 57.--Composite size distribution (transport-rate weighted) of bedload sediment, Tanana River, 1980

[In percent by weight]

Particle size (mm)	Byers Island		Fairbanks		Lower end Goose Is.		Upper end Goose Is.		North Pole		Chena R. Floodway	
	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer
128	---	---	---	---	---	---	---	---	---	---	---	---
64	---	100	---	100	---	100	---	100	---	100	---	100
32	0.5	99.5	3.2	96.8	7.5	92.5	6.8	93.2	8.1	91.9	9.0	91.0
16	3.1	96.4	15.9	80.9	15.8	76.7	16.8	76.4	15.3	76.6	15.2	75.8
8	8.0	88.4	24.5	56.4	16.7	60.0	10.7	65.7	16.7	59.9	17.5	58.3
4	5.4	83.0	12.6	43.8	8.7	51.3	4.7	61.0	5.1	54.8	6.3	52.0
2	1.9	81.1	3.3	40.5	2.9	48.4	3.8	57.2	1.3	53.5	1.6	50.4
1	.9	80.2	1.1	39.4	.8	47.6	.4	56.8	.6	52.9	.7	49.7
.5	17.3	62.9	1.4	38.0	.8	46.8	18.8	38.0	1.2	51.7	2.2	47.5
.25	35.1	27.8	20.6	17.4	20.1	26.7	22.2	15.8	26.5	25.2	27.7	19.8
.125	22.2	5.6	15.5	1.9	23.8	2.9	12.9	2.9	20.5	4.7	16.0	3.8
.062	4.8	.8	1.5	.4	2.4	.5	2.5	.4	3.8	.9	3.2	.6
<.062	.8	0	.4	0	.5	0	.4	0	.9	0	.6	0

Percent-finer parameter	Particle-size statistics [Particle diameter (mm) at given percent-finer parameter]					
d_5	0.12	0.16	0.14	0.15	0.13	0.14
d_{16}	.19	.24	.20	.25	.20	.22
d_{25}	.24	.33	.24	.35	.25	.29
d_{35}	.29	.46	.34	.46	.33	.38
d_{50}	.39	5.6	2.9	.78	.48	1.3
d_{65}	.54	9.9	9.7	7.2	9.7	10
d_{75}	.79	13	15	14	15	15
d_{84}	4.6	17	21	21	21	22
d_{90}	8.8	21	27	27	28	30
d_{95}	13	28	35	34	35	36

Table 58.--Composite size distribution (transport-rate weighted) of bedload sediment, Tanana River, 1981

[In percent by weight]

Particle size (mm)	Byers Island		Fairbanks		Lower end Goose Is.		Upper end Goose Is.		North Pole		Chena R. Floodway	
	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer	Percent retained	Percent finer
128	---	---	---	---	---	---	---	---	---	100	---	---
64	---	100	---	100	---	100	---	100	1.1	98.9	---	100
32	1.2	98.8	2.3	97.7	8.6	91.4	6.0	94.0	7.7	91.2	11.7	88.3
16	7.5	91.3	10.0	87.7	17.2	74.2	14.0	80.0	14.4	76.8	15.4	72.9
8	10.5	80.8	14.5	73.2	19.1	55.1	15.7	64.3	14.9	61.9	11.7	61.2
4	5.2	75.6	7.2	66.0	9.0	46.1	7.4	56.9	6.8	55.1	6.1	55.1
2	1.5	74.1	2.0	64.0	2.5	43.6	1.9	55.0	1.6	53.5	2.4	52.7
1	.6	73.5	.6	63.4	.7	42.9	.7	54.3	.5	53.0	1.2	51.5
.5	1.0	72.5	.9	62.5	.9	42.0	1.2	53.1	.8	52.2	1.8	49.7
.25	34.2	38.3	38.3	24.2	26.6	15.4	30.6	22.5	21.7	30.5	25.3	24.4
.125	31.6	6.7	20.9	3.3	13.4	2.0	19.2	3.3	26.6	3.9	21.2	3.2
.062	5.7	1.0	2.9	.4	1.7	.3	2.9	.4	3.5	.4	2.8	.4
<.062	1.0	0	.4	0	.3	0	.4	0	.4	0	.4	0

Percent-finer parameter	Particle-size statistics [Particle diameter (mm) at given percent-finer parameter]					
d_5	0.11	0.14	0.16	0.14	0.13	0.14
d_{16}	.17	.21	.25	.21	.19	.21
d_{25}	.20	.25	.33	.27	.23	.25
d_{35}	.24	.31	.43	.34	.29	.34
d_{50}	.31	.40	5.4	.47	.47	.56
d_{65}	.42	2.8	11	8.2	9.1	9.9
d_{75}	3.0	8.6	16	13	15	17
d_{84}	9.6	13	22	19	22	25
d_{90}	14	18	30	25	30	33
d_{95}	20	24	36	33	40	38

Table 59.--Sediment transport in the Tanana River at Fairbanks, water year 1980

Discharge equaled or exceeded (m^3/s)	Number of days	Percentage of time	Sediment-transport rate				Ratio of average bedload to average suspended (percent)	Sediment loads					
			Suspended		Bedload			Suspended			Bedload		
			Equaled or exceeded (Mg/d)	Average (Mg/d)	Equaled or exceeded (Mg/d)	Average (Mg/d)		Increment (Mg)	Cumulative (Mg)	Cumulative percentage of annual load	Increment (Mg)	Cumulative (Mg)	Cumulative percentage of annual load
1,670	1	0.3	525,000	---	3,930	---	0.8	525,000	525,000	2.4	3,930	3,930	1.4
1,650	1	.6	509,000	---	3,850	---	.8	509,000	1,030,000	4.7	3,850	7,780	2.9
1,550	1	.8	430,000	---	3,480	---	.8	430,000	1,460,000	6.6	3,480	11,300	4.2
1,460	1	1.1	366,000	---	3,150	---	.9	366,000	1,830,000	8.3	3,150	14,400	5.3
1,450	1	1.4	360,000	---	3,120	---	.9	360,000	2,190,000	9.9	3,120	17,500	6.4
1,420	4	2.5	340,000	---	3,010	---	.9	1,360,000	3,550,000	16.1	12,000	29,500	10.8
1,410	3	3.3	333,000	---	2,980	---	.9	999,000	4,550,000	20.7	8,940	38,500	14.2
1,400	4	4.4	327,000	---	2,940	---	.9	1,310,000	5,860,000	26.6	11,800	50,300	18.5
1,390	2	4.9	321,000	---	2,910	---	.9	642,000	6,500,000	29.6	5,820	56,100	20.6
1,380	3	5.7	315,000	---	2,870	---	.9	945,000	7,450,000	33.9	8,610	64,700	23.8
1,370	1	6.0	308,000	---	2,840	---	.9	308,000	7,750,000	35.2	2,840	67,500	24.8
1,360	2	6.6	302,000	---	2,810	---	.9	604,000	8,360,000	38.0	5,620	73,200	26.9
1,350	1	6.8	297,000	---	2,770	---	.9	97,000	8,660,000	39.4	2,770	75,900	27.9
1,340	2	7.4	291,000	---	2,740	---	.9	582,000	9,240,000	42.0	5,480	81,400	29.9
1,330	3	8.2	285,000	---	2,700	---	1.0	855,000	10,100,000	45.9	8,100	89,500	32.9
1,300	2	8.7	268,000	---	2,610	---	1.0	536,000	10,600,000	48.2	5,220	94,700	34.8
1,250	9	11.2	241,000	254,000	2,440	2,520	1.0	2,290,000	12,900,000	58.6	22,700	117,000	43.0
1,200	6	12.8	216,000	228,000	2,280	2,360	1.0	1,370,000	14,300,000	65.0	14,200	132,000	48.5
1,150	7	14.8	193,000	204,000	2,130	2,200	1.1	1,430,000	15,700,000	71.4	15,400	147,000	54.0
1,100	1	15.0	171,000	182,000	1,980	2,060	1.1	182,000	15,900,000	72.3	2,060	149,000	54.8
1,000	3	15.8	132,000	152,000	1,690	1,840	1.2	456,000	16,400,000	74.6	5,520	155,000	57.0
900	9	18.3	99,700	116,000	1,420	1,560	1.3	1,040,000	17,400,000	79.1	14,000	169,000	62.1
800	17	23.0	72,600	86,200	1,170	1,300	1.5	1,460,000	18,900,000	85.9	22,100	191,000	70.2
700	16	27.3	50,700	61,600	943	1,060	1.7	986,000	19,800,000	90.0	17,000	208,000	76.5
600	16	31.7	33,500	42,000	732	838	2.0	672,000	20,500,000	93.2	13,400	221,000	81.2
500	29	39.6	20,500	27,000	543	638	2.4	783,000	21,300,000	96.8	18,500	240,000	88.2
400	25	46.4	11,300	15,900	376	460	2.9	398,000	21,700,000	98.6	11,500	251,000	92.3
300	10	49.2	5,200	8,250	235	306	3.7	82,500	21,800,000	99.1	3,060	254,000	93.4
200	21	54.9	1,750	3,480	121	178	---	73,100	21,800,000	99.1	3,740	258,000	94.8
119	165	100.0	432	1,090	51	86	---	180,000	22,000,000	100.0	14,200	272,000	100.0

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Table 60.--Sediment transport in the Tanana River at Fairbanks, water year 1981

Discharge equaled or exceeded (m^3/s)	Number of days	Percentage of time	Sediment-transport rate: Suspended: Equaled or exceeded (Mg/d)	Sediment-transport rate: Suspended: Average (Mg/d)	Sediment-transport rate: Bedload: Equaled or exceeded (Mg/d)	Sediment-transport rate: Bedload: Average (Mg/d)	Ratio of average bedload to average suspended (percent)	Sediment loads: Suspended: Increment (Mg)	Sediment loads: Suspended: Cumulative (Mg)	Sediment loads: Suspended: Cumulative percentage of annual load	Sediment loads: Bedload: Increment (Mg)	Sediment loads: Bedload: Cumulative (Mg)	Sediment loads: Bedload: Cumulative percentage of annual load
1,670	1	0.3	525,000	---	3,930	---	0.8	525,000	525,000	2.4	3,930	3,930	1.4
1,840	1	.3	716,000	---	6,550	---	.9	716,000	716,000	2.6	6,550	6,550	2.0
1,780	1	.5	649,000	---	6,090	---	.9	649,000	1,360,000	4.9	6,090	12,600	3.8
1,770	1	.8	639,000	---	6,010	---	.9	639,000	2,000,000	7.2	6,010	18,600	5.6
1,760	1	1.1	628,000	---	5,940	---	.9	628,000	2,630,000	9.5	5,940	24,600	7.4
1,750	1	1.4	618,000	---	5,860	---	.9	618,000	3,250,000	11.7	5,860	30,400	9.1
1,740	2	1.9	607,000	---	5,790	---	.9	1,210,000	4,460,000	16.1	11,600	42,000	12.6
1,720	3	2.7	587,000	---	5,640	---	1.0	1,760,000	6,220,000	22.4	16,900	59,000	17.7
1,710	1	3.0	577,000	---	5,570	---	1.0	577,000	6,800,000	24.6	5,570	64,500	19.4
1,700	2	3.6	567,000	---	5,500	---	1.0	1,130,000	7,930,000	28.6	11,000	75,500	22.7
1,690	2	4.1	557,000	---	5,430	---	1.0	1,110,000	9,040,000	32.6	10,900	86,400	26.0
1,670	1	4.4	538,000	---	5,290	---	1.0	538,000	9,580,000	34.6	5,290	91,700	27.5
1,650	4	5.5	519,000	---	5,150	---	1.0	2,080,000	11,700,000	42.4	20,600	112,000	33.6
1,630	2	6.0	501,000	---	5,020	---	1.0	1,000,000	12,700,000	46.2	10,000	122,000	36.6
1,600	2	6.6	474,000	---	4,810	---	1.0	948,000	13,600,000	49.1	9,620	132,000	39.6
1,570	3	7.4	448,000	---	4,620	---	1.0	1,340,000	14,900,000	53.8	13,900	146,000	43.8
1,540	2	7.9	423,000	---	4,430	---	1.0	846,000	15,800,000	57.0	8,860	155,000	46.6
1,500	3	8.8	391,000	---	4,180	---	1.1	1,170,000	17,000,000	61.4	12,500	167,000	50.2
1,400	4	9.9	319,000	---	3,590	---	1.1	1,280,000	18,200,000	65.7	14,400	182,000	54.6
1,300	5	11.2	256,000	288,000	3,050	3,320	1.2	1,440,000	19,700,000	71.1	16,600	198,000	59.5
1,100	8	13.4	156,000	206,000	2,110	2,580	1.2	1,650,000	21,300,000	76.9	20,600	219,000	65.8
1,000	9	15.8	118,000	137,000	1,710	1,910	1.4	1,230,000	22,600,000	81.6	17,200	236,000	70.9
900	17	20.5	86,400	102,000	1,360	1,540	1.5	1,730,000	24,300,000	87.7	26,200	262,000	78.7
800	19	25.7	61,000	73,700	1,050	1,200	1.6	1,400,000	25,700,000	92.8	22,800	285,000	85.6
700	12	29.0	41,000	51,000	782	916	1.8	612,000	26,300,000	95.0	11,000	296,000	88.9
600	14	32.9	26,000	33,600	557	670	2.0	470,000	26,800,000	96.8	9,380	305,000	91.6
500	25	39.7	15,200	20,600	373	465	2.3	515,000	27,300,000	98.6	11,600	317,000	95.2
400	18	44.7	7,850	11,500	228	300	2.6	207,000	27,500,000	99.3	5,400	322,000	96.7
300	14	48.5	3,350	5,600	121	174	3.1	78,400	27,600,000	99.6	2,440	325,000	97.6
200	26	55.6	1,010	2,180	50	86	---	56,700	27,600,000	99.6	2,240	327,000	98.2
150	162	100.0	431	720	26	38	---	117,000	27,700,000	100.0	6,160	333,000	100.0