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

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

Contents is the volume of water in a reservoir. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

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

NEW DOWNSTREAM ORDER OF LISTING GAGING STATIONS

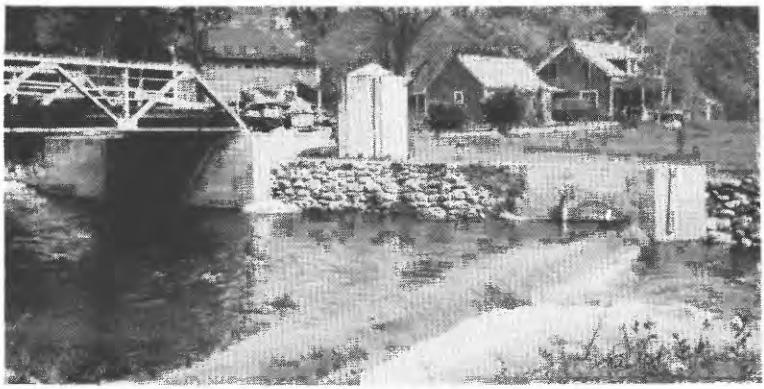
Beginning with the series of reports for the water year ending September 30, 1951, the order of listing gaging station records has been changed. In this report, in a downstream direction along the main stem all stations on a tributary entering above a main-stem station are listed before that station. If a tributary enters between two main-stem stations, it is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. To indicate the rank of any tributary on which a gaging station is situated and the stream to which it is immediately tributary, each indention in the listing of gaging stations in the table of contents of this report represents one rank. This new 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.

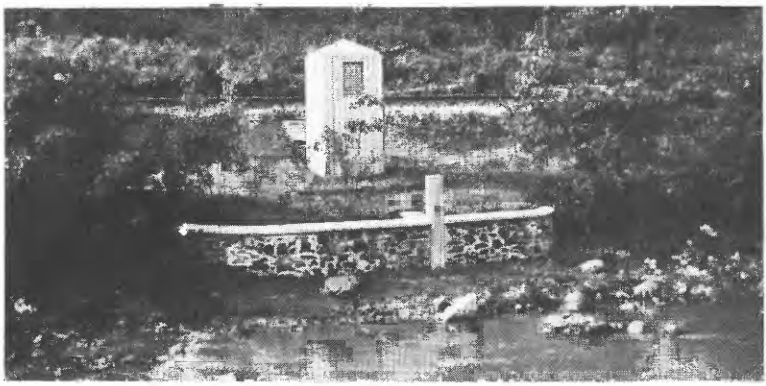
EXPLANATION OF DATA

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.

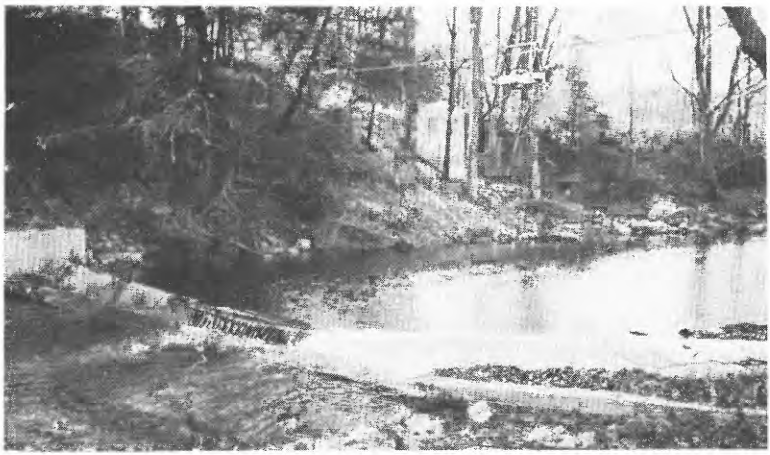
Rating tables giving the discharge for any stage are prepared from stage-discharge relation curves defined by discharge measurements. If extensions to the rating curves



A, OTTER BROOK NEAR KEENE, N. H.



B, PEQUABUCK RIVER AT FORESTVILLE, CONN.



C, MILL RIVER AT NORTHAMPTON, MASS.

FIGURE 1.—GAGING-STATION STRUCTURES.

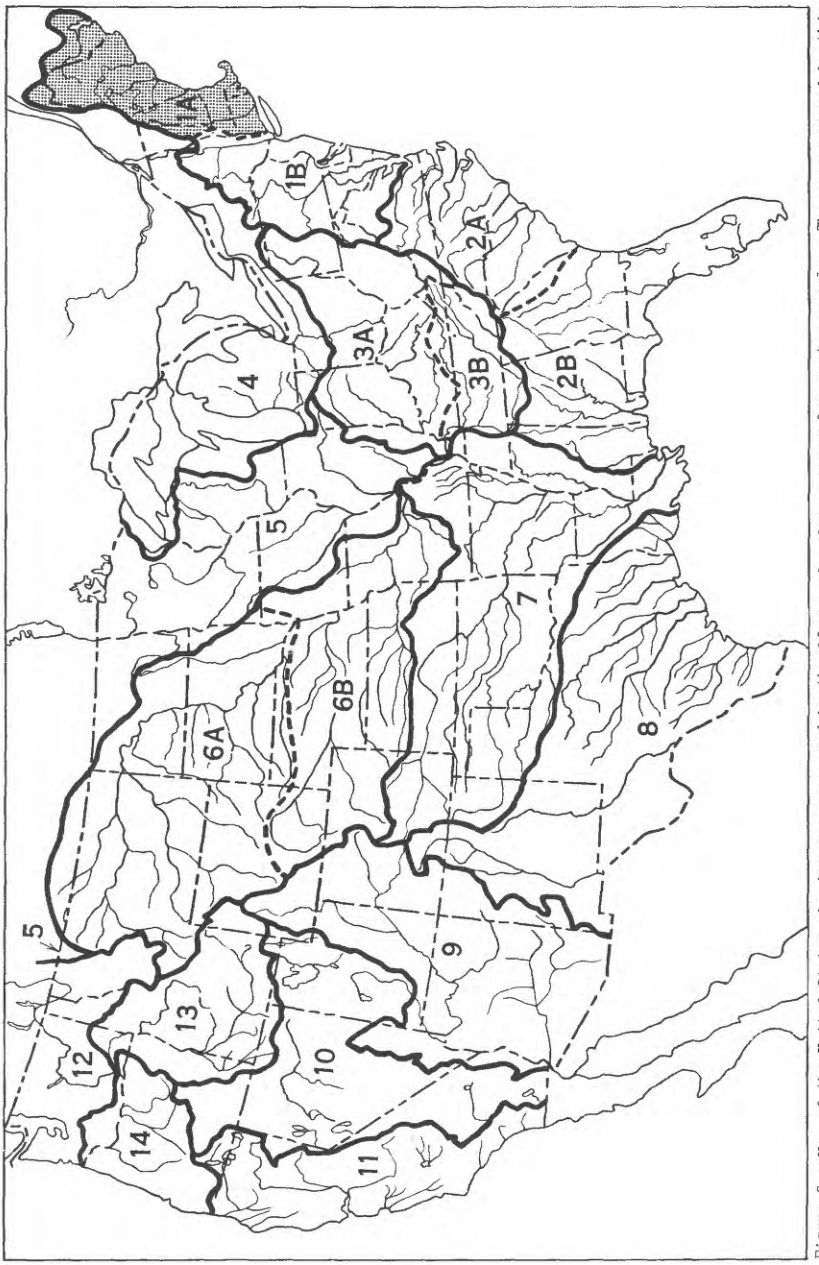


Figure 2.--Map of the United States showing areas covered by the 18 annual volumes on surface-water supply. The area covered by this report is shaded.

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2. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

3. Sets are available for consultation in the offices of the Water Resources Division of the Geological Survey. Addresses of the offices in the area covered by this report are given on page 2.

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 stream 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 date for drainage basins in this report are listed below. The data for any particular gaging station will, in general, be found in the reports covering the years during which the station was maintained. Before 1951, records for the North Atlantic slope basins, Maine to Connecticut, were included with those of the other rivers in the North Atlantic slope basins.

Numbers of water-supply papers containing results of stream measurements in North Atlantic slope basins, Maine to Connecticut, 1899-1951

Year	W.S.P.no.	Year	W.S.P.no.	Year	W.S.P.no.	Year	W.S.P.no.	Year	W.S.P.no.
1899	35	1911	301	1922	541	1932	726	1942	951
1900	47	1912	321	1923	561	1933	741	1943	971
1901	65, 75	1913	351	1924	581	1934	756	1944	1001
1902	82	1914	381	1925	601	1935	781	1945	1031
1903	97	1915	401	1926	621	1936	801	1946	1051
1904	124	1916	431	1927	641	1937	821	1947	1081
1905	165	1917	451	1928	661	1938	851	1948	1111
1906	201	1918	471	1929	681	1939	871	1949	1141
1907-8	241	1919-20	501	1930	696	1940	891	1950	1171
1909	261	1921	521	1931	711	1941	921	1951	1201
1910	281								

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. The streams and points of measurement are listed in the same order as the streams and gaging stations in the body of the report. An index of the records obtained before 1904 has been published in Water-Supply Paper 119.

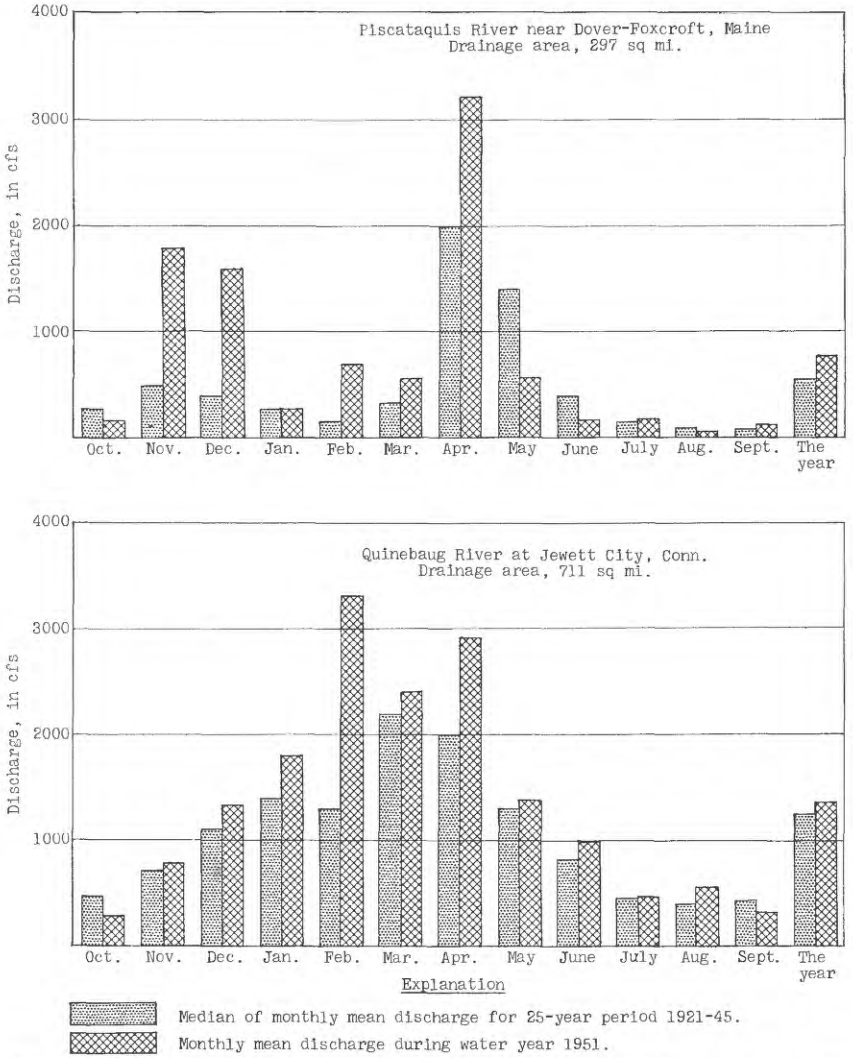

Figure 3.--Comparison of discharge at two key gaging stations during 1951 water year with median discharge for 25-year period.

ST. JOHN RIVER BASIN

St. John River at Ninemile Bridge, Maine

Location.--Lat 46°42', long. 69°43', T. 12, R. 15, Aroostook County, on right bank about 0.1 mile below Ninemile Brook, 0.4 mile downstream from highway bridge at Ninemile, and 11 miles northwest of Clayton Lake Post Office.

Drainage area.--1,290 sq mi, approximately.

Records available.--November 1950 to September 1951.

Gage.--Water-stage recorder. Altitude of gage about 1,050 ft.

Extremes.--Maximum daily discharge during period, 18,800 cfs Apr. 11, 12; minimum discharge, 243 cfs June 19, 20.

Remarks.--Records fair prior to May 10, excellent thereafter.

Rating table, Nov. 28, 1950, to Sept. 30, 1951, except periods of ice effect (gage height, in feet, and discharge, in cubic feet per second)

1.0	235	1.7	625	3.0	2,180	5.0	7,050
1.1	273	2.0	882	3.5	3,100	6.0	10,700
1.3	368	2.3	1,180	4.0	4,230	7.0	14,600
1.5	484	2.6	1,570	4.5	5,550	8.1	19,200

Discharge , in cubic feet per second, November 1950 to September 1951

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		-	14,100	580	410	740	995	14,200	2,440	946	343	1,930
2		-	11,000	580	400	720	1,490	11,600	2,000	864	300	2,770
3		-	8,380	580	390	710	2,180	9,900	1,630	846	314	2,280
4		-	6,990	590	380	695	3,100	9,000	1,380	828	960	2,200
5		-	6,300	650	375	680	5,500	8,000	1,310	775	2,280	2,000
6		-	7,250	640	370	675	7,790	7,100	1,410	4,360	1,720	1,540
7		-	6,210	635	370	670	10,300	6,400	1,330	9,830	1,150	1,280
8		-	5,440	620	380	660	12,700	5,700	1,310	7,340	810	1,330
9		-	4,850	610	420	650	15,200	*5,300	1,130	4,740	666	1,150
10		-	6,210	610	490	640	16,900	5,200	956	3,000	873	919
11		-	8,340	595	550	635	18,800	4,750	801	2,040	855	732
12		-	9,180	590	610	630	16,800	4,280	649	1,660	666	603
13		-	13,000	580	780	630	17,100	4,390	551	2,250	497	524
14		-	11,100	575	960	680	15,300	4,330	441	*2,510	390	447
15		-	7,990	560	1,100	*800	13,700	3,780	335	1,960	323	406
16		-	5,440	560	1,080	865	13,700	3,510	*330	1,700	278	368
17		-	4,160	*550	1,060	900	13,800	3,440	304	2,100	286	368
18		-	*3,180	540	1,010	910	13,000	3,100	282	2,120	785	*358
19		-	2,350	540	970	900	10,700	2,640	258	1,620	2,800	343
20		-	1,820	530	940	870	8,700	*2,260	250	1,700	2,900	309
21		-	1,420	520	915	840	7,890	2,020	273	2,070	2,260	282
22		-	1,170	510	885	810	7,310	1,930	300	1,630	2,040	254
23		-	1,000	505	860	790	7,690	2,820	273	1,220	2,250	246
24		-	835	490	840	760	8,810	4,540	575	946	1,960	250
25		-	700	480	815	740	10,100	4,060	1,330	698	1,630	338
26		-	610	470	790	730	11,100	*3,200	2,200	573	1,310	338
27		-	480	445	770	715	11,500	2,480	1,820	610	1,080	429
28		*12,800	560	440	750	700	12,800	2,070	1,310	828	1,430	429
29		*15,100	595	*420	-	695	13,400	2,660	984	633	1,580	581
30		16,100	590	420	-	695	14,400	3,230	846	491	1,230	573
31		-	590	410	-	730	-	2,940	-	401	1,050	-
Total		-	151,860	16,825	19,670	22,865	324,755	150,830	29,008	63,289	37,016	25,577
Mean		-	4,899	543	702	738	10,830	4,865	967	2,042	1,194	853
Cfsm		-	3.80	0.421	0.544	0.572	8.40	3.77	0.750	1.58	0.926	0.661
In.		-	4.38	0.49	0.57	0.66	9.37	4.35	0.84	1.82	1.07	0.74

Calendar year	: Max	Min	Mean	Cfsm	In.
Water year	: Max	Min	Mean	Cfsm	In.

* Discharge measurement made on this day.

Note.--No gage-height record Apr. 9 to May 9; discharge computed on basis of records for station at Dickey. Stage-discharge relation affected by ice Dec. 5 to Apr. 8.