represents one rank. This downstream order and system of indention show which gaging stations are on tributaries between any two stations on a main stem and the rank of the tributary on which each gaging station is situated.

The order of listing used before the publication of the 1951 report listed first all stations on the main stem from headwaters toward mouth, then all stations on the uppermost tributary to the main stem from the tributary's source to mouth, and then all stations from source to mouth of the uppermost tributary to the tributary.

EXPLANATION OF DATA

The base data collected at gaging stations consist of records of stage and measurements of discharge. In addition, observations of factors affecting the stage-discharge relation, weather records, and other information are used to supplement base data in determining the daily flow. The records of stage are obtained either from direct readings on a nonrecording gage or from a water-stage recorder that gives a continuous record of fluctuations. Measurements of discharge are made with a current meter by the general methods adopted by the Geological Survey on the basis of experience in stream gaging since 1888. These methods are described in Water-Supply Paper 888 and are also outlined in standard textbooks on the measurement of stream discharge. Typical structures in use at gaging stations are shown in figure 1.

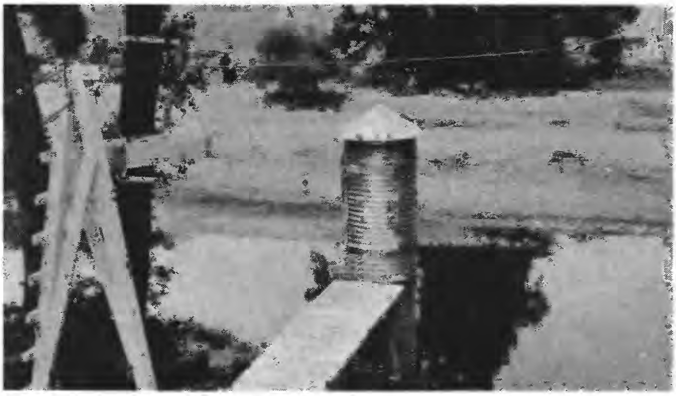
Rating tables giving the discharge for any stage are prepared from stage-discharge relation curves defined by discharge measurements. If extensions to the rating curves are necessary to define the extremes of discharge, they are made on the basis of indirect measurements of peak discharge (such as slope-area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

At some gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in determining discharge. Information requisite for determining the slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage. If so, the rate of change in stage is used as a factor in the determination of discharge.

At most gaging stations in the northern part of the United States and at some in the mountainous regions of other parts the stage-discharge relation is affected by ice during the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements, consideration being given to the available information on temperature and precipitation, notes by gage observers and engineers, and

A. FISH CREEK NEAR DUARTE, CALIF.

B. SACRAMENTO RIVER AT DELTA, CALIF.



C. NORTH FORK CACHE CREEK NEAR LOWER LAKE, CALIF.

FIGURE I.—GAGING-STATION STRUCTURES

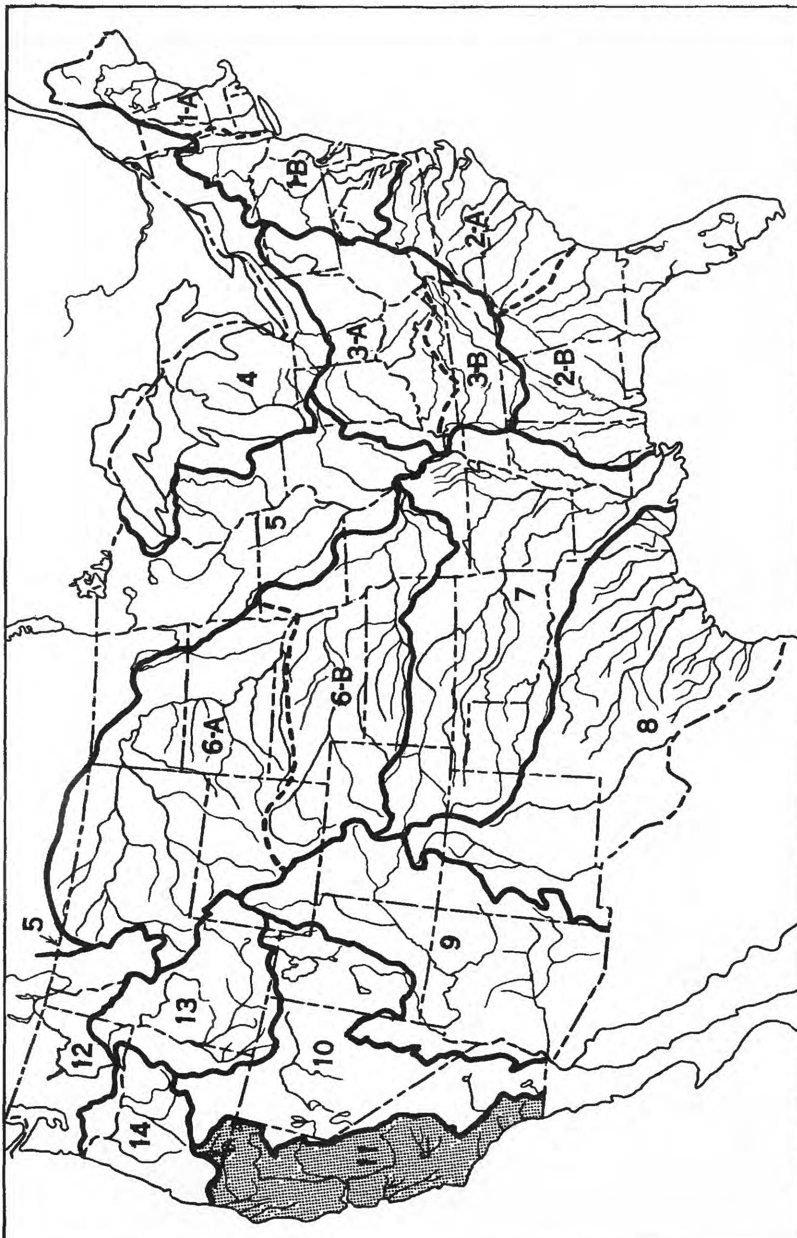


Figure 2.--Map of the United States showing areas covered by the 18 annual volumes on surface-water supply. The area covered by this report is shaded.

Reports containing compilations of records of discharge by States

WSP	Period	Report
298..........	1887-1912	Water resources of California, part 1, Stream measurements in Sacramento River basin.
299..........	1878-1912	Water resources of California, part 2, Stream measurements in San Joaquin River basin.
300..........	1891-1912	Water resources of California, part 3, Stream measurements in the Great Basin and Pacific Coast river basins.
370..........	1878-1910	Surface water supply of Oregon.
477..........	1890-1918	Surface water supply of Pacific slope of California.
597-E........	1895-1927	Surface water supply of Sacramento River basin.
636-D........	1895-1927	Surface water supply of San Joaquin River basin.
636-E........	1894-1927	Surface water supply of Pacific slope basins in southern California.
637-A........	1895-1927	Surface water supply of minor San Francisco Bay, northern Pacific, and Great basins in California.

Records of discharge have been published also in State reports. Some of these are not contained in the publications of the Geological Survey or are revisions of records previously published in its water-supply papers. The following table contains a list of these reports for the area covered by this report.

State reports containing compilations of records of discharge

State	Period	Report	Issued by
Oregon........	1878-1914	Bull. 4, Water resources of the State of Oregon.	Office of the State Engineer.
Do.........	1914-24	Bull. 7, Water resources of the State of Oregon.	Do.
Do.........	1924-30	Bull. 8, Water resources of the State of Oregon.	Do.
Do.........	1930-36	Bull. 9, Water resources of the State of Oregon.	Do.
Do.........	1936-41	Bull. 10, Water resources of the State of Oregon.	Do.

Note.--In addition to the records contained in the reports listed above, the States of California and Oregon have issued annual or biennial reports in which are contained records of discharge.

The reports listed in the foregoing tables contain the customary records of discharge collected during the systematic operation of gaging stations. Detailed information on the stage and discharge of many streams during major floods has been included is special reports on these floods published by the Geological Survey. The more recent of these special reports also contain other pertinent hydrologic information and analyses and compilations of data relating to earlier notable floods. The following is a list of these reports:

Report

WSP 147: Destructive floods in the United States in 1904.
WSP 426: Southern California floods of January 1916.
WSP 771: Floods in the United States, magnitude and frequency.
WSP 796-C: Flood in La Canada Valley, Calif., January 1, 1934.
WSP 843: Floods in December 1937 in northern California.
WSP 844: Floods of March 1938 in southern California.
WSP 847: Maximum discharges at stream-measurement stations through September 1938.
WSP 1137-E: Floods of 1950 in southwestern Oregon and northwestern California.
WSP 1137-F: Flood of November-December 1950 in Central Valley basin, California.
WSP 1227-D: Summary of floods in the United States during 1951.
WSP 1260-D: Flood of 1952 in California.

RECORDS OF DISCHARGE COLLECTED BY AGENCIES OTHER THAN THE GEOLOGICAL SURVEY

The table below contains a list of gaging stations for the area covered by this report, at which records of discharge were collected during the water year October 1952 to September 1953 by agencies other than the Geological Survey. The records of these stations are not contained in publications of the Geological Survey, nor have they been published elsewhere except as noted in footnotes to the table. Not listed are gaging stations on many canals for which records were collected in connection with the operation of irrigation projects.

Records of discharge collected by agencies other than the Geological Survey

Stream	Location	Period	Collected by
Alameda storm drain....	Alameda St. at Santiago Blvd., northeast of Orange, Calif.	1937-53	Orange County Flood Control District.
Alhambra Wash..........	Klingerman St., Wilmar, Calif........	1929-53	Los Angeles County Flood Control District.
Aliso Wash............	Nordhoff St., near Northridge, Calif.	1939-53	Do.