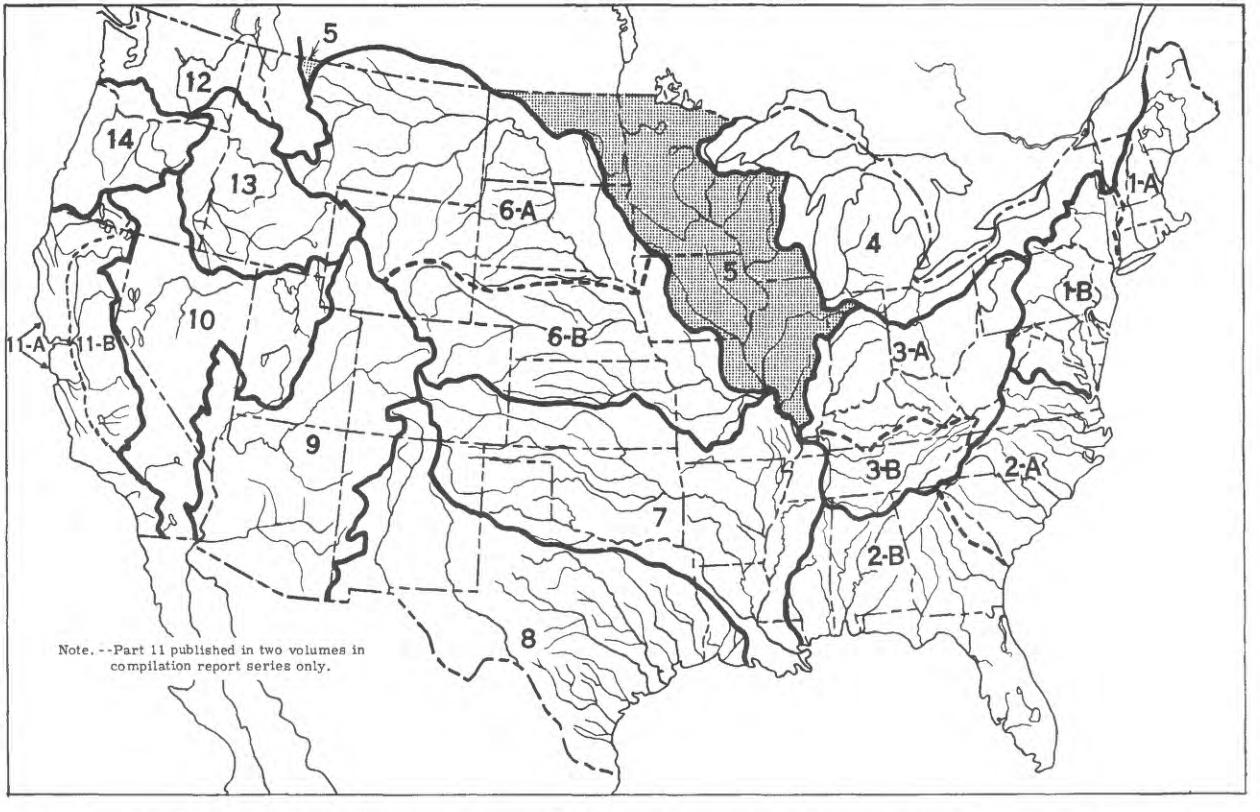

Figure 1 . —Map of the United States showing areas covered by the annual reports on surface-water supply and also by the present series of compilation reports. The area covered by this report is shaded.

11. Pacific slope basins in California, in two volumes:
    A, Pacific slope basins in California except Central Valley.
    B, Pacific slope basins in California, Central Valley.
12. Pacific slope basins in Washington and upper Columbia River basin.
13. Snake River basin.
14. Pacific slope basins in Oregon and lower Columbia River basin.

Early records of the flow of streams in the United States are published in the reports listed below. In many of these reports records for years earlier than those indicated have been included for some streams.

Streamflow data for the years 1884–1901, in reports of the Geological Survey

(A = Annual Report; B = Bulletin; W = Water-Supply Paper)

Report	Character of data	Year
10th A, pt. 2	Descriptive information only.	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to September 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	do	1884–92.
14th A, pt. 2	Monthly discharge	1888–93.
B 131	Descriptions, measurements, gage heights, and ratings	1893–94.
16th A, pt. 2	Descriptive information only.	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge.	1895.
W 11	Gage heights	1896.
18th A, pt. 4.	Descriptions, measurements, ratings, and monthly discharge.	1895–96.
W 15	Descriptions, measurements, and gage heights of streams east of the Mississippi River, and Missouri River and tributaries above Kansas River.	1897.
W 16	Descriptions, measurements, and gage heights of streams west of the Mississippi River, except Missouri River and tributaries above Kansas River.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge.	1897.
W 27	Measurements, ratings, and gage heights of streams east of the Mississippi River, and Missouri River and tributaries.	1898.
W 28	Measurements, ratings, and gage heights of streams west of the Mississippi River, except Missouri River and tributaries.	1898.
20th A, pt. 4	Monthly discharge	1898.
W 35 to 39.	Descriptions, measurements, gage heights, and ratings.	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52.	Descriptions, measurements, gage heights, and ratings.	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings.	1901
W 75	Monthly discharge	1901.

Reports on surface-water supply containing records from 1899 to 1950 for drainage basins in this report are listed in the following table. The data for any particular gaging station will, in general, be found in the reports covering the years during which the station was maintained.

Numbers of water-supply papers containing results of stream measurements in Hudson Bay and Upper Mississippi River basins, 1899—1950

Year	W.S.P.	Year	W.S.P.	Year	W.S.P.	Year	W.S.P.	Year	W.S.P.
1899	36	1910	285	1921	525	1931	715	1941	925
1900	49	1911	305	1922	545	1932	730	1942	955
1901	a65, 66, 75	1912	325	1923	565	1933	745	1943	975
1902	a83, 85	1913	355	1924	585	1934	760	1944	1005
1903	a98, 99, b100	1914	385	1925	605	1935	785	1945	1035
1904	a128, 130	1915	405	1926	625	1936	805	1946	1055
1905	171	1916	435	1927	645	1937	825	1947	1085
1906	207	1917	455	1928	665	1938	855	1948	1115
1907-8	245	1918	475	1920	685	1939	875	1949	1145
1909	265	1919-20	505	1930	700	1940	895	1950	1175

aTributaries of Mississippi River from east.
bHudson Bay basin only.

The records at most of the stations discussed in these reports extend over many years. Miscellaneous measurements at many points other than regular gaging stations have been made each year and are published under "Miscellaneous discharge measurements" at the end of each report.

Reports also have been published that are compilations of records for various areas, usually a single State or drainage basin. These reports contain records previously published (some of which may have been revised), as well as some records not contained in the annual series of water-supply papers. The following table lists reports of this type for the area covered by this report.

Reports containing compilations of records by States and drainage basins

W.S.P.	Period	Report
156.....	1895-1905	Water powers of Northern Wisconsin.
491.....	1898-1917	Water supply of St. Mary and Milk Rivers (Mont., Canada).
917.....	1881-1938	Surface waters of Missouri and St. Mary River basins (Mont.).

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.

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State reports containing compilations of records of discharge

State	Period	Report	Issued by
Illinois.....	1908-11	Water resources of Illinois.....	Rivers and Lakes Commission.
Do.....	1900-1934	Streamflow data of Illinois.....	Division of Waterways.
Indiana.....	1923-27	Pub. 72, Surface water supply of Indiana.	Department of Conservation.
Do.....	1927-30	Pub. 112, Surface water supply of Indiana.	Do.
Iowa.....	1873-1932	Streamflow records of Iowa.....	State Planning Board.
Do.....	1873-1940	Water-Supply Bull. 1, Summaries of yearly and flood flow relating to Iowa streams.	Iowa Geological Survey.
Do.....	1941-42	Water-Supply Bull. 2, Surface water resources of Iowa.	Do.
Do.....	1943-50	Water-Supply Bull. 3, Surface water resources of Iowa.	Do.
Minnesota.	1909-12	Water-resources investigations of Minnesota.	State Drainage Commission.
Do.....	1883-1949	Bull. 5, Surface water supplies of the Mesabi Iron Range.	Department of Conservation, Division of Waters.
Missouri...	1857-1926	Vol. 20, 2d series, Water resources of Missouri.	Missouri Bureau of Geology and Mines.
Do.....	1927-39	Vol. 26, 2d series, Surface waters of Missouri.	Missouri Geological Survey and Water Resources.
Do.....	1940-49	Vol. 34, 2d series, Surface waters of Missouri.	Do.
Montana..	1889-1911	5th biennial report.	Office of the State Engineer.
Do.....	1881-1938	Special Rept. 10, vols. 1-4, Water resources of Montana.	Montana Agricultural Experiment Station.
North Dakota.	1919-21	Report to Governor of North Dakota on flood control.	State engineer.
Do.....	1882-1925	Surface water supply of North Dakota (with 12th biennial report).	Do.
Do.....	1882-1938	Surface water in North Dakota.	State Planning Board.
Do.....	1882-1944	Supplement B, 4th biennial report.	State Water Conservation Commission.
Wisconsin.	1888-1914	1st report of Railroad Commission of Wisconsin to Legislature on water powers.	Railroad Commission of Wisconsin.
Do.....	1914-23	2d report of Railroad Commission of Wisconsin to Legislature on water powers.	Do.

Note.--In addition to records contained in reports listed above, the following States have issued annual or biennial reports that contain records of discharge: Indiana, Missouri, Montana, North Dakota, and South Dakota.

Detailed information on the stage and discharge of many streams during major floods has been included in special reports on these floods published by the Geological Survey or other agencies. 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.

Reports			Issued by
W.S.P.	162:	Destructive floods in the United States in 1905.	U. S. Geological Survey.
W.S.P.	771:	Floods in the United States, magnitude and frequency.	Do.
W.S.P.	838:	Floods of Ohio and Mississippi Rivers, January, February 1937.	Do.
W.S.P.	847:	Maximum discharges at stream-measurement stations through September 1938.	Do.
W.S.P.	1137-B:	Floods of 1950 in the Red River of the North and Winnipeg River basins.	Do.
W.S.P.	1137-G:	Floods of 1950 in the Upper Mississippi River and Lake Superior basins in Minnesota.	Do.
Cir.	370:	Floods in Missouri, magnitude and frequency.	Do.
Bull.	1:	Iowa floods, magnitude and frequency.	Iowa Highway Research Board.
Bull.	1:	Magnitude and frequency of floods in Minnesota.	Minnesota Division of Waters.
Bull.	7:	The 1912 flood on the lower Mississippi.	Illinois Rivers and Lakes Commission.
The floods of May 1943 in Illinois.			Illinois Division of Waterways.
Floods in Illinois, magnitude and frequency.			Do.
Unit hydrographs in Illinois.			Do.
Flow duration of Illinois streams.			Do.

HYDROLOGIC CONDITIONS

Hydrologic conditions in the area covered by this report vary greatly with respect to both location and time. Figure 2 shows annual discharges for three representative streams, one in the Hudson Bay basin and two in the Upper Mississippi River basin. The average discharge shown on the graphs is based on the period of record at each of the gaging stations.

Of all the basins in the United States, the two covered by this report are unusual in that they have a vary large number of lakes as the result of glaciation. The natural storage in the lakes, often augmented by some additional control with low dams, plays an important role in maintaining the flow of streams principally in Minnesota and Wisconsin.

Except for the high precipitation in the Saskatchewan River basin in Montana, average annual precipitation generally increases from north to south and from west to east. Summer storms cause floods in most parts of the area, and the spring thaw produces high water on many streams.

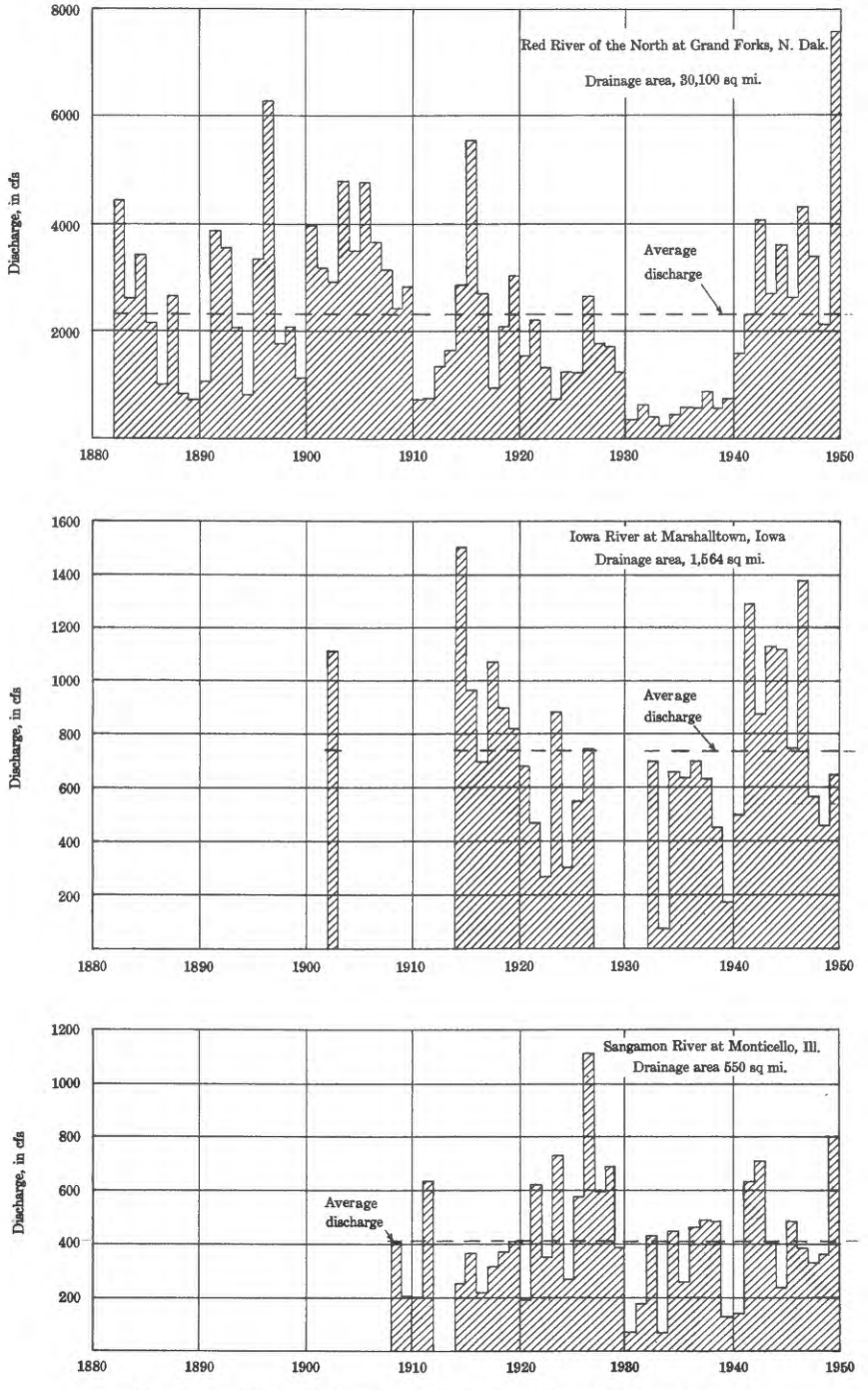

Figure 2.--Yearly discharge at three representative stations.